FLORIDA POWER & LIGHT COMPANY

ST. LUCIE PLANT UNIT NO. 1 & 2

LICENSE NO. DPR-67 & NPF-16

COMBINED SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

FOR THE PERIOD

January 1, 1985 THROUGH June 30, 1985

TABLE OF CONTENTS

EFFLUENT AND WASTE DISPOSAL SUPPLEMENTAL INFORMATION

1. Regulatory Limits

1.1 For Liquid Waste Effluents

a. The concentration of radioactive material released from the site 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 2×10^{-4} micro curies/ml total activity.

b. The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each reactor unit, to UNRESTRICTED AREAS shall be limited to:

During any calendar quarter to $\leq$ 1.5 mrems to the total body and to $\leq$ 5 mrems to any organ, and

During any calendar year to $\leq$ 3 mrems to the total body and to $\leq$ 10 mrems to any organ.

1.2 For Gaseous Waste Effluents:

a. The dose rate in UNRESTRICTED AREAS due to radioactive materials released in gaseous effluents from the site shall be limited to:

For Noble Gases: $\leq$ 500 mrems/yr to the total body and $\leq$ 3000 mrems/yr to the skin, and

For Iodine-131, Iodine-133, Tritium, and all radionuclides in particulate form with half-lives greater than 8 days:

$\leq$ 1500 mrems/yr to any organ.

* b. The air dose due to noble gases released in gaseous effluents from each reactor unit, to areas at and beyond the SITE BOUNDARY shall be limited to the following:

During any calendar quarter, to $\leq$ 5 mrad for gamma radiation and $\leq$ 10 mrad for beta radiation and, during any calendar year to $\leq$ 10 mrad for gamma radiation and $\leq$ 20 mrad for beta radiation.

* c. The dose to a MEMBER OF THE PUBLIC from Iodine-131, Iodine-133, Tritium, and all radionuclides in particulate form, with half-lives > 8 days in gaseous effluents released, from each reactor unit to areas at and beyond the SITE BOUNDARY, shall be limited to the following:

During any calendar quarter to $\leq$ 7.5 mrem to any organ, and during any calendar year to $\leq$ 15 mrem to any organ.

* The calculated doses contained in a semi-annual report shall not apply to any STS LCO. The reported values are based on actual release conditions instead of historical conditions that the STS LCO dose calculations are based on. The STS LCO dose limits are therefore included in Item 1 of the report, for information only.

EFFLUENT AND WASTE DISPOSAL SUPPLEMENTAL INFORMATION
(continued)

2. Maximum Permissible Concentrations

WATER: As per 10 CFR Part 20, Appendix B, Table II, Column 2, except for entrained or dissolved noble gases as described in 1.1.a of this report.

AIR: Release concentrations are limited to dose rate limits described in 1.2.a of this report.

3. Average energy of fission and activation gases in gaseous effluents is not applicable.

4. Measurements and Approximations of Total Radioactivity

A summary of liquid effluent accounting methods is described in Table 3.1.

A summary of gaseous effluent accounting methods is described in Table 3.2.

4.1 Estimate of Errors

a. Sampling Error

The error associated with volume measurement devices, flow measuring devices, etc. based on calibration data and design tolerances has been conservatively estimated collectively to be less than ± 10%.

b. Analytical Error for Nuclides

Type	Average	Maximum
Liquid	±9%	±30%
Gaseous	±10%	±35%

EFFLUENT AND WASTE DISPOSAL SUPPLEMENTAL INFORMATION
(continued)

4. Measurements and Approximations of Total Radioactivity (continued)

4.1 (continued)

b. (continued)

TABLE 3.1
RADIOACTIVE LIQUID EFFLUENT SAMPLING AND ANALYSIS

LIQUID SOURCE	SAMPLING FREQUENCY	TYPE OF ANALYSIS	METHOD OF ANALYSIS
Monitor Tank Releases[1]	Each Batch	Principal Gamma Emitters	p.h.a.
	Monthly Composite	H-3	L.S.
		Gross Alpha	G.F.P.
	Quarterly Composite	SR-90, SR-89 FE-55	C.S.
Continuous Releases	Daily Grab Samples	Principal Gamma Emitters & I-131 4/M Composite	p.h.a.
		Dissolved & Entrained Gases one batch/month	
		H-3 Composite Monthly	L.S.
		Gross Alpha Composite Monthly	G.F.P.
		Sr-89, Sr-90, & Fe-55 Composite Quarterly	C.S.

[1]Boric Acid Evaporator condensate is normally recovered to the Primary Water Storage Tank for recycling into the reactor coolant system and does not contribute to liquid waste effluent totals.

p.h.a. - gamma spectrum pulse height analysis using Lithium Germanium detectors. All peaks are identified and quantified

L.S. - Liquid Scintillation Counting

C.S. - Chemical Separation

G.F.P. - Gas Flow Proportional Counting

4/M - four per month

EFFLUENT AND WASTE DISPOSAL SUPPLEMENTAL INFORMATION
(continued)

4. Measurements and Approximations of Total Radioactivity (continued)

4.1 (continued)

b. (continued)

TABLE 3.2
RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS

GASEOUS SOURCE	SAMPLING FREQUENCY	TYPE OF ANALYSIS	METHOD OF ANALYSIS
Waste gas Decay Tank Releases	Each Tank	Principal Gamma Emitters	(G) - p.h.a.
Containment Purge Releases	Each Purge	Principal Gamma Emitters	(G) - p.h.a.
		H-3	L.S.
Plant Vent	Weekly	Principal Gamma Emitters	(G, C, P) - p.h.a.
		H-3	L.S.
	Monthly Composite (Particulates)	Gross Alpha	P - G.F.P.
	Quarterly Composite (Particulates)	SR-90 SR-89	C.S.

