

YANKEE ATOMIC ELECTRIC COMPANY



1671 Worcester Road, Framingham, Massachusetts 01701

March 29, 1988

FYR 88-41

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

References: (a) License No. DPR-3 (Docket No. 50-29)
(b) Letter, YAEC to USNRC, dated February 26, 1988

Subject: Semiannual Effluent Release Report

Dear Sir:

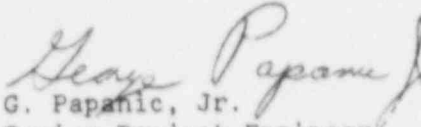
Enclosed please find the supplemental report which includes the summary of estimates of off-site radiation doses resulting from plant effluents during 1987. This information is submitted in accordance with Technical Specification 6.9.5.b.

For convenience, the above supplemental report is submitted with the inclusion of the 1987 third and fourth quarters radioactive liquid and gaseous releases, and solid waste disposal table summaries, which were previously submitted in Reference (b).

We trust that this information is satisfactory; however, should you have any questions, please contact us.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY


G. Papanic, Jr.
Senior Project Engineer
Licensing

GP/25.517

Enclosures

cc: USNRC Region I
USNRC Resident Inspector, YNPS

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EFFLUENT AND WASTE DISPOSAL
SEMIANNUAL REPORT
FOR
THIRD AND FOURTH QUARTERS, 1987
INCLUDING
ANNUAL RADIOLOGICAL IMPACT ON MAN
FOR 1987

Yankee Atomic Electric Company
Rowe, Massachusetts

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ERRATA

In the Yankee Effluent and Waste Disposal Semiannual Report covering the first and second quarters of 1987, the following corrections should be made:

Supplemental Information

None

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YANKEE ATOMIC ELECTRIC COMPANY
SEMIANNUAL EFFLUENT RELEASE REPORT
JULY - DECEMBER 1987

1.0 INTRODUCTION

Tables 1 through 3 list the recorded radioactive liquid and gaseous effluents and solid waste for the second six months of the year, with data summarized on a quarterly basis. Table 4 summarizes the estimated radiological dose commitments from all radioactive liquid and gaseous effluents released during the year 1987. Tables 5A through 5H report the cumulative joint frequency distributions of wind speed, wind direction, and atmospheric stability for the 12-month period, January to December 1987. Radioactive effluents reported in the Semiannual Effluent Report covering the first six months of the year were used to determine the off-site doses for the first half of 1987.

As required by Technical Specification 6.9.5.b dose commitments resulting from the release of radioactive materials in liquids and gases were estimated in accordance with the "Yankee Nuclear Power Station Off-Site Dose Calculation Manual" (ODCM). These dose estimates were made using a "Method II" analysis as described in the ODCM. A "Method II" analysis incorporates the methodology of Regulatory Guide 1.109 (Reference 1) and actual measured meteorological data recorded during the reporting period. For batch gaseous releases, the meteorological conditions concurrent with the time of release of radioactive materials (as determined by sampling frequency and measurement) were used for determining the gaseous pathway doses. As required by Technical Specification 6.9.5.b.(2), this report shall also include an assessment of the radiation doses from radioactive effluents to member(s) of the public due to allowed recreational activities inside the site boundary during the year. However, for this reporting period, no recreational activities inside the site boundary were permitted, and therefore are not addressed. The limited use of the Information Center on-site is associated with educational activities as they pertain to the production of electricity and as such are not included under Specification 6.9.5.b.(2). Assessment of

radiation doses (including direct radiation) to the likely most exposed real member(s) of the public for the calendar year for the purposes of demonstrating conformance with 40 CFR 190, Environmental Radiation Protection Standards for Nuclear Power Operations, are also required to be included in this report, if the conditions indicated in Technical Specification 3.11.4, "Total Dose" have been exceeded during the year. Since the conditions indicated in the action statement under Technical Specification 3.11.4.a were not entered into during the year, no additional radiation dose assessments are required.

All calculated dose estimates for this reporting period are well below the dose criteria of 10 CFR Part 50, Appendix I.

Appendices A through H indicate the status of reportable items per the requirements of Technical Specifications 3.3.3.6, 3.3.3.7, 3.11.1.4, 3.4.12.1, 3.12.2, 6.14.1, 6.15.2, and 6.16.1.

2.C METEOROLOGICAL DATA

Meteorological data was collected during the reporting period from the site's 200 foot meteorological tower located approximately 180 meters north of the vapor container. The tower instrumentation is designed to meet the requirements of Regulatory Guide 1.23 (Reference 2) for meteorological monitoring.

The main release point for gases discharged from the plant is via the 150 foot primary vent stack, located between the vapor container and the primary auxiliary building. The primary vent stack is treated as a mixed mode elevated release point dependent upon windspeed as described in Regulatory Guide 1.111 (Reference 3).

X/Q and D/Q values were derived for all receptor points from the site meteorological record using a straight line airflow model. All dispersion and deposition factors have been calculated employing appropriate source configuration considerations and removal mechanism (e.g., dry deposition) described in Regulatory Guide 1.111 (Reference 3). Terrain elevations, including downwind valley flow corrections for the surrounding area were factored into the calculation of X/Q and D/Q values at each receptor location.

3.0 DOSE ASSESSMENT

3.1 Doses from Liquid Effluents

Technical Specification 3.11.1.2 limits total body (1.5 mrem per quarter, and 3 mrem per year) and organ doses (5 mrem per quarter, and 10 mrem per year) from liquid effluents to a member of the public to those specified in 10 CFR Part 50, Appendix I. By implementing the requirements of 10 CFR Part 50, Appendix I, Technical Specification 3.11.1.2 assures that the release of radioactive material in liquid effluents will be kept "as low as is reasonably achievable."

Exposure pathways that could exist as a result of liquid effluents are fish, direct exposure from river shoreline sedimentation, milk and meat via animal ingestion of the Deerfield River water, and meat, milk and vegetable pathways via crop irrigation with water withdrawn from the Deerfield River. The drinking water and aquatic invertebrate pathways do not exist downriver of the Yankee Plant at Rowe.

The dose analysis for the liquid pathways, given above, assumes a dilution based on the monthly average flow at the Sherman Dam. This results in conservative dose estimates from the liquid effluents.

The resultant whole body and organ doses from liquid effluents were determined by summing the contributions from all pathways at each location. The whole body and organ doses to a member of the public from liquid effluents are given in Table 4. The estimated quarterly and annual doses due to liquid effluents are well below the 10 CFR Part 50, Appendix I dose criteria of Technical Specification 3.11.1.2.

