

SEMIANNUAL RADIOACTIVE
EFFLUENT RELEASE
REPORT
1990
JANUARY - JUNE

FLORIDA POWER CORPORATION
CRYSTAL RIVER - UNIT 3
FACILITY OPERATING LICENSE NO. DPR-72
DOCKET NO. 50-302
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Approved by:

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Manager, Site Nuclear Services

Date:

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INTRODUCTION

This report is submitted as required by Technical Specification 6.9.1.5.d to Crystal River Facility Operating License No. DPR-72. In accordance with Technical Specifications, the following information must be included in this report:

A summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the plant as outlined in Regulatory Guide 1.21 (Rev. 1, 1974) with data summarized on a quarterly basis following the format of Appendix B thereof.

For each type of solid waste shipped off site:

- Container Volume
- Total Curie Quantity (specified as measured or estimated)
- Principal Radionuclides (specified as measured or estimated)
- Type of Waste (e.g., spent resin, compacted dry waste)
- Type of container (e.g., LSA, Type A, Type B)
- Solidification Agent (e.g., cement)

A list and description of unplanned releases to unrestricted areas.

A description of any changes to the:

- Process Control Program (PCP)
- Off-Site Dose Calculation Manual (ODCM)
- Radioactive Waste Treatment Systems

A listing of new Environmental Radiological Monitoring Program dose calculation location changes identified by the land-use census.

Information relating to effluent monitor instrumentation being inoperable for thirty or more days.

Information regarding meteorological data and environmental dose assessments will be included in the year-end semiannual report as required by Technical Specifications.

In addition to the required data, graphs have been included so that the current data for certain types of radionuclides can be quickly compared to previous years values.

No adverse trends are evident in the data as the doses associated with the releases continue to be a small fraction of the limits.

TABLE 1
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1990
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit	Quarter 1	Quarter 2	Est. Total Error %
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A. Fission and Activation Gases

1. Total Release	Ci	6.58E+03	2.10E+01	30
2. Average Release Rate for Period	uCi/sec	8.44E+02	2.67E+00	
3. Percent of Technical Specification Limit	%	5.56E+00	1.37E-02	

B. Iodines

1. Total Iodine - 131	Ci	4.06E-4	2.62E-5	30
2. Average Release Rate for Period	uCi/sec	5.22E-05	3.33E-06	
3. Percent of Technical Specification Limit	%	3.53E+00	1.77E-01	

C. Particulates

1. Particulates with half-lives > 8 days	Ci	1.86E-07	4.68E-07	30
2. Average Release Rate for Period	uCi/sec	2.39E-08	5.95E-08	
3. Percent of Technical Specification Limit	%	3.53E+00	1.77E-01	
4. Gross Alpha Radioactivity	Ci	≤ LLD	1.70E-08	

D. Tritium

1. Total Release	Ci	1.64E+00	8.31E+00	30
2. Average Release Rate for Period	uCi/sec	2.11E-01	1.06E+00	
3. Percent of Technical Specification Limit	%	3.53E+00	1.77E-01	

TABLE 2
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1990
GASEOUS EFFLUENTS - GROUND LEVEL RELEASES

		CONTINUOUS MODE		BATCH MODE	
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 1	Quarter 2
1. Fission gases					
argon-41	Ci				
krypton-85	Ci			1.36E+01	2.37E+00
krypton-85m	Ci	1.13E+00		3.32E-02	
krypton-87	Ci	1.17E+00			
krypton-88	Ci				
xenon-131	Ci	6.02E+01		1.26E+01	5.21E-01
xenon-133	Ci	5.63E+03	6.52E+00	7.71E+02	1.15E+01
xenon-133m	Ci	4.90E+01		4.56E+00	9.15E-03
xenon-135	Ci	3.47E+01		1.51E+00	
xenon-135m	Ci				
xenon-138	Ci				
unidentified	Ci				
Total for Period	Ci	5.78E+03	6.52E+00	8.03E+02	1.44E+01

