VERMONT YANKEE NUCLEAR POWER CORPORATION

VERMONT YANKEE NUCLEAR POWER STATION

VERNON, VERMONT

SUPPLEMENTAL
EFFLUENT AND WASTE DISPOSAL
SEMIANNUAL REPORT
FOR
THIRD AND FOURTH QUARTERS, 1990
INCLUDING
ANNUAL RADIOLOGICAL IMPACT ON MAN
FOR 1990

Vermont Yankee Nuclear Power Station

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ERRATA

In the Vermont Yankee Effluent and Waste Disposal Semiannual Report covering the first and second quarters of 1990, the following corrections should be made:

None.

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VERMONT YANKEE NUCLEAR POWER STATION
SEMIANNUAL EFFLUENT RELEASE REPORT
JULY - DECEMBER 1990

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 1990. 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 1990. Radioactive effluents reported in the Semiannual Effluent Report covering the first six months of the year were used to determine the resulting doses for the first half of 1990.

As required by Technical Specification 6.7.C.1 dose commitments resulting from the release of radioactive materials in liquids and gases were estimated in accordance with the "Vermont 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.

As required by Technical Specification 6.7.C.1.b, 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, as a result, no dose assessments are required.

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 40CFR190, "Environmental Radiation Protection Standards for Nuclear Power Operations," are also required to be

included in this report if the conditions indicated in Technical Specification 3.8.M.1, "Total Dose," have been exceeded during the year. Since the conditions indicated in the action statement under Technical Specification 3.8.M.2 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 B through H indicate the status of reportable items per the requirements of Technical Specifications 6.7.C.1 and 6.14.A.

2.0 METEOROLOGICAL DATA

Meteorological data was collected during this reporting period from the site's 300-foot met tower located approximately 2,200 feet northwest of the reactor building, and about 1,400 feet from the plant stack. The 300-foot tower is approximately the same height as the primary plant stack (94 meters) and is designed to meet the requirements of Regulatory Guide 1.23 for meteorological monitoring.

X/Q and D/Q values were derived for all receptor points from the site meteorological record for each quarter using a straight-line airflow model. All dispersion factors have been calculated employing appropriate source configuration considerations, as described in Regulatory Guide 1.111 (Reference 1). A source depletion model as described in "Meteorology and Atomic Energy - 1968" (Reference 2) was used to generate deposition factors, assuming a constant deposition velocity of 0.01 m/sec. Changes in terrain elevations in the site environment were also factored into the meteorological models.

3.0 DOSE ASSESSMENT

3.1 Doses From Liquid Effluents

There were no routine or accidental liquid releases from Vermont Yankee during 1990. As a result, no receiving water exposure pathways could contribute to any whole body or organ doses to individuals in unrestricted areas.

3.2 Doses From Noble Gases

Technical Specification 3.8.F.1 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 3.8.F.1 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 are typically calculated at the site boundary, and nearest resident in each of the sixteen principle compass directions, as well as the point of highest off-site ground level air concentration of radioactive materials, and for each of the milk animal locations located within five miles of the plant.

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

Technical Specification 3.8.G.1 limits the organ dose to a member of the public from iodine-131, iodine-133, 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 3.8.G.1 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 and nearest resident in each of the sixteen principle compass directions, as well as all milk animal locations within five miles of the plant. The nearest resident and milk animals in each sector were identified by the most recent Annual Land Use Census as required by Technical Specification 3.9.D. Conservatively, a vegetable garden was assumed to exist at each milk animal and nearest resident location. Furthermore, the meat pathway was assumed to exist at each milk animal location. Doses were also calculated at the point of maximum ground level air concentration of radioactive materials in gaseous effluents and included the assumption that the inhalation, vegetable garden, and ground plane exposure pathways exist for an individual with a 100 percent occupancy factor.

It is assumed that milk and meat animals are free to graze on open pasture during the second and third quarters with no supplemental feeding. This assumption is conservative since most of the milk animals inventoried in the site vicinity are fed stored feed throughout the entire year with only limited grazing allowed during the growing season. It has also been assumed that only 50 percent of the iodine deposited from gaseous effluent is in elemental form (I_2) and is available for uptake (see p. 26, Reference 4). During the first and fourth quarters, the milk animals are assumed to receive only stored feed.

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 to any age group due to iodines and particulates at any of the off-site receptor locations are reported in Table 4. These estimated organ doses are well below the 10 CFR Part 50, Appendix I dose criteria of Technical Specification 3.8.G.1.

3.4 Whole-Body Doses in Unrestricted Areas From Direct Radiation

The major source of dose, consisting of direct radiation and skyshine, from the station is due to N-16 decay in the turbine building. Because of the orientation of the turbine building on the site, and the shielding effects of the adjacent reactor building, only the seven westerly sectors (SSW to NNW) see any significant direct radiation.

