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May 11, 2000
BVY 00-44

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Subject: **Vermont Yankee Nuclear Power Station**
License No. DPR-28 (Docket No. 50-271)
1999 Annual Radioactive Effluent Release Report

In accordance with Vermont Yankee Technical Specification 6.6.D and 10CFR50.36a(a)(2), attached is a copy of the 1999 Annual Radioactive Effluent Release Report.

We trust that the information provided is adequate; however, should you have questions or require additional information, please contact Mr. David P. Tkatch at (802) 258-5500.

Sincerely,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Gautam Sen
Licensing Manager

Attachment
cc: USNRC Region 1 Administrator
USNRC Resident Inspector – VYNPS
USNRC Project Manager – VYNPS
Vermont Department of Public Service
Vermont Division of Occupational and Radiological Health
Massachusetts Metropolitan District Commission
Massachusetts Department of Public Health

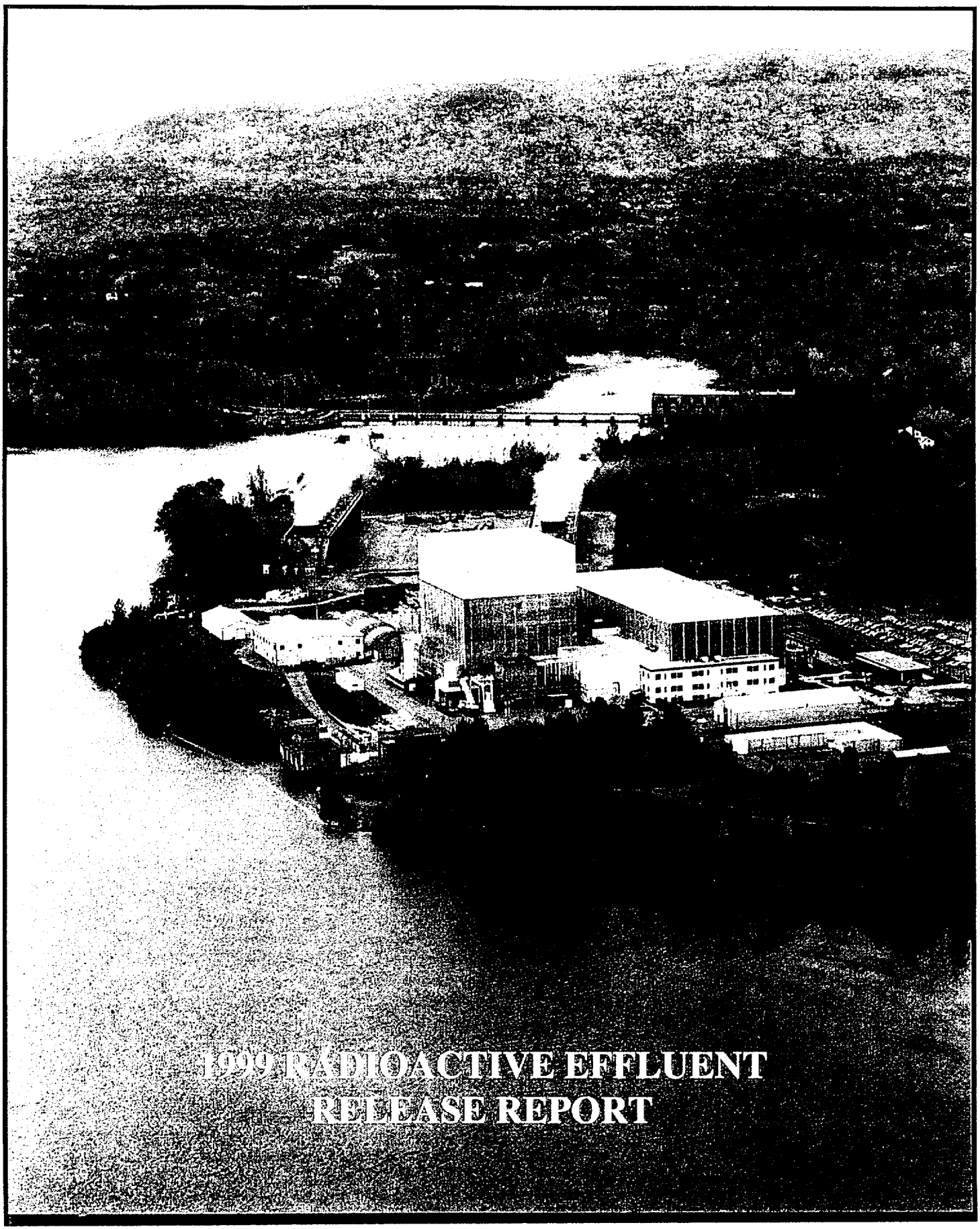
IE48

SUMMARY OF VERMONT YANKEE COMMITMENTS

BVY NO.: 00-44

The following table identifies commitments made in this document by Vermont Yankee. Any other actions discussed in the submittal represent intended or planned actions by Vermont Yankee. They are described to the NRC for the NRC's information and are not regulatory commitments. Please notify the Licensing Manager of any questions regarding this document or any associated commitments.

COMMITMENT	COMMITTED DATE OR "OUTAGE"
None	N/A



1999 RADIOACTIVE EFFLUENT RELEASE REPORT

Vermont Yankee Nuclear Power Station, Vernon, Vermont

RADIOACTIVE EFFLUENT RELEASE REPORT FOR 1999 INCLUDING ANNUAL RADIOLOGICAL IMPACT ON MAN

Vermont Yankee Nuclear Power Station

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

2.0 METEOROLOGICAL DATA 2

3.0 DOSE ASSESSMENT 3

3.1 Doses From Liquid Effluents 3
3.2 Doses From Noble Gases 3
3.3 Doses From Iodine-131, Iodine-133, Tritium, and Radionuclides in Particulate Form With Half-Lives Greater Than 8 Days 3
3.4 Whole-Body Doses in Unrestricted Areas From Direct Radiation 4
3.5 Doses From On-Site Disposal of Septic Waste and Cooling Tower Silt 5
3.6 On-Site Recreational Activities 5

REFERENCES 6

APPENDIX A - SUPPLEMENTAL INFORMATION A-1

APPENDIX B - LIQUID HOLDUP TANKS B-1

APPENDIX C - RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION C-1

APPENDIX D - RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION D-1

APPENDIX E - RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM E-1

APPENDIX F - LAND USE CENSUS F-1

APPENDIX G - PROCESS CONTROL PROGRAM G-1

APPENDIX H - OFF-SITE DOSE CALCULATION MANUAL H-1

APPENDIX I - RADIOACTIVE LIQUID, GASEOUS AND SOLID WASTE TREATMENT SYSTEMS I-1

APPENDIX J - ON-SITE DISPOSAL OF SEPTIC WASTE J-1

LIST OF TABLES

Number	Title	Page
1A	First and Second Quarters, 1999 Gaseous Effluents - Summation of All Releases	7
1A	Third and Fourth Quarters, 1999 Gaseous Effluents - Summation of All Releases	8
1B	First and Second Quarters, 1999 Gaseous Effluents - Elevated Releases	9
1B	Third and Fourth Quarters, 1999 Gaseous Effluents - Elevated Releases	10
1C	First and Second Quarters, 1999 Gaseous Effluents - Ground Level Releases	11
1C	Third and Fourth Quarters, 1999 Gaseous Effluents - Ground Level Releases	12
1D	Gaseous Effluents - Nonroutine Releases	13
2A	Liquid Effluents - Summation of All Releases	14
2B	Liquid Effluents - Nonroutine Releases	15
3	First and Second Quarters, 1999 Solid Waste and Irradiated Fuel Shipments	16
3	Third and Fourth Quarters, 1999 Solid Waste and Irradiated Fuel Shipments	18
4A	Maximum Off-Site Doses/Dose Commitments to Members of the Public from Liquid and Gaseous Effluents for 1999 (10CFR50, Appendix I)	20
4B	Maximum Annual Dose Commitments from Direct External Radiation, Plus Liquid and Gaseous Effluents for 1999(*) (40CFR190)	21
4C	Receptor Locations for Vermont Yankee	22
4D	Usage Factors for Various Gaseous Pathways at Vermont Yankee	23
4E	Environmental Parameters for Gaseous Effluents at Vermont Yankee	24

5A to 5H	Annual Summary of Upper Level Joint Frequency Distribution	26-33
6A to 6H	Annual Summary of Lower Level Joint Frequency Distribution	34-41

RADIOACTIVE EFFLUENT RELEASE REPORT FOR 1999
[INCLUDING ANNUAL RADIOLOGICAL IMPACT ON MAN]

1.0 INTRODUCTION

Tables 1 through 3 list the recorded radioactive liquid and gaseous effluents and solid waste for the year, with data summarized on a quarterly basis for both liquids and gases. Table 4A summarizes the estimated radiological dose commitments from all radioactive liquid and gaseous effluents released during the year 1999 in response to the ALARA objectives of 10CFR50, Appendix I. Also included on Table 4A is the estimate of direct dose from fixed station sources along the limiting west site boundary line. Tables 5A through 6H report the cumulative joint frequency distributions of wind speed, wind direction, and atmospheric stability for the 12-month period, January to December 1999. Radioactive effluents reported in Tables 1 and 2 were used to determine the resulting doses for 1999.

As required by Technical Specification 6.6.D and ODCM Section 7.1, dose commitments resulting from the release of radioactive materials in liquids and gases during the reporting period 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 3) and actual measured meteorological data recorded during the reporting period.

As required by ODCM Section 7.1, 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. For this reporting period, the only recreational activity permitted was employee access to a boat launching ramp adjacent to the intake structure. The assessment of recreational activities is described in Section 3.6.

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. However, Table 4B does provide the combination of doses and dose commitments from plant effluents and direct radiation sources for the limiting member of the public off-site as a demonstration of compliance with the dose standards of 40CFR190.

All calculated dose estimates for this reporting period are below the dose criteria of 10CFR Part 50, Appendix I, and 40CFR190.

Appendices B through H indicate the status of reportable items per the requirements of Technical Specification 6.7.B.1.c and ODCM Section 7.1.

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 for all stack (elevated) releases. Changes in terrain elevations in the site environment were also factored into the meteorological models as appropriate.

Table 4C lists the distances from the plant stack to the nearest site boundary, resident, and milk animal in each of the 16 principle compass directions as determined during the 1999 land use census. These locations were used in the calculation of atmospheric dispersion factors.

3.0 DOSE ASSESSMENT

3.1 Doses From Liquid Effluents

Technical Specification 3.8.B.1 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 10CFR Part 50, Appendix I. By implementing the requirements of 10CFR Part 50, Appendix I, Technical Specification 3.8.B.1 assures that the release of radioactive material in liquid effluents will be kept "as low as is reasonably achievable."

For periods in which liquid waste discharges actually occur, the exposure pathways that could exist are fish, direct exposure from river shoreline sedimentation, milk and meat via animal ingestion of the Connecticut River water, and meat, milk and vegetable pathways via crop irrigation with water withdrawn from the Connecticut River. The drinking water and aquatic invertebrate pathways do not exist downriver of the Vermont Yankee plant.

There were no recorded liquid radwaste discharges during the report period, and therefore, no dose impact.

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 10CFR Part 50, Appendix I. By implementing the requirements of 10CFR 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, nearest resident in each of the sixteen principal compass directions, 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, Iodine-133, 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 10CFR Part 50, Appendix I (7.5 mrem per quarter, and 15 mrem per year). By implementing the requirements of 10CFR 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 principal 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.1 (see Table 4C). 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 cow location since this data category is not part of the annual land use census. 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 3). During the first and fourth quarters, the milk animals are assumed to receive only stored feed. Usage factors for gaseous effluents are listed by age group and pathway in Table 4D. Table 4E provides other dose model parameter assumptions used in the dose assessments.

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 4A. These estimated organ doses are well below the 10CFR 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 4) 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, the Low Level Waste Storage Pad Facility, and old turbine rotors and casings in the turbine storage facility. The annual dose is based on dose rate measurements in these three 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 4A . These site boundary doses assume a 100 percent occupancy factor, and take no credit for the shielding effect of any residential structure.

Table 4B lists the combination of direct radiation and effluent release doses at the limiting nearest residence for the purpose of demonstrating compliance with the dose standards contained in 40CFR190. For direct radiation, no credit for actual occupancy time is taken (i.e., occupancy is equal to 100%).

3.5 Doses From On-Site Disposal of Septic Waste and Cooling Tower Silt

Off-Site Dose Calculation Manual, Appendices B and F, require that all applications of septage and the cooling tower silt within the approved designated disposal areas be limited to ensure the dose to a maximally-exposed individual during the period of Vermont Yankee site control be maintained at less than 1 mrem/year to the whole body and any organ. After the period associated with Vermont Yankee operational control, the dose to the inadvertent intruder is to be maintained at less than 5 mrem/year. The projected dose from on-site disposals of septic waste and the cooling tower silt is given in Appendix J of this report.

3.6 On-Site Recreational Activities

During the summer of 1999, limited access to a boat launching ramp located on-site just north of the intake structure was permitted for employees, their families and guests. An assessment of the Thermoluminescent Dosimeters (TLD's) situated at the boat launch, on the boat launch access gate and along the access road to the boat launch were used to estimate the direct radiation exposure rate for this recreational activity. Security access records show 4 days to be the highest amount of usage for a single individual. A usage factor of 48 hours/year was calculated using a conservative occupancy rate of 12 hours/day. Most visits were 6 hours or less in duration. The shoreline recreational usage factor in Regulatory Guide 1.109 (Table E-5), is 67 hours/year. The Regulatory Guide 1.109 shoreline recreational usage factor of 67 hours/year was applied to the highest TLD because it is more conservative. The resulting individual dose is estimated to be 0.8 mrem. This is considered conservative since the TLD results at the boat ramp (most probable occupancy location) were more than three times lower than the TLD along the access road as used in this calculation. There was no significant gaseous inhalation or ground deposition contribution to dose since the close proximity of the ramp area to the 94 meter tall plant stack kept gaseous effluents well over head.

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. 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 l, October 1977.

4. 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 Annual Report
First and Second Quarters, 1999
Gaseous Effluents - Summation of All Releases

		Unit	Quarter 1	Quarter 2	Est. Total Error, %
A.	Fission and Activation Gases				
	1.Total release	Ci	6.40E-01	0.00E+00	±2.30E+01
	2.Average release rate for period	µCi/sec	8.12E-02	0.00E+00	
	3.Percent of Tech. Spec. limit (1)	%	9.60E-04	0.00E+00	
B.	Iodines				
1.	Total Iodine	Ci	3.46E-04	5.79E-04	±1.80E+01
2.	Average release rate for period	µCi/sec	4.39E-05	7.34E-05	
3.	Percent of Tech. Spec. limit (2)	%	2.04E-02	6.73E-02	
C.	Particulates				
1.	Particulates with T-1/2 > 8 days	Ci	3.16E-06	2.24E-06	±1.80E+01
2.	Average release rate for period	µCi/sec	4.01E-07	2.84E-07	
3.	Percent of Tech. Spec. limit (3)	%	(3)	(3)	
4.	Gross alpha radioactivity	Ci	0.00E+00	0.00E+00	
D.	Tritium				
1.	Total release	Ci	5.08E+00	4.97E+00	±1.80E+01
2.	Average release rate for period	µCi/sec	6.44E-01	6.30E-01	
3.	Percent of Tech. Spec. limit (3)	%	(3)	(3)	

(1) Technical Specification 3.8.F.1.a for the most limiting of beta air or 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 Iodine above in Part B.

TABLE 1A
(Continued)

Vermont Yankee
Effluent and Waste Disposal Annual Report
Third and Fourth Quarters, 1999
Gaseous Effluents - Summation of All Releases

	Unit	Quarter 3	Quarter 4	Est. Total Error, %
A. Fission and Activation Gases				
1. Total release	Ci	1.72E-01	0.00E+00	±2.30E+01
2. Average release rate for period	µCi/sec	2.18E-02	0.00E+00	
3. Percent of Tech. Spec. limit (1)	%	1.66E-04	0.00E+00	
B. Iodines				
1. Total Iodine	Ci	7.87E-04	3.89E-05	±1.80E+01
2. Average release rate for period	µCi/sec	9.98E-05	4.93E-06	
3. Percent of Tech. Spec. limit (2)	%	1.13E-01	9.08E-03	
C. Particulates				
1. Particulates with T-1/2 > 8 days	Ci	1.07E-05	5.75E-06	±1.80E+01
2. Average release rate for period	µCi/sec	1.36E-06	7.29E-07	
3. Percent of Tech. Spec. limit (3)	%	(3)	(3)	
4. Gross alpha radioactivity	Ci	0.00E+00	0.00E+00	
D. Tritium				
1. Total release	Ci	4.42E+00	2.23E+00	±1.50E+01
2. Average release rate for period	µCi/sec	5.61E-01	2.82E-01	
3. Percent of Tech. Spec. limit (3)	%	(3)	(3)	

(1) Technical Specification 3.8.F.1.a for the most limiting of beta air or 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 Iodine above in Part B.

TABLE 1B
Vermont Yankee
Effluent and Waste Disposal Annual Report
First and Second Quarters, 1999
Gaseous Effluents - Elevated Releases

		Continuous Mode		Batch Mode(1)	
		Quarter		Quarter	
Nuclides Released	Units	1	2	1	2
1. Fission Gases					
Krypton-85	Ci	ND	ND		
Krypton-85m	Ci	ND	ND		
Krypton-87	Ci	ND	ND		
Krypton-88	Ci	ND	ND		
Xenon-133	Ci	ND	ND		
Xenon-133m	Ci	ND	ND		
Xenon-135	Ci	ND	ND		
Xenon-135m	Ci	6.40E-01	ND		
Xenon-138	Ci	ND	ND		
Unidentified	Ci	ND	ND		
Total for Period	Ci	6.40E-01	0.00E+00	0.00E+00	0.00E+00
2. Iodines					
Iodine-131	Ci	9.17E-05	8.55E-05		
Iodine-133	Ci	2.54E-04	4.93E-04		
Iodine-135	Ci	ND	ND		
Total for Period	Ci	3.46E-04	5.79E-04	0.00E+00	0.00E+00
3. Particulates					
Strontium-89	Ci	ND	ND		
Strontium-90	Ci	ND	ND		
Cesium-134	Ci	ND	ND		
Cesium-137	Ci	ND	ND		
Barium-Lanthanum-140	Ci	ND	ND		
Manganese-54	Ci	ND	ND		
Chromium-51	Ci	ND	ND		
Cobalt-58	Ci	ND	ND		
Cobalt-60	Ci	ND	ND		
Cerium-141	Ci	ND	ND		
Zinc-65	Ci	ND	ND		
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00

(1) There were no batch mode gaseous releases for this reporting period.
ND Not Detected at the plant stack

TABLE 1B
(Continued)

Vermont Yankee
Effluent and Waste Disposal Annual Report
Third and Fourth Quarters, 1999
Gaseous Effluents - Elevated Releases

		Continuous Mode		Batch Mode(1)	
		Quarter		Quarter	
Nuclides Released	Units	3	4	3	4
1. Fission Gases					
Krypton-85	Ci	ND	ND		
Krypton-85m	Ci	ND	ND		
Krypton-87	Ci	ND	ND		
Krypton-88	Ci	ND	ND		
Xenon-133	Ci	ND	ND		
Xenon-133m	Ci	ND	ND		
Xenon-135	Ci	1.72E-01	ND		
Xenon-135m	Ci	ND	ND		
Xenon-138	Ci	ND	ND		
Unidentified	Ci	ND	ND		
Total for Period	Ci	1.72E-01	0.00E+00	0.00E+00	0.00E+00
2. Iodines					
Iodine-131	Ci	1.34E-04	3.89E-05		
Iodine-133	Ci	6.53E-04	ND		
Iodine-135	Ci	ND	ND		
Total for Period	Ci	7.87E-04	3.89E-05	0.00E+00	0.00E+00
3. Particulates					
Strontium-89	Ci	1.07E-05	ND		
Strontium-90	Ci	ND	ND		
Cesium-134	Ci	ND	ND		
Cesium-137	Ci	ND	ND		
Barium-Lanthanum-140	Ci	ND	ND		
Manganese-54	Ci	ND	5.75E-06		
Chromium-51	Ci	ND	ND		
Cobalt-58	Ci	ND	ND		
Cobalt-60	Ci	ND	ND		
Cerium-141	Ci	ND	ND		
Zinc-65	Ci	ND	ND		
Total for Period	Ci	1.07E-05	5.75E-06	0.00E+00	0.00E+00

(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 Annual Report
First and Second Quarters, 1999
Gaseous Effluents - Ground Level Releases (2)

		Continuous Mode		Batch Mode(1)	
		Quarter		Quarter	
Nuclides Released	Units	1(1)(2)	2	1(1)	2(2)(3)
1. Fission Gases					
Krypton-85	Ci	ND			ND
Krypton-85m	Ci	ND			ND
Krypton-87	Ci	ND			ND
Krypton-88	Ci	ND			ND
Xenon-133	Ci	ND			ND
Xenon-135	Ci	ND			ND
Xenon-135m	Ci	ND			ND
Xenon-138	Ci	ND			ND
Unidentified	Ci	ND			ND
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Iodines					
Iodine-131	Ci	ND			ND
Iodine-133	Ci	ND			ND
Iodine-135	Ci	ND			ND
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Particulates					
Strontium-89	Ci	ND			ND
Strontium-90	Ci	ND			ND
Cesium-134	Ci	ND			ND
Cesium-137	Ci	4.79E-07			3.38E-07
Barium-Lanthanum-140	Ci	ND			ND
Manganese-54	Ci	9.73E-08			6.87E-08
Chromium-51	Ci	ND			ND
Cobalt-58	Ci	ND			ND
Cobalt-60	Ci	9.22E-07			6.52E-07
Cerium-141	Ci	ND			ND
Zinc-65	Ci	1.96E-07			1.38E-07
Iron-55	CI	1.47E-06			1.04E-06
Total for Period	Ci	3.16E-06	0.00E+00	0.00E+00	2.24E-06

(1) Burning of waste oil was treated as a continuous release for the first quarter
(2) The North Warehouse stack was used as a ground level release point for burning of waste oil.
(3) There were seven ground level gaseous releases of this type for the second quarter.
ND Not detected in the waste oil sample.