2. Iodines

iodine-131	Ci	4.06E-04	2.62E-05	6.33E-09	
iodine-133	Ci	9.91E-06	1.41E-06		
iodine-135	Ci				
Total for Period	Ci	4.16E-04	2.76E-05	6.33E-09	

3. Particulates

manganese-54	Ci				
cobalt-58	Ci				
iron-59	Ci				
cobalt-60	Ci				
zinc-65	Ci				
strontium-89	Ci	1.43E-07			
strontium-90	Ci	4.32E-08	4.68E-07		
molybdenum-99	Ci				
tellurium-132	Ci				
cesium-134	Ci				
cesium-137	Ci				
cesium-138	Ci				
unidentified	Ci				
Total for Period	Ci	1.86E-07	4.68E-07		

TABLE 3
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1990
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	1.83E-01	2.59E-01	25
2. Average diluted concentration during period	uCi/ml	8.05E-08	1.22E-07	
3. Percent of applicable limit	%	4.66E+00	5.44E+00	
B. Tritium				
1. Total Release	Ci	1.26E+02	4.79E+01	30
2. Average diluted concentration during period	uCi/ml	7.49E-06	1.73E-05	
3. Percent of applicable limit	%	2.50E-01	5.77E-01	
C. Dissolved and entrained gases				
1. Total release	Ci	4.08E+01	1.43E-01	25
2. Average diluted concentration during period	uCi/ml	2.24E-06	5.16E-08	
3. Percent of applicable limit	%	1.12E+00	2.58E-02	
D. Gross alpha radioactivity				
1. Total release	Ci	1.37E-05	4.18E-05	30
E. Volume of Waste released (prior to dilution)				
1. Batch and Continuous Modes	Liters	1.24E+07	1.08E+07	10
F. Volume of dilution water used during period				
1. Batch and Continuous Modes	Liters	3.86E10	7.91E+09	10

TABLE 4
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1990
LIQUID EFFLUENTS

Nuclides Released	Unit	CONTINUOUS MODE		BATCH MODE	
		Quarter 1	Quarter 2	Quarter 1	Quarter 2
sodium-24	Ci				
chromium-51	Ci			2.49E-02	1.05E-02
manganese-54	Ci			2.66E-03	5.84E-03
iron-55	Ci	1.78E-03		5.89E-03	2.89E-02
cobalt-58	Ci			9.67E-02	1.31E-01
iron-59	Ci			2.72E-03	8.22E-04
cobalt-60	Ci			9.82E-03	5.91E-02
zinc-65	Ci				
rubidium-88	Ci			5.42E-03	
strontium-89	Ci			7.85E-05	1.34E-04
strontium-90	Ci	1.06E-04		1.90E-04	3.33E-05
strontium-92	Ci				1.97E-03
niobium-95	Ci			3.51E-03	6.85E-03
zirconium-95	Ci			2.55E-03	3.27E-03
zirconium-97	Ci				1.61E-04
molybdenum-99	Ci			2.78E-03	
technetium-99m	Ci			4.64E-03	
ruthenium-103	Ci			1.33E-03	1.13E-03
ruthenium-106	Ci				
silver-110m	Ci				5.39E-03
iodine-131	Ci			7.28E-03	2.96E-04
iodine-133	Ci				
tellurium-132	Ci			4.98E-04	2.49E-05
iodine-133	Ci			1.66E-04	
cesium-134	Ci			6.31E-04	6.42E-04
cesium-136	Ci				
cesium-137	Ci			1.13E-03	2.12E-03
barium-139	Ci				
barium-140	Ci			1.16E-04	
lanthanum-140	Ci			8.32E-03	3.76E-04
cerium-141	Ci			2.00E-04	8.57E-05
cerium-144	Ci				3.48E-04
unidentified	Ci				