G - Gaseous Grab Sample

C - Charcoal Filter Sample

P - Particulate Filter Sample

L.S. - Liquid Scintillation Counting

C.S. - Chemical Separation

p.h.a. - Gamma spectrum pulse height analysis using Lithium Germanium detectors. All peaks are identified and quantified

G.F.P. - Gas Flow Proportional Counting

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 1 & 2
SEMIANNUAL REPORT
January ', 1985 THROUGH June 30, 1985

EFFLUENT AND WASTE DISPOSAL - SUPPLEMENTAL INFORMATION
(continued)

5. Batch Releases

5.1 Liquid

		UNIT 1	UNIT 2	
a.	Number of batch releases:	22	22	
b.	Total time period of batch releases:	1.06E04	1.06E04	MINUTES
c.	Maximum time period for a batch release:	660	660	MINUTES
d.	Average time period for a batch release:	482	482	MINUTES
e.	Minimum time period for a batch release:	322	322	MINUTES
f.	Average stream flow during periods of release of effluent into a flowing stream:	1.02E06	1.02E06	GPM

ALL LIQUID RELEASES ARE SUMMARIZED IN TABLES

5.2 Gaseous

a.	Number of batch releases:	27	46	
b.	Total time period for batch releases:	15389	13385	MINUTES
c.	Maximum time period for a batch release:	1592	1920	MINUTES
d.	Average time period for batch releases:	570	291	MINUTES
e.	Minimum time period for a batch release:	164	35	MINUTES

ALL GASEOUS WASTE RELEASES ARE SUMMARIZED IN TABLES

6. Unplanned Releases

6.1 Liquid

a.	Number of releases:	0	0	
b.	Total activity releases:	0	0	CURIES

6.2 Gaseous

a.	Number of releases:	0	0	
b.	Total activity released:	0	0	CURIES

6.3 See attachments (if applicable) for:

a. A description of the event and equipment involved.
b. Cause(s) for the unplanned release.
c. Actions taken to prevent a recurrence.
d. Consequences of the unplanned release.

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 1 & 2
SEMIANNUAL REPORT
January 1, 1985 THROUGH June 30, 1985

EFFLUENT AND WASTE DISPOSAL - SUPPLEMENTAL INFORMATION
(continued)

7. Assessment of radiation dose from radioactive effluents to the GENERAL PUBLIC is reported on the January Report.

8. Offsite Dose Calculation Manual (ODCM) Revisions:

Seven pages were revised. Pages 19, 25, 66, and 72 correct typographical errors. Page 53 changes Ag-110m to Ag-110 to be consistent with ORNL/NUREG/TM-102 Reference. Pages 80 and 81 identifies the H15 Sample Distance @ < 1 mile instead of 1 mile. Page 81 also had a comment added to identify the agency actually conducting the sampling program and their interaction with Florida Power & Light Company.

None of the above changes affected the methodology of dose calculations of the ODCM.

9. Solid Waste and Irradiated Fuel Shipments

No irradiated fuel shipments were made from the site. Common solid waste from St. Lucie Units 1 and 2 were shipped jointly. A summation of these shipments is given in Table 3.8 of this report.

10. Process Control Program Revisions

No revisions were made during the reporting period.

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 1
SEMIANNUAL REPORT
January 1, 1985 THROUGH June 30, 1985

TABLE 3.3-1
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

NUCLIDES RELEASED	UNIT	QUARTER # 1	QUARTER # 2
A. Fission and Activation Products			
1. Total Release (not including tritium, gases, alpha)	CI	5.42E-01	2.19E-01
2. Average diluted concentration during period	uCI/ml	1.17E-08	6.12E-09
B. Tritium			
1. Total Release	CI	1.01 E02	7.75 E01
2. Average diluted concentration during period	uCI/ml	7.27E-06	2.16E-06
C. Dissolved and Entrained Gases			
1. Total release	CI	1.58E 00	2.38E-01
2. Average diluted concentration during period	uCI/ml	3.42E-08	6.66E-09
D. Gross Alpha Radioactivity			
1. Total Release	CI	0	0
E. Volume of Waste Released (prior to dilution)	Liters	1.59 E06	1.27 E06
F. Volume of Dilution Water Used During Period	Liters	4.62 E10	3.58 E10

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 1
SEMIANNUAL REPORT
January 1, 1985 THROUGH June 30, 1985

TABLE 3.4-1
LIQUID EFFLUENTS

NUCLIDES RELEASED	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER # 1	QUARTER # 2	QUARTER # 1	QUARTER # 2
Na-24	CI	0	0	0	5.25 E-05
CR-51	CI	0	0	2.53 E-04	7.55 E-03
MN-54	CI	0	0	5.85 E-03	1.12 E-03
MN-56	CI	0	0	0	0
Co-57	CI	0	0	0	0
Co-58	CI	0	0	8.55 E-02	4.42 E-02
Co-60	CI	0	0	3.48 E-02	3.47 E-02
Fe-59	CI	0	0	3.32 E-03	6.55 E-04
Fe-55	CI	0	0	2.94 E-02	8.90 E-02
Ag-110	CI	0	0	0	1.11 E-05
SN-113	CI	0	0	2.45 E-05	0
Sb-122	CI	0	0	1.04 E-03	8.30 E-05
Sb-124	CI	0	0	5.45 E-04	5.65 E-04
W-187	CI	0	0	0	0
Np-239	CI	0	0	0	0
I-131	CI	0	0	3.17 E-02	1.39 E-02
I-132	CI	0	0	0	0
I-133	CI	0	0	1.90 E-04	7.00 E-4
I-134	CI	0	0	0	0
I-135	CI	0	0	0	0
Zr-95	CI	0	0	8.90 E-04	1.30 E-03
Nb-95	CI	0	0	0	0
ZR-97	CI	0	0	0	0
Nb-97	CI	0	0	0	4.04 E-05
Mo-99	CI	0	0	0	0
Tc-99M	CI	0	0	1.46 E-04	2.22 E-04
Ru-103	CI	0	0	1.82 E-04	2.69 E-04
Sb-125	CI	0	0	7.50 E-03	4.64 E-03
Cs-134	CI	0	0	1.15 E-01	6.50 E-03

