



**North  
Atlantic**

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The Northeast Utilities System

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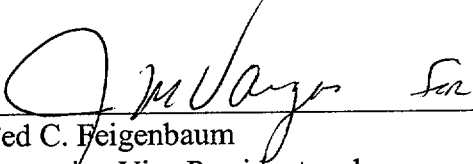
Seabrook Station  
2000 Annual Radiological Environmental Operating Report

North Atlantic Energy Service Corporation (North Atlantic) has enclosed the 2000 Annual Radiological Environmental Operating Report for Seabrook Station. This report summarizes the implementation of North Atlantic's Radiological Environmental Monitoring Program (REMP). Attachment 1 to the enclosure is the complete data set for the REMP samples. This report is being submitted pursuant to the requirements of Seabrook Station Technical Specification 6.8.1.3.

Should you require further information regarding this matter, please contact James M. Peschel, Manager – Regulatory Programs, at (603) 773-7194.

Very truly yours,

NORTH ATLANTIC ENERGY SERVICE CORP.

  
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**ENCLOSURE TO NYN-01039**

SEABROOK STATION  
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

For the Period  
January - December 2000

April 2001

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The Radiological Environmental Monitoring Program for Seabrook Station operated without interruption for the period of January through December 2000. This report describes the REMP program and its implementation as required by Technical Specifications as defined in the Technical Requirements Manual. It also contains analytical results, data evaluation, dose assessment, and data trends for each environmental sample media. Also included are the results of the Land Use Census, historical data, and the Duke Engineering and Services Environmental Laboratory (DESEL) performance in the Quality Assurance Intercomparison Program required by the Technical Requirements Manual.

Samples collected as part of the radiological environmental program included air particulates, charcoal filters, milk, ground water, surface (sea) water, sediment, fish, lobsters, shellfish, algae, vegetation and direct radiation. Radiological analysis on all samples included that for gamma and/or beta radiation. Any variability observed in the data is based primarily on a number of natural variables that can influence background radiation. The radionuclides identified as naturally occurring are K-40, Be-7, Th-232 and its daughter products. Cesium-137 was detected in milk as the result of fallout from atmospheric nuclear weapons testing. The levels detected are similar to those levels measured during the preoperational phase of the monitoring program. There is a decreasing trend in the number of positive samples identified. This is due to the natural decay of the residual Cs-137.

In the course of the year, seventeen Condition Reports (CR's) involving the REMP were initiated. Three CR's were the result of Oversight audit # 00-A10-01. Two involve sample submittal dates. The remaining CR's are sample media specific and are described in the appropriate sections of the report. The CR's were of low significance.

During 2000, Seabrook Station had a unit capacity factor of 78.1%. This capacity factor takes into account a scheduled refueling outage and two forced outages. The refueling outage initiated on October 21 and terminated on January 28, 2001. Total outage period was 99.9 days. The extension of RFO-7 past the planned 29 days was due to operability issues of both alpha and bravo emergency diesel generators. The forced outages lasted 2.9 and 3.0 days (January 8-11 & June 26 -29, 2000) respectively. The capacity factor excluding the refueling outage was 97.2%.

In 2000, the maximum whole body dose to the hypothetically exposed individual was .021 millirem. This whole body dose is the sum of all the exposure pathways for liquid and gaseous effluents, plus the direct whole body dose from station operations. This total dose represents approximately 0.08% of the whole body dose limit for a member of the public as set forth in 40CFR190. The complete calculational methodology is submitted to the NRC as part of the Annual Radioactive Effluent Release Report.

The results of the 2000 Radiological Environmental Surveillance Program continues to clearly demonstrate that there is no significant short term or chronic long term radiological impact on the environment in the vicinity of Seabrook Station. No abnormal radiological characteristics were identified or observed in the surrounding environs. Plant effluents contribute no measurable radiation exposure to the general public as confirmed and assessed by the REMP. Environmental radiation levels measured on site, at the site boundary and near the nearest resident are at background levels. This is consistent with previous data. As a result, no increasing or decreasing trend exists.

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ANNUAL RADIOLOGICAL ENVIRONMENTAL  
OPERATING REPORT

1.0 Introduction

The North Atlantic Energy Service Corporation's (NAESCO) Radiological Environmental Monitoring Program at Seabrook Station has been designed and carried out to achieve the following specific objectives:

- \* To provide an indication of the appearance or accumulation of any radioactive material in the environment caused by the operation of the nuclear power station.
- \* To provide assurance to regulatory agencies and the public that the station's environmental impact is known and within anticipated limits.
- \* To verify the adequacy and proper functioning of station effluent controls and monitoring systems.
- \* To provide standby monitoring capability for rapid assessment of risk to the general public in the event of unanticipated or accidental releases of radioactive material.

North Atlantic Energy Service Corporation collected the terrestrial samples. Normandeau Associates, Inc. collected the marine and sediment samples. After initial processing, the samples were sent to the Duke Engineering & Services Environmental Laboratory (DESEL) in Marlborough, Massachusetts for further processing and radionuclide analysis. The DESEL also processed the environmental thermoluminescent dosimeters (TLD's).

This report is a summary of the findings of the Radiological Environmental Monitoring Program for 2000. It is being provided in compliance with Part A of Seabrook Stations Offsite Dose Calculation Manual (ODCM) and Technical Specification 6.8.1.3 as defined in the Technical Requirements Program (TRP) Manual 5.2-10.1.

## 2.0 Environmental Monitoring Program

In this section, Table 2.1 outlines the monitoring program as specified in section TRP5.2-9.1 of the Technical Requirements Manual. Table 2.2 lists the operational sampling stations and their specific locations (distances are measured from the center of the Unit 1 Containment Building). The sampling locations are shown on maps in Figures 2.1 through 2.6

Below are listed the two-letter media codes and what they represent:

AP	Air Particulate
CF	Charcoal Filter
TM	Milk
WG	Ground Water
WS	Surface (Sea) Water
SE	Sediment
FH	Fin fish
HA	Lobsters
MU	Mussels (Shellfish)
TL	Direct Radiation (TLD)
AL	Irish Moss (algae)
TF	Food Crop

Table 2.1

Radiological Environmental Monitoring Program

<u>Media</u>	<u>Sampling Frequency</u>	<u>Required Analyses</u>
Air Particulate (AP)	-Weekly -Quarterly Composite	Gross Beta Gamma spectroscopy
Charcoal Filter (CF)	-Weekly	I-131
Milk (TM)	-Monthly; semimonthly When animals are on pasture	Gamma spectroscopy I-131
Surface (Sea) Water (WS)	-Monthly -Quarterly Composite	Gamma spectroscopy H-3 (composite)
Sediment (SE)	-Semiannually	Gamma spectroscopy
Fish & Invertebrates (FH, HA, MU)	-Quarterly or -Semiannually	Gamma spectroscopy
Direct Radiation (TL)	-Quarterly	Integrated gamma exposure
Irish Moss (AL)	-Semiannually	Gamma Spectroscopy
Ground Water (WG)	-Quarterly	Gamma Spectroscopy Gross Beta H-3
Food Crops (TF)	-Monthly/Growing Season	Gamma Spectroscopy

Table 2.2  
Radiological Environmental Monitoring Locations  
2000

<u>Station Code</u> <u>(Media - Sta. No.)</u>	<u>Station</u> <u>Description</u>	<u>Zone</u>	<u>Distance</u> <u>From</u> <u>Plant</u> <u>(km)</u>	<u>Direction</u> <u>From</u> <u>Plant</u>
AP/CF-01+	PSNH Barge Landing Area	1	2.7	ESE
AP/CF-02+	Hampton Marina	1	2.7	E
AP/CF-03+	Southwest Boundary	1	0.8	SW
AP/CF-04+	West Boundary	1	1.0	W
AP/CF-05	Winnacunnet High School	1	4.0	NNE
AP/CF-06+	Georgetown Substation	2	24.0	SSW
AP/CF-07	PSNH Substation	1	5.7	NNW
AP/CF-08	E&H Substation	1	3.4	SSE
TM-04+	Salisbury, MA	1	5.2	SW
TM-08+	Hampton Falls, NH	1	6.1	WNW
TM-09+	Hampton, NH	1	5.3	NNW
TM-15	Hampton Falls, NH	1	6.9	NW
TM-16	Kensington, NH	1	7.6	WNW
TM-20+	Rowley, MA	2	17.0	S
TM-21	North Andover, MA	2	28.1	SW
TM-22	Haverhill, MA	2	27.2	SW
WG-01	Seabrook Town Wells	1	5.6	W
WG-04	Seabrook Station Well No.4	1	1.0	N
WG-13	Seabrook Station Well No.13	1	1.0	N
WS-01+	Hampton-Discharge Area	1	5.3	E
WS-51+	Ipswich Bay	2	16.9	SSE
SE-02	Hampton-Discharge Area	1	5.3	E
SE-07+	Hampton Beach	1	3.1	E
SE-08	Seabrook Beach	1	3.2	ESE
SE-52	Ipswich Bay	1	16.9	SSE
SE-57	Plum Island Beach	2	15.9	SSE
FH-03+	Hampton-Discharge Area	1	4.5	ESE
FH-53+	Ipswich Bay	2	16.4	SSE
HA-04+	Hampton-Discharge Area	1	5.5	E
HA-54+	Ipswich	2	17.2	SSE
MU-06+	Hampton-Discharge Area	1	5.2	E
MU-09	Hampton Harbor	1	2.6	E
MU-56+	Ipswich Bay	2	17.4	SSE
MU-59	Plum Island	2	15.8	SSE
AL-05	Hampton-Discharge Area	1	5.2	E
AL-55	Ipswich Bay	2	17.4	SSE
TF-01	Hampton Falls, NH	1	1.5	WNW
TF-02	Hampton Falls, NH	1	5.0	WNW
TF-03	Salisbury, Ma	1	5.1	SW
TF-06	Ipswich, Ma	2	26.0	S

Table 2.2 (Cont'd)

Radiological Environmental Monitoring Locations  
2000

<u>Station Code</u> <u>(Media - Sta. No.)</u>	<u>Station</u> <u>Description</u>	<u>Zone</u>	<u>Distance</u> <u>From</u> <u>Plant</u> <u>(km)</u>	<u>Direction</u> <u>From</u> <u>Plant</u>
TL-1+	Brimmer's Lane, Hampton Falls	I	1.1	N
TL-2+	Landing Road, Hampton	I	3.2	NNE
TL-3+	Glade Path, Hampton Beach	I	3.1	NE
TL-4+	Island Path, Hampton Beach	I	2.4	ENE
TL-5+	Harbor Road, Hampton Beach	I	2.7	E
TL-6+	PSNH Barge Landing Area	I	2.7	ESE
TL-7+	Cross Road, Seabrook Beach	I	2.6	SE
TL-8+	Farm Lane, Seabrook	I	1.1	SSE
TL-9+	Farm Lane, Seabrook	I	1.1	S
TL-10+	Site Boundary Fence	I	1.0	SSW
TL-11+	Site Boundary Fence	I	1.0	SW
TL-12+	Site Boundary Fence	I	1.0	WSW
TL-13+	Inside Site Boundary	I	0.8	W
TL-14+	Trailer Park, Seabrook	I	1.1	WNW
TL-15+	Brimmer's Lane, Hampton Falls	I	1.4	NW
TL-16+	Brimmer's Lane Hampton Falls	I	1.1	NNW
TL-17+	South Road, North Hampton	0	7.9	N
TL-18+	Mill Road, North Hampton	0	7.6	NNE
TL-19+	Appledore Avenue, North Hampton	0	7.9	NE
TL-20+	Ashworth Avenue, Hampton Beach	0	4.1	ENE
TL-21+	Route 1A, Seabrook Beach	0	3.7	SE
TL-22+	Cable Avenue, Salisbury Beach	0	7.6	SSE
TL-23+	Ferry Road, Salisbury	0	8.1	S
TL-24+	Ferry Lots Lane, Salisbury	0	7.2	SSW
TL-25+	Elm Street, Amesbury	0	7.6	SW
TL-26+	Route 107A, Amesbury	0	8.1	WSW
TL-27+	Highland St. S. Hampton	0	7.6	W
TL-28+	Rte. 150, Kensington	0	7.9	WNW
TL-29+	Frying Pan Ln., Hampton Falls	0	7.4	NW
TL-30+	Route 27, Hampton	0	7.9	NNW

Table 2.2 (Cont'd)

Radiological Environmental Monitoring Locations  
2000

<u>Station Code</u> <u>(Media - Sta. No.)</u>	<u>Station</u> <u>Description</u>	<u>Zone</u>	<u>Distance</u> <u>From</u> <u>Plant</u> <u>(km)</u>	<u>Direction</u> <u>From</u> <u>Plant</u>
TL-31+	Alumni Drive, Hampton	S	4.0	NNE
TL-32+	Seabrook Elementary School	S	1.9	S
TL-33+	Dock Area, Newburyport	S	9.7	S
TL-34+	Bow Street, Exeter	S	12.1	NW
TL-35+	Lincoln Ackerman School	S	2.4	NNW
TL-36+	Route 97, Georgetown	2	22.0	SSW
TL-37+	Post Office Plaistow, NH	2	26.0	WSW
TL-38+	Emerson St. Hampstead, NH	2	29.0	W
TL-39+	Fremont, NH	2	27.0	NW
TL-40+	Newmarket, NH	2	24.0	NNW
TL-41	Portsmouth, NH	2	21.0	NNE
TL-42	Ipswich, MA	2	27.0	SSE
TL-43	Education Center	S	0.3	ENE
TL-44	Rocks Road Landing	S	0.5	SW
TL-45	Hampton Fire Station	S	4.5	NE
TL-46	Seabrook Beach	S	2.9	ESE
TL-47	Hampton Falls, NH	S	4.2	WNW

---

1 = Indicator Stations; 2 = Control Stations;

0 = Outer Ring TLD;

I = Inner Ring TLD;

S = Special Interest TLD

+ = Sample Locations Required by the Off-Site Dose Calculation Manual (ODCM)