Total for period	Ci	1.89E-03		1.82E-01	2.59E-01
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TABLE 4 (CONTINUED)
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1990
LIQUID EFFLUENTS

Dissolved & Entrained Gases	Unit	CONTINUOUS MODE		BATCH MODE	
		Quarter 1	Quarter 2	Quarter 1	Quarter 2
argon-41	Ci			9.06E-06	
krypton-85	Ci			6.38E-02	
krypton-85m	Ci			1.95E-04	
krypton-88	Ci			2.90E-04	
xenon-131m	Ci			4.47E-01	9.17E-03
xenon-133	Ci			3.98E-01	1.34E-01
xenon-133m	Ci			3.39E-01	
xenon-135	Ci	4.06E-05		2.03E-01	5.48E-05
xenon-135m	Ci				

tritium	Ci	1.13E-01	3.64E-03	1.26E+02	4.79E+01
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TABLE 5

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1990

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Non irradiated fuel)

1. Type of waste	Unit	6-month period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m ³ Ci	4.33E+01 5.13E+00	20
b. Dry compressible waste, contaminated equip, etc.	m ³ Ci	6.16E+02 1.74E+01	50
c. Irradiated components, control rods, etc.	m ³ Ci	4.16E-01 1.10E+02	50
d. Other (describe)	m ³ Ci		
2. Estimate* of major nuclide composition (by type of waste)			
a.	Cs-137 2.36E+01% Cs-134 1.86E+01% H-3 1.71E+01% Co-58 1.20E+01%	Co-60 8.75E+00% Fe-55 7.15E+00%	
b.	Fe-55 6.04E+01% Ni-63 7.89E+00% Cs-137 5.48E+00% Co-58 4.73E+00%	Co-60 4.41E+00% Cs-134 2.68E+00% Mn-54 2.63E+00%	
c.	Fe-55 6.57E+01%	Co-60 3.30E+01%	

3. Solid Waste Disposition

Number of Shipments

3

Mode of Transportation

Transport Truck -
Exclusive Use Vehicle

Destination

Chem-Nuclear Systems, Inc.
Barnwell, SC

13

"

SEG**, Oak Ridge, TN.

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments

0

Mode of Transportation

N/A

Destination

N/A

* With the exception of Secondary Resin shipments all curie values and principle radionuclides are determined by indirect methods and are therefore estimates. Secondary Resin shipments are evaluated by direct (gamma spectroscopy) and indirect (applying scaling factors) methods, with the results being a combination of measured and estimated value.