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 1
SEMIANNUAL REPORT
January 1, 1985 THROUGH June 30, 1985

TABLE 3.4-1
LIQUID EFFLUENTS
(continued)

NUCLIDES RELEASED	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER #1	QUARTER #2	QUARTER #1	QUARTER #2
Cs-136	CI	0	0	6.40 E-03	1.27 E-04
Cs-137	CI	0	0	2.17 E-01	9.85 E-03
Ba-140	CI	0	0	0	0
La-140	CI	0	0	1.18 E-03	2.41 E-03
Ce-141	CI	0	0	5.60 E-5	3.11 E-04
Ce-144	CI	0	0	0	5.40 E-04
Sr-89	CI	0	0	4.77 E-04	8.90 E-05
Sr-90	CI	0	0	5.55 E-05	2.54 E-05
Y-90	CI	0	0	5.55 E-05	2.54 E-05
UNIDENTIFIED	CI	0	0	0	0
TOTAL FOR PERIOD ABOVE	CI	0	0	5.42 E-1	2.19 E-1
AR-41	CI	0	0	0	0
KR-85	CI	0	0	0	0
XE-131M	CI	0	0	3.76 E-03	0
XE-133	CI	0	0	1.56 E-00	2.33 E-01
XE-133M	CI	0	0	1.28 E-02	2.16 E-03
XE-135	CI	0	0	3.14 E-03	3.21 E-03
KR-85M	CI	0	0	0	0
XE-138	CI	0	0	0	0
TOTAL FOR PERIOD ABOVE	CI	0	0	1.58 E 00	2.38 E-01

NOTE: If no value is entered for a nuclide, the value equals zero Curies.

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 2
SEMIANNUAL REPORT
January 1, 1985 THROUGH June 30, 1985

TABLE 3.3-2
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

NUCLIDES RELEASED	UNIT	QUARTER # 1	QUARTER # 2
A. Fission and Activation Products			
1. Total Release (not including tritium, gases, alpha)	CI	5.73 E-01	2.19 E-01
2. Average diluted concentration during period	uCI/ml	9.29 E-09	5.03 E-09
B. Tritium			
1. Total Release	CI	1.01 E 02	1.55 E 02
2. Average diluted concentration during period	uCI/ml	1.45 E-05	3.56 E-06
C. Dissolved and Entrained Gases			
1. Total release	CI	1.59 E 00	2.38 E-01
2. Average diluted concentration during period	uCI/ml	3.44 E-08	5.47 E-09
D. Gross Alpha Radioactivity			
1. Total Release	CI	0	0
E. Volume of Waste Released (prior to dilution)	Liters	5.50 E 06	3.53 E 06
F. Volume of Dilution Water Used During Period	Liters	6.17 E 10	4.35 E 10

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 2
SEMIANNUAL REPORT
January 1, 1985 THROUGH June 30, 1985

TABLE 3.4-1
LIQUID EFFLUENTS

NUCLIDES RELEASED	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER # 1	QUARTER # 2	QUARTER # 1	QUARTER # 2
Na-24	CI	1.40 E-03	0	0	5.25 E-05
CR-51	CI	0	0	2.53 E-04	7.55 E-03
MN-54	CI	1.11 E-04	0	5.85 E-03	1.12 E-03
MN-56	CI	0	0	0	0
Co-57	CI	0	0	0	0
Co-58	CI	0	0	8.55 E-02	4.42 E-02
Co-60	CI	0	0	3.48 E-02	3.47 E-02
Fe-59	CI	0	0	3.32 E-03	6.55 E-04
Fe-55	CI	1.56 E-03	3.98 E-04	2.94 E-02	8.90 E-02
Ag-110	CI	0	0	0	1.11 E-05
SN-113	CI	0	0	2.45 E-05	0
Sb-122	CI	0	0	1.04 E-03	8.30 E-05
Sb-124	CI	0	0	5.45 E-04	5.65 E-04
W-187	CI	0	0	0	0
Np-239	CI	0	0	0	0
I-131	CI	5.71 E-03	2.43 E-04	3.17 E-02	1.39 E-02
I-132	CI	4.24 E-03	0	0	0
I-133	CI	9.95 E-03	0	1.90 E-04	7.00 E-4
I-134	CI	0	0	0	0
I-135	CI	0	0	0	0
Zr-95	CI	0	0	8.90 E-04	1.30 E-03
Nb-95	CI	0	0	0	0
ZR-97	CI	0	0	0	0
Nb-97	CI	0	0	0	4.04 E-05
Mo-99	CI	0	0	0	0
Tc-99M	CI	0	0	1.46 E-04	2.22 E-04
Ru-103	CI	0	0	1.82 E-04	2.69 E-04
Sb-125	CI	0	0	7.50 E-03	4.64 E-03
Cs-134	CI	1.51 E-03	1.52 E-05	1.15 E-01	6.50 E-03

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 2
SEMIANNUAL REPORT
January 1, 1985 THROUGH June 30, 1985

TABLE 3.4-1
LIQUID EFFLUENTS
(continued)

