

NEW YORK POWER AUTHORITY
JAMES A. FITZPATRICK NUCLEAR POWER PLANT
EFFLUENT AND WASTE DISPOSAL
SEMI-ANNUAL REPORT

JULY 1, 1991 - DECEMBER 31, 1991

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SEMI-ANNUAL REPORT JULY 1991 - DECEMBER 1991

SUPPLEMENTAL INFORMATION

FACILITY: JAENPP

LICENSEE: NEW YORK POWER AUTHORITY

1. Technical Specification Limits

a. Fission and Activation Gases:

- (1) The dose rate at or beyond the site boundary due to radioactive materials released from the plant in gaseous effluent shall be limited as follows:
 - (a) Less than or equal to 500 mrem/year to the whole body and less than or equal to 3000 mrem/year to the skin from noble gases.
- (2) The air dose to areas at or beyond the site boundary from noble gases released from the plant in gaseous effluent shall be limited:
 - (a) During any calendar quarter, to less than or equal to 5 mrad from gamma radiation, and less than or equal to 10 mrad from beta radiation; and,
 - (b) During any calendar year, to less than or equal to 10 mrad from gamma radiation and less than or equal to 20 mrad from beta radiation.

b. Tritium, Iodines and Particulates, Half Lives > 8 days:

- (1) The dose to a member of the public at or beyond the site boundary from Iodine-131, Iodine-133, Tritium, and radionuclides in particulate form with half-lives greater than 8 days released from the plant in gaseous effluent shall be limited:
 - (a) During any calendar quarter to less than or equal to 7.5 mrem to any organ; and,
 - (b) During any calendar year to less than or equal to 15 mrem to any organ.
 - (c) Less than 0.1% of the limits of Specification 3.4.a.1 and 3.4.a.2 as a result of burning contaminated oil.

SUPPLEMENTAL INFORMATION (Continued)

(2) The dose rate at or beyond the site boundary due to radioactive materials released from the plant in gaseous effluents shall be limited as follows:

- (a) Less than or equal to 1500 mrem/year to any organ from Iodine-131, Iodine-133, Tritium and for radioactive materials in particulate form with half-lives greater than 8 days (inhalation pathway only).

c. Liquid Effluents:

(1) The concentration of radioactive materials released to the unrestricted areas shall not exceed the values specified in 10 CFR 20, Appendix B, Table II, Column 2. For dissolved or entrained noble gases the concentration shall be limited to $2.00\text{E-}04 \mu\text{Ci/ml}$.

(2) The dose to a member of the public from radioactive materials released from the plant in liquid effluents to unrestricted areas shall be limited as follows:

- (a) During any calendar quarter, limited to less than or equal to 1.5 mrem to the whole body and to less than or equal to 5 mrem to any organ; and,
- (b) During any calendar year, limited 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. Maximum Permissible Concentrations

a. Fission and activation gases:	(None specified)	
b. Iodines:	(None specified)	
c. Particulates, half-lives > 8 days:	(None specified)	
d. Liquid effluents:	<u>Quarter 3</u>	<u>Quarter 4</u>
(1) Fission and activation products (mixture MPC) ($\mu\text{Ci/ml}$)	5.60E-05	8.84E-05
(2) Tritium ($\mu\text{Ci/ml}$)	3.00E-03	3.00E-03
(3) Dissolved and entrained gases ($\mu\text{Ci/ml}$)	2.00E-04	2.00E-04

SUPPLEMENTAL INFORMATION (Continued)

3. Average Energy

(None specified)

4. Measurements and Approximations of Total Radioactivity

- a. Fission and Activation Gases: Continuous monitor on each release path calibrated to a marinelli grab sample analyzed by gamma spectroscopy; bubbler grab sample analyzed for Tritium.
- b. Iodines: Gamma spectral analysis of charcoal cartridge and particulate filter on each release path.
- c. Particulates: Gamma spectral analysis of particulate filter and charcoal cartridge on each release path.
- d. Liquid Effluents: Gamma spectral analysis of each batch discharged, except composite analysis for Strontium-89, Strontium-90, Iron-55, Tritium, and Alpha.
- e. Solid Waste: Gamma spectral analysis of a representative sample of each waste shipment. Scaling factors established from off-site composite sample analyses to estimate concentration of non-gamma emitters. Low activity trash shipments, curie content estimated by dose rate measurement and application of appropriate scaling factors.
- f. Error Estimation Method: Overall error for sampling and analysis estimated by combining individual errors using error propagation methods. This process composed of determinate and undeterminate errors.

Determinate - Pump flowrates, volume measurements and analysis collection yields

Undeterminate - Random counting error estimated using accepted statistical calculations

SUPPLEMENTAL INFORMATION (Continued)

5. Batch Releases

Liquid:	<u>Quarter 3</u>	<u>Quarter 4</u>
(1) Number of batch releases:	2.20E+01	1.20E+01
(2) Total time period for batch release: (min)	1.46E+03	1.01E+03
(3) Maximum time period for batch release: (min)	9.10E+01	2.30E+02
(4) Average time period for batch release: (min)	6.65E+01	8.39E+01
(5) Minimum time period for batch release: (min)	2.50E+01	1.00E+01

Gaseous: There were no gaseous batch releases for this report period.