**Scientific Ecology Group repacks and incinerates waste to reduce burial volume.

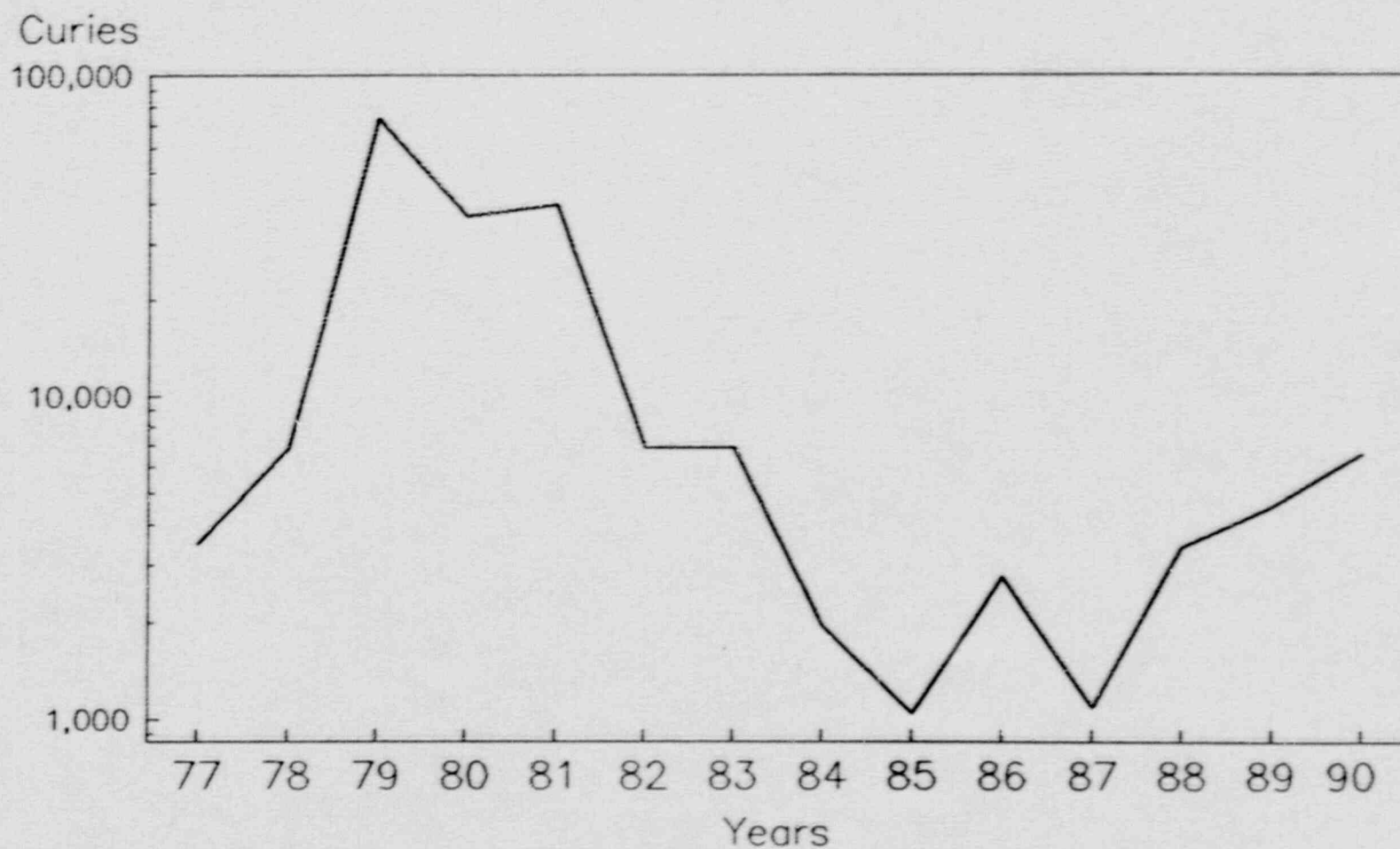
TABLE 6
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1990
SHIPMENT SUMMARY