High Pressure Ionization Chamber (HPIC) measurements have been made in the plant area in order to estimate the direct radiation from the station. The chamber was located at a point along the west site boundary which has been determined to receive the maximum direct radiation from the plant. Using measurements of dose rate made while the plant operated at different power levels, from shutdown to 100 percent, the total integrated dose from direct radiation over each three month period was determined by considering the quarterly gross megawatts generated. Field measurements of exposure, in units of Roentgen, were modified by multiplying by 0.6 to obtain whole-body dose equivalents, in units of rem, in accordance with recommendations of HASL Report 305 (Reference 5) for radiation fields resulting from N-16 photons.

The other sources of dose, including direct radiation and skyshine, to the site boundary are from low level radioactive waste stored in the north warehouse and the low level waste storage pad facility. The annual dose is based on dose rate measurements in these two storage facilities and determined at the same most restrictive site boundary dose location as that for N-16 shine from the Turbine Building.

The estimated direct radiation dose from all major sources combined for the most limiting site boundary location is listed on Table 4 for each quarter. These site boundary doses assume a 100 percent occupancy factor, and take no credit for the shielding effect of any structure.

3.5 Doses From On-Site Disposal of Septic Waste

Off-Site Dose Calculational Manual, Appendix B, requires that all applications of septage within the approved designated disposal areas be limited to ensure the dose to a maximally-exposed individual be maintained at less than 1 mrem/year to the whole body and any organ, and the dose to the inadvertent intruder be maintained at less than 5 mrem/year. The projected dose from on-site disposals of septic waste is given in Appendix J.

REFERENCES

1. 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, March 1976.

2. Meteorology and Atomic Energy, 1968, Section 5-3.2.2, "Cloud Depletion", pg. 204. U. S. Atomic Energy Commission, July 1968.

3. C. A. Pelletier, and J. D. Zimbrick, "Kinetics of Environmental Radioiodine Transport Through the Milk-Food Chain", Environmental Surveillance in the Vicinity of Nuclear Facilities, Charles D. Thomas Publishers, Springfield, Illinois, 1970.

4. Regulatory Guide 1.109, "Calculation of Annual Doses to Man From Routine Release of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR Part 50, Appendix I", U. S. Nuclear Regulatory Commission, Office of Standards Development, Revision 1, October 1977.

5. W. M. Lowder, P. D. Raft, and G. dePlanque Burke, "Determination of N-16 Gamma Radiation Fields at BWR Nuclear Power Stations", Health and Safety Laboratory, Energy Research and Development Administration, Report No. 305, May 1976.

TABLE 1A

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

Third and Fourth Quarters, 1990

Gaseous Effluents - Summation of All Releases

	Unit	Quarter 3	Quarter 4	Est. Total Error, %
A. Fission and Activation Gases				
1. Total release	Ci	1.24E+03	7.83E+02	±1.00E+02
2. Average release rate for period	uCi/sec	1.58E+02	9.95E+01	
3. Percent of Tech. Spec. limit (1)	%	5.70E+00	2.12E+00	
B. Iodines				
1. Total Iodine-131	Ci	3.52E-02	4.05E-03	±5.00E+01
2. Average release rate for period	uCi/sec	4.48E-03	5.16E-04	
3. Percent of Tech. Spec. limit (2)	%	2.21E+01	2.79E-01	
C. Particulates				
1. Particulates with T-1/2 > 8 days	Ci	4.55E-03	3.33E-03	±5.00E+01
2. Average release rate for period	uCi/sec	5.79E-04	4.24E-04	
3. Percent of Tech. Spec. limit	%	(3)	(3)	
4. Gross alpha radioactivity	Ci	2.98E-05	1.91E-06	
D. Tritium				
1. Total release	Ci	2.68E+01	2.89E+01	±5.00E+01
2. Average release rate for period	uCi/sec	3.41E+00	3.67E+00	
Percent of Tech. Spec. limit	%	(3)	(3)	

(1) Technical Specification 3.8.F.1.a for gamma air dose.

(2) Technical Specification 3.8.G.1 for dose from I-131, I-133, Tritium, and radionuclides in particulate form.

(3) Per Technical Specification 3.8.G.1, dose contribution from Tritium and particulates are included with I-131 above in Part B.

ND Not Detected.

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TABLE 1B

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

Third and Fourth Quarters, 1990

Gaseous Effluents - Elevated Release

Nuclides Released	Unit	Continuous Mode Quarter 3	Continuous Mode Quarter 4	Batch Mode (1) Quarter 3	Batch Mode (1) Quarter 4
1. Fission Gases					
Krypton-85	Ci	ND	ND		
Krypton-85m	Ci	1.60E+01	7.11E+00		
Krypton-87	Ci	5.65E+01	2.58E+01		
Krypton-88	Ci	4.91E+01	1.59E+01		
Xenon-133	Ci	2.92E+01	3.76E+00		
Xenon-135	Ci	7.03E+01	2.01E+01		
Xenon-135m	Ci	2.06E+02	1.21E+02		
Xenon-138	Ci	8.17E+02	5.89E+02		
	Ci				
Unidentified	Ci				
Total for period	Ci	1.24E+03	7.83E+02		
2. Iodines					
Iodine-131	Ci	3 -02	4.05E-03		
Iodine-133	Ci	4.78E-02	1.20E-02		
Iodine-135	Ci	6.44E-02	4.89E-02		
Total for period	Ci	1.47E-01	1.01E-01		
3. Particulates					
Strontium-89	Ci	1.82E-03	1.74E-03		
Strontium-90	Ci	2.88E-05	1.92E-05		
Cesium-134	Ci	8.22E-06	7.69E-06		
Cesium-137	Ci	5.46E-05	2.50E-05		
Barium-Lanthanum-140	Ci	2.29E-03	1.28E-03		
Manganese-54	Ci	2.96E-05	8.66E-05		
Zinc-65	Ci	5.06E-05	1.35E-05		
Cobalt-58	Ci	ND	6.87E-06		
Cobalt-60	Ci	2.69E-04	1.24E-04		
Iron-59	Ci	ND	2.54E-05		
Cerium-141	Ci	ND	2.89E-06		