3.2 Doses From Noble Gases

Technical Specification 3.11.2.2 limits the gamma air dose (5 mrad per quarter, and 10 mrad per year) and beta air (10 mrad per quarter, and 20 mrad per year) dose from noble gases released in gaseous effluents from the site to areas at and beyond the site boundary to those specified in 10 CFR Part 50, Appendix I. By implementing the requirements of 10 CFR Part 50, Appendix I, Technical Specification 3.11.2.2 assures that the releases of radioactive noble gases in gaseous effluents will be kept "as low as is reasonably achievable."

Dose estimates due to the release of noble gases to the atmosphere were calculated at the site boundary, nearest resident, nearest vegetable garden and nearest milk animal in each of the sixteen principle compass directions, as well as the point of highest off-site ground level air concentration of radioactive materials. Gamma and beta air doses, as well as whole body and skin doses, were calculated at each of the above locations.

To determine the beta contribution to the skin dose, a semi-infinite cloud model was utilized. The whole body gamma dose was calculated using a finite cloud sector average model with a Gaussian distribution of activity in the vertical plane. The gamma radiation received from the cloud at a point of interest was determined by integrating the contribution from a differential volume over the entire cloud, taking into account the geometry of the cloud, variation in concentration, attenuation by the interaction of photons with matter in the path between the source and receptor point, and scattering of radiation from material outside the direct path to the point of interest. For skin and whole body doses an attenuation factor of 0.7 was applied to the dose calculations to account for the dose reduction due to shielding which would be provided by a residential structure. No additional credit was taken for decay of radionuclides in transit to the receptor point.

The estimated quarterly and annual gamma and beta air doses at the point of highest off-site exposure are listed in Table 4. The estimated gamma and beta air doses due to noble gases released in gaseous effluents are well below the 10 CFR Part 50, Appendix I dose criteria of Technical Specification 3.11.2.2.

3.3 Doses From Iodine-131, Tritium and Radionuclides in Particulate Form With Half-Lives Greater Than 8 Days

Technical Specification 3.11.2.3 limits the organ dose to a member of the public from iodine-131, tritium and radionuclides in particulate form with half-lives greater than 8 days (hereafter called iodines and particulates) in gaseous effluents released from the site to areas at and beyond the site boundary to those specified in 10 CFR Part 50, Appendix I (7.5 mrem per quarter, and 15 mrem per year). By implementing the requirements of 10 CFR Part 50, Appendix I, Technical Specification 3.11.2.3 assures that the releases of iodines and particulates in gaseous effluents will be kept "as low as is reasonably achievable."

Exposure pathways that could exist as a result of the release of iodines and particulates to the atmosphere include external irradiation from activity deposited onto the ground surface, inhalation and ingestion of vegetables, meat and milk. Dose estimates were made at the site boundary, nearest resident, nearest vegetable garden and nearest milk animal in each of the sixteen principle compass directions. The nearest resident, nearest vegetable garden and nearest milk animal in each sector were identified by the most recent Annual Land Use Census as required by Technical Specification 3.12.2. Doses were also calculated at the point of maximum ground level air concentration of radioactive materials in gaseous effluents. Doses were calculated for pathways which were determined by the field survey to actually exist. Conservatively, a vegetable garden was assumed to exist at each milk animal location. Furthermore, the meat pathway was assumed to exist at each milk animal location. Meat animals were assumed to receive their entire intake from pasture during the second and third quarters. Milk animals were assumed to receive 50 percent of their intake from pasture during this period. This assumption is realistic since most dairy operations utilize supplemental feeding of animals when on pasture or actually restrict animals to full time silage feeding throughout the entire year.

The resultant organ doses were determined after adding the contributions from all pathways at each location. Doses were calculated for the whole body, GI-tract, bone, liver, kidney, thyroid, lung and skin for adults, teenagers, children and infants. The maximum estimated quarterly and annual organ doses due to iodines and particulates at any of the off-site receptor locations are reported in Table 4. The doses to all other organs at all other locations for all other age groups are less than the doses reported in Table 4. The estimated organ doses from iodines and particulates in gaseous effluents are well below the 10 CFR Part 50, Appendix I dose criteria of Technical Specification 3.11.2.3.

REFERENCES

1. Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Release of Reactor Effluents for the Purpose of Evaluating Compliance With 10 CFR Part 50, Appendix I," U.S. Nuclear Regulatory Commission, Office of Standards Development, Revision 1, October 1977.
2. Regulatory Guide 1.23, "On-Site Meteorological Programs (Safety Guide 23)," U.S. Nuclear Regulatory Commission, Office of Standards Development, February 1972.
3. Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light - Water - Cooled Reactors," U.S. Nuclear Regulatory Commission, Office of Standards Development, Revision 1, October 1977.

TABLE 1A

Yankee Atomic Electric Company, Rowe, Massachusetts
 Effluent and Waste Disposal Semiannual Report
 Third and Fourth Quarters, 1987
 Gaseous Effluents - Summation of All Releases

Unit	Quarter 3	Quarter 4	Est. Total Error, %
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A. Fission and Activation Gases

1. Total release	Ci	7.74E+01	7.17E+01	±5.50E+01
2. Average release rate for period	uCi/sec	9.85E+00	9.12E+00	
3. Percent of Tech. Spec. limit (1)(4)	%	7.42E-01	6.58E-01	

B. Iodines

1. Total Iodine-131	Ci	2.10E-05	4.25E-06	±2.50E+01
2. Average release rate for period	uCi/sec	2.67E-06	5.41E-07	
3. Percent of Tech. Spec. limit (2)(4)	%	6.40E-02	4.93E-02	

C. Particulates

1. Particulates with T-1/2 > 8 days	Ci	2.69E-06	2.71E-06	±3.00E+01
2. Average release rate for period	uCi/sec	3.42E-07	3.45E-07	
3. Percent of Tech. Spec. limit	%	(3)	(3)	
4. Gross alpha radioactivity	Ci	2.80E-08	1.42E-08	

D. Tritium

1. Total release	Ci	9.42E-01	1.47E+00	±3.00E+01
2. Average release rate for period	uCi/sec	1.20E-01	1.87E-01	
3. Percent of Tech. Spec. limit	%	(3)	(3)	

- (1) Technical Specification 3.11.2.2.a for gamma air dose. Percent values for Technical Specification 3.11.2.2.b for beta air dose are approximately the same.
- (2) Technical Specification 3.11.2.3.a for dose from I-131, Tritium, and radionuclides in particulate form.
- (3) Per Technical Specification 3.11.2.3, dose contribution from Tritium and particulates are included with I-131 above in Part B.