TABLE 1C
(Continued)

Vermont Yankee
Effluent and Waste Disposal Annual Report
Third and Fourth Quarters, 1999
Gaseous Effluents - Ground Level Releases

	Continuous Mode			Batch Mode(1)	
		Quarter		Quarter	
Nuclides Released	Units	3(1)	4(1)	3(1)	4(1)
1. Fission Gases					
Krypton-85	Ci				
Krypton-85m	Ci				
Krypton-87	Ci				
Krypton-88	Ci				
Xenon-133	Ci				
Xenon-135	Ci				
Xenon-135m	Ci				
Xenon-138	Ci				
Unidentified	Ci				
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Iodines					
Iodine-131	Ci				
Iodine-133	Ci				
Iodine-135	Ci				
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3. Particulates					
Strontium-89	Ci				
Strontium-90	Ci				
Cesium-134	Ci				
Cesium-137	Ci				
Barium-Lanthanum-140	Ci				
Manganese-54	Ci				
Chromium-51	Ci				
Cobalt-58	Ci				
Cobalt-60	Ci				
Cerium-141	Ci				
Zinc-65	Ci				
Iron-55	CI				
Total for Period	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00

(1) There were no ground level gaseous releases for this reporting period.
ND Not detected in the waste oil sample.

TABLE 1D
Vermont Yankee
Effluent and Waste Disposal Annual Report
for 1999
Gaseous Effluents - Nonroutine Releases

There were no nonroutine or accidental gaseous releases during this reporting period.

TABLE 2A
Vermont Yankee
Effluent and Waste Disposal Annual Report
for 1999
Liquid Effluents - Summation of All Releases

There were no liquid releases during this reporting period.

TABLE 2B
Vermont Yankee
Effluent and Waste Disposal Annual Report
for 1999
Liquid Effluents - Nonroutine Releases

There were no nonroutine or accidental liquid releases during this reporting period.

TABLE 3
Vermont Yankee
Effluent and Waste Disposal Annual Report
First and Second Quarters, 1999
Solid Waste and Irradiated Fuel Shipments

A. Solid Waste Shipped Off-Site for Burial or Disposal (not irradiated fuel)

1. Type of Waste

Shipped from VY for Burial or Disposal	Unit	1st and 2nd Quarters 1999	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3 Ci	67.7 137.6	±2.50E+01
b. Dry compressible waste, contaminated equipment, etc.	m^3 Ci	None	±2.50E+01
c. Irradiated components, control rods, etc.	m^3 Ci	None	±2.50E+01

Shipped from Processor(s) for Burial or Disposal	Unit	1st and 2nd Quarters 1999	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3 Ci	None	±2.50E+01
b. Dry compressible waste, contaminated equipment, etc.	m^3 Ci	27.6 1.2	±2.50E+01
c. Irradiated components, control rods, etc.	m^3 Ci	None	±2.50E+01

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

a. Spent resins, filter sludges, evaporator bottoms, etc.		b. Dry compressible waste, contaminated equipment, etc.	
Isotope	Percent (1)	Isotope	Percent (1)
Zinc-65	11.9	Iron-55	% 6.35E+01
Cesium-137	27	Zinc-65	% 6.90E+00
Cobalt-60	22.3	Cobalt-60	% 1.45E+01
Cesium-134	1.5	Manganese-54	% 4.70E+00
Manganese-54	6.3	Cesium-137	% 1.10E+00
Iron-55	11.5	Chromium-51	% 4.40E+00
Nickel-63	12	Cerium-144	% 1.30E+00
Cerium-144	6.2		

(1) Includes only those nuclides that are greater than 1% of the total activity

TABLE 3
(Continued)

Vermont Yankee
Effluent and Waste Disposal Annual Report
First and Second Quarters, 1999
Solid Waste and Irradiated Fuel Shipments

3. Disposition of Solid Waste Shipments (1st and 2nd Quarters)

				Destination	
No. of Shipments	From VY	From Processor	Mode of Transportation	Processor	Burial or Disposal
14	X		Truck		CNS, Inc. Barnwell, SC
3	X		Truck	GTS Duratek Oak Ridge, TN	
30		X	Truck		Envirocare Clive, Utah

B. Irradiated Fuel Shipments (Disposition): None.

C. Additional Data (1st and 2nd Quarters)

Supplemental Information	Shipments from VY to Processors	Shipments from VY for Burial or Disposal	Shipments from Processors for Burial or Disposal
Class of Solid Waste Shipped	A	A, B	A
Type of Containers Used	Strong Tight	STC, Type A	Strong Tight
Solidification Agent or Absorbent	None	None	None

Note: Sections A.1 and A.2 above do not include the data for the waste shipments from VY to the processors that were not ultimately sent out for burial or disposal in 1999. The data for this waste will be included in the report that covers the year that this waste is shipped from the processor or VY for burial or disposal.

TABLE 3
(Continued)

Vermont Yankee
Effluent and Waste Disposal Annual Report
Third and Fourth Quarters, 1999
Solid Waste and Irradiated Fuel Shipments

A. Solid Waste Shipped Off-Site for Burial or Disposal (not irradiated fuel)

1. Type of Waste

Shipped from VY for Burial or Disposal	Unit	3rd and 4th Quarters 1999	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m3 Ci	43.5 146.5	±2.50E+01
b. Dry compressible waste, contaminated equipment, etc.	m3 Ci	46.5 0.8	±2.50E+01
c. Irradiated components, control rods, etc.	m3 Ci	None	±2.50E+01

Shipped from Processor(s) for Burial or Disposal	Unit	3rd and 4th Quarters 1999	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m3 Ci	None	±2.50E+01
b. Dry compressible waste, contaminated equipment, etc.	m3 Ci	6.9 0.13	±2.50E+01
c. Irradiated components, control rods, etc.	m3 Ci	None	±2.50E+01

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

a. Spent resins, filter sludges, evaporator bottoms, etc.		b. Dry compressible waste, contaminated equipment, etc.	
Isotope	Percent (1)	Isotope	Percent (1)
Zinc-65	11.9	Iron-55	% 6.35E+01
Cesium-137	27	Zinc-65	% 6.90E+00
Cobalt-60	22.3	Cobalt-60	% 1.45E+01
Cesium-134	1.5	Manganese-54	% 4.70E+00
Manganese-54	6.3	Cesium-137	% 1.10E+00
Iron-55	11.5	Chromium-51	% 4.40E+00
Nickel-63	12	Cerium-144	%1.30E+00
Cerium-144	6.2		

(1) Includes only those nuclides that are greater than 1% of the total activity

TABLE 3
(Continued)

Vermont Yankee
Effluent and Waste Disposal Annual Report
Third and Fourth Quarters, 1999
Solid Waste and Irradiated Fuel Shipments

3. Disposition of Solid Waste Shipments (3rd and 4th Quarters)

				Destination	
No. of Shipments	From VY	From Processor	Mode of Transportation	Processor	Burial or Disposal
14		X	Truck		Envirocare Clive, Utah
12	X		Truck		CNS, Inc. Barnwell, SC
7	X		Truck	GTS Duratek, Oak Ridge, TN	

B. Irradiated Fuel Shipments (Disposition): None.

C. Additional Data (3rd and 4th Quarters)

Supplemental Information	Shipments from VY to Processors	Shipments from VY for Burial or Disposal	Shipments from Processors for Burial or Disposal
Class of Solid Waste Shipped	A	A, B	A
Type of Containers Used	Strong Tight	STC, Type A	Strong Tight
Solidification Agent or Absorbent	None	None	None

Note: Sections A.1 and A.2 above do not include the data for the waste shipments from VY to the processors that were not ultimately sent out for burial or disposal in 1999. The data for this waste will be included in the report that covers the year that this waste is shipped from the processor or VY for burial or disposal.

TABLE 4A
Vermont Yankee
Maximum* Off-Site Doses/Dose Commitments to Members of the Public
from Liquid and Gaseous Effluents
for 1999
(10CFR50, Appendix I)

Source	Dose (mrem)[a]				
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Year[b]
Liquid Effluents					
Total Body Dose					
Footnotes	(c)	(c)	(c)	(c)	(c)
Organ Dose					
Footnotes	(c)	(c)	(c)	(c)	(c)
Airborne Effluents					
Iodines and Particulates	1.52E-03	5.05E-03	8.50E-03	6.81E-04	1.58E-02
Footnotes	(1)	(2)	(3)	(4)	
Noble Gases					
Beta Air (mrad)	1.29E-05		1.66E-05		2.95E-05
Footnotes	(5)	(d)	(6)	(d)	
Gamma Air (mrad)	4.80E-05		6.64E-06		5.46E-05
Footnotes	(7)	(d)	(8)	(d)	
Direct Radiation					
See Section 3.4	4.36	4.39	4.37	2.84	15.9 (**)

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

** Maximum direct dose point on the West Site Boundary fenceline.

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

(b) The yearly dose is the sum of the doses for each quarter, or a full annual assessment.

(c) There were no liquid releases in this quarter.

(d) There were no detectable noble gas releases in this quarter.

(1) Child/Thyroid/SW/2600 meters
(2) Infant/Thyroid/SSE/5240 meters
(3) Infant/Thyroid/NW/4260 meters
(4) Child/Thyroid/WSW/2900 meters
(5) SW/2600 meters
(6) WNW/2400 meters
(7) SSE/850 meters
(8) NNW/550 meters

TABLE 4B
Vermont Yankee
Maximum Annual Dose Commitments from Direct External Radiation, Plus Liquid and Gaseous Effluents for 1999(*)
(40CFR190)

Pathway	Total Body (mrem)	Maximum Organ (mrem)	Thyroid (mrem)
Direct External (a)	12.3	12.3	12.3
Liquids	(c)	(c)	(c)
Gases	3.49E-05	5.53E-05(d)	3.54E-05
Annual Total (b)	12.3	12.3	12.3

(*) The location of the projected maximum individual doses from combined direct radiation plus liquid and gaseous effluents correspond to residences at the southwest boundary relative to the plant stack.

(a) No occupancy time fraction (assumed 100%) or residential shielding credit is assumed which would reduce real doses below the calculated values. Expected direct external radiation doses would be reduced by about 54% with a realistic residential shielding credit and occupancy time (0.7 shielding factor from Regulatory Guide 1.109 and annual occupancy time 6760 hours).

(b) Annual dose limits contained in the EPA Radiation Protection Standards (40CFR190) equal 25 mrem to the total body and any organ, except 75 mrem to the thyroid of a real member of the public.

(c) There was no liquid release in 1999.

(d) Maximum dose to any organ over all age groups for each release.

TABLE 4C
Receptor Locations for Vermont Yankee

Sector	Site Boundary (1) (Meters)	Nearest Resident(2) (Meters)	Nearest Milk Animal(2) Within 10 km (Meters)
N	400	1470	--
NNE	350	1400	5520 (Cows)
NE	350	1250	--
ENE	400	970	--
E	500	930	--
ESE	700	2830	--
SE	750	1970	3600 (cows)
SSE	850	2050	5240 (cows)
S	385	450	2220 (cows)
SSW	300	450	--
SW	250	410	8200 (cows)
WSW	250	450	9590 (goats)
W	300	620	820 (cows)
WNW	400	1060	7530 (cows)
NW	550	2600	4260 (cows)
NNW	550	2600	--

(1) Vermont Yankee UFSAR Figure 2.2-5.

(2) The location(s) given are based on data from the Vermont Yankee 1999 Land Use Census relative to the plant stack. Gardens are assumed to be present at all resident locations.

TABLE 4D

Usage Factors for Various Gaseous Pathways at Vermont Yankee

(From Reference 1, Table E-5[1])

Age Group	Veg. (kg/yr)	Leafy Veg. (kg/yr)	Milk (l/yr)	Meat (kg/yr)	Inhalation (m^3/yr)
Adult	520	64	310	110	8,000
Teen	630	42	400	65	8,000
Child	520	26	330	41	3,700
Infant	0	0	330	0	1,400

(1) Regulatory Guide 1.109.

TABLE 4E
Environmental Parameters for Gaseous Effluents at Vermont Yankee

		Vegetables		Cow Milk		Goat Milk		Meat	
Variable		Stored	Leafy	Pasture	Stored	Pasture	Stored	Pasture	Stored
YV	Agricultural Productivity (kg/m^2)	2	2	0.70	2	0.70	2	0.70	2
P	Soil Surface Density (kg/m^2)	240	240	240	240	240	240	240	240
T	Transport Time to User (hrs)			48	48	48	48	480	480
TB	Soil Exposure Time [a] (hrs)	131,400	131,400	131,400	131,400	131,400	131,400	131,400	131,400
TF	Crop Exposure Time to Plume (hrs)	1,440	1,440	720	1,440	720	1,440	720	1,440
TH	Holdup After Harvest (hrs)	1,440	24	0	2,160	0	2,160	0	2,160
QF	Animals Daily Feed (kg/day)			50	50	6	6	50	50
FP	Fraction of Year on Pasture[b]			0.50		0.50		0.50	
FS	Fraction Pasture Feed When on Pasture[c]			1		1		1	

Note:Footnotes on following page.

TABLE 4E
(Continued)

Environmental Parameters for Gaseous Effluents at Vermont Yankee

		Vegetables		Cow Milk		Goat Milk		Meat	
Variable		Stored	Leafy	Pasture	Stored	Pasture	Stored	Pasture	Stored
FG	Fraction of Stored Vegetables Grown in Garden	0.76							
FL	Fraction of Leafy Vegetables Grown in Garden		1.0						
FI	Fraction Elemental Iodine = 0.5								
H	Absolute Humidity = 5.6[d]								

(a) For Method II dose/dose rate analyses of identified radioactivity releases of less than one year, the soil exposure time for that release may be set at 8,760 hours (one year) for all pathways.

(b) For Method II dose/dose rate analyses performed for releases occurring during the first or fourth calendar quarters, the fraction of time animals are assumed to be on pasture is zero (nongrowing season). For the second and third calendar quarters, the fraction of time on pasture (FP) will be set at 1.0. FP may also be adjusted for specific farm locations if this information is so identified and reported as part of the land use census.

(c) For Method II analyses, the fraction of pasture feed while on pasture may be set to less than 1.0 for specific farm locations if this information is so identified and reported as part of the land use census.

(d) For all Method II analyses, an absolute humidity value equal to 5.6 (gm/m^3) shall be used to reflect conditions in the Northeast (Reference: Health Physics Journal, Volume 39 (August), 1980; Pages 318-320, Pergammon Press).

TABLE 5A

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS A CLASS FREQUENCY (PERCENT) = .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	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	2
(1)	.00	.00	.00	.00	1.82	.00	.00	1.82	.00	.00	.00	.00	.00	.00	.00	.00	.00	3.64
(2)	.00	.00	.00	.00	.01	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.03
4-7	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	3
(1)	1.82	.00	.00	.00	.00	.00	1.82	1.82	.00	.00	.00	.00	.00	.00	.00	.00	.00	5.45
(2)	.01	.00	.00	.00	.00	.00	.01	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.04
8-12	1	0	0	0	0	0	0	0	0	1	0	1	0	1	1	10	0	15
(1)	1.82	.00	.00	.00	.00	.00	.00	.00	.00	1.82	.00	1.82	.00	1.82	1.82	18.18	.00	27.27
(2)	.01	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.01	.00	.01	.01	.13	.00	.19
13-18	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	13	0	17
(1)	.00	.00	.00	.00	.00	.00	.00	.00	1.82	1.82	.00	3.64	.00	.00	.00	23.64	.00	30.91
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.01	.01	.00	.03	.00	.00	.00	.17	.00	.22
19-24	1	0	0	0	0	0	0	0	0	0	1	0	0	1	1	7	0	11
(1)	1.82	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.82	.00	.00	1.82	1.82	12.73	.00	20.00
(2)	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.01	.01	.09	.00	.14
GT 24	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	6	0	7
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.82	.00	.00	.00	10.91	.00	12.73
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.08	.00	.09
ALL SPEEDS	3	0	0	0	1	0	1	2	1	2	1	4	0	2	2	36	0	55
(1)	5.45	.00	.00	.00	1.82	.00	1.82	3.64	1.82	3.64	1.82	7.27	.00	3.64	3.64	65.45	.00	100.00
(2)	.04	.00	.00	.00	.01	.00	.01	.03	.01	.03	.01	.05	.00	.03	.03	.46	.00	.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 .95 MPH)

TABLE 5B

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS B CLASS FREQUENCY (PERCENT) = 1.24

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	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
(1)	.00	.00	.00	1.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.03
(2)	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01
4-7	0	0	0	0	0	0	3	1	2	0	1	0	0	0	3	8	0	18
(1)	.00	.00	.00	.00	.00	.00	3.09	1.03	2.06	.00	1.03	.00	.00	.00	3.09	8.25	.00	18.56
(2)	.00	.00	.00	.00	.00	.00	.04	.01	.03	.00	.01	.00	.00	.00	.04	.10	.00	.23
8-12	5	1	0	0	0	0	1	1	5	1	1	1	0	1	2	9	0	28
(1)	5.15	1.03	.00	.00	.00	.00	1.03	1.03	5.15	1.03	1.03	1.03	.00	1.03	2.06	9.28	.00	28.87
(2)	.06	.01	.00	.00	.00	.00	.01	.01	.06	.01	.01	.01	.00	.01	.03	.12	.00	.36
13-18	3	0	0	0	0	0	0	0	2	1	1	0	2	4	1	11	0	25
(1)	3.09	.00	.00	.00	.00	.00	.00	.00	2.06	1.03	1.03	.00	2.06	4.12	1.03	11.34	.00	25.77
(2)	.04	.00	.00	.00	.00	.00	.00	.00	.03	.01	.01	.00	.03	.05	.01	.14	.00	.32
19-24	2	0	0	0	0	0	0	0	0	0	1	0	3	2	4	5	0	17
(1)	2.06	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.03	.00	3.09	2.06	4.12	5.15	.00	17.53
(2)	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.04	.03	.05	.06	.00	.22
GT 24	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	8
(1)	4.12	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	4.12	.00	8.25
(2)	.05	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.05	.00	.10
ALL SPEEDS	14	1	0	1	0	0	4	2	9	2	4	1	5	7	10	37	0	97
(1)	14.43	1.03	.00	1.03	.00	.00	4.12	2.06	9.28	2.06	4.12	1.03	5.15	7.22	10.31	38.14	.00	100.00
(2)	.18	.01	.00	.01	.00	.00	.05	.03	.12	.03	.05	.01	.06	.09	.13	.47	.00	1.24

(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 .95 MPH)

TABLE 5C

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS C CLASS FREQUENCY (PERCENT) = 3.17

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	2	1	1	0	0	1	0	0	0	0	0	0	0	0	2	1	0	8
(1)	.81	.40	.40	.00	.00	.40	.00	.00	.00	.00	.00	.00	.00	.00	.81	.40	.00	3.24
(2)	.03	.01	.01	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.03	.01	.00	.10
4-7	5	2	1	0	2	9	8	6	2	3	1	0	1	0	1	11	0	52
(1)	2.02	.81	.40	.00	.81	3.64	3.24	2.43	.81	1.21	.40	.00	.40	.00	.40	4.45	.00	21.05
(2)	.06	.03	.01	.00	.03	.12	.10	.08	.03	.04	.01	.00	.01	.00	.01	.14	.00	.67
8-12	16	2	2	0	0	4	3	7	13	11	2	1	8	3	4	16	0	92
(1)	6.48	.81	.81	.00	.00	1.62	1.21	2.83	5.26	4.45	.81	.40	3.24	1.21	1.62	6.48	.00	37.25
(2)	.21	.03	.03	.00	.00	.05	.04	.09	.17	.14	.03	.01	.10	.04	.05	.21	.00	1.18
13-18	14	1	0	0	0	0	0	0	11	2	0	1	7	10	4	16	0	66
(1)	5.67	.40	.00	.00	.00	.00	.00	.00	4.45	.81	.00	.40	2.83	4.05	1.62	6.48	.00	26.72
(2)	.18	.01	.00	.00	.00	.00	.00	.00	.14	.03	.00	.01	.09	.13	.05	.21	.00	.85
19-24	6	1	0	0	0	0	0	0	0	0	0	0	3	2	3	5	0	20
(1)	2.43	.40	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.21	.81	1.21	2.02	.00	8.10
(2)	.08	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.04	.03	.04	.06	.00	.26
GT 24	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	9
(1)	.81	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	2.83	.00	3.64
(2)	.03	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.09	.00	.12
ALL SPEEDS	45	7	4	0	2	14	11	13	26	16	3	2	19	15	14	56	0	247
(1)	18.22	2.83	1.62	.00	.81	5.67	4.45	5.26	10.53	6.48	1.21	.81	7.69	6.07	5.67	22.67	.00	100.00
(2)	.58	.09	.05	.00	.03	.18	.14	.17	.33	.21	.04	.03	.24	.19	.18	.72	.00	3.17

(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 .95 MPH)

TABLE 5D

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS D CLASS FREQUENCY (PERCENT) = 47.26