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

ND - Not detected at the plant stack.

TABLE 1C

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

Third and Fourth Quarters 1990

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 1990.

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TABLE 1D

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

Third and Fourth Quarters 1990

Gaseous Effluents - Nonroutine Releases

There were no nonroutine or accidental gaseous releases during the third or fourth quarters of 1990.

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TABLE 2A

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

Third and Fourth Quarters 1990

Liquid Effluents - Summation of All Releases

There were no liquid releases during the third or fourth quarters of 1990.

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TABLE 2B

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

Third and Fourth Quarters 1990

Liquid Effluents - Nonroutine Releases

There were no nonroutine or accidental releases during the third or fourth quarters of 1990.

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TABLE 3

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

Third and Fourth Quarters, 1990

Solid Waste and Irradiated Fuel Shipments

A. Solid Waste Shipped Off-Site for Burial or Disposal (Not Irradiated Fuel): None

	Unit	6-Month Period	Est. Total Error, %
1. Type of Waste			
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3		
	Ci	*	*
b. Dry compressible waste, contaminated equipment, etc.	m^3		
	Ci	*	*
c. Irradiated components, control rods, etc.	m^3		
	Ci	*	*

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

a.	%	%
	%	%
	%	%
	%	%
	%	%
	%	%
	%	%
	%	%
	%	%
	%	%
	%	%
	%	%
	%	%
	%	%
	%	%

3. Solid Waste Disposition: *

Number of Shipments	Mode of Transportation	Destination

B. Irradiated Fuel Shipments (Disposition): None

C. Supplemental information
1) Class of solid waste containers shipped: *
2) Types of containers used: *
3) Solidification agent or absorbent: *

*Not applicable. No solid waste or irradiated fuel shipments during the third and the fourth quarters of 1990.

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TABLE 4

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

Third and Fourth Quarters, 1990

Maximum* Off-Site Doses and Dose Commitments to Members of the Public

Source		Dose (mrem)*** 1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Year**
Liquid Effluents (a)		-	-	-	-	
Airborne Effluents						
Iodines and Particulates		2.42E-02 (1)	5.60E-01 (2)	1.66E+00 (2)	2.09E-02 (1)	2.27E+00
Noble Gases	Beta Air (mrad)	1.13E-01 (3)	6.41E-02 (3)	1.11E-01 (3)	8.52E-02 (3)	3.73E-01
	Gamma Air (mrad)	1.29E-01 (4)	3.18E-02 (4)	2.85E-01 (5)	1.06E-01 (4)	5.52E-01
Whole Body Dose from Facility Direct Radiation (mrem)****		3.74E+00	4.05E+00	2.87E+00	3.59E+00	1.43E+01
Hypothetical Dose from On-Site Septic Waste Disposal						1.24E-02

*"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.

****Maximum receptor point, west site boundary, no resident present.

(1) Child/Bone, NW-2900 meters.
(2) Infant/Thyroid, NW-4700 meters.
(3) NW-2900 meters.

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TABLE 4

(Continued)

(4) NW-550 meters.
(5) S-400 meters.
(a) There were no liquid releases during this reporting period.

TABLE 5A

VERMONT YANKEE JAN90-DEC90 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS A CLASS FREQUENCY (PERCENT) = .09

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
C-3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
(1)	14.29	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	14.29	.00	.00	28.57
(2)	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.02
4-7	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
8-12	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
(1)	14.29	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	14.29	.00	.00	28.57
(2)	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.02
13-18	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
(1)	.00	.00	.00	.00	.00	.00	14.29	.00	.00	.00	.00	.00	.00	.00	14.29	.00	.00	28.57
(2)	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.02
19-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	14.29	.00	14.29
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.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	2	0	0	0	0	0	1	0	0	0	0	0	0	0	3	1	0	7
(1)	28.57	.00	.00	.00	.00	.00	14.29	.00	.00	.00	.00	.00	.00	.00	42.86	14.29	.00	100.00
(2)	.02	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.04	.01	.00	.09

