SEMIANNUAL RADIOACTIVE EFFLUENT

RELEASE REPORT

CALLAWAY NUCLEAR PLANT

UNION ELECTRIC COMPANY

LICENSE NPF - 30

JANUARY - JUNE 1987

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1.0 INTRODUCTION

This Semiannual Radioactive Effluent Release Report for Union Electric Company's Callaway Plant is submitted in accordance with the requirements of Technical Specification 6.9.1.7. The report covers the period from January 1, 1987 through June 30, 1987.

This report includes a summary of the quanities of radioactive liquid and gaseous effluents and solid waste released from the plant. The information is presented in accordance with the format outlined in Appendix B of Regulatory Guide 1.21, Revision 1, June 1974.

All liquid and gaseous effluents discharged during this reporting period were in compliance with the limits of the Callaway Plant Technical Specifications.

2.0 SUPPLEMENTAL INFORMATION

2.1 Regulatory Limits

Specified as follows are the technical specification limits applicable to the release of radioactive material in liquid and gaseous effluents.

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 less than or equal to 3000 mrem/yr to the skin.

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

a. During any calendar quarter: Less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation and,

b. During any calendar year: Less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

2.1.2 Radioiodine, Tritium, and Particulates

The dose rate due to Iodine 131 and 133, tritium and all radionuclides in particulate form with half lives greater than eight (8) days released in gaseous effluents from the site to areas at and beyond the site boundary shall be limited to less than or equal to 1500 mrem/yr to any organ.

The dose to a member of the public from Iodine 131 and 133, tritium, and all radionuclides in particulate form with half-lives greater than eight (8) days in gaseous effluents released to areas at and beyond the site boundary shall be limited to the following:

a. During any calendar quarter: Less than or equal to 7.5 mrem to any organ and,

b. 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 the concentrations specified in 10 CFR Part 20, Appendix B, Table II, 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-04 microcuries/ml total activity.

The dose or dose commitment to an Individual from radioactive materials in liquid effluents released to unrestricted areas shall be limited:

a. During any calendar quarter to less than or equal to 1.5 mrem to the total body and less than or equal to 5 mrem to any organ, and

b. During any calendar year to less than or equal to 3 mrem to the whole body and to less than or equal to 10 mrem to any organ.

2.1.4 Uranium Fuel Cycle Sources

The annual (calendar year) dose or dose commitment to any member of the public due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrem to the total body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrem.

2.2 Maximum Permissible Concentrations

2.2.1 The maximum permissible concentration values specified in 10CFR20, Appendix B, Table II, Column 2 are used to calculate release rates and permissible concentrations of liquid radioactive effluents at the unrestricted area boundary. A value of 2.0E-4 microcuries/ml is used as the MPC for dissolved and entrained noble gases in liquid effluents.

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

2.3 Average Energy

This is not applicable to the Callaway Plant's radiological effluent technical specifications.

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 Table 4.11-1 and Table 4.11-2 of the Callaway Plant Technical Specifications (See NUREG-1058, "Technical Specifications, Callaway Plant, Unit No. 1" (October, 1984)).

Gamma spectroscopy was the primary analysis technique used to determine the radionuclide composition and concentration of liquid and gaseous effluents. Composite samples were analyzed for Sr-89, Sr-90, and Fe-55 by an independent laboratory. Tritium and alpha were measured for both liquid and gaseous effluents using liquid scintillation counting and gas flow proportional counting techniques, respectively.

The total radioactivity in effluent releases was determined from the measured concentrations of each radionuclide present and the total volume of effluents discharged. Gross beta or gamma radioactivity measurement techniques were not utilized to approximate the total radioactivity in effluents.