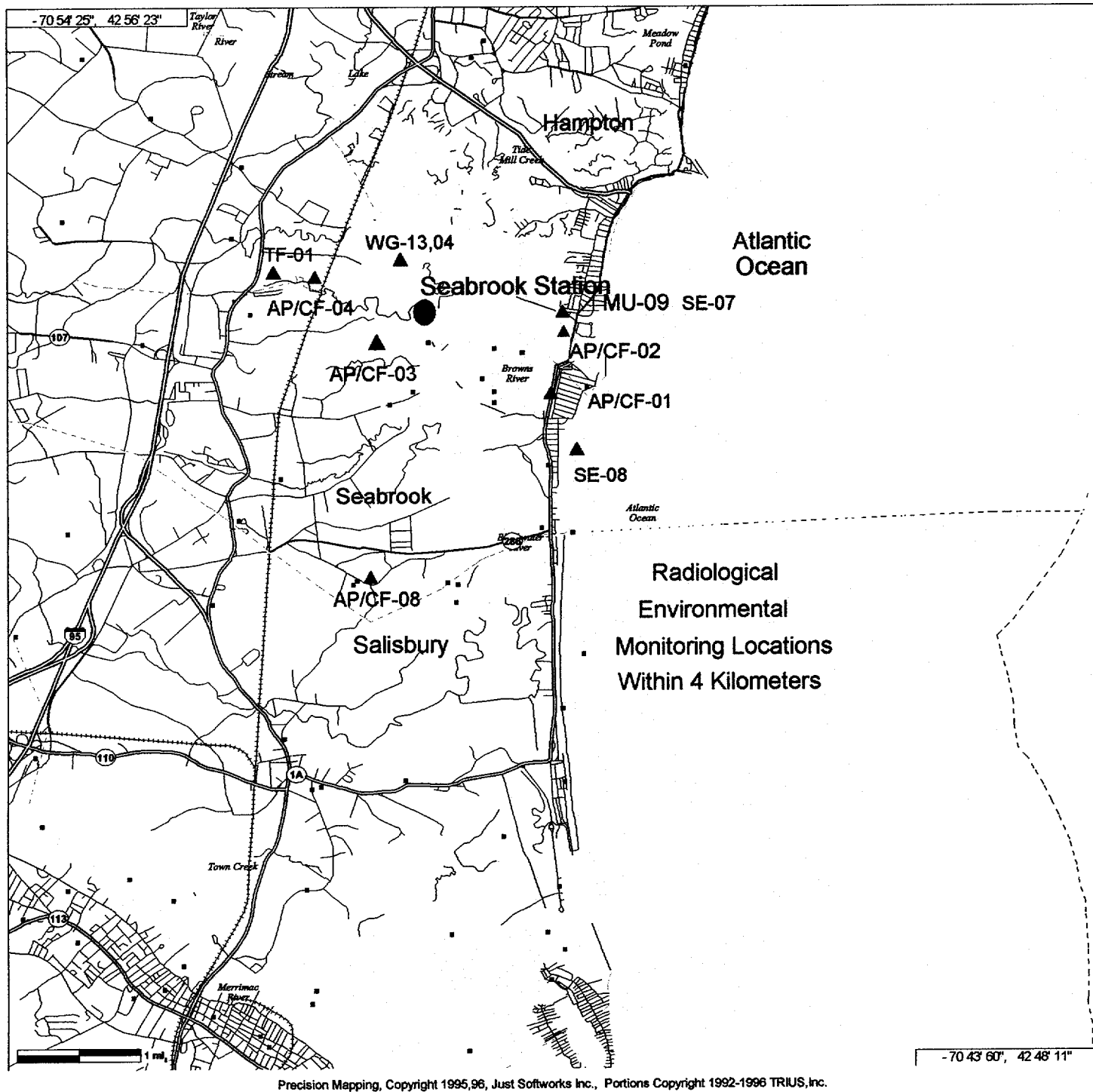


FIGURE 2.1 RADIOLOGICAL ENVIRONMENTAL MONITORING LOCATIONS  
WITHIN 4 KILOMETERS OF SEABROOK STATION

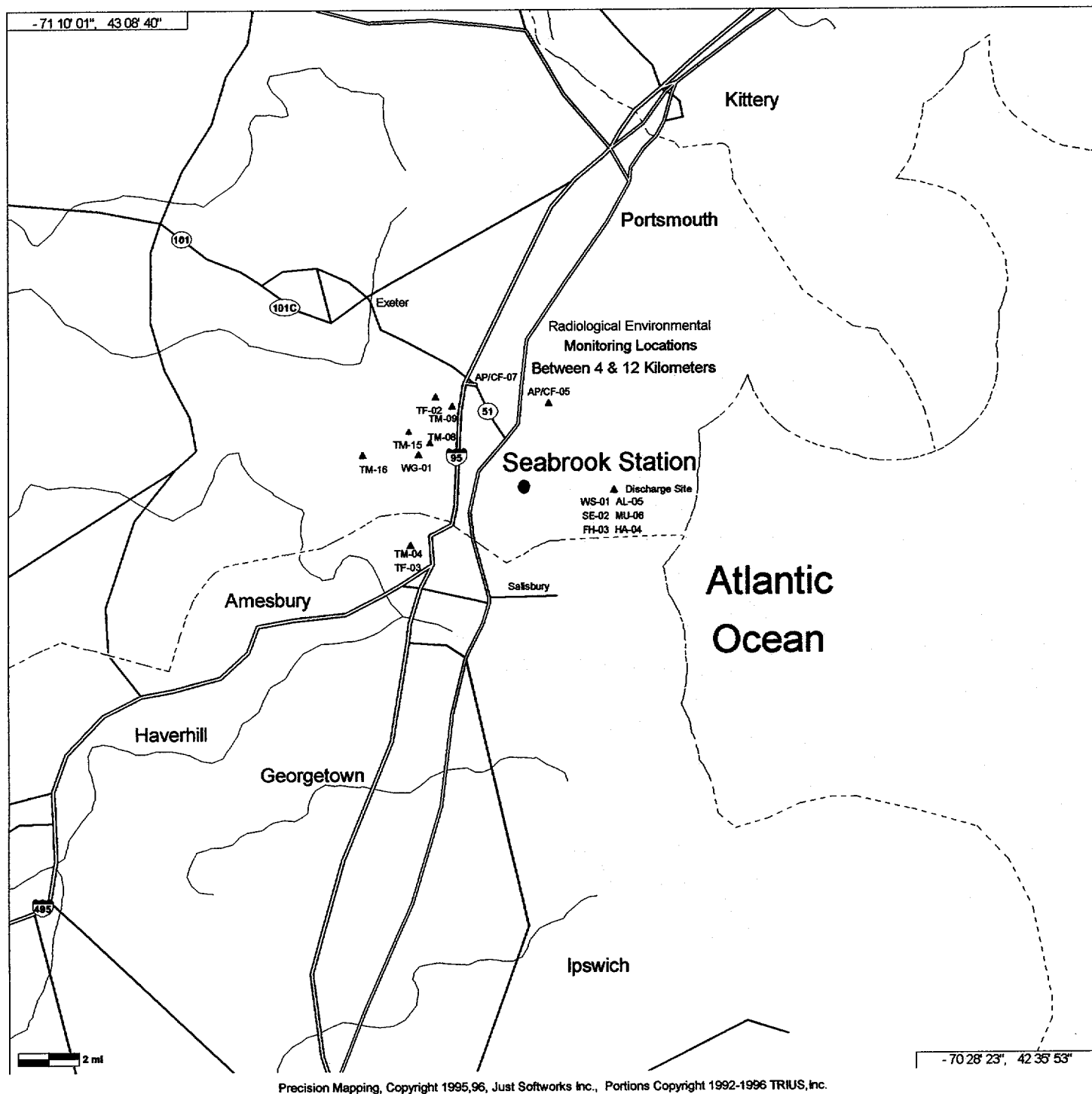


FIGURE 2.2 RADIOLOGICAL ENVIRONMENTAL MONITORING LOCATIONS  
BETWEEN 4 and 12 KILOMETERS FROM SEABROOKSTATION



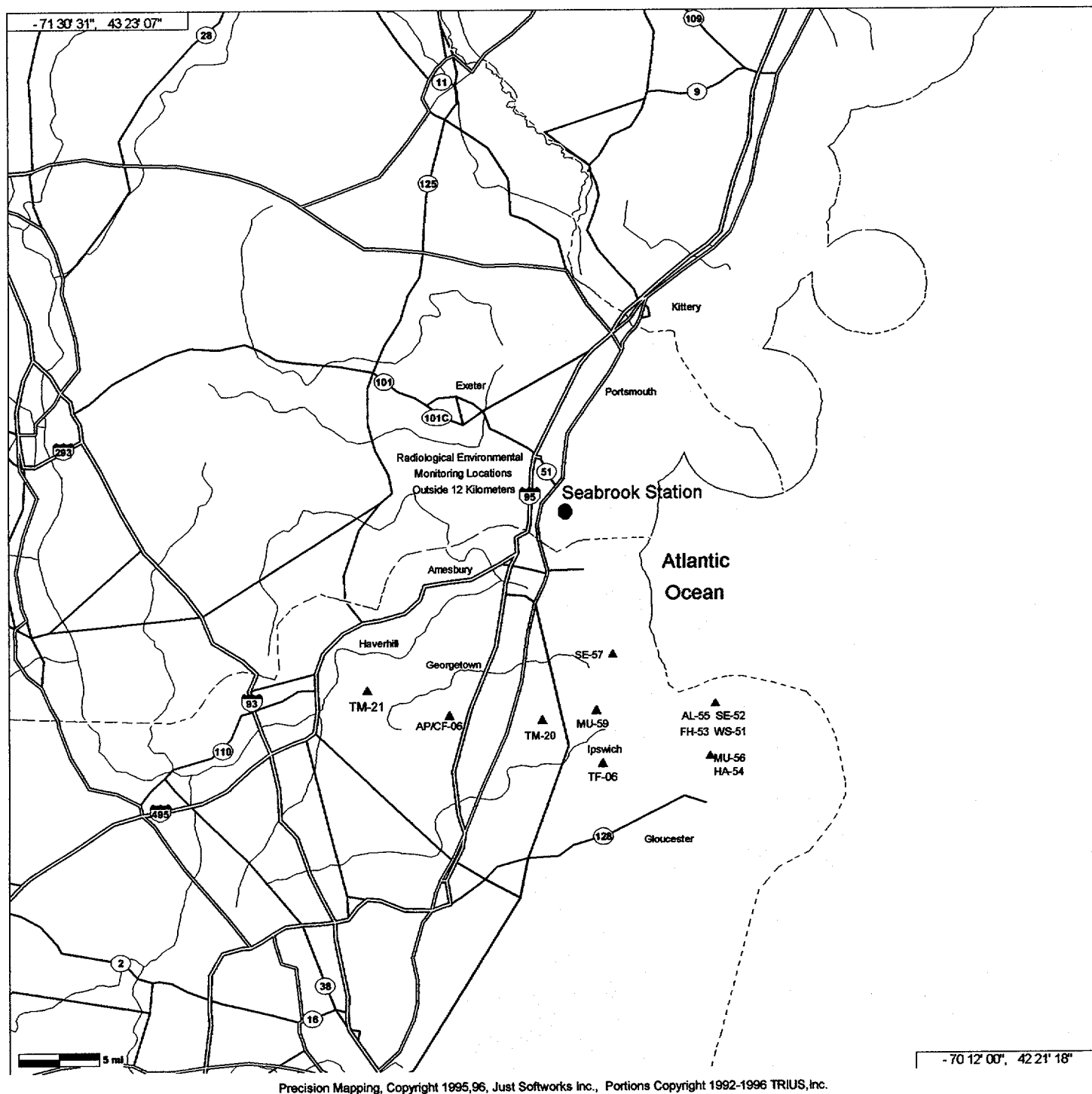


FIGURE 2.3 RADIOLOGICAL ENVIRONMENTAL MONITORING LOCATIONS  
OUTSIDE 12 KILOMETERS OF SEABROOK STATION



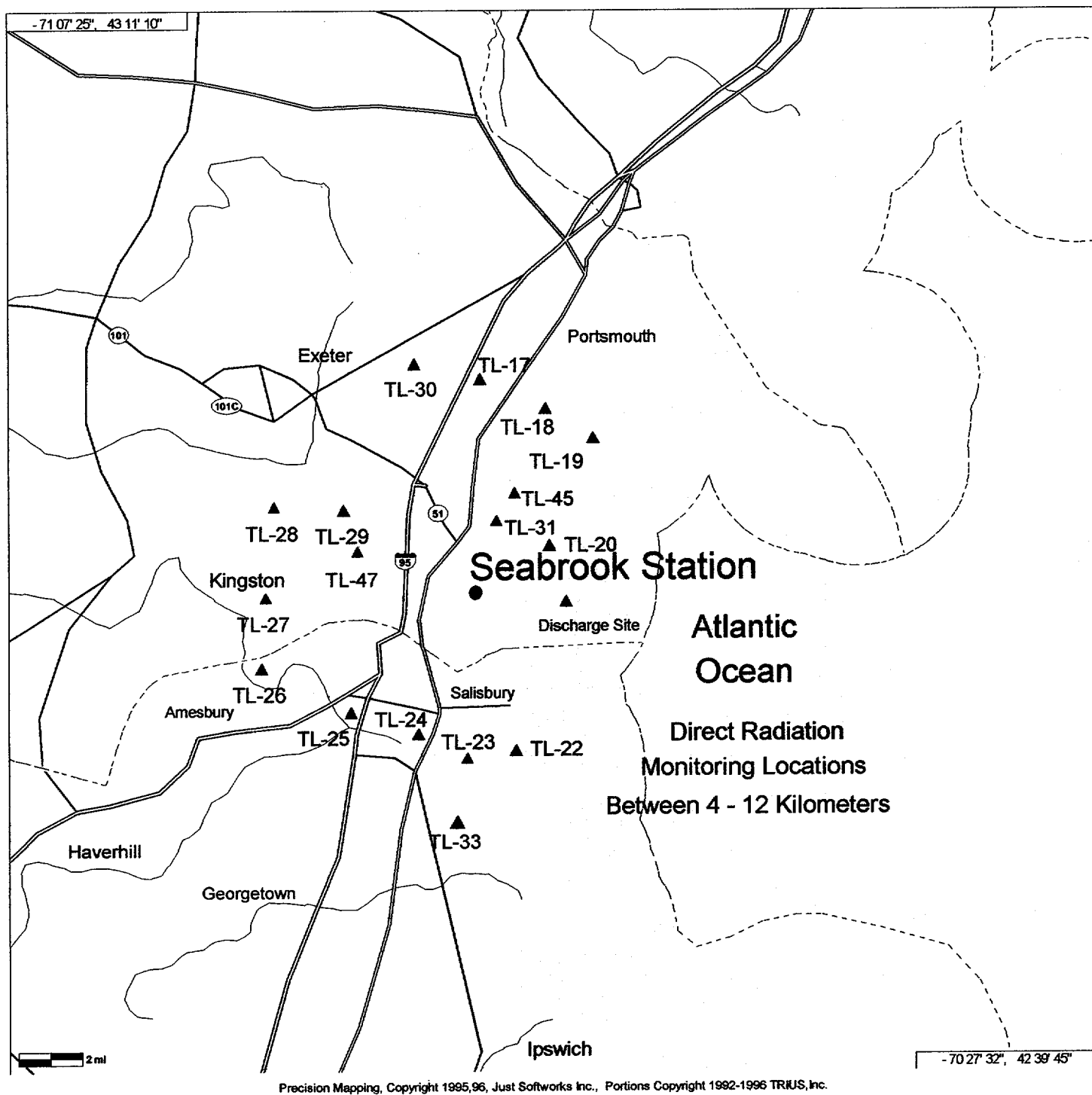


FIGURE 2.5 DIRECT RADIATION MONITORING LOCATIONS BETWEEN 4 and 12 KILOMETERS FROM SEABROOK STATION

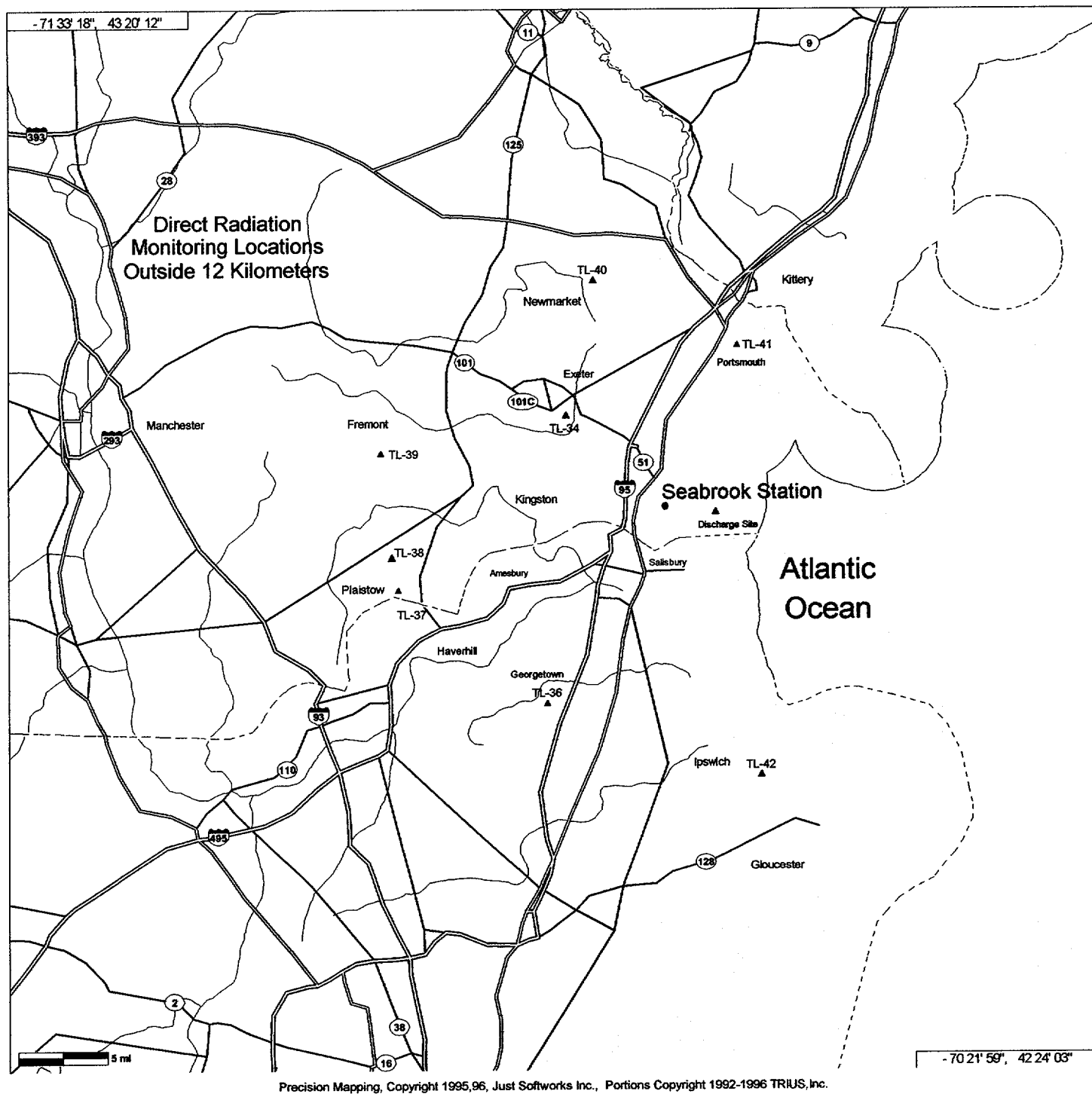


FIGURE 2.6 DIRECT RADIATION MONITORING LOCATIONS OUTSIDE 12 KILOMETERS OF SEABROOK STATION

### 3.0 Summary of Radiological Environmental Data

The following pages summarize the analytical results of the environmental samples, which were collected in 2000. Each environmental media category is presented as a separate subsection. A table that summarizes the data follows a discussion of the sampling requirements and results for each program. Listed at the top of each table are the units of measurement for each medium. The left-hand column contains the radionuclide, which is being reported, total number of analyses of that radionuclide, and the number of measurements that exceed ten times the yearly average of control measurements. The latter are classified as "non-routine" measurements. The next column lists the Lower Limit of Detection (LLD) for those radionuclides which have detection capability requirements specified in the Off-Site Dose Calculation Manual.

Those sampling stations which are adjacent to the plant and which could conceivably be affected by the operation of Seabrook Station are called "Indicator" or "Zone 1" stations. Distant stations, which are beyond potential plant influences, are called "Control" or "Zone 2" stations. Direct radiation (TLD) monitoring locations are subdivided into site boundary, inner ring, and outer ring (emergency response) stations.

A set of statistical parameters is calculated for each radionuclide. This set of statistical parameters includes separate analyses for (1) the indicator stations, (2) the station having the highest annual mean concentration for that radionuclide, (3) and control stations. For each of these three groups of data, these parameters are as follows:

- \* The mean value of all concentrations.
- \* The range of values.
- \* The number of positive measurements (a concentration which is greater than the a posteriori LLD for that analysis) divided by the total number of measurements.

Each single radioactivity measurement in media datum in this report is based on a single measurement and is reported as a concentration plus or minus a one standard deviation uncertainty. The quoted uncertainty term represents only the random uncertainty associated with the radioactive decay process (counting statistics), and not the propagation of all possible uncertainties in the analytical procedure.

Attachment I contains the data for the samples collected in 2000. The results are organized by sample type, within each sample type listing the data is alphabetical by nuclide, within each nuclide listing the data is chronologically arranged by end date (date of sample collection).

The radionuclide value concentrations (charcoal media) have been corrected for radioactive decay to the end of the collection. The airborne radioiodine (charcoal) concentrations have been calculated assuming a constant flow rate and concentration throughout the collection period and correcting for decay while sampling as well as between sample collection termination and analysis.

Pursuant to ODCM requirements, any concentration below the LLD for its analysis is reported as "not detected". These values are set to zero for averaging purposes. Where a range of values is reported in the tables of this section, values less than the a posteriori LLD for the analysis are reported as zero.

A) Air Particulate

Air monitoring stations were established at a total of eight locations (five are required by the Offsite Dose Calculation Manual). Seven of the locations are indicators, while the remaining one is a control station.

Airborne particulates are collected by passing the air through a glass-fiber filter. These filters are collected weekly and held for at least 100 hours before being analyzed for gross-beta activity (indicated as GR-B in tables) to allow for the decay of radon daughter products. For the year, 414 particulate filters were collected for gross beta activity. Two weekly air samples were not collected and analyzed. The gross beta activity for the indicator locations is statistically equivalent to that seen at the control station. The gross beta results for all stations is also similar to what was seen in the preoperational program and for the last nine years of commercial operation. Fluctuations seen in the gross beta activity throughout the year can be attributed to changes in the environment. Concentrations of naturally occurring radionuclides in the atmosphere directly above land are affected by natural environmental processes such as wind direction, precipitation, snow cover, and soil temperature and moisture.

No plant related gamma-emitting radionuclides were detected in any of the quarterly composite air filters samples analyzed. Therefore no increasing or decreasing trend exists. In 2000, naturally occurring Be-7 was the only nuclide detected. Be-7 is of cosmogenic origin. This is consistent with previous years both pre and post operationally.

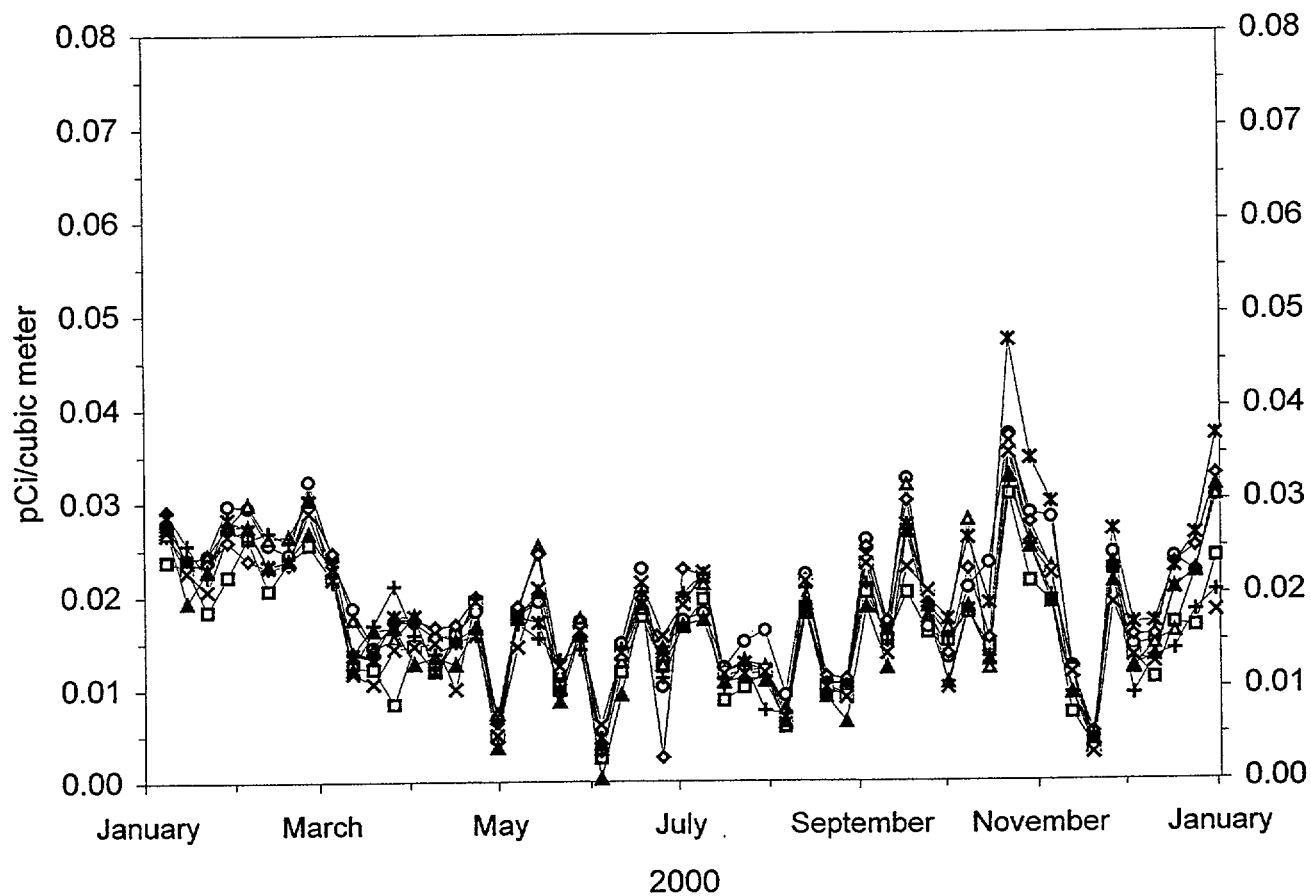
For week #21, air sample station #1 was found to be off at the time of filter change out. A sample was not available for collection. A Condition Report (CR) was initiated. Wet and inclement weather caused the GFI breaker to trip open. For week #51, air sample station #6 located in Georgetown MA was found inoperable at time of changeout. A seized pump was the cause. A sample was not available for collection. A CR was initiated.

Three other CR's involving the REMP air-sampling program were initiated for the year. For week #43, air sampler #2 was not running at time of change out due to a blown fuse. An adequate air volume was still collected. During week #25, small holes were found in the particulate filters at time of change out. These holes were the result of an intense windstorm that caused sand to puncture the filters. This windstorm occurred during the latter part of the sampling cycle; therefore an adequate sample volume was collected for analysis. For week #3, REMP air samples were inadvertently shipped to the wrong mailing address rather than to the DESEL Environmental Laboratory. The air samples were quickly found and resent to the correct address.

The air particulate sampling program demonstrated no off-site dose to the public or impact to the environment, from this pathway, as the result of plant operations. This is consistent with previous years and the preoperational program.

FIGURE 3.1

GROSS-BETA MEASUREMENTS OF AIR PARTICULATE FILTERS  
SEABROOK STATION



- AP-01 Barge Landing Area
- AP-02 Hampton Marina
- △— AP-03 SW Boundary
- ◇— AP-04 W Boundary
- ×— AP-05 Winnacunnet High School
- x— AP-06 Georgetown Substation (Control)
- +— AP-07 PSNH Substation, Hampton
- ▲— AP-08 Exeter & Hampton Electric Co.