WIND DIRECTION FROM

SPEED MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VRBL	TOTAL
CALM	2	2	2	0	3	1	0	0	0	0	0	1	4	0	2	0	0	17
(1)	.05	.05	.05	.00	.08	.03	.00	.00	.00	.00	.00	.03	.11	.00	.05	.00	.00	.46
(2)	.03	.03	.03	.00	.04	.01	.00	.00	.00	.00	.00	.01	.05	.00	.03	.00	.00	.22
C-3	55	35	38	27	34	32	68	50	30	13	13	14	13	10	28	61	0	521
(1)	1.49	.95	1.03	.73	.92	.87	1.84	1.36	.81	.35	.35	.38	.35	.27	.76	1.65	.00	14.13
(2)	.70	.45	.49	.35	.44	.41	.87	.64	.38	.17	.17	.18	.17	.13	.36	.78	.00	6.68
4-7	97	26	21	14	31	46	117	101	88	30	10	12	16	24	26	181	0	840
(1)	2.63	.71	.57	.38	.84	1.25	3.17	2.74	2.39	.81	.27	.33	.43	.65	.71	4.91	.00	22.78
(2)	1.24	.33	.27	.18	.40	.59	1.50	1.29	1.13	.38	.13	.15	.21	.31	.33	2.32	.00	10.77
8-12	112	17	8	10	8	35	68	115	175	61	17	32	68	106	60	150	0	1042
(1)	3.04	.46	.22	.27	.22	.95	1.84	3.12	4.75	1.65	.46	.87	1.84	2.87	1.63	4.07	.00	28.26
(2)	1.44	.22	.10	.13	.10	.45	.87	1.47	2.24	.78	.22	.41	.87	1.36	.77	1.92	.00	13.36
13-18	136	14	0	2	4	8	11	32	141	38	10	18	77	130	93	144	0	858
(1)	3.69	.38	.00	.05	.11	.22	.30	.87	3.82	1.03	.27	.49	2.09	3.53	2.52	3.91	.00	23.27
(2)	1.74	.18	.00	.03	.05	.10	.14	.41	1.81	.49	.13	.23	.99	1.67	1.19	1.85	.00	11.00
19-24	70	8	0	1	0	2	1	6	11	4	3	3	18	46	55	93	0	321
(1)	1.90	.22	.00	.03	.00	.05	.03	.16	.30	.11	.08	.08	.49	1.25	1.49	2.52	.00	8.71
(2)	.90	.10	.00	.01	.00	.03	.01	.08	.14	.05	.04	.04	.23	.59	.70	1.19	.00	4.11
GT 24	13	0	0	0	0	0	0	3	1	0	0	0	3	8	20	40	0	88
(1)	.35	.00	.00	.00	.00	.00	.00	.08	.03	.00	.00	.00	.08	.22	.54	1.08	.00	2.39
(2)	.17	.00	.00	.00	.00	.00	.00	.04	.01	.00	.00	.00	.04	.10	.26	.51	.00	1.13
ALL SPEEDS	485	102	69	54	80	124	265	307	446	146	53	80	199	324	284	669	0	3687
(1)	13.15	2.77	1.87	1.46	2.17	3.36	7.19	8.33	12.10	3.96	1.44	2.17	5.40	8.79	7.70	18.14	.00	100.00
(2)	6.22	1.31	.88	.69	1.03	1.59	3.40	3.93	5.72	1.87	.68	1.03	2.55	4.15	3.64	8.57	.00	47.26

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
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C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

TABLE 5E

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS E CLASS FREQUENCY (PERCENT) = 32.16

WIND DIRECTION FROM

SPEED MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VRBL	TOTAL
CALM	6	2	4	3	3	2	2	6	1	1	1	2	2	2	1	2	0	40
(1)	.24	.08	.16	.12	.12	.08	.08	.24	.04	.04	.04	.08	.08	.08	.04	.08	.00	1.59
(2)	.08	.03	.05	.04	.04	.03	.03	.08	.01	.01	.01	.03	.03	.03	.01	.03	.00	.51
C-3	111	68	52	46	67	37	65	55	26	19	16	24	17	20	40	74	0	737
(1)	4.42	2.71	2.07	1.83	2.67	1.47	2.59	2.19	1.04	.76	.64	.96	.68	.80	1.59	2.95	.00	29.37
(2)	1.42	.87	.67	.59	.86	.47	.83	.70	.33	.24	.21	.31	.22	.26	.51	.95	.00	9.45
4-7	138	16	5	8	7	33	91	104	76	22	10	23	33	23	50	231	0	870
(1)	5.50	.64	.20	.32	.28	1.32	3.63	4.15	3.03	.88	.40	.92	1.32	.92	1.99	9.21	.00	34.68
(2)	1.77	.21	.06	.10	.09	.42	1.17	1.33	.97	.28	.13	.29	.42	.29	.64	2.96	.00	11.15
8-12	55	6	3	2	1	4	17	72	79	27	22	16	56	60	34	172	0	626
(1)	2.19	.24	.12	.08	.04	.16	.68	2.87	3.15	1.08	.88	.64	2.23	2.39	1.36	6.86	.00	24.95
(2)	.70	.08	.04	.03	.01	.05	.22	.92	1.01	.35	.28	.21	.72	.77	.44	2.20	.00	8.02
13-18	22	0	0	0	0	0	3	2	25	13	3	2	29	39	10	54	0	202
(1)	.88	.00	.00	.00	.00	.00	.12	.08	1.00	.52	.12	.08	1.16	1.55	.40	2.15	.00	8.05
(2)	.28	.00	.00	.00	.00	.00	.04	.03	.32	.17	.04	.03	.37	.50	.13	.69	.00	2.59
19-24	0	0	0	0	0	0	2	1	4	5	1	0	4	3	2	8	0	30
(1)	.00	.00	.00	.00	.00	.00	.08	.04	.16	.20	.04	.00	.16	.12	.08	.32	.00	1.20
(2)	.00	.00	.00	.00	.00	.00	.03	.01	.05	.06	.01	.00	.05	.04	.03	.10	.00	.38
GT 24	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	3
(1)	.00	.00	.00	.00	.00	.00	.00	.04	.00	.00	.00	.00	.04	.04	.00	.00	.00	.12
(2)	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.01	.01	.00	.00	.00	.04
ALL SPEEDS	332	92	64	59	78	76	180	241	211	87	53	67	142	148	137	541	0	2508
(1)	13.23	3.67	2.55	2.35	3.11	3.03	7.17	9.61	8.41	3.47	2.11	2.67	5.66	5.90	5.46	21.56	.00	99.96
(2)	4.26	1.18	.82	.76	1.00	.97	2.31	3.09	2.70	1.12	.68	.86	1.82	1.90	1.76	6.93	.00	32.15

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
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C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

TABLE 5F

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS F CLASS FREQUENCY (PERCENT) = 13.51

WIND DIRECTION FROM

SPEED MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VRBL	TOTAL
CALM	4	4	0	1	1	0	0	3	1	0	0	3	0	2	2	1	0	22
(1)	.38	.38	.00	.09	.09	.00	.00	.28	.09	.00	.00	.28	.00	.19	.19	.09	.00	2.09
(2)	.05	.05	.00	.01	.01	.00	.00	.04	.01	.00	.00	.04	.00	.03	.03	.01	.00	.28
C-3	58	28	29	29	23	35	34	38	22	11	12	20	10	23	16	41	0	429
(1)	5.50	2.66	2.75	2.75	2.18	3.32	3.23	3.61	2.09	1.04	1.14	1.90	.95	2.18	1.52	3.89	.00	40.70
(2)	.74	.36	.37	.37	.29	.45	.44	.49	.28	.14	.15	.26	.13	.29	.21	.53	.00	5.50
4-7	53	6	2	2	20	22	48	55	41	8	11	14	20	22	23	59	0	406
(1)	5.03	.57	.19	.19	1.90	2.09	4.55	5.22	3.89	.76	1.04	1.33	1.90	2.09	2.18	5.60	.00	38.52
(2)	.68	.08	.03	.03	.26	.28	.62	.70	.53	.10	.14	.18	.26	.28	.29	.76	.00	5.20
8-12	10	2	0	1	1	2	8	20	26	10	3	11	13	19	13	38	0	177
(1)	.95	.19	.00	.09	.09	.19	.76	1.90	2.47	.95	.28	1.04	1.23	1.80	1.23	3.61	.00	16.79
(2)	.13	.03	.00	.01	.01	.03	.10	.26	.33	.13	.04	.14	.17	.24	.17	.49	.00	2.27
13-18	2	0	0	0	0	0	1	1	2	1	0	1	1	2	3	4	0	18
(1)	.19	.00	.00	.00	.00	.00	.09	.09	.19	.09	.00	.09	.09	.19	.28	.38	.00	1.71
(2)	.03	.00	.00	.00	.00	.00	.01	.01	.03	.01	.00	.01	.01	.03	.04	.05	.00	.23
19-24	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
(1)	.09	.00	.00	.00	.00	.00	.00	.00	.09	.00	.00	.00	.00	.00	.00	.00	.00	.19
(2)	.01	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.00	.00	.00	.03
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	128	40	31	33	45	59	91	117	93	30	26	49	44	68	57	143	0	1054
(1)	12.14	3.80	2.94	3.13	4.27	5.60	8.63	11.10	8.82	2.85	2.47	4.65	4.17	6.45	5.41	13.57	.00	100.00
(2)	1.64	.51	.40	.42	.58	.76	1.17	1.50	1.19	.38	.33	.63	.56	.87	.73	1.83	.00	13.51

(1)=PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
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TABLE 5G

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

297.0 FT WIND DATA STABILITY CLASS G CLASS FREQUENCY (PERCENT) = 1.96

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	1	1	0	0	0	2
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.65	.65	.00	.00	.00	1.31
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.01	.00	.00	.00	.03
C-3	2	1	3	0	2	5	6	7	1	6	2	4	1	1	5	3	0	49
(1)	1.31	.65	1.96	.00	1.31	3.27	3.92	4.58	.65	3.92	1.31	2.61	.65	.65	3.27	1.96	.00	32.03
(2)	.03	.01	.04	.00	.03	.06	.08	.09	.01	.08	.03	.05	.01	.01	.06	.04	.00	.63
4-7	5	0	2	2	2	2	1	12	4	3	4	7	9	5	4	3	0	65
(1)	3.27	.00	1.31	1.31	1.31	1.31	.65	7.84	2.61	1.96	2.61	4.58	5.88	3.27	2.61	1.96	.00	42.48
(2)	.06	.00	.03	.03	.03	.03	.01	.15	.05	.04	.05	.09	.12	.06	.05	.04	.00	.83
8-12	2	1	0	0	0	0	1	3	3	1	1	0	1	6	2	9	0	30
(1)	1.31	.65	.00	.00	.00	.00	.65	1.96	1.96	.65	.65	.00	.65	3.92	1.31	5.88	.00	19.61
(2)	.03	.01	.00	.00	.00	.00	.01	.04	.04	.01	.01	.00	.01	.08	.03	.12	.00	.38
13-18	2	0	0	0	0	0	0	1	1	0	0	0	0	2	0	1	0	7
(1)	1.31	.00	.00	.00	.00	.00	.00	.65	.65	.00	.00	.00	.00	1.31	.00	.65	.00	4.58
(2)	.03	.00	.00	.00	.00	.00	.00	.01	.01	.00	.00	.00	.00	.03	.00	.01	.00	.09
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	11	2	5	2	4	7	8	23	9	10	7	11	12	15	11	16	0	153
(1)	7.19	1.31	3.27	1.31	2.61	4.58	5.23	15.03	5.88	6.54	4.58	7.19	7.84	9.80	7.19	10.46	.00	100.00
(2)	.14	.03	.06	.03	.05	.09	.10	.29	.12	.13	.09	.14	.15	.19	.14	.21	.00	1.96

(1) =PERCENT OF ALL GOOD OBSERVATIONS FOR THIS PAGE
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C= CALM (WIND SPEED LESS THAN OR EQUAL TO .95 MPH)

TABLE 5H

VERMONT YANKEE JAN 99 - DEC 99 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	12	8	6	4	7	3	2	9	2	1	1	6	7	5	5	3	0	81
(1)	.15	.10	.08	.05	.09	.04	.03	.12	.03	.01	.01	.08	.09	.06	.06	.04	.00	1.04
(2)	.15	.10	.08	.05	.09	.04	.03	.12	.03	.01	.01	.08	.09	.06	.06	.04	.00	1.04
C-3	228	133	123	103	127	110	173	151	79	49	43	62	41	54	91	180	0	1747
(1)	2.92	1.70	1.58	1.32	1.63	1.41	2.22	1.94	1.01	.63	.55	.79	.53	.69	1.17	2.31	.00	22.39
(2)	2.92	1.70	1.58	1.32	1.63	1.41	2.22	1.94	1.01	.63	.55	.79	.53	.69	1.17	2.31	.00	22.39
4-7	299	50	31	26	62	112	269	280	213	66	37	56	79	74	107	493	0	2254
(1)	3.83	.64	.40	.33	.79	1.44	3.45	3.59	2.73	.85	.47	.72	1.01	.95	1.37	6.32	.00	28.89
(2)	3.83	.64	.40	.33	.79	1.44	3.45	3.59	2.73	.85	.47	.72	1.01	.95	1.37	6.32	.00	28.89
8-12	201	29	13	13	10	45	98	218	301	112	46	62	146	196	116	404	0	2010
(1)	2.58	.37	.17	.17	.13	.58	1.26	2.79	3.86	1.44	.59	.79	1.87	2.51	1.49	5.18	.00	25.76
(2)	2.58	.37	.17	.17	.13	.58	1.26	2.79	3.86	1.44	.59	.79	1.87	2.51	1.49	5.18	.00	25.76
13-18	179	15	0	2	4	8	15	36	183	56	14	24	116	187	111	243	0	1193
(1)	2.29	.19	.00	.03	.05	.10	.19	.46	2.35	.72	.18	.31	1.49	2.40	1.42	3.11	.00	15.29
(2)	2.29	.19	.00	.03	.05	.10	.19	.46	2.35	.72	.18	.31	1.49	2.40	1.42	3.11	.00	15.29
19-24	80	9	0	1	0	2	3	7	16	9	6	3	28	54	65	118	0	401
(1)	1.03	.12	.00	.01	.00	.03	.04	.09	.21	.12	.08	.04	.36	.69	.83	1.51	.00	5.14
(2)	1.03	.12	.00	.01	.00	.03	.04	.09	.21	.12	.08	.04	.36	.69	.83	1.51	.00	5.14
GT 24	19	0	0	0	0	0	0	4	1	0	0	1	4	9	20	57	0	115
(1)	.24	.00	.00	.00	.00	.00	.00	.05	.01	.00	.00	.01	.05	.12	.26	.73	.00	1.47
(2)	.24	.00	.00	.00	.00	.00	.00	.05	.01	.00	.00	.01	.05	.12	.26	.73	.00	1.47
ALL SPEEDS	1018	244	173	149	210	280	560	705	795	293	147	214	421	579	515	1498	0	7801
(1)	13.05	3.13	2.22	1.91	2.69	3.59	7.18	9.04	10.19	3.76	1.88	2.74	5.40	7.42	6.60	19.20	.00	99.99
(2)	13.05	3.13	2.22	1.91	2.69	3.59	7.18	9.04	10.19	3.76	1.88	2.74	5.40	7.42	6.60	19.20	.00	99.99

(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 .95 MPH)

TABLE 6A

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

35.0 FT WIND DATA STABILITY CLASS A CLASS FREQUENCY (PERCENT) = 4.08

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	3	0	0	2	0	2	3	0	2	1	0	1	0	0	1	2	0	17
(1)	.85	.00	.00	.57	.00	.57	.85	.00	.57	.28	.00	.28	.00	.00	.28	.57	.00	4.83
(2)	.03	.00	.00	.02	.00	.02	.03	.00	.02	.01	.00	.01	.00	.00	.01	.02	.00	.20
4-7	27	3	0	0	5	8	7	18	11	5	1	2	7	7	20	33	0	154
(1)	7.67	.85	.00	.00	1.42	2.27	1.99	5.11	3.13	1.42	.28	.57	1.99	1.99	5.68	9.38	.00	43.75
(2)	.31	.03	.00	.00	.06	.09	.08	.21	.13	.06	.01	.02	.08	.08	.23	.38	.00	1.79
8-12	30	1	2	0	1	1	0	8	18	11	1	5	5	10	14	35	0	142
(1)	8.52	.28	.57	.00	.28	.28	.00	2.27	5.11	3.13	.28	1.42	1.42	2.84	3.98	9.94	.00	40.34
(2)	.35	.01	.02	.00	.01	.01	.00	.09	.21	.13	.01	.06	.06	.12	.16	.41	.00	1.65
13-18	8	1	0	0	0	0	0	0	1	0	0	1	4	6	7	10	0	38
(1)	2.27	.28	.00	.00	.00	.00	.00	.00	.28	.00	.00	.28	1.14	1.70	1.99	2.84	.00	10.80
(2)	.09	.01	.00	.00	.00	.00	.00	.00	.01	.00	.00	.01	.05	.07	.08	.12	.00	.44
19-24	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
(1)	.28	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.28
(2)	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.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	69	5	2	2	6	11	10	26	32	17	2	9	16	23	42	80	0	352
(1)	19.60	1.42	.57	.57	1.70	3.13	2.84	7.39	9.09	4.83	.57	2.56	4.55	6.53	11.93	22.73	.00	100.00
(2)	.80	.06	.02	.02	.07	.13	.12	.30	.37	.20	.02	.10	.19	.27	.49	.93	.00	4.08

(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 .95 MPH)

TABLE 6B

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

35.0 FT WIND DATA STABILITY CLASS B CLASS FREQUENCY (PERCENT) = 3.42

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	8	4	2	1	2	1	2	1	1	0	0	0	0	1	1	1	0	25
(1)	2.71	1.36	.68	.34	.68	.34	.68	.34	.34	.00	.00	.00	.00	.34	.34	.34	.00	8.47
(2)	.09	.05	.02	.01	.02	.01	.02	.01	.01	.00	.00	.00	.00	.01	.01	.01	.00	.29
4-7	17	8	3	0	11	14	8	27	13	5	0	5	3	3	9	23	0	149
(1)	5.76	2.71	1.02	.00	3.73	4.75	2.71	9.15	4.41	1.69	.00	1.69	1.02	1.02	3.05	7.80	.00	50.51
(2)	.20	.09	.03	.00	.13	.16	.09	.31	.15	.06	.00	.06	.03	.03	.10	.27	.00	1.73
8-12	19	3	1	0	0	2	0	4	22	7	0	4	3	11	11	11	0	98
(1)	6.44	1.02	.34	.00	.00	.68	.00	1.36	7.46	2.37	.00	1.36	1.02	3.73	3.73	3.73	.00	33.22
(2)	.22	.03	.01	.00	.00	.02	.00	.05	.26	.08	.00	.05	.03	.13	.13	.13	.00	1.14
13-18	6	0	0	0	0	0	0	0	0	1	0	0	5	2	5	3	0	22
(1)	2.03	.00	.00	.00	.00	.00	.00	.00	.00	.34	.00	.00	1.69	.68	1.69	1.02	.00	7.46
(2)	.07	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.06	.02	.06	.03	.00	.26
19-24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.34	.00	.00	.00	.34
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.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	50	15	6	1	13	17	10	32	36	13	0	9	11	18	26	38	0	295
(1)	16.95	5.08	2.03	.34	4.41	5.76	3.39	10.85	12.20	4.41	.00	3.05	3.73	6.10	8.81	12.88	.00	100.00
(2)	.58	.17	.07	.01	.15	.20	.12	.37	.42	.15	.00	.10	.13	.21	.30	.44	.00	3.42

(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 .95 MPH)

TABLE 6C

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

35.0 FT WIND DATA STABILITY CLASS C CLASS FREQUENCY (PERCENT) = 5.54

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	10	8	7	5	6	8	5	6	2	2	1	1	3	2	5	9	0	80
(1)	2.09	1.67	1.46	1.05	1.26	1.67	1.05	1.26	.42	.42	.21	.21	.63	.42	1.05	1.88	.00	16.74
(2)	.12	.09	.08	.06	.07	.09	.06	.07	.02	.02	.01	.01	.03	.02	.06	.10	.00	.93
4-7	21	8	5	11	24	22	12	19	21	9	5	5	4	7	16	43	0	232
(1)	4.39	1.67	1.05	2.30	5.02	4.60	2.51	3.97	4.39	1.88	1.05	1.05	.84	1.46	3.35	9.00	.00	48.54
(2)	.24	.09	.06	.13	.28	.26	.14	.22	.24	.10	.06	.06	.05	.08	.19	.50	.00	2.69
8-12	18	2	0	0	2	1	0	2	38	5	2	2	16	21	9	21	0	139
(1)	3.77	.42	.00	.00	.42	.21	.00	.42	7.95	1.05	.42	.42	3.35	4.39	1.88	4.39	.00	29.08
(2)	.21	.02	.00	.00	.02	.01	.00	.02	.44	.06	.02	.02	.19	.24	.10	.24	.00	1.61
13-18	8	1	0	0	0	0	0	0	2	2	0	1	0	3	7	1	0	25
(1)	1.67	.21	.00	.00	.00	.00	.00	.00	.42	.42	.00	.21	.00	.63	1.46	.21	.00	5.23
(2)	.09	.01	.00	.00	.00	.00	.00	.00	.02	.02	.00	.01	.00	.03	.08	.01	.00	.29
19-24	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.21	.00	.21	.00	.00	.42
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.01	.00	.00	.02
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	57	19	12	16	32	31	17	27	63	18	8	9	24	33	38	74	0	478
(1)	11.92	3.97	2.51	3.35	6.69	6.49	3.56	5.65	13.18	3.77	1.67	1.88	5.02	6.90	7.95	15.48	.00	100.00
(2)	.66	.22	.14	.19	.37	.36	.20	.31	.73	.21	.09	.10	.28	.38	.44	.86	.00	5.54

(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 .95 MPH)