TABLE 1B

Yankee Atomic Electric Company, Rowe, Massachusetts
 Effluent and Waste Disposal Semiannual Report
 Third and Fourth Quarters, 1987
 Gaseous Effluents - Elevated Release

Nuclides Released	Unit	Continuous Mode		Batch Mode(1)	
		Quarter	Quarter	Quarter	Quarter
		3	4	3	4
1. Fission Gases					
Krypton-85	Ci	2.09E-02	1.36E-02		
Krypton-85m	Ci	8.68E-01	8.02E-01		
Krypton-87	Ci	7.51E-01	8.09E-01		
Krypton-88	Ci	1.54E+00	1.58E+00		
Xenon-133	Ci	4.06E+01	3.48E+01		
Xenon-135	Ci	1.52E+01	1.36E+01		
Xenon-135m	Ci	1.61E+01	1.85E+01		
Xenon-138	Ci	4.83E-01	5.26E-01		
Xenon-133m	Ci	8.68E-01	4.63E-01		
Argon-37	Ci	3.38E-02	2.55E-02		
Argon-41	Ci	4.62E-01	3.35E-01		
Carbon-14	Ci	3.60E-03	2.34E-03		
Xenon-131m	Ci	5.21E-01	2.78E-01		
Unidentified	Ci				
Total for period	Ci	7.74E+01	7.17E+01		
2. Iodines					
Iodine-131	Ci	2.10E-05	4.25E-06		
Iodine-133	Ci	1.63E-05	<1.67E-06		
Iodine-135	Ci	<1.90E-06	<1.92E-07		
Total for period	Ci	3.73E-05	4.25E-06		
3. Particulates					
Strontium-89	Ci	<7.72E-08	<3.79E-08		
Strontium-90	Ci	<8.69E-09	<5.42E-09		
Cesium-134	Ci	9.75E-08	1.04E-07		
Cesium-137	Ci	4.05E-07	5.75E-07		
Barium-Lanthanum-140	Ci	<1.19E-06	<9.54E-07		
Zinc-65	Ci	<9.30E-07	<7.19E-07		
Cobalt-58	Ci	<3.97E-07	<2.98E-07		
Cobalt-60	Ci	2.06E-06	2.03E-06		
Iron-59	Ci	<8.27E-07	<6.44E-07		
Chromium-51	Ci	8.14E-08	<2.04E-06		
Zirconium-Niobium-95	Ci	1.99E-08	<5.05E-07		
Cerium-141	Ci	<3.41E-07	<2.65E-07		
Cerium-144	Ci	<1.47E-06	<1.14E-06		
Antimony-124	Ci	<3.71E-07	<2.96E-07		
Manganese-54	Ci	2.40E-08	<3.13E-07		
Silver-110m	Ci	<3.71E-07	<2.78E-07		
Molybdenum-99	Ci	<2.80E-06	<2.13E-06		
Ruthenium-103	Ci	<3.41E-07	<2.66E-07		
Total for period	Ci	2.69E-06	2.71E-06		

(1) There were no batch mode releases during this reporting period.

TABLE 1C

Yankee Atomic Electric Company, Rowe, Massachusetts
Effluent and Waste Disposal Semiannual Report
Third and Fourth Quarters 1987
Gaseous Effluents - Ground Level Releases

There were no routine measured ground level continuous or batch mode gaseous releases during the third or fourth quarters of 1987.

TABLE 2A

Yankee Atomic Electric Company, Rowe, Massachusetts
 Effluent and Waste Disposal Semiannual Report
 Third and Fourth Quarters, 1987
 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, gases, alpha)	Ci	4.29E-03	1.29E-03	±2.00E+01
2. Average diluted concentration during period	uCi/ml	6.76E-11	2.00E-11	
3. Percent of applicable limit (1)	%	7.18E-03	1.41E-03	
B. Tritium				
1. Total release	Ci	3.12E+01	5.48E+01	±1.00E+01
2. Average diluted concentration during period	uCi/ml	4.91E-07	8.50E-07	
3. Percent of applicable limit (1)	%	1.64E-02	2.83E-02	
C. Dissolved and Entrained Gases				
1. Total release	Ci	1.97E-02	7.57E-02	±2.00E+01
2. Average diluted concentration during period	uCi/ml	3.10E-10	1.17E-09	
3. Percent of applicable limit (2)	%	1.55E-04	5.85E-04	
D. Gross Alpha Radioactivity				
1. Total release	Ci	<2.66E-06	<3.41E-06	±3.50E+01
E. Volume of waste released (prior to dilution)				
	liters	7.28E+06	6.44E+06	±3.00E+01
F. Volume of dilution water used during period				
	liters	6.33E+10	6.45E+10	±5.00E+00

- (1) Concentration limits specified in 10CFR, Part 20, Appendix B, Table II, Column 2 (Technical Specification 3.11.1.1). The percent of applicable limit reported is based on the average diluted concentration during the period. At no time did any release exceed the concentration limit.
- (2) Concentration limits for dissolved and entrained noble gases is 2E-04 microcuries/ml (Technical Specification 3.11.1.1). The percent of applicable limit reported is based on the average diluted concentration during the period. At no time did any release exceed the concentration limit.

TABLE 2B

Yankee Atomic Electric Company, Rowe, Massachusetts
Effluent and Waste Disposal Semiannual Report
Third and Fourth Quarters, 1987
Liquid Effluents