FIGURE 3.1.1

GROSS-BETA MEASUREMENTS OF AIR PARTICULATE FILTERS  
QUARTERLY AVERAGES  
SEABROOK STATION

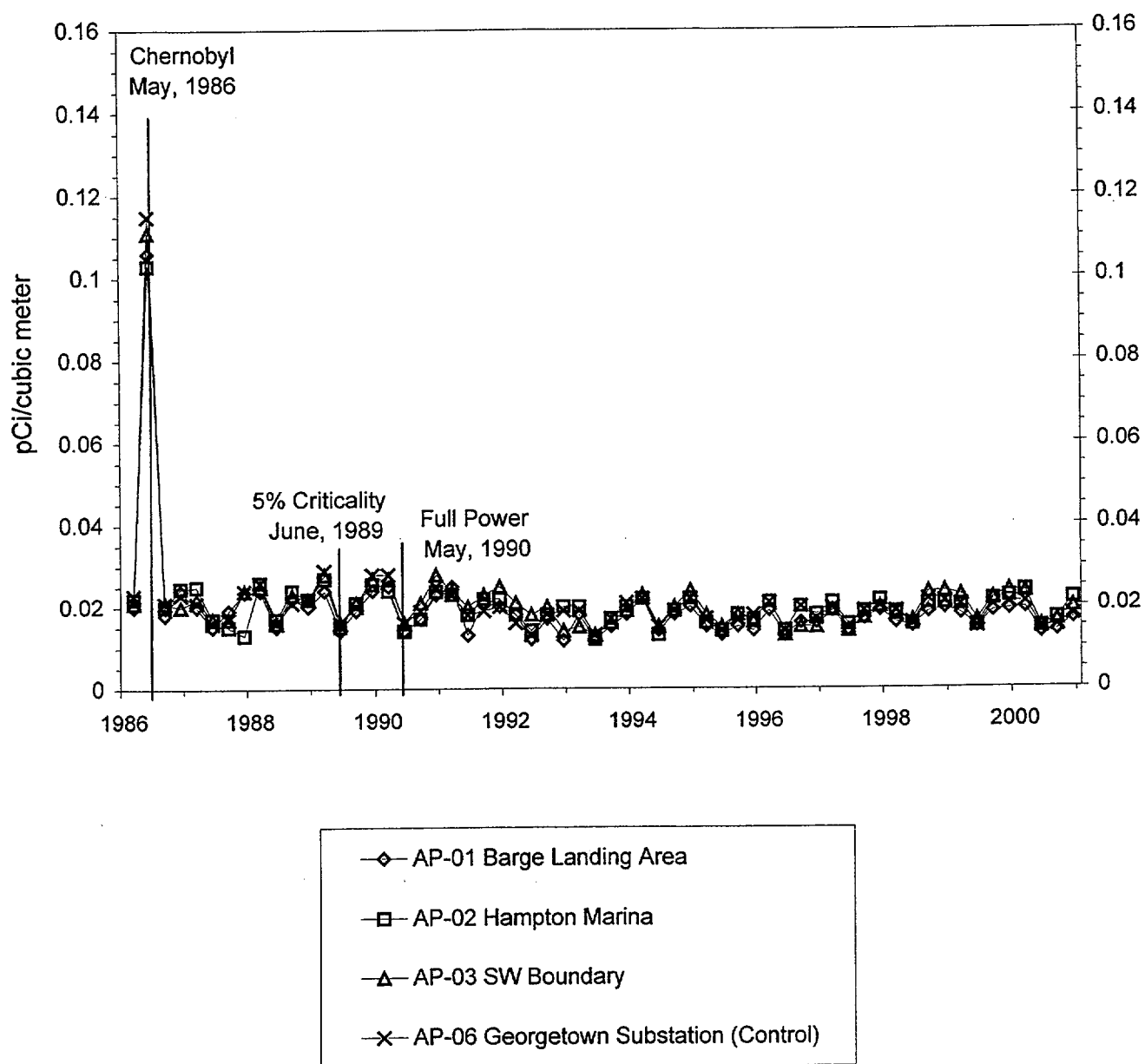




FIGURE 3.1.2

GROSS-BETA MEASUREMENTS OF AIR PARTICULATE FILTERS  
QUARTERLY AVERAGES  
SEABROOK STATION

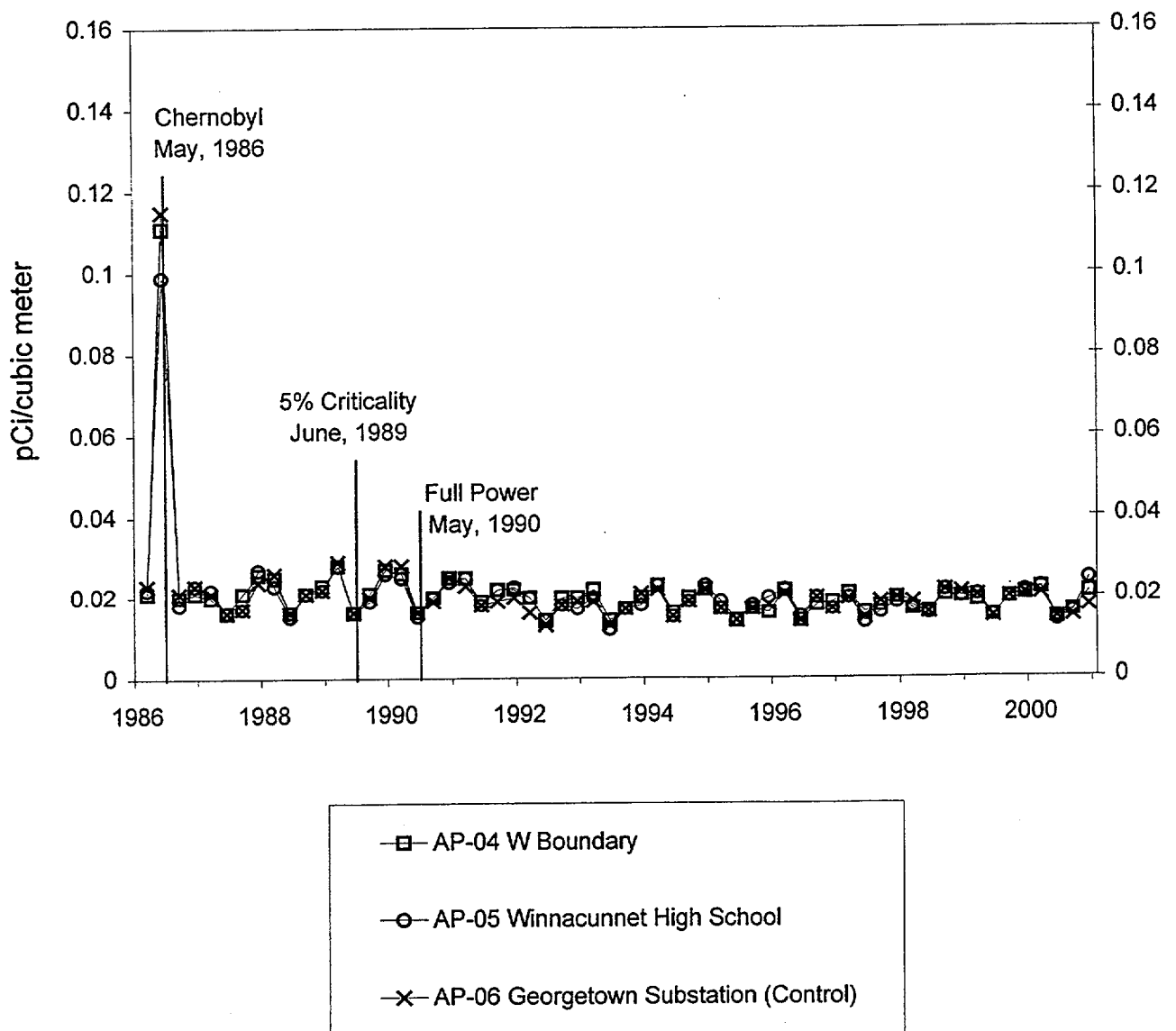


FIGURE 3.1.3

GROSS-BETA MEASUREMENTS OF AIR PARTICULATE FILTERS  
QUARTERLY AVERAGES  
SEABROOK STATION

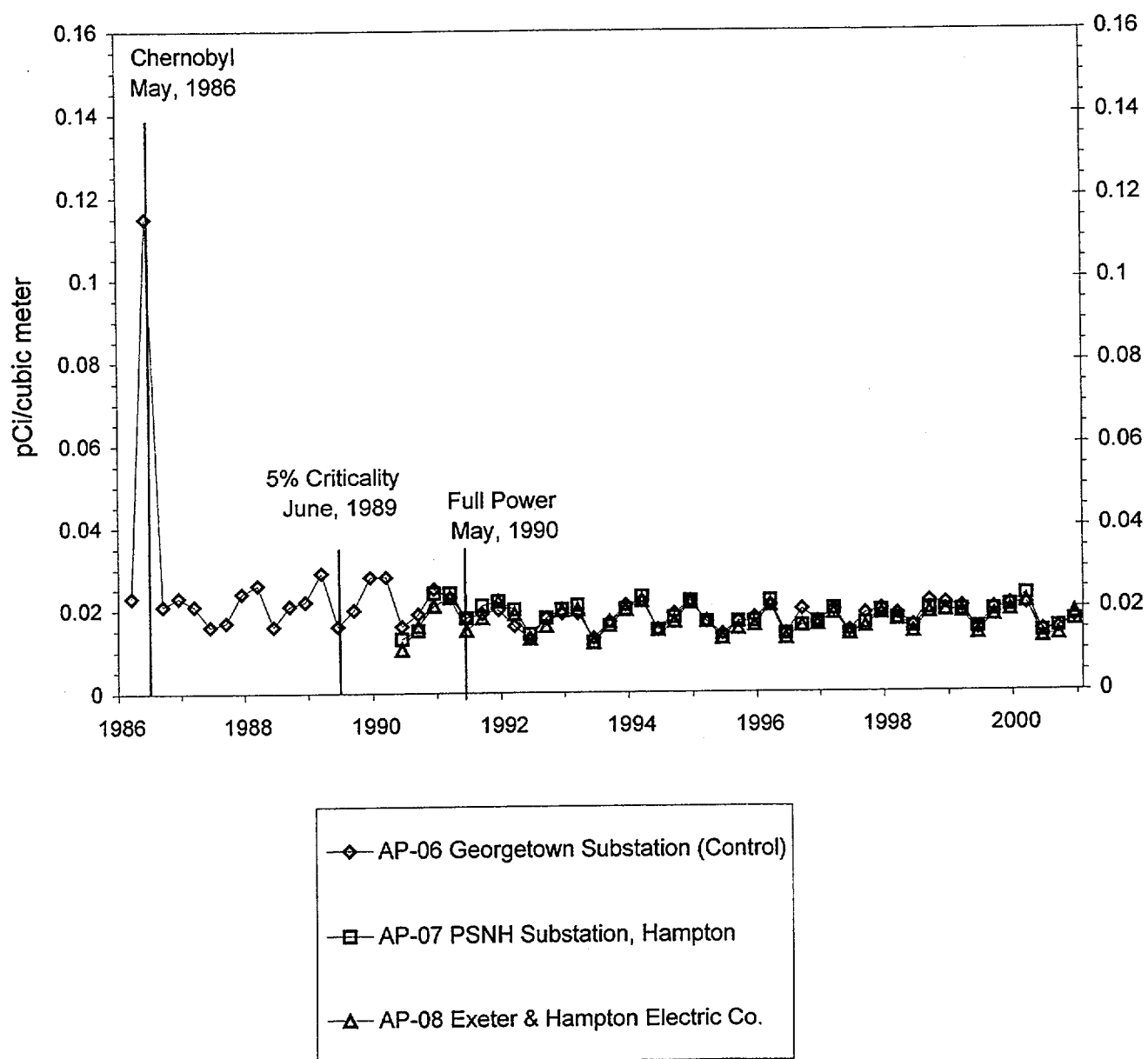
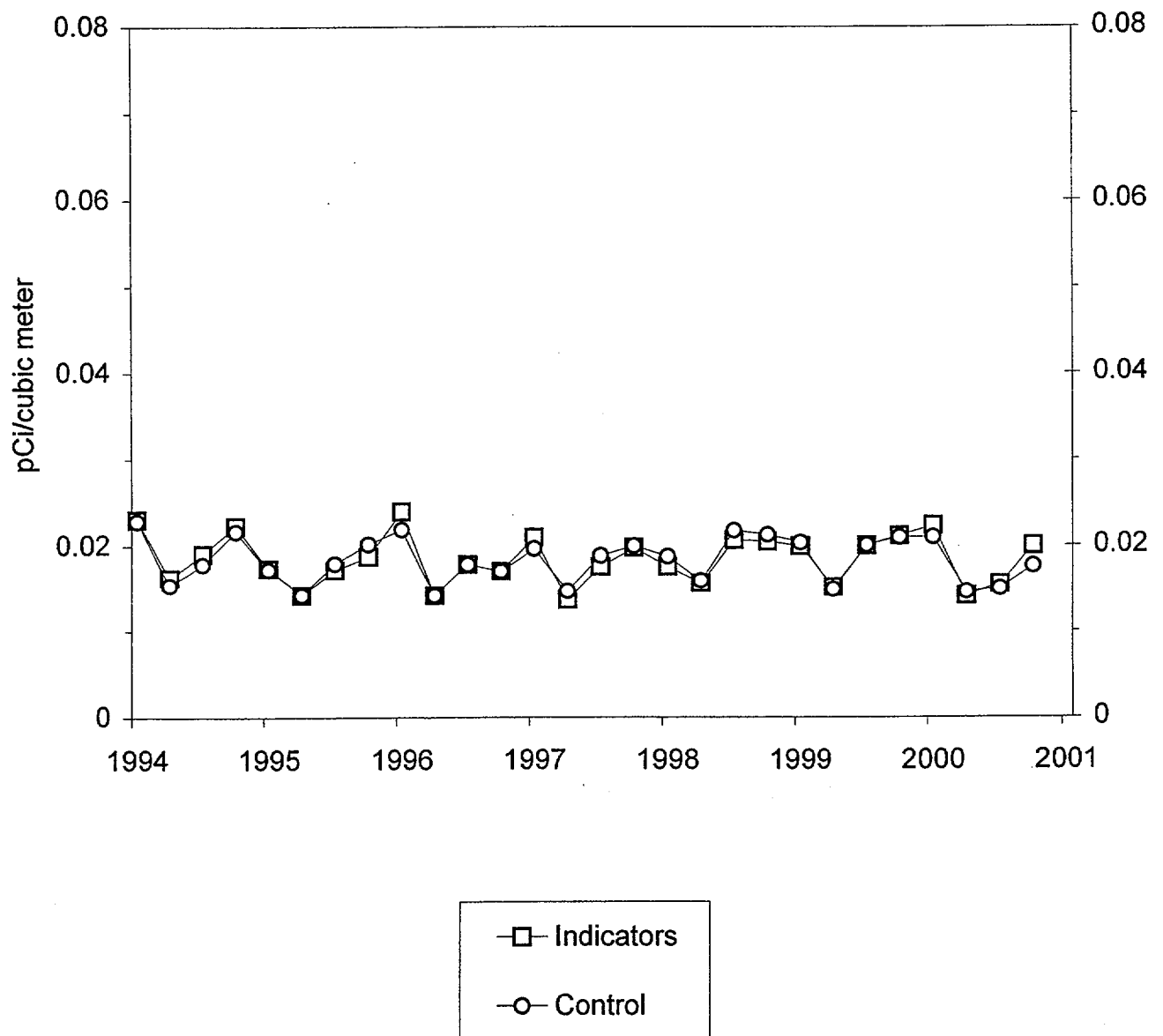


FIGURE 3.2

GROSS-BETA ON AIR PARTICULATE FILTERS  
QUARTERLY AVERAGES  
SEABROOK STATION



Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Air Particulates (AP)      UNITS: pCi/cubic meter

Radionuclides (No. Analyses) (Non-Routine*)		Required LLD	Indicator Stations	Station With Highest Mean		Control Stations
			Mean Range (No. Detected**)	Sta.	Mean Range (No. Detected**)	Mean Range (No. Detected**)
GR-B	(414)	0.01	1.8E -2	02	1.9E -2	1.7E -2
	(0)		( 2.9 - 472.4)E -4 (349/ 363)		( 3.5 - 37.2)E -3 (50/ 52)	( 3.0 - 35.2)E -3 (50/ 51)
Be-7	(32)		7.7E -2	05	9.8E -2	7.6E -2
	(0)		( 4.1 - 13.8)E -2 (28/ 28)		( 8.3 - 11.6)E -2 (4/ 4)	( 4.5 - 10.6)E -2 (3/ 4)
K-40	(32)		2.9E -3	05	5.5E -3	-1.0E -3
	(0)		( -1.1 - 1.7)E -2 (0/ 28)		( 3.8 - 7.1)E -3 (0/ 4)	( -4.2 - 3.1)E -3 (0/ 4)
Cr-51	(32)		-4.0E -3	08	9.6E -3	-1.8E -2
	(0)		( -7.4 - 3.2)E -2 (0/ 28)		( -5.8 - 32.1)E -3 (0/ 4)	( -2.7 - -0.4)E -2 (0/ 4)
Mn-54	(32)		3.3E -5	08	3.7E -4	0.0E 0
	(0)		( -5.8 - 10.7)E -4 (0/ 28)		( 0.0 - 1.1)E -3 (0/ 4)	( -2.8 - 1.3)E -4 (0/ 4)
Co-57	(32)		-2.8E -5	06	1.2E -4	1.2E -4
	(0)		( -2.7 - 2.4)E -4 (0/ 28)		( -1.8 - 42.6)E -5 (0/ 4)	( -1.8 - 42.6)E -5 (0/ 4)
Co-58	(32)		-6.9E -5	06	3.4E -4	3.4E -4
	(0)		( -1.0 - 0.7)E -3 (0/ 28)		( -1.3 - 1.6)E -3 (0/ 4)	( -1.3 - 1.6)E -3 (0/ 4)
Fe-59	(31)		8.2E -4	01	4.9E -3	-1.2E -3
	(0)		( -3.5 - 10.2)E -3 (0/ 27)		( 1.3 - 7.0)E -3 (0/ 4)	( -1.8 - 0.0)E -3 (0/ 4)
Co-60	(32)		1.7E -4	01	5.5E -4	-7.5E -5
	(0)		( -9.0 - 9.0)E -4 (0/ 28)		( 1.5 - 8.2)E -4 (0/ 4)	( -4.5 - 5.8)E -4 (0/ 4)
Zn-65	(32)		-8.1E -4	08	3.4E -4	-1.2E -3
	(0)		( -2.9 - 1.7)E -3 (0/ 28)		( -3.9 - 17.4)E -4 (0/ 4)	( -2.8 - 0.4)E -3 (0/ 4)
Se-75	(32)		1.4E -4	04	5.8E -4	-8.9E -5
	(0)		( -6.8 - 14.7)E -4 (0/ 28)		( 1.7 - 14.7)E -4 (0/ 4)	( -9.3 - 9.5)E -4 (0/ 4)
Zr-95	(32)		-7.0E -5	07	1.1E -3	-2.9E -4
	(0)		( -2.4 - 2.3)E -3 (0/ 28)		( -6.5 - 234.6)E -5 (0/ 4)	( -1.8 - 0.6)E -3 (0/ 4)

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Air Particulates (AP)    UNITS: pCi/cubic meter

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations	Station With Highest Mean		Control Stations
		Mean Range (No. Detected**)	Sta.	Mean Range (No. Detected**)	Mean Range (No. Detected**)
Ru-103 (32) (0)		7.6E -5 ( -2.1 - 2.7)E -3 (0/ 28)	04	1.3E -3 ( 0.0 - 2.7)E -3 (0/ 4)	-1.3E -4 ( -4.7 - 2.4)E -4 (0/ 4)
Ru-106 (32) (0)		-2.3E -4 ( -7.1 - 5.5)E -3 (0/ 28)	01	2.0E -3 ( -4.8 - 55.1)E -4 (0/ 4)	-2.5E -3 ( -3.2 - -0.9)E -3 (0/ 4)
Ag-110M (32) (0)		-1.6E -4 ( -1.4 - 0.9)E -3 (0/ 28)	06	2.7E -4 ( 0.0 - 6.6)E -4 (0/ 4)	2.7E -4 ( 0.0 - 6.6)E -4 (0/ 4)
Sb-124 (30) (0)		1.3E -4 ( -5.5 - 5.5)E -3 (0/ 26)	07	2.0E -3 ( -2.0 - 5.5)E -3 (0/ 3)	1.3E -3 ( 0.0 - 2.6)E -3 (0/ 4)
I-131 (32) (0)		3.1E -2 ( -6.5 - 5.0)E -1 (0/ 28)	02	1.5E -1 ( 0.0 - 4.6)E -1 (0/ 4)	-8.6E -2 ( -4.1 - 0.3)E -1 (0/ 4)
Cs-134 (32) (0)	0.05	3.8E -5 ( -6.5 - 8.1)E -4 (0/ 28)	07	3.1E -4 ( 1.7 - 5.0)E -4 (0/ 4)	5.6E -5 ( -3.0 - 9.9)E -4 (0/ 4)
Cs-137 (32) (0)	0.06	-4.7E -5 ( -9.8 - 7.9)E -4 (0/ 28)	03	2.1E -4 ( 1.8 - 55.3)E -5 (0/ 4)	-2.6E -4 ( -8.5 - 1.4)E -4 (0/ 4)
Ba-140 (32) (0)		-1.5E -2 ( -1.0 - 0.3)E -1 (0/ 28)	04	6.9E -3 ( 7.4 - 195.1)E -4 (0/ 4)	-6.9E -3 ( -3.5 - 3.3)E -2 (0/ 4)
Ce-141 (32) (0)		-2.8E -4 ( -3.0 - 3.0)E -3 (0/ 28)	05	6.5E -4 ( 1.3 - 11.6)E -4 (0/ 4)	-7.1E -4 ( -2.3 - 0.5)E -3 (0/ 4)
Ce-144 (32) (0)		-2.3E -4 ( -2.9 - 2.9)E -3 (0/ 28)	05	5.8E -4 ( -8.7 - 29.0)E -4 (0/ 4)	2.4E -4 ( -1.8 - 2.0)E -3 (0/ 4)
Th-232 (32) (0)		6.5E -4 ( -2.6 - 4.6)E -3 (0/ 28)	01	2.1E -3 ( 1.2 - 4.6)E -3 (0/ 4)	2.5E -4 ( -1.9 - 1.6)E -3 (0/ 4)

\* Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table A.5-3.