NUCLIDES RELEASED	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER #1	QUARTER #2	QUARTER # 1	QUARTER # 2
Cs-136	CI	0	0	6.40 E-03	1.27 E-04
Cs-137	CI	2.10 E-03	3.54 E-05	2.17 E-01	9.85 E-03
Cs-138	CI	4.82 E-02	0	0	0
Ba-140	CI	0	8.14 E-06	0	0
La-140	CI	0	0	1.18 E-03	2.41 E-03
Ce-141	CI	0	0	5.60 E-5	3.11 E-04
Ce-144	CI	0	0	0	5.40 E-04
Sr-89	CI	0	0	4.77 E-4	8.90 E-05
Sr-90	CI	0	0	5.55 E-05	2.54 E-05
Y-90	CI	0	0	5.55 E-05	2.54 E-05
UNIDENTIFIED	CI	0	0	0	0
TOTAL FOR PERIOD ABOVE	CI	3.14 E-02	7.00 E-04	5.42 E-01	2.19 E-01
AR-41	CI	0	0	0	0
KR-85	CI	0	0	0	0
XE-131M	CI	0	0	3.76 E-03	0
XE-133	CI	0	2.50 E-05	1.56 E 00	2.33 E-01
XE-133M	CI	0	0	1.28 E-02	2.16 E-
XE-135	CI	6.43 E-04	0	3.14 E-03	3.21 E-03
XE-135M	C	8.75 E-03	0	0	0
XE-138	CI	0	0	0	0
TOTAL FOR PERIOD ABOVE	CI	9.39 E-03	2.50 E-05	1.58 E 00	2.38 E-01

NOTE: If no value is entered for a nuclide, the value equals zero Curies.

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 1
SEMIANNUAL REPORT
January 1, 1985 THROUGH June 30, 1985

TABLE 3.6-1
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

NUCLIDES RELEASED	UNIT	QUARTER # 1	QUARTER # 2
A. Fission and Activation Gases			
1. Total Release	CI	1.89 E 04	9.93 E 03
2. Average Release Rate for Period	uCI/sec	2.40 E 03	1.26 E 03
B. Iodines			
1. Total Iodine-131	CI	1.31 E-01	5.26 E-01
2. Average Release Rate for Period	uCI/sec	1.66 E-02	6.67 E-02
C. Particulates			
1. Particulates T-1/2 > 8 Days	CI	3.75 E-05	1.43 E-05
2. Average Release Rate for Period	uCI/sec	4.82 E-06	1.82 E-06
3. Gross Alpha Radioactivity	CI	1.62 E-07	5.44 E-08
D. Tritium			
1. Total Release	CI	2.43 E 02	1.08 E 02
2. Average Release Rate for Period	uCI/sec	3.08 E 01	1.37 E 01

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 1
SEMIANNUAL REPORT
January 1, 1985 THROUGH June 30, 1985

TABLE 3.7-1
GASEOUS EFFLUENTS

NUCLIDES RELEASED	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER # 1	QUARTER # 2	QUARTER # 1	QUARTER # 2
1. FISSION GASES					
AR-41	CI	0	0	2.55 E00	0
KR-85	CI	0	0	2.71 E00	2.41 E00
KR-85M	CI	1.20 E02	1.52 E02	2.06 E01	2.73 E-1
KR-87	CI	1.67 E01	5.96 E01	3.11 E00	0
KR-88	CI	4.03 E01	1.85 E02	1.74 E01	1.63 E-1
XE-131M	CI	4.15 E00	0	3.45 E00	4.55 E00
XE-133	CI	8.38 E03	6.27 E03	8.93 E03	1.96 E03
XE-133M	CI	3.62 E01	6.18 E01	7.12 E01	1.43 E01
XE-135	CI	9.32 E02	1.18 E03	2.98 E02	1.37 E01
XE-135M	CI	0	2.55 E01	0	0
XE-138	CI	0	0	0	0
TOTAL FOR PERIOD ABOVE	CI	9.53 E03	7.93 E03	9.35 E03	2.00 E03

2. IODINES			
I-130	CI	0	0
I-131	CI	2.85 E-02	1.95 E-02
I-132	CI	0	2.19 E-01
I-133	CI	1.02 E-01	9.07 E-02
I-135	CI	0	1.97 E-01
TOTAL FOR PERIOD ABOVE	CI	1.31 E-01	5.26 E-01

3. PARTICULATES			
Co-58	CI	0	0
Co-60	CI	0	0
SR-89	CI	0	0
SR-90	CI	0	0
Y-90	CI	0	0
I-131	CI	3.75 E-05	1.43 E-05
	CI		
TOTAL FOR PERIOD ABOVE	CI	3.75 E-05	1.43 E-05

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 2
SEMIANNUAL REPORT
January 1, 1985 THROUGH June 30, 1985

TABLE 3.6-2
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

NUCLIDES RELEASED	UNIT	QUARTER #1	QUARTER #2
A. Fission and Activation Gases			
1. Total Release	CI	2.96 E 03	1.62 E 03
2. Average Release Rate for Period	uCI/sec	3.75 E 02	2.05 E 02
B. Iodines			
1. Total Iodine-131	CI	5.23 E-02	1.16 E-01
2. Average Release Rate for Period	uCI/sec	6.63 E-03	1.47 E-02
C. Particulates			
1. Particulates T-1/2 > 8 Days	CI	1.76 E-05	2.82 E-05
2. Average Release Rate for Period	uCI/sec	2.26 E-06	3.59 E-06
3. Gross Alpha Radioactivity	CI	2.65 E-07	1.41 E-09
D. Tritium			
1. Total Release	CI	3.83 E 01	6.79 E 01
2. Average Release Rate for Period	uCI/sec	4.86 E 00	8.61 E 00

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO. 2
SEMIANNUAL REPORT
January 1, 1985 THROUGH June 30, 1985