2.5 Batch Releases

2.5.1 Liquid

2.5.1.1 Number of batch releases: 116

2.5.1.2 Total time period for batch releases: 37426 minutes

2.5.1.3 Maximum time period for a batch release. 1031 minutes

2.5.1.4 Average time period for batch releases: 322.6 minutes

2.5.1.5 Minimum time period for a batch release: 148 minutes

2.5.1.6 Average stream flow during periods of release of effluent into a flowing stream: 69,000 cfs

2.5.2 Gaseous

2.5.2.1 Number of batch releases: 59
2.5.2.1.1 Includes 5 Spring Outage batch releases

2.5.2.2 Total time period for batch releases: 49910 minutes
2.5.2.1.1 Includes 41339 minutes of Spring Outage batch releases

2.5.2.3 Maximum time period for a batch release: 29482 minutes
2.5.2.3.1 Maximum time period for a batch release other than the Spring Outage: 249 minutes

2.5.2.4 Average time period for batch releases: 845.9 minutes
2.5.2.4.1 Average time period for batch releases without the Spring Outage: 197 minutes

2.2.2.5 Minimum time period for a batch release: 28 minutes

2.6 Abnormal Releases

2.6.1 Liquid

2.6.1.1 Number of releases: 0

2.6.1.2 Total Activity released: 0

2.6.2 Gaseous

2.6.2.1 Number of releases: 2

2.6.2.2 Total Activity released: 1.93 Ci

3.0 SUMMARY OF GASEOUS RADIOACTIVE EFFLUENTS

3.1 The quantities of radioactive material released in gaseous effluents are summarized in Table 1A and 1B. Note that for this reporting period no gaseous effluents were considered as elevated releases.

4.0 SUMMARY OF LIQUID RADIOACTIVE EFFLUENTS

4.1 The quantities of radioactive material released in liquid effluents are summarized in Table 2A and 2B.

5.0 SOLID WASTES

5.1 The quantities of radioactive material released in shipments of solid waste and irradiated fuel transported from the site during the reporting period are summarized in Table 3. The activity and fractional abundance of each nuclide was determined for each waste type by an independent laboratory based upon radiochemical analysis of samples of that waste type. The curie amount of each nuclide listed in Table 3 was determined as the product of the fractional abundance and the total curies shipped. Those nuclides which comprise at least 1% of the total activity for a particular waste type are presented in Table 3.

6.0 RELATED INFORMATION

6.1 Unplanned Releases

Unplanned releases are inadvertant or accidental releases of radioactive material, or releases of radioactive material via normal pathways without a release permit or proper authorization, or without proper sampling and analysis, or releases which are conducted in such a manner as to result in significant deviation from the requirements of the release permit.

There were two unplanned releases during the reporting period, involving one instance of an inadvertent partial release of a Waste Gas Decay Tank (WGDT) to the Radwaste Building following maintenance activities and one instance involving a minor deviation from the conditions stipulated on a Containment Purge release permit. In each instance, the release occurred through the plant's normal release point, and resulted in an insignificant offsite dose; the health and safety of the public was not compromised.

6.1.1 On 6/25/87 maintenance work was completed on Gaseous Rad Waste (GRW) Compressor "B". At approximately 1345, the Rad/Chem Technician (RC Tech) was instructed to clear the maintenance tags and to restore the compressor to service. Upon returning to the Radwaste Control Room, he discovered a decrease in WGDT "F" of approximately 2 psig and an increase in the Radwaste Building Vent activity. The R/C Tech immediately isolated GRW compressor "B". The Radwaste Building Vent activity reached a peak activity of 1.2E-3 μCi/sec at approximately 1410. The leak was later determined to be the result of a missing drain plug on the underside of the compressor housing which had been inadvertently left out following the maintenance work. This incident resulted in the release of a small quantity of noble gases:

Xe-133	9.51E-1 Ci
Xe-135	1.69E-3 Ci
Gamma Air Dose:	1.52E-6 mrad
Beta Air Dose:	4.29E-6 mrad
Total Body Dose Rate:	2.10E-3 mrem/yr
Skin Dose Rate:	4.29E-3 mrem/yr

These values are a small fraction of Technical Specification limits.

This incident is documented in Callaway Plant Incident Report 87-114.