Nuclides Released	Unit	Continuous Mode		Batch Mode	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4
Strontium-89	Ci	<1.98E-04	<2.39E-04	2.58E-05	<1.37E-06
Strontium-90	Ci	2.02E-07	<2.99E-05	6.36E-06	1.40E-06
Cesium-134	Ci	2.49E-05	6.23E-06	5.24E-04	5.16E-05
Cesium-137	Ci	1.02E-04	1.53E-05	6.71E-04	9.07E-05
Iodine-131	Ci	2.19E-05	1.85E-05	1.25E-03	2.41E-04
Cobalt-58	Ci	<3.41E-05	<4.12E-05	3.55E-06	<6.55E-06
Cobalt-60	Ci	3.37E-05	8.55E-06	1.38E-04	4.26E-05
Iron-59	Ci	<7.10E-05	<9.25E-05	2.22E-06	<1.31E-05
Zinc-65	Ci	<8.48E-05	<9.91E-05	<2.32E-05	<1.52E-05
Manganese-54	Ci	<5.73E-05	<4.43E-05	3.17E-05	5.53E-07
Chromium-51	Ci	<2.75E-04	<3.28E-04	<1.40E-04	<7.16E-05
Zirconium-Niobium-95	Ci	<5.98E-05	<7.23E-05	7.51E-07	2.11E-07
Molybdenum-99	Ci	<2.71E-04	<3.13E-04	<7.55E-05	<4.67E-05
Technetium-99m	Ci	1.27E-05	2.33E-06	<1.67E-05	<1.02E-05
Barium-Lanthanum-140	Ci	<1.15E-04	<1.71E-05	<5.00E-05	<2.63E-05
Cerium-141	Ci	<4.76E-05	<5.57E-05	<2.67E-03	<1.66E-05
Ruthenium-103	Ci	<3.31E-05	<4.18E-05	<1.45E-05	<7.76E-06
Cerium-144	Ci	<2.18E-04	<2.50E-04	<1.24E-04	3.57E-06
Iodine-133	Ci	<3.57E-05	<4.09E-05	1.82E-04	2.37E-05
Selenium-75	Ci	<3.88E-05	<4.59E-05	<2.08E-05	<1.09E-05
Silver-110m	Ci	<3.56E-05	<4.10E-05	<1.22E-05	<7.53E-06
Antimony-124	Ci	<3.52E-05	<4.12E-05	<1.66E-05	2.84E-06
Carbon-14	Ci	--	--	8.09E-04	8.21E-04
Iron-55	Ci	<6.71E-03	<5.98E-03	4.25E-04	<4.56E-04
Cesium-136	Ci	<3.46E-05	<4.34E-05	<1.00E-05	<6.77E-06
Unidentified	Ci				
Total for period (above)	Ci	1.95E-04	5.09E-05	4.07E-03	1.29E-03
Xenon-133	Ci	<9.63E-05	<1.19E-04	1.09E-02	6.32E-02
Xenon-135	Ci	<4.72E-05	<3.29E-05	1.18E-04	7.56E-05
Xenon-131m	Ci	<1.20E-03	<1.44E-03	6.95E-05	1.93E-03
Xenon-133m	Ci	<2.42E-04	<2.84E-04	1.10E-04	2.63E-04
Krypton-85	Ci	<1.12E-02	<1.37E-02	8.49E-03	1.02E-02

TABLE 3

Yankee Atomic Electric Company, Rowe, Massachusetts
Effluent and Waste Disposal Semiannual Report
Third and Fourth Quarters, 1987
Solid Waste and Irradiated Fuel Shipments

A. Solid Waste Shipped Off-Site for Burial or Disposal (Not Irradiated Fuel)*

	Unit	6-Month Period	Est. Total Error, %
1. Type of Waste			
a. Spent resins, filter sludges, evaporator bottoms, etc. - LSA container**,+	m ³	8.10E+00	
	Ci	7.93E-01	±3.00E+01
b. Dry compressible waste, contaminated equipment, etc. - LSA container++	m ³	1.61E+02	
	Ci	4.04E+00	±1.00E+02
c. Irradiated components, control rods, etc.	m ³		
	Ci		
d.	m ³		
	Ci		
e.	m ³		
	Ci		

2. Estimate of Major Nuclide Composition (By Type of Waste)***

a. Hydrogen-3	% 3.51E+01	b. Cesium-137	% 3.24E+01
Cesium-137	% 2.26E+01	Cesium-134	% 2.97E+01
Cesium-134	% 1.92E+01	Iron-55	% 2.65E+01
Iron-55	% 1.74E+01	Cobalt-60	% 3.94E+00
Cobalt-60	% 2.67E+00	Niobium-95	% 2.66E+00
Nickel-63	% 1.44E+00	Nickel-63	% 2.06E+00
	%	Iron-59	% 1.57E+00
	%	Manganese-54	% 1.10E+00
	%		%
	%		%
	%		%

3. Solid Waste Disposition

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
6	Truck	Barnwell, SC

B. Irradiated Fuel Shipments (Disposition): None.

+ Container volume equal to 55 gallons (drums).

++ Container volume equal to 105 ft³ (boxes).

* Solid waste is Class A, as defined in 10CFR61.55.

** Solidification agent is cement.

*** Excluding nuclides with half-lives less than 12.8 days.

TABLE 4

Yankee Atomic Electric Company, Rowe, Massachusetts
 Effluent and Waste Disposal Semiannual Report
 Third and Fourth Quarters, 1987
Maximum* Off-Site Doses and Dose Commitments to Members of the Public

Source		Dose (mrem)***				Year**
		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	
Liquid Effluents						
Whole Body (1)		3.67E-02	4.29E-02	2.07E-02	1.47E-02	1.15E-01
Critical Organ (2)		5.87E-02	7.03E-02	3.24E-02	1.60E-02	1.77E-01
Airborne Effluents						
Iodines and Particulates		1.40E-02 (3)	1.94E+00 (3)	4.80E-03 (3)	3.70E-03 (4)	1.96E+00
Noble Gases (5)	Beta Air (mrad)	1.58E-01	1.15E-01	8.99E-02	7.26E-02	4.36E-01
	Gamma Air (mrad)	5.96E-02	2.87E-02	3.71E-02	3.29E-02	1.58E-01

*"Maximum" means the largest fraction of corresponding 10CFR50, Appendix I, dose design objective.

**"Maximum" dose for the year is the sum of the maximum doses for each quarter. This results in a conservative yearly dose estimate, but still well within the limits of 10CFR50.

***The numbered footnotes indicate the location of the dose receptor, age group, and organ, where appropriate.

- (1) Adult, second quarter; child, first, third, and fourth quarters
- (2) Liver of child
- (3) Bone of child, SW, and WSW-1300 meters
- (4) Thyroid of child, SW, and WSW-1300 meters
- (5) S and SSE-800 meters

TABLE 4

(Continued)