TABLE 3.7-2
GASEOUS EFFLUENTS

NUCLIDES RELEASED	UNIT	CONTINUOUS MODE		BATCH MODE	
		QUARTER # 1	QUARTER # 2	QUARTER # 1	QUARTER # 2
1. FISSION GASES					
AR-41	CI	0	0	2.89 E 00	3.02 E 00
KR-85	CI	0	0	0	1.38 E-01
KR-85M	CI	1.38 E 01	8.34 E 00	6.85 E-01	1.60 E 00
KR-87	CI	0	0	6.52 E-02	1.51 E-01
KR-88	CI	0	1.81 E 00	9.47 E-01	1.64 E 00
XE-131M	CI	0	0	2.49 E 00	1.83 E 00
XE-133	CI	2.19 E 03	1.20 E 03	4.94 E 02	2.22 E 02
XE-133M	CI	0	0	4.90 E 00	2.11 E 00
XE-135	CI	2.40 E 02	1.57 E 02	1.10 E 01	1.31 E 01
XE-135M	CI	0	0	0	0
XE-138	CI	0	0	0	0
TOTAL FOR PERIOD ABOVE	CI	2.44 E 03	1.37 E 03	5.17 E 02	2.46 E 02
2. IODINES					
I-130	CI	0	0		
I-131	CI	2.71 E-02	5.54 E-02		
I-132	CI	0	3.43 E-02		
I-133	CI	2.52 E-02	2.62 E-02		
I-135	CI	0	0		
TOTAL FOR PERIOD ABOVE	CI	5.23 E-2	1.16 E-1		
3. PARTICULATES					
Co-58	CI	0	0		
Co-60	CI	0	0		
SR-89	CI	0	0		
SR-90	CI	0	0		
Y-90	CI	0	0		
I-131	CI	1.76 E-05	2.82 E-05		
	CI				
	CI				
TOTAL FOR PERIOD ABOVE	CI	1.76 E-5	2.82 E-05		

TABLE 3.8

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

January 1-June 30, 1985

St. Lucie Unit Nos. 1 & 2

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fuel)

1. Type of waste	Unit	6-month Period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3 Ci	4.5 E 1 6.2 E 2	2.0 E1
b. Dry compressible waste, contaminated equip, etc.	m^3 Ci	2.0 E 2 2.0 E1	2.0 E1
c. Irradiated components, control rods, etc.	m^3 Ci	. E . E	. E
d. Other (describe)	m^3 Ci	. E . E	. E

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

a.	Cs-137	%	4.2 E 1
	Cs-134	%	2.1 E 1
	Co-60	%	5.6 E 0
	Co-58	%	1.3 E 1
	Fe-55	%	8.4 E 0
		%	. E
b.	Cs-137	%	1.6 E 1
	Cs-134	%	8.0 E 0
	Co-60	%	2.2 E 1
	Co-58	%	1.1 E 1
	Fe-55	%	1.8 E 1
	H-3	%	1.5 E 1

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
12	Sole Use Truck	Barnwell, S.C.
2	Sole Use Truck	Richland, Wash.

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NOS. 1 AND 2
SEMIANNUAL REPORT
JANUARY 1, 1985 THROUGH JUNE 30, 1985
TABLE 3.8 (Cont.)
Solid Waste Supplement

Waste Classification	Total Volume Cu-Ft	Total Curie Quantity (Note 1)	Principal Radionuclides (Notes 1,2)	Type of Waste (Note 3)	R.G. 1.21 Category	Type of Container (Note 4)	Solidification Agent (or Absorbent)
A	6798	3.687	None	PWR Trash	1.b	Non-Specification Strong Tight Pkg.	None
A	966	0.686	None	PWR Ion-Exchange Resin	1.a	Non-Specification Strong Tight Pkg.	None
B	195	16.449	^{63}Ni, ^{90}Sr, ^{137}Cs	PWR Trash	1.b	NRC Certified LSA > Type A	None
B	390	227.530	^{63}Ni, ^{90}Sr, ^{137}Cs	PWR Ion-Exchange Resin	1.a	NRC Certified LSA > Type A	None
C	121	364.338	^{129}I, ^{63}Ni, ^{90}Sr, ^{60}Co, ^{137}Cs, ^{134}Cs, ^{58}Co, ^{131}I, ^{54}Mn, ^{95}Nb, ^{55}Fe	PWR Ion-Exchange Resin	1.a	NRC Certified Type B	None
C	121	26.670	^{14}C, ^{99}Tc, ^{129}I, ^{60}Co, ^{63}Ni, ^{90}Sr, ^{137}Cs, ^{54}Mn, ^{57}Co, ^{58}Co, ^{59}Fe, ^{95}Nb, ^{95}Zr, ^{113}Sn	PWR Filters	1.a	NRC Certified Type B	None

TOTAL VOLUME: 8591 FT^3
TOTAL ACTIVITY: 639.360 Curies

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NOS. 1 AND 2
SEMIANNUAL REPORT
January 1, 1985 THROUGH June 30, 1985
TABLE 3.8 (Cont.)
Solid Waste Supplement

Note 1: The total curie quantity and radionuclide composition of solid waste shipped from the St. Lucie Plant are determined using a combination of qualitative and quantitative techniques. In general, the St. Lucie Plant follows the guidelines outlined in the Low-Level Waste Licensing Branch Technical Position (BTP) on Radioactive Waste Classification (5/11/83) for these determinations.

The most frequently used techniques for determining the total curie quantity in a package are the dose-to-curie methods and the (Concentration) X (Volume or Mass) calculations. Where appropriate, engineering type activation analyses may be applied. Since each of the above methodologies involves to some extent qualitative parameters, the total curie quantity is considered to be an estimate.

The composition of radionuclides in the waste is determined by both on-site analyses for principal gamma emitters, and periodic offsite analyses for other radionuclides. The onsite analyses are performed either on a batch basis or on a routine basis using reasonably representative samples as appropriate for the waste type. Offsite analyses are used to establish scaling factors or other estimates for radionuclides such as ^{3}H, ^{14}C, ^{99}Tc, ^{129}I, TRU, ^{241}Pu, ^{242}Cm, ^{63}Ni, and ^{55}Fe.