(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

VERMONT YANKEE JAN90-DEC90 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS B CLASS FREQUENCY (PERCENT) = .40

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
C-3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	3.13	.00	3.13
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
4-7	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	6
(1)	3.13	.00	.00	.00	.00	.00	3.13	.00	.00	.00	.00	.00	.00	.00	.00	12.50	.00	18.75
(2)	.01	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.05	.00	.07
8-12	2	0	0	0	0	0	1	2	0	0	0	0	0	0	0	1	0	6
(1)	6.25	.00	.00	.00	.00	.00	3.13	6.25	.00	.00	.00	.00	.00	.00	.00	3.13	.00	18.75
(2)	.02	.00	.00	.00	.00	.00	.01	.02	.00	.00	.00	.00	.00	.00	.00	.01	.00	.07
13-18	1	0	0	0	0	0	0	2	1	0	0	1	0	3	0	3	0	11
(1)	3.13	.00	.00	.00	.00	.00	.00	6.25	3.13	.00	.00	3.13	.00	9.38	.00	9.38	.00	34.38
(2)	.01	.00	.00	.00	.00	.00	.00	.02	.01	.00	.00	.01	.00	.04	.00	.04	.00	.14
19-24	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	2	0	8
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	12.50	6.25	.00	6.25	.00	25.00
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.05	.02	.00	.02	.00	.10
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	4	0	0	0	0	0	2	4	1	0	0	1	4	5	0	11	0	32
(1)	12.50	.00	.00	.00	.00	.00	6.25	12.50	3.13	.00	.00	3.13	12.50	15.63	.00	34.38	.00	100.00
(2)	.05	.00	.00	.00	.00	.00	.02	.05	.01	.00	.00	.01	.05	.06	.00	.14	.00	.40

(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

VERMONT YANKEE JAN90-DEC90 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS C CLASS FREQUENCY (PERCENT) = 1.81

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
C-3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.68	.00	.68	.00	1.37
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.01	.00	.02
4-7	2	2	1	0	2	0	2	1	1	0	1	1	0	1	1	7	0	22
(1)	1.37	1.37	.68	.00	1.37	.00	1.37	.68	.68	.00	.68	.68	.00	.68	.68	4.79	.00	15.07
(2)	.02	.02	.01	.00	.02	.00	.02	.01	.01	.00	.01	.01	.00	.01	.01	.09	.00	.27
8-12	2	0	0	0	0	[illegible]	2	10	5	1	0	1	0	2	5	22	0	52
(1)	1.37	.00	.00	.00	.00	1.[illegible]	1.37	6.85	3.42	.68	.00	.68	.00	1.37	3.42	15.07	.00	35.62
(2)	.02	.00	.00	.00	.00	.02	.02	.12	.06	.01	.00	.01	.00	.02	.06	.27	.00	.64
13-18	2	0	0	0	0	1	0	4	10	0	0	1	7	4	1	17	0	47
(1)	1.37	.00	.00	.00	.00	.68	.00	2.74	6.85	.00	.00	.68	4.79	2.74	.68	11.64	.00	32.19
(2)	.02	.00	.00	.00	.00	.01	.00	.05	.12	.00	.00	.01	.09	.05	.01	.21	.00	.58
19-24	0	0	0	0	0	0	0	0	1	0	0	1	6	2	0	10	0	20
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.68	.00	.00	.68	4.11	1.37	.00	6.85	.00	13.70
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.01	.07	.02	.00	.12	.00	.25
GT 24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	3
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.68	.68	.68	.00	2.05
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.01	.01	.00	.04
ALL SPEEDS	6	2	1	0	2	3	4	15	17	1	1	4	13	11	8	58	0	146
(1)	4.11	1.37	.68	.00	1.37	2.05	2.74	10.27	11.64	.68	.68	2.74	8.90	7.53	5.48	39.73	.00	100.00
(2)	.07	.02	.01	.00	.02	.04	.05	.19	.21	.01	.01	.05	.16	.14	.10	.72	.00	1.81