6. Abnormal Releases

a. Liquid:	<u>Quarter 3</u>	<u>Quarter 4</u>
(1) Number of releases:	None	None
(2) Total activity released:	None	None
b. Gaseous		
(1) Number of releases:	None	None
(2) Total activity released:	None	None

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TABLE 1A
GASEOUS EFFLUENTS--SUMMATION OF ALL RELEASES

	UNIT	QUARTER 3	QUARTER 4	EST TOTAL ERROR %
A. FISSION AND ACTIVATION GASES				
1. Total Release	Cl	5.51E+02	4.45E+02	≤ 25
2. Average release rate for period	μCi/sec	6.93E+01	5.60E+01	
3. Tech. Spec. Limit	%	*	*	
B. IODINE-131				
1. Total Iodine-131	Cl	3.23E-05	3.39E-05	≤ 25
2. Average release rate for period	μCi/sec	4.07E-06	4.27E-06	
3. Tech. Spec. Limit	%	*	*	
C. IODINE-133 AND PARTICULATES				
1. Iodine-133 and Particulates with half-lives >8 days	Cl	2.20E-04	3.04E-04	≤ 25
2. Average release rate for period	μCi/sec	2.76E-05	3.83E-05	
3. Tech. Spec. Limit	%	*	*	
4. Gross alpha radioactivity	Cl	5.39E-06	7.92E-06	≤ 25
D. TRITIUM				
1. Total Release	Cl	3.24E-01	2.74E+00	≤ 25
2. Average release rate for period	μCi/sec	4.08E-08	3.44E-07	
3. Tech. Spec. Limit	%	*	*	
*E. PERCENT OF TECHNICAL SPECIFICATION LIMITS				

FISSION AND ACTIVATION GASES

1. Quarterly gamma air dose limit	%	2.32E-01	1.50E-01
2. Quarterly beta air dose limit	%	4.55E-02	1.90E-02
3. Yearly gamma air dose limit	%	1.16E-01	7.52E-02
4. Yearly beta air dose limit	%	2.28E-02	9.50E-03
5. Whole body dose rate limit	%	2.24E-03	1.45E-03
6. Skin dose rate limit	%	5.53E-04	3.09E-04

**HALOGENS, TRITIUM AND PARTICULATES
WITH HALF-LIVES >8 DAYS**

7. Quarterly dose limit (organ)	%	9.00E-03	8.80E-03
8. Yearly dose limit (organ)	%	4.50E-03	4.40E-03
9. Organ dose rate limit	%	7.20E-05	8.03E-05

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TABLE 1B
GASEOUS EFFLUENTS--ELEVATED RELEASE

<u>NUCLIDES RELEASED</u>	<u>UNIT</u>	<u>CONTINUOUS MODE</u>	
		<u>QUARTER 3</u>	<u>QUARTER 4</u>
1. <u>Fission Gases</u>			
Argon-41	CI	1.25E+00	2.73E+00
Krypton-85m	CI	7.64E+01	5.78E+01
Krypton-87	CI	1.98E+01	9.77E+00
Krypton-88	CI	1.10E+02	7.29E+01
Xenon-131m	CI	4.59E+01	1.54E+01
Xenon-133	CI	1.26E+02	1.71E+02
Xenon-133m	CI	3.52E-01	1.05E+00
Xenon-135	CI	9.03E+01	4.32E+01
Xenon-135m	CI	3.86E+00	1.79E+00
Xenon-137	CI	1.83E+01	-----
Xenon-138	CI	1.33E+01	5.02E+00
2. <u>Iodines</u>			
Iodine-131	CI	2.32E-05	2.30E-05
Iodine-133	CI	1.90E-05	1.69E-04
3. <u>Particulates</u>			
Manganese-54	CI	1.65E-07	1.76E-06
Strontium-89	CI	4.11E-05	1.42E-06
Strontium-90	CI	6.76E-08	-----
Ruthenium-103	CI	-----	2.25E-07
Silver-110m	CI	-----	1.78E-06
Cesium-137	CI	4.76E-07	7.04E-08
Barium/Lanthanum-140	CI	3.91E-07	-----

Note: There were no batch releases for this report period.

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TABLE 1C
GASEOUS EFFLUENTS--GROUND LEVEL RELEASES

NUCLIDES RELEASED	UNIT	CONTINUOUS MODE	
		QUARTER 3	QUARTER 4
1. <u>Fission Gases</u>			
Argon-41	CI	4.37E-01	3.30E-02
Krypton-85m	CI	8.25E+00	1.81E-01
Krypton-88	CI	1.75E+00	2.52E+00
Xenon-131m	CI	1.70E+01	2.72E+01
Xenon-133	CI	1.76E+00	3.34E+01
Xenon-133m	CI	1.44E+00	1.86E-01
Xenon-135	CI	8.57E+00	1.27E+00
Xenon-135m	CI	2.86E-01	-----
Xenon-137	CI	7.22E+00	-----
2. <u>Iodines</u>			
Iodine-131	CI	9.16E-06	1.09E-05
Iodine-133	CI	6.51E-05	8.75E-05
3. <u>Particulates</u>			
Manganese-54	CI	1.85E-07	3.02E-06
Cobalt-60	CI	3.49E-05	1.02E-05
Zinc-65	CI	5.72E-05	1.59E-05
Strontium-89	CI	1.32E-08	8.12E-06
Strontium-90	CI	7.25E-10	-----
Niobium-95	CI	1.03E-06	-----
Barium/Lanthanum-140	CI	-----	4.90E-06

Note: There were no batch releases for this report period.