\*\* The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

B) Charcoal Filters

Charcoal filter cartridges are in series with the air particulate glass-fiber filters. Monitoring stations were established at a total of eight locations (five are required by the ODCM). Seven of these are indicators and one is a control. Charcoal filters from the air sampling stations were collected and analyzed weekly for I-131 activity.

During 2000, A total of 414 charcoal cartridges from all eight locations were analyzed. As was the case with particulate air samples, two samples were missed for the year and a total of five CR's were generated (see section A). No sample analysis indicated a detectable measurement for I-131 that was statistically relevant (positive) at the air sampling locations stated in the ODCM and as stated in the Technical Requirements Manual.

The REMP program has detected no radioiodine at any offsite air sample location, since Seabrook Station's initial criticality of June 1989. There is no dose to the public or impact to the environment from this pathway. The preoperational data for I-131 are consistent with present data. Therefore, no increasing or decreasing trend exists.

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Charcoal Cartridge (CF)      UNITS: pCi/cubic meter

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations *****	Station With Highest Mean *****	Control Stations *****
		Mean Range (No. Detected**)	Sta. Mean Range (No. Detected**)	Mean Range (No. Detected**)
I-131 (414) (0)	0.07	2.8E -4 ( -2.8 - 2.7)E -2 (0/ 363)	02      1.7E -3 ( -1.5 - 2.7)E -2 (0/ 52)	9.2E -4 ( -1.5 - 2.5)E -2 (0/ 51)

\* Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table A.5-3.

\*\* The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

C) Milk

Milk samples were collected every two weeks during the pasture season and monthly at other times. Samples are analyzed for I-131 and gamma-emitting radionuclides.

Milk samples were collected from five indicator and two control locations for the year. Three of the indicator locations and one control are required by Technical Specifications. Milk sample location TM-21 (Barker Farm) dropped out of the program. The last sample collected from TM-21 was for week #21. A CR was generated for the elimination of this milk sample location. This change in the milk program was reviewed and assessed as part of the Land Use Census for 2000. The Barker Farm was a 'back up' control location. The Spring Hill Farm (TM-22) of Ward Hill, Ma was brought into the Program as a replacement for the Barker Farm. The first sample collected was during week 28.

Milk sample location TM-22 (Spring Hill Farm) dropped out of the Program following week #46. The owner of the dairy herd moved his animals out of state. A CR was generated.

Two other milk related CR's were generated within the year. One dealt with improper pre-labeling of two milk containers for week #21. The other dealt with a missed communication with the Commonwealth of Massachusetts regarding collection of split samples. The CR's were of low significance.

A total of 105 milk samples were collected within the year. Each sample was analyzed for gamma emitting radionuclides. In addition, all samples are evaluated for I-131 through an iodine extraction process. Gamma analysis indicated only potassium-40 and cesium-137 was present. Detectable concentrations of Cs-137 were measured in several samples collected in 2000.

Two positive results for Cs-137 were detected at required location TM-04 (2). Additionally location TM-16 had two positive Cs-137 results. It has been shown in the preoperational program that this nuclide is the result of atmospheric nuclear weapons testing that persists in the environment. The levels of Cs-137 detected in 2000 are consistent with that detected in the pre-operational phase and during the first nine years of commercial operations.

Potassium-40 was detected in all indicator and control locations. Potassium-40 is a naturally occurring nuclide detected in many environmental sample media.

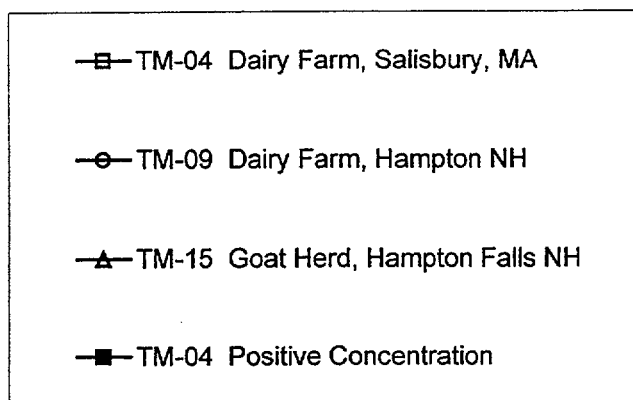
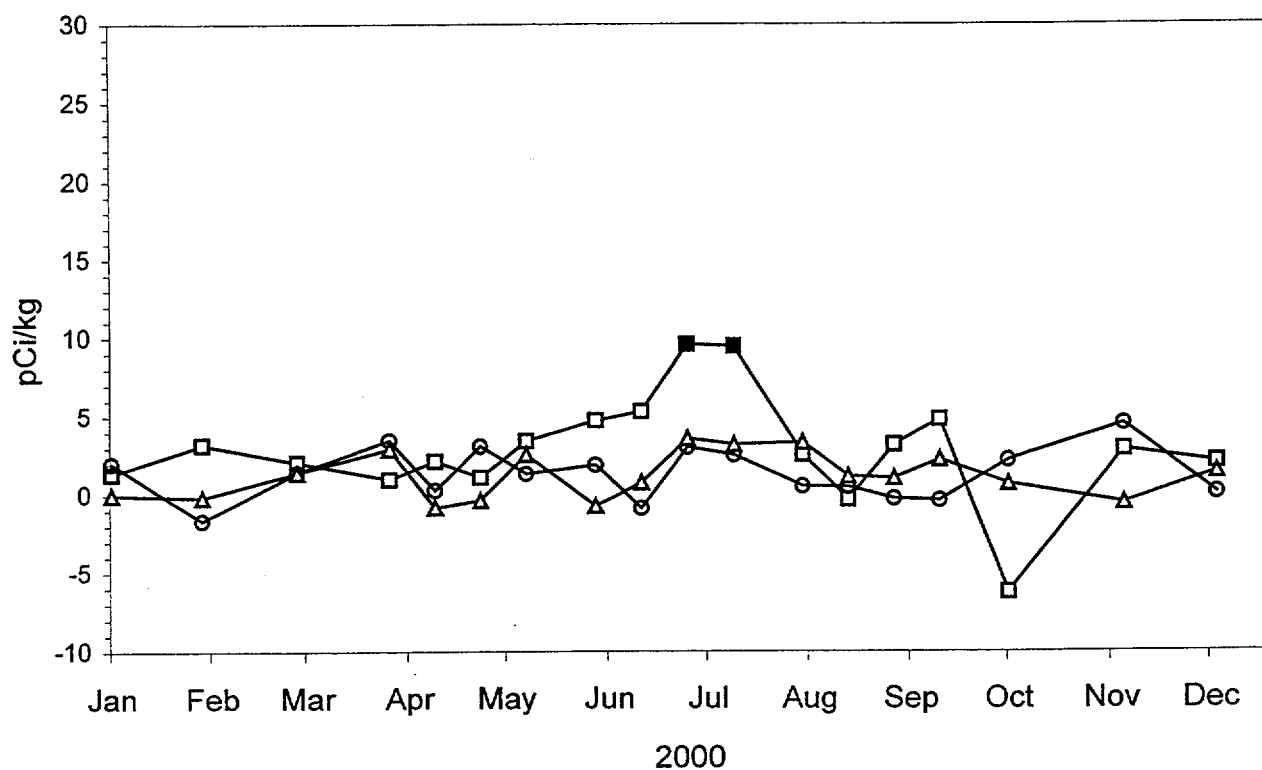
Iodine-131 was not positively identified at any required or added location for the year. The samples met the Lower Limit of Detection (LLD) requirements (1 pCi's/kg) for I-131 in milk. This is consistent with previous years for both the pre-operational and operational phases of the program.

The calculated dose as the result of plant effluents is not evaluated due to the fact that no plant related radionuclides were detected. The milk-sampling program demonstrated that there is no impact to the public or environment, through this pathway, from plant operations. Therefore, no increasing or decreasing trend exists.



FIGURE 3.3

CESIUM-137 IN MILK  
SEABROOK STATION



**FIGURE 3.3.1**  
**CESIUM-137 IN MILK**  
**ANNUAL AVERAGE CONCENTRATIONS**

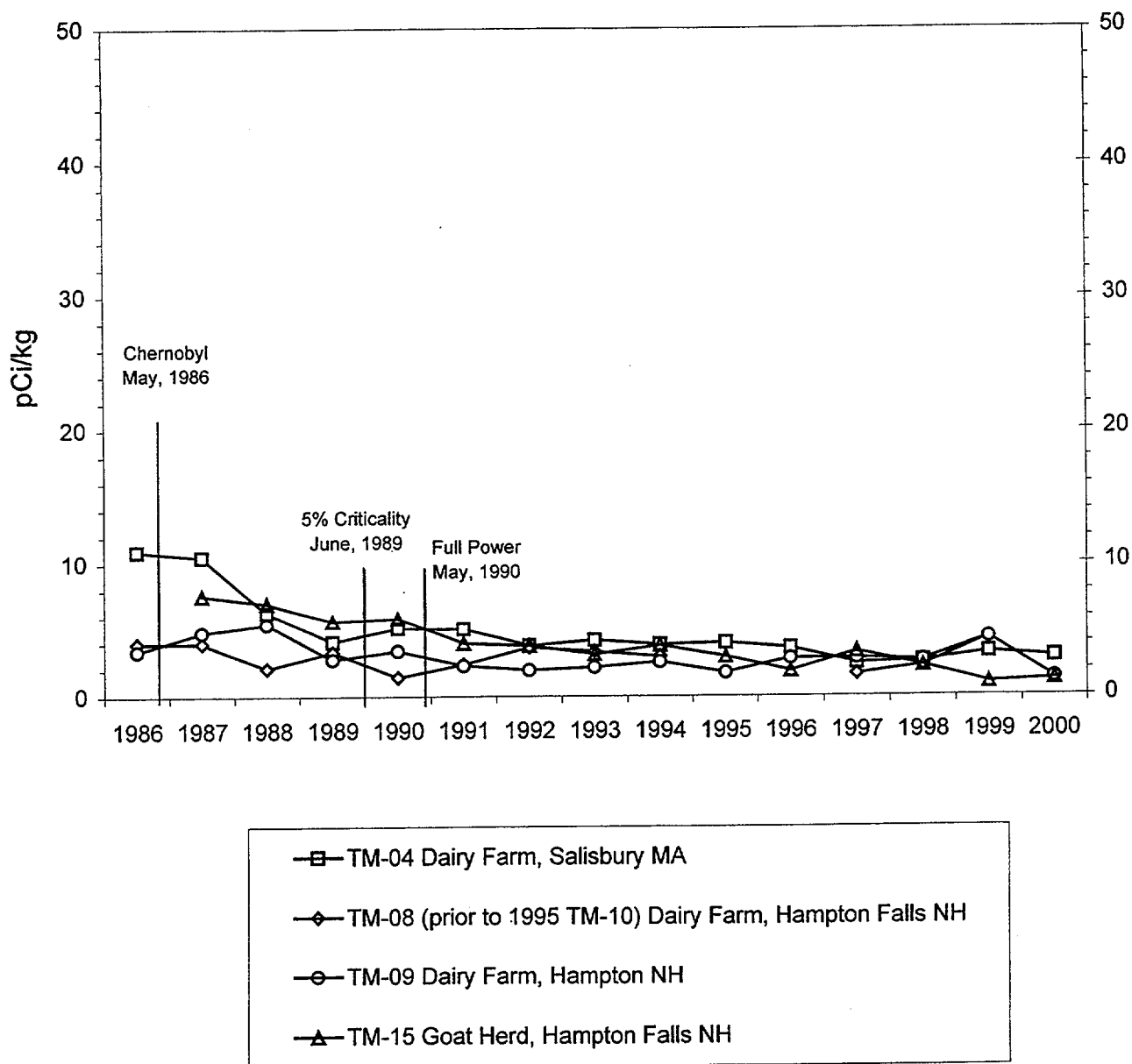


FIGURE 3.4

CESIUM -137 IN MILK  
SEABROOK STATION

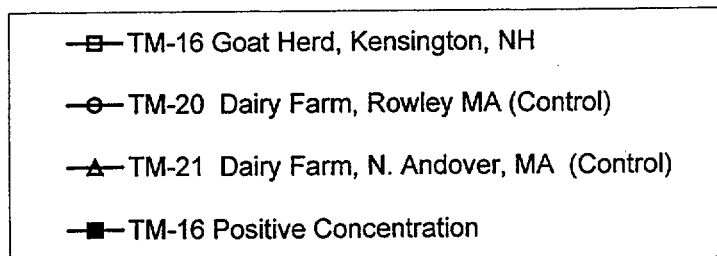
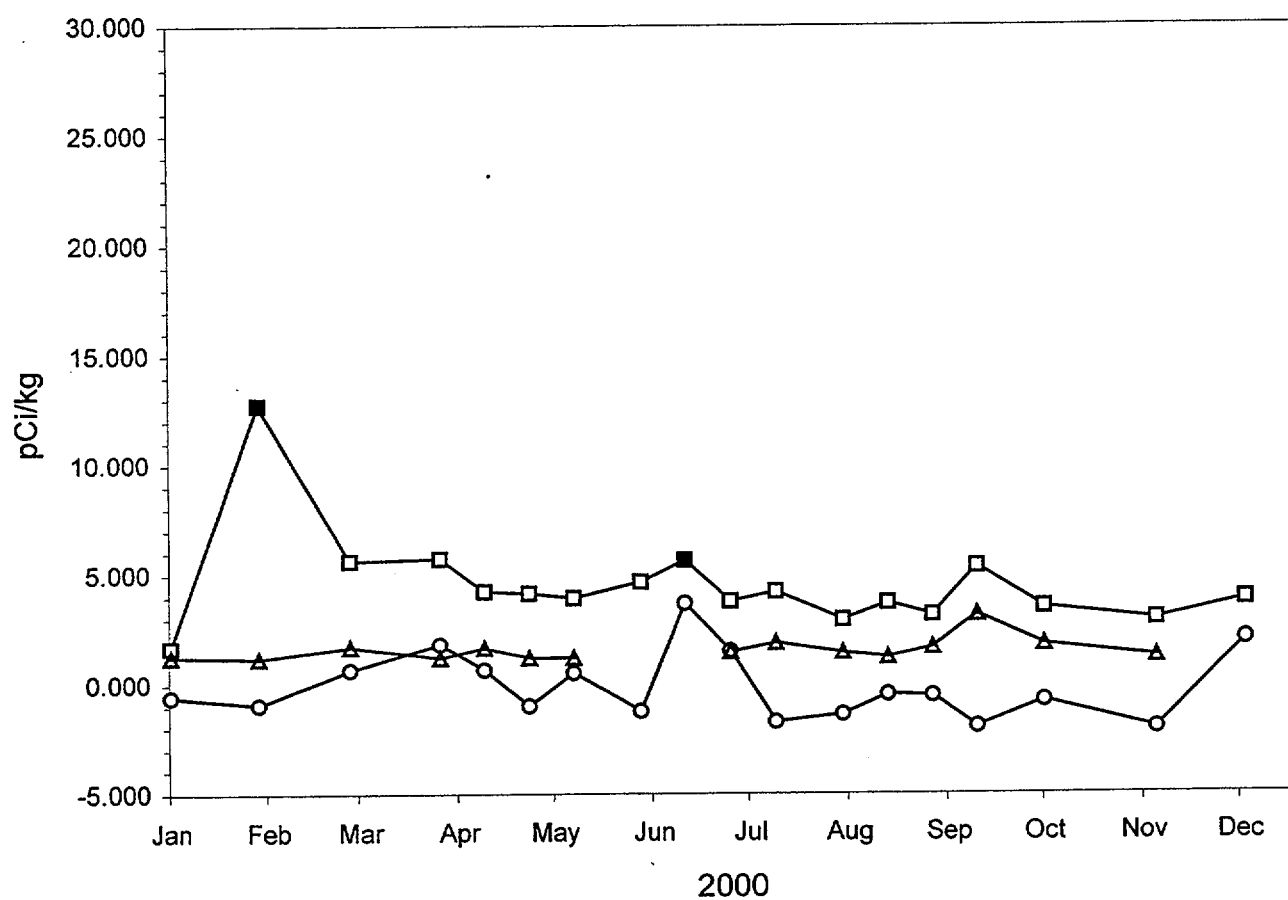
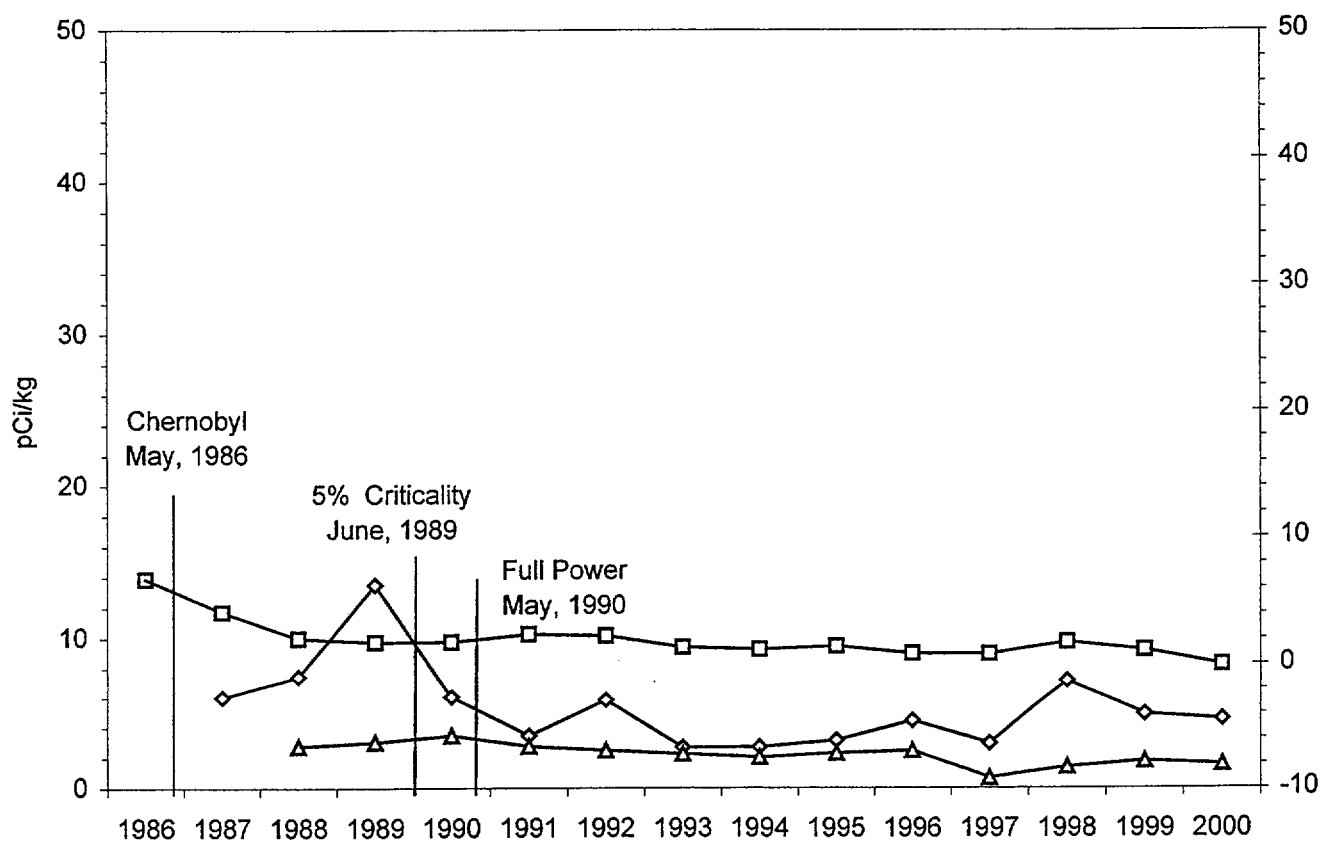


FIGURE 3.4.1  
CESIUM-137 IN MILK  
ANNUAL AVERAGE CONCENTRATIONS



- ◇— TM-16 Goat Herd, Kensington NH
- △— TM-21 Dairy Farm, N. Andover MA (Control)
- TM-20 Dairy Farm, Rowley MA (Control)