DATE AND SHIPMENT #	CONTAINER VOLUME*	TOTAL CURIES	PRINCIPLE RADIONUCLIDES	WASTE TYPE	CONTAINER TYPE	SOLIDIF. AGENT
2-6 90-06	372	9.76E-4	Cs-134, Cs-137, Sr-89, H-3, Sb-122	SC	ST **	NA
2-8 90-08	372	3.29E-4	Cs-134, Cs-137, H-3, Sb-122, Sr-89	SC	ST	NA
2-13 90-09	375	1.37E-3	Cs-134, Cs-137, H-3, Sb-122, Sr-89	SC	ST	NA
3-30 90-13	1280	1.87	Fe-55, Co-60, Cs-134, Cs-137, I-131, Ni-63	NW	ST	NA
4-5 90-15	1280	1.28	Fe-55, Co-60, Cs-137, Ni-63, Cs-134	NW	ST	NA
4-10 90-17	1280	3.49	Fe-55, Co-60, Cs-137, I-131, Ni-63, Co-58	NW	ST	NA
4-20 90-20	205.8	205.8	Co-58, Co-60, Cs-134, Cs-137, H-3, Sb-122	SR	HIC***	NA
4-25 90-22	2 @ 1280	1.63	Co-58, Co-60, Cs-137, Ni-63, Fe-55	NW	ST	NA
5-1 90-26	2 @ 1280	0.772	Co-58, Co-60, Cs-137, Cs-134, Ni-63, Fe-55	NW	ST	NA
5-8 90-29	14.7	110.	Co-60, Fe-55	IC	SS Liner	NA
5-16 90-36	2 @ 1280	0.349	Cs-134, Cs-137, Fe-55, Ni-63, Pu-241	NW	ST	NA
5-25 90-41	2 @ 1280	2.79	Co-58, Co-60, Cs-137, Ni-63, Fe-55	NW	ST	NA
6-6 90-45	2 @ 1280	1.13	Co-58, Co-60, Cs-137, Ni-63, Fe-55	NW	ST	NA
6-14 90-48	2 @ 1280	2.08	Co-58, Co-60, Cs-137, Ni-63, Fe-55	NW	ST	NA
6-18 90-49	205.8	1.98	Co-58, Co-60, H-3, C-14, Ni-63, Fe-55	SR	HIC	NA
6-29 90-55	2 @ 1280	2.03	Co-58, Co-60, Ni-63, Fe-55	NW	ST	NA

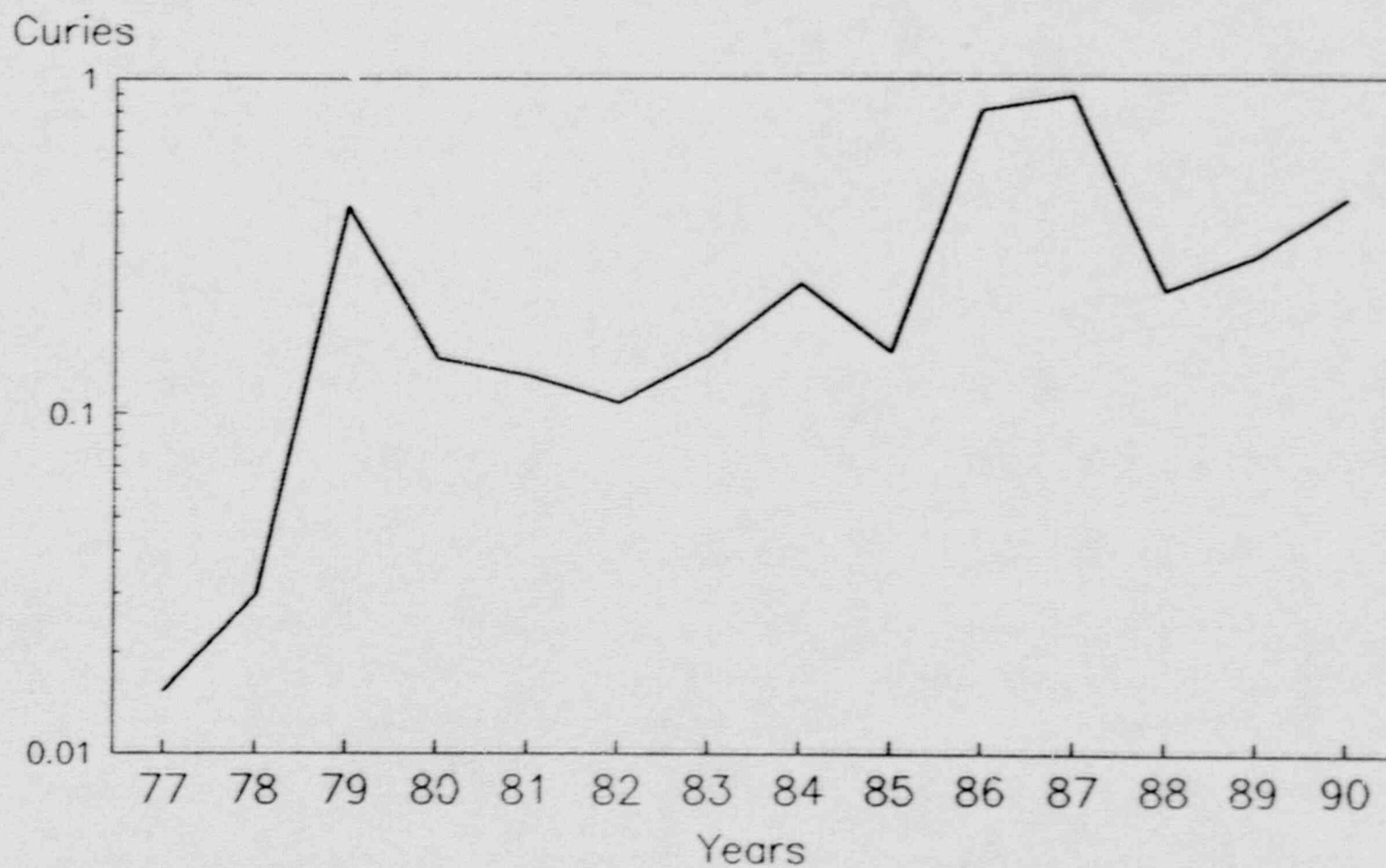
WASTE TYPE: SR - Spent Resin NW - Non-Compacted Waste CE - Contaminated Equipment
SC - Secondary Resin CW - Compacted Waste IC - Irradiated Components
F - Filters EB - Evaporator Bottoms