Note 2: "Principal Radionuclides" refers to those radionuclides contained in the waste in concentrations greater than .01 times the concentration of that nuclide listed in Table 1 or .01 times the smallest concentration of that nuclide listed in Table 2 of 10CFR61.

Note 3: "Type of Waste" is generally specified as described in NUREG 0782, Draft Environmental Impact Statement on 10 CFR 61 "Licensing Requirements for Land Disposal of Radioactive Waste".

Note 4: "Type of Container" refers to the transport package.

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE UNIT NO 1 & 2
SEMIANNUAL REPORT
January 1, 1985 THROUGH June 30, 1985

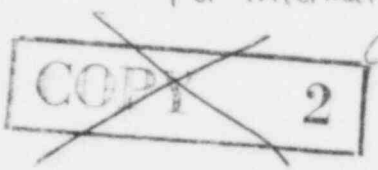
ATTACHMENT A

CHANGES TO OFFSITE DOSE CALCULATION MANUAL
DURING PERIOD JANUARY 1, 1985 THROUGH JUNE 30, 1985

PAGE REVISIONS ATTACHED

FLORIDA POWER & LIGHT COMPANY
ST. LUCIE PLANT
CHEMISTRY OPERATING PROCEDURE NO. C-200
REVISION 5

For information only
B2C02



TITLE:

Offsite Dose Calculation Manual (ODCM)

REVIEW AND APPROVAL:

Reviewed by Facility Review Group April 22, 1982

Approved by C. M. Wethy Plant Manager April 27, 1982

Revision 5 Reviewed by F R G 12-21 1984

Approved by C. M. Wethy Plant Manager 3-20-1985

Proof of Plant Manager approval

ST. LUCIE PLANT
CHEMISTRY OPERATING PROCEDURE NO. C-200, REVISION 5
OFFSITE DOSE CALCULATION MANUAL (ODCM)

2.2 (continued)

1. Simplified Total Body Dose Rate Calculation

From an evaluation of past releases, an effective total body dose factor (K_{eff}) can be derived. This dose factor is in effect a weighted average total body dose factor, i.e., weighted by the radionuclide distribution typical of past operation. (Refer to Appendix C for a detailed explanation and evaluation of K_{eff}). The value of K_{eff} has been derived from the radioactive noble gas effluents for the years 1978, 1979, and 1980. The value is:

$$K_{eff} = 6.8 \times 10^{2} \quad \frac{mrem\text{-}m^3}{uCi\text{-}yr}$$

This value may be used in conjunction with the total noble gas release rate (Qi) to verify that the instantaneous dose rate is within the allowable limits. To allow for any unexpected variability in the radionuclide distribution, a conservatism factor of 0.8 is introduced into the calculation. The simplified equation is:

$$DR_{TB} = \frac{K_{eff}}{0.8} \overline{(X/Q)} \sum_{i} \dot{Q}_i$$

To further simplify the determination, the historical annual average meteorological X/Q of 1.6×10^{-6} sec/m^3 (From Table M-1) may be substituted into the equation. Also, the dose limit of 500 mrem/yr may be substituted for DR_{TB}. Making these substitutions yields a single cumulative (or gross) noble gas release rate limit. This value is:

Noble gas release rate limit = 3.5×10^{5} uCi/sec

As long as the noble gas release rates do not exceed this value (3.5×10^{5} uCi/sec), no additional dose rate calculations are needed to verify compliance with Technical Specification 3.11.2.1.

2. Setpoint Determination

To comply with Tech. Spec. 3.3.3.10, the alarm/trip setpoints are established to ensure that the noble gas releases do not exceed the value of 3.5×10^{5} uCi/sec, which corresponds to a total body dose rate of 500 mrem/yr. The method that follows is a step-by-step procedure for establishing the setpoints. To allow for multiple sources of releases from different or common release points, the allowable operating setpoints will be controlled administratively by allocating a percentage of the total allowable release to each of the release sources. /R5

A. Determine (V) the maximum volume release rate potential from the in-plant procedures for the release source under consideration. The units of (V) are ft^3/min.

ST. LUCIE PLANT
CHEMISTRY OPERATING PROCEDURE NO. C-200, REVISION 5
OFFSITE DOSE CALCULATION MANUAL (ODCM)

2.3 (continued)

The calculations of Sections 2.3.1, 2.3.2, 2.3.4, and 2.3.5 may be omitted. The dose rate calculations as specified in these sections are included for completeness and are to be used only for evaluating unusual circumstances where releases of particulate materials other than radioiodines in airborne releases are abnormally high. The calculations of Sections 2.3.1, 2.3.2, 2.3.4, and 2.3.5 will typically be used to demonstrate compliance with the dose rate limit of Tech. Spec. 3.11.2.1 for radioiodines and particulates when the measured releases of particulate material (other than radioiodines and with half lives >8 days) are >10 times the measured releases of radioiodines.

1. The Instantaneous Inhalation Dose Rate Method:

NOTE
The H-3 dose is calculated as per 2.3.4

A. The controlling location is assumed to be an Infant located in the _____ sector at the _____ mile range. The $\overline{(X/Q)}_D$ for this location is _____ sec/m^3. This value is common to all nuclides. (See Table M-2 for value, sector and range.)

