

NEW YORK POWER AUTHORITY  
JAMES A. FITZPATRICK NUCLEAR POWER PLANT  
ADDENDUM TO THE  
EFFLUENT AND WASTE DISPOSAL  
SEMIANNUAL REPORT

JULY 1985 - DECEMBER 1985

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## TABLE 6

NEW YORK POWER AUTHORITY  
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EFFLUENT AND WASTE DISPOSAL  
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ASSESSMENT OF RADIATION DOSES TO THE GENERAL PUBLIC

### INTRODUCTION

The James A. FitzPatrick Nuclear Power Plant Technical Specifications require that the radiation doses to the likely most exposed member of the public from reactor releases be assessed. The doses to the public are assessed by using dose model calculations. The dose models are based on acceptable methodologies found in the Offsite Dose Calculation Manual (ODCM). The ODCM also provides for the calculation of offsite doses based on the results of environmental field sampling. Both calculation methods are based on the methodology presented in Regulatory Guide 1.109. The doses to the likely most exposed member of the public are calculated for the calendar period of July 1, 1985 through December 31, 1985. These dates cover the period of time for the 1985 calendar year during which the Radiological Effluent Technical Specification were in effect. For the first half of 1985 the requirement to perform dose calculations did not exist and doses to the public during that period are not included in this report.

### MODEL CONSIDERATIONS

Calculated doses are not based on actual environmental sample data for 1985, with the exception of doses from direct radiation. To provide for possible physical variations in actual parameters from those used in the dose model (i.e. residence time inhalation rates, consumption rates etc.) and for simplification, it is assumed in dose calculations that the likely most exposed member of the public is positioned in the maximum receptor location for each pathway during the assessment period.

1. Inhalation Dose - The inhalation dose is calculated at the critical residence due to the high occupancy factor.
2. Cow Milk Ingestion - The cow milk ingestion dose is calculated using the critical milk cow location based on atmospheric dispersion factors. The likely most exposed member of the public is assumed to obtain milk from the critical milk location.

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3. Goat Milk Ingestion - The goat milk ingestion pathway is calculated based on the critical goat location. Again, the likely most exposed member of the public is assumed to obtain goat's milk from the critical goat milk location.
4. Meat Consumption - The maximum dose resulting from meat consumption is based a the critical meat location which is considered to be at the critical milk cow location. The likely most exposed member of the public is assumed to obtain meat from the critical meat animal location.
5. Fruit and Vegetable Consumption - The maximum dose associated with the consumption of fruits and vegetables is calculated using the critical garden location. The likely most exposed member of the public is assumed to obtain vegetables from the critical garden location.
6. Direct Radiation - The dose as a result of direct radiation from the site includes contribution from direct shine from the two generating facilities located at the site, direct radiation from the overhead gaseous plume and plume submersion and from ground plane deposition. This total dose is measured by environmental TLD. The critical location is based on the closest year round residence from the generating facilities as well as the closest residence in the critical downwind sector in order to evaluate both direct radiation from the generating facilities and gaseous plumes as determined by local meteorology. During 1985 (3rd & 4th quarters), the closest resident and the critical downwind resident are at the same location.
7. Liquid Pathways - Doses to the likely most exposed member of the public as a result of liquid releases were calculated using the potable water, fish consumption, shoreline deposition and boating pathways. The critical resident was assumed to participate in the aquatic activities, consume potable water and fresh water fish.

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8. Activities Inside The Site Boundary - Doses to members of the public as a result of activities inside the site boundary are limited to activities at the Energy Information Center. This site is open to the public and offers educational information and summer picnicking sites. The dose pathways considered for activities at the Energy Information Center include direct radiation and inhalation. The direct radiation evaluation includes contributions from four possible components; direct radiation from the generating facilities, direct radiation from a possible overhead plume, direct radiation from plume submersion and direct radiation from ground plane deposition. The direct radiation pathway is evaluated using high sensitivity environmental TLD's. The inhalation pathway is evaluated using the source term for tritium, iodine and particulates with halflives greater than 8 days.