TABLE 6D

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

35.0 FT WIND DATA STABILITY CLASS D CLASS FREQUENCY (PERCENT) = 41.27

WIND DIRECTION FROM

SPEED MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VRBL	TOTAL
CALM	2	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	5
(1)	.06	.00	.00	.00	.00	.00	.00	.03	.00	.00	.06	.00	.00	.00	.00	.00	.00	.14
(2)	.02	.00	.00	.00	.00	.00	.00	.01	.00	.00	.02	.00	.00	.00	.00	.00	.00	.06
C-3	106	59	66	64	69	57	82	67	54	43	37	34	49	47	71	141	0	1046
(1)	2.98	1.66	1.85	1.80	1.94	1.60	2.30	1.88	1.52	1.21	1.04	.96	1.38	1.32	1.99	3.96	.00	29.38
(2)	1.23	.68	.77	.74	.80	.66	.95	.78	.63	.50	.43	.39	.57	.54	.82	1.63	.00	12.13
4-7	167	43	25	31	47	83	58	136	158	54	28	47	90	71	124	239	0	1401
(1)	4.69	1.21	.70	.87	1.32	2.33	1.63	3.82	4.44	1.52	.79	1.32	2.53	1.99	3.48	6.71	.00	39.35
(2)	1.94	.50	.29	.36	.54	.96	.67	1.58	1.83	.63	.32	.54	1.04	.82	1.44	2.77	.00	16.24
8-12	161	17	2	4	4	7	1	26	140	21	12	13	84	122	102	168	0	884
(1)	4.52	.48	.06	.11	.11	.20	.03	.73	3.93	.59	.34	.37	2.36	3.43	2.87	4.72	.00	24.83
(2)	1.87	.20	.02	.05	.05	.08	.01	.30	1.62	.24	.14	.15	.97	1.41	1.18	1.95	.00	10.25
13-18	43	6	0	0	0	1	0	6	15	5	6	0	11	55	44	18	0	210
(1)	1.21	.17	.00	.00	.00	.03	.00	.17	.42	.14	.17	.00	.31	1.54	1.24	.51	.00	5.90
(2)	.50	.07	.00	.00	.00	.01	.00	.07	.17	.06	.07	.00	.13	.64	.51	.21	.00	2.43
19-24	0	0	0	0	0	0	0	0	1	0	0	0	1	4	7	0	0	13
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.03	.00	.00	.00	.03	.11	.20	.00	.00	.37
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.01	.05	.08	.00	.00	.15
GT 24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.03	.00	.00	.00	.03
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.01
ALL SPEEDS	479	125	93	99	120	148	141	236	368	123	85	94	235	300	348	566	0	3560
(1)	13.46	3.51	2.61	2.78	3.37	4.16	3.96	6.63	10.34	3.46	2.39	2.64	6.60	8.43	9.78	15.90	.00	100.00
(2)	5.55	1.45	1.08	1.15	1.39	1.72	1.63	2.74	4.27	1.43	.99	1.09	2.72	3.48	4.03	6.56	.00	41.27

(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 .95 MPH)

TABLE 6E

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

35.0 FT WIND DATA STABILITY CLASS E CLASS FREQUENCY (PERCENT) = 28.27

WIND DIRECTION FROM

SPEED MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VRBL	TOTAL
CALM	5	2	1	1	1	1	6	1	1	4	1	4	0	3	3	3	0	37
(1)	.21	.08	.04	.04	.04	.04	.25	.04	.04	.16	.04	.16	.00	.12	.12	.12	.00	1.52
(2)	.06	.02	.01	.01	.01	.01	.07	.01	.01	.05	.01	.05	.00	.03	.03	.03	.00	.43
C-3	76	31	26	20	25	35	39	64	101	115	177	139	148	149	178	187	0	1510
(1)	3.12	1.27	1.07	.82	1.03	1.44	1.60	2.62	4.14	4.72	7.26	5.70	6.07	6.11	7.30	7.67	.00	61.91
(2)	.88	.36	.30	.23	.29	.41	.45	.74	1.17	1.33	2.05	1.61	1.72	1.73	2.06	2.17	.00	17.51
4-7	44	5	4	3	8	20	23	79	70	30	18	32	70	73	126	135	0	740
(1)	1.80	.21	.16	.12	.33	.82	.94	3.24	2.87	1.23	.74	1.31	2.87	2.99	5.17	5.54	.00	30.34
(2)	.51	.06	.05	.03	.09	.23	.27	.92	.81	.35	.21	.37	.81	.85	1.46	1.57	.00	8.58
8-12	7	0	0	0	1	0	1	13	17	6	3	2	13	29	20	22	0	134
(1)	.29	.00	.00	.00	.04	.00	.04	.53	.70	.25	.12	.08	.53	1.19	.82	.90	.00	5.49
(2)	.08	.00	.00	.00	.01	.00	.01	.15	.20	.07	.03	.02	.15	.34	.23	.26	.00	1.55
13-18	0	0	0	0	0	0	0	0	3	0	0	0	3	5	7	0	0	18
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.12	.00	.00	.00	.12	.21	.29	.00	.00	.74
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.03	.00	.00	.00	.03	.06	.08	.00	.00	.21
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	132	38	31	24	35	56	69	157	192	155	199	177	234	259	334	347	0	2439
(1)	5.41	1.56	1.27	.98	1.44	2.30	2.83	6.44	7.87	6.36	8.16	7.26	9.59	10.62	13.69	14.23	.00	100.00
(2)	1.53	.44	.36	.28	.41	.65	.80	1.82	2.23	1.80	2.31	2.05	2.71	3.00	3.87	4.02	.00	28.27

(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 .95 MPH)

TABLE 6F

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

35.0 FT WIND DATA STABILITY CLASS F CLASS FREQUENCY (PERCENT) = 13.52

WIND DIRECTION FROM

SPEED MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VRBL	TOTAL
CALM	1	0	1	1	0	0	0	0	0	0	1	1	1	1	2	4	0	13
(1)	.09	.00	.09	.09	.00	.00	.00	.00	.00	.00	.09	.09	.09	.09	.17	.34	.00	1.11
(2)	.01	.00	.01	.01	.00	.00	.00	.00	.00	.00	.01	.01	.01	.01	.02	.05	.00	.15
C-3	21	23	10	11	15	9	15	22	41	135	248	182	137	89	66	47	0	1071
(1)	1.80	1.97	.86	.94	1.29	.77	1.29	1.89	3.52	11.58	21.27	15.61	11.75	7.63	5.66	4.03	.00	91.85
(2)	.24	.27	.12	.13	.17	.10	.17	.26	.48	1.57	2.88	2.11	1.59	1.03	.77	.54	.00	12.42
4-7	1	0	0	0	3	1	1	1	4	8	10	3	8	8	15	15	0	78
(1)	.09	.00	.00	.00	.26	.09	.09	.09	.34	.69	.86	.26	.69	.69	1.29	1.29	.00	6.69
(2)	.01	.00	.00	.00	.03	.01	.01	.01	.05	.09	.12	.03	.09	.09	.17	.17	.00	.90
8-12	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	2
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.09	.00	.00	.00	.09	.00	.00	.00	.00	.17
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.01	.00	.00	.00	.00	.02
13-18	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.09	.09	.00	.00	.00	.17
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.01	.00	.00	.00	.02
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	23	23	11	12	18	10	16	23	46	143	259	186	148	99	83	66	0	1166
(1)	1.97	1.97	.94	1.03	1.54	.86	1.37	1.97	3.95	12.26	22.21	15.95	12.69	8.49	7.12	5.66	.00	100.00
(2)	.27	.27	.13	.14	.21	.12	.19	.27	.53	1.66	3.00	2.16	1.72	1.15	.96	.77	.00	13.52

(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 .95 MPH)

TABLE 6G

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

35.0 FT WIND DATA STABILITY CLASS G CLASS FREQUENCY (PERCENT) = 3.90

WIND DIRECTION FROM

SPEED MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	VRBL	TOTAL
CALM	1	0	1	0	0	0	0	0	0	1	0	0	2	1	0	0	0	6
(1)	.30	.00	.30	.00	.00	.00	.00	.00	.00	.30	.00	.00	.60	.30	.00	.00	.00	1.79
(2)	.01	.00	.01	.00	.00	.00	.00	.00	.00	.01	.00	.00	.02	.01	.00	.00	.00	.07
C-3	5	10	3	6	7	5	7	7	28	35	59	29	29	21	23	13	0	287
(1)	1.49	2.98	.89	1.79	2.08	1.49	2.08	2.08	8.33	10.42	17.56	8.63	8.63	6.25	6.85	3.87	.00	85.42
(2)	.06	.12	.03	.07	.08	.06	.08	.08	.32	.41	.68	.34	.34	.24	.27	.15	.00	3.33
4-7	1	0	0	0	2	2	1	0	0	7	13	4	1	2	5	4	0	42
(1)	.30	.00	.00	.00	.60	.60	.30	.00	.00	2.08	3.87	1.19	.30	.60	1.49	1.19	.00	12.50
(2)	.01	.00	.00	.00	.02	.02	.01	.00	.00	.08	.15	.05	.01	.02	.06	.05	.00	.49
8-12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.30	.00	.00	.00	.00	.00	.30
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.00	.00	.01
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	7	10	4	6	9	7	8	7	28	43	72	34	32	24	28	17	0	336
(1)	2.08	2.98	1.19	1.79	2.68	2.08	2.38	2.08	8.33	12.80	21.43	10.12	9.52	7.14	8.33	5.06	.00	100.00
(2)	.08	.12	.05	.07	.10	.08	.09	.08	.32	.50	.83	.39	.37	.28	.32	.20	.00	3.90

(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 .95 MPH)

TABLE 6H

VERMONT YANKEE JAN 99 - DEC 99 METEOROLOGICAL DATA JOINT FREQUENCY DISTRIBUTION

35.0 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	9	2	3	2	1	1	6	2	1	5	4	5	3	5	5	7	0	61
(1)	.10	.02	.03	.02	.01	.01	.07	.02	.01	.06	.05	.06	.03	.06	.06	.08	.00	.71
(2)	.10	.02	.03	.02	.01	.01	.07	.02	.01	.06	.05	.06	.03	.06	.06	.08	.00	.71
C-3	229	135	114	109	124	117	153	167	229	331	522	386	366	309	345	400	0	4036
(1)	2.65	1.57	1.32	1.26	1.44	1.36	1.77	1.94	2.65	3.84	6.05	4.47	4.24	3.58	4.00	4.64	.00	46.79
(2)	2.65	1.57	1.32	1.26	1.44	1.36	1.77	1.94	2.65	3.84	6.05	4.47	4.24	3.58	4.00	4.64	.00	46.79
4-7	278	67	37	45	100	150	110	280	277	118	75	98	183	171	315	492	0	2796
(1)	3.22	.78	.43	.52	1.16	1.74	1.28	3.25	3.21	1.37	.87	1.14	2.12	1.98	3.65	5.70	.00	32.41
(2)	3.22	.78	.43	.52	1.16	1.74	1.28	3.25	3.21	1.37	.87	1.14	2.12	1.98	3.65	5.70	.00	32.41
8-12	235	23	5	4	8	11	2	53	236	50	18	27	122	193	156	257	0	1400
(1)	2.72	.27	.06	.05	.09	.13	.02	.61	2.74	.58	.21	.31	1.41	2.24	1.81	2.98	.00	16.23
(2)	2.72	.27	.06	.05	.09	.13	.02	.61	2.74	.58	.21	.31	1.41	2.24	1.81	2.98	.00	16.23
13-18	65	8	0	0	0	1	0	6	21	8	6	2	24	72	70	32	0	315
(1)	.75	.09	.00	.00	.00	.01	.00	.07	.24	.09	.07	.02	.28	.83	.81	.37	.00	3.65
(2)	.75	.09	.00	.00	.00	.01	.00	.07	.24	.09	.07	.02	.28	.83	.81	.37	.00	3.65
19-24	1	0	0	0	0	0	0	0	1	0	0	0	2	5	8	0	0	17
(1)	.01	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.02	.06	.09	.00	.00	.20
(2)	.01	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.02	.06	.09	.00	.00	.20
GT 24	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
(1)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.01
(2)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.00	.01
ALL SPEEDS	817	235	159	160	233	280	271	508	765	512	625	518	700	756	899	1188	0	8626
(1)	9.47	2.72	1.84	1.85	2.70	3.25	3.14	5.89	8.87	5.94	7.25	6.01	8.12	8.76	10.42	13.77	.00	100.00
(2)	9.47	2.72	1.84	1.85	2.70	3.25	3.14	5.89	8.87	5.94	7.25	6.01	8.12	8.76	10.42	13.77	.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 .95 MPH)

APPENDIX A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
Supplemental Information
for 1999

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

2A. TECHNICAL SPECIFICATION LIMITS - CONCENTRATION

Technical Specification and Category	Limit
a. Noble Gases	No ECL Limits
b. Iodine-131, Iodine-133, Tritium and Radionuclides in Particulate Form With Half-Lives	
Greater Than 8 Days	No ECL Limits

c. Liquids

3.8.A.1	Total fraction of ECL excluding noble gases (10CFR20, Appendix B, Table 2, Column 2):	≤1.0E+01
3.8.A.1	Total noble gas concentration:	≤2E-04 μCi/cc

3. AVERAGE ENERGY

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

a. Average gamma energy: Not Applicable

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

Continuous stack monitors monitor the gross Noble Gas radioactivity released from the plant stack. Because release rates are normally below the detection limit of these monitors, periodic grab samples are taken and analyzed for the gaseous isotopes present. These are used to calculate the individual isotopic releases indicated in Table 1B and the totals of Table 1A. The error involved in these steps may be approximately ±23 percent.

b. Iodines

Continuous isokinetic samples are drawn from the plant stack through a particulate filter and charcoal cartridge. The filters and cartridges are normally removed weekly and are analyzed for Iodine-131, 132, 133, 134, and 135. The error involved in these steps may be approximately ±18 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 ±18 percent.

d. Tritium

Technical Specification Table 4.8.2 requires as a minimum that grab samples from the plant stack be taken monthly and analyzed for tritium. The stack sampling design included a cold trap collection device for this sample collection. The error involved in this sample is approximately ±15 percent.

e. Waste Oil

Prior to issuing the permit to burn a drum of radioactively contaminated waste oil, one liter of the oil is analyzed by gamma spectroscopy to determine concentrations of radionuclides that meet or exceed the LLD for all of the liquid phase radionuclides listed in Technical Specification Table 4.8.1.

Monthly, samples from drums that were issued burn permits are sent to the E-Lab for compositing and analysis. The E-Lab analyzes for tritium, alpha, Fe-55, Sr-89, and Sr-90 on the composite sample.

The error involved in this sample is approximately ±15 percent.

f. Liquid Effluents

If radioactive liquid effluents are to be released from the facility, they are continuously monitored. Measurements are also required 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 (μCi/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 effluents to be 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 analyzed for tritium and gross alpha radioactivity. A quarterly proportional composite sample, comprising an aliquot of each batch released during a quarter, is analyzed for Sr-89, Sr-90, and Fe-55.

5. BATCH RELEASES

a. Liquid

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

b. Gaseous

There were seven batch releases from burning waste oil during the second quarter reporting period.

The gaseous releases from burning waste oil are treated as either batch or continuous releases based on the total hours of burning in a calendar quarter.

On September 25, 1998 a sampled waste oil drum was counted long enough to meet the "a priori" liquid LLDs, but the "a posteriori" LLDs were not met for Xe-138 and Ce-144. The waste oil drum was burned under permit 99-06 in March 1999, giving an additional five months for radioactive decay.

Nuclide	LLD for the analysis	Required LLD
Xe-138	3.25E-05 μCi/ml	1.0E-05 μCi/ml
Ce-144	5.52E-07 μCi/ml	5.0E-07 μCi/ml

6. ABNORMAL RELEASES

a. Liquid

There were no nonroutine liquid releases during the reporting period.

b. Gaseous

There were no nonroutine gaseous releases (measured) 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 annual Radioactive Effluent Release Report per ODCM Section 7.1.

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

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 annual Radioactive Effluent Release Report of the reason(s) for delay in correcting the inoperability are required per ODCM Section 7.1.

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 annual Radioactive Effluent Release Report of the reason(s) for the delay in correcting the inoperability is required per ODCM 7.1.

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, ODCM 7.1 requires the following to be included in the next annual Radioactive 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: No changes were needed in the milk sampling locations specified in Technical Specification Table 3.9.3 due to sample unavailability during the reporting year.

The Evans Farm (location TM-23 & TC-23) has been removed from the Radiological Environmental Monitoring Program because there are no longer any cows to provide milk samples. Per Technical Specification Table 3.9.3, silage is only required to be sampled at locations that milk is collected from. In addition, ODCM Table 4.1 lists TM-23 and TC-23 as non-required sampling locations. Therefore, there is no need to identify a new location for replacement samples.

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, ODCM 7.1 requires the identification of the new location(s) in the next annual Radioactive Effluent Release Report.

Response: The Land Use Census was completed in the third quarter of 1999. No locations yielded a 20 percent greater dose or dose commitment than the values currently being calculated in Technical Specification 4.8.G.1.

APPENDIX G

PROCESS CONTROL PROGRAM

Requirement: Technical Requirements Manual (TRM) 6.12.A.1 requires that licensee initiated changes to the Process Control Program (PCP) be submitted to the Commission in the annual Radioactive Effluent Release Report for the period in which the change(s) was made.

Response: The following changes were made to the Process Control Program (PCP) and issued as TRM Revision 5 during this reporting period:

(1) New Procedure in PP 7500 series format

(2) Added organization, authorities and responsibilities section

(3) Added implementing procedure and document section, includes training and qualifications and performance indicators.

(4) Added dewatering method to cartridge filter section (4.b)

(5) Added AP 6805, Document Control to references.

(6) Removed reference to AP 0620, Chemical Material Use

These changes to the PCP have not affected TRM Section 6.12.

A determination was made that the change did not reduce the overall conformance of the dewatered spent resins/filter media waste product to existing criteria for solid waste shipments and disposals.

The revision does not affect Technical Specifications and does not affect any system or process described in the FSAR and a review of VOQAM was done with no findings.

This change was reviewed against AP 6002.02; it was determined that no safety evaluation is required.

The revised Process Control Program is attached. The revised Process Control Program documents the fact that the change has been reviewed by PORC and approved by the Director of Operations.

The Process Control Program was reviewed and the changes were determined to be of no impact.

Dept. Mgr.		Proc. No.	PP 7504
PORC 99-016	M.M. Hoyle	Rev. No.	Original
QSS		Issue Date	04/02/99
Plant Mgr.		Review Date	04/02/04
Dir. of Ops.			

PROCESS CONTROL PROGRAM

PURPOSE

The Vermont Yankee Nuclear Power Corporation Process Control Program (PCP) describes the administrative and technical controls of the radioactive waste systems which provide assurance that Vermont Yankee meets federal shipping and burial site requirements.

The PCP complies with Technical Specification 6.12 and 4.8.N by describing process parameters, controls, tests, sampling and analysis to ensure compliance with 10 CFR 20, 10 CFR 71, 10 CFR 61 (Energy), and 49 CFR 172-173 (Transportation); State and burial site regulatory requirements.

The use classification of this procedure is **Information Use.**

DISCUSSION

This procedure functions as the document for describing the current process for administrating radioactive waste which applies to Vermont Yankee. This procedure:

- Lists all of the current waste streams that have been identified, and processes that VY utilizes.
- Lists approved burial containers which comply with site criteria for stabilized waste.
- Describes waste class determination protocols which comply with burial site and federal regulations.
- States the regulations and procedures which implement the process control program.

REFERENCES

1. Technical Specifications
   a. 6.12
   b. 4.8.N
2. Administrative Limits
   a. None

3. Other

a. 49 CFR 172-173
b. 10 CFR 20
c. 10 CFR 71
d. 10 CFR 61
e. CNS Burial Site Criteria
f. CNS RDS-1000 Dewatering System Manual
g. VOQAM, Operational Quality Assurance Manual
h. AP 0504, Shipment of Radioactive Materials
i. AP 0619, Chemical Control/Hazard Communication Program
j. OP 2151, Liquid Radwaste
k. OP 2153, Solid Radwaste
l. OP 2511, Radwaste Cask/Liner Handling
m. OP 2512, Radwaste Drum, Box and Sealand Handling
n. OP 2527, Sampling and Analysis for Radwaste Classification
o. AP 6805, Document Control
p. PP 7503, Hazardous Waste Program

APPENDICES, ATTACHMENTS AND FIGURES

1. None

PROGRAM SCOPE

1. Applicability

This program properly describes the processing of waste materials generated as part of plant operations and applies to activities which generate radioactive waste materials at Vermont Yankee.

2. Objectives

The objective of the Process Control Program is to maintain an effective program for identifying, controlling, testing, sampling and processing waste materials generated at VY, specifically;

a. To ensure personnel safety along with minimizing exposures through personnel knowledge, awareness and proper handling techniques / practices;

b. To properly identify, process and classify waste streams generated as a result of operations and maintenance activities at VY;

c. To conduct all waste activities in compliance with pertinent regulations, permits, and licenses.

ORGANIZATION, AUTHORITIES AND RESPONSIBILITIES

1. Organization

Operations, Maintenance and Radiation Protection Departments' personnel are identified on the Vermont Yankee Organizational Chart. Specific individuals within the departments have varying degrees of involvement depending on their level and scope of training.

The size of the organization can expand temporarily as special needs arise or additional support or expertise is required. Permanent modifications to the organizational chart or increases in support personnel numbers beyond authorized resources require additional management approvals and shall be controlled by the appropriate corporate policies.

2. Responsibilities

A brief description of management level responsibilities is outlined below. More detailed responsibilities and specific authorities are defined in individual position descriptions or identified in approved policies, procedures or management directives. Annually, the PCP shall be reviewed by the following individuals.

a. Director of Operations - Ultimate responsibility for corporate and plant activities to ensure safe, effective and proper administrative controls concerning radioactive waste operations.

b. Plant Manager - Maintains responsibility for safe, orderly and efficient operation of the VY Plant and therefore maintains control of any and all radioactive waste operations.

This position reports to the Director of Operations.

c. Technical Services Superintendent (TSS) - Responsible for the proper conduct of radioactive waste activities to ensure personnel, public and environmental health and safety. The TSS shall ensure that goals which support the objectives of this program are established and performance indicators are defined to monitor the effectiveness of the Process Control Program.

This position reports to the Plant Manager.

d. Radiation Protection Manager (RPM) - Responsible for managing radioactive waste to ensure the health and safety of Plant personnel, the general public and the environment; and to ensure that all waste activities are performed in support of the objectives of this program.

This position reports to the TSS.

e. Operations Manager (OM) - Responsible for the day to day operational activities of the solid and liquid waste streams. The OM ensures procedure implementation and compliance for all operational radioactive waste processes.

This position reports to the OPS Superintendent.

f. Radwaste Supervisor (RWS) - Responsible for development and implementation of the radioactive waste program, to ensure compliance with all regulatory requirements. The RWS shall keep abreast of amendments to existing waste regulations proposed by state and federal agencies and ensure applicable procedures are current.

This position reports to the RPM.

NOTE

Worker responsibilities are addressed through General Employee Training (GET) Requalification and Employee Continuing Training Programs.