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TABLE 5A

YANKEE ROWE JAN87-DEC87 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

196.0 FT WIND DATA STABILITY CLASS A CLASS FREQUENCY (PERCENT) = .63

WIND DIRECTION FROM

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VRBL	TOTAL
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
0-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
4-7	1	0	0	0	0	0	0	2	1	4	2	1	0	0	0	0	0	11
(1)	2.04	.00	.00	.00	.00	.00	.00	4.08	2.04	8.16	4.08	2.04	.00	.00	.00	.00	.00	22.45
(2)	.01	.00	.00	.00	.00	.00	.00	.03	.01	.05	.03	.01	.00	.00	.00	.00	.00	.14
8-12	0	0	0	0	0	1	0	0	4	2	19	4	1	0	0	1	0	32
(1)	.00	.00	.00	.00	.00	2.04	.00	.00	8.16	4.08	38.78	8.16	2.04	.00	.00	2.04	.00	65.31
(2)	.00	.00	.00	.00	.00	.01	.00	.00	.05	.03	.24	.05	.01	.00	.00	.01	.00	.41
13-18	0	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	6
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	2.04	10.20	.00	.00	.00	.00	.00	.00	12.24
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.06	.00	.00	.00	.00	.00	.00	.06
19-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
GT 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ALL SPEEDS	1	0	0	0	0	1	0	2	5	7	26	5	1	0	0	1	0	49
(1)	2.04	.00	.00	.00	.00	2.04	.00	4.08	10.20	14.29	53.06	10.20	2.04	.00	.00	2.04	.00	100.00
(2)	.01	.00	.00	.00	.00	.01	.00	.03	.06	.09	.33	.06	.01	.00	.00	.01	.00	.63

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
 (2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 5B

YANKEE ROWE JAN87-DEC87 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

196.0 FT WIND DATA

STABILITY CLASS B

CLASS FREQUENCY (PERCENT) = 1.27

WIND DIRECTION FROM

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VREL	TOTAL
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
0-3	0	1	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	4
(1)	.00	1.01	1.01	.00	.00	1.01	.00	.00	.00	.00	.00	.00	1.01	.00	.00	.00	.00	4.04
(2)	.00	.01	.01	.00	.00	.01	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.02
4-7	0	0	0	0	0	0	2	5	1	3	10	1	1	0	0	0	0	27
(1)	.00	.00	.00	.00	.00	.00	2.02	5.05	1.01	3.03	10.10	1.01	1.01	.00	.00	.00	.00	23.23
(2)	.00	.00	.00	.00	.00	.00	.03	.06	.01	.04	.13	.01	.01	.00	.00	.00	.00	.20
8-12	4	0	0	0	0	0	0	3	4	7	27	14	0	0	0	1	0	60
(1)	4.04	.00	.00	.00	.00	.00	.00	3.03	4.04	7.07	27.27	14.14	.00	.00	.00	1.01	.00	60.51
(2)	.05	.00	.00	.00	.00	.00	.00	.04	.05	.09	.35	.18	.00	.00	.00	.01	.00	.77
13-18	1	0	0	0	0	0	0	0	1	1	7	2	0	0	0	0	0	12
(1)	1.01	.00	.00	.00	.00	.00	.00	.00	1.01	1.01	7.07	2.02	.00	.00	.00	.00	.00	12.12
(2)	.01	.00	.00	.00	.00	.00	.00	.00	.01	.01	.09	.03	.00	.00	.00	.00	.00	.15
19-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
GT 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ALL SPEEDS	5	1	1	0	0	1	2	8	6	11	44	17	2	0	0	1	0	99
(1)	5.05	1.01	1.01	.00	.00	1.01	2.02	8.08	6.06	11.11	44.44	17.17	2.02	.00	.00	1.01	.00	100.00
(2)	.06	.01	.01	.00	.00	.01	.03	.10	.08	.14	.57	.22	.03	.00	.00	.01	.00	1.27

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE

(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 5C

YANKEE ROWE JAN37-DEC27 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

196.0 FT WIND DATA

STABILITY CLASS C

CLASS FREQUENCY (PERCENT) = 2.37

WIND DIRECTION FROM

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VRBL	TOTAL
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.10
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
C-3	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
(1)	.00	.54	.00	.54	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.08
(2)	.00	.01	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.02
4-7	4	2	0	0	0	1	4	6	7	6	10	11	3	2	3	1	0	60
(1)	2.17	1.09	.00	.00	.00	.54	2.17	3.26	3.80	3.26	5.43	5.98	1.63	1.09	1.63	.54	.00	32.11
(2)	.05	.03	.00	.00	.00	.01	.05	.08	.09	.08	.13	.14	.04	.03	.04	.01	.00	.77
8-12	13	4	0	0	0	3	2	3	3	10	35	23	8	5	0	5	0	112
(1)	7.07	2.17	.00	.00	.00	1.63	1.09	1.63	1.63	5.43	17.02	12.50	4.35	1.63	.00	2.72	.00	60.87
(2)	.17	.05	.00	.00	.00	.04	.03	.04	.04	.13	.45	.30	.10	.04	.00	.06	.00	1.44
13-18	1	1	0	0	0	0	0	0	0	0	2	5	0	0	0	0	0	9
(1)	.54	.54	.00	.00	.00	.00	.00	.00	.00	.00	1.09	2.72	.00	.00	.00	.00	.00	4.89
(2)	.01	.01	.00	.00	.00	.00	.00	.00	.00	.00	.03	.06	.00	.00	.00	.00	.00	.12
19-24	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.54	.00	.00	.00	.00	.00	.00	.54
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.01
GT 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ALL SPEEDS	18	8	0	1	0	4	6	9	10	16	48	39	11	5	3	6	0	184
(1)	9.78	4.35	.00	.54	.00	2.17	3.26	4.89	5.43	8.70	26.09	21.20	5.98	2.72	1.63	3.26	.00	100.00
(2)	.23	.10	.00	.01	.00	.05	.08	.12	.13	.21	.62	.50	.14	.06	.04	.08	.00	2.37

