EFFLUENT AND WASTE DISPOSAL

SEMIANNUAL REPORT

FOR

FIRST AND SECOND QUARTERS, 1986

Vermont Yankee Nuclear Power Station

IE48
1/1

TABLE 1A

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

First and Second Quarters, 1986

Gaseous Effluents - Summation of All Releases

	Unit	Quarter 1	Quarter 2	Est. Total Error, %
A. Fission and Activation Gases				
1. Total release	Ci	<7.78E+02	<7.86E+02	±1.00E+02
2. Average release rate for period	uCi/sec	<9.89E+01	<1.00E+02	
3. Percent of Tech. Spec. limit (1)(4)	%	<2.80E+00	<2.90E+00	
B. Iodines				
1. Total Iodine-131	Ci	<2.18E-04	2.54E-05	±5.00E+01
2. Average release rate for period	uCi/sec	<2.78E-05	3.23E-06	
3. Percent of Tech. Spec. limit (2)(4)	%	9.71E-03	1.12E-02	
C. Particulates				
1. Particulates with T-1/2 > 8 days	Ci	1.11E-03	9.54E-04	±5.00E+01
2. Average release rate for period	uCi/sec	1.41E-04	1.21E-04	
3. Percent of Tech. Spec. limit	%	(3)	(3)	
4. Gross alpha radioactivity	Ci	<7.64E-07	<1.75E-06	
D. Tritium				
1. Total release	Ci	4.28E-01	3.20E-01	±5.00E+01
2. Average release rate for period	uCi/sec	5.45E-02	4.07E-02	
3. Percent of Tech. Spec. limit	%	(3)	(3)	

(1) Technical Specification 3.8.F.1.a for gamma air dose. Percent values for Technical Specification 3.8.F.1.a for beta air dose are approximately the same.

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

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

(4) The first and second quarter percent of Technical Specification limits are based on conservative plant quarterly dose determinations.

TABLE 1B

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

First and Second Quarters, 1986

Gaseous Effluents - Elevated Release

Nuclides Released	Unit	Continuous Mode Quarter 1	Continuous Mode Quarter 2	Batch Mode(1) Quarter 1	Batch Mode(1) Quarter 2
1. Fission Gases					
Krypton-85	Ci	(2)	(2)		
Krypton-85m	Ci	(10)	(10)		
Krypton-87	Ci	(11)	(11)		
Krypton-88	Ci	(12)	(12)		
Xenon-133	Ci	<7.78E+02	<7.86E+02		
Xenon-135	Ci	(13)	(13)		
Xenon-135m	Ci	(3)	(3)		
Xenon-138	Ci	(14)	(14)		
	Ci				
Unidentified	Ci				
Total for period	Ci	<7.78E+02	<7.86E+02		
2. Iodines					
Iodine-131	Ci	(4)	2.54E-05		
Iodine-133	Ci	(15)	(15)		
Iodine-135	Ci	(16)	(16)		
Total for period	Ci	(4)	2.54E-05		
3. Particulates					
Strontium-89	Ci	(5)	(5)		
Strontium-90	Ci	(6)	(6)		
Cesium-134	Ci	(7)	(7)		
Cesium-137	Ci	(8)	5.66E-05		
Barium-Lanthanum-140	Ci	(9)	(9)		
Manganese-54	Ci	1.18E-05	3.75E-05		
Cobalt-60	Ci	6.56E-04	6.95E-04		
Zinc-65	Ci	4.41E-04	1.65E-04		
Unidentified	Ci				

(1) There were no batch mode gaseous releases for this reporting period.
(2) Not detected in the off-gas mix. Limit of detectability ≤ 6.97E-07 uCi/cc.
(3) Not detected in the off-gas mix. Limit of detectability ≤ 2.54E-07 uCi/cc.
(4) Not detected in the off-gas mix. Limit of detectability ≤ 1.15E-15 uCi/cc.
(5) Not detected in the off-gas mix. Limit of detectability ≤ 4.39E-15 uCi/cc.
(6) Not detected in the off-gas mix. Limit of detectability ≤ 5.35E-16 uCi/cc.
(7) Not detected in the off-gas mix. Limit of detectability ≤ 1.42E-13 uCi/cc.
(8) Not detected in the off-gas mix. Limit of detectability ≤ 1.80E-13 uCi/cc.
(9) Not detected in the off-gas mix. Limit of detectability ≤ 5.19E-13 uCi/cc.
(10) Not detected in the off-gas mix. Limit of detectability ≤ 1.63E-07 uCi/cc.
(11) Not detected in the off-gas mix. Limit of detectability ≤ 6.07E-07 uCi/cc.
(12) Not detected in the off-gas mix. Limit of detectability ≤ 5.09E-07 uCi/cc.
(13) Not detected in the off-gas mix. Limit of detectability ≤ 2.81E-07 uCi/cc.
(14) Not detected in the off-gas mix. Limit of detectability ≤ 2.47E-06 uCi/cc.
(15) Not detected in the off-gas mix. Limit of detectability ≤ 2.48E-12 uCi/cc.
(16) Not detected in the off-gas mix. Limit of detectability ≤ 2.03E-11 uCi/cc.