(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

VERMONT YANKEE JAN90-DEC90 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS D CLASS FREQUENCY (PERCENT) = 49.26

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	53	32	31	33	32	44	53	46	24	15	18	8	8	15	36	37	0	485
(1)	1.33	.80	.78	.83	.80	1.10	1.33	1.15	.60	.38	.45	.20	.20	.38	.90	.93	.00	12.18
(2)	.66	.40	.38	.41	.40	.54	.66	.57	.30	.19	.22	.10	.10	.19	.45	.46	.00	6.00
4-7	75	42	23	27	48	91	159	114	77	25	9	10	13	22	52	186	0	973
(1)	1.88	1.05	.58	.68	1.21	2.28	3.99	2.86	1.93	.63	.23	.25	.33	.55	1.31	4.67	.00	24.43
(2)	.93	.52	.28	.33	.59	1.13	1.97	1.41	.95	.31	.11	.12	.16	.27	.64	2.30	.00	12.03
8-12	148	23	7	8	28	29	74	132	182	38	21	31	51	114	58	204	0	1148
(1)	3.72	.58	.18	.20	.70	.73	1.86	3.31	4.57	.95	.53	.78	1.28	2.86	1.46	5.12	.00	28.82
(2)	1.83	.28	.09	.10	.35	.36	.92	1.63	2.25	.47	.26	.38	.63	1.41	.72	2.52	.00	14.20
13-18	93	12	4	2	0	4	6	31	142	23	12	19	91	187	104	163	0	893
(1)	2.33	.30	.10	.05	.00	.10	.15	.78	3.57	.58	.30	.48	2.28	4.69	2.61	4.09	.00	22.42
(2)	1.15	.15	.05	.02	.00	.05	.07	.38	1.76	.28	.15	.23	1.13	2.31	1.29	2.02	.00	11.04
19-24	24	3	0	0	0	1	0	5	59	1	1	2	23	88	56	120	0	383
(1)	.60	.08	.00	.00	.00	.03	.00	.13	1.48	.03	.03	.05	.58	2.21	1.41	3.01	.00	9.62
(2)	.30	.04	.00	.00	.00	.01	.00	.06	.73	.01	.01	.02	.28	1.09	.69	1.48	.00	4.74
GT 24	4	1	0	0	0	0	0	4	6	1	0	0	3	28	15	39	0	101
(1)	.10	.03	.00	.00	.00	.00	.00	.10	.15	.03	.00	.00	.08	.70	.38	.98	.00	2.54
(2)	.05	.01	.00	.00	.00	.00	.00	.05	.07	.01	.00	.00	.04	.35	.19	.48	.00	1.25
ALL SPEEDS	397	113	65	70	108	169	292	332	490	103	61	70	189	454	321	749	0	3983
(1)	9.97	2.84	1.63	1.76	2.71	4.24	7.33	8.34	12.30	2.59	1.53	1.76	4.75	11.40	8.06	18.80	.00	100.00
(2)	4.91	1.40	.80	.87	1.34	2.09	3.61	4.11	6.06	1.27	.75	.87	2.34	5.61	3.97	9.26	.00	49.26

(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 5E

VERMONT YANKEE JAN90-DEC90 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS E CLASS FREQUENCY (PERCENT) = 33.30

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
C-3	70	50	50	45	42	62	80	55	32	22	16	8	8	18	21	60	0	639
(1)	2.60	1.86	1.86	1.67	1.56	2.30	2.97	2.04	1.19	.82	.59	.30	.30	.67	.78	2.23	.00	23.73
(2)	.87	.62	.62	.56	.52	.77	.99	.68	.40	.27	.20	.10	.10	.22	.26	.74	.00	7.90
4-7	125	19	5	14	15	60	209	134	87	23	17	14	22	23	46	176	0	989
(1)	4.64	.71	.19	.52	.56	2.23	7.76	4.98	3.23	.85	.63	.52	.82	.85	1.71	6.54	.00	36.72
(2)	1.55	.23	.06	.17	.19	.74	2.58	1.66	1.08	.28	.21	.17	.27	.28	.57	2.18	.00	12.23
8-12	58	8	0	0	2	7	70	97	94	37	12	15	59	66	42	146	0	713
(1)	2.15	.30	.00	.00	.07	.26	2.60	3.60	3.49	1.37	.45	.56	2.19	2.45	1.56	5.42	.00	26.48
(2)	.72	.10	.00	.00	.02	.09	.87	1.20	1.16	.46	.15	.19	.73	.82	.52	1.81	.00	8.82
13-18	12	1	0	0	0	1	2	26	52	20	3	4	22	51	37	70	0	301
(1)	.45	.04	.00	.00	.00	.04	.07	.97	1.93	.74	.11	.15	.82	1.89	1.37	2.60	.00	11.18
(2)	.15	.01	.00	.00	.00	.01	.02	.32	.64	.25	.04	.05	.27	.63	.46	.87	.00	3.72
19-24	2	0	0	0	0	0	0	2	9	4	2	1	3	5	3	17	0	48
(1)	.07	.00	.00	.00	.00	.00	.00	.07	.33	.15	.07	.04	.11	.19	.11	.63	.00	1.78
(2)	.02	.00	.00	.00	.00	.00	.00	.02	.11	.05	.02	.01	.04	.06	.04	.21	.00	.59
GT 24	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	3
(1)	.00	.00	.00	.00	.00	.00	.00	.04	.00	.00	.00	.00	.00	.04	.04	.00	.00	.11
(2)	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.01	.01	.00	.00	.04
ALL SPEEDS	267	78	55	59	59	130	361	315	274	106	50	42	114	164	150	469	0	2693
(1)	9.91	2.90	2.04	2.19	2.19	4.83	13.41	11.70	10.17	3.94	1.86	1.56	4.23	6.09	5.57	17.42	.00	100.00
(2)	3.30	.96	.68	.73	.73	1.61	4.46	3.90	3.39	1.31	.62	.52	1.41	2.03	1.86	5.80	.00	33.30