B. Enter the release rate in ft^3/min of the release source and convert to cc/sec.

$$= \frac{\quad ft^3}{min} \times \frac{2.8317 \times 10^4 cc}{ft^3} \times \frac{min}{60\ sec.} = cc/sec$$

C. Solve for $\dot{Q}_i$ for nuclide (i) by obtaining the uCi/cc assay value of the release source activity and multiplying it by the product of 2.3.1.B above.

$$\dot{Q}_i = \frac{(\text{nuclide [i] assay})\ uCi}{cc} \times \frac{(\text{Value 2.3.1.B})\ cc}{sec}$$ /R5

$\dot{Q}_i$ = _____ uCi/sec for nuclide (i)

D. Obtain the R_i value from Table G-5 for the organ T.

E. Solve for DR_i

$$DR_{iT} = R_{iT}\ \overline{(X/Q)}_D\ \dot{Q}_i = \frac{mrem\text{-}m^3}{uCi\text{-}yr} \times \frac{sec}{m^3} \times \frac{uCi}{sec}$$

DR_{iT} = $\frac{mrem}{yr}$ The Dose Rate to organ T from nuclide (i)

F. Repeat steps 2.3.1.C through 2.3.1.E for each nuclide (i) reported in the assay of the release source.

ST. LUCIE PLANT
CHEMISTRY OPERATING PROCEDURE NO. C-200, REVISION 5
OFFSITE DOSE CALCULATION MANUAL (ODCM)

TABLE L-1

MAXIMUM PERMISSIBLE CONCENTRATIONS IN WATER IN UNRESTRICTED AREAS

Nuclide[1]	MPC (uCi/ml)	Nuclide[1]	MPC (uCi/ml)	Nuclide[1]	MPC (uCi/ml)
H-3	3 E-3	Y-90	2 E-5	Te-129	8 E-4
Na-24	3 E-5	Y-91m	3 E-3	Te-131m	4 E-5
P-32	2 E-5	Y-91	3 E-5	Te-131	None
Cr-51	2 E-3	Y-92	6 E-5	Te-132	2 E-5
Mn-54	1 E-4	Y-93	3 E-5	I-130	3 E-6
Mn-56	1 E-4	Zr-95	6 E-5	I-131	3 E-7
Fe-55	8 E-4	Zr-97	2 E-5	I-132	8 E-6
Fe-59	5 E-5	Nb-95	1 E-4	I-133	1 E-6
Co-57	4 E-4	Nb-97	9 E-4	I-134	2 E-5
Co-58	9 E-5	Mo-99	4 E-5	I-135	4 E-6
Co-60	3 E-5	Tc-99m	3 E-3	Cs-134	9 E-6
Ni-65	1 E-4	Tc-101	None	Cs-136	6 E-5
Cu-64	2 E-4	Ru-103	8 E-5	Cs-137	2 E-5
Zn-65	1 E-4	Ru-105	1 E-4	Cs-138	None
Zn-69	2 E-3	Ru-106	1 E-5	Ba-139	None
Br-82	4 E-5	Ag-110	3 E-5	Ba-140	2 E-5 /R4
Br-83	3 E-6	Sn-113	8 E-5	Ba-141	None
Br-84	None[2]	In-113m	1 E-3	Ba-142	None
Br-85	None	Sb-122	3 E-5	La-140	2 E-5
Rb-86	2 E-5	Sb-124	2 E-5	La-142	None
Rb-88	None	Sb-125	1 E-4	Ce-141	9 E-5
Rb-89	None	Te-125m	1 E-4	Ce-143	4 E-5
Sr-89	3 E-6	Te-127m	5 E-5	Ce-144	1 E-5
Sr-90	3 E-7	Te-127	2 E-4	Pr-144	None
Sr-91	5 E-5	Te-129m	2 E-5	W-187	6 E-5
Sr-92	6 E-5			Np-239	1 E-4

[1]If a nuclide is not listed, refer to 10CFR20, Appendix B, and use the most conservative insoluble/soluble MPC where they are given in Table II, Column 2.

[2]None - (As per 10CFR20, Appendix B) "No MPC limit for any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life less than 2 hours."

Verified MPC's against a 10CFR20 Revision of July 1985. all O.K. BEC

ST. LUCIE PLANT
CHEMISTRY OPERATING PROCEDURE NO. C-200, REVISION 5
OFFSITE DOSE CALCULATION MANUAL (ODCM)

TABLE M-3

Selecting the Appropriate Long Term (D/Q) for Dose Calculations Involving Radioiodines and 8D Particulates for Grass-Cow-Milk or Grass-Goat-Milk:

TYPE OF DOSE CALCULATION	LIMITING RANGE	LIMITING SECTOR	(D/Q) Value $1/m^2$
Release Rate - LCO	A	A	A
1/31 Days - LCO	B	B	B
Quarterly-Yearly - LCO	B	B	B
12 Consecutive Months - LCO	B	B	B
Semi-Annual Report	C	C	C

A. The worst cow or goat as per locations from land census. If no milk animal in any sector, assume a cow at 4.25 miles in the highest (D/Q) sector over land.

B. The historical $\overline{(D/Q)}$ of all land sectors with the worst cow or goat from each sector as reported in the Land Census. A 4.25 mile cow should be assumed in the worst sector when no milk animal is reported.

C. The highest (D/Q) at a milk animal location of all milk animals reported in the Land Census Report. (If no milk animals within 5 miles a 4.25 mile cow should be assumed in the sector having the highest (D/Q) at 4.25 miles). Actual Met Data should be used for the selection of the worst case milk animal and for the dose calculations. If both goat and milk animals are reported inside 5 miles, dose calculations should be performed on each animal and the higher dose animal contribution should be used. /R5

The historical wind frequency fractions for each sector are listed in Table M-8.

ST. LUCIE PLANT
CHEMISTRY OPERATING PROCEDURE NO. C-200, REVISION 5
OFFSITE DOSE CALCULATION MANUAL (ODCM)

APPENDIX B

Limited Analysis Dose Assessment for Liquid Radioactive Effluents

The radioactive liquid effluents for the years 1978, 1979, and 1980 were evaluated to determine the dose contribution of the radionuclide distribution. This analysis was performed to evaluate the use of a limited dose analysis for determining environmental doses. Limiting the dose calculation to a few selected radionuclides that contribute the majority of the dose provides a simplified method of determining compliance with the dose limits of Technical Specificaiton 3.11.1.2.