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE

(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 5D

YANKEE ROWE JAN67-DEC67 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

196.0 FT WIND DATA

STABILITY CLASS D

CLASS FREQUENCY (PERCENT) = 49.38

WIND DIRECTION FROM

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VRBL	TOTAL
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
0-3	71	100	55	24	26	12	17	10	16	36	47	32	21	15	20	24	0	526
(1)	1.85	2.51	1.43	.63	.63	.31	.44	.26	.42	.94	1.22	.83	.55	.39	.52	.63	.00	13.71
(2)	.51	1.29	.71	.31	.33	.15	.22	.13	.21	.46	.60	.41	.27	.19	.26	.31	.00	6.73
4-7	242	299	81	28	28	43	38	44	84	142	197	145	94	74	85	101	0	1749
(1)	6.63	7.70	2.11	.73	.73	1.12	.99	1.15	2.19	3.70	5.13	3.83	2.45	1.93	2.21	2.63	.00	45.54
(2)	3.37	3.83	1.04	.36	.36	.55	.49	.57	1.08	1.83	2.53	1.92	1.21	.95	1.09	1.30	.00	22.49
8-12	313	287	15	2	1	6	5	9	31	72	143	168	56	27	47	99	0	1294
(1)	8.16	7.43	.47	.05	.03	.16	.13	.23	.81	1.88	3.73	4.38	1.46	.70	1.22	2.53	.00	33.45
(2)	4.03	3.69	.23	.03	.01	.08	.06	.12	.40	.93	1.84	2.16	.72	.35	.60	1.27	.00	16.52
13-18	105	90	0	0	0	0	0	0	1	4	19	42	3	1	1	4	0	270
(1)	2.74	2.34	.00	.00	.00	.00	.00	.00	.03	.10	.50	1.09	.08	.03	.03	.10	.00	7.03
(2)	1.35	1.16	.00	.00	.00	.00	.00	.00	.01	.05	.24	.54	.04	.01	.01	.05	.00	3.47
19-24	4	4	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	10
(1)	.10	.10	.00	.00	.00	.00	.00	.00	.00	.00	.05	.00	.00	.00	.00	.00	.00	.26
(2)	.05	.05	.00	.00	.00	.00	.00	.00	.00	.00	.03	.00	.00	.00	.00	.00	.00	.13
GT 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ALL SPEEDS	755	779	154	54	55	61	60	63	132	254	408	391	174	117	153	228	0	3838
(1)	19.67	20.30	4.01	1.41	1.43	1.59	1.56	1.64	3.44	6.62	10.63	10.19	4.53	3.05	3.99	5.94	.00	100.00
(2)	9.71	10.02	1.98	.69	.71	.78	.77	.81	1.70	3.27	5.25	5.03	2.24	1.51	1.97	2.93	.00	49.38

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
 (2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 5E

YANKEE ROWE JAN87-DEC87 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

196.0 FT WIND DATA

STABILITY CLASS E

CLASS FREQUENCY (PERCENT) = 36.22

WIND DIRECTION FROM

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VRBL	TOTAL
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
0-3	264	519	183	75	52	37	35	43	33	77	73	61	30	31	31	62	0	1604
(1)	9.38	18.44	6.50	2.63	1.85	1.31	1.24	1.53	1.17	2.74	2.59	2.17	1.07	1.10	1.10	2.20	.00	57.45
(2)	3.40	6.68	2.35	.96	.67	.48	.45	.55	.42	.99	.94	.78	.39	.40	.40	.80	.00	20.44
4-7	158	358	78	14	9	11	18	30	44	80	108	44	20	15	17	22	0	1021
(1)	5.61	12.72	2.77	.50	.32	.39	.64	1.07	1.56	2.84	3.84	1.56	.71	.53	.60	.78	.00	33.45
(2)	2.03	4.61	1.00	.18	.12	.14	.23	.39	.57	1.03	1.39	.57	.26	.15	.22	.28	.00	13.20
8-12	29	47	12	0	0	0	0	4	4	15	23	8	4	0	0	10	0	156
(1)	1.03	1.67	.43	.00	.00	.00	.00	.14	.14	.53	.82	.28	.14	.00	.00	.36	.00	5.54
(2)	.37	.60	.15	.00	.00	.00	.00	.05	.05	.19	.30	.10	.05	.00	.00	.13	.00	2.01
13-18	5	14	0	1	0	0	0	1	0	0	3	0	0	0	0	0	0	24
(1)	.18	.50	.00	.04	.00	.00	.00	.04	.00	.00	.11	.00	.00	.00	.00	.00	.00	.85
(2)	.06	.18	.00	.01	.00	.00	.00	.01	.00	.00	.04	.00	.00	.00	.00	.00	.00	.31
19-24	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
(1)	.00	.07	.00	.00	.00	.00	.00	.00	.00	.00	.04	.00	.00	.00	.00	.00	.00	.11
(2)	.00	.03	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.04
GT 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ALL SPEEDS	456	940	273	90	61	48	53	78	81	172	208	113	54	46	48	94	0	2815
(1)	16.20	33.39	9.70	3.20	2.17	1.71	1.88	2.77	2.88	6.11	7.39	4.01	1.92	1.63	1.71	3.34	.00	104.00
(2)	5.87	12.09	3.51	1.16	.78	.62	.68	1.00	1.04	2.21	2.68	1.45	.69	.59	.62	1.21	.00	36.22

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
 (2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 5F

YANKEE ROWE JAN37-DEC87 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

196.0 FT WIND DATA STABILITY CLASS F CLASS FREQUENCY (PERCENT) = 7.80

WIND DIRECTION FROM

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VRBL	TOTAL
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
0-3	30	64	48	32	24	27	19	13	17	17	23	7	15	9	9	15	0	364
(1)	4.95	10.56	7.92	5.28	3.96	4.46	3.14	2.15	2.61	2.61	3.80	1.16	2.48	1.49	1.49	2.48	.00	60.84
(2)	.29	.62	.46	.31	.23	.26	.19	.13	.17	.17	.22	.09	.19	.12	.12	.19	.00	4.75
4-7	13	55	42	14	3	7	7	9	9	14	24	15	3	0	4	7	0	224
(1)	2.15	9.08	6.93	2.31	.50	1.16	1.16	1.49	1.49	2.31	3.96	2.48	.50	.00	.66	1.16	.00	37.21
(2)	.17	.71	.54	.18	.04	.09	.09	.12	.12	.18	.31	.19	.04	.00	.05	.09	.00	2.93
8-12	0	6	0	0	0	0	0	1	0	2	1	1	0	0	0	0	0	11
(1)	.00	.99	.00	.00	.00	.00	.00	.17	.00	.33	.17	.17	.00	.00	.00	.00	.00	1.82
(2)	.00	.03	.00	.00	.00	.00	.00	.01	.00	.03	.01	.01	.00	.00	.00	.00	.00	.14
13-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
19-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
GT 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ALL SPEEDS	43	125	90	46	27	34	26	23	26	33	48	23	18	9	13	22	0	806
(1)	7.10	20.63	14.65	7.59	4.46	5.61	4.29	3.80	4.29	5.45	7.92	3.80	2.97	1.49	2.15	3.63	.00	100.00
(2)	.55	1.61	1.16	.59	.35	.44	.33	.30	.33	.42	.62	.30	.23	.12	.17	.28	.00	7.80