(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 5F

VERMONT YANKEE JAN90-DEC90 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS F CLASS FREQUENCY (PERCENT) = 12.70

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
C-3	33	35	17	17	29	37	45	32	16	11	9	9	11	15	16	38	0	370
(1)	3.21	3.41	1.66	1.66	2.82	3.60	4.38	3.12	1.56	1.07	.88	.88	1.07	1.46	1.56	3.70	.00	36.03
(2)	.41	.43	.21	.21	.36	.46	.56	.40	.20	.14	.11	.11	.14	.19	.20	.47	.00	4.58
4-7	32	5	3	7	16	35	99	77	31	12	6	16	22	18	25	58	0	462
(1)	3.12	.49	.29	.68	1.56	3.41	9.64	7.50	3.02	1.17	.58	1.56	2.14	1.75	2.43	5.65	.00	44.99
(2)	.40	.06	.04	.09	.20	.43	1.22	.95	.38	.15	.07	.20	.27	.22	.31	.72	.00	5.71
8-12	2	0	0	1	0	1	29	27	16	6	6	7	10	14	10	51	0	180
(1)	.19	.00	.00	.10	.00	.10	2.82	2.63	1.56	.58	.58	.68	.97	1.36	.97	4.97	.00	17.53
(2)	.02	.00	.00	.01	.00	.01	.36	.33	.20	.07	.07	.09	.12	.17	.12	.63	.00	2.23
13-18	1	0	0	0	0	0	0	0	3	3	0	1	0	2	2	3	0	15
(1)	.10	.00	.00	.00	.00	.00	.00	.00	.29	.29	.00	.10	.00	.19	.19	.29	.00	1.46
(2)	.01	.00	.00	.00	.00	.00	.00	.00	.04	.04	.00	.01	.00	.02	.02	.04	.00	.19
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	68	40	20	25	45	73	173	136	66	32	21	33	43	49	53	150	0	1027
(1)	6.62	3.89	1.95	2.43	4.38	7.11	16.85	13.24	6.43	3.12	2.04	3.21	4.19	4.77	5.16	14.61	.00	100.00
(2)	.84	.49	.25	.31	.56	.90	2.14	1.68	.82	.40	.26	.41	.53	.61	.66	1.86	.00	12.70

(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

VERMONT YANKEE JAN90-DEC90 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS G CLASS FREQUENCY (PERCENT) = 2.45

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
C-3	6	2	3	2	5	4	6	4	2	1	3	1	1	2	4	7	0	53
(1)	3.03	1.01	1.52	1.01	2.53	2.02	3.03	2.02	1.01	.51	1.52	.51	.51	1.01	2.02	3.54	.00	26.77
(2)	.07	.02	.04	.02	.06	.05	.07	.05	.02	.01	.04	.01	.01	.02	.05	.09	.00	.66
4-7	7	1	0	2	3	8	12	14	9	2	7	3	2	8	5	11	0	94
(1)	3.54	.51	.00	1.01	1.52	4.04	6.06	7.07	4.55	1.01	3.54	1.52	1.01	4.04	2.53	5.56	.00	47.47
(2)	.09	.01	.00	.02	.04	.10	.15	.17	.11	.02	.09	.04	.02	.10	.06	.14	.00	1.16
8-12	0	0	0	1	0	1	8	10	4	0	3	0	6	5	1	6	0	45
(1)	.00	.00	.00	.51	.00	.51	4.04	5.05	2.02	.00	1.52	.00	3.03	2.53	.51	3.03	.00	22.73
(2)	.00	.00	.00	.01	.00	.01	.10	.12	.05	.00	.04	.00	.07	.06	.01	.07	.00	.56
13-18	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	1	0	6
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.52	1.01	.51	.00	3.03
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.04	.02	.01	.00	.07
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	3	3	5	8	13	26	28	15	3	13	4	9	18	12	25	0	198
(1)	6.57	1.52	1.52	2.53	4.04	6.57	13.13	14.14	7.58	1.52	6.57	2.02	4.55	9.09	6.06	12.63	.00	100.00
(2)	.16	.04	.04	.06	.10	.16	.32	.35	.19	.04	.16	.05	.11	.22	.15	.31	.00	2.45