IMPLEMENTING PROCEDURES AND DOCUMENTS

Generally, management approval and direction for hazardous waste activities is demonstrated in the review and approval process for plant procedures. Specific key elements of the program are outlined and described below with a basic philosophy or approach provided.

1. Procedures

a. Controls for waste activities are written in the form of administrative procedures. The procedures require the approval of the appropriate Department Head during the review process, review by the Plant Operations Review Committee (PORC) and approval of the Plant Manager or Superintendent prior to issuance in accordance with AP 0037.

b. Procedures are to be considered as management directives and are expected to be followed. Deficiencies or deviations shall be resolved by formalized change processes per AP 0037.

c. Written procedures shall contain sufficient detail to ensure satisfactory compliance with the work effort, but need not delineate basic skills normally possessed by qualified personnel as determined and described in the Training and Qualification Section of this procedure. Training prerequisites are outlined in AP 0504, Shipment of Radioactive Material.

d. Vendor technical information shall be used as reference material in the preparation of procedures and should be used as guidance in conjunction with specific tasks, if appropriate.

2. Training and Qualification

a. Performance-based, accredited training programs are approved, in place and functional for Technical Staff and Managers, Supervisor Development, Operations, Maintenance and Radiation Protection Technicians.

Program performance monitoring and control of content is accomplished through direct interaction between department supervision and management, the Technical Services Superintendent and the Training Department.

b. Job posting and individual position descriptions establish the minimum qualifications. General knowledge and basic skill levels are demonstrated through testing of job applicants.

c. The RWS, integral with the Training Department, maintains and ensures the assignment of qualified personnel to perform duties in support of program objectives. This is accomplished through personnel observation, interaction and varying degrees of direct supervision. Training prerequisites are outlined in AP 0504, Shipment of Radioactive Material.

d. Contracted services, whether integrated with staff personnel or assigned specific tasks, are verified to have the necessary qualifications and training prior to commencement of work activities.

3. Performance Indicators

Performance indicators are an important element of any program which enable the program owner to conduct timely assessments of the effectiveness of a program.

The RWS shall monitor the effectiveness of the program efforts by generating and trending the following performance indicators, as a minimum:

- Number of event reports or observations generated as result of improper control of radioactive waste stream items.
- Number of event reports or observations generated as result of procedure violations concerning radioactive waste handling operations .
- Timeliness of program updates resulting from regulatory changes.

4. General Implementation

Implementation of this program is generally controlled by approved procedures. This section does not supersede or eliminate the need for specific procedures when appropriate. The topics contained in this section illustrate management approval and direction for those areas identified.

a. Solidification

Vermont Yankee Nuclear Power Corporation does not routinely solidify liquid waste. If the use of solidification to dispose of any liquid waste is required, it will be done by an outside vendor under the vendor's PCP. The vendor PCP will be reviewed and approved by the Plant Health Physicist, the Radiation Protection Manager, PORC, Plant Manager and Director of Operations prior to implementation. This review is to identify that there is sufficient supporting documentation of the vendor's PCP to give assurance that the final product will meet all requirements for transport and burial, and that sufficient procedural controls exist to assure safe operations. [TS 4.8.N]

b. Cartridge Filter Elements

Low activity cartridge filter elements (<200 mR/hr @ 30cm) will be air dried (~24hr or as determined by the Radwaste Supervisor) and handled as dry active waste. Filters determined to be above the dose limitations per 49 CFR, will be placed in casks. The liner shall be dewatered by the RDS-1000 System or a similar approved system and then shipped for disposal.

c. Resins

Normal operations produce radioactive waste in the form of depleted resins. These resins are processed in the burial container using a rapid dewatering system (RDS-1000) manufactured by Chem-Nuclear Systems, Inc. [OP 2153]

The system has been tested, by Chem-Nuclear, for certification in meeting the Barnwell Site Criteria and disposal requirement for free standing liquid. These tests are described in Chem-Nuclear's Topical Report on the RDS-1000 Radioactive Waste Dewatering System. In addition, to comply with the statement, "Any liquids present in waste packages shall be non-corrosive with respect to the container," Vermont Yankee tested the pH of various resin mixtures used by the plant in solution with water. The range was found to be 4.2 - 8.4. A solution is not considered corrosive if the pH is greater than 4.0 and less than 10.0.

A resin sample is taken from each liner prior to shipment. The sample is counted to determine the activity and waste classification. Class A resins that exceed 1.0 μCi/cc of isotopes with greater than 5 year half-lives and all Class B and C resins will be disposed of in an approved High Integrity Container (HIC).

Vendor supplied or temporary methods of processing resins may be used in lieu of the above process provided that the vendor or temporary process meets the requirements of quality described above and does not conflict with accepted burial criteria or safety requirements. Such methods will be reviewed and approved by the personnel stated in 4.a prior to implementation.

a. Filter Liners

During refueling outages and normal operation, liquid radwaste processing may require use of a decanting filter on the condensate phase separators. A floating suction is used to decant the water and resin into a filter liner. Filtered water is pumped from the liner. The liner is dewatered in accordance with OP 2511 (MOOID9409-03) such that the burial site criterion for free-standing water is met. A resin sample is taken from the liner and analyzed to determine the activity and waste classification.

b. Dry Active Waste (DAW)

DAW is compacted, as practical, or shipped to a vendor that sorts the material for processing or recycling. All DAW is examined before being compacted or shipped. Any liquids or items found that would compromise the integrity of the package are removed and separated as specified by procedure [OP 2512]. DAW which includes compactable, incinerable and metal materials are segregated in the plant and transported to the applicable sealand container, then shipped to the appropriate/cost effective off-site processor. If deemed practical, the DAW will be surveyed and free-released onsite, if possible. Containers used for DAW shipments meet the criteria of 49 CFR 173.425a. or b. "No leakage of radioactive material," as specified in 49 CFR 173.425.b.1 will be met provided that no radioactive materials in quantities equal to or exceeding those specified in 49 CFR 173.443 are detected on the external surfaces of the package at any time during shipment.

c. Chelating Agents

In order to comply with 10 CFR 20 Appendix F, chelating agents are controlled by the plant chemistry department using procedure AP 0619.

d. Explosive Waste

No waste capable of detonation or of explosive decomposition or reaction will be disposed as per 10 CFR 61.56(a)(4). Refer to MSDS via AP 0619.

e. Toxic Waste

No waste capable of generating toxic gases, vapors, or fumes will be disposed as per 10 CFR 61.56(a)(5). Refer to MSDS via AP 0619.

f. Pyrophoric Waste

No waste that is pyrophoric will be disposed as per 10 CFR 61.56(a)(6). Refer to MSDS via AP 0619.

g. High Integrity Containers (HICs)

Vermont Yankee Nuclear Power Corporation has contracted with various suppliers of approved HICs. South Carolina has approved PCPs for HICs used by Vermont Yankee. Any HIC Vermont Yankee may choose to use at some future time, will meet all applicable requirements.

h. Waste Class Determination

Along with an approved outside laboratory, Vermont Yankee periodically performs laboratory analysis on all waste streams to determine the activity of radionuclides listed in Tables 1 and 2 of 10 CFR 61. Correlation analysis verifies that the relative concentration of each radionuclide, with respect to the overall activity in a given Vermont Yankee waste stream, remains constant over time. A set of scaling factors is determined which allows the activity of 10 CFR 61 radionuclides to be estimated using the results of gamma spectrometric analysis or direct gamma dose rate measurements.

For resin wastes, analysis is performed on samples of each source of resin comprising the contents of a burial container. Scaling factors are applied to the activity of radionuclides identified by gamma spectrometry analysis to determine the activity of those radionuclides which are not detected in the gamma spectrum.

For DAW, dose rate-to-curie conversion calculations are performed to determine the total activity present in a container. Scaling factors are applied to the container's total curie content to determine the activity of individual radionuclides.

Specific procedures for determining 10 CFR 61 scaling factors are contained in OP 2527, "Sampling and Analysis for Radwaste Classification." Once the activity of each radionuclide in a burial container is estimated, the waste classification is derived using methods required by 10 CFR 61. Specific procedures for waste class determination are contained in AP 0504, "Shipment of Radioactive Material."

i. Mixed Waste

No mixed waste will be disposed as per 10 CFR 61.56(a)(8) unless properly treated. Refer to MSDS via AP 0619.

FINAL CONDITIONS

1. This procedure is retained per AP 6805.

APPENDIX H

OFF-SITE DOSE CALCULATION MANUAL

Requirement: Technical Specification 6.7.B.1 requires that licensee initiated changes to the Off-Site Dose Calculation Manual (ODCM) be submitted to the Commission in the annual Radioactive Effluent Release Report for the period in which the change(s) was made effective.

Response: During the reporting period, three revisions (No. 23, 24 and 25) to the ODCM were made.

The major changes included in Revision 23 to the ODCM are:

(23.A) Relocation of Reporting Requirements from Technical Specification Section 6 to the ODCM

As part of a Technical Specification improvement, NRC reporting requirements for the Radioactive Effluent Release Report, the Environmental Radiological Operating Report, and Special Reports as previously described in VY Technical Specifications, Section 6, have been relocated to the ODCM. A new Section 7.0, "Reporting Requirements," has been added to the ODCM to incorporate these changes. The content of the material and actions required by the current Technical Specifications has not been changed in this relocation action, other than a re-numbering of the sections to have the material correlate within the current contents of the ODCM. As such, these changes are considered administrative in nature and will maintain the same level of control that is now in place.

(23.B) Changes to the Current REMP Sampling Program (Milk, Silage & Well Water)

The Evans Farm (location TM-23 & TC-23) has been removed from the Radiological Environmental Monitoring Program (Table 4.1 and Figure 4-3) because there are no longer any cows available to provide milk samples. Per Technical Specification Table 3.9.3, silage is only required to be sampled at locations that milk is collected from. The basis for this relationship is that silage is part of the effluent release - milk pathway of exposure, and gives added information on the re-concentration of effluent activity in the human food pathway. In addition, ODCM Table 4.1 lists TM-23 and TC-23 as non-required sampling locations. Therefore, there is no need to identify a new location for obtaining replacement samples.

As a result of the 1998 Land Use Census the status of Blodgett Farm (TM-18 and TC-18) has been changed to a technical specification requirement due to its higher

ranking among the other farms in terms of critical organ dose. The status of Miller Farm (TM-11 and TC-11) is also changed to a non-technical specification requirement based on the land use census analysis ranking.

A new on-site ground water sampling location, WG-14, has also been added to the REMP. This new well sampling site is located near the new Staff Office Building and is intended to be used as its potable water supply. This is an enhancement to the program to reflect a change in the local environment. This change involves update Table 4.1 and Figure 4-1 of the ODCM.

(23.C) REMP Laboratory Intercomparison Program

During a recent audit, a question was raised about how the DESEL interlaboratory comparison program satisfied VY Technical Specification 3.9.E. This specification requires that the laboratory intercomparison QA program be approved by the NRC. The current program involves using an independent commercial laboratory as a replacement for the EPA in the laboratory intercomparison program. This change was implemented during late 1995 when the EPA discontinued its work in the laboratory intercomparison program. The NRC has provided a position statement, which acknowledges that commercial programs traceable to NIST can be used to satisfy this requirement of standard RETS. This acknowledgment has been included into the ODCM Section 4.1 and Reference Section to document the NRC position, which is being implemented by DESEL.

(23.D) N-16 Dose to the Maximum Resident Location

Based on TLD measurements in 1998, a reassessment of the projected dose due to N-16 scatter radiation from the Turbine Building during plant operations to a west site boundary fence line location has resulted in the new maximum nearest resident location with respect to direct dose. Reference 3 has derived a new dose relationship between plant gross power output and N-16 scatter dose to a resident. The same methodology as previously applied in this type of dose projection has been carried over to the revision. This revision reflects identified changes in the local environment and results in an improvement to the ability to project doses to critical receptors.

(23.E) Minor editorial changes to improve readability and eliminate redundant or unnecessary text

Several minor editorial corrections were made to the ODCM as part of revision 23. More clarification has been added to the statement on page B-23 of the ODCM referring to the time interval between the pumping of the septic system. This involved adding the statement "The actual practice may be to pump the septic tanks every two to three years.

During December 1997, Yankee Atomic Electric Company's Nuclear Service Division was taken over by Duke Engineering and Services. Therefore, applicable changes have been made replacing certain references to "Yankee Atomic" or "YNSD" with "Duke Engineering and Services" or "DE&S."

Revision No. 24 to the ODCM included the following changes:

(24.A) Relocation of Technical Specification 6.14. "Major Changes to Radioactive Liquid, Gaseous, and Solid Waste Treatment Systems"

As part of implementing the direction provided by NRC Generic Letter 89-01, and as requested and accepted by the NRC as part of Reference 1, Technical Specification Section 6.14, "Major Changes to Radioactive Liquid, Gaseous, and Solid Waste Treatment Systems," has been moved to the ODCM. A new section, Section 7.4, has been added to the ODCM to incorporate this addition. The relocation of these details to the ODCM is acceptable considering the controls provided by existing regulations and the controls remaining in the Technical Specifications for ODCM changes. This relocation was recently approved by Amendment No. 171 to the VY Technical Specifications.

(24.B) Standard Nomenclature

As part of Technical Specification Amendment No. 171, specific changes were made to certain wording used in the Technical Specifications to reflect standard industry practice. Specifically, the "Annual Radioactive Effluent Release Report" was changed to the "Radioactive Effluent Release Report," and the "Radiological Environmental Surveillance Report" was changed to the "Annual Radiological Environmental Operating Report." In addition, the required submittal date for these two reports was changed to May 15th of each year. Because of these changes, the names and dates in the ODCM have been updated to maintain consistency with the Technical Specifications.

(24.C) Relocation of Technical Specification Reporting Requirements

Amendment No. 171 to the Technical Specifications involved moving the section regarding certain reporting requirements from the old Section 6.7.C of the Technical Specifications to a new Section 7.0 in the ODCM. In moving this section, the wording was kept identical to that which was used in the Technical Specifications. In order to reduce confusion, some additional clarification was made to the new section in the ODCM. This involved adding the words "Technical Specification" to any mention of a technical specification section in order to reduce confusion between sections in the Technical Specifications and sections in the ODCM. In

addition, any references to the Technical Specification sections, which no longer exist, were updated to reflect their new location.

(24.D) Addition of new Ground Water Sampling Location

Ground water sampling location, WG-13, has been added as a radiological environmental sampling location to Section 4.0 of the ODCM. At the same time, the page numbering in Section 4.0 was changed to be consistent with the numbering used throughout the ODCM. This is considered an expansion of the minimum required program, and therefore does not impact the REMP Program capability to detect and monitor environmental radiation.

(24.E) Elimination of Supplemental Reports to the Radioactive Effluent Release Report

A statement in section 7.1 of the ODCM has been removed. This statement allowed a supplemental report to be submitted after the Radioactive Effluent Release Report up to 180 days after January 1 each year. This supplemental report contained an assessment of the radiation dose associated with the radioactive liquid and gaseous effluents released from the unit. Since the time to prepare the annual report has been extended to May 15, the need for a supplemental report has been eliminated.

Revision 25 to the ODCM included:

(25.A) Stack Effluent Tritium Sampler

Figure 6-2, "Radioactive Gaseous Effluent Streams, Radiation Monitors, and Radwaste Treatment System at Vermont Yankee" was updated to include the addition of a new continuous tritium sampler for stack effluents.

All the above noted ODCM changes were determined to maintain the level of protection in the calculation of off-site doses resulting from radioactive gaseous and liquid effluents since no changes have been made to either the dose calculation or setpoint methodologies. It is therefore concluded that these revisions will maintain the level of radioactive effluent control required by 10CFR20.1302, 40CFR190, 10CFR50.36a, and Appendix I to 10CFR Part 50, and not adversely impact the accuracy or reliability of effluent dose or setpoint calculations.

Attached are affected replacement pages, which bring the ODCM up to-date through Revision 25.

VERMONT YANKEE NUCLEAR POWER STATION

OFF-SITE DOSE CALCULATION MANUAL

REVISION 25

This document contains Vermont Yankee proprietary information. This information may not be transmitted, in whole or in part, to any other organization without permission of Vermont Yankee.

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Page	Revision	Date
i	25	12/02/99
ii	25	12/02/99
iii	25	12/02/99
iv	23	05/12/99
v	17	05/31/94
vi	18	07/20/95
vii	23	05/12/99
viii	17	05/31/94
ix	24	08/31/99
x	24	08/31/99
1-1	24	08/31/99
1-2	15	07/08/93
1-3	21	08/14/97
1-4	17	05/31/94
1-5	20	07/30/96
1-6	21	08/14/97
1-7 to 1-9	17	05/31/94
1-10	15	07/08/93
1-11	17	05/31/94
1-12	16	10/28/93
1-13 to 1-18	15	07/08/93
1-19 to 1-20	17	05/31/94
1-21	15	07/08/93
1-22	20	07/30/96
2-1 to 2-2	21	08/14/97
2-3	15	07/08/93
2-4	21	08/14/97
3-1	18	07/20/95
3-2	17	05/31/94
3-3	18	07/20/95
3-4 to 3-6	17	05/31/94
3-7	23	05/12/99
3-8 to 3-11	15	07/08/93
3-12	23	05/12/99
3-13	17	05/31/94
3-14	20	07/30/96
3-15 to 3-17	17	05/31/94
3-18	23	05/12/99
3-19	15	07/08/93
3-20	20	07/30/96
3-21 to 3-24	17	05/31/94
3-25	23	05/12/99
3-26 to 3-28	17	05/31/94
3-29	23	05/12/99
3-30 to 3-32	17	05/31/94
3-33	25	12/02/99
3-34 to 3-36	17	05/31/94
3-37	23	05/12/99

LIST OF AFFECTED PAGES
(Continued)

Page	Revision	Date
3-38 to 3-40	17	05/31/94
3-41	23	05/12/99
3-42 to 3-45	17	05/31/94
3-46	23	05/12/99
3-47 to 3-50	17	05/31/94
3-51	23	05/12/99
3-52	18	07/20/95
3-53 to 3-57	17	05/31/94
3-58	20	07/30/96
3-59	15	07/08/93
4-1	23	05/12/99
4-2	24	08/31/99
4-3	24	08/31/99
4-4	24	08/31/99
4-5	24	08/31/99
4-6	24	08/31/99
4-7	24	08/31/99
4-8	25	12/02/99
4-9	24	08/31/99
4-10	24	08/31/99
4-11	24	08/31/99
4-12	24	08/31/99
5-1	15	07/08/93
5-2	21	08/14/97
5-3	15	07/08/93
5-4 to 5-7	21	08/14/97
5-8 to 5-12	18	07/20/95
5-13 to 5-14	20	07/30/96
5-15	21	08/14/97
5-16	18	07/20/95
5-17 to 5-21	20	07/30/96
5-22	18	07/20/95
6-1 to 6-8	17	05/31/94
6-9	18	07/20/95
6-10	25	12/02/99
7-1 to 7-7	25	12/02/99
R-1	23	05/12/99
A-1 to A-2	15	07/08/93
A-3	20	07/30/96
A-4	17	05/31/94
A-5 to A-8	20	07/30/96
A-9	17	05/31/94
A-10 to A-15	20	07/30/96
A-16 to A-21	17	05/31/94
A-22 to A-23	20	07/30/96
A-24	17	05/31/94

Revision 25 Date 12/02/99

3.7 Method to Calculate the Gamma Air Dose from Noble Gases 3-30

3.8 Method to Calculate the Beta Air Dose from Noble Gases 3-34

3.9 Method to Calculate the Critical Organ Dose from Iodines Tritium and Particulates 3-38

3.10 Receptor Points and Annual Average Atmospheric Dispersion Factors for Important Exposure Pathways 3-45

3.11 Method to Calculate Direct Dose From Plant Operation 3-51

3.12 Cumulative Doses 3-59

4.0 ENVIRONMENTAL MONITORING PROGRAM 4-1

5.0 SETPOINT DETERMINATIONS 5-1

5.1 Liquid Effluent Instrumentation Setpoints 5-2
5.2 Gaseous Effluent Instrumentation Setpoints 5-11

6.0 LIQUID AND GASEOUS EFFLUENT STREAMS, RADIATION MONITORS, AND RADWASTE TREATMENT SYSTEMS 6-1

6.1 In-Plant Radioactive Liquid Effluent Pathways 6-1
6.2 In-Plant Radioactive Gaseous Effluent Pathways 6-4

7.0 REPORTING REQUIREMENTS 7-1

REFERENCES R-1

APPENDIX A: Method I Example Calculations A-1
APPENDIX B: Approval of Criteria for Disposal of Slightly Contaminated Septic Waste On-Site at Vermont Yankee B-1
APPENDIX C: Response to NRC/EG&G Evaluation of ODCM Update Through Revision 4 C-1
APPENDIX D: Assessment of Surveillance Criteria for Gas Releases from Waste Oil Incineration D-1
APPENDIX E: NRC Safety Evaluation for Disposal of Slightly Contaminated Soil On-Site at VY (Below the Chem Lab Floor) - TAC No. M82152 E-1
APPENDIX F: Approval Pursuant to 10CFR20.2002 for On-Site Disposal of Cooling Tower Silt F-1
APPENDIX G: Maximum Permissible Concentrations (MPCs) in Air and Water Above Natural Background Taken from 10CFR20.1 to 20.602, Appendix B G-1

LIST OF TABLES
(continued)

NUMBER	TITLE	PAGE
3.10-2	Site Boundard Distances	3-49
3.10-3	Recirculation Correction Factors	3-50
4.1	Radiological Environmental Monitoring Stations	4-4
5.2-1	Relative Fractions of Core Inventory Noble Gases After Shutdown	5-22

LIST OF FIGURES

NUMBER	TITLE	PAGE
4-1	Environmental Sampling Locations in Close Proximity to Plant	4-7
4-2	Environmental Sampling Locations Within 5 km of Plant	4-8
4-3	Environmental Sampling Locations Greater Than 5 km from Plant	4-9
4-4	TLD Locations in Close Proximity to Plant	4-10
4-5	TLD Locations Within 5 km of Plant	4-11
4-6	TLD Locations Greater than 5 km from Plant	4-12
6-1	Liquid Effluent Streams, Radiation Monitors, and Radwaste Treatment System at Vermont Yankee	6-9
6-2	Gaseous Effluent Streams, Radiation Monitors, and Radwaste Treatment System at Vermont Yankee	6-10

1.0 INTRODUCTION

This ODCM (Off-Site Dose Calculation Manual) provides formal and approved methods for the calculation of off-site concentration, off-site doses, and effluent monitor setpoints in order to comply with the Vermont Yankee Technical Specifications 3.8/4.8 and 3.9/4.9, hereafter referred to as the Radiological Effluent Technical Specifications. The ODCM forms the basis for plant procedures and is designed for use by the procedure writer. In addition, the ODCM will be useful to the writer of periodic reports required by the NRC on the dose consequences of plant operation. The dose methods contained herein follow accepted NRC guidance for calculation of doses necessary to demonstrate compliance with the dose objectives of Appendix I to 10CFR50 (Regulatory Guide 1.109) unless otherwise noted in the text.