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TABLE 2A
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 and alpha)	Cl	1.77E-03	2.46E-03	≤ 25
2. Average diluted concentration during period	μCi/ml	1.05E-11	1.42E-11	
3. Applicable limit	%	1.87E-05	1.61E-05	
B. TRITIUM				
1. Total Release	Cl	7.08E-01	4.19E-01	≤ 25
2. Average diluted concentration during period	μCi/ml	4.19E-09	2.42E-09	
3. Applicable limit	%	1.40E-04	8.06E-05	
C. DISSOLVED AND ENTRAINED GASES				
1. Total Release	Cl	-----	3.41E-04	≤ 25
2. Average diluted concentration during period	μCi/ml	-----	1.97E-12	
3. Applicable Limit	%	-----	9.86E-07	
D. GROSS ALPHA RADIOACTIVITY				
1. Total Release	Cl	5.85E-05	-----	≤ 25
E. VOLUME OF WASTE RELEASED (BEFORE TO DILUTION)				
	liters	8.63E+05	5.10E+05	
F. VOLUME OF DILUTION WATER USED DURING PERIOD				
	liters	1.69E+11	1.73E+11	
G. PERCENT OF TECHNICAL SPECIFICATION LIMITS				
1. Quarterly Whole Body Dose	%	4.18E-03	2.53E-03	
2. Quarterly Organ Dose	%	2.24E-03	1.58E-03	
3. Annual Whole Body Dose	%	2.09E-03	1.27E-03	
4. Annual Organ Dose	%	1.12E-03	7.92E-04	

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TABLE 2B
LIQUID EFFLUENTS

<u>NUCLIDES RELEASED</u>	<u>UNIT</u>	<u>BATCH MODE</u>	
		<u>QUARTER 3</u>	<u>QUARTER 4</u>
Hydrogen-3	CI	7.08E-01	4.19E-01
Chromium-51	CI	-----	3.95E-04
Manganese-54	CI	3.92E-04	3.56E-04
Iron-59	CI	-----	4.08E-05
Cobalt-60	CI	3.89E-04	3.35E-04
Zinc-65	CI	7.43E-04	7.97E-04
Arsenic-76	CI	-----	3.67E-05
Strontium-92	CI	1.05E-05	5.79E-06
Niobium-95	CI	1.12E-05	-----
Niobium-97	CI	3.33E-05	1.76E-05
Technetium-99m	CI	-----	5.29E-05
Silver-110m	CI	1.19E-04	4.58E-05
Xenon-133	CI	-----	2.42E-05
Cesium-134	CI	2.80E-05	-----
Xenon-135	CI	-----	3.17E-04
Cesium-137	CI	4.32E-05	2.34E-05
Barium/Lanthanum-140	CI	-----	9.25E-06
Cerium-141	CI	9.50E-07	-----

Note: There were no continuous mode discharges during this report period.

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TABLE 3A
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. SOLID WASTE SHIPPED OFF SITE FOR DISPOSAL OR BURIAL (NOT IRRADIATED FUEL)

1. <u>Type of Waste</u>	<u>UNIT</u>	<u>SIX MONTH PERIOD</u>	<u>EST TOTAL ERROR %</u>
a. Spent resins, filter sludges	m ³	66.8	± 10
evaporator bottoms, etc.	Ci	248	± 25
b. Dry compressible waste,	m ³	1382	± 10
contaminated equipment, etc.	Ci	3.72	± 25
c. Irradiated components	m ³	N/A	N/A
	Ci	N/A	N/A
d. Other	m ³	N/A	N/A
	Ci	N/A	N/A

2. Estimate of Major Nuclide Composition

<u>Isotope</u>	<u>% Abundance</u>	<u>Isotope</u>	<u>% Abundance</u>
Zinc-65	48.330	Ruthinium-106	2.747
Cobalt-60	17.689	Cobalt-58	1.714
Iron-55	13.643	Cesium-134	1.345
Manganese-54	6.398	Chromium-51	1.291
Cesium-137	3.174	Carbon-14	0.252
		Nickel-63	0.163

3. Solid Waste Disposition

<u>Shipment</u>	<u>Qty</u>	<u>Transportation Mode</u>	<u>Destination</u>
Type A	32	Truck	Barnwell, SC
Type A	61	Truck	Richland, WA

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TABLE 3B
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. NRC CLASS A

1. 70% Powdered Resin/30% Bead Resin (LSA)

Container Type:	170.8 ft HIC
Solidification Media:	None
Total Volume:	170.8 ft ³
No. of Shipments:	1
Type:	Cask
Mode:	Truck

<u>Principal Isotopes</u>	<u>Curies</u>	<u>% Abundance</u>	<u>Quantity Determination</u>
Zinc-65	18.40	53.409	M
Cobalt-60	4.48	13.004	M
Ruthenium-106	2.70	7.837	E
Iron-55	2.68	7.779	E
Cesium-137	1.37	3.977	M
Manganese-54	1.23	3.570	M
Silver-110m	1.12	3.251	M
Cesium-134	0.67	1.930	M
Zirconium-95	0.58	1.684	E
Chromium-51	0.37	1.080	E
Nickel-63	0.0	0.149	E
Nickel-59	0.01	0.044	E

TOTAL: 34.5 Curies

E = Estimated

M = Measured

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TABLE 3B
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. NRC CLASS A

2. 100% Powdered Resin (LSA)

Container Type:	170.8 ft ³ HIC
Solidification Media:	None
Total Volume:	512.4
No. of Shipments:	3
Type:	Cask
Mode:	Truck

<u>Principal Isotopes</u>	<u>Curies</u>	<u>% Abundance</u>	<u>Quantity Determination</u>
Zinc-65	32.0	41.404	M
Cobalt-60	20.9	27.115	M
Iron-55	11.4	14.782	E
Cesium-137	4.71	6.102	M
Manganese-54	3.43	4.450	M
Cobalt-58	2.05	2.652	M
Cesium-134	1.32	1.711	M
Chromium-51	1.20	1.552	M
Nickel-63	0.15	0.193	E