TABLE 1C

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

First and Second Quarters, 1986

Gaseous Effluents - Ground Level Releases

There were no routine measured ground level continuous or batch mode gaseous releases during the first or second quarters of 1986.

TABLE 1D

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

First and Second Quarters, 1986

Gaseous Effluents - Nonroutine Releases

There were no nonroutine or accidental gaseous releases during the first or second quarters of 1986.

TABLE 2A

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

First and Second Quarters, 1986

Liquid Effluents - Nonroutine Releases

There were no liquid releases during the first or second quarters of 1986.

TABLE 2B

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

First and Second Quarters, 1986

Liquid Effluents - Nonroutine Releases

There were no nonroutine or accidental releases during the first or second quarters of 1986.

TABLE 3

Vermont Yankee

Effluent and Waste Disposal Semiannual Report

First and Second Quarters, 1986

Solid Waste and Irradiated Fuel Shipments

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

	Unit	6-Month Period	Est. Total Error, %
1. Type of Waste			
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3	2.93E+01	
	Ci	1.78E+02	±7.50E+01
b. Dry compressible waste, contaminated equipment, etc.	m^3	2.26E+02	
	Ci	1.06E+01	±7.50E+01
c. Irradiated components, control rods, etc.	m^3		
	Ci		

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

a.		b.	
Zinc-65	% 4.75E+01	Cesium-137	% 3.79E+01
Cobalt-60	% 2.55E+01	Cobalt-60	% 3.48E+01
Cesium-137	% 1.56E+01	Zinc-65	% 1.29E+01
Manganese-54	% 8.93E+00	Manganese-54	% 4.67E+00
Cobalt-58	% 7.10E-01	Cesium-134	% 2.87E+00
Nickel-63	% 4.20E-01	Plutonium-241	% 2.61E+00
Cesium-134	% 3.90E-01	Cobalt-58	% 1.64E+00
	%	Hydrogen-3	% 9.70E-01
	%	Zirconium-95	% 7.30E-01
	%		%
	%		%
	%		%
	%		%
	%		%

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
15	Truck	Barnwell, SC

B. Irradiated Fuel Shipments (Disposition): None

C. Supplemental information
1) Class of solid waste containers shipped: 8A (unstable), 7B
2) Types of containers used: 6 Type A, 1 Type B, and 8 LSA
3) Solidification agent or absorbent: None

APPENDIX A

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

Supplemental Information
First and Second Quarters, 1986

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

3. Average Energy

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

a.	Average gamma energy:	3rd Quarter	3.00E-03 MeV/dis
		4th Quarter	3.00E-03 MeV/dis
b.	Average beta energy:	Not Applicable	

4. Measurements and Approximations of Total Radioactivity

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

a. Fission and Activation Gases

Daily samples are drawn at the discharge of the air ejector. Isotopic breakdown of the releases are determined from these samples. A logarithmic chart of the stack gas monitor is read daily to determine the gross release rate. At the very low release rates normally encountered during operation with the augmented off-gas system the error of release rates may be approximately ±100 percent.

b. Iodines

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

c. Particulates

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

d. Liquid Effluents

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

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

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

There were no liquid releases during the reporting period.

5. Batch Releases

a. Liquid

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

b. Gaseous

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

6. Abnormal Releases

a. Liquid

There were no nonroutine liquid releases during the reporting period.

b. Gaseous

There were no nonroutine gaseous releases during the reporting period.

APPENDIX B

LIQUID HOLDUP TANKS

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

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

APPENDIX C

RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

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

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

APPENDIX D

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

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

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

APPENDIX E

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

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

Response: As part of the Environmental Monitoring Program, milk sampling locations TM-11 (Miller Farm, 0.8 km, WNW) and TM-13 (Newton Farm, 5.1 km, SSE) were replaced with TM-14 (Brown Farm, 2.1 km, SSW) and Tm-15 (Coombs Farm, 4.7 km, NW), based on a dosimetric analysis done pursuant to Technical Specification 3.9.D.2 (Land Use Census). Milk sampling location TM-12 (Whitaker Farm, 2.6 km, S) was also replaced during the reporting period with location TM-13 (Newton Farm, 5.1 km, SSE) when TM-12 went out of business. The choice of TM-13 as a replacement was based on the dosimetric ranking of available locations done as part of the Land Use Census.