Demonstration of compliance with the dose limits of 40CFR190 (see Technical Specification 3.8.M) will be considered as demonstrating compliance with the 0.1 rem limit of 10CFR20.1301(a)(1) for members of the public in unrestricted areas (Reference 56 FR 23374, third column).

It shall be the responsibility of the Chemistry Manager and Radiation Protection Manager to ensure that the ODCM is used in the performance of the surveillance requirements of the appropriate portions of Technical Specifications. The administration of the program for the onsite disposal of slightly contaminated waste, as described in Appendices, is also the responsibility of the Chemistry Manager.

All changes to the ODCM must be reviewed by PORC and approved by the Plant Manager, in accordance with Technical Specification 6.7.B, prior to implementation. All approved changes shall be submitted to the NRC for their information in the Radioactive Effluent Release Report for the period in which the change(s) was made effective. The plant's Document Control Center (DCC) shall maintain the current version of the ODCM and issue under controlled distribution all approved changes to it.

Method I is conservative because it is based on dose factors DFL_{itb} which were chosen from the base case to be the highest of the four age groups for each radionuclide, as well as assuming minimum river dilution flow.

3.2.3 Method II

If Method I cannot be applied, or if the Method I dose exceeds the limit or if a more exact calculation is required, then Method II should be applied. Method II consists of the models, input data and assumptions in Regulatory Guide 1.109, Rev. 1 (Reference A), except where site-specific models, data or assumptions are more applicable, such as the use of actual river flow at the time of actual discharge as opposed to the minimum river flow of 1,260 cfs that is assumed in the Method I dose factors (except for the fish pathway). The base case analysis, documented above, is a good example of the use of Method II. It is an acceptable starting point for a Method II analysis. Analyses requiring Method II calculations should be referred to DE&S to be performed and documented.

where:

DFL_{imo} = Site-specific maximum organ dose factor (mrem/Ci) for a liquid release. See Table 1.1-11.

Q_i = Total activity (Ci) released for radionuclide "i".

Because of the assumptions about receptors, environment, and radionuclides; and because of the low Objective and Standard, the lack of immediate restriction on plant operation, and the adherence to 10CFR20 concentrations (which limit public health consequences) a failure of Method I (i.e., the exposure of a real individual being underestimated) is improbable and the consequences of a failure are minimal.

3.3.3 Method II

If Method I cannot be applied, or if the Method I dose exceeds the limit or if a more exact calculation is required, then Method II should be applied. Method II consists of the models, input data and assumptions in Regulatory Guide 1.109, Rev. 1 (Reference A), except where site-specific models, data or assumptions are more applicable. The base case analysis, documented above, is a good example of the use of Method II. It is an acceptable starting point for a Method II analysis. Analyses requiring Method II calculations should be referred to DE&S to be performed and documented.

The calculation of ground level release dispersion parameters are based on the location of the North Warehouse with respect to the site boundary that would experience the highest exposure. The North Warehouse contains a waste oil burner that can be used for the incineration of low level contaminated waste oil, and is designated as a ground level release point to the atmosphere. Due to differences in building cross sectional areas and resulting building wake effects, the North Warehouse atmospheric dispersion factors are conservative in comparison to those associated with the main plant facilities, such as the Turbine Building. As a consequence, any potential or unexpected ground level release from the Turbine Building or adjoining structures can utilize the above ground release dose assessment equations.

In the case of noble gas dose rates, Method II cannot provide much extra realism because $\dot{R}_{tbs}$ and $\dot{R}_{tbg}$ are already based on several factors which make use of current plant parameters. However, should it be needed, the dose rate analysis for critical receptor can be performed making use of current meteorology during the time interval of recorded peak release rate in place of the default atmospheric dispersion factor used in Method I.

3.4.3 Method II

If Method I cannot be applied, or if the Method I dose exceeds the limit, then Method II may be applied. Method II consists of the models, input data and assumptions in Regulatory Guide 1.109, Rev. 1 (Reference A), except where site-specific models, data or assumptions are more applicable. The base case analysis, documented above, is a good example of the use of Method II. It is an acceptable starting point for a Method II analysis. Analyses requiring Method II calculations should be referred to DE&S to be performed and documented.

The calculation of ground level release dispersion parameters are based on the location of the North Warehouse with respect to the site boundary that would experience the highest exposure. The North Warehouse contains a waste oil burner that can be used for the incineration of low level contaminated waste oil, and is designated as a ground level release point to the atmosphere. Due to differences in building cross sectional areas and resulting building wake effects, the North Warehouse atmospheric dispersion factors are conservative in comparison to those associated with the main plant facilities, such as the Turbine Building. As a consequence, any potential or unexpected ground level release from the Turbine Building or adjoining structures can utilize the above ground release dose assessment equations.

3.5.3 Method II

If Method I cannot be applied, or if the Method I dose exceeds the limit, then Method II may be applied. Method II consists of the models, input data and assumptions in Regulatory Guide 1.109, Rev. 1 (Reference A), except where site-specific models, data or assumptions are more applicable. The base case analysis, documented above, is a good example of the use of Method II. It is an acceptable starting point for a Method II analysis. Analyses requiring Method II calculations should be referred to DE&S to be performed and documented.

DFG'_{sico} and DFG'_{gico} (North Warehouse waste oil burner vent releases) incorporates the conversion constant of 31.54 and has assumed that the shielding factor (S_F) applied to the direct exposure pathway from radionuclides deposited on the ground plane is equal to 1.0 in place of the S_F value of 0.7 assumed in the determination of DFG_{sico} and DFG_{gico} for the integrated doses over time.

The selection of critical receptor (based on the combination of exposure pathways which include direct dose from the ground plane, inhalation and ingestion of vegetables, meat, and milk) which is outlined in Section 3.10 is inherent in Method I, as are the maximum expected off-site atmospheric dispersion factors based on past long-term site-specific meteorology.

The calculation of ground level release dispersion parameters are based on the location of the North Warehouse with respect to the site boundary that would experience the highest exposure. The North Warehouse contains a waste oil burner that can be used for the incineration of low level contaminated waste oil, and is designated as a ground level release point to the atmosphere. Due to differences in building cross sectional areas and resulting building wake effects, the North Warehouse atmospheric dispersion factors are conservative in comparison to those associated with the main plant facilities, such as the Turbine Building. As a consequence, any potential or unexpected ground level release from the Turbine Building or adjoining structures can utilize the above ground release dose assessment equations.

Should Method II be needed, the analysis for critical receptor critical pathway(s) and atmospheric dispersion factors may be performed with actual meteorologic and latest land use census data to identify the location of those pathways which are most impacted by these type of releases.

3.6.3 Method II

If Method I cannot be applied, or if the Method I dose exceeds the limit, then Method II may be applied. Method II consists of the models, input data and assumptions in Regulatory Guide 1.109, Rev. 1 (Reference A), except where site-specific models, data or assumptions are more applicable. The base case analysis, documented above, is a good example of the use of Method II. It is an acceptable starting point for a Method II analysis. Analyses requiring Method II calculations should be referred to DE&S to be performed and documented.

The calculation of ground level release dispersion parameters are based on the location of the North Warehouse with respect to the site boundary that would experience the highest exposure. The North Warehouse contains a waste oil burner that can be used for the incineration of low level contaminated waste oil, and is designated as a ground level release point to the atmosphere. Due to differences in building cross sectional areas and resulting building wake effects, the North Warehouse atmospheric dispersion factors are conservative in comparison to those associated with the main plant facilities, such as the Turbine Building. As a consequence, any potential or unexpected ground level release from the Turbine Building or adjoining structures can utilize the above ground release dose assessment equations.

The main difference between Method I and Method II is that Method II would allow the use of actual meteorology to determine $[X/Q]^{\gamma}$ rather than use the maximum long-term average value obtained for the years 1981 to 1985.

3.7.3 Method II

If the Method I dose determination indicates that the Technical Specification limit may be exceeded, or if a more exact calculation is required, then Method II may be applied. Method II consists of the models, input data and assumptions in Regulatory Guide 1.109, Rev. 1 (Reference A), except where site-specific models, data or assumptions are more applicable. Analyses requiring Method II calculations should be referred to DE&S to be performed and documented.

$= 3.52E-05 \text{ sec/m}^3$

leading to:

$$D^{\beta}_{airg} = 1.12 \sum_i Q_i^{GL} DF_i^{\beta} \quad (3\text{-}43)$$

The calculation of ground level release dispersion parameters are based on the location of the North Warehouse with respect to the site boundary that would experience the highest exposure. The North Warehouse contains a waste oil burner that can be used for the incineration of low level contaminated waste oil, and is designated as a ground level release point to the atmosphere. Due to differences in building cross sectional areas and resulting building wake effects, the North Warehouse atmospheric dispersion factors are conservative in comparison to those associated with the main plant facilities, such as the Turbine Building. As a consequence, any potential or unexpected ground level release from the Turbine Building or adjoining structures can utilize the above ground release dose assessment equations.

3.8.3 Method II

If Method I cannot be applied, or if the Method I dose determination indicates that the Technical Specification limit may be exceeded, or if a more exact calculation is required, then Method II may be applied. Method II consists of the models, input data and assumptions in Regulatory Guide 1.109, Rev. 1 (Reference A), except where site-specific models, data or assumptions are more applicable. Analyses requiring Method II calculations should be referred to DE&S to be performed and documented.

of the base case. The dose factors DFG_{ico} used in Method I were chosen from the base case to be the highest of the set for that radionuclide. In effect each radionuclide is conservatively represented by its own critical age group and critical organ.

3.9.3 METHOD II

If Method I cannot be applied, or if the Method I dose exceeds the limit or if a more exact calculation is required, then Method II should be applied. Method II consists of the models, input data and assumptions in Regulatory Guide 1.109, Rev. 1 (Reference A), except where site-specific models, data or assumptions are more applicable. The base case analysis, documented above, is a good example of the use of Method II. It is an acceptable starting point for a Method II analysis. Analyses requiring Method II calculations should be referred to DE&S to be performed and documented.

3. The point of maximum ground level air concentration (maximum depleted X/Q) of radioiodines and other particulates for determining critical organ dose from inhalation; and

4. The point of maximum deposition (maximum D/Q) of radioiodines and other particulates for determining critical organ dose from ingestion.

The Stack release pathway was evaluated as an elevated release assuming a constant nominal Stack flow rate of 175,000 cfm. The point of maximum gamma exposure from Stack releases (SSE sector, 750 meters) was determined by finding the maximum five-year average gamma X/Q at any off-site location. The location of the maximum ground level air concentration and deposition of radioiodines and other particulates (NW sector, 2700 meters) was determined by finding the maximum five-year average depleted X/Q and D/Q at any off-site location. For the purposes of determining the Method I dose factors for radioiodines, tritium, and particulates, a milk animal was assumed to exist at the location of highest calculated ground level air concentration and deposition of radioiodines and other particulates as noted above. This location then conservatively bounds the deposition of radionuclides at all real milk animal locations.

The North Warehouse release pathway was evaluated as a ground level release using the same meteorological period-of-record as the stack. The highest long-term atmospheric dispersion factors at the site boundary were determined (see Table 3.10-1) and doses and dose rates to the critical off-site receptor were calculated assuming the highest site boundary atmospheric dispersion factors all occurred at the same location.

3.10.2 Vermont Yankee Atmospheric Dispersion Model

The long-term average atmospheric dispersion factors are computed for routine releases using Duke Engineering & Services (DE&S) AEOLUS-2 Computer Code (Reference B). AEOLUS-2 is based, in part, on the constant mean wind direction model discussed in Regulatory Guide 1.111 (Reference C). Since AEOLUS-2 is a straight-line steady-state model, site-specific recirculation correction factors were developed for each release pathway to adjust the AEOLUS-2 results to account for temporal variations of atmospheric transport and diffusion conditions. The applicable recirculation correction factors are listed in Table 3.10-3.

3.11 Method to Calculate Direct Dose From Plant Operation

Technical Specification 3.8.M.1 restricts the dose to the whole body or any organ to any member of the public from all station sources (including direct radiation from fixed sources on-site) to 25 mrem in a calendar year (except the thyroid, which is limited to 75 mrem).

3.11.1 Turbine Building

The maximum contribution of direct dose to the whole body or to any organ due to N-16 decay from the turbine is:

$$D_d = K_{N16}(L) * E \qquad (3\text{-}27)$$

$$(\text{mrem}) \qquad \frac{(\text{mrem})}{MW_e h} \qquad (MW_e h)$$

where:

D_d = The dose contribution from N-16 decay at either the site boundary of maximum impact (west site boundary) or maximum off-site residence - (mrem).

E = Gross electric output over the period of interest ($MW_e h$).

$K_{N16}(L)$ = The N-16 dose conversion factor for (L) equal to either:
(1) 3.17E-06 for the maximum west site boundary; or
(2) 2.63E-06 for the maximum residence (i.e., SW site boundary with respect to Turbine Hall) (mrem/$MW_e h$). The maximum resident dose may also be corrected for occupancy time (i.e., multiply the dose by the fraction of time typically spent by the resident at the location during the period of interest) if documented.

3.11.2 North Warehouse

Radioactive materials and low level waste can be stored in the north warehouse. The maximum annual dose contributions to off-site receptors (west site boundary line) from sources in the shielded (east) end and the unshielded (west) end of the north warehouse are:

4.0 ENVIRONMENTAL MONITORING PROGRAM

The radiological environmental monitoring stations are listed in Table 4.1. The locations of the stations with respect to the Vermont Yankee plant are shown on the maps in Figures 4-1 to 4-6.

4.1 Intercomparison Program

All routine radiological analyses for environmental samples are performed at the Duke Engineering & Services Environmental Laboratory (DESEL). This was formally the Yankee Atomic Environmental Laboratory. The Laboratory participates in several government and commercial intercomparison quality assurance programs (QAPs) that are traceable to the National Institute of Standards and Technology (NIST). These include: Nuclear Energy Institute (NEI)/NIST Measurement Assurance Program for the Nuclear Power Industry; U.S. Environmental Protection Agency's Intercomparison Program for Drinking Water as available; and Analytics, Inc. (commercial). DESEL also participates in the QAP for environmental media conducted by the Environmental Measurements Laboratory of the U.S. Department of Energy. These intercomparison programs satisfy Technical Specification 4.9.E.1 (see Reference G for NRC position).

4.2 Airborne Pathway Monitoring

The environmental sampling program is designed to achieve several major objectives, including sampling air in predominant up-valley and down-valley wind directions, and sampling air in nearby communities and at a proper control location, while maintaining continuity with two years of preoperational data and 18 years of operational data (as of 1990). The chosen air sampling locations are discussed below.

To assure that an unnecessarily frequent relocation of samplers will not be required due to short-term or annual fluctuations in meteorology, thus incurring needless expense and destroying the continuity of the program, long term, site specific ground level D/Qs (five-year averages - 1978 through 1982) were evaluated in comparison to the existing air monitoring locations to determine their adequacy in meeting the above-stated objectives of the program and the intent of the NRC general guidance. The long-term average meteorological data base precludes the need for an annual re-evaluation of air sampling locations based on a single year's meteorological history.

The Connecticut River Valley in the vicinity of the Vermont Yankee plant has a pronounced up- and down-valley wind flow. Based on five years of meteorological data, wind blows into the 3 "up-valley" sectors (N, NNW, and NW) 27 percent of the time, and the 4 "down-valley" sectors (S, SSE, SE, and ESE) 40 percent of the time, for a total "in-valley" time of 67 percent.

Station AP/CF-12 (NNW, 3.6 km) in North Hinsdale, New Hampshire, monitors the up-valley sectors. It is located in the sector that ranks fourth overall in terms of wind frequency (i.e., in terms of how often the wind blows into that sector), and is approximately 0.5 miles from the location of the calculated maximum ground level D/Q (i.e., for any location in any sector, for the entire Vermont Yankee environs). This station provides a second function by its location in that it also monitors North Hinsdale, New Hampshire, the community with the second highest ground level D/Q for surrounding communities, and it has been in operation since the preoperational period.

The down-valley direction is monitored by two stations - at River Station Number 3.3 (AP/CF-11, SSE, 1.9 km) and at Northfield, Massachusetts (AP/CF-14, SSE, 11.6 km). They both reside in the sector with the maximum wind frequency and they bound the down-valley point of calculated maximum ground level D/Q (the second highest overall ground level D/Q for any location in any sector). Station AP/CF-11 is approximately one mile from this point, between it and the plant. Station AP/CF-14 also serves as a community monitor for Northfield, Massachusetts. Both stations have been in operation since the preoperational period.

In addition to the up- and down-valley locations, two communities have been chosen for community sampling locations. The four nearest population groups with the highest long-term average D/Q values, in decreasing order, are Northfield, Massachusetts, North Hinsdale, New Hampshire, Brattleboro, Vermont, and Hinsdale, New Hampshire. The community sampler for Northfield is at Station AP/CF-14 (mentioned above). North Hinsdale is already monitored by the up-valley station (AP/CF-12, NNW, 3.6 km), which also indirectly monitors the city of Brattleboro, located further out in the same sector. The second sampler specifically designated for a community is at Hinsdale Substation (AP/CF-13, E, 3.1 km) in Hinsdale.

The control air sampler was located at Spofford Lake (AP/CF-21, NNE, 16.4 km) due to its distance from the plant and the low frequency for wind blowing in that direction based on the long-term (five-year) meteorological history. Sectors in the general west to southwest direction, which would otherwise have been preferable due to lower wind frequencies, were not chosen since they approached the region surrounding the Yankee Atomic plant in Rowe, Massachusetts.

An additional air sampler is maintained at the Tyler Hill site (AP/CF-15, WNW, 3.1 km), which is along the western side of the valley in general proximity of historical dairy operations. (The sixth location is not a specific Technical Specification requirement.)

4.3 Distances and Directions to Monitoring Stations

It should be noted that the distances and directions for direct radiation monitoring locations in Table 4.1, as well as the sectors shown in Figures 4.5 and 4.6, are keyed to the center of the Turbine Building due to the critical nature of the Turbine Building-to-TLD distance for close-in stations. For simplicity, all other radiological environmental sampling locations use the plant stack as the origin.

Technical Specification Table 3.9.3, Footnote a, specifies that in the Annual Radiological Environmental Operating Report and ODCM, the reactor shall be used as the origin for all distances and directions to sampling locations. Vermont Yankee interprets "the reactor" to mean the reactor site which includes the plant stack and the Turbine Building. The distances to the plant stack and Turbine Building will, therefore, be used in the Annual Radiological Environmental Operating Reports and ODCM for the sampling and TLD monitoring stations, respectively.

Table 4.1

Radiological Environmental Monitoring Stations[1]

Exposure Pathway and/or Sample		Sample Location and Designated Code[2]		Distance (km)[5]	Direction[5]
1. AIRBORNE (Radioiodine and Particulate)					
		AP/CF-11	River Station No. 3.3	1.88	SSE
		AP/CF-12	N. Hinsdale, NH	3.61	NNW
		AP/CF-13	Hinsdale Substation	3.05	E
		AP/CF-14	Northfield, MA	11.61	SSE
		AP/CF-15	Tyler Hill Road[4]	3.14	WNW
		AP/CF-21	Spofford Lake	16.36	NNE
2. WATERBORNE					
a.	Surface	WR-11	River Station No. 3.3	1.88	Downriver
		WR-21	Rt. 9 Bridge	11.83	Upriver
b.	Ground	WG-11	Plant Well	0.24	On-Site
		WG-12	Vernon Nursing Well	2.13	SSE
		WG-13	COB Well	0.26	On-Site
		WG-14	Staff Office Building Well	0.27	On-Site
		WG-22	Skibniowsky Well	13.73	N
c.	Sediment From Shoreline	SE-11	Shoreline Downriver	0.57	SSE
		SE-12	North Storm Drain Outfall[3]	0.13	E
3. INGESTION					
a.	Milk[8]	TM-11	Miller Farm[4]	0.82	W
		TM-14	Brown Farm	2.22	S
		TM-16	Meadow Crest Farm	4.26	NW
		TM-18	Blodgett Farm	3.60	SE
		TM-22	Franklin Farm[4]	9.73	WSW
		TM-24	County Farm	21.64	N
b.	Mixed Grasses	TG-11	River Station No. 3.3	1.88	SSE
		TG-12	N. Hinsdale, NH	3.61	NNW
		TG-13	Hinsdale Substation	3.05	E
		TG-14	Northfield, MA	11.61	SSE
		TG-15	Tyler Hill Rd.[4]	3.07	WNW
		TG-21	Spofford Lake	16.36	NNE

Revision 24 Date 08/31/99

Table 4.1
(Continued)

Radiological Environmental Monitoring Stations[1]

Exposure Pathway and/or Sample	Sample Location and Designated Code[2]		Distance (km)[5]	Direction[5]
c. Silage	TM-11	Miller Farm[4]	0.82	W
	TC-14	Brown Farm	2.22	S
	TC-16	Meadow Crest Farm	4.26	NW
	TC-18	Blodgett Farm	3.60	SE
	TC-22	Franklin Farm[4]	9.73	WSW
	TC-24	County Farm	21.64	N
d. Fish	FH-11	Vernon Pond	(6)	(6)
	FH-21	Rt. 9 Bridge	11.83	Upriver
4. DIRECT RADIATION				
	DR-1	River Station No. 3.3	1.61	SSE
	DR-2	N. Hinsdale, NH	3.88	NNW
	DR-3	Hinsdale Substation	2.98	E
	DR-4	Northfield, MA	11.34	SSE
	DR-5	Spofford Lake	16.53	NNE
	DR-6	Vernon School	0.52	WSW
	DR-7	Site Boundary[7]	0.28	W
	DR-8	Site Boundary	0.25	SSW
	DR-9	Inner Ring	1.72	N
	DR-10	Outer Ring	4.49	N
	DR-11	Inner Ring	1.65	NNE
	DR-12	Outer Ring	3.58	NNE
	DR-13	Inner Ring	1.23	NE
	DR-14	Outer Ring	3.88	NE
	DR-15	Inner Ring	1.46	ENE
	DR-16	Outer Ring	2.84	ENE
	DR-17	Inner Ring	1.24	E
	DR-18	Outer Ring	2.97	E
	DR-19	Inner Ring	3.65	ESE
	DR-20	Outer Ring	5.33	ESE
	DR-21	Inner Ring	1.82	SE
	DR-22	Outer Ring	3.28	SE
	DR-23	Inner Ring	1.96	SSE
	DR-24	Outer Ring	3.89	SSE
	DR-25	Inner Ring	1.91	S

Table 4.1
(Continued)

Radiological Environmental Monitoring Stations[1]

Exposure Pathway and/or Sample	Sample Location and Designated Code[2]		Distance (km)[5]	Direction[5]
	DR-26	Outer Ring	3.77	S
	DR-27	Inner Ring	1.10	SSW
	DR-28	Outer Ring	2.23	SSW
	DR-29	Inner Ring	0.92	SW
	DR-30	Outer Ring	2.36	SW
	DR-31	Inner Ring	0.71	WSW
	DR-32	Outer Ring	5.09	WSW
	DR-33	Inner Ring	0.66	WNW
	DR-34	Outer Ring	4.61	W
	DR-35	Inner Ring	1.30	WNW
	DR-36	Outer Ring	4.43	WNW
	DR-37	Inner Ring	2.76	NW
	DR-38	Outer Ring	7.34	NW
	DR-39	Inner Ring	3.13	NNW
	DR-40	Outer Ring	5.05	NNW

(1) Sample locations are shown on Figures 4.1 to 4.6.