TOTAL: 77.2 Curies

E = Estimated

M = Measured

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TABLE 3H
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. NRC CLASS A

3. 70% Bead Resin/30% Powdered Resin (LSA)

Container Type:	170.8 ft ³ HIC
Solidification Media:	None
Total Volume:	170.8 ft ³
No. of Shipments:	1
Type:	Cask
Mode:	Truck

<u>Principal Isotopes</u>	<u>Curies</u>	<u>% Abundance</u>	<u>Quantity Determination</u>
Zinc-65	8.86	55.177	M
Cobalt-60	2.35	14.635	M
Iron-55	1.72	10.712	E
Ruthenium-106	1.03	6.414	E
Manganese-54	0.65	4.116	M
Cesium-137	0.42	2.641	M
Zirconium-95	0.22	1.370	E
Cesium-134	0.17	1.077	M
Lanthanum-140	0.16	1.003	M
Nickel-63	0.03	0.166	E

TOTAL: 16.1 Curies

E = Estimated

M = Measured

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TABLE 3B
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. NRC CLASS A

4. 85% Powdered Resin/15% Resin (LSA)

Container Type:	170.8 ft ³ HIC
Solidification Media:	None
Total Volume:	170.8 ft ³
No. of Shipments:	1
Type:	Cask
Mode:	Truck

<u>Principal Isotopes</u>	<u>Curies</u>	<u>% Abundance</u>	<u>Quantity Determination</u>
Zinc-65	0.250	41.295	M
Cobalt-60	0.177	29.237	M
Iron-55	0.100	16.518	E
Cesium-137	0.036	5.864	M
Manganese-54	0.028	4.658	M
Cesium-134	0.009	1.568	M
Nickel-63	0.002	0.334	E

TOTAL: 0.603 Curies

E = Estimated

M = Measured

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TABLE 3B
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. NRC CLASS A

5. 18.8 ft³ Pressure Vessel Charcoal Filter Dewatered (LSA)

Container Type:	18.8 ft ³ Pressure Vessel
Solidification Media:	None
Total Volume:	56.4 ft ³
No. of Shipments:	1*
Type:	Cask
Mode:	Truck

<u>Principal Isotopes</u>	<u>Curies</u>	<u>% Abundance</u>	<u>Quantity Determination</u>
Zinc-65	0.52	33.122	M
Iron-55	0.44	27.992	E
Cobalt-60	0.43	27.486	M
Manganese-54	0.14	8.917	M
Carbon-14	0.02	1.056	E

TOTAL: 1.58 Curies

E = Estimated

M = Measured

* 3 Pressure Vessels out of one 7 Pressure Vessel Shipment combined with one Table 3B A6 (page 16) shipment.

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TABLE 3B
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. NRC CLASS A

6. 18.8 ft³ Pressure Vessels, Dewatered Bead Resin (LSA)

Container Type:	18.8 ft ³ Pressure Vessel
Solidification Media:	None
Total Volume:	733.2 ft ³
No. of Shipments:	6*
Type:	Cask
Mode:	Truck

<u>Principal Isotopes</u>	<u>Curies</u>	<u>% Abundance</u>	<u>Quantity Determination</u>
Zinc-65	5.90	49.910	M
Iron-55	2.07	17.485	E
Cobalt-60	2.03	17.193	M
Manganese-54	0.98	8.239	M
Cesium-137	1.17	1.404	M
Chromium-51	0.13	1.131	M
Antimony-125	0.12	1.046	M
Ruthenium-106	0.12	1.042	E
Carbon-14	0.08	0.662	E
Nickel-63	0.02	0.160	E

TOTAL: 11.8 Curies

E = Estimated

M = Measured

*5 Shipments of 7 Pressure Vessels and
1 Shipment of 4 Pressure Vessels combined with 3 Pressure Vessels
from one Table 3B A5 (page 15) shipment.

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TABLE 3B
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. NRC CLASS A

7. 100% Dewatered Bead Resin in a HIC (LSA)

Container Type:	170.8 ft ³ HIC
Solidification Media:	None
Total Volume:	341.6 ft ³
No. of Shipments:	2
Type:	Cask
Mode:	Truck

<u>Principal Isotope:</u>	<u>Curies</u>	<u>% Abundance</u>	<u>Quantity Determination</u>
Zinc-65	11.90	43.046	M
Iron-55	5.72	20.622	E
Cobalt-60	5.62	20.261	M
Manganese-54	3.18	11.454	M
Cobalt-58	0.42	1.524	M
Carbon-14	0.22	0.779	E
Cesium-137	0.17	0.619	M
Nickel-63	0.06	0.229	E

TOTAL: 27.7 Curies

E = Estimated

M = Measured

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TABLE 3B
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. NRC CLASS A

8. 100% Dewatered Bead Resin in a HIC (LSA)

Container Type:	205.8 ft ³ HIC
Solidification Media:	None
Total Volume:	205.8 ft ³
No. of Shipments:	1
Type:	Cask
Mode:	Truck

<u>Principal Isotopes</u>	<u>Curies</u>	<u>% Abundance</u>	<u>Quantity Determination</u>
Zinc-65	44.10	55.923	M
Iron-55	8.38	10.627	E
Cobalt-60	8.22	10.424	M
Manganese-54	6.36	8.065	M
Ruthinium-106	2.99	3.792	E
Chromium-51	1.46	1.851	M
Cobalt-58	1.38	1.750	M
Cesium-137	1.06	1.344	M
Cesium-134	1.05	1.331	M
Antimony-125	0.90	1.146	E
Silver-110m	0.82	1.039	E
Carbon-14	0.32	0.401	E
Nickel-63	0.09	0.118	E