6.1.2 On 6/13/87 a Containment Mini Purge was conducted under release permit #CAL-87-G-58 to reduce containment pressure. Pre-release dose calculations were performed using a 2 hour release duration. The release was initiated at 15:52 and terminated at 19:00, exceeding the 2 hour release duration stipulated by the release permit. Total activity released and offsite doses were:

H-3	2.58E-3 Ci
Kr-85m	3.69E-4 Ci
Xe-131m	1.50E-2 Ci
Xe-133m	1.34E-2 Ci
Xe-133	1.77E0 Ci
Xe-135	8.19E-3 Ci
Ar-41	3.56E-2 Ci
Gamma Air Dose:	3.17E-5 mrad
Beta Air Dose:	6.33E-5 mrad
Total Body Dose Rate:	7.77E-2 mrem/yr
Skin Dose Rate:	1.56E-1 mrem/yr
Maximum Organ Dose:	2.27E-4 mrem

These values are a small fraction of Technical Specification limits.

This incident is documented in Callaway Plant Incident Report 87-108.

6.2 Changes to the Process Control Program

There were no changes to the PCP during the reporting period.

6.3 Changes to the Offsite Dose Calculation Manual

There were no changes to the ODCM during the reporting period.

6.4 Major Changes to Radwaste Treatment Systems

There were no major changes to Radwaste Treatment Systems during the reporting period.

6.5 Land Use Census Changes

There were no changes in critical receptor locations for dose calculations during the reporting period.

6.6 Inoperability of Effluent Monitoring Instrumentation

All effluent monitoring instrumentation was OPERABLE within the limits specified by Specifications 3.3.3.9 and 3.3.3.10 during the reporting period.

TABLE 1A

SEMIANNUAL SUMMATION OF GASEOUS RELEASES
ALL AIRBORNE EFFLUENTS
QUARTERS 1 AND 2, 1987

TYPE OF EFFLUENT	UNIT	QUARTER 1	QUARTER 2	EST TOTAL ERROR %
A. FISSION AND ACTIVATION GASES				
1. TOTAL RELEASE	CURIES	6.32E2	1.22E3	35
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	81.3	155	
3. PERCENT OF TECH SPEC LIMIT	%	4.7E-3	8.9E-3	
B. RADIOIODINES				
1. TOTAL IODINE-131	CURIES	6.54E-5	2.24E-4	35
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	8.41E-6	2.85E-5	
3. PERCENT OF TECH SPEC LIMIT	%	8.0E-6	2.7E-5	
C. PARTICULATES				
1. PARTICULATES (HALF-LIVES > 8 DAYS)	CURIES	9.88E-7	2.00E-5	35
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	1.27E-7	2.54E-6	
3. PERCENT OF TECH SPEC LIMIT	%	8.3E-9	1.6E-7	
4. GROSS ALPHA RADIOACTIVITY	CURIES	6.73E-7	2.69E-6	
D. TRITIUM				
1. TOTAL RELEASE	CURIES	3.39E0	5.92E0	25
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	4.36E-1	7.53E-1	
3. PERCENT OF TECH SPEC LIMIT	%	2.9E-5	5.0E-5	

TABLE 1B

SEMIANNUAL AIRBORNE CONTINUOUS AND BATCH RELEASES
GROUND LEVEL RELEASES
FISSION GASES, IODINES, AND PARTICULATES
QUARTERS 1 AND 2, 1987