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Milk (TM)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations	Station With Highest Mean		Control Stations
		Mean, Range (No. Detected**)	Sta.	Mean Range (No. Detected**)	Mean Range (No. Detected**)
Be-7 (105) (0)		-1.6E 0 ( -4.3 - 2.4)E 1 (0/ 72)	16	3.4E 0 ( -1.2 - 1.3)E 1 (0/ 18)	-1.3E 0 ( -2.7 - 2.4)E 1 (0/ 33)
K-40 (105) (0)		1.6E 3 ( 1.2 - 2.0)E 3 (72/ 72)	16	1.9E 3 ( 1.6 - 2.0)E 3 (18/ 18)	1.4E 3 ( 1.2 - 1.7)E 3 (33/ 33)
Cr-51 (105) (0)		1.9E 0 ( -3.3 - 3.4)E 1 (0/ 72)	22	6.2E 0 ( -3.0 - 2.4)E 1 (0/ 8)	2.3E 0 ( -3.0 - 2.6)E 1 (0/ 33)
Mn-54 (105) (0)		-3.3E -2 ( -3.4 - 3.4)E 0 (0/ 72)	22	4.3E -1 ( -9.7 - 15.5)E -1 (0/ 8)	-2.2E -1 ( -3.9 - 2.3)E 0 (0/ 33)
Co-57 (105) (0)		3.0E -2 ( -3.1 - 3.7)E 0 (0/ 72)	22	5.6E -1 ( -5.7 - 19.1)E -1 (0/ 8)	3.1E -1 ( -1.5 - 3.4)E 0 (0/ 33)
Co-58 (105) (0)		-4.6E -1 ( -5.8 - 4.6)E 0 (0/ 72)	21	5.9E -3 ( -2.0 - 1.9)E 0 (0/ 7)	-2.3E -1 ( -4.9 - 4.1)E 0 (0/ 33)
Fe-59 (105) (0)		6.3E -1 ( -1.1 - 1.2)E 1 (0/ 72)	16	1.6E 0 ( -4.9 - 6.5)E 0 (0/ 18)	4.8E -1 ( -1.1 - 0.6)E 1 (0/ 33)
Co-60 (105) (0)		2.9E -1 ( -5.3 - 3.9)E 0 (0/ 72)	15	7.1E -1 ( -4.1 - 3.9)E 0 (0/ 18)	-2.2E -1 ( -2.5 - 2.8)E 0 (0/ 33)
Zn-65 (105) (0)		-2.5E 0 ( -1.8 - 1.7)E 1 (0/ 72)	21	4.0E 0 ( -1.5 - 10.9)E 0 (0/ 7)	3.5E -1 ( -1.0 - 1.1)E 1 (0/ 33)
Se-75 (105) (0)		-5.3E -2 ( -5.8 - 4.5)E 0 (0/ 72)	22	1.0E 0 ( -2.9 - 4.0)E 0 (0/ 8)	6.2E -1 ( -2.9 - 4.4)E 0 (0/ 33)
Zr-95 (105) (0)		1.8E -1 ( -6.4 - 7.5)E 0 (0/ 72)	21	1.1E 0 ( -2.0 - 3.3)E 0 (0/ 7)	-3.9E -1 ( -3.9 - 3.3)E 0 (0/ 33)
Ru-103 (105) (0)		-6.6E -1 ( -7.7 - 2.5)E 0 (0/ 72)	20	-6.2E -2 ( -1.9 - 2.9)E 0 (0/ 18)	-6.8E -1 ( -5.0 - 2.9)E 0 (0/ 33)

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Milk (TM)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations *****	Sta.	Station With Highest Mean	Control Stations
		Mean Range (No. Detected**)		Mean Range (No. Detected**)	Mean Range (No. Detected**)
Ru-106 (105) (0)		-6.2E -1 ( -3.2 - 2.9)E 1 (0/ 72)	20	8.8E 0 ( -1.0 - 2.6)E 1 (0/ 18)	5.3E 0 ( -1.2 - 3.0)E 1 (0/ 33)
Ag-110M (105) (0)		-4.3E -1 ( -7.2 - 5.4)E 0 (0/ 72)	22	5.6E -1 ( -1.9 - 4.1)E 0 (0/ 8)	-2.4E -1 ( -5.5 - 4.1)E 0 (0/ 33)
Sb-124 (105) (0)		-6.4E -1 ( -1.2 - 0.9)E 1 (0/ 72)	22	5.9E -1 ( -9.6 - 21.9)E -1 (0/ 8)	1.3E -2 ( -3.1 - 4.2)E 0 (0/ 33)
I-131 (105) (0)	1	5.1E -2 ( -1.5 - 8.5)E -1 (0/ 72)	15	8.4E -2 ( -3.2 - 85.3)E -2 (0/ 18)	3.5E -2 ( -5.6 - 13.7)E -2 (0/ 33)
Cs-134 (105) (0)	15	-7.5E -2 ( -7.5 - 3.8)E 0 (0/ 72)	20	5.4E -1 ( -3.4 - 4.3)E 0 (0/ 18)	2.6E -1 ( -3.4 - 4.3)E 0 (0/ 33)
Cs-137 (105) (0)	18	2.5E 0 ( -6.2 - 12.8)E 0 (4/ 72)	16	4.6E 0 ( 1.7 - 12.8)E 0 (2/ 18)	2.8E -2 ( -7.3 - 3.7)E 0 (0/ 33)
Ba-140 (105) (0)	15	1.1E -1 ( -5.5 - 10.0)E 0 (0/ 72)	22	2.4E 0 ( -1.7 - 4.3)E 0 (0/ 8)	8.0E -1 ( -6.1 - 7.3)E 0 (0/ 33)
Ce-141 (105) (0)		-1.1E 0 ( -6.1 - 7.7)E 0 (0/ 72)	20	-1.5E -2 ( -4.5 - 10.8)E 0 (0/ 18)	-4.7E -1 ( -8.3 - 10.8)E 0 (0/ 33)
Ce-144 (105) (0)		1.8E 0 ( -2.2 - 3.0)E 1 (0/ 72)	09	4.6E 0 ( -1.4 - 2.3)E 1 (0/ 18)	4.5E -1 ( -1.7 - 1.8)E 1 (0/ 33)
Th-232 (105) (0)		2.3E -1 ( -1.4 - 1.2)E 1 (0/ 72)	21	1.6E 0 ( -5.1 - 10.0)E 0 (0/ 7)	6.7E -1 ( -1.1 - 1.1)E 1 (0/ 33)

\* Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table A.5-3.

\*\* The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

D) Surface Water

Surface water (seawater) grab samples are required at two locations (control and indicator) monthly. The indicator (01) is over the vicinity of the plant discharge. The control location (51) is located in Ipswich Bay, MA. A gamma analysis is performed on each sample. A tritium analysis is performed on the quarterly composite of these samples.

For the year, 24-gamma analyses were performed on surface water samples. The only radionuclide detected in 2000 was naturally occurring K-40. No plant related nuclides were detected. The present data for gamma emitters in seawater is consistent with that of the pre-operational program and the last twelve years of operations. Therefore, no increasing or decreasing trend exists.

Quarterly composites from the same gamma collection samples were analyzed for tritium. Eight samples were analyzed in 2000. The monthly composites showed no presence of tritium. The composites met the required LLD (3000 pCi's/kg) for tritium in seawater. These results are consistent with preoperational tritium data.

The calculated dose, as the result of plant effluents is not evaluated due to the fact that no plant related radionuclides were or have been detected. Therefore, no increasing or decreasing trend exists. This sampling program demonstrates that there is no impact to the public or environment, through this pathway, from plant operations.

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Sea Water (WS)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)		Required LLD	Indicator Stations ***** Mean Range (No. Detected**)	Sta.	Station With Highest Mean ----- Mean Range (No. Detected**)	Control Stations ----- Mean Range (No. Detected**)
H-3	(8) (0)	3000	1.8E 2 ( -8.3 - 44.7)E 1 (0/ 4)	01	1.8E 2 ( -8.3 - 44.7)E 1 (0/ 4)	-6.0E 1 ( -3.2 - 2.2)E 2 (0/ 4)
Be-7	(24) (0)		4.6E -1 ( -1.1 - 1.3)E 1 (0/ 12)	01	4.6E -1 ( -1.1 - 1.3)E 1 (0/ 12)	-1.4E 0 ( -1.8 - 1.6)E 1 (0/ 12)
K-40	(24) (0)		3.0E 2 ( 2.3 - 3.5)E 2 (12/ 12)	01	3.0E 2 ( 2.3 - 3.5)E 2 (12/ 12)	2.8E 2 ( 2.0 - 3.4)E 2 (12/ 12)
Cr-51	(24) (0)		2.5E 0 ( -1.6 - 3.4)E 1 (0/ 12)	01	2.5E 0 ( -1.6 - 3.4)E 1 (0/ 12)	4.7E -1 ( -2.5 - 1.8)E 1 (0/ 12)
Mn-54	(24) (0)	15	-4.6E -1 ( -3.4 - 2.0)E 0 (0/ 12)	51	-4.3E -1 ( -1.8 - 1.0)E 0 (0/ 12)	-4.3E -1 ( -1.8 - 1.0)E 0 (0/ 12)
Co-57	(24) (0)		4.2E -1 ( -4.8 - 18.1)E -1 (0/ 12)	01	4.2E -1 ( -4.8 - 18.1)E -1 (0/ 12)	-2.9E -1 ( -1.3 - 1.1)E 0 (0/ 12)
Co-58	(24) (0)	15	-2.2E -1 ( -2.0 - 2.2)E 0 (0/ 12)	01	-2.2E -1 ( -2.0 - 2.2)E 0 (0/ 12)	-7.1E -1 ( -1.5 - 0.4)E 0 (0/ 12)
Fe-59	(24) (0)	30	6.3E -2 ( -3.5 - 4.9)E 0 (0/ 12)	01	6.3E -2 ( -3.5 - 4.9)E 0 (0/ 12)	-1.2E -1 ( -6.6 - 4.1)E 0 (0/ 12)
Co-60	(24) (0)	15	-3.3E -1 ( -1.6 - 1.2)E 0 (0/ 12)	51	8.4E -1 ( -5.3 - 43.2)E -1 (0/ 12)	8.4E -1 ( -5.3 - 43.2)E -1 (0/ 12)
Zn-65	(24) (0)	30	-2.4E 0 ( -6.9 - 7.3)E 0 (0/ 12)	51	-1.8E 0 ( -1.3 - 0.6)E 1 (0/ 12)	-1.8E 0 ( -1.3 - 0.6)E 1 (0/ 12)
Se-75	(24) (0)		1.5E -1 ( -2.1 - 1.5)E 0 (0/ 12)	01	1.5E -1 ( -2.1 - 1.5)E 0 (0/ 12)	-1.2E 0 ( -3.6 - 1.2)E 0 (0/ 12)
Zr-95	(24) (0)	15	2.1E -1 ( -2.1 - 2.9)E 0 (0/ 12)	01	2.1E -1 ( -2.1 - 2.9)E 0 (0/ 12)	-1.8E -1 ( -4.9 - 3.2)E 0 (0/ 12)



Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Sea Water (WS)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations	Sta.	Station With Highest Mean	Control Stations
		Mean Range (No. Detected**)		Mean Range (No. Detected**)	Mean Range (No. Detected**)
Ru-103 (24) (0)		-7.4E -1 ( -2.9 - 1.3)E 0 (0/ 12)	01	-7.4E -1 ( -2.9 - 1.3)E 0 (0/ 12)	-8.9E -1 ( -3.9 - 2.0)E 0 (0/ 12)
Ru-106 (24) (0)		3.3E 0 ( -1.4 - 2.2)E 1 (0/ 12)	01	3.3E 0 ( -1.4 - 2.2)E 1 (0/ 12)	7.6E -2 ( -1.2 - 1.9)E 1 (0/ 12)
Ag-110M (24) (0)		5.4E -1 ( -1.1 - 2.4)E 0 (0/ 12)	01	5.4E -1 ( -1.1 - 2.4)E 0 (0/ 12)	-1.6E -1 ( -2.3 - 3.0)E 0 (0/ 12)
Sb-124 (24) (0)		4.8E -1 ( -4.4 - 3.9)E 0 (0/ 12)	01	4.8E -1 ( -4.4 - 3.9)E 0 (0/ 12)	-1.6E 0 ( -5.0 - 2.9)E 0 (0/ 12)
I-131 (24) (0)	15	-1.7E -1 ( -5.5 - 4.7)E 0 (0/ 12)	51	-1.2E -1 ( -3.0 - 7.2)E 0 (0/ 12)	-1.2E -1 ( -3.0 - 7.2)E 0 (0/ 12)
Cs-134 (24) (0)	15	-2.9E -1 ( -2.4 - 1.4)E 0 (0/ 12)	51	1.5E -1 ( -2.0 - 2.8)E 0 (0/ 12)	1.5E -1 ( -2.0 - 2.8)E 0 (0/ 12)
Cs-137 (24) (0)	18	1.4E -1 ( -3.1 - 2.3)E 0 (0/ 12)	01	1.4E -1 ( -3.1 - 2.3)E 0 (0/ 12)	-2.7E -1 ( -3.4 - 1.6)E 0 (0/ 12)
Ba-140 (24) (0)	15	-6.0E -1 ( -6.3 - 3.9)E 0 (0/ 12)	51	6.9E -1 ( -1.2 - 3.3)E 0 (0/ 12)	6.9E -1 ( -1.2 - 3.3)E 0 (0/ 12)
Ce-141 (24) (0)		-7.8E -1 ( -4.2 - 2.8)E 0 (0/ 12)	51	-4.9E -1 ( -4.0 - 4.4)E 0 (0/ 12)	-4.9E -1 ( -4.0 - 4.4)E 0 (0/ 12)
Ce-144 (24) (0)		6.4E -1 ( -9.2 - 14.4)E 0 (0/ 12)	01	6.4E -1 ( -9.2 - 14.4)E 0 (0/ 12)	-3.0E 0 ( -1.9 - 0.6)E 1 (0/ 12)
Th-232 (24) (0)		1.7E -1 ( -5.1 - 6.8)E 0 (0/ 12)	01	1.7E -1 ( -5.1 - 6.8)E 0 (0/ 12)	-2.8E -1 ( -3.6 - 5.1)E 0 (0/ 12)

\* Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table A.5-3.

\*\* The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

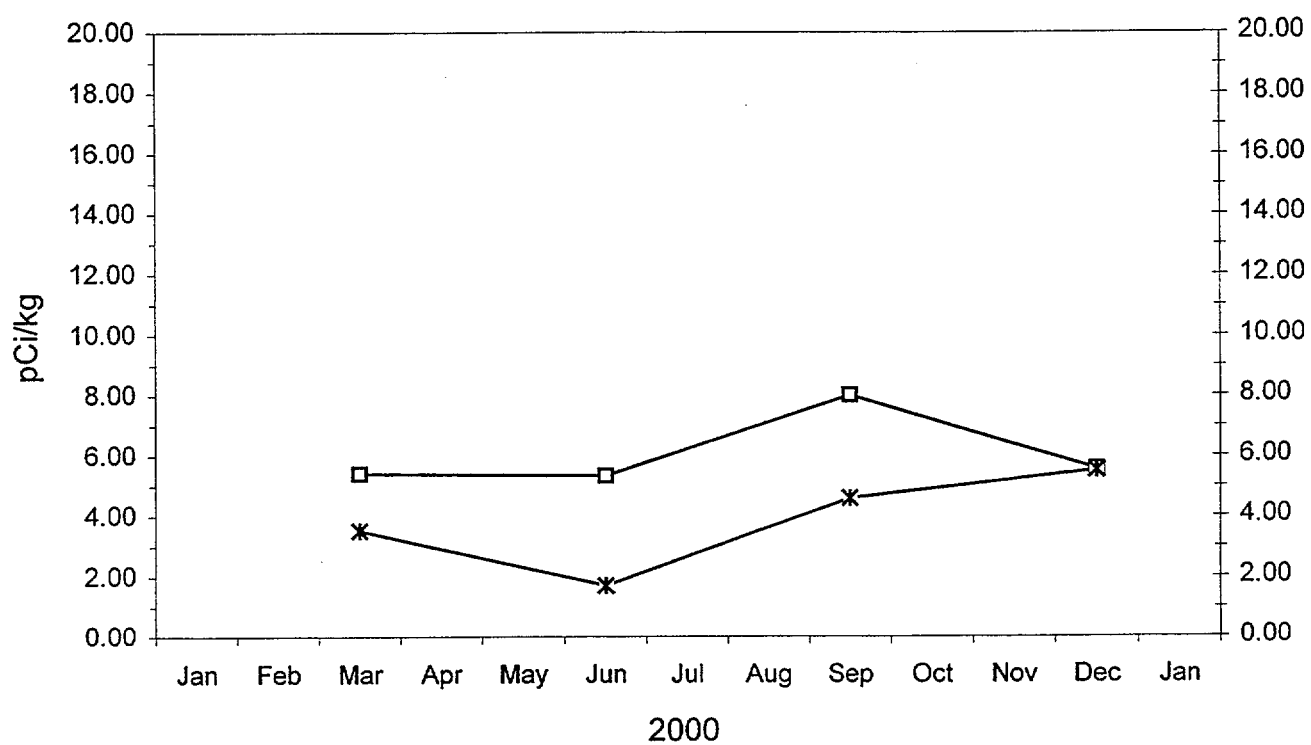
E) Ground Water

There is no requirement to collect ground water samples. For the year, four quarterly ground water samples were collected from two locations. These samples were analyzed for gross-beta activity, gamma-emitters and tritium. These samples were collected from the drinking water line supplied to the Site (by the Town of Seabrook) and from an inactive well located approximately 1 km North of the plant. One CR was generated that concerned a missed gross beta analysis for week #49. The samples were subsequently reanalyzed for the missed gross beta test.

Gross beta activity was detected in seven of the eight samples taken and is due to naturally occurring radium and its daughter products. The gross beta activity seen at both locations is similar to what was seen in the preoperational program and are consistent with results over the last ten years of commercial operations. No tritium or gamma emitters were detected. The calculated dose is not evaluated due to the fact that plant related radionuclides have not been detected. Therefore no increasing or decreasing trend exists. There is no impact to the public, through this pathway, from plant operations.

FIGURE 3.5

GROSS-BETA MEASUREMENTS OF GROUND WATER  
SEABROOK STATION

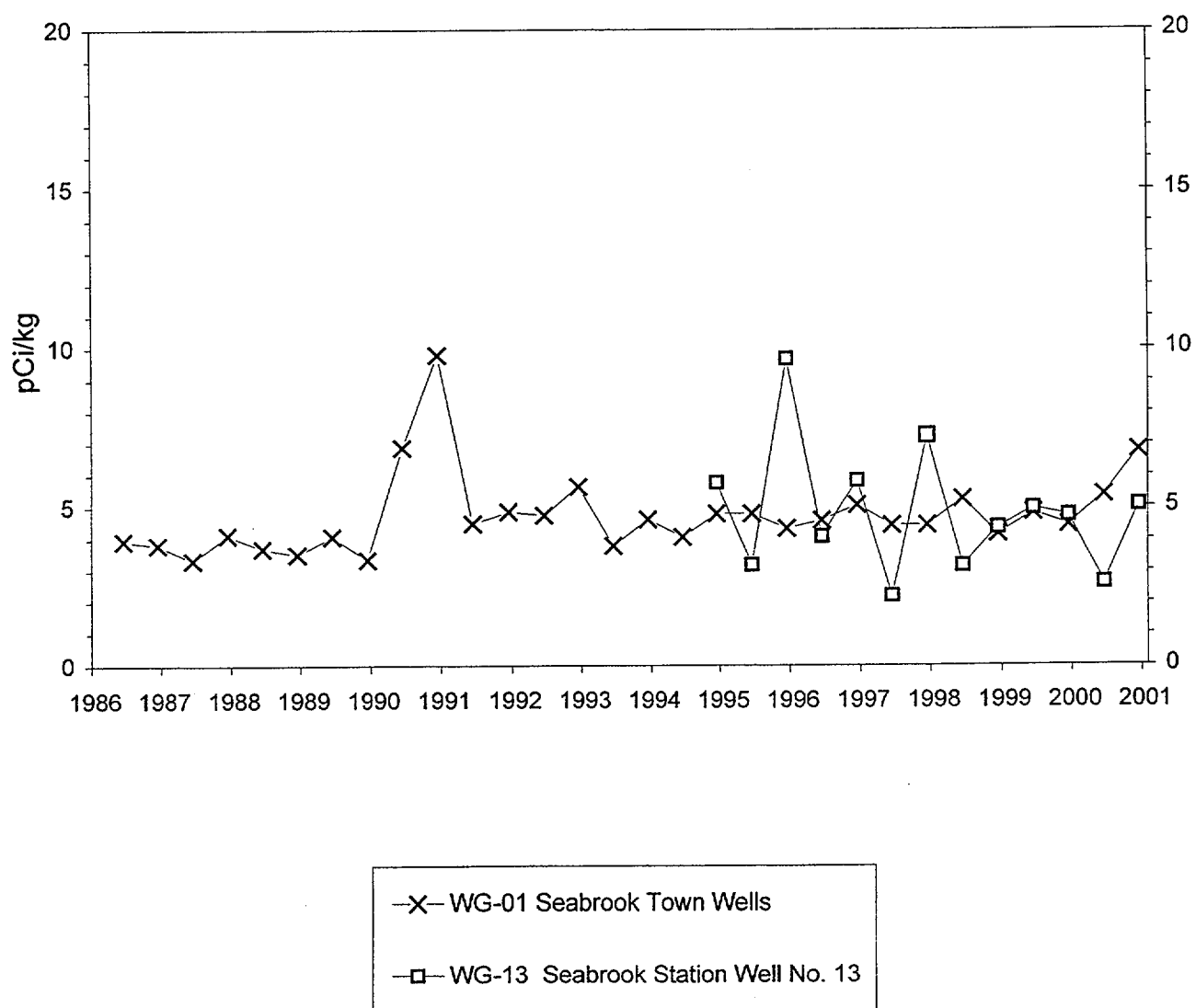


—□— WG-01 Seabrook Town Wells

—\*— WG-13 Seabrook Station Well No. 13

FIGURE 3.5.1

GROSS-BETA MEASUREMENTS OF GROUND WATER  
SEMI-ANNUAL AVERAGES  
SEABROOK STATION



Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Ground Water (WG)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations	Station With Highest Mean		Control Stations
		Mean Range (No. Detected**)	Sta.	Mean Range (No. Detected**)	Mean Range (No. Detected**)
GR-B (8) (0)	4	5.0E 0 ( 1.7 - 8.0)E 0 (7/ 8)	01	6.1E 0 ( 5.3 - 8.0)E 0 (4/ 4)	NO DATA
H-3 (8) (0)	3000	1.3E 2 ( -1.9 - 6.1)E 2 (0/ 8)	01	1.4E 2 ( -1.9 - 4.4)E 2 (0/ 4)	NO DATA
Be-7 (8) (0)		1.1E -1 ( -1.2 - 1.0)E 1 (0/ 8)	01	1.0E 0 ( -1.2 - 1.0)E 1 (0/ 4)	NO DATA
K-40 (8) (0)		-1.3E -1 ( -3.0 - 2.2)E 1 (0/ 8)	01	2.6E 0 ( -1.3 - 1.9)E 1 (0/ 4)	NO DATA
Cr-51 (8) (0)		2.3E 0 ( -2.3 - 2.5)E 1 (0/ 8)	01	5.1E 0 ( -4.1 - 25.0)E 0 (0/ 4)	NO DATA
Mn-54 (8) (0)	15	-6.7E -1 ( -2.3 - 2.2)E 0 (0/ 8)	13	-4.5E -2 ( -9.3 - 21.6)E -1 (0/ 4)	NO DATA
Co-57 (8) (0)		2.1E -1 ( -1.0 - 1.1)E 0 (0/ 8)	13	3.1E -1 ( -2.9 - 5.5)E -1 (0/ 4)	NO DATA
Co-58 (8) (0)	15	-9.8E -1 ( -3.9 - 0.5)E 0 (0/ 8)	13	-2.0E -1 ( -8.6 - 5.3)E -1 (0/ 4)	NO DATA
Fe-59 (8) (0)	30	-1.0E 0 ( -5.7 - 4.8)E 0 (0/ 8)	13	2.1E -1 ( -3.9 - 4.8)E 0 (0/ 4)	NO DATA
Co-60 (8) (0)	15	7.7E -1 ( -3.1 - 22.7)E -1 (0/ 8)	13	1.0E 0 ( -7.4 - 226.7)E -2 (0/ 4)	NO DATA
Zn-65 (8) (0)	30	2.5E 0 ( -6.5 - 17.4)E 0 (0/ 8)	01	7.7E 0 ( 1.9 - 17.4)E 0 (0/ 4)	NO DATA
Se-75 (8) (0)		-6.4E -1 ( -2.4 - 1.5)E 0 (0/ 8)	01	-5.7E -1 ( -2.3 - 1.5)E 0 (0/ 4)	NO DATA