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CALCULATION FACTORS

1. Meteorology - actual meteorological data and sector wind frequency distribution for the time period of July 1, 1985 through December 31, 1985 was used to determine average dispersion factors (X/Q, D/Q) used in the dose calculations. Meteorological data for the period was submitted in the Semiannual Report for the period of July 1, 1985 through December 31, 1985 Table 4. See Table 6-1 for specific X/Q and D/Q Values.
2. Specific Activities - The specific release activities used in the dose assessment are listed in the Semiannual Radioactive Effluent Release Report (1.21 Report) for the period of July 1, 1985 through December 31, 1985.
  - a. Noble gases - Table 1B elevated  
- Table 1C ground level
  - b. Iodine and particulates - Table 1B elevated  
- Table 1C ground level
  - c. Liquid effluents - Table 2B
3. Residence Time
  - a. Energy Information Center - 48 hours/year
  - b. Critical resident - 24 hours/day
4. Receptor locations
  - a. See Table 6-1

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5. Direct Radiation:

a. Energy Information Center:

Data from two environmental TLD's located immediately to the east and west of the Energy Information Center are compared to the average of the three TLD control locations. The average Energy Information Center TLD dose was 7.0 mrem per standard month (based on TLD data for the entire year). The average control TLD dose was 7.0 mrem per standard month. The net dose is 0.0 mrem per standard month or 0.0 mrem for the period covered by this assessment.

b. Critical resident:

The measured direct radiation dose for the second half of 1985 to the critical resident is based on TLD data which measured the annual dose to be 66 mrem or 5.5 mrem per standard month. The average annual control dose, based on the average of three control locations, was recorded to be 67.5 mrem or 5.6 mrem per standard month. The net critical residence dose is less than the control dose which results from naturally occurring radionuclides in the soil and rock in the environment. The direct radiation dose to the critical resident as a result of activities at the generating facilities is assumed to be 0.0 bases on TLD data.

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4. CALCULATION RESULTS

The results of calculated doses are contained in Table 6-2. The total dose of each organ was calculated based on the assumption that the likely most exposed member of the public received the dose that would be accumulated as a result of participation in aquatic recreation and consuming food products from each of the critical receptor locations.

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TABLE 6-1  
 CRITICAL RECEPTOR DATA

RECEPTOR	GEOGRAPHIC LOCATION	ATMOSPHERIC DISPERSION FACTORS			
		*RELEASE POINT	X/Q (sec/m <sup>3</sup> )	D/Q (1/m <sup>2</sup> )	
<b>A. IODINES &amp; PARTICULATES</b>					
1. Critical Garden	0.8 mi @ 107° (ESE)	ST	---	1.2E-9	
	1.2 mi @ 82° (E)	TB	---	6.3E-9	
	0.8 mi @ 107° (ESE)	RW	---	4.2E-9	
	1.2 mi @ 82° (E)	RX/RF	---	2.9E-9	
2. Critical Cow/Meat	2.2 mi @ 138° (SE)	ST	---	4.5E-10	
	" "	TB	---	6.4E-10	
	" "	RW	---	7.5E-10	
	" "	RX/RF	---	6.5E-10	
3. Critical Goat	7.5 mi @ 89° (E)	ST	---	1.0E-10	
	" "	TB	---	1.1E-10	
	" "	RW	---	1.3E-10	
	" "	RX/RF	---	1.2E-10	
4. Critical Resident	a. Inhalation	0.9 mi @ 82° (E)	ST	2.4E-8	---
		" "	TB	1.3E-7	---
		" "	RW	3.1E-7	---
		" "	RX/RF	1.3E-7	---
	b. Deposition	0.7 Mi @ 118° (ESE)	ST	---	1.3E-9
		" "	TB	---	3.0E-9
		" "	RW	---	5.2E-9
		" "	RX/RF	---	3.3E-9
<b>B. NOBLE GASES</b>					
1. Energy Information Center	0.9 mi @ 266° (W)	ST	9.9E-10	---	
	" "	TB	2.1E-8	---	
	" "	RW	1.9E-7	---	
	" "	RX/RF	1.8E-8	---	
2. Critical Resident (Site Boundry)	1.5 mi @ 202° (SSW)	ST	7.6E-8	---	
	0.6 mi @ 90° (E)	TB	1.6E-7	---	
	" "	RW	4.9E-7	---	
	" "	RX/RF	1.9E-7	---	

\* ST = Main Stack, TB = Turbine Building Vent, RW = Radwaste Building Vent  
 RX/RF = Reactor Building/Refuel Floor Vent



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Table 6-1 (Con't)  
 CRITICAL RECEPTOR DATA