		CONTINUOUS RELEASES		BATCH RELEASES	
NUCLIDE	UNIT	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
1. FISSION GASES					
Kr-85M	CURIES	1.03E0	5.84E0	1.50E-1	4.26E-2
Kr-85	CURIES	0	0	5.47E0	5.58E0
Kr-87	CURIES	1.40E-1	1.56E0	1.58E-2	0
Kr-88	CURIES	6.11E-1	6.98E0	1.44E-1	4.52E-3
Xe-131M	CURIES	5.39E-1	3.01E-1	2.54E0	8.34E0
Xe-133M	CURIES	1.75E0	1.01E1	2.29E0	6.70E0
Xe-133	CURIES	3.73E2	4.52E2	2.21E2	6.67E2
Xe-135M	CURIES	0	5.05E-1	0	0
Xe-135	CURIES	2.01E1	5.51E1	2.52E0	1.66E0
Xe-138	CURIES	0	0	1.20E-3	0
Ar-41	CURIES	0	0	5.09E-1	8.35E-1
TOTAL FOR PERIOD	CURIES	3.97E2	5.32E2	2.35E2	6.90E2
2. IODINES					
I-131	CURIES	6.49E-5	1.60E-4	4.80E-7	6.37E-5
I-133	CURIES	1.67E-6	0	1.79E-7	1.39E-7
I-135	CURIES	0	0	0	0
TOTAL FOR PERIOD	CURIES	6.66E-5	1.60E-4	6.59E-7	6.38E-5
3. PARTICULATES					
H-3	CURIES	3.21E0	4.10E0	1.83E-1	1.82E0
Co-58	CURIES	0	1.37E-5	0	0
Co-60	CURIES	0	2.66E-7	0	0
Sr-89	CURIES	0	0	0	0
Cs-134	CURIES	0	1.57E-6	0	0
Cs-137	CURIES	3.15E-7	1.85E-6	0	0
Sr-90	CURIES	0	0	0	0
G ALPHA	CURIES	5.67E-7	8.68E-7	1.06E-7	1.83E-6
TOTAL FOR PERIOD	CURIES	3.21E0	4.10E0	1.83E-1	1.82E0

TABLE 2A

SEMIANNUAL SUMMATION OF LIQUID RELEASES
ALL LIQUID EFFLUENTS
QUARTERS 1 AND 2, 1987

TYPE OF EFFLUENT	UNIT	QUARTER 1	QUARTER 2	EST TOTAL ERROR %
A. FISSION AND ACTIVATION PRODUCTS				
1. TOTAL RELEASE (NOT INCLUDING TRITIUM, GASES, ALPHA)	CURIES	3.89E-3	2.93E-2	25
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	UCI/ML	7.63E-9	7.83E-8	
3. PERCENT OF APPLICABLE LIMIT	%	1.60E0	3.0E0	
B. TRITIUM				
1. TOTAL RELEASE	CURIES	1.77E2	1.22E2	25
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	UCI/ML	3.47E-4	3.25E-4	
3. PERCENT OF APPLICABLE LIMIT	%	1.2E1	1.1E1	
C. DISSOLVED AND ENTRAINED GASES				
1. TOTAL RELEASE	CURIES	1.23E0	6.57E-1	25
2. AVERAGE DILUTED CONCENTRATION DURING PERIOD	UCI/ML	2.41E-6	1.75E-6	
3. PERCENT OF APPLICABLE LIMIT	%	1.2E0	8.7E-1	
D. GROSS ALPHA RADIOACTIVITY				
1. TOTAL RELEASE	CURIES	1.02E-3	7.40E-4	25
E. WASTE VOL RELEASED (PRE-DILUTION)	GAL	5.83E6	4.86E6	10
F. VOLUME OF DILUTION WATER USED	GAL	1.29E8	9.43E7	10