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Ground Water (WG)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations	Station With Highest Mean		Control Stations
		Mean Range (No. Detected**)	Sta.	Mean Range (No. Detected**)	Mean Range (No. Detected**)
Zr-95 (8) (0)	15	7.4E -1 ( -3.5 - 4.9)E 0 (0/ 8)	13	1.6E 0 ( -2.4 - 4.1)E 0 (0/ 4)	NO DATA
Ru-103 (8) (0)		-5.8E -1 ( -2.2 - 0.7)E 0 (0/ 8)	13	-3.0E -1 ( -1.5 - 0.7)E 0 (0/ 4)	NO DATA
Ru-106 (8) (0)		-2.4E 0 ( -1.3 - 0.5)E 1 (0/ 8)	13	7.6E -1 ( -3.9 - 4.7)E 0 (0/ 4)	NO DATA
Ag-110M (8) (0)		-1.3E -1 ( -3.0 - 1.9)E 0 (0/ 8)	13	-8.6E -2 ( -1.4 - 1.9)E 0 (0/ 4)	NO DATA
Sb-124 (8) (0)		-1.3E 0 ( -6.9 - 4.4)E 0 (0/ 8)	01	1.7E -1 ( -4.0 - 4.4)E 0 (0/ 4)	NO DATA
I-131 (8) (0)	15	-1.4E -1 ( -3.7 - 2.3)E 0 (0/ 8)	13	2.6E -2 ( -3.4 - 2.3)E 0 (0/ 4)	NO DATA
Cs-134 (8) (0)	15	4.8E -1 ( -1.8 - 2.4)E 0 (0/ 8)	01	1.2E 0 ( -8.3 - 23.9)E -1 (0/ 4)	NO DATA
Cs-137 (8) (0)	18	-8.8E -1 ( -1.9 - 0.6)E 0 (0/ 8)	01	-5.3E -1 ( -1.9 - 0.6)E 0 (0/ 4)	NO DATA
Ba-140 (8) (0)	15	1.4E 0 ( -1.5 - 4.0)E 0 (0/ 8)	01	1.8E 0 ( -3.7 - 40.4)E -1 (0/ 4)	NO DATA
Ce-141 (8) (0)		-1.1E 0 ( -3.8 - 2.7)E 0 (0/ 8)	13	3.7E -2 ( -2.6 - 2.7)E 0 (0/ 4)	NO DATA
Ce-144 (8) (0)		2.9E 0 ( -1.4 - 1.9)E 1 (0/ 8)	01	3.6E 0 ( -9.2 - 19.2)E 0 (0/ 4)	NO DATA
Th-232 (8) (0)		6.6E -1 ( -6.9 - 13.2)E 0 (0/ 8)	01	4.3E 0 ( -2.4 - 13.2)E 0 (0/ 4)	NO DATA

\* Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table A.5-3.

\*\* The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

F) Sediment

Semiannual sediment sampling is required at one location, although a total of five locations, three indicators and two controls, are collected. The indicator stations are comprised of two beach sediment cores from Seabrook Beach and one subtidal sediment core taken from near the discharge structure. The control locations, both beach and subtidal, are both located within Ipswich Harbor. A total of 30 samples were collected for the year from all locations. Each sediment core was sectioned into 5-centimeter segments. Segment 1 extends from the top of the core to 5 centimeters, segment two extends from 5 to 10 centimeters and the third segment extends from 10 to 15 centimeters in depth. A gamma analysis was performed on each segment.

The only radionuclides detected in 2000 were naturally occurring K-40 and Th-232 with its natural daughters. Potassium-40 was detected in all core samples at all depths from all locations. Thorium-232 and its daughters were present in 14 of the 18 indicator segments and in 11 of the 12 control segments. No plant related radionuclides were detected in any segment. No increasing or decreasing trend exists. This is consistent with the preoperational program and with previous years of plant operations. There is no dose to the public or impact to the environment from any pathways associated with these media.

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Sediment (SE)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)		Indicator Stations *****		Station With Highest Mean -----		Control Stations -----
		Required LLD	Mean Range (No. Detected**)	Sta.	Mean Range (No. Detected**)	Mean Range (No. Detected**)
Be-7	(30)		-2.1E 1	07	7.9E 1	-8.5E 1
	(0)		( -4.0 - 3.4)E 2		( -3.3 - 3.4)E 2	( -3.5 - 1.4)E 2
			(0/ 18)		(0/ 6)	(0/ 12)
K-40	(30)		1.6E 4	08	1.9E 4	1.2E 4
	(0)		( 1.0 - 2.6)E 4		( 1.3 - 2.6)E 4	( 1.0 - 1.4)E 4
			(18/ 18)		(6/ 6)	(12/ 12)
Cr-51	(30)		-3.1E 1	52	1.4E 2	6.2E 1
	(0)		( -4.6 - 4.4)E 2		( -3.8 - 3.5)E 2	( -3.8 - 3.5)E 2
			(0/ 18)		(0/ 6)	(0/ 12)
Mn-54	(30)		1.2E 0	52	9.5E 0	1.4E 0
	(0)		( -3.5 - 3.7)E 1		( -8.8 - 31.3)E 0	( -3.2 - 3.1)E 1
			(0/ 18)		(0/ 6)	(0/ 12)
Co-57	(30)		9.9E -1	08	4.3E 0	-3.1E 0
	(0)		( -3.4 - 2.0)E 1		( -1.2 - 1.7)E 1	( -2.7 - 1.8)E 1
			(0/ 18)		(0/ 6)	(0/ 12)
Co-58	(30)		-5.4E 0	08	1.1E 1	-7.3E 0
	(0)		( -4.7 - 2.3)E 1		( 3.3 - 22.9)E 0	( -4.8 - 4.2)E 1
			(0/ 18)		(0/ 6)	(0/ 12)
Fe-59	(30)		-1.6E 1	57	-1.4E 1	-2.4E 1
	(0)		( -1.0 - 0.8)E 2		( -1.0 - 0.5)E 2	( -1.0 - 0.5)E 2
			(0/ 18)		(0/ 6)	(0/ 12)
Co-60	(30)		3.0E 0	08	1.1E 1	2.4E 0
	(0)		( -4.0 - 4.7)E 1		( -2.6 - 4.7)E 1	( -3.6 - 17.4)E 0
			(0/ 18)		(0/ 6)	(0/ 12)
Zn-65	(30)		1.4E 1	02	8.6E 1	3.6E 1
	(0)		( -2.1 - 2.0)E 2		( -3.1 - 19.9)E 1	( -1.3 - 2.4)E 2
			(0/ 18)		(0/ 6)	(0/ 12)
Se-75	(30)		1.2E -1	08	3.6E 0	-2.1E 0
	(0)		( -2.3 - 3.8)E 1		( -1.4 - 3.0)E 1	( -2.7 - 5.5)E 1
			(0/ 18)		(0/ 6)	(0/ 12)
Zr-95	(30)		7.7E 0	52	1.7E 1	-4.3E 0
	(0)		( -4.1 - 5.9)E 1		( 5.4 - 548.8)E -1	( -7.0 - 5.5)E 1
			(0/ 18)		(0/ 6)	(0/ 12)
Ru-103	(30)		3.8E -3	02	9.5E 0	-3.3E 0
	(0)		( -4.4 - 4.1)E 1		( -3.0 - 4.1)E 1	( -2.8 - 2.1)E 1
			(0/ 18)		(0/ 6)	(0/ 12)



Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Sediment (SE)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations *****	Sta.	Station With Highest Mean *****	Control Stations *****
		Mean Range (No. Detected**)		Mean Range (No. Detected**)	Mean Range (No. Detected**)
Ru-106 (30) (0)		-2.5E 1 ( -5.8 - 3.6)E 2 (0/ 18)	08	6.9E 1 ( -2.5 - 3.6)E 2 (0/ 6)	-6.7E 0 ( -2.6 - 3.0)E 2 (0/ 12)
Ag-110M (30) (0)		-3.5E 0 ( -4.4 - 5.2)E 1 (0/ 18)	57	1.0E 1 ( -4.8 - 5.7)E 1 (0/ 6)	9.8E -1 ( -4.8 - 5.7)E 1 (0/ 12)
Sb-124 (30) (0)		-9.0E 1 ( -6.6 - 1.8)E 2 (0/ 18)	57	-3.8E 1 ( -1.5 - 0.6)E 2 (0/ 6)	-3.1E 3 ( -3.7 - 0.0)E 4 (0/ 12)
I-131 (30) (0)		-2.2E 1 ( -1.7 - 1.9)E 2 (0/ 18)	52	3.1E 1 ( -2.0 - 1.2)E 2 (0/ 6)	1.0E 1 ( -2.0 - 1.2)E 2 (0/ 12)
Cs-134 (30) (0)	150	1.2E 1 ( -3.0 - 4.8)E 1 (0/ 18)	08	1.7E 1 ( -9.3 - 36.4)E 0 (0/ 6)	4.2E 0 ( -2.0 - 2.6)E 1 (0/ 12)
Cs-137 (30) (0)	180	-6.2E 0 ( -4.5 - 2.9)E 1 (0/ 18)	08	3.8E -1 ( -1.2 - 1.5)E 1 (0/ 6)	-1.3E 1 ( -6.8 - 2.8)E 1 (0/ 12)
Ba-140 (30) (0)		-6.7E 1 ( -6.3 - 1.3)E 2 (0/ 18)	52	3.9E 1 ( -7.4 - 21.1)E 1 (0/ 6)	3.2E 1 ( -8.5 - 21.1)E 1 (0/ 12)
Ce-141 (30) (0)		4.8E 0 ( -6.1 - 5.8)E 1 (0/ 18)	52	3.2E 1 ( -3.1 - 11.5)E 1 (0/ 6)	1.8E 1 ( -3.1 - 11.5)E 1 (0/ 12)
Ce-144 (30) (0)		-1.7E 1 ( -2.0 - 2.7)E 2 (0/ 18)	07	5.4E 1 ( -1.1 - 2.7)E 2 (0/ 6)	-2.4E 1 ( -2.1 - 1.4)E 2 (0/ 12)
Th-232 (30) (0)		5.5E 2 ( 1.4 - 14.0)E 2 (14/ 18)	52	1.5E 3 ( 9.2 - 20.1)E 2 (6/ 6)	9.2E 2 ( 9.1 - 200.6)E 1 (11/ 12)

\* Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table A.5-3.

\*\* The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

G) Fish

Semiannual fish and invertebrate samples are required from two locations. Samples were collected from two locations quarterly. This section presents the results for fish sampling only. Invertebrate results may be found in sections entitled Lobsters and Shellfish.

For week #7, Normandeau Associates, was unable to collect fish from either the indicator or control locations. Procedural collection steps were met as net towing was attempted for approximately 4 hours at the designated locations. A CR was generated. During the year, the fish species collected from station no.03 (indicator station) was Winter Flounder. Species collected from station no.53 (control station) were various non-commercial species plus Winter Flounder.

A gamma analysis was performed on each sample collected. In 2000, the only radionuclide detected in fish samples was natural occurring K-40. No plant related radionuclides were detected. No increasing or decreasing trend exists. Subsequently, there is no dose to the public or impact to the environment, through this pathway, from plant operations. This is consistent with the last twelve years of plant operations, as well as the preoperational program.

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Fish (FH)      UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)		Required LLD	Indicator Stations	Sta.	Station With Highest Mean	Control Stations
			Mean Range (No. Detected**)		Mean Range (No. Detected**)	Mean Range (No. Detected**)
Be-7	(6)		-6.2E 1	53	-1.4E 1	-1.4E 1
	(0)		( -1.2 - 0.2)E 2		( -6.4 - 4.1)E 1	( -6.4 - 4.1)E 1
			(0/ 3)		(0/ 3)	(0/ 3)
K-40	(6)		3.3E 3	03	3.3E 3	2.8E 3
	(0)		( 2.9 - 3.7)E 3		( 2.9 - 3.7)E 3	( 2.6 - 2.9)E 3
			(3/ 3)		(3/ 3)	(3/ 3)
Cr-51	(6)		8.7E 1	03	8.7E 1	-7.0E 1
	(0)		( -5.0 - 15.6)E 1		( -5.0 - 15.6)E 1	( -1.1 - 0.0)E 2
			(0/ 3)		(0/ 3)	(0/ 3)
Mn-54	(6)	130	-2.1E 0	03	-2.1E 0	-6.4E 0
	(0)		( -5.9 - 1.7)E 0		( -5.9 - 1.7)E 0	( -2.1 - 0.5)E 1
			(0/ 3)		(0/ 3)	(0/ 3)
Co-57	(6)		-1.7E 0	53	1.0E 0	1.0E 0
	(0)		( -9.3 - 3.8)E 0		( -3.5 - 7.5)E 0	( -3.5 - 7.5)E 0
			(0/ 3)		(0/ 3)	(0/ 3)
Co-58	(6)	130	-4.6E 0	53	5.4E 0	5.4E 0
	(0)		( -1.2 - 0.3)E 1		( -2.2 - 2.2)E 1	( -2.2 - 2.2)E 1
			(0/ 3)		(0/ 3)	(0/ 3)
Fe-59	(6)	260	2.6E 1	03	2.6E 1	1.7E 0
	(0)		( 1.4 - 4.2)E 1		( 1.4 - 4.2)E 1	( -2.8 - 1.7)E 1
			(0/ 3)		(0/ 3)	(0/ 3)
Co-60	(6)	130	1.4E 0	53	4.9E 0	4.9E 0
	(0)		( -6.9 - 6.8)E 0		( -2.0 - 15.6)E 0	( -2.0 - 15.6)E 0
			(0/ 3)		(0/ 3)	(0/ 3)
Zn-65	(6)	260	-1.1E 1	53	-6.2E 0	-6.2E 0
	(0)		( -1.8 - -0.7)E 1		( -2.5 - 1.4)E 1	( -2.5 - 1.4)E 1
			(0/ 3)		(0/ 3)	(0/ 3)
Se-75	(6)		-5.7E 0	53	2.6E 0	2.6E 0
	(0)		( -9.4 - -0.6)E 0		( -7.9 - 11.7)E 0	( -7.9 - 11.7)E 0
			(0/ 3)		(0/ 3)	(0/ 3)
Zr-95	(6)		6.4E -1	03	6.4E -1	-2.0E 0
	(0)		( -1.7 - 3.6)E 0		( -1.7 - 3.6)E 0	( -3.0 - 1.6)E 1
			(0/ 3)		(0/ 3)	(0/ 3)
Ru-103	(6)		-2.6E 0	53	8.5E 0	8.5E 0
	(0)		( -1.6 - 1.9)E 1		( 6.7 - 10.9)E 0	( 6.7 - 10.9)E 0
			(0/ 3)		(0/ 3)	(0/ 3)

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Fish (FH)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations	Sta.	Station With Highest Mean	Control Stations
		Mean Range (No. Detected**)		Mean Range (No. Detected**)	Mean Range (No. Detected**)
Ru-106 (6) (0)		3.9E 0 ( -1.4 - 3.2)E 1 (0/ 3)	53	3.5E 1 ( -1.4 - 10.9)E 1 (0/ 3)	3.5E 1 ( -1.4 - 10.9)E 1 (0/ 3)
Ag-110M (6) (0)		2.3E 0 ( -1.6 - 1.2)E 1 (0/ 3)	53	6.9E 0 ( -4.3 - 17.1)E 0 (0/ 3)	6.9E 0 ( -4.3 - 17.1)E 0 (0/ 3)
Sb-124 (6) (0)		1.5E 1 ( 0.0 - 2.6)E 1 (0/ 3)	03	1.5E 1 ( 0.0 - 2.6)E 1 (0/ 3)	-1.7E 1 ( -5.2 - 0.0)E 1 (0/ 3)
I-131 (6) (0)		-1.5E 1 ( -2.0 - -1.3)E 1 (0/ 3)	03	-1.5E 1 ( -2.0 - -1.3)E 1 (0/ 3)	-2.1E 1 ( -5.2 - -1.9)E 1 (0/ 3)
Cs-134 (6) (0)	130	2.8E 0 ( 0.0 - 6.4)E 0 (0/ 3)	53	5.9E 0 ( 0.0 - 8.9)E 0 (0/ 3)	5.9E 0 ( 0.0 - 8.9)E 0 (0/ 3)
Cs-137 (6) (0)	150	7.5E 0 ( 3.0 - 15.3)E 0 (0/ 3)	03	7.5E 0 ( 3.0 - 15.3)E 0 (0/ 3)	3.9E 0 ( 2.7 - 5.3)E 0 (0/ 3)
Ba-140 (6) (0)		1.3E 1 ( -2.1 - 3.8)E 1 (0/ 3)	03	1.3E 1 ( -2.1 - 3.8)E 1 (0/ 3)	-4.6E 0 ( -2.3 - 1.3)E 1 (0/ 3)
Ce-141 (6) (0)		-1.1E 1 ( -3.6 - 0.2)E 1 (0/ 3)	53	-1.0E 1 ( -2.2 - -0.3)E 1 (0/ 3)	-1.0E 1 ( -2.2 - -0.3)E 1 (0/ 3)
Ce-144 (6) (0)		-7.1E 1 ( -1.1 - 0.0)E 2 (0/ 3)	53	7.7E 0 ( -1.9 - 2.9)E 1 (0/ 3)	7.7E 0 ( -1.9 - 2.9)E 1 (0/ 3)
Th-232 (6) (0)		-1.0E 1 ( -2.8 - 1.3)E 1 (0/ 3)	53	1.3E 1 ( -1.3 - 5.0)E 1 (0/ 3)	1.3E 1 ( -1.3 - 5.0)E 1 (0/ 3)

\* Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table A.5-3.

\*\* The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

#### H) Lobsters

Semiannual fish and invertebrate samples were required from two locations. This section provides the results for one type of invertebrate - *Homarus americanus* (American lobsters). Fish and other invertebrate results may be found in the sections entitled Fish and Shellfish, respectively. Samples were collected from two locations semiannually. During the year, lobsters were collected from an indicator location near the discharge and from a control location within Ipswich Bay. A total of four samples were collected for the year.

A gamma analysis was performed on each sample. The only radionuclide detected in lobster samples in 2000 was natural occurring K-40. No plant related radionuclides were detected. Therefore, no increasing or decreasing trend exists. Subsequently, there is no dose to the public or impact to the environment, from this pathway, from plant operations. This is consistent with the last twelve years of plant operations as well as the preoperational program.