C. DIRECT RADIATION	GEOGRAPHIC LOCATION	MEASURED DOSE
TLD LOCATIONS	DISTANCE/DIRECTION	MREM/STANDARD MONTH*
1. Critical Residence	0.7 mi @ 118°	5.5
2. Control Location #1	16.4 mi @ 42°	6.2
3. Control Location #2	12.6 mi @ 226°	5.6
4. Control Location #3	19.8 mi @ 170°	5.2
5. Energy Information Center	0.88 mi @ 266°(W)	5.9

\* BASED ON ANNUAL MEASURE DOSE

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TABLE 6-2  
 MAXIMUM INDIVIDUAL ORGAN DOSES IN mRem

Source	Total Body	Skin	Liver	Thyroid	Kidney	Lung	GI-LLI	Bone
A. Gaseous Pathway								
1. Noble Gases	8.7E-3	1.7E-2	—	—	—	—	—	—
2. Radioiodines Particulates	9.7E-4 CHILD* GPD**	8.1E-4 CHILD* GPD**	1.0E-3 INFANT* GPD**	8.2E-2 INFANT* COWSM**	1.1E-3 CHILD* GPD**	7.6E-4 TEEN* GPD**	1.1E-3 TEEN* GPD**	2.6E-3 CHILD* SFV**
B. Liquid Pathway	5.3E-6 TEEN* LSD**	6.5E-7 TEEN* LSD**	5.4E-6 TEEN* LSD**	4.8E-6 TEEN* LSD**	4.8E-6 TEEN* LSD**	4.8E-6 TEEN* LSD**	8.4E-6 TEEN* FWF**	3.8E-6 TEEN* LSD**
C. Direct Radiation	0.0	—	—	—	—	—	—	—
D. Activities Inside Site Boundry (All Sources)	4.2E-4 NG**	1.1E-3 NG**	—	3.4E-6 CHILD* INHAL**	—	—	—	—

\* AGE GROUP OF MAXIMUM ORGAN DOSE

\*\* PRIMARY PATHWAY FOR DOSE CONTRIBUTION TO EACH ORGAN

Where: GPD = Ground Plant Deposition  
 COWSM = Cows Milk  
 SFV = Stored Fruits/Vegetables  
 NG = Noble Gases  
 INHAL = Inhalation  
 LSD = Lake Shore Deposits  
 FWF = Fresh Water Fish

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5. 40 CFR 190 Assessment

The James A. FitzPatrick Nuclear Power Plant Technical Specifications require that radiation doses to the likely most exposed member of the public are assessed relative to 40 CFR 190 requirements. The dose limits of 40 CFR 190 are 25 mrem (whole body or organ) per calendar year and 75 mrem (thyroid) per calendar year. The requirement of 40 CFR 190 states that the effluents of the James A. FitzPatrick Nuclear Power Plant and other nearby uranium fuel cycle facilities be considered. In this case, the effluents of the James A. FitzPatrick Nuclear Power Plant and the Nine Mile Point-1 Power Plant must be considered. The maximum total dose to the thyroid is calculated to be 1.1 mrem and the maximum organ dose is 0.03 mrem to the bone. The calculated doses are based on reactor effluents from the Nine Mile -1 facility for the entire year of 1985. The dose contribution from the James A. FitzPatrick Nuclear Power Plant are based on reactor releases for only the third and fourth quarter of 1985. The calculated doses are well below the requirements of 40 CFR 190 and demonstrate compliance.

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ENVIRONMENTAL SAMPLE LOCATION CHANGES

The location (direction and distance) for the critical dairy cow, milk goat and garden have changed. In each case the replacement location is in a less critical location with respect to atmosphere dispersion factors.

1. The critical dairy cow, was part of a small dairy operation which is no longer in existence because of a death in the family. There are no plans to restart a dairy operation. The new critical dairy cow location is located in the southeast sector 2.2 miles from the site.
2. The critical goat location changed because the owners of the previous location have discontinued goat raising. The owners of the new critical goat location indicated at the time of the census that they do not consume goats milk. It is assumed, however, that the owners do consume goats milk for conservative dose estimates. The new critical location is located in the east sector, 7.5 miles from the site.
3. The critical garden location was changed as a result of the owners selling their residence and land to move. The residence will be destroyed or moved and the land sold to Oswego County for park land development. The new critical garden is located in the east sector 0.9 miles from the site.
4. TLD map #22 was changed to Hickory Grove Road (4.5 miles at 97° E) from Demster Beach Road (4.8 miles at 97° E) because of continual theft of the TLD. The new location is still within the Technical Specification requirements for environmental TLDs.