(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 5H

VERMONT YANKEE JAN90-DEC90 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 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	163	119	101	97	108	147	184	137	74	49	46	26	28	51	78	144	0	1552
(1)	2.02	1.47	1.25	1.20	1.34	1.82	2.28	1.69	.92	.61	.57	.32	.35	.63	.96	1.78	.00	19.19
(2)	2.02	1.47	1.25	1.20	1.34	1.82	2.28	1.69	.92	.61	.57	.32	.35	.63	.96	1.78	.00	19.19
4-7	242	69	32	50	84	194	482	340	205	62	40	44	59	72	129	442	0	2546
(1)	2.99	.85	.40	.62	1.04	2.40	5.96	4.20	2.54	.77	.49	.54	.73	.89	1.60	5.47	.00	31.49
(2)	2.99	.85	.40	.62	1.04	2.40	5.96	4.20	2.54	.77	.49	.54	.73	.89	1.60	5.47	.00	31.49
8-12	213	31	7	10	30	40	184	278	301	82	42	54	126	201	117	430	0	2146
(1)	2.63	.38	.09	.12	.37	.49	2.28	3.44	3.72	1.01	.52	.67	1.56	2.49	1.45	5.32	.00	26.54
(2)	2.63	.38	.09	.12	.37	.49	2.28	3.44	3.72	1.01	.52	.67	1.56	2.49	1.45	5.32	.00	26.54
13-18	109	13	4	2	0	6	9	63	208	46	15	26	120	250	147	257	0	1275
(1)	1.35	.16	.05	.02	.00	.07	.11	.78	2.57	.57	.19	.32	1.48	3.09	1.82	3.18	.00	15.77
(2)	1.35	.16	.05	.02	.00	.07	.11	.78	2.57	.57	.19	.32	1.48	3.09	1.82	3.18	.00	15.77
19-24	26	3	0	0	0	1	0	7	69	5	3	4	36	97	59	150	0	460
(1)	.32	.04	.00	.00	.00	.01	.00	.09	.85	.06	.04	.05	.45	1.20	.73	1.86	.00	5.69
(2)	.32	.04	.00	.00	.00	.01	.00	.09	.85	.06	.04	.05	.45	1.20	.73	1.86	.00	5.69
GT 24	4	1	0	0	0	0	0	5	6	1	0	0	3	30	17	40	0	107
(1)	.05	.01	.00	.00	.00	.00	.00	.06	.07	.01	.00	.00	.04	.37	.21	.49	.00	1.32
(2)	.05	.01	.00	.00	.00	.00	.00	.06	.07	.01	.00	.00	.04	.37	.21	.49	.00	1.32
ALL SPEEDS	757	236	144	159	222	388	859	830	863	245	146	154	372	701	547	1463	0	8086
(1)	9.36	2.92	1.78	1.97	2.75	4.80	10.62	10.26	10.67	3.03	1.81	1.90	4.60	8.67	6.76	18.09	.00	100.00
(2)	9.36	2.92	1.78	1.97	2.75	4.80	10.62	10.26	10.67	3.03	1.81	1.90	4.60	8.67	6.76	18.09	.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

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

Supplemental Information
Third and Fourth Quarters, 1990

Facility: Vermont Yankee Nuclear Power Station

Licensee: Vermont Yankee Nuclear Power Corporation

1A. Technical Specification Limits - Dose and Dose Rate

Technical Specification and Category		Limit
a. Noble Gases		
3.8.E.1	Total body dose rate	500 mrem/yr
3.8.E.1	Skin dose rate	3000 mrem/yr
3.8.F.1	Gamma air dose	5 mrad in a quarter
3.8.F.1	Gamma air dose	10 mrad in a year
3.8.F.1	Beta air dose	10 mrad in a quarter
3.8.F.1	Beta air dose	20 mrad in a year
b. Iodine-131, Iodine-133, Tritium and Radionuclides in Particulate Form With Half-Lives Greater Than 8 Days		
3.8.E.1	Organ dose rate	1500 mrem/yr
3.8.G.1	Organ dose	7.5 mrem in a quarter
3.8.G.1	Organ dose	15 mrem in a year
c. Liquids		
3.8.B.1	Total body dose	1.5 mrem in a quarter
3.8.B.1	Total body dose	3 mrem in a year
3.8.B.1	Organ dose	5 mrem in a quarter
3.8.B.1	Organ dose	10 mrem in a year

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2A. Technical Specification Limits - Concentration

Technical Specification and Category	Limit
a. Noble Gases	No MPC limits
b. Iodine-131, Iodine-133, Tritium and Radionuclides in Particulate Form With Half-Lives Greater Than 8 Days:	No MPC limits
c. Liquids	
3.8.A.1 Total fraction of MPC excluding noble gases (10CFR20, Appendix B, Table II, Column 2):	≤1.0
3.8.A.1 Total noble gas concentration:	≤2E-04 uCi/cc

3. Average Energy

Provided below are the average energy ($\bar{E}$) of the radionuclide mixture in releases of fission and activation gases, if applicable.

a. Average gamma energy:	3rd Quarter	1.04E+00 MeV/dis
	4th Quarter	1.12E+00 MeV/dis
b. Average beta energy:	Not Applicable	

4. Measurements and Approximations of Total Radioactivity

Provided below are the methods used to measure or approximate the total radioactivity in effluents and the methods used to determine radionuclide composition.

a. Fission and Activation Gases

Stack-continuous monitors normally show less than detectable releases of fission and activation gases. Therefore, to determine the level of releases, gas grab samples are drawn at the stack monthly or when the noble gas monitors show an increase. The grab samples are analyzed by gamma spectroscopy to determine the isotopic composition and resultant release rate. The error involved in these steps may be approximately ±100 percent.

b. Iodines

Continuous isokinetic samples are drawn from the plant stack through a particulate filter and charcoal cartridge. The filters and cartridge are removed weekly (if releases are less than 4 percent of the Tech Spec limit), or daily (if they are greater than 4 percent of the limit), and are analyzed for radioiodine 131, 132, 133, 134, and 135. The error involved in these steps may be approximately ±50 percent.

c. Particulates

The particulate filters described in b. above are also counted for particulate radioactivity. The error involved in this sample is also approximately ±50 percent.

d. Liquid Effluents

Radioactive liquid effluents released from the facility are continuously monitored. Measurements are also made on a representative sample of each batch of radioactive liquid effluents released. For each batch, station records are retained of the total activity (mCi) released, concentration (uCi/ml) of gross

radioactivity, volume (liters), and approximate total quantity of water (liters) used to dilute the liquid effluent prior to release to the Connecticut River.