(2) Station Nos. 10 through 19 are indicator stations. Station Nos. 20 through 29 are control stations (for all except milk, silage and the direct radiation stations).

(3) To be sampled and analyzed semiannually.

(4) Non-Tech Spec station.

(5) Distance and direction from the center of the Turbine Building for direct radiation monitors; from the plant stack for all others.

(6) Fish samples are collected from anywhere in Vernon Pond, which is adjacent to the plant (see Figure 4-1).

(7) DR-7 satisfies Technical Specification Table 3.9.3 for an inner ring direct radiation monitoring location. However, it is averaged as a Site Boundary TLD due to its close proximity to the plant.

(8) In accordance with Technical Specification Table 3.9.3, notation a, samples will be collected on the required schedule as availability of milk permits. All deviations from the sample schedule will be reported in the Annual Radiological Environmental Operating Report.

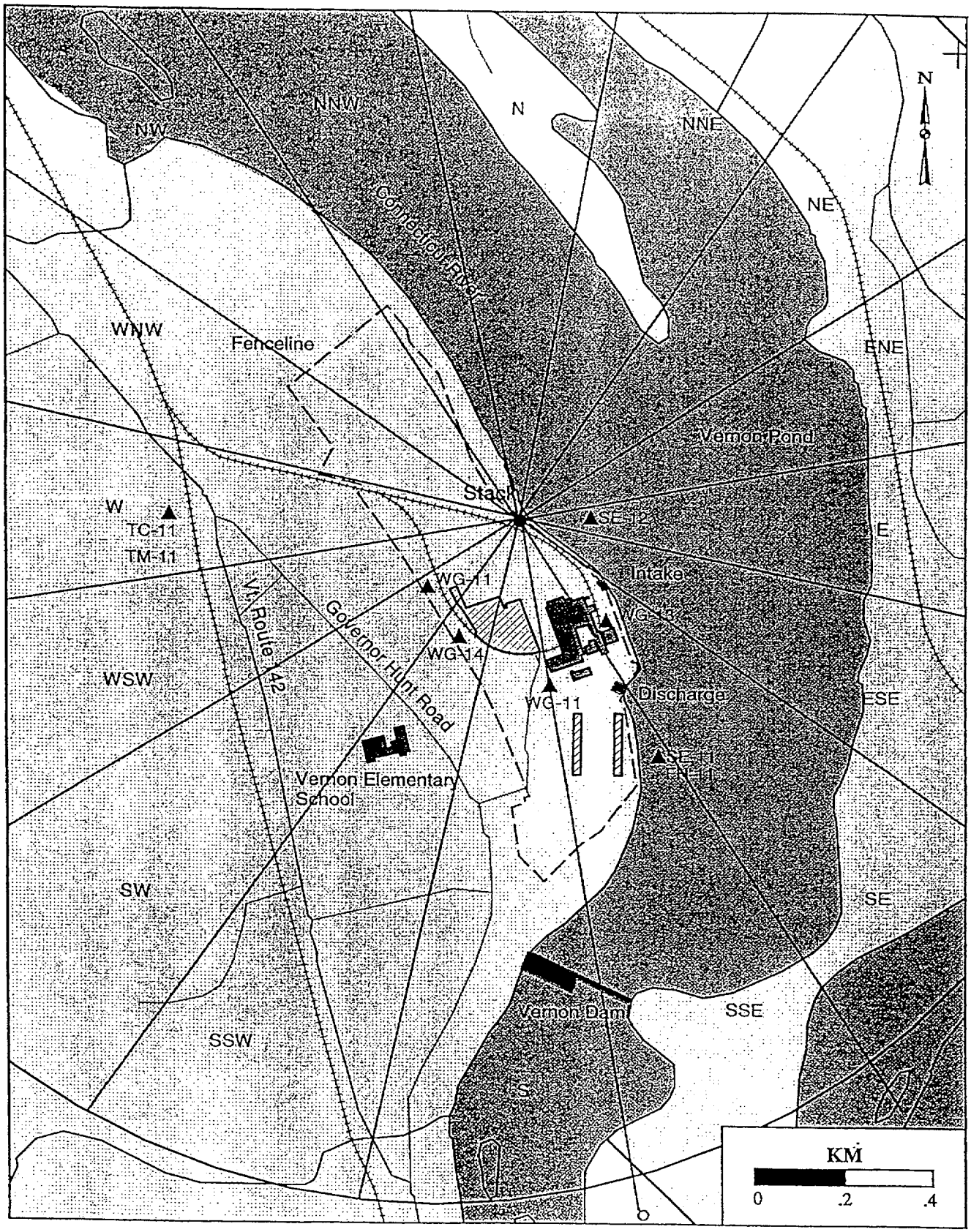

Figure 4-1 Environmental Sampling Locations in Close Proximity to the Plant

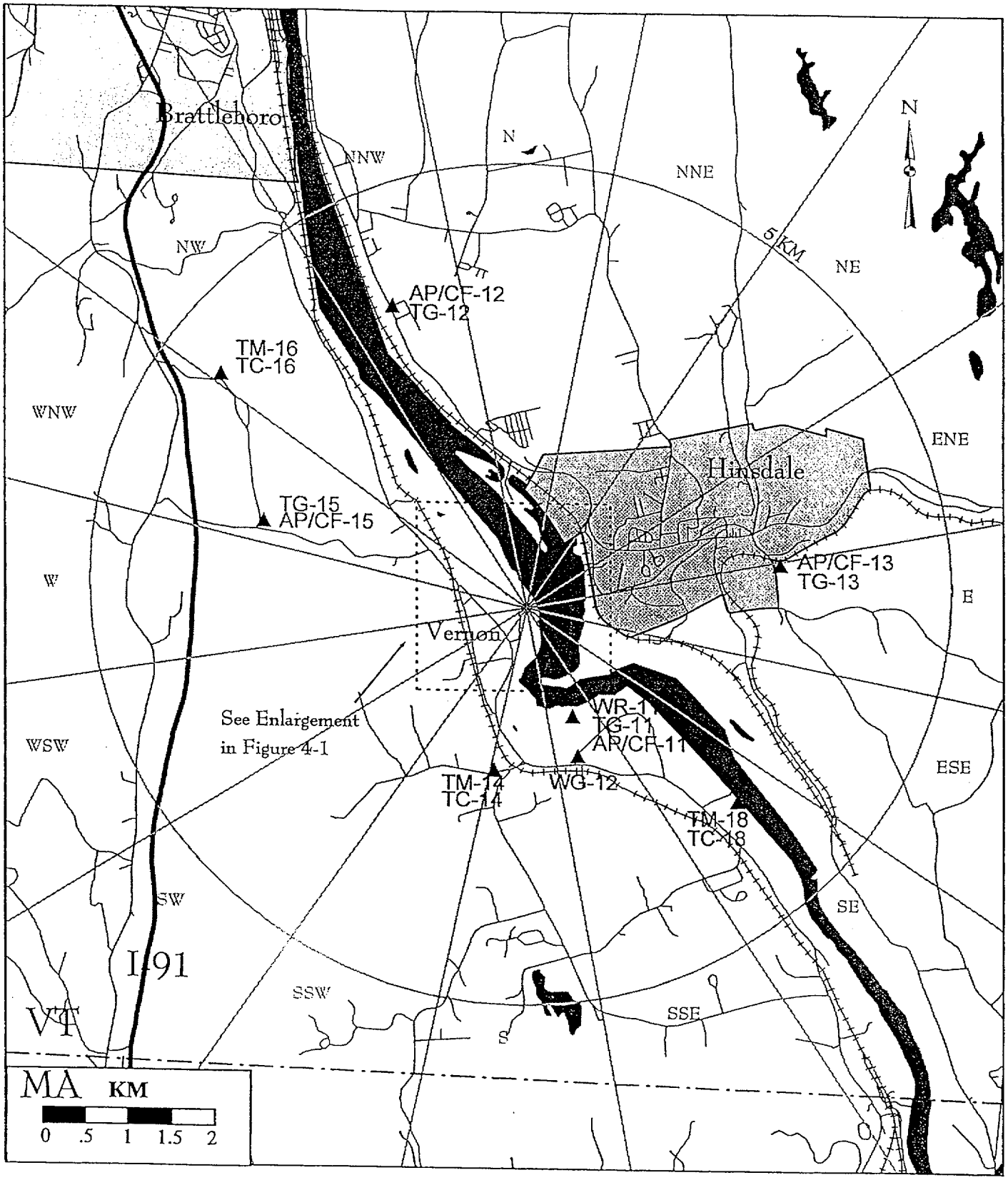

Figure 4-2 Environmental Sampling Locations Within 5 Km of Plant

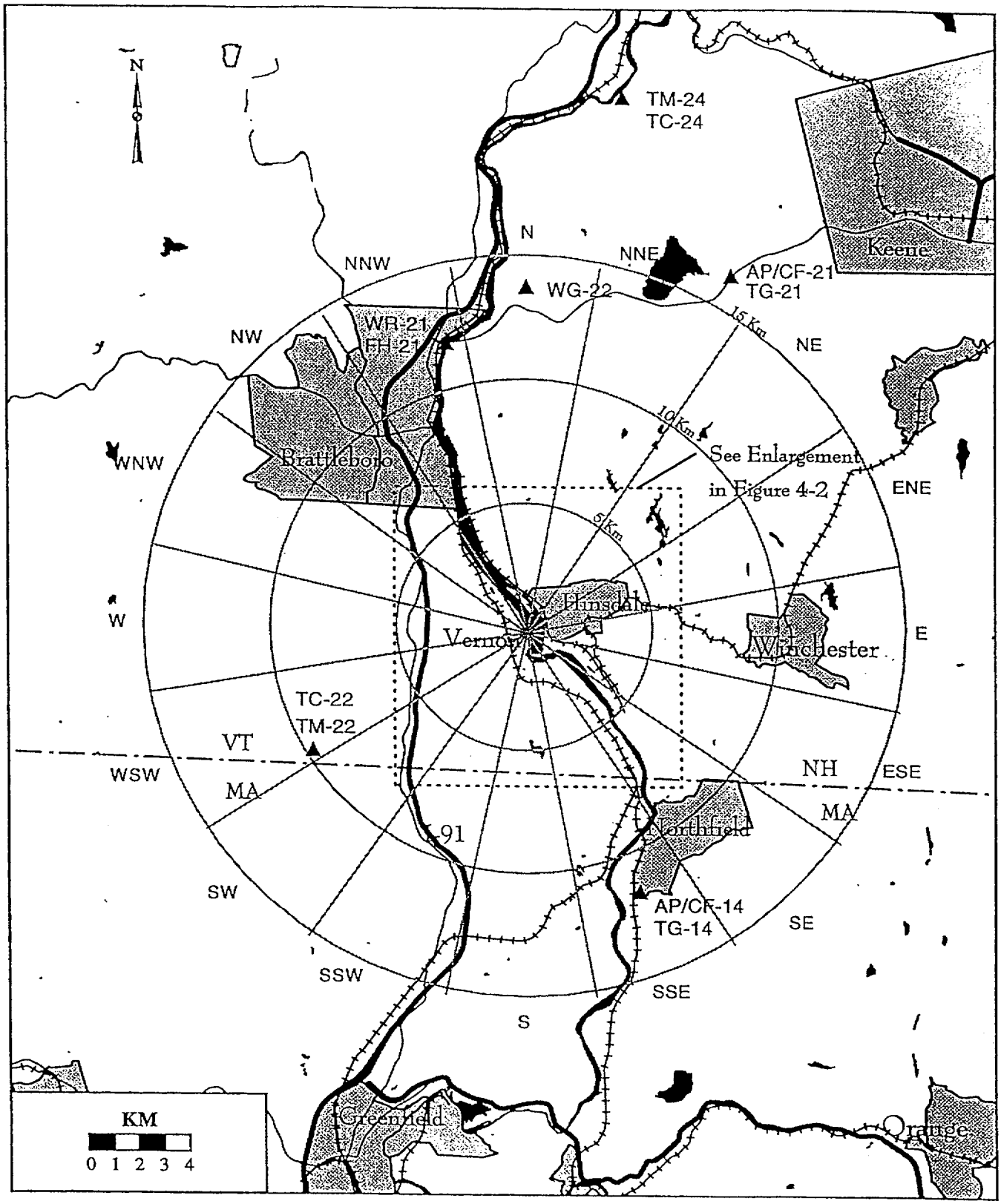

Figure 4-3 Environmental Sampling Locations Greater than 5 Km from Plant

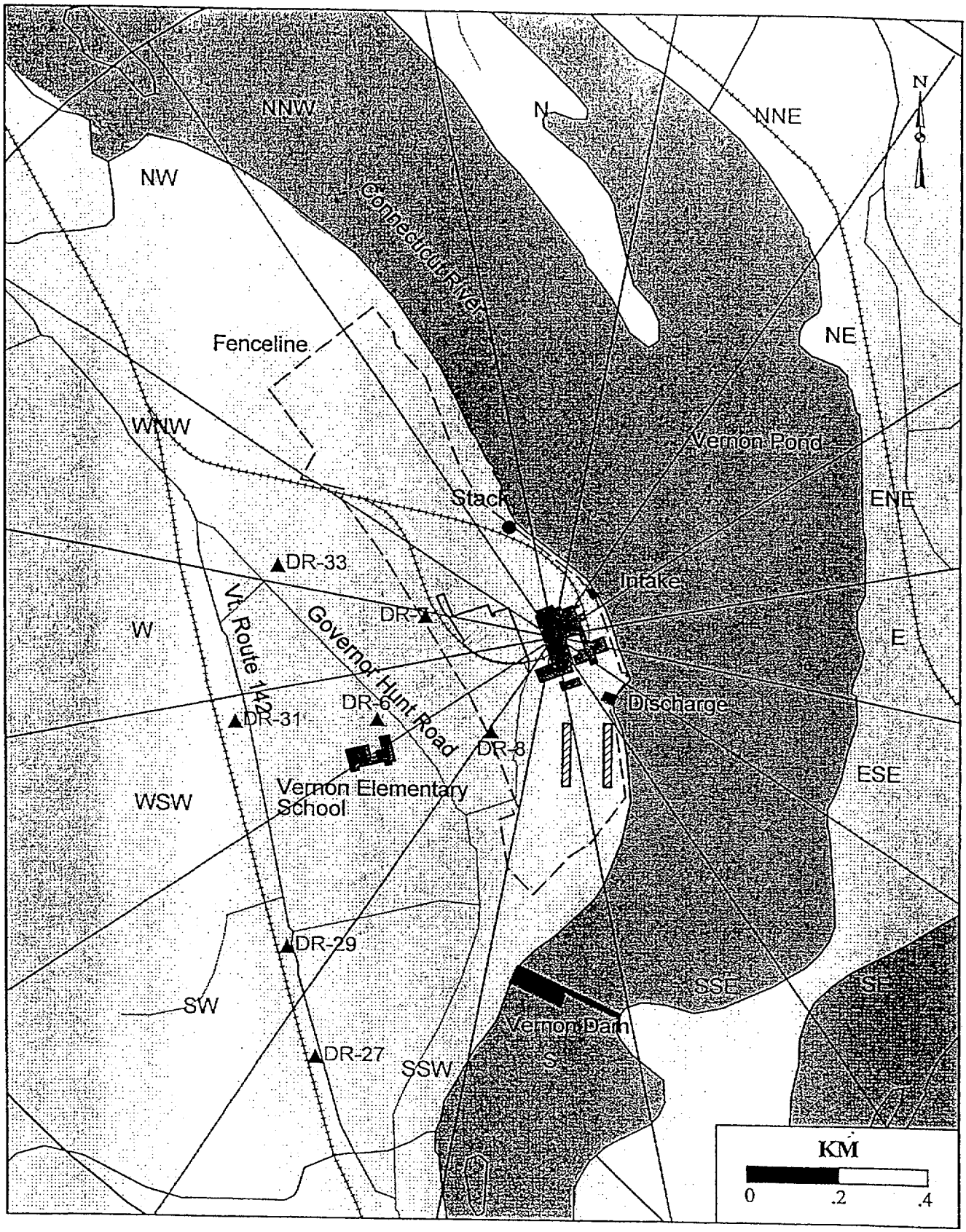

Figure 4-4 TLD Locations in Close Proximity to Plant

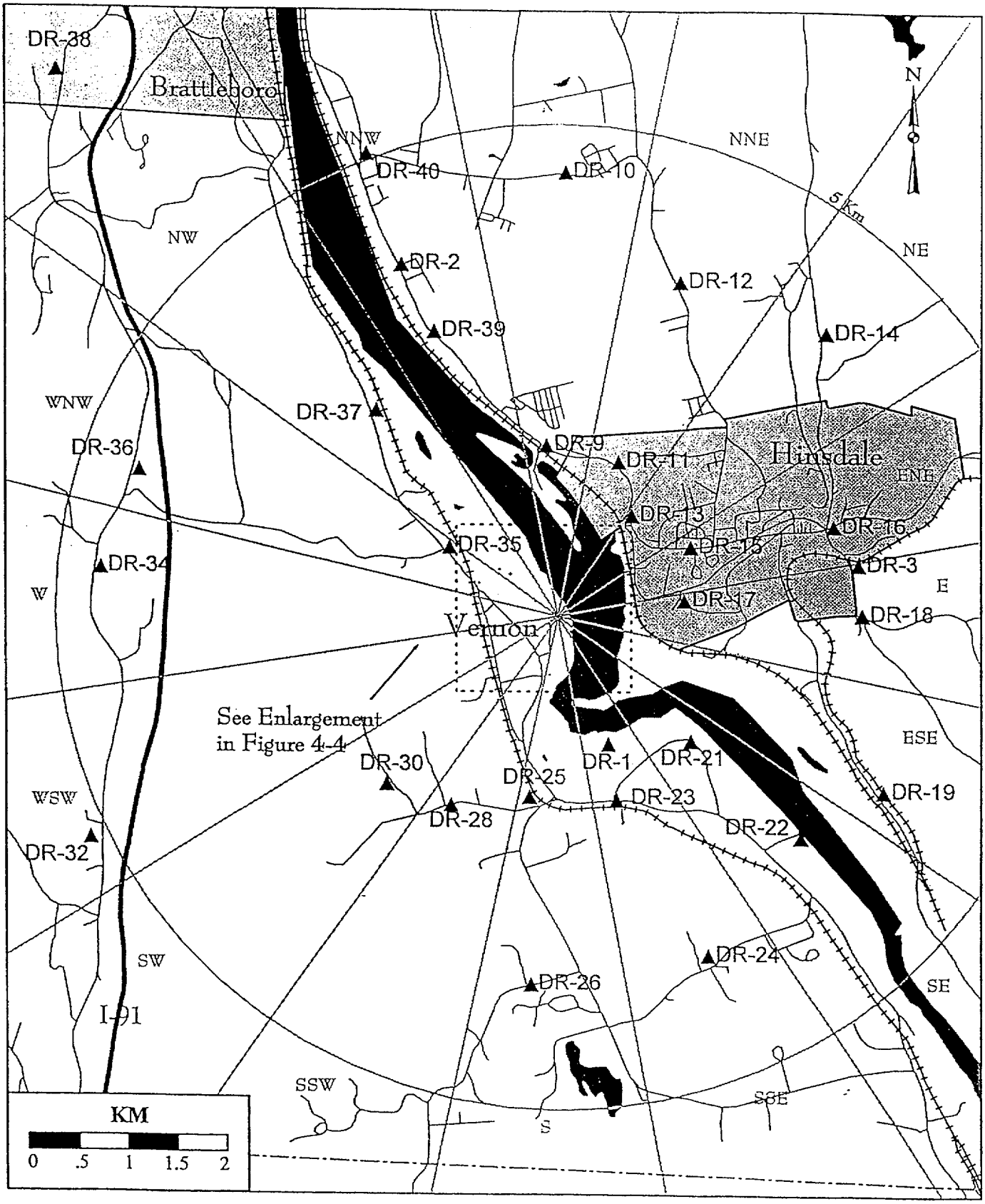

Figure 4-5 TLD Locations Within 5 Km of Plant

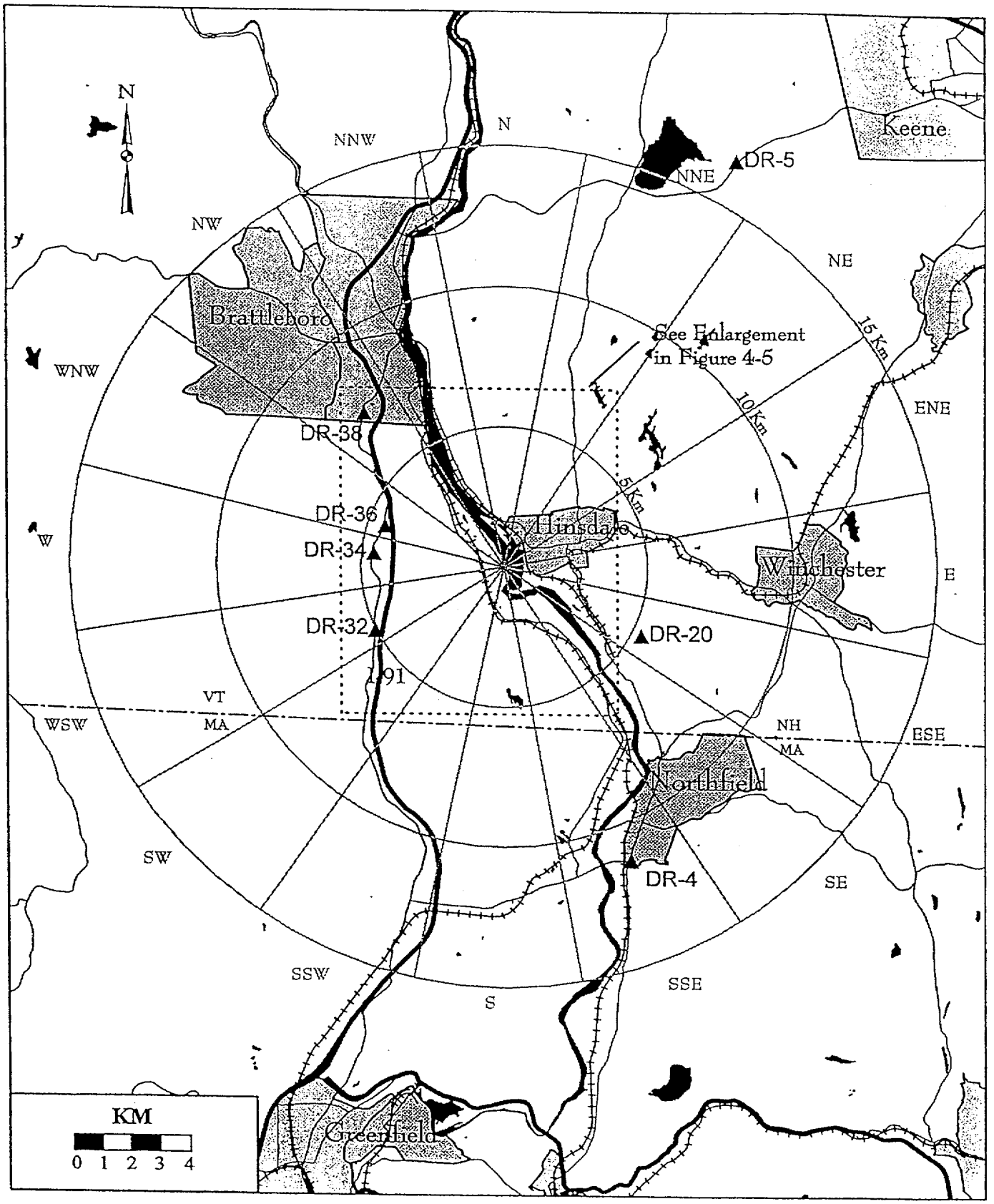

Figure 4-6 TLD Locations Greater Than 5 Km from Plant

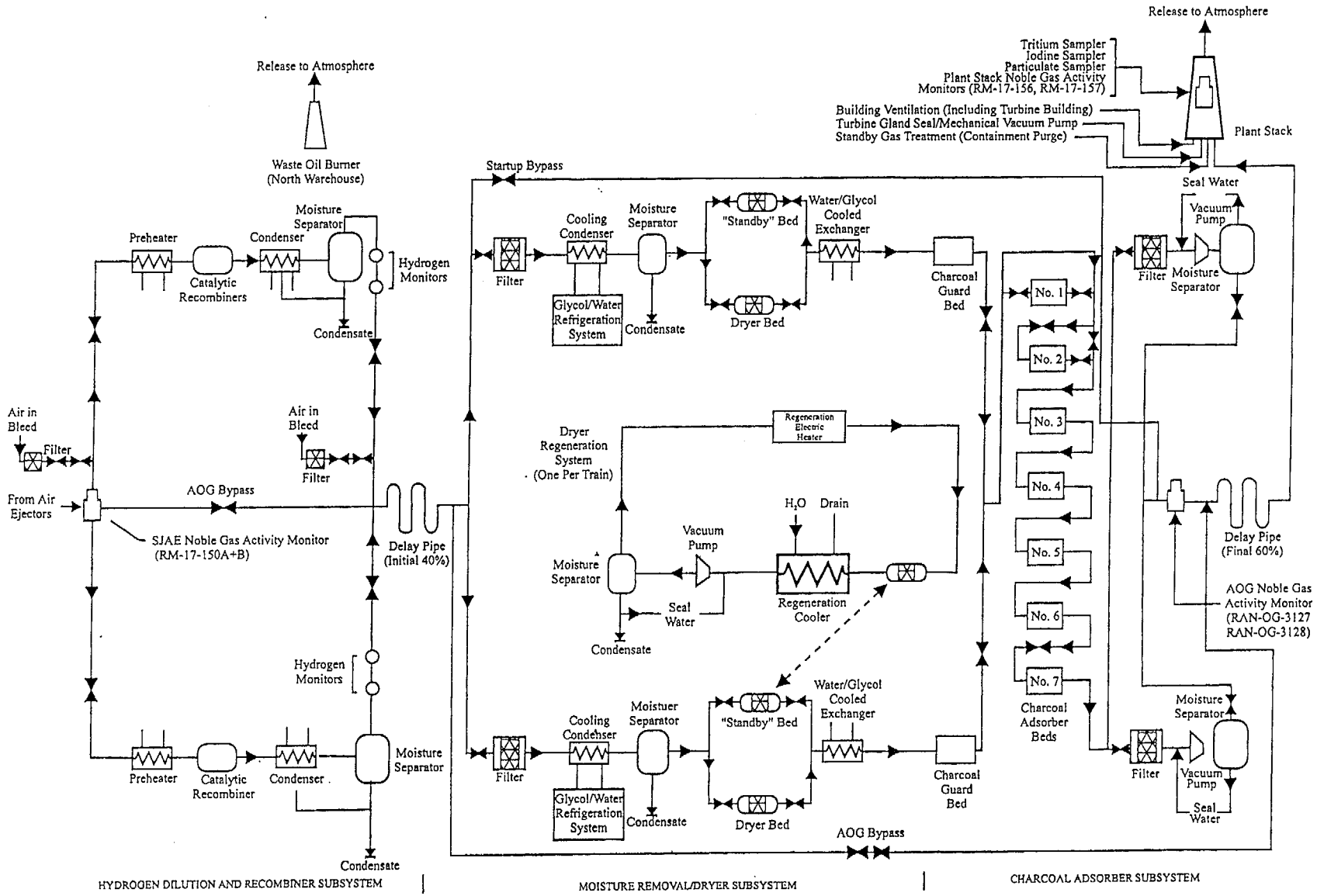

FIGURE 6-2: Radioactive Gaseous Effluent Streams, Radiation Monitors, and Radwaste Treatment System at Vermont Yankee*

*Normal (design) radioactive process streams only are shown.

7.0 UNIQUE REPORTING REQUIREMENTS

7.1 Annual Radioactive Effluent Release Report

In accordance with 10CFR 50.36a, the Radioactive Effluent Release Report covering the operation of the unit shall be submitted by May 15 of each year.

The Radioactive Effluent Release Report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit as outlined in Regulatory Guide 1.21, Revision 1, June 1974, "Measuring, Evaluating and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants", with data summarized on a quarterly basis following the format of Appendix B thereof. For solid wastes the format for Table 3 in Appendix B of Regulatory Guide 1.21 shall be supplemented with three additional categories: class of solid wastes (as defined by 10CFR Part 61), type of container (e.g., LSA, Type A, Type B, Large Quantity), and solidification agent or absorbent, if any.

In addition, the Radioactive Effluent Release Report shall include an annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing on magnetic tape of wind speed, wind direction, atmospheric stability, and precipitation (if measured), or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability.* This same report shall include an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit during the previous calendar year. The Radioactive Effluent Release Report shall also include an assessment of the radiation doses from radioactive effluents to member(s) of the public due to any allowed recreational activities inside the site boundary during the previous calendar year. All assumptions used in making these assessments (e.g., specific activity, exposure time and location) shall be included in these reports. For any batch or discrete gas volume releases, the meteorological conditions concurrent with the time of release of radioactive materials in gaseous effluents (as determined by sampling frequency and measurement) shall be used for determining the gaseous pathway doses. For radioactive materials released in continuous effluent streams, quarterly average meteorological conditions concurrent with the quarterly release period shall be used for determining the gaseous pathway doses. The assessment of radiation doses shall be performed in accordance with the Off-Site Dose Calculation Manual (ODCM).

With the limits of Technical Specification 3.8.M.1 being exceeded during the calendar year, the Radioactive Effluent Release Report shall also include

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*In lieu of submission with the Radioactive Effluent Release Report, the licensee has the options of retaining this summary of required meteorological data in a file that shall be provided to the NRC upon request.

an assessment of radiation doses to the likely most exposed real member(s) of the public from reactor releases (including doses from primary effluent pathways and direct radiation) for the previous calendar year to show conformance with 40CFR190, Environmental Radiation Protection Standards for Nuclear Power Operation.

The Radioactive Effluent Release Report shall include a list and description of unplanned releases from the site to site boundary of radioactive materials in gaseous and liquid effluents made during the reporting period.

With the quantity of radioactive material in any outside tank exceeding the limit of Technical Specification 3.8.D.1, describe the events leading to this condition in the next Radioactive Effluent Release Report.

If inoperable radioactive liquid effluent monitoring instrumentation is not returned to operable status prior to the next release pursuant to Note 4 of Technical Specification Table 3.9.1, explain in the next Radioactive Effluent Report the reason(s) for delay in correcting the inoperability.

If inoperable gaseous effluent monitoring instrumentation is not returned to operable status within 30 days pursuant to Note 5 of Technical Specification Table 3.9.2, explain in the next Radioactive Effluent Release Report the reason(s) for delay in correcting the inoperability.

With milk samples no longer available from one or more of the sample locations required by Technical Specification Table 3.9.3, identify the cause(s) of the sample(s) no longer being available, identify the new location(s) for obtaining available replacement samples, and include revised ODCM figure(s) and table(s) reflecting the new location(s) in the next Radioactive Effluent Release Report.

With a land use census identifying one or more locations which yield at least a 20 percent greater dose or dose commitment than the values currently being calculated in Technical Specification 4.8.G.1, identify the new location(s) in the next Radioactive Effluent Release Report.

Changes made during the reporting period to the Process Control Program (PCP) and to the Off-Site Dose Calculation Manual (ODCM), shall be identified in the next Radioactive Effluent Release Report.

7.2 Environmental Radiological Monitoring

The Annual Radiological Environmental Operating Report covering the operation of the unit during previous calendar year shall be submitted by May 15th of each year.

The report shall include summaries, interpretations, and an analysis of trends of the results of the radiological environmental surveillance activities for the report period. The material provided shall be consistent with the objectives outlined in the ODCM and in 10CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C.

The Annual Radiological Environmental Operating Report shall include summarized and tabulated results of all radiological environmental samples taken during the report period pursuant to Table 4-1 and Figures 4-1 through 4-6. In the event that some results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

With the level of radioactivity in an environmental sampling media at one or more of the locations specified in Technical Specification Table 3.9.3 exceeding the reporting levels of Technical Specification Table 3.9.4, the condition shall be described in the next Annual Radiological Environmental Operating Report only if the measured level of radioactivity was not the result of plant effluents. With the radiological environmental monitoring program not being conducted as specified in Technical Specification Table 3.9.3, a description of the reasons for not conducting the program as required and the plans for preventing a recurrence shall be included in the next Annual Radiological Environmental Operating Report.

The Annual Radiological Environmental Operating Report shall also include the results of the land use census required by Technical Specification 3.9.D. A summary description of the radiological environmental monitoring program including a map of all sampling locations keyed to a table giving distances and directions from the reactor shall be in the reports. If new environmental sampling locations are identified in accordance with Technical Specification 3.9.D, the new locations shall be identified in the next Annual Radiological Environmental Operating Report.

The reports shall also include a discussion of all analyses in which the LLD required by Technical Specification Table 4.9.3 was not achievable.

The results of license participation in the intercomparison program required by Technical Specification 3.9.E shall be included in the reports. With analyses not being performed as required by Technical Specification 3.9.E, the corrective actions taken to prevent a recurrence shall be reported to the Commission in the next Annual Radiological Environmental Operating Report.

7.3 Special Reports

Special reports shall be submitted to the Director of the Office of Inspection and Enforcement Regional Office within the time period specified for each report.

7.3.1 Liquid Effluents(Technical Specifications 3.8.B and 3.8.C.)

With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the limits of Technical Specification 3.8.B.1, prepare and submit to the Commission within 30 days a special report which identifies the cause(s) for exceeding the limit(s) and defines the corrective actions taken to assure that subsequent releases will be in compliance with the limits of Technical Specification 3.8.B.1.