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 5G

YANJEE ROWE JAN87-DEC87 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

196.0 FT WIND DATA

STABILITY CLASS G

CLASS FREQUENCY (PERCENT) = 2.34

WIND DIRECTION FROM

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VREL	TOTAL
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
0-3	5	11	7	11	6	6	8	7	6	6	5	4	2	2	2	3	0	91
(1)	2.75	6.04	3.85	6.04	3.30	3.30	4.40	3.85	3.30	3.30	2.75	2.20	1.10	1.10	1.10	1.65	.00	50.00
(2)	.06	.14	.09	.14	.08	.08	.10	.09	.08	.08	.06	.05	.03	.03	.03	.04	.00	1.17
4-7	8	14	11	5	4	0	5	3	6	13	6	2	4	4	2	2	0	89
(1)	4.40	7.69	6.04	2.75	2.20	.00	2.75	1.65	3.30	7.14	3.30	1.10	2.20	2.20	1.10	1.10	.00	45.00
(2)	.10	.18	.14	.06	.05	.00	.06	.04	.08	.17	.08	.03	.05	.05	.03	.03	.00	1.14
8-12	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	2
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.55	.00	.55	.00	.00	.00	.00	.00	1.10
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.01	.00	.00	.00	.00	.00	.03
13-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
19-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
GT 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ALL SPEEDS	13	25	18	16	10	6	13	10	12	20	11	7	6	6	4	5	0	182
(1)	7.14	13.74	9.89	8.79	5.49	3.30	7.14	5.49	6.59	10.99	6.04	3.85	3.30	3.30	2.20	2.75	.00	100.00
(2)	.17	.32	.23	.21	.13	.08	.17	.13	.15	.26	.14	.09	.08	.08	.05	.06	.00	2.34

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD
 (2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

TABLE 5H

YANKEE FOWE JAN87-DEC87 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

195.0 FT WIND DATA

STABILITY CLASS ALL

CLASS FREQUENCY (PERCENT) = 100.00

WIND DIRECTION FROM

SPEED(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VRBL	TOTAL
CALM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
0-3	370	696	294	143	108	83	79	73	72	136	148	104	69	57	62	104	0	2558
(1)	4.76	8.95	3.78	1.84	1.39	1.07	1.02	.94	.93	1.75	1.90	1.34	.89	.73	.80	1.34	.00	33.42
(2)	4.76	8.95	3.78	1.84	1.39	1.07	1.02	.94	.93	1.75	1.90	1.34	.89	.73	.80	1.34	.00	33.42
4-7	446	727	212	61	44	62	74	99	152	262	357	223	125	95	111	133	0	3183
(1)	5.74	9.35	2.73	.76	.57	.80	.95	1.27	1.96	3.37	4.59	2.87	1.61	1.22	1.43	1.71	.00	40.25
(2)	5.74	9.35	2.73	.76	.57	.80	.95	1.27	1.96	3.37	4.59	2.87	1.61	1.22	1.43	1.71	.00	40.48
8-12	359	344	30	2	1	10	7	20	46	109	248	219	69	36	47	116	0	1657
(1)	4.62	4.43	.39	.03	.01	.13	.09	.26	.59	1.40	3.19	2.82	.89	.39	.60	1.49	.00	21.32
(2)	4.62	4.43	.39	.03	.01	.13	.09	.26	.59	1.40	3.19	2.82	.89	.39	.60	1.49	.00	21.42
13-16	112	105	0	1	0	0	0	1	2	6	36	49	3	1	1	4	0	321
(1)	1.44	1.35	.00	.01	.00	.00	.00	.01	.03	.08	.46	.63	.04	.01	.01	.05	.00	4.13
(2)	1.44	1.35	.00	.01	.00	.00	.00	.01	.03	.08	.46	.63	.04	.01	.01	.05	.00	4.13
19-24	4	6	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	14
(1)	.05	.08	.00	.00	.00	.00	.00	.00	.00	.00	.05	.00	.00	.00	.00	.00	.00	.18
(2)	.05	.08	.00	.00	.00	.00	.00	.00	.00	.00	.05	.00	.00	.00	.00	.00	.00	.18
GT 24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ALL SPEEDS	1291	1878	536	207	153	155	160	193	272	513	793	595	266	183	221	357	0	7773
(1)	16.61	24.16	6.90	2.66	1.97	1.99	2.06	2.48	3.50	6.60	10.20	7.65	3.42	2.35	2.84	4.59	.00	100.00
(2)	16.61	24.16	6.90	2.66	1.97	1.99	2.06	2.48	3.50	6.60	10.20	7.65	3.42	2.35	2.84	4.59	.00	100.00

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE

(2)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PERIOD

C= CALM (WIND SPEED LESS THAN OR EQUAL TO .60 MPH)

APPENDIX A

Radioactive Liquid Effluent Monitoring Instrumentation

Requirement: Radioactive liquid effluent monitoring instrumentation channels are required to be operable in accordance with Technical Specification 3.3.3.6. With less than the minimum number of channels operable and reasonable efforts to return the instrument(s) to operable status within 30 days being unsuccessful, Technical Specification 3.3.6.b requires an explanation for the delay in correcting the inoperability in the next Semiannual Effluent Release Report.

Response: The flow rate measuring device for the steam generator blowdown tank effluent (Table 3.3-8) which was installed during the last reporting period was calibrated and declared operational on November 19, 1987. ACTION Statement 17 of Table 3.3-8 was still in effect, until the flow rate measuring device for the steam generator blowdown tank effluent was calibrated.

APPENDIX B

Radioactive Gaseous Effluent Monitoring Instrumentation

Requirement: Radioactive gaseous effluent monitoring instrumentation channels are required to be operable in accordance with Technical Specification 3.3.3.7. With less than the minimum number of channels operable and reasonable efforts to return the instrument(s) to operable status within 30 days being unsuccessful, Technical Specification 3.3.3.7.b requires an explanation for the delay in correcting the inoperability in the next Semiannual Effluent Release Report.

Response: Since the requirements of Technical Specification 3.3.3.7 governing the operability of radioactive gaseous effluent monitoring instrumentation were met for this reporting period, no response is required.

APPENDIX C

Liquid Holdup Tanks

Requirement: Technical Specification 3.11.1.4 limits the quantity of radioactive material contained in any outside temporary tank. With the quantity of radioactive material in any outside temporary tank exceeding the limits of Technical Specification 3.11.1.4, a description of the events leading to this condition is required in the next Semiannual Effluent Release Report.

Response: The limits of Technical Specification 3.11.1.4 were not exceeded during this reporting period.

APPENDIX D

Radiological Environmental Monitoring Program

Requirement: The radiological environmental monitoring program is conducted in accordance with Technical Specification 3.4.12.1. With milk or fresh leafy vegetation samples no longer available from one or more of the required sample locations, Technical Specification 3.4.12.1.c requires the identification of the new location(s) for obtaining replacement sample(s) in the next Semiannual Effluent Release Report and inclusion of revised Off-Site Dose Calculation Manual Figure(s) and Table(s) reflecting the new location(s).