* Container volume in cubic feet ** ST - Strong Tight *** High Integrity Container

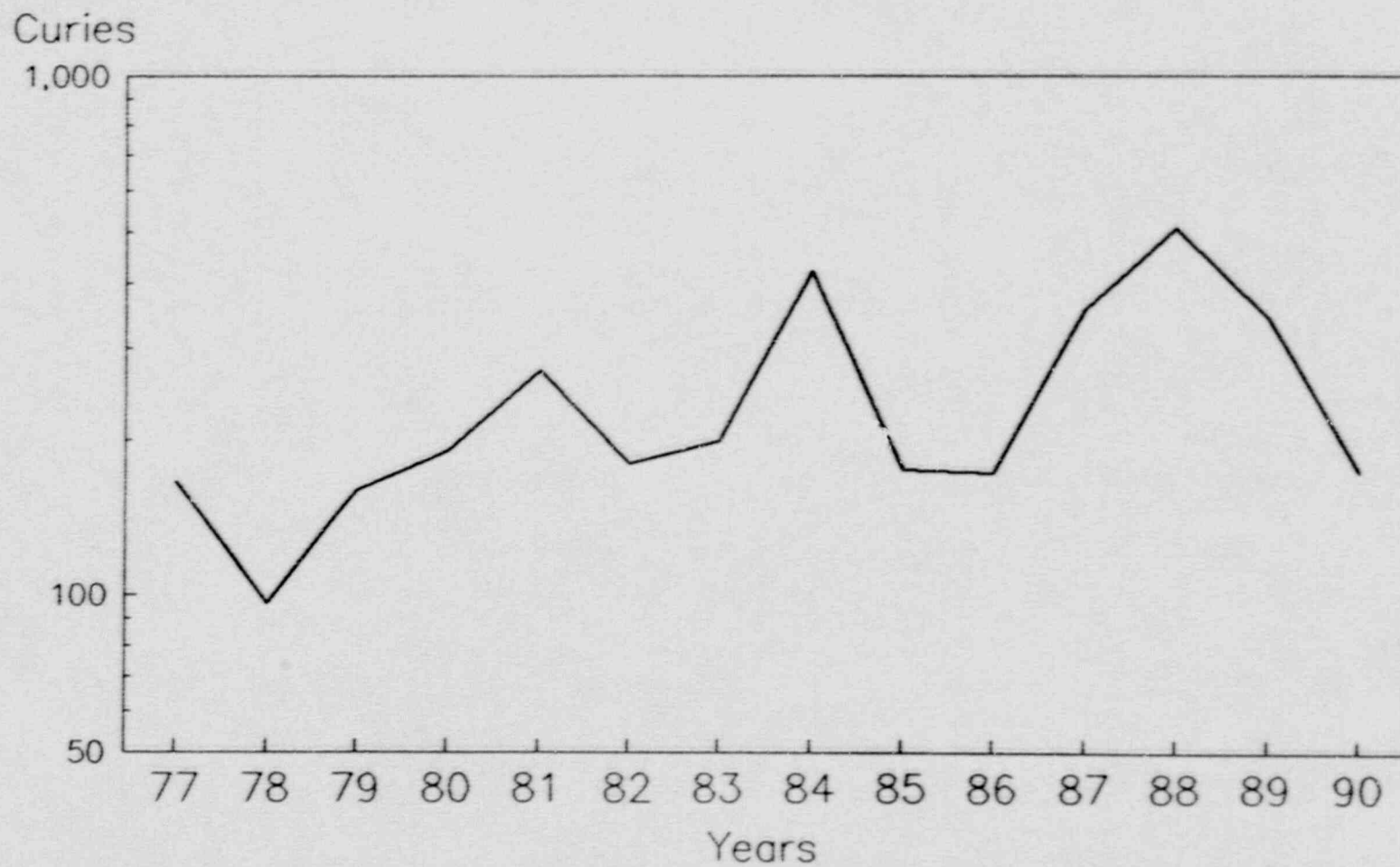
GASEOUS RELEASES FISSION & ACTIVATION PRODUCTS