TABLE 2B

SEMIANNUAL LIQUID CONTINUOUS AND BATCH RELEASES
TOTALS FOR EACH NUCLIDE RELEASED
QUARTER 1 AND 2, 1987

		CONTINUOUS RELEASES		BATCH RELEASES	
NUCLIDE	UNIT	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
ALL NUCLIDES					
H-3	CURIES	0	0	1.77E2	1.22E2
Na-24	CURIES	0	0	0	0
Cr-51	CURIES	0	0	0	4.07E-3
Mn-54	CURIES	0	0	3.41E-5	7.69E-4
Fe-55	CURIES	0	0	0	0
Fe-59	CURIES	0	0	0	1.66E-4
Co-58	CURIES	0	0	1.18E-4	1.58E-2
Co-60	CURIES	0	0	2.23E-4	1.98E-3
Zn-65	CURIES	0	0		0
Rb-88	CURIES	0	0	0	8.93E-5
Sr-89	CURIES	0	0	0	0
Zr-95	CURIES	0	0	0	5.23E-4
Nb-95	CURIES	0	0	0	8.91E-4
Mo-99	CURIES	0	0	0	0
Tc-99M	CURIES	0	0	0	0
Ag-110M	CURIES	0	0	0	3.55E-4
I-131	CURIES	0	0	2.32E-3	3.24E-3
I-133	CURIES	0	0	4.32E-4	2.15E-5
I-135	CURIES	0	0	0	0
Cs-134	CURIES	0	0	3.43E-4	5.69E-4
Cs-136	CURIES	0	0	0	0
Cs-137	CURIES	0	0	4.13E-4	8.01E-4
La-140	CURIES	0	0	0	0
Ce-141	CURIES	0	0	4.33E-6	0
Ce-144	CURIES	0	0	0	7.24E-5
W-187	CURIES	0	0	0	0
Kr-85	CURIES	0	0	0	0
Kr-85M	CURIES	0	0	0	1.16E-4
Xe-131M	CURIES	0	0	1.13E-2	6.30E-3
Xe-133	CURIES	0	0	1.20E0	6.32E-1
Xe-133M	CURIES	0	0	1.16E-2	6.69E-3
Xe-135	CURIES	0	0	4.67E-3	1.13E-2
Xe-135M	CURIES	0	0	0	0
Ba-140	CURIES	0	0	0	0
Sr-90	CURIES	0	0	0	0
G ALPHA	CURIES	0	0	1.02E-3	7.04E-4
UNIDENTIFIED	CURIES	0	0	0	0
TOTAL FOR PERIOD	CURIES	0	0	1.78E2	1.22E2

TABLE 3

SOLID WASTE & IRRADIATED FUEL SHIPMENTS
QUARTERS 1 & 2, 1987

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (DOES NOT INCLUDE IRRADIATED FUEL)

	TYPE OF WASTE		6-MONTH PERIOD		EST. TOTAL ERROR (%)
a.	Spent resins, filter sludges evaporator bottoms, etc.		29.5	m^3	25%
			2.77E2	Ci	
	Fe-55	26.6%	7.38E1	Ci	
	Co-60	18.7%	5.2E1	Ci	
	Cs-137	13.4%	3.71E1	Ci	
	Mn-54	11.6%	3.21E1	Ci	
	Co-58	10.1%	2.81E1	Ci	
	Ni-63	9.2%	2.55E1	Ci	
	Cs-134	7.4%	2.06E1	Ci	
	C-14	1.4%	3.88E0	Ci	
	H-3	0.6%	1.74E0	Ci	
b.	Dry compressible waste, contaminated equipment, etc.		11.9	m^3	25%
			2.03E-1	Ci	
	Fe-55	45.2%	9.16E-2	Ci	
	Co-58	25.8%	5.23E-2	Ci	
	Nb-95	7.0%	1.42E-2	Ci	
	Co-60	6.6%	1.34E-2	Ci	
	C-14	6.3%	1.29E-2	Ci	
	Mn-54	3.8%	7.65E-3	Ci	
	Zr-95	3.6%	7.39E-3	Ci	
	Cs-134	1.6%	3.25E-3	Ci	
c.	Irradiated components, control rods, etc.		0	m^3	
			0	Ci	
d.	Other		0	m^3	
			0	Ci	

Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination	Class	Type of Container
1	Truck	Barnwell, SC	C	LSA
3	Truck	Richland, WA	A	LSA

TABLE 3 (cont.)

Solidification Agent

Cement (applicable to waste type "a" (evaporator bottoms) only)

B. IRRADIATED FUEL SHIPMENTS (DISPOSITION)

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

UNION ELECTRIC

1901 Gratiot Street, St. Louis

Donald F. Schnell
Vice President

August 31, 1987

U. S. Nuclear Regulatory Commission
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Washington, DC 20555

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ULNRC-1588

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CALLAWAY PLANT
FACILITY OPERATING LICENSE NPF-30
SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

The enclosed Semi-Annual Effluent Release Report for the first half of 1987 is submitted pursuant to Section 6.9.1.7 of the Callaway Plant Technical Specifications.

Very truly yours,

Donald F. Schnell

Donald F. Schnell

JMC/plh

Enclosure

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