TOTAL: 78.9 Curies

E = Estimated

M = Measured

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TABLE 3B
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. NRC CLASS A

9. Compacted/Uncompacted Dry Active Waste (LSA)

Container Type:	LSA Box (various sizes)
Solidification Media:	None
Total Volume:	3700 ft ³
No. of Shipments:	5
Type:	LSA Box
Mode:	Truck

<u>Principal Isotopes</u>	<u>Curies</u>	<u>% Abundance</u>	<u>Quantity Determination</u>
Zinc-65	0.742	57.175	M
Iron-55	0.155	11.967	E
Cobalt-60	0.153	11.787	M
Manganese-54	0.069	5.279	M
Ruthinium-106	0.067	5.196	M
Cesium-137	0.028	2.190	M
Chromium-51	0.020	1.534	E
Antimony-125	0.014	1.108	M

TOTAL: 1.297 Curies

E = Estimated

M = Measured

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TABLE 3B
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. NRC CLASS A

10. Uncompacted Dry Active Waste (Dirt/Rock) (LSA)

Container Type:	LSA Box (various sizes)
Solidification Media:	None
Total Volume:	33,339.76 ft ³
No. of Shipments:	69
Type:	LSA Boxes
Mode:	Truck

<u>Principal Isotopes</u>	<u>Curies</u>	<u>% Abundance</u>	<u>Quantity Determination</u>
Iron-55	2.250	94.149	E
Zinc-65	0.083	3.460	M
Cobalt-60	0.056	2.391	M

TOTAL: 2.39 Curies

E = Estimated

M = Measured

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TABLE 3B
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. NRC CLASS A

11. 40ft Sealand Van (LSA)

Container Type:	40 ft Sealand Van
Solidification Media:	None
Total Volume:	7464 ft ³
No. of Shipments:	4
Type:	Sealand Van
Mode:	Truck

<u>Principal Isotopes</u>	<u>Curies</u>	<u>% Abundance</u>	<u>Quantity Determination</u>
Iron-55	0.0131	39.81	E
Zinc-65	0.0096	29.38	M
Cobalt-60	0.0082	24.86	M
Manganese-54	0.0009	2.63	M
Nickel-63	0.0005	1.49	M

TOTAL: 0.0328 Curies

E = Estimated

M = Measured

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ATTACHMENT NO. 1

CHANGES TO THE OFFSITE DOSE CALCULATION MANUAL (ODCM)

In accordance with Section 7.3.C.3 of Amendment 93 to the James A. FitzPatrick Nuclear Power Plant Technical Specifications, changes made to the Offsite Dose Calculation Manual (ODCM) during the reporting period shall be included in the Semiannual Radioactive Effluent Release Report.

No changes were made to the ODCM this report period.

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ATTACHMENT NO. 2

SUMMARY OF CHANGES TO THE PROCESS CONTROL PROGRAM

In accordance with Section 7.3.C. of Amendment 93 to the James A. FitzPatrick Nuclear Power Plant Technical Specifications, changes made to the Process Control Program (PCP) during the reporting period shall be included in the Semiannual Radioactive Effluent Release Report.

Revision 4 to the Process Control Program (PCP) procedure AP-1.10 was approved for use on 7-03-91 (PORC Meeting No. 91-65). This revision was made due to changing Waste Disposal Contractors. This change did not reduce conformance to existing criteria for solid waste.

Revision 5 to the Process Control Program (PCP) procedure AP-1.10 was approved for use on 11-06-91 (PORC Meeting No. 91-109). This revision was made to respond to two Adverse Quality Control Reports (91-053 and 91-054). This change did not reduce conformance to existing criteria for solid waste.

Revision 6 to the Process Control Program (PCP) procedure AP-1.10 was approved for use on 11-20-91 (PORC Meeting No. 91-112). This revision was made to incorporate an additional Waste Contractor Quality Assurance Program. This change did not reduce conformance to existing criteria for solid waste.

Revision 7 to the Process Control Program (PCP) procedure AP-1.10 was approved for use on 12-12-91 (PORC Meeting No. 91-117). This revision was made to add one additional Waste Contractor Procedures (FO-AD-002), it also references a Waste Contractor Procedure (SD-OP-048) and indicates that PORC approval is required before using this procedure. This change did not reduce conformance to existing criteria for solid waste.

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ATTACHMENT 2 (continued)