None of the above changes will reduce the accuracy or reliability of dose calculations or setpoint determinations. Proposed ODCM tables and maps reflecting the above radiological environmental monitoring program changes are included in Appendix H.

Milk sampling location TM-11 (Miller Farm, 0.8 km, WNW) and air sampling location AP/CF-15 (Tyler Hill Rd., 3.2 km, WNW) were also added to the ODCM as non-Technical Specification stations. Samples are collected there routinely in order to provide additional information to the program.

APPENDIX F

LAND USE CENSUS

Requirement: A land use census is conducted in accordance with Technical Specification 3.9.D. With a land use census identifying a location(s) which yields at least a 20 percent greater dose or dose commitment than the values currently being calculated in Technical Specification 4.8.G.1, Technical Specification 6.7.C.1 requires the identification of the new location(s) in the next Semiannual Effluent Release Report.

Response: No locations were identified by the 1985 land use census that would yield at least a 20 percent greater dose or dose commitment than the values currently being calculated pursuant to Technical Specification 4.8.G.1.

APPENDIX G

PROCESS CONTROL PROGRAM

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

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

APPENDIX H

OFF-SITE DOSE CALCULATION MANUAL

Requirement: Technical Specification 6.13.A.1 requires that licensee initiated changes to the Off-Site Dose Calculation Manual (ODCM) be submitted to the Commission in the Semiannual Radioactive Effluent Release Report for the period in which the change(s) was made effective.

Response: Changes were made to the radiological environmental monitoring program as described in Appendix E. Proposed revisions to the tables and maps of Section 4 of the ODCM are included in this appendix. None of the changes will reduce the accuracy or reliability of dose calculations or setpoint determinations.

Table 4.1

Radiological Environmental Monitoring Stations*

Exposure Pathway and/or Sample		Sample Location and Designated Code**	Distance From the Plant Stack (km)	Direction From the Plant
1. AIRBORNE (Radioiodine and Particulate)				
	AP/CF-11	River Station No. 3.3	1.9	SSE
	AP/CF-12	N. Hinsdale, NH	3.6	NNW
	AP/CF-13	Hinsdale Substation	3.1	E
	AP/CF-14	Northfield, MA	11.3	SSE
	*1AP/CF-15	Tyler Hill Rd.	3.2	WNW
	AP/CF-21	Spofford Lake	16.1	NNE
2. WATERBORNE				
a. Surface	WR-11	River Station No. 3.3	1.9	Downriver
	WR-21	Rt. 9 Bridge	12.8	Upriver
b. Ground	WG-11	Plant Well	--	On-site
	WG-12	Vernon Nursing Well	2.0	SSE
	WG-21	Brattleboro CC	12.1	NNW
c. Sediment From Shorline	SE-11	Shorline Downriver	0.8	On-site
	SE-12	North Storm*** Drain Outfall	0.15	On-site
3. INGESTION				
a. Milk	*1 TM-11	Miller Farm	0.8	WNW
	TM-14	Brown Farm	2.6	S
	TM-13	Newton Farm	5.1	SSE
	TM-15	Coombs Farm	4.5	NW
	TM-21	Moore Farm	15.9	N
b. Mixed Grasses	TG-11	River Station No.3.3	1.9	SSE
	TG-12	N. Hinsdale, NH	3.6	NNE
	TG-13	Hinsdale Substation	3.1	E
	TG-14	Northfield, MA	11.3	SSE
	* 1 TG-15	Tyler Hill Rd.	3.2	WNW
	TG-21	Spofford Lake	16.1	NNE
c. Silage	*1TC-11	Miller Farm	0.8	WNW
	TC-14	Brown Farm	2.6	S
	TC-13	Newton Farm	5.1	SSE
	TC-15	Coombs Farm	4.5	NW
	TC-21	Moore Farm	15.9	N
d. Fish	FH-11	Vernon Pond	--	On-site
	FH-21	Rt. 9 Bridge	12.8	Upriver
	*1	Non-Tech Spec Station		