Response: All required milk and fresh leafy vegetation samples were available during this reporting period.

APPENDIX E

Land Use Census

Requirement: A land use census is conducted in accordance with Technical Specification 3.12.2. With a land use census identifying a location(s) which yields at least a 20 percent greater dose or dose commitment than the values currently being calculated in Technical Specification 4.11.2.3, Technical Specification 3.12.2.a requires the identification of the new location(s) in the next Semiannual Effluent Release Report.

Response: The land use census for this reporting period did not identify any locations yielding at least a 20 percent greater dose or dose commitment than the values currently being calculated in Technical Specification 4.11.2.3.

Requirement: With a land use census identifying a location(s) which yields a calculated dose or dose commitment (via the same exposure pathway) at least 20 percent greater than at a location from which samples are currently being obtained in accordance with Technical Specification 3.12.1, Technical Specification 3.12.2.b requires that the location(s) be added to the program if permission from the owner to collect samples can be obtained and if sufficient sample volume is available. The identification of the new location(s) is required in the next Semiannual Effluent Release Report.

Response: No changes were made in the Radiological Environmental Monitoring Program as a result of the 1987 land use census.

APPENDIX F

Process Control Program

Requirement: Technical Specification 6.14.1 requires that licensee initiated changes to the Process Control Program be submitted to the Commission in the Semiannual Radioactive Effluent Release Report for the period in which the change(s) was made.

Response: There was no licensee initiated change(s) to the Process control Program during this reporting period.

APPENDIX G

Off-Site Dose Calculation Manual

Requirement: Technical Specification 6.15.2 requires that licensee initiated changes to the Off-Site Dose Calculation Manual be submitted to the Commission in the Semiannual Radioactive Effluent Release Report for the period in which the change(s) was made effective.

Response: There were no licensee-initiated changes to the Off-Site Dose Calculation Manual during this reporting period.

APPENDIX H

Radioactive Liquid, Gaseous, and Solid Waste Treatment Systems

Requirement: Technical Specification 6.16.1 requires that licensee initiated major changes to the radioactive waste systems (liquid, gaseous, and solid) be reported to the Commission in the Semiannual Radioactive Effluent Release Report for the period in which the evaluation was reviewed by the Plant Operation Review Committee.

Response: There were no licensee initiated major changes to the radioactive waste systems (liquid, gaseous, and solid) during this reporting period.

APPENDIX I

Supplemental Information Third and Fourth Quarters, 1987

1. Technical Specification Limits - Dose and Dose Rate

<u>Technical Specification and Category</u>	<u>Limit</u>
a. <u>Noble Gases</u>	
3.11.2.1 Total body dose rate	500 mrem/yr
3.11.2.1 Skin dose rate	3000 mrem/yr
3.11.2.2 Gamma air dose	5 mrad in a quarter
3.11.2.2 Gamma air dose	10 mrad in a year
3.11.2.2 Beta air dose	10 mrad in a quarter
3.11.2.2 Beta air dose	20 mrad in a year
b. <u>Iodine-131, Tritium and Radionuclides</u> <u>in Particulate Form With Half-Lives</u> <u>Greater than 8 days</u>	
3.11.2.1 Organ dose rate	1500 mrem/yr
3.11.2.3 Organ dose	7.5 mrem in a quarter
3.11.2.3 Organ dose	15 mrem in a year
c. <u>Liquids</u>	
3.11.1.2 Total body dose	1.5 mrem in a quarter
3.11.1.2 Total body dose	3 mrem in a year
3.11.1.2 Organ dose	5 mrem in a quarter
3.11.1.2 Organ dose	10 mrem in a year

2. Technical Specification Limits - Concentration

<u>Technical Specification and Category</u>	<u>Limit</u>
a. <u>Noble Gases</u>	No MPC limits
b. <u>Iodine-131, Tritium and Radionuclides</u> <u>in Particulate Form With Half-Lives</u> <u>Greater than 8 days</u>	No MPC limits
c. <u>Liquids</u>	
3.11.1.1 Total sum of the fraction of MPC (10CFR20, Appendix B, Tables II, Column 2), excluding noble gases less than:	1.0
3.11.1.1 Total noble gas concentration	2E-04 uCi/cc

3. Measurements and Approximations of Total Radioactivity

a. Noble Gases

"Continuous discharges" are determined by indirect measurement. Primary gas samples are taken periodically and analyzed. It is assumed that in primary to secondary leakage all gases are ejected through the air ejector. In primary coolant charging pump leakage all gases are ejected to the primary vent stack either during flashing or liquid waste processing. "Batch discharges" are determined by direct measurement. Errors associated with these measurements are estimated to be ± 55 percent.

b. Iodines

Iodines are continuously monitored by drawing a sample from the primary vent stack through a particulate filter and charcoal cartridge. The filter and charcoal cartridge are removed and

analyzed weekly. The errors associated with these measurements are estimated to be ± 25 percent.

c. Particulates

The particulate filter described in (b) above is analyzed weekly. The errors associated with the determination of particulate effluents are estimated to be ± 30 percent.

d. Liquid Effluents

Liquid effluents are determined by direct measurement. In line composite samples are analyzed for strontium-89, strontium-90, gross alpha activity and carbon-14. There is no compositing of samples for tritium or dissolved fission gas analysis. For continuous discharges composite samples are used for gamma isotopic analysis. A gamma isotopic analysis is performed on a representative sample for each batch release using the Marinelli Beaker geometry. The errors associated with these measurements are as follows: fission and activation products, ± 20 percent; tritium, ± 10 percent; dissolved fission gases, ± 20 percent; alpha activity, ± 35 percent.

4. Batch Releases

a. Liquids

Third Quarter

Number of batch releases: 22

Total time period for batch releases: 9,119 minutes

Maximum time period for a batch release: 1,975 minutes

Average time period for batch releases: 415 minutes

Minimum time period for a batch release: 240 minutes

Average stream flow during period (Sherman Dam): 437 cfs

Average discharge rate: 16.7 gpm

Fourth Quarter

Number of batch releases: 18

Total time period for batch releases: 6,371 minutes

Maximum time period for a batch release: 1,275 minutes

Average time period for batch releases: 354 minutes

Minimum time period for a batch release: 240 minutes

Average stream flow during period (Sherman Dam): 836 cfs

Average discharge rate: 18.9 gpm

b. Gases

There were no batch gaseous releases during the third and fourth quarters of 1987.

5. Abnormal Releases

a. Liquid

There were no nonroutine liquid releases during the reporting period.

b. Gases

There were no nonroutine gaseous releases during the reporting period.