1. CONTRACTOR PROCEDURES:

- a. During this time frame, we deleted former Waste Contractor LN Procedures and implemented new Chem-Nuclear Systems Inc. procedures.
- b. The current Chem-Nuclear Systems, Inc. Procedures are as listed:
 - o CNSI Procedure, QA-AD-0001 - Quality Assurance Program, Revision F, 4/25/91 (PORC Meeting No. 91-47).
 - o SEG Quality Assurance Program, Revision 3, 11/20/91 (PORC Meeting No. 91-112).
 - o CNSI Procedure, FO-OP-022-41802 - Ecodex Precoat/Powdex/Solka-Floc/Diatomaceous Earth Dewatering Procedure For CNSI 14-215 or Smaller Liners At James A. FitzPatrick Nuclear Power Plant, Revision N, 5/8/91 (PORC Meeting No. 91-51).
 - CNSI Procedure, FO-OP-022-41802 Revision P was approved on 5/23/91 (PORC Meeting No. 91-53). This change was made due to a change in South Carolina Certificate of Compliance for percent of oil and new requirement for documentation of an approved NRC Q/A Program. This change did not reduce conformance to existing criteria for solid waste.
 - CNSI Procedure, FO-OP-022-41802 Revision 15 was approved on 12/12/91 (PORC Meeting No. 91-117). This change was made to incorporate in Chem-Nuclear's procedure the use of Pneumatic HIC Lid Closure Tool. This change did not reduce conformance to existing criteria for solid waste.
 - o CNSI Procedure, FO-OP-023-41802 - Bead Resin/Activated Carbon Dewatering Procedure For CNSI 14-215 or Smaller Liners At James A. FitzPatrick Nuclear Power Plant, Revision 0, 5/8/91 (PORC Meeting No. 91-51).
 - CNSI Procedure, FO-OP-023-41802 Revision 0, 12/12/91 (PORC Meeting No. 91-117) This change was in addition to the initiated revision whereby it adds the valve line-up. This change did not reduce conformance to existing criteria for solid waste.

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ATTACHMENT 2 (continued)

1. CONTRACTOR PROCEDURES (Continued):

- o CNSI Procedure FO-OP-025-45230 - Dewatering Procedure for CNSI 24-inch Diameter Pressure Vessels at James A. FitzPatrick Nuclear Power Plant, Revision 0, 4/19/91 (PORC Meeting No. 91-45).
- o CNSI Procedure, FO-OP-032-41802 - Set-up and Operating Procedure For RDS-1000 Unit Number 9 at James A. FitzPatrick Nuclear Power Plant, Revision 0, 5/8/91 (PORC Meeting No. 91-51).
 - CNSI Procedure, FO-OP-032-41802 Revision A was approved on 7/17/91 (PORC Meeting No. 91-70). These changes were made due to an engineering change to the fill head assembly of the RDS-1000 dewatering assembly. This change did not reduce conformance to existing criteria for solid waste.
- o CNSI Procedure, FO-AD-002 - Operating Guidelines For Use Of Polyethylene High Integrity Containers.
- o CNSI Procedure, SD-OP-048 - Process Control Program And Operating Procedure For In-Situ Solidification Of Suspended Objects. This revision is in the approval stages.

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ATTACHMENT NO. 3

SUMMARY OF CHANGES TO THE ENVIRONMENTAL MONITORING AND
DOSE CALCULATION LOCATIONS

In accordance with section 7.3.C.3 of Amendment 93 to the James A. FitzPatrick Nuclear Power Plant Technical Specifications, a listing of new locations for dose calculation and/or environmental monitoring identified by the land use census shall be included in the Semiannual Radioactive Effluent Release Reports.

1. CHANGES IN ENVIRONMENTAL MONITORING LOCATIONS

No change in Environmental Monitoring Locations was required based on the land use census.

2. NEW LOCATIONS FOR DOSE CALCULATIONS

No changes in Dose Calculation Receptor Locations were required based on land use census.

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ATTACHMENT NO. 4

DEVIATIONS FROM THE REQUIRED
ENVIRONMENTAL SAMPLING SCHEDULE

In accordance with Section 7.3.C.7 of Amendment 93 to the James A. FitzPatrick Nuclear Power Plant Technical Specifications, the cause for unavailability of any environmental samples required during the report period shall be included in the Semi-annual Radioactive Effluent Release Reports.

EXCEPTION TO THE ENVIRONMENTAL SAMPLING PROGRAM

The air sampling pump at the R-2 offsite Environmental Sampling Station was inoperable for 2 hours (0630 to 0830 hours) on December 3, 1991. The inoperability was caused by a mechanical failure. The pump was replaced.

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ATTACHMENT NO. 5

SEMI-ANNUAL SUMMARY OF HOURLY METEOROLOGICAL DATA

In accordance with Section 7.3.C.2 of Amendment 93 to the James A. FitzPatrick Nuclear Power Plant Technical Specifications, an annual summary of meteorological data may be included and submitted in the Semiannual Radioactive Effluent Release Report within 60 days after January 1 of each year.

Meteorological data for the period of January 1, 1991 through December 31, 1991 is not included in this report. It is on file and available upon request.

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ATTACHMENT NO. 6

REPORT NOTES

Table 2A Section A and B and Table 2B Normal Liquid Effluents

The values for Tritium, Strontium-88, Strontium-90, and Iron-55 were calculated from the most recent available sample data. If the actual sample data significantly alters the percent of allowable release limits, the report will be revised and redistributed.

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ADDENDUM 1

ASSESSMENT OF RADIATION DOSES TO THE PUBLIC JANUARY - DECEMBER 1991

1. INTRODUCTION

The James A. FitzPatrick Nuclear Power Plant Radiological Effluent Technical Specifications (RETS) require an assessment of the radiation doses to the public due to radioactive liquid and gaseous effluents. This assessment of doses to the public is based on accepted methodologies found in the Offsite Dose Calculation Manual (ODCM).

2. DOSE LIMITS

A. DOSE FROM LIQUID EFFLUENTS (RETS 2.3)

Applicability

Applies to doses from radioactive material in liquid effluents.

Objective

To ensure that the dose limitations of 10 CFR 50, Appendix I, are met.

Specifications

The dose to a member of the public from radioactive materials released from the plant in liquid effluents to unrestricted areas shall be limited as follows:

1. During any calendar quarter, limited to less than or equal to 1.5 mrem to the whole body and to less than or equal to 5 mrem to any organ.
2. During any calendar year, limited to less than or equal to 3 mrem to the whole body and to less than or equal to 10 mrem to any organ.