Tables B-1 and B-2 present the results of this evaluation. Table B-1 presents the fraction of the adult total body dose contributed by the major radionuclides. Table B-2 presents the same data for the adult GI-LLI dose. The adult total body and adult GI-LLI were determined to be the limiting doses based on an evaluation of all age groups (adult, teenager, child, and infant) and all organs (bone, liver, kidney, lung, and GI-LLI). As the data in the tables show, the radionuclides Fe-59, Co-58, Co-60, Zn-65, Cs-134, and Cs-137 dominate the total body dose; the radionuclides, Fe-59, Co-58, Co-60, Zn-65, and Nb-95 dominate the GI-LLI dose. In all but one case (1979-fish, GI-LLI dose) these radionuclides contribute 90% or more of the total dose. If for 1979 the fish and shellfish pathways are combined as is done to determine the total dose, the contribution from these nuclides is 84% of the total GI-LLI dose.

Therefore, the dose commitment due to radioactive material in liquid effluents can be reasonably estimated by limiting the dose calculation to the radionuclides, Fe-59, Co-58, Co-60, Zn-65, Nb-95, Cs-134, and Cs-137, which cumulatively contribute the majority of the total dose calculated by using all radionuclides detected. This limited analysis dose assessment method is a simplified calculation that provides a reasonable evaluation of doses due to liquid radioactive effluents.

Tritium is not included in the limited analysis dose assessment for liquid releases because the potential dose resulting from normal reactor releases is negligible and is essentially independent of radwaste system operation. The amount of tritium releases annually is about 300 curies. At St. Lucie, 300 Ci/yr released to the Atlantic Ocean produces a calculated whole body dose of 5×10^{-7} mrem/yr via the fish and shellfish pathways. This amounts to less than 0.001% of the design objective dose of 3 mrem/yr. Furthermore, the release of tritium is a function of operating time and power level and is essentially unrelated to radwaste system operation. /R5

ST. LUCIE PLANT
CHEMISTRY OPERATING PROCEDURE NO. C-200, REVISION 5
OFFSITE DOSE CALCULATION MANUAL (ODCM)

APPENDIX E
(continued)
RADIOLOGICAL ENVIRONMENTAL SURVEILLANCE
ST. LUCIE PLANT
Key to Sample Locations

PATHWAY	LOCATION	DESCRIPTION	SAMPLES COLLECTED	SAMPLE COLLECTION FREQUENCY	APPROXIMATE DISTANCE (miles)	DIRECTION SECTOR
Direct Radiation	S-10	US 1 and SR 714	TLD	Quarterly	10	S
Direct Radiation	S/SSE-10	Indian River Drive and Quail Run Lane	TLD	Quarterly	10	SSE
Direct Radiation	SSE-5	Entrance of Nettles Island	TLD	Quarterly	5	SSE
Direct Radiation	SSE-10	Elliot Museum	TLD	Quarterly	10	SSE
Direct Radiation	SE-1	South of Cooling Canal	TLD	Quarterly	1	SE
Direct Radiation	*1-32	U. of Florida-IFAS Entomology Lab Vero Beach	TLD	Quarterly	19	NNW
Airborne	H08	FPL Substation - Weatherby Road	Radioiodine & Particulates	Weekly	6	WNW
Airborne	*H12	FPL Substation - SR 76, Stuart	Radioiodine & Particulates	Weekly	12	S
Airborne	H14	Onsite - near south property line	Radioiodine & Particulates	Weekly	1	SE
Airborne	H30	Power Line - 7609 Indian River Drive	Radioiodine & Particulates	Weekly	2	W
Airborne	H34	Onsite - At Meteorological Tower	Radioiodine & Particulates	Weekly	0.5	N
Waterborne	H15	Atlantic Ocean vicinity of public beaches east side of Route A1A	Surface Water (ocean) Sediment From shoreline	Weekly Semi-Annually	< 1	ENE/E/ESE
Waterborne	*H59	Near south end of Hutchinson Island	Surface Water (ocean) Sediment From shoreline	Monthly Semi-Annually	10-20	S/SSE

* Denotes Control Sample

ST. LUCIE PLANT
CHEMISTRY OPERATING PROCEDURE NO. C-200, REVISION 5
OFFSITE DOSE CALCULATION MANUAL (ODCM)

APPENDIX E
RADIOLOGICAL ENVIRONMENTAL SURVEILLANCE
ST. LUCIE PLANT
Key to Sample Locations

PATHWAY	LOCATION	DESCRIPTION	SAMPLES COLLECTED	SAMPLE COLLECTION FREQUENCY	APPROXIMATE DISTANCE (miles)	DIRECTION SECTOR
Food Products	H15	Ocean side vicinity of St. Lucie Plant	Crustacea Fish	Semi-Annually Semi-Annually	< 1	ENE/E/ESE /R5
Food Products	H51	Offsite near north property line	Broad leaf vegetation (mangrove)	Monthly (when available)	1	N/NNW
Food Products	H52	Offsite near south property line	Broad leaf vegetation (mangrove)	Monthly (when available)	1	S/SSE
Food Products	*H59	Near south end of Hutchinson Island	Crustacea Fish Broad leaf vegetation (mangrove)	Semi-Annually Semi-Annually Monthly	10-20	S/SSE

* Denotes control sample

It is the policy of Florida Power & Light Company (FPL) that the St. Lucie 1 & 2 Radiological Environmental Monitoring Programs are conducted by the State of Florida Department of Health and Rehabilitative Services (DHRS), pursuant to an Agreement between FPL and DHRS and; that coordination of the Radiological Environmental Monitoring Programs with DHRS and compliance with the Radiological Environmental Monitoring Program Technical Specifications are the responsibility of the Nuclear Energy Services Department. /R5