LIQUID RELEASES FISSION & ACTIVATION PRODUCTS



LIQUID RELEASES - TRITIUM



UNPLANNED RELEASES

There were no unplanned liquid or gaseous releases for the period of this report.

RADIOACTIVE WASTE TREATMENT SYSTEMS

There were no significant changes to the radioactive waste treatment systems for the period of this report.

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM

The June 1990 land-use census did not identify any new dose calculation locations.

EFFLUENT MONITOR INSTRUMENTATION OPERABILITY

This report is submitted pursuant to Technical Specification 3.3.3.9, Action b to describe reasons for inoperability of flow element WD-19-FE. This flow rate monitor was inoperable from February 3, 1990 until June 19, 1990.

Flow element WD-19-FE measures the flow of effluent gases during releases from the Waste Gas system. Effluent flows from one of three Waste Gas Decay Tanks, through control valve WDV-857, WD-19-FE, and the Auxiliary Building Ventilation Filters and is monitored by RM-A2.

The flow element has been rendered inoperable on several occasions due to moisture condensing in the gas lines. Moisture caused corrosion of the metallic bearings within the flow element. Corroded bearings resulted in diminished or lost flow element output.

In January of 1990, plant engineers decided to replace the flow element with an element equipped with jeweled bearings, which would not be subject to moisture induced corrosion. Replacement parts were received in May, 1990. The new flow element was installed on June 18, 1990 and returned to service on June 19, 1990.

The extended period during which the monitor was inoperable was caused by long lead times for procuring parts. Crystal River Unit 3 was in a refueling outage from March 14, 1990 to June 23, 1990. During this period, the Waste Gas system was aligned directly to the Auxiliary Building Ventilation Filters. This alignment bypassed WD-19-FE.

ODCM AND PCP

A description of the changes to the ODCM (Rev. 15) follows. The revised pages have also been included. The PCP was not changed.

Page

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|-------|---|
| 60 | Correct typographical error: 1.73×10^6 changed to 1.73×10^5 |
| 87,88 | Added a definition of "unplanned release" to help ensure that the provisions of Technical Specifications 6.9.1.5.d and 6.5.1.6.k are met. |