B. GASEOUS DOSE RATES (RETS 3.2)

Applicability

Applies to the radiation dose from radioactive material in gaseous effluents.

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ADDENDUM 1 (continued)

Objective

To ensure that the dose rates at or beyond the site boundary from gaseous effluents do not exceed the annual dose limits of 10 CFR 20, for unrestricted areas.

Specifications

The dose rate at or beyond the site boundary due to radioactive materials released from the plant in gaseous effluents shall be limited as follows:

1. Less than or equal to 1500 mrem/year to the whole body and less than or equal to 3000 mrem/year to the skin from noble gases.

C. AIR DOSE, NOBLE GASES (RETS 3.3)

Applicability

Applies to the air dose due to noble gases in gaseous effluents.

Objective

To ensure that the noble gas dose limitations of 10 CFR 50, Appendix I, are met.

Specifications

The air dose to areas at or beyond the site boundary from noble gases released from the plant in gaseous effluents shall be limited:

1. During any calendar quarter, to less than or equal to 5 mrad from gamma radiation, and less than or equal to 10 mrad from beta radiation; and,
2. During any calendar year, to less than or equal to 10 mrad from gamma radiation and less than or equal to 20 mrad from beta radiation.

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ADDENDUM 1 (continued)

D. DOSE DUE TO IODINE-131, IODINE-133, TRITIUM AND
RADIONUCLIDES IN PARTICULATE FORM (RETS 3.4)

Applicability

Applies to the cumulative dose from Iodine-131, Iodine-133, Tritium, and radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents.

Objective

To ensure that the dose limitations of 10 CFR 50, Appendix I, are met.

Specifications

The dose to a member of the public at or beyond the site boundary from Iodine-131, Iodine-133, Tritium, and radionuclides in particulate form with half-lives greater than 8 days released from the plant in gaseous effluents shall be limited:

1. During any calendar quarter to less than or equal to 7.5 mrem to any organ; and,
2. During any calendar year to less than or equal to 15 mrem to any organ.

E. TOTAL DOSE FROM URANIUM FUEL CYCLE (RETS 5.1)

Applicability

Applies to radiation dose from releases of radioactivity and radiation from uranium fuel cycle sources.

Objective

To ensure that the requirements of 40 CFR 190 are met.

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ADDENDUM 1 (continued)

Specifications

The dose or dose commitment to any member of the public, due to releases of radioactivity and radiation, from uranium fuel cycle sources shall be limited as follows:

1. Less than or equal to 25 mrem/year to the whole body; and,
2. Less than or equal to 25 mrem/year to any organ except the thyroid which shall be limited to less than or equal to 75 mrem/year.

3. DOSE ASSESSMENT

A. METHODOLOGY

The assessment of radiation doses to the public due to radioactive liquid and gaseous effluents is performed in accordance with the ODCM. The ODCM is based on methodologies and models suggested by the "Guidance Manual For Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants" (NUREG-0133) and "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the purpose of Evaluating Compliance with 10CFR50, Appendix I" (Regulatory Guide 1.109).

B. ASSUMPTIONS

Dose calculations are performed using formulas and constants defined in the ODCM. Specific radioactive release activities used in the dose calculations are listed in the Semiannual Radioactive Effluent Release Reports (1.21 Reports) for the period of January 1, 1991 to December 31, 1991. Historical meteorological data was used to generate tables of average dispersion factors. Locations of interest were identified from the 1991 land use census. Dispersion factors and locations of interest used in performing the dose calculations are listed in Table 2.

C. ASSESSMENT RESULTS SUMMARY

The calculated doses to the public due to radioactive effluents are listed on Table 1. The calculated doses are small fractions of their respective dose limits.

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ADDENDUM 1 (continued)

4. 40 CFR 190 DOSE ASSESSMENT

A. METHODOLOGY

Evaluation to demonstrate compliance with the 40 CFR 190 dose limits must be performed when the doses calculated for 10 CFR 50 compliance exceed twice their respective limits. When additional dose assessment is required to demonstrate compliance with 40 CFR 190 it is performed in accordance with the ODCM.

B. RESULTS SUMMARY

The cumulative dose contribution from liquid and gaseous effluents for this report period were calculated and are listed on Table 1. The calculated doses are less than twice their respective 10 CFR 50 limits, therefore, additional calculations are not necessary to demonstrate compliance with 40 CFR 190 dose limits (RETS 5.1.6).

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ADDENDUM 1 (continued)

TABLE 1
ANNUAL DOSE ASSESSMENT, 1991

A. LIQUIDS					
QUARTER	1	2	3	4	ANNUAL
Organ (mrem) (a)	1.21E-01	5.31E-04	1.12E-04	7.92E-05	1.22E-01
% of Limit	2.42E+00	1.06E-02	2.24E-03	1.58E-03	1.22E+00
Whole Body (mrem) (b)	5.70E-02	2.85E-04	6.27E-05	3.80E-05	5.74E-02
% of Limit	3.80E+00	1.90E-02	4.18E-03	2.53E-03	1.91E+00
B. NOBLE GASES					
QUARTER	1	2	3	4	ANNUAL
Total Body (mrem/yr)	1.39E-02	8.37E-03	1.12E-02	7.23E-03	4.06E-02
% of Limit	1.11E-02	6.70E-03	8.94E-03	5.78E-03	8.13E-03
Skin (mrem/yr)	2.04E-02	1.13E-02	1.66E-02	9.27E-03	5.76E-02
% of Limit	2.73E-03	1.51E-03	2.21E-03	1.24E-03	1.92E-03
Gamma (mrad)	1.45E-02	8.73E-03	1.16E-02	7.52E-03	4.23E-02
% of Limit	2.90E-01	1.75E-01	2.32E-01	1.50E-01	4.23E-01
Beta (mrad)	6.02E-03	2.39E-03	4.55E-03	1.90E-03	1.49E-02
% of Limit	6.02E-02	2.39E-02	4.55E-02	1.90E-02	7.43E-02
C. IODINES AND PARTICULATES					
QUARTER	1	2	3	4	ANNUAL
Organ (mrem) (c)	2.66E-02	2.89E-02	6.75E-04	6.60E-04	5.68E-02
% of Limit	3.54E-01	3.85E-01	9.00E-03	8.80E-03	3.79E-01