Proposed

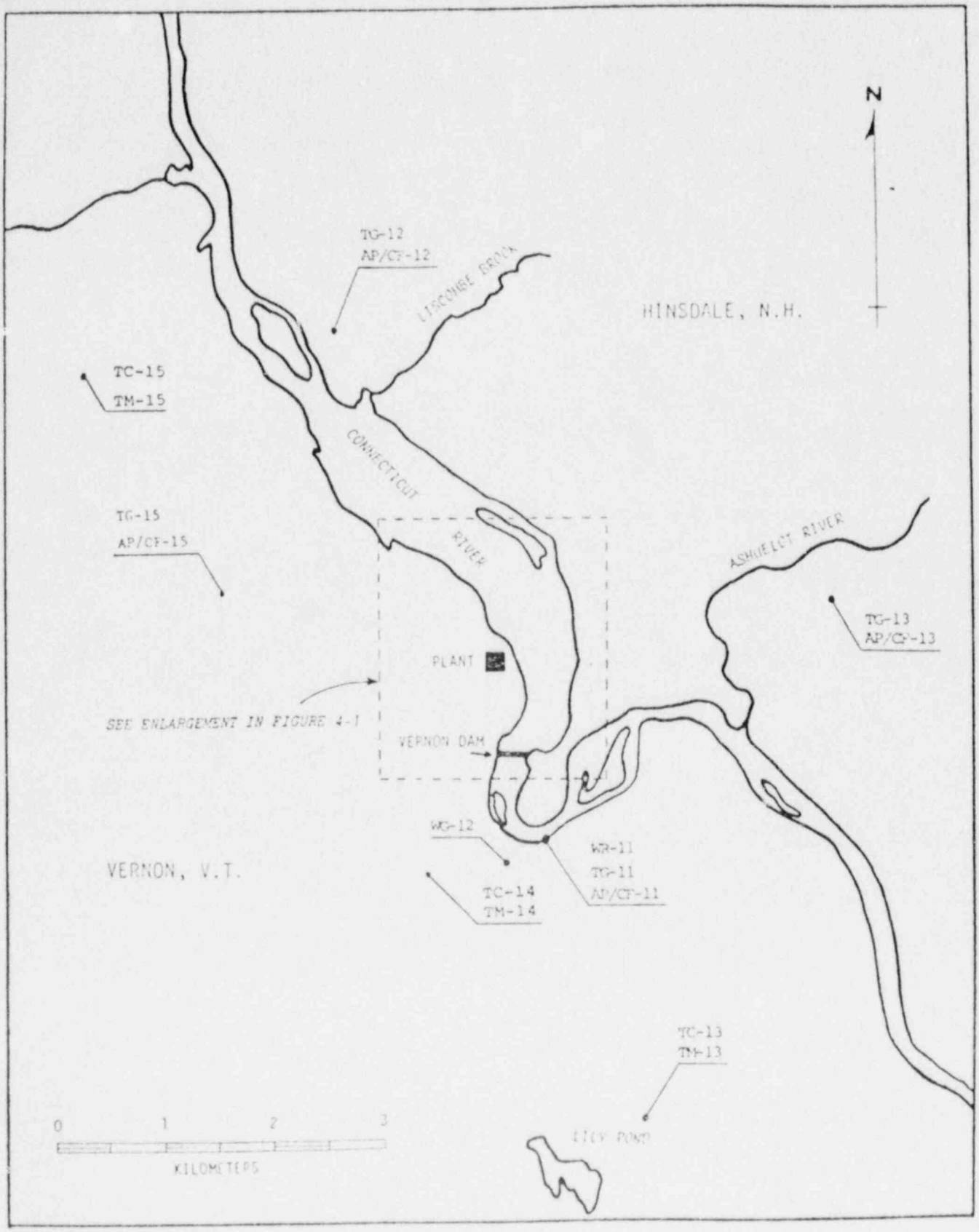

Figure 4-2 Environemntal Sampling Locations Within 5km of Plant

APPENDIX I

RADIOACTIVE LIQUID, GASEOUS, AND SOLID WASTE TREATMENT SYSTEMS

Requirement: Technical Specification 6.14.A requires that licensee initiated major changes to the radioactive waste systems (liquid, gaseous, and solid) be reported to the Commission in the Semiannual Radioactive Effluent Release Report for the period in which the evaluation was reviewed by the Plant Operation Review Committee.

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

VERMONT YANKEE
NUCLEAR POWER CORPORATION

RD 5, Box 169, Ferry Road, Brattleboro, VT 05301

REPLY TO:
ENGINEERING OFFICE
1671 WORCESTER ROAD
FRAMINGHAM, MASSACHUSETTS 01701
TELEPHONE 617-872-8100

August 29, 1986
FVY 86-79

United States Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA 19406

Attention: Dr. Thomas E. Murley
Regional Administrator

References: (a) License No. DPR-28 (Docket No. 50-271)

Subject: Vermont Yankee Semiannual Effluent Release Report

Dear Sir:

Enclosed herewith please find two copies of the Vermont Yankee Nuclear Power Corporation Semiannual Effluent Release Report. This report covers the period beginning January 1, 1986 and ending June 30, 1986, and is submitted in accordance with our Technical Specifications 6.7.c.1.

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

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

R. W. Capstick
Licensing Engineer

RWC/bll

Enclosures

cc: United States Nuclear Regulatory Commission
Office of Inspection and Enforcement
Washington, DC 20555
Attention: Document Control Desk

IE48
1/1