Each batch of radioactive liquid effluent released is analyzed for gross gamma and gamma isotopic radioactivity. A monthly proportional composite sample, comprising an aliquot of each batch released during a month, is also analyzed for tritium, SR-89, SR-90, gross beta and gross alpha radioactivity, in addition to gamma spectroscopy.

There were no liquid releases during the reporting period.

5. Batch Releases

a. Liquid

There were no routine liquid batch releases during the reporting period.

b. Gaseous

There were no routine gaseous batch releases during the reporting period.

6. Abnormal Releases

a. Liquid

There were no nonroutine liquid releases during the reporting period.

b. Gaseous

There were no nonroutine gaseous releases during the reporting period.

APPENDIX B

LIQUID HOLDUP TANKS

Requirement: Technical Specification 3.8.D.1 limits the quantity of radioactive material contained in any outside tank. With the quantity of radioactive material in any outside tank exceeding the limits of Technical Specification 3.8.D.1, a description of the events leading to this condition is required in the next Semiannual Effluent Release Report per Technical Specification 6.7.C.1.

Response: The limits of Technical Specification 3.8.D.1 were not exceeded during this reporting period.

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APPENDIX C

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

Requirement: Radioactive liquid effluent monitoring instrumentation channels are required to be operable in accordance with Technical Specification Table 3.9.1. If an inoperable radioactive liquid effluent monitoring instrument is not returned to operable status prior to a release pursuant to Note 4 of Table 3.9.1, an explanation in the next Semiannual Effluent Release Report of the reason(s) for delay in correcting the inoperability are required per Technical Specification 6.7.C.1.

Response: Since the requirements of Technical Specification Table 3.9.1 governing the operability of radioactive liquid effluent monitoring instrumentation were met for this reporting period, no response is required.

APPENDIX D

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Requirement: Radioactive gaseous effluent monitoring instrumentation channels are required to be operable in accordance with Technical Specification Table 3.9.2. If inoperable gaseous effluent monitoring instrumentation is not returned to operable status within 30 days pursuant to Note 5 of Table 3.9.2, an explanation in the next Semiannual Effluent Release Report of the reason(s) for the delay in correcting the inoperability is required per Technical Specification 6.7.C.1.

Response: Since the requirements of Technical Specification Table 3.9.2 governing the operability of radioactive gaseous effluent monitoring instrumentation were met for this reporting period, no response is required.

APPENDIX E

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Requirement: The radiological environmental monitoring program is conducted in accordance with Technical Specification 3.9.C. With milk samples no longer available from one or more of the sample locations required by Technical Specification Table 3.9.3, Technical Specification 6.7.C.1 requires the following to be included in the next Semiannual Effluent Release Report: (1) identify the cause(s) of the sample(s) no longer being available, (2) identify the new location(s) for obtaining available replacement samples and (3) include revised ODCM figure(s) and table(s) reflecting the new location(s).

Response: All required milk samples were available during this reporting period.

APPENDIX F

LAND USE CENSUS

Requirement: A land use census is conducted in accordance with Technical Specification 3.9.D. 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 4.8.G.1, Technical Specification 6.7.C.1 requires the identification of the new location(s) in the next Semiannual Effluent Release Report.

Response: No locations were identified by the 1990 land use census that would yield at least a 20 percent greater dose or dose commitment than the values currently being calculated pursuant to Technical Specification 4.8.G.1.

APPENDIX G

PROCESS CONTROL PROGRAM

Requirement: Technical Specification 6.12.A.1 requires that licensee initiated changes to the Process Control Program (PCP) 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.

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APPENDIX H

OFF-SITE DOSE CALCULATION MANUAL

Requirement: Technical Specification 6.13.A.1 requires that licensee initiated changes to the Off-Site Dose Calculation Manual (ODCM) 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 I

RADIOACTIVE LIQUID, GASEOUS, AND SOLID WASTE MANAGEMENT SYSTEMS

Requirement: Technical Specification 6.14.A 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.

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APPENDIX J

ON-SITE DISPOSAL OF SEPTIC WASTE

Requirement: Off-Site Dose Calculational Manual, Appendix B requires that the dose impact due to on-site disposal of septic waste during the reporting year and from previous years be reported to the Commission in the Semiannual Radioactive Effluent Report filed after January 1, if disposals occur during the reporting year.

Response: There were two on-site disposals of septic waste during the reporting year. The total volume of septage spread was approximately 19,000 gallons, with all detected radioactivity contained in the solid fraction. The average solids content of the waste was 12.7 wt. %. The total activity spread during 1990 on the 1.9 acres (southern) on-site disposal plot was:

Nuclide	Activity (Ci)
Mn-54	3.21E-7
Co-60	1.12E-5
Zn-65	7.73E-7
Cs-137	1.04E-6
Ce-141	2.28E-7

The projected hypothetical dose from on-site disposals of septic waste is 1.24E-02 mrem/year. This dose was calculated according to the model and the assumptions of Off-Site Dose Calculational Manual, Appendix B.

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