With liquid radwaste being discharged without processing through appropriate treatment systems and estimated doses in excess of Technical Specification 3.8.C.1, prepare and submit to the Commission within 30 days a special report which includes the following information:

(1) explanation of why liquid radwaste was being discharged without treatment, identification of any inoperable equipment or subsystems, and the reasons for the inoperability;

(2) action(s) taken to restore the inoperable equipment to operable status; and

(3) summary description of action(s) taken to prevent a recurrence.

7.3.2 Gaseous Effluents (Technical Specifications 3.8.F, 3.8.G, 3.8.H, and 3.8.I)

With the calculated air dose from radioactive noble gases in gaseous effluents exceeding any of the limits of Technical Specification 3.8.F.1, prepare and submit to the Commission within 30 days a special report which identifies the cause(s) for exceeding the limit(s) and the corrective action(s) taken to assure that subsequent releases will be in compliance with the limits of Technical Specification 3.8.F.1. With the calculated dose from the release of Iodine-131, Iodine-133, tritium, and/or radionuclides in particulate form exceeding any of the limits of Technical Specification 3.8.G.1, prepare and submit to the Commission within 30 days a special report which identifies the cause(s) for exceeding the limit(s) and the corrective action(s) taken to assure that subsequent releases will be in compliance with the limits of Technical Specification 3.8.G.1.

With gaseous radwaste being discharged without processing through appropriate treatment systems as defined in Technical Specification 3.8.H.1 for more than seven (7) consecutive days, or in excess of the limits of Technical Specification 3.8.I.1, prepare and submit to the Commission within 30 days a special report which includes the following information:

(1) explanation of why gaseous radwaste was being discharged without treatment (Technical Specification 3.8.H.1), or with resultant doses in excess of Technical Specification 3.8.I.1, identification of any inoperable equipment or subsystems, and the reasons for the inoperability;

(2) action(s) taken to restore the inoperable equipment to operable status; and

(3) summary description of action(s) taken to prevent a recurrence.

7.3.3 Total Dose (Technical Specification 3.8.M)

With the calculated dose from the release of radioactive materials in liquid or gaseous effluents exceeding the limits of Technical Specification 3.8.M, prepare and submit to the Commission within 30 days a special report which defines the corrective action(s) to be taken to reduce subsequent releases to prevent recurrence of exceeding the limits of Technical Specification 3.8.M and includes the schedule for achieving conformance with these limits. This special report, required by 10CFR Part 20.2203(a)(4), shall include an analysis that estimates the radiation exposure (dose) to a member of the public from station sources, including all effluent pathways and direct radiation, for the calendar year that includes the release(s) covered by this report. It shall also describe levels of radiation and concentrations of radioactive material involved, and the cause of the exposure levels or concentrations. If the estimated doses exceed any of the limits of Technical Specification 3.8.M, and if the release condition resulting in violation of 40CFR Part 190 has not already been corrected, the special report shall include a request for a variance in accordance with the provisions of 40CFR Part 190. Submittal of the report is considered a timely request, and a variance is granted until staff action on the request is complete.

7.3.4 Radiological Environmental Monitoring (Technical Specification 3.9.C)

With the level of radioactivity as the result of plant effluents in an environmental sampling media at one or more of the locations specified in Technical Specification Table 3.9.3 exceeding the reporting levels of Technical Specification Table 3.9.4, prepare and submit to the Commission within 30 days from the receipt of the Laboratory Analyses a special report

which includes an evaluation of any release conditions, environmental factors or other factors which caused the limits of Technical Specification Table 3.9.4 to be exceeded. This report is not required if the measured level of radioactivity was not the result of plant effluents, however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report.

7.3.5 Land Use Census (Technical Specification 3.9.D)

With a land use census not being conducted as required by Technical Specification 3.9.D, prepare and submit to the Commission within 30 days a special report which identifies the reasons why the survey was not conducted, and what steps are being taken to correct the situation.

7.4 Major Changes to Radioactive Liquid, Gaseous, and Solid Waste Treatment Systems**

Licensee-initiated major changes to the radioactive waste systems (liquid, gaseous, and solid):

A. Shall be reported to the commision in the Radioactive Effluent Release Report for the period in which the evaluation was reviewed by the PORC. The discussion of each change shall contain:

1. A summary of the evaluation that led to the determination that the change could be made in accordance with 10CFR Part 50.59;

2. Sufficient detailed information to support the reason for the change without benefit of additional or supplemental information;

3. A detailed description of the equipment, components, and processes involved and the interfaces with other plant systems;

4. An evaluation of the change, which shows the predicted releases of radioactive materials in liquid and gaseous effluents and/or quantity of solid waste that differ from those previously predicted in the license application and amendments thereto;

5. An evaluation of the change, which shows the expected maximum exposures to member(s) of the public at the site boundary and to the general population that differ from

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**Licensee may choose to submit the information called for in this Specification as part of the annual FSAR update.

those previously estimated in the license application and amendments thereto;

6. A comparison of the predicted releases of radioactive materials, in liquid and gaseous effluents and in solid waste, to the actual releases for the period prior to when the changes are to be made;

7. An estimate of the exposure to plant operating personnel as a result of the change; and

8. Documentation of the fact that the change was reviewed and found acceptable by PORC.

B. Shall become effective upon review and acceptance by PORC and approval by the Plant Manager.

REFERENCES

A. Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10CFR50, Appendix I," U.S. Nuclear Regulatory Commission, Revision 1, October 1977.

B. Hamawi, J. N., "AEOLUS-2 - A Computer Code for the Determination of Continuous and Intermittent-Release Atmospheric Dispersion and Deposition of Nuclear Power Plant Effluents in Open-terrain Sites, Coastal Sites, and Deep-River Valleys for Assessment of Ensuing doses and Finite-Cloud Gamma Radiation Exposures," Entech Engineering, Inc., P100R13A, March 1988 (Mod 5, Revised by Yankee Atomic Electric Company, March 1992).

C. 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, March 1976.

D. National Bureau of Standards, "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure," Handbook 69, June 5, 1959.

E. Slade, D. H., "Meteorology and Atomic Energy - 1968, USAEC, July 1968.

F. Lowder, W. M., 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.

G. Letter from Charles L. Miller of the United States Nuclear Regulatory Commission to John F. Schmidt of the Nuclear Energy Institute, dated December 26, 1995.

APPENDIX I

RADIOACTIVE LIQUID, GASEOUS, AND SOLID WASTE TREATMENT SYSTEMS

Requirement: ODCM Section 7.4 requires that licensee initiated major changes to the radioactive waste systems (liquid, gaseous, and solid) be reported to the Commission in the annual 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 during this reporting period.

APPENDIX J

ON-SITE DISPOSAL OF SEPTIC WASTE AND COOLING TOWER SILT

Requirement: Off-Site Dose Calculational Manual, Appendices B and F requires that the dose impact due to on-site disposal of septic waste and the cooling tower silt during the reporting year and from previous years be reported to the Commission in the annual Radioactive Effluent Report if disposals occur during the reporting year. VYNPC will report in the Annual Radiological Effluent Release Report a list of the radionuclides present and the total radioactivity associated with the on-site disposal activities at Vermont Yankee.

Response: There was one on-site disposal of septic waste during the reporting year. The total volume of the septage spread was approximately 8,000 gallons. The total activity spread on the 1.9 acres (southern) on-site disposal field from 1999 spreadings and from previous years was:

Nuclide	Activity Spread in 1999 (Ci)	All Past Spreading Decayed to 7/99 plus 1999 Spreading (Ci)
Mn-54	2.03E-07	3.73E-07
Co-60	2.78E-06	1.29E-05
Zn-65	3.80E-07	4.42E-07
Cs-137	4.75E-07	6.07E-05

The maximum organ (or whole body) incremental dose from material spread in 1999 was estimated to be 5.03E-03 mrem/yr. The maximum organ dose from all past spreading operations, including the material spread in 1999, totaled 9.37E-02 mrem/yr. These calculated values are within the 1 mrem/yr limit applied during the period of operational control of the site. The projected hypothetical dose for the period following the loss of operational control of the site area due to all spreading operations to-date is 2.10E-01 mrem/yr versus a 5 mrem/yr dose limit.