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: American Lobster (HA)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)		Required LLD	Indicator Stations	Station With Highest Mean		Control Stations
			Mean Range (No. Detected**)	Sta. Mean Range (No. Detected**)	Mean Range (No. Detected**)	
Be-7	(4) (0)		-1.6E 1 ( -3.2 - 0.1)E 1 (0/ 2)	54	5.2E 1 ( 0.0 - 1.0)E 2 (0/ 2)	5.2E 1 ( 0.0 - 1.0)E 2 (0/ 2)
K-40	(4) (0)		1.9E 3 ( 1.8 - 2.1)E 3 (2/ 2)	04	1.9E 3 ( 1.8 - 2.1)E 3 (2/ 2)	1.8E 3 ( 1.6 - 2.0)E 3 (2/ 2)
Cr-51	(4) (0)		3.5E 1 ( -1.8 - 8.8)E 1 (0/ 2)	04	3.5E 1 ( -1.8 - 8.8)E 1 (0/ 2)	-2.3E 1 ( -3.0 - -1.6)E 1 (0/ 2)
Mn-54	(4) (0)	130	-2.7E 0 ( -6.0 - 0.7)E 0 (0/ 2)	54	1.3E 0 ( -2.7 - 5.2)E 0 (0/ 2)	1.3E 0 ( -2.7 - 5.2)E 0 (0/ 2)
Co-57	(4) (0)		2.0E 0 ( -3.4 - 7.5)E 0 (0/ 2)	04	2.0E 0 ( -3.4 - 7.5)E 0 (0/ 2)	-7.5E 0 ( -1.0 - -0.5)E 1 (0/ 2)
Co-58	(4) (0)	130	-8.7E -1 ( -2.5 - 0.7)E 0 (0/ 2)	04	-8.7E -1 ( -2.5 - 0.7)E 0 (0/ 2)	-3.1E 0 ( -5.8 - -0.3)E 0 (0/ 2)
Fe-59	(4) (0)	260	1.9E 0 ( -1.8 - 2.2)E 1 (0/ 2)	54	3.8E 1 ( 2.2 - 5.4)E 1 (0/ 2)	3.8E 1 ( 2.2 - 5.4)E 1 (0/ 2)
Co-60	(4) (0)	130	1.3E 1 ( 1.2 - 1.4)E 1 (0/ 2)	04	1.3E 1 ( 1.2 - 1.4)E 1 (0/ 2)	2.0E 0 ( 1.9 - 2.0)E 0 (0/ 2)
Zn-65	(4) (0)	260	-5.2E 0 ( -1.7 - 0.7)E 1 (0/ 2)	04	-5.2E 0 ( -1.7 - 0.7)E 1 (0/ 2)	-3.1E 1 ( -3.4 - -2.7)E 1 (0/ 2)
Se-75	(4) (0)		-1.4E 1 ( -1.5 - -1.3)E 1 (0/ 2)	54	-4.0E -1 ( -2.5 - 1.7)E 0 (0/ 2)	-4.0E -1 ( -2.5 - 1.7)E 0 (0/ 2)
Zr-95	(4) (0)		-2.1E 1 ( -4.1 - -0.1)E 1 (0/ 2)	54	4.6E 0 ( -8.1 - 17.2)E 0 (0/ 2)	4.6E 0 ( -8.1 - 17.2)E 0 (0/ 2)
Ru-103	(4) (0)		1.3E 1 ( 1.0 - 1.5)E 1 (0/ 2)	04	1.3E 1 ( 1.0 - 1.5)E 1 (0/ 2)	3.1E 0 ( -9.2 - 15.4)E 0 (0/ 2)

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: American Lobster (HA)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations ***** Mean Range (No. Detected**)	Station With Highest Mean ----- Sta. Mean Range (No. Detected**)		Control Stations ----- Mean Range (No. Detected**)
Ru-106 (4) (0)		-1.7E 1 ( -4.9 - 1.4)E 1 (0/ 2)	54	2.9E 1 ( 1.4 - 4.5)E 1 (0/ 2)	2.9E 1 ( 1.4 - 4.5)E 1 (0/ 2)
Ag-110M (4) (0)		-7.4E 0 ( -1.5 - 0.0)E 1 (0/ 2)	54	-5.5E 0 ( -2.3 - 1.2)E 1 (0/ 2)	-5.5E 0 ( -2.3 - 1.2)E 1 (0/ 2)
Sb-124 (4) (0)		-1.6E 1 ( -2.2 - -0.9)E 1 (0/ 2)	54	0.0E 0 ( 0.0 - 0.0)E 0 (0/ 2)	0.0E 0 ( 0.0 - 0.0)E 0 (0/ 2)
I-131 (4) (0)		-3.3E 1 ( -3.6 - -3.0)E 1 (0/ 2)	54	-1.5E 1 ( -1.6 - -1.4)E 1 (0/ 2)	-1.5E 1 ( -1.6 - -1.4)E 1 (0/ 2)
Cs-134 (4) (0)	130	-3.3E 0 ( -9.7 - 3.2)E 0 (0/ 2)	04	-3.3E 0 ( -9.7 - 3.2)E 0 (0/ 2)	-8.2E 0 ( -9.2 - -7.2)E 0 (0/ 2)
Cs-137 (4) (0)	150	2.7E 1 ( 2.4 - 3.0)E 1 (0/ 2)	04	2.7E 1 ( 2.4 - 3.0)E 1 (0/ 2)	-9.8E -1 ( -6.9 - 5.0)E 0 (0/ 2)
Ba-140 (4) (0)		-2.8E -1 ( -4.1 - 3.6)E 0 (0/ 2)	54	1.1E 1 ( 0.0 - 2.2)E 1 (0/ 2)	1.1E 1 ( 0.0 - 2.2)E 1 (0/ 2)
Ce-141 (4) (0)		-5.6E 0 ( -9.4 - -1.7)E 0 (0/ 2)	54	-1.7E 0 ( -2.1 - 1.7)E 1 (0/ 2)	-1.7E 0 ( -2.1 - 1.7)E 1 (0/ 2)
Ce-144 (4) (0)		6.0E 1 ( 4.4 - 7.5)E 1 (0/ 2)	04	6.0E 1 ( 4.4 - 7.5)E 1 (0/ 2)	2.8E 0 ( -2.0 - 2.6)E 1 (0/ 2)
Th-232 (4) (0)		3.8E 1 ( -1.5 - 9.2)E 1 (0/ 2)	54	1.1E 2 ( 8.1 - 13.8)E 1 (0/ 2)	1.1E 2 ( 8.1 - 13.8)E 1 (0/ 2)

\* Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table A.5-3.

\*\* The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

## I) Shellfish

Semiannual fish and invertebrate samples are required from two locations. This section provides the results for shellfish samples only. Fish and other invertebrate results may be found in the sections entitled Fish and Lobsters, respectively.

During the year there were two species of mussels harvested for analysis. *Modiolus* (horse mussels) were collected, by divers, from near the discharge outfall (indicator station) and from Ipswich Bay (control). *Mytilus* (blue mussels) were collected from the intratidal areas of Seabrook Harbor (indicator) and Plum Island, MA (control). Eight samples were collected for the year.

A gamma analysis was performed on each sample. The only radionuclide detected in shellfish samples in 2000 was natural occurring K-40. No plant related radionuclides were detected. Therefore, no increasing or decreasing trend exists. Subsequently, there is no dose to the public or impact to the environment, from this pathway, from plant operations. This is consistent with the preoperational program and with previous years of plant operations.



Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Mussel (MU)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations	Sta.	Station With Highest Mean	Control Stations
		Mean Range (No. Detected**)		Mean Range (No. Detected**)	Mean Range (No. Detected**)
Be-7 (8) (0)		3.2E 1 ( -5.2 - 7.0)E 1 (0/ 4)	59	1.1E 2 ( 8.8 - 13.7)E 1 (0/ 2)	5.2E 1 ( -5.7 - 13.7)E 1 (0/ 4)
K-40 (8) (0)		1.0E 3 ( 8.4 - 12.0)E 2 (4/ 4)	56	1.4E 3 ( 1.2 - 1.7)E 3 (2/ 2)	1.4E 3 ( 1.2 - 1.7)E 3 (4/ 4)
Cr-51 (8) (0)		1.3E 0 ( -2.0 - 2.4)E 2 (0/ 4)	06	2.2E 1 ( -2.0 - 2.4)E 2 (0/ 2)	-8.7E 1 ( -2.8 - 0.0)E 2 (0/ 4)
Mn-54 (8) (0)	130	-5.5E -1 ( -3.3 - 1.8)E 0 (0/ 4)	56	2.9E 0 ( -1.1 - 1.7)E 1 (0/ 2)	-1.5E 0 ( -1.1 - 1.7)E 1 (0/ 4)
Co-57 (8) (0)		4.4E 0 ( -2.6 - 8.9)E 0 (0/ 4)	09	5.9E 0 ( 2.9 - 8.9)E 0 (0/ 2)	-1.3E 0 ( -2.6 - 0.9)E 0 (0/ 4)
Co-58 (8) (0)	130	-8.7E 0 ( -2.5 - 0.6)E 1 (0/ 4)	06	6.0E 0 ( 5.6 - 6.3)E 0 (0/ 2)	-5.3E 0 ( -1.5 - 0.4)E 1 (0/ 4)
Fe-59 (8) (0)	260	-2.9E 1 ( -5.9 - -0.7)E 1 (0/ 4)	56	2.3E 1 ( 1.5 - 3.1)E 1 (0/ 2)	1.8E 1 ( 4.5 - 30.7)E 0 (0/ 4)
Co-60 (8) (0)	130	3.4E 0 ( -3.8 - 12.4)E 0 (0/ 4)	06	4.3E 0 ( -3.8 - 12.4)E 0 (0/ 2)	7.9E -1 ( -5.9 - 11.0)E 0 (0/ 4)
Zn-65 (8) (0)	260	-1.9E 1 ( -6.4 - 3.6)E 1 (0/ 4)	06	2.8E 0 ( -3.0 - 3.6)E 1 (0/ 2)	-1.3E 1 ( -2.8 - 0.0)E 1 (0/ 4)
Se-75 (8) (0)		-4.7E 0 ( -1.9 - 0.3)E 1 (0/ 4)	59	8.5E 0 ( 8.4 - 8.7)E 0 (0/ 2)	-4.3E 0 ( -1.8 - 0.9)E 1 (0/ 4)
Zr-95 (8) (0)		2.0E 0 ( -1.9 - 2.0)E 1 (0/ 4)	06	3.4E 0 ( -9.2 - 16.1)E 0 (0/ 2)	-6.3E 0 ( -7.1 - -5.3)E 0 (0/ 4)
Ru-103 (8) (0)		-1.5E -2 ( -8.6 - 4.5)E 0 (0/ 4)	06	3.4E 0 ( 2.3 - 4.5)E 0 (0/ 2)	-2.2E 0 ( -1.1 - 0.5)E 1 (0/ 4)

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Mussel (MU)      UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations	Station With Highest Mean		Control Stations
		Mean Range (No. Detected**)	Sta.	Mean Range (No. Detected**)	Mean Range (No. Detected**)
Ru-106 (8) (0)		-7.8E 1 ( -2.1 - 0.0)E 2 (0/ 4)	59	4.3E 1 ( 3.8 - 4.8)E 1 (0/ 2)	4.0E 1 ( -7.3 - 14.8)E 1 (0/ 4)
Ag-110M (8) (0)		-4.5E 0 ( -2.6 - 0.5)E 1 (0/ 4)	09	2.5E 0 ( 0.0 - 4.9)E 0 (0/ 2)	-3.3E 0 ( -4.1 - 2.8)E 1 (0/ 4)
Sb-124 (8) (0)		-1.1E 1 ( -3.3 - 0.0)E 1 (0/ 4)	06	0.0E 0 ( 0.0 - 0.0)E 0 (0/ 2)	-1.1E 1 ( -2.4 - 1.2)E 1 (0/ 4)
I-131 (8) (0)		-3.7E 0 ( -6.1 - 3.8)E 1 (0/ 4)	59	6.2E 0 ( -7.2 - 19.6)E 0 (0/ 2)	-9.3E 0 ( -3.0 - 2.0)E 1 (0/ 4)
Cs-134 (8) (0)	130	-4.9E 0 ( -2.8 - 2.4)E 1 (0/ 4)	06	8.9E 0 ( -6.6 - 24.3)E 0 (0/ 2)	1.8E 0 ( -6.7 - 8.4)E 0 (0/ 4)
Cs-137 (8) (0)	150	1.5E 0 ( -7.3 - 6.0)E 0 (0/ 4)	06	5.4E 0 ( 4.9 - 6.0)E 0 (0/ 2)	1.1E -2 ( -1.2 - 1.5)E 1 (0/ 4)
Ba-140 (8) (0)		-7.5E 0 ( -2.3 - 1.0)E 1 (0/ 4)	06	2.8E 0 ( -4.8 - 10.4)E 0 (0/ 2)	-6.7E 0 ( -4.2 - 1.0)E 1 (0/ 4)
Ce-141 (8) (0)		-4.9E 0 ( -2.2 - 1.5)E 1 (0/ 4)	09	1.0E 1 ( 5.9 - 14.5)E 0 (0/ 2)	-1.6E 1 ( -2.5 - -0.7)E 1 (0/ 4)
Ce-144 (8) (0)		-5.7E 1 ( -1.2 - 0.2)E 2 (0/ 4)	09	-1.8E 1 ( -5.2 - 1.6)E 1 (0/ 2)	-2.3E 1 ( -9.1 - 4.3)E 1 (0/ 4)
Th-232 (8) (0)		1.4E 1 ( -3.0 - 8.4)E 1 (0/ 4)	06	3.6E 1 ( -1.3 - 8.4)E 1 (0/ 2)	-2.6E 0 ( -5.4 - 3.8)E 1 (0/ 4)

\* Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table A.5-3.

\*\* The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

J) Irish Moss

There is no requirement to collect Irish Moss samples. Semiannual Chondrus (Irish Moss) samples were collected from an indicator area near plant discharge and a control location within Ipswich Bay. Four samples were collected for the year.

A gamma analysis was performed on each sample. The only radionuclides detected in 2000 were naturally occurring Be-7 and K-40. Potassium 40 was found in all samples analyzed and Be-7 was found in one indicator sample. No plant related radionuclides were detected. Therefore no increasing or decreasing trend exists. Subsequently, there is no dose to the public or impact to the environment, through this pathway, from plant operations. This is consistent with the preoperational program and with previous years of plant operations.

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Irish Moss (AL)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)		Indicator Stations .....		Station With Highest Mean .....		Control Stations .....
		Required LLD	Mean Range (No. Detected**)	Sta.	Mean Range (No. Detected**)	Mean Range (No. Detected**)
Be-7	(4)		7.9E 1	05	7.9E 1	1.6E 1
	(0)		( 0.0 - 1.6)E 2 (1/ 2)		( 0.0 - 1.6)E 2 (1/ 2)	( -2.8 - 6.0)E 1 (0/ 2)
K-40	(4)		7.4E 3	05	7.4E 3	7.0E 3
	(0)		( 6.7 - 8.1)E 3 (2/ 2)		( 6.7 - 8.1)E 3 (2/ 2)	( 6.5 - 7.5)E 3 (2/ 2)
Cr-51	(4)		3.8E 1	55	8.0E 1	8.0E 1
	(0)		( 1.1 - 6.6)E 1 (0/ 2)		( 2.0 - 157.8)E 0 (0/ 2)	( 2.0 - 157.8)E 0 (0/ 2)
Mn-54	(4)		-3.1E 0	55	1.6E 0	1.6E 0
	(0)		( -5.0 - -1.1)E 0 (0/ 2)		( -8.3 - 39.7)E -1 (0/ 2)	( -8.3 - 39.7)E -1 (0/ 2)
Co-57	(4)		-2.6E 0	55	6.0E 0	6.0E 0
	(0)		( -4.0 - -1.2)E 0 (0/ 2)		( -2.1 - 121.9)E -1 (0/ 2)	( -2.1 - 121.9)E -1 (0/ 2)
Co-58	(4)		-2.5E 0	05	-2.5E 0	-4.5E 0
	(0)		( -4.7 - -0.2)E 0 (0/ 2)		( -4.7 - -0.2)E 0 (0/ 2)	( -1.1 - 0.2)E 1 (0/ 2)
Fe-59	(4)		-6.9E 0	55	2.7E 1	2.7E 1
	(0)		( -8.7 - -5.1)E 0 (0/ 2)		( -6.8 - 60.6)E 0 (0/ 2)	( -6.8 - 60.6)E 0 (0/ 2)
Co-60	(4)		-3.7E 0	55	2.5E 0	2.5E 0
	(0)		( -7.9 - 0.6)E 0 (0/ 2)		( -1.9 - 52.4)E -1 (0/ 2)	( -1.9 - 52.4)E -1 (0/ 2)
Zn-65	(4)		-1.0E 0	05	-1.0E 0	-3.1E 1
	(0)		( -2.4 - 2.2)E 1 (0/ 2)		( -2.4 - 2.2)E 1 (0/ 2)	( -6.3 - 0.1)E 1 (0/ 2)
Se-75	(4)		3.7E 0	05	3.7E 0	2.5E 0
	(0)		( 2.2 - 5.1)E 0 (0/ 2)		( 2.2 - 5.1)E 0 (0/ 2)	( -2.2 - 7.3)E 0 (0/ 2)
Zr-95	(4)		8.8E -1	55	3.3E 0	3.3E 0
	(0)		( -3.1 - 4.9)E 0 (0/ 2)		( -2.0 - 8.5)E 0 (0/ 2)	( -2.0 - 8.5)E 0 (0/ 2)
Ru-103	(4)		-1.4E 0	55	9.3E -1	9.3E -1
	(0)		( -7.4 - 4.7)E 0 (0/ 2)		( -1.9 - 3.8)E 0 (0/ 2)	( -1.9 - 3.8)E 0 (0/ 2)

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Irish Moss (AL)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations	Sta.	Station With Highest Mean	Control Stations
		Mean Range (No. Detected**)		Mean Range (No. Detected**)	Mean Range (No. Detected**)
Ru-106 (4) (0)		-2.3E 1 ( -2.8 - -1.7)E 1 (0/ 2)	55	8.3E 1 ( 3.5 - 13.1)E 1 (0/ 2)	8.3E 1 ( 3.5 - 13.1)E 1 (0/ 2)
Ag-110M (4) (0)		5.2E 0 ( -6.7 - 17.1)E 0 (0/ 2)	55	7.8E 0 ( -2.0 - 17.5)E 0 (0/ 2)	7.8E 0 ( -2.0 - 17.5)E 0 (0/ 2)
Sb-124 (4) (0)		-8.0E 0 ( -1.6 - 0.0)E 1 (0/ 2)	55	3.6E 0 ( 0.0 - 7.2)E 0 (0/ 2)	3.6E 0 ( 0.0 - 7.2)E 0 (0/ 2)
I-131 (4) (0)		-3.0E 1 ( -4.9 - -1.0)E 1 (0/ 2)	55	-1.3E 1 ( -5.2 - 2.6)E 1 (0/ 2)	-1.3E 1 ( -5.2 - 2.6)E 1 (0/ 2)
Cs-134 (4) (0)		-4.4E 0 ( -6.7 - -2.0)E 0 (0/ 2)	55	6.9E 0 ( 3.1 - 10.8)E 0 (0/ 2)	6.9E 0 ( 3.1 - 10.8)E 0 (0/ 2)
Cs-137 (4) (0)		-2.2E 0 ( -6.2 - 1.7)E 0 (0/ 2)	55	-5.9E -1 ( -3.0 - 1.8)E 0 (0/ 2)	-5.9E -1 ( -3.0 - 1.8)E 0 (0/ 2)
Ba-140 (4) (0)		4.9E 0 ( 1.4 - 8.4)E 0 (0/ 2)	55	2.2E 1 ( 4.1 - 40.5)E 0 (0/ 2)	2.2E 1 ( 4.1 - 40.5)E 0 (0/ 2)
Ce-141 (4) (0)		9.8E 0 ( 8.2 - 11.4)E 0 (0/ 2)	05	9.8E 0 ( 8.2 - 11.4)E 0 (0/ 2)	5.7E 0 ( 4.7 - 6.8)E 0 (0/ 2)
Ce-144 (4) (0)		-1.8E 1 ( -4.6 - 1.0)E 1 (0/ 2)	55	2.8E 0 ( -9.7 - 65.0)E -1 (0/ 2)	2.8E 0 ( -9.7 - 65.0)E -1 (0/ 2)
Th-232 (4) (0)		1.8E 1 ( 1.6 - 1.9)E 1 (0/ 2)	05	1.8E 1 ( 1.6 - 1.9)E 1 (0/ 2)	4.1E 0 ( -2.5 - 3.3)E 1 (0/ 2)

\* Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table A.5-3.

\*\* The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.

K) Food Crop

There is no requirement for food crop samples as long as the required milk locations are available. Samples were collected from three to four locations in the growing season months. Strawberries (June), green beans (July), and corn (August) were collected. For the month of July only two locations had food crops available. For the year, a total of nine samples were collected.

A gamma analysis was performed on each sample. The only radionuclide detected in 2000 was natural occurring K-40. Potassium 40 was detected at all locations both indicator and control for the three months sampled. Potassium 40 was not detected at the control station for the June time period. No plant related radionuclides were detected. Therefore, no increasing or decreasing trend exists. Subsequently, there is no dose to the public or impact on the environment, through this pathway, from plant operations. This is consistent with the preoperational program and with previous years of plant operations.

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Food Crop (TF)    UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)		Indicator Stations *****		Station With Highest Mean *****		Control Stations *****
		Required LLD	Mean Range (No. Detected**)	Sta.	Mean Range (No. Detected**)	Mean Range (No. Detected**)
Be-7	(9) (0)		1.0E 1 ( -4.0 - 10.3)E 1 (0/ 7)	02	2.9E 1 ( -1.8 - 10.3)E 1 (0/ 3)	-2.5E -1 ( -1.3 - 1.2)E 1 (0/ 2)
K-40	(9) (0)		1.8E 3 ( 1.2 - 2.2)E 3 (7/ 7)	03	1.9E 3 ( 1.4 - 2.2)E 3 (3/ 3)	1.6E 3 ( 1.0 - 2.2)E 3 (2/ 2)
Cr-51	(9) (0)		2.8E 1 ( -3.7 - 7.0)E 1 (0/ 7)	01	6.7E 1 (0/ 1)	2.7E 1 ( -3.6 - 9.1)E 1 (0/ 2)
Mn-54	(9) (0)		-5.9E -1 ( -1.4 - 1.6)E 1 (0/ 7)	01	3.2E 0 (0/ 1)	5.4E -1 ( -6.3 - 17.1)E -1 (0/ 2)
Co-57	(9) (0)		2.5E 0 ( -7.3 - 8.9)E 0 (0/ 7)	01	3.9E 0 (0/ 1)	-4.7E 0 ( -8.1 - -1.3)E 0 (0/ 2)
Co-58	(9) (0)		-3.2E 0 ( -1.5 - 1.1)E 1 (0/ 7)	02	-6.2E -1 ( -1.5 - 1.1)E 1 (0/ 3)	-5.2E 0 ( -1.1 - 0.1)E 1 (0/ 2)
Fe-59	(9) (0)		5.6E 0 ( -1.9 - 3.8)E 1 (0/ 7)	03	1.7E 1 ( 6.1 - 37.5)E 0 (0/ 3)	7.5E 0 ( -2.0 - 3.5)E 1 (0/ 2)
Co-60	(9) (0)		1.9E -1 ( -9.7 - 18.9)E 0 (0/ 7)	03	4.5E 0 ( -7.9 - 18.9)E 0 (0/ 3)	4.4E 0 ( -2.0 - 10.8)E 0 (0/ 2)
Zn-65	(9) (0)		-3.0E 0 ( -4.6 - 5.0)E 1 (0/ 7)	03	2.7E 1 ( 0.0 - 5.0)E 1 (0/ 3)	-5.3E 1 ( -7.4 - -3.1)E 1 (0/ 2)
Se-75	(9) (0)		2.5E 0 ( -4.3 - 10.1)E 0 (0/ 7)	06	9.5E 0 ( 5.9 - 13.2)E 0 (0/ 2)	9.5E 0 ( 5.9 - 13.2)E 0 (0/ 2)
Zr-95	(9) (0)		1.4E 1 ( -1.5 - 3.6)E 1 (0/ 7)	02	2.5E 1 ( 8.4 - 35.9)E 0 (0/ 3)	1.7E 1 ( -7.3 - 40.8)E 0 (0/ 2)
Ru-103	(9) (0)		4.9E 0 ( -1.8 - 2.0)E 1 (0/ 7)	06	1.2E 1 ( 1.1 - 1.3)E 1 (0/ 2)	1.2E 1 ( 1.1 - 1.3)E 1 (0/ 2)

Radiological Environmental Program Summary  
Seabrook Nuclear Power Station, Seabrook, NH  
(January - December 2000)

MEDIUM: Food Crop (TF)      UNITS: pCi/kg

Radionuclides (No. Analyses) (Non-Routine*)	Required LLD	Indicator Stations *****	Station With Highest Mean		Control Stations
		Mean Range (No. Detected**)	Sta.	Mean Range (No. Detected**)	Mean Range (No. Detected**)
Ru-106 (9) (0)		-2.3E 1 ( -1.6 - 1.1)E 2 (0/ 7)	01	1.1E 1 (0/ 1)	-6.6E 1 ( -1.0 - -0.3)E 2 (0/ 2)
Ag-110M (9) (0)		1.3E 0 ( -1.2 - 1.2)E 1 (0/ 7)	01	9.4E 0 (0/ 1)	3.7E 0 ( 0.0 - 7.4)E 0 (0/ 2)
Sb-124 (9) (0)		5.9E 0 ( -2.7 - 2.7)E 1 (0/ 7)	06	2.0E 1 ( -1.3 - 5.3)E 1 (0/ 2)	2.0E 1 ( -1.3 - 5.3)E 1 (0/ 2)
I-131 (9) (0)	60	-1.7E 1 ( -6.0 - 2.1)E 1 (0/ 7)	01	2.1E 1 (0/ 1)	-6.3E 0 ( -2.6 - 1.4)E 1 (0/ 2)
Cs-134 (9) (0)	60	6.0E 0 ( -9.7 - 11.6)E 0 (0/ 7)	02	1.1E 1 ( 1.1 - 1.2)E 1 (0/ 3)	2.3E -1 ( -1.1 - 1.2)E 1 (0/ 2)
Cs-137 (9) (0)	80	-4.6E 0 ( -1.4 - 0.3)E 1 (0/ 7)	06	1.1E 1 ( 1.1 - 1.2)E 1 (0/ 2)	1.1E 1 ( 1.1 - 1.2)E 1 (0/ 2)
Ba-140 (9) (0)		-1.5E 1 ( -6.2 - 1.6)E 1 (0/ 7)	01	1.6E 1 (0/ 1)	1.3E 1 ( 5.2 - 20.6)E 0 (0/ 2)
Ce-141 (9) (0)		8.4E -1 ( -2.2 - 1.9)E 1 (0/ 7)	01	1.9E 1 (0/ 1)	-3.0E 0 ( -2.8 - 2.2)E 1 (0/ 2)
Ce-144 (9) (0)		-2.3E 1 ( -5.1 - 2.2)E 1 (0/ 7)	01	-2.0E 1 (0/ 1)	-2.4E 1 ( -7.5 - 2.6)E 1 (0/ 2)
Th-232 (9) (0)		8.5E 0 ( -7.6 - 7.5)E 1 (0/ 7)	03	4.2E 1 ( -1.3 - 7.5)E 1 (0/ 3)	-5.8E 0 ( -2.1 - 1.0)E 1 (0/ 2)

\* Non-Routine refers to those radionuclides that exceeded the Reporting Levels in ODCM Table A.5-3.

\*\* The fraction of sample analyses yielding detectable measurements (i.e. >3 standard deviations) is shown in parentheses.



L) Direct Radiation

Direct gamma radiation exposure was measured with thermoluminescent dosimeters (TLDs). Two Panasonic UD-814 TLD badges are placed at each of the monitoring stations. Each TLD badge has 3  $\text{CaSO}_4:\text{Tm}$  elements. A total of forty-seven stations are located offsite, forty of which are required. The badges were collected and readout on a quarterly schedule. The exposure rates were normalized to a 91-day quarter. A summary of the data is shown in Table 3.1. Overall, the REMP direct radiation program showed no indication of increased direct radiation above background either within the owner-controlled area or beyond the site boundary. This is demonstrated by the fact that indicator location results are statistically identical to control locations. The annual mean of all indicator locations was 16.1 mrem while the mean of all control locations was 17.6 mrem. This verifies that there is no difference in the annual dose as a function of distance from the plant. The 2000 TLD direct radiation program, when compared to the previous years of operational data and the pre-operational program, shows no significant trends relative to increased dose rates in the environment.

In the first quarter, TLD badge #9 located 1.1 km from the Plant (in the Southern sector) was missing at the time of change out. A CR was initiated. No further corrective actions were implemented. In the fourth quarter, TLD Badge #23 located 8.1 km from the Plant (in the Southern Sector) was also missing at time of change out. A CR was initiated. No further corrective actions were initiated.

The direct radiation-monitoring program demonstrated that there was no offsite dose to the public or impact to the environment from the operation of the plant.

TABLE 3.1

Environmental TLD Measurements  
Net Exposure in mR/Standard Quarter (91 days)  
2000

Sta. No.	Description	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Annual
		Exp.	S.D.	Exp.	S.D.	Exp.	S.D.	Exp.	S.D.	Ave. Exp.
TL-01	Brimmer's Lane	14.9 ± 0.8		15.0 ± 0.6		16.4 ± 0.7		16.4 ± 0.4		15.7
TL-02	Landing Road	13.8 ± 0.5		13.3 ± 0.5		15.0 ± 0.5		15.5 ± 0.5		14.4
TL-03	Glade Path	14.9 ± 0.7		14.4 ± 0.6		15.7 ± 0.6		15.9 ± 0.6		15.2
TL-04	Island Path	14.6 ± 0.5		14.0 ± 0.6		15.7 ± 0.5		15.4 ± 0.5		14.9
TL-05	Harbor Road	15.0 ± 0.6		14.1 ± 0.6		15.4 ± 0.6		16.5 ± 0.8		15.3
TL-06	Barge Landing	13.5 ± 0.7		13.0 ± 0.5		14.2 ± 0.6		14.7 ± 0.5		13.9
TL-07	Cross Road	12.7 ± 0.5		12.3 ± 0.5		13.3 ± 0.5		13.9 ± 0.5		13.1
TL-08	Farm Lane	14.9 ± 0.6		14.4 ± 0.6		15.6 ± 0.5		15.8 ± 0.6		15.2
TL-09	Farm Lane	(1)		15.3 ± 0.9		16.8 ± 0.7		16.9 ± 0.9		16.3
TL-10	Site Boundary	16.5 ± 0.7		16.1 ± 0.8		17.6 ± 0.6		18.1 ± 0.9		17.1
TL-11	Site Boundary	13.3 ± 0.6		13.6 ± 0.4		15.0 ± 0.6		15.0 ± 0.4		14.2
TL-12	Site Boundary	17.7 ± 0.7		17.7 ± 0.7		19.2 ± 0.8		19.4 ± 0.6		18.5
TL-13	Inside Site Boundary	18.4 ± 0.8		17.9 ± 1.1		19.3 ± 0.6		20.8 ± 0.6		19.1
TL-14	Trailer Park	15.4 ± 1.0		14.7 ± 0.5		15.8 ± 0.6		16.1 ± 0.6		15.5
TL-15	Brimmer's Lane	14.3 ± 0.9		14.3 ± 0.5		16.9 ± 0.5		16.4 ± 0.4		15.5
TL-16	Brimmer's Lane	13.1 ± 0.6		13.0 ± 0.4		14.8 ± 0.7		14.6 ± 0.7		13.9
TL-17	South Road	14.3 ± 0.6		15.0 ± 0.6		16.1 ± 0.8		16.1 ± 0.5		15.4
TL-18	Mill Road	13.7 ± 0.7		14.0 ± 0.5		16.0 ± 1.0		15.7 ± 0.6		14.9
TL-19	Appledore Avenue	14.5 ± 0.7		14.6 ± 0.6		16.4 ± 0.6		16.6 ± 0.6		15.5
TL-20	Ashworth Avenue	17.4 ± 0.8		17.4 ± 0.8		18.9 ± 0.6		20.5 ± 0.8		18.6
TL-21	Route 1A	15.6 ± 0.8		15.6 ± 0.6		16.6 ± 0.8		17.1 ± 0.6		16.2
TL-22	Cable Avenue	16.4 ± 0.8		15.9 ± 0.6		17.6 ± 0.7		17.7 ± 0.6		16.9
TL-23	Ferry Road	14.4 ± 1.0		14.6 ± 0.9		15.9 ± 0.7		(1)		15.0
TL-24	Ferry Lots Lane	14.2 ± 0.7		14.3 ± 0.6		16.3 ± 0.7		15.4 ± 0.4		15.1
TL-25	Elm Street	16.3 ± 0.6		15.4 ± 0.7		16.8 ± 0.6		17.8 ± 0.6		16.6
TL-26	Route 107A	16.1 ± 1.1		16.5 ± 0.7		17.2 ± 0.7		18.0 ± 0.6		17.0
TL-27	Highland Street	15.5 ± 0.6		15.8 ± 0.7		16.9 ± 1.0		16.9 ± 1.0		16.3
TL-28	Route 150	15.6 ± 1.0		16.7 ± 0.8		17.3 ± 0.6		17.8 ± 0.5		16.9
TL-29	Frying Pan Lane	14.9 ± 0.7		15.6 ± 0.6		16.5 ± 0.6		16.6 ± 0.5		15.9
TL-30	Route 27	14.1 ± 0.7		15.9 ± 0.8		16.8 ± 0.9		16.6 ± 0.6		15.9
TL-31	Alumni Drive	13.8 ± 0.5		14.6 ± 0.7		16.2 ± 0.5		15.8 ± 0.8		15.1
TL-32	SB Elementary School	16.5 ± 0.6		17.1 ± 0.6		18.2 ± 0.7		17.7 ± 0.6		17.4
TL-33	Dock Area	18.3 ± 0.8		18.2 ± 0.8		18.5 ± 0.6		19.6 ± 0.6		18.7

TABLE 3.1

Environmental TLD Measurements  
Net Exposure in mR/Standard Quarter (91 days)  
2000

Sta. No.	Description	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter		Annual
		<u>Exp.</u>	<u>S.D.</u>	<u>Exp.</u>	<u>S.D.</u>	<u>Exp.</u>	<u>S.D.</u>	<u>Exp.</u>	<u>S.D.</u>	<u>Ave. Exp.</u>
TL-34	Bow Street	18.3	± 1.0	19.6	± 0.9	20.0	± 0.7	20.4	± 0.7	19.6
TL-35	Lincoln Ack. School	17.5	± 0.7	18.0	± 0.7	19.5	± 0.8	19.6	± 1.2	18.7
TL-36	Route 97 (Control)	16.2	± 0.7	16.6	± 0.8	17.3	± 0.5	17.7	± 0.6	17.0
TL-37	Plaistow, NH (Control)	17.3	± 0.8	17.9	± 0.6	19.2	± 0.7	19.1	± 0.6	18.4
TL-38	Hampstead, NH (Control)	20.0	± 1.0	20.0	± 1.1	21.5	± 0.7	20.9	± 0.6	20.6
TL-39	Fremont, NH (Control)	18.7	± 1.0	18.3	± 0.6	20.0	± 0.9	20.1	± 0.5	19.3
TL-40	Newmarket, NH (Control)	15.5	± 0.8	17.0	± 0.9	18.0	± 0.6	18.5	± 0.9	17.3
TL-41	Portsmouth, NH (Control)	14.4	± 0.7	15.4	± 0.8	16.7	± 0.5	16.5	± 0.6	15.8
TL-42	Ipswich, MA (Control)	13.9	± 0.6	14.4	± 0.5	15.0	± 0.6	15.3	± 0.4	14.7
TL-43	Rocks Road Landing	13.3	± 0.5	14.3	± 0.6	15.4	± 0.6	15.0	± 0.4	14.5
TL-44	SB Education Center	14.4	± 0.6	14.9	± 0.8	16.1	± 0.7	15.8	± 0.9	15.3
TL-45	Hampton Fire Station	16.9	± 0.8	17.5	± 0.5	18.4	± 0.6	18.7	± 0.6	17.9
TL-46	SB Police Station	16.6	± 0.7	16.8	± 0.7	18.0	± 0.6	17.8	± 0.7	17.3
TL-47	Route 84	15.4	± 0.8	15.8	± 0.7	17.4	± 0.7	16.7	± 0.6	16.3
Mean of Indicators		15.3		15.4		16.7		17.0		16.1
Mean of Controls		16.6		17.1		18.2		18.3		17.6

(1) TLD Missing

FIGURE 3.6

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

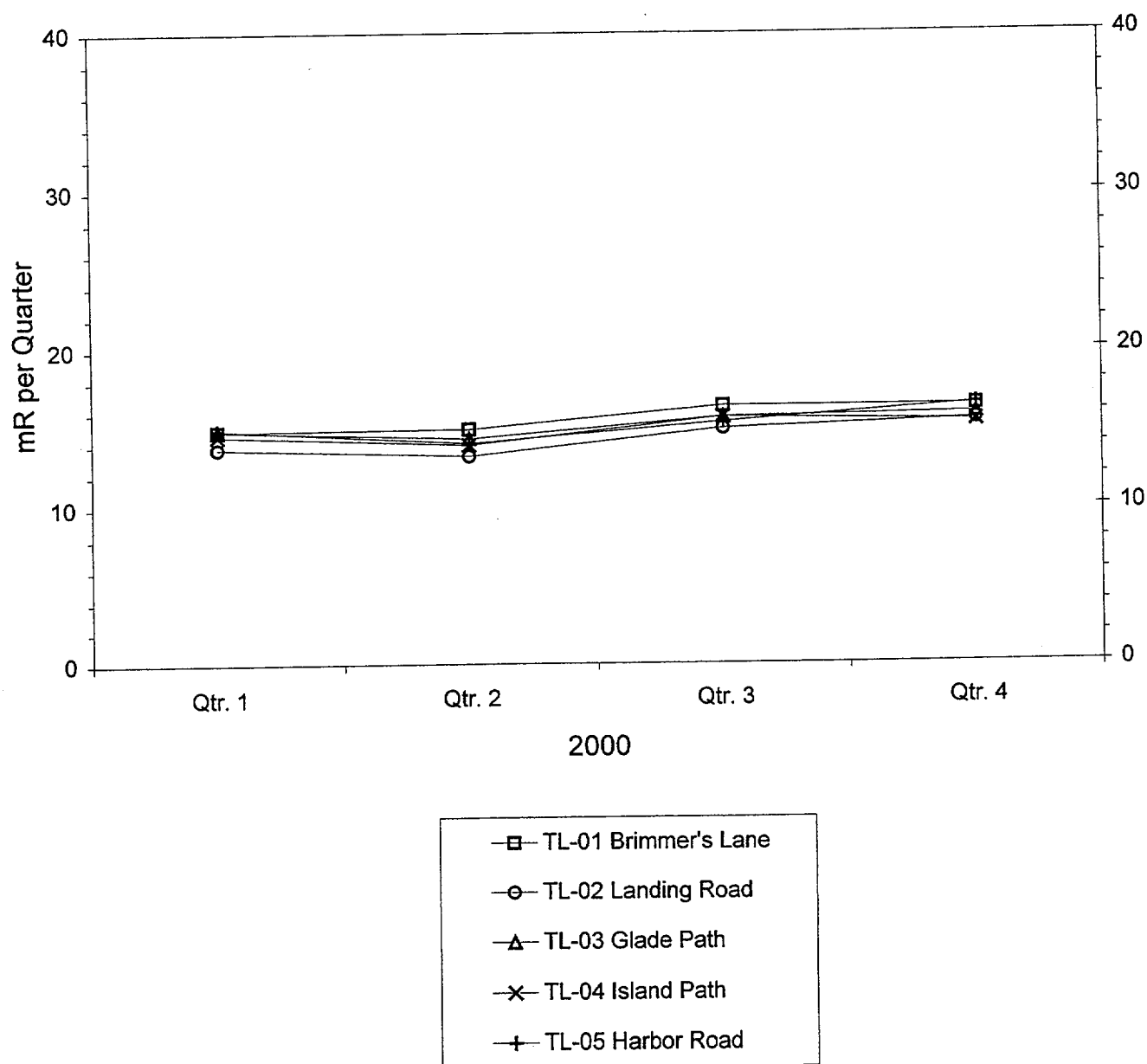


FIGURE 3.6.1

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

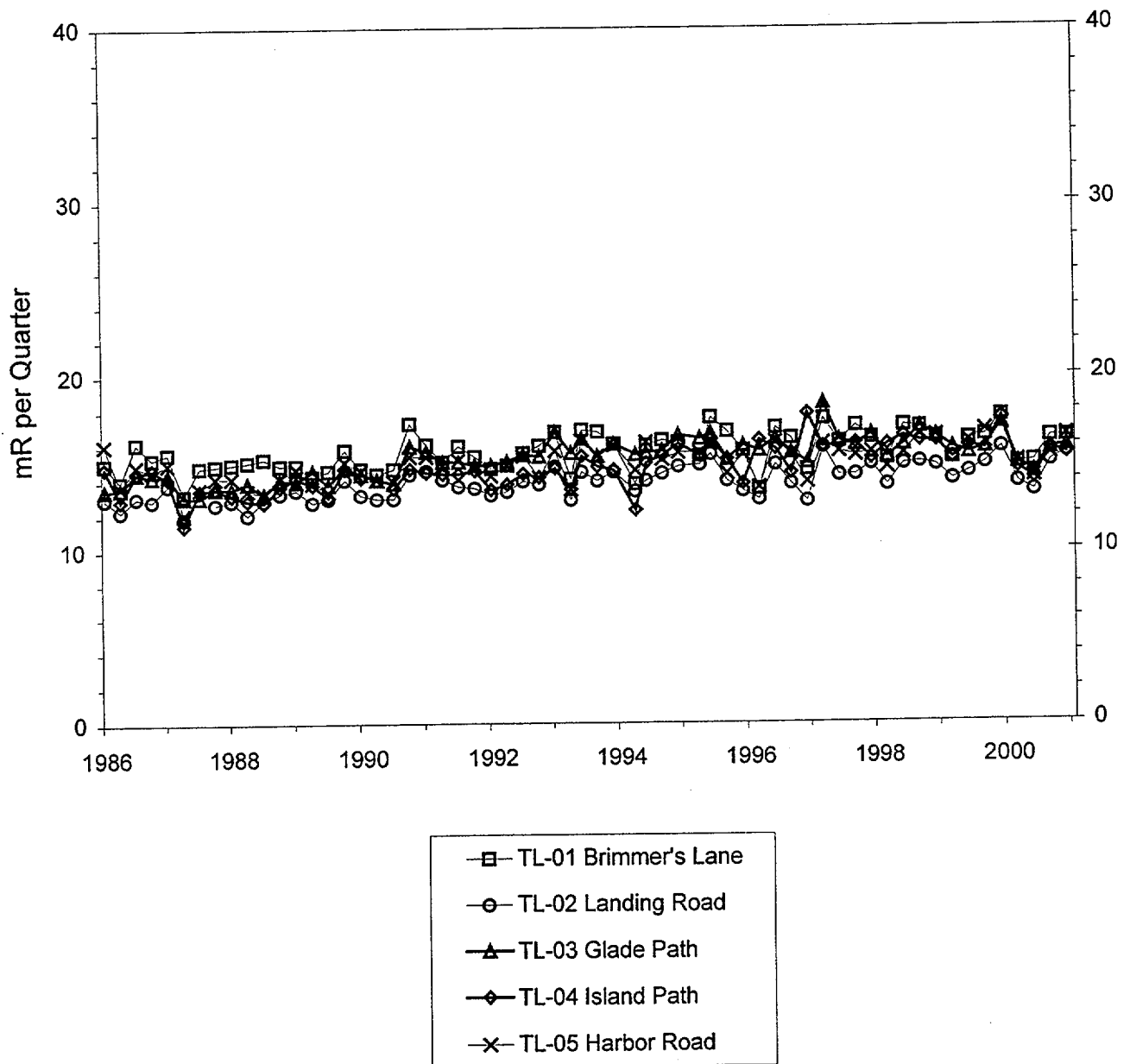


FIGURE 3.7

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

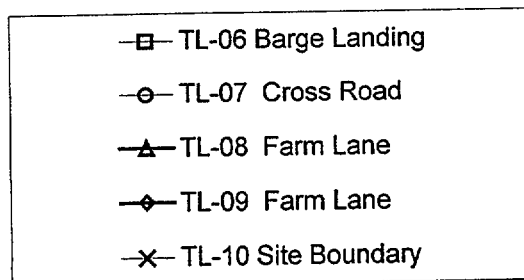