This section is included in accordance with the requirements of RETS 6.2, Land Census Program.

TABLE 8

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DEVIATIONS FROM THE REQUIRED ENVIRONMENTAL SAMPLING SCHEDULE

EXCEPTION TO THE PROGRAM

1. The air sampling pump at the R2 offsite environmental sampling station was inoperable from October 3, 1985 (0800 hours) to October 4, 1985 (0830 hours). Inoperability was the result of de-energizing the pump for electrical repair, circuit box upgrade, and wiring change.
2. The air sampling pump at the R3 offsite environmental sampling station was inoperable from October 16, 1985 (0821 hours) to October 16, 1985 (1503 hours). Inoperability was the result of de-energizing the pump for circuit box upgrade and wiring change.
3. The air sampling pump at the R4 offsite environmental sampling station was inoperable from October 17, 1985 (0812 hours) to October 17, 1985 (1442 hours). Inoperability was the result of de-energizing the pump for circuit box upgrade and wiring change.
4. The air sampling pump at the R1 offsite environmental sampling station was inoperable from October 18, 1985 (0750 hours) to October 18, 1985 (1437 hours). Inoperability was the result of de-energizing the pump for circuit box upgrade and wiring change.
5. The air sampling pump at the R5 offsite environmental sampling station was inoperable from October 29, 1985 (0914 hours) to October 30, 1985 (1345 hours). Inoperability was the result of de-energizing the pump for circuit box upgrade and wiring change.
6. The air sampling pump at the R2 offsite environmental sampling station was inoperable from November 17, 1985 (1105 hours) to November 19, 1985 (1243 hours). Inoperability was caused by an electrical malfunction.

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DEVIATIONS FROM THE REQUIRED ENVIRONMENTAL SAMPLING SCHEDULE

7. The air sampling pump at the R2 offsite environmental sampling station was inoperable from December 17, 1985 (0820 hours) to December 17, 1985 (1255 hours). Inoperability was caused by an electrical malfunction.
8. The spring collection of GAMMARUS did not contain sufficient quantities for Sr-89 and Sr-90 analysis as required by Table 4.3.1, Appendix B of the James A. FitzPatrick Nuclear Power Plant Environmental Technical Specifications, which were in effect at the time of the sample collection. As required by plant procedures, three attempts were made to obtain sufficient quantities of GAMMARUS for analysis. The unavailability of GAMMARUS is most likely due to the unseasonably cold temperature of Lake Ontario and the delay of the spring lake turnover. Few GAMMARUS were inhabiting the shoreline shallows during the spring sampling season. The collection of GAMMARUS in sufficient quantities has historically (1982 and 1984) been a difficult sample medium to obtain due to seasonal unavailability.

NOTE: ATTACHED IS A REVISION TO TABLE 5 OF THE JAMES A. FITPATRICK NUCLEAR POWER PLANT SEMIANNUAL RADIOLOGICAL EFFLUENT RELEASE REPORT, FOR THE PERIOD OF JULY 1, 1985 THROUGH DECEMBER 31, 1985, DATED FEBRUARY 28, 1986.

TABLE 5 FROM THE ORIGINAL SUBMITTAL SHOULD BE REPLACED BY THE ATTACHED CORRECTED PAGE.

TABLE 5

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SUMMARY OF CHANGES TO OFFSITE DOSE CALCULATION MANUAL

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 Process Surveillance Procedures (PSP) and Offsite Dose Calculation Manual (ODCM) during the reporting period are to be included in the Semiannual Radiological Effluent Release Report. Pursuant to this requirement, the following information is provided:

No changes or revisions were made to the Process Control Program or the ODCM during the reporting period of July 1, 1985 through December 31, 1985.

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Although the ODCM was not changed or revised during the above referenced reporting period, it has undergone two revisions during the period of time between the original submittal for review by the Commission (October 26, 1983) and the beginning of this reporting period. The referenced revisions are dated; June 15, 1983 (Rev. 0), June 25, 1985 (Rev. 1) and June 28, 1985 (Rev. 2). Appendix I to this document provides a copy of the latest revision to the ODCM (Rev. 2) which will serve as a reference for future changes to the ODCM.

- \* Revision No. 1 to Semiannual Radioactive Effluent Release Report Dated February 28, 1986.