(a) Dose to the Teen Liver primarily by the fish pathway.

(b) Dose to the Adult Whole Body primarily by the fish pathway.

(c) Dose to the Infant Thyroid primarily by the goats milk pathway.

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ADDENDUM 1 (continued)

TABLE 2
METEOROLOGICAL DATA AND LOCATIONS OF INTEREST

RECEPTOR	GEOGRAPHIC LOCATION	ATMOSPHERIC DISPERSION FACTOR		
		RELEASE POINT	X/Q (sec/m ³)	D/Q (1/m ²)
A. IODINE & PARTICULATES				
1. Garden	0.9 mi @ 82°E	ST	-	1.62E-09
Grazing Season	0.9 mi @ 82°E	RX	-	5.18E-09
Cary	0.9 mi @ 82°E	TB	-	4.74E-09
Location No. 78	0.9 mi @ 82°E	RF	-	5.18E-09
	0.9 mi @ 82°E	RW	-	6.10E-09
2. Meat	1.2 mi @ 126°SE	ST	-	8.39E-10
Grazing Season	1.2 mi @ 126°SE	RX	-	1.72E-09
Parkhurst	1.2 mi @ 126°SE	TB	-	1.61E-09
Location No. 26	1.2 mi @ 126°SE	RF	-	1.72E-09
	1.2 mi @ 126°SE	RW	-	2.01E-09
3. Cow	2.2 mi @ 138°SE	ST	-	3.87E-10
Grazing Season	2.2 mi @ 138°SE	RX	-	6.57E-10
France	2.2 mi @ 138°SE	TB	-	6.30E-10
Location No. 10	2.2 mi @ 138°SE	RF	-	6.57E-10
	2.2 mi @ 138°SE	RW	-	7.23E-10
4. Goat	2.5 mi @ 146°SE	ST	-	3.30E-10
Grazing Season	2.5 mi @ 146°SE	RX	-	5.33E-10
Nickolas	2.5 mi @ 146°SE	TB	-	5.13E-10
Location No. 61	2.5 mi @ 146°SE	RF	-	5.33E-10
	2.5 mi @ 146°SE	RW	-	5.80E-10
5. Resident Annual Average				
a Inhalation	1.9 mi @ 90°E	ST	3.16E-08	-
	0.9 mi @ 82°E	RX	2.81E-07	-
	0.9 mi @ 82°E	TB	2.41E-07	-
	0.9 mi @ 82°E	RF	2.81E-07	-
	0.9 mi @ 82°E	RW	4.38E-07	-

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ADDENDUM 1 (continued)

TABLE 2
METEOROLOGICAL DATA AND LOCATIONS OF INTEREST

RECEPTOR		GEOGRAPHIC LOCATION	ATMOSPHERIC DISPERSION FACTOR		
A.	IODINE & PARTICULATES	DISTANCE/ DIRECTION	RELEASE POINT	X/Q (sec/m ³)	D/Q (l/m ²)
<hr/>					
	b. Deposition	0.9 mi @ 82°E	ST	-	1.63E-09
		0.7 mi @ 118°ESE	RX	-	5.99E-09
		0.7 mi @ 118°ESE	TB	-	5.45E-09
		0.7 mi @ 118°ESE	RF	-	5.99E-09
		0.7 mi @ 118°ESE	RW	-	7.06E-09
<hr/>					
B. NOBLE GASES					
1.	Air Dose	1.9 mi @ 90°E	ST	3.16E-08	-
	Annual Average	0.6 mi @ 90°E	ST(fc)	1.44E-07	-
		0.6 mi @ 90°E	RX	4.83E-07	-
		0.6 mi @ 90°E	TB	3.96E-07	-
		0.6 mi @ 90°E	RF	4.83E-07	-
		0.6 mi @ 90°E	RW	7.47E-07	-
2.	Total Body	0.6 mi @ 90°E	ST(fc)	1.44E-07	-
	Annual Average	0.6 mi @ 90°E	RX	4.83E-07	-
		0.6 mi @ 90°E	TB	3.96E-07	-
		0.6 mi @ 90°E	RF	4.83E-07	-
		0.6 mi @ 90°E	RW	7.47E-07	-
3.	Skin	1.9 mi @ 90°E	ST	3.16E-08	-
	Annual Average	0.6 mi @ 90°E	ST(fc)	1.44E-07	-
		0.6 mi @ 90°E	RX	4.83E-07	-
		0.6 mi @ 90°E	TB	3.96E-07	-
		0.6 mi @ 90°E	RF	4.83E-07	-
		0.6 mi @ 90°E	RW	7.47E-07	-

ST = Main Stack
RX = Reactor Building
TB = Turbine Building Vent
RF = Refuel Floor Vent
RW = Radwaste Vent
fc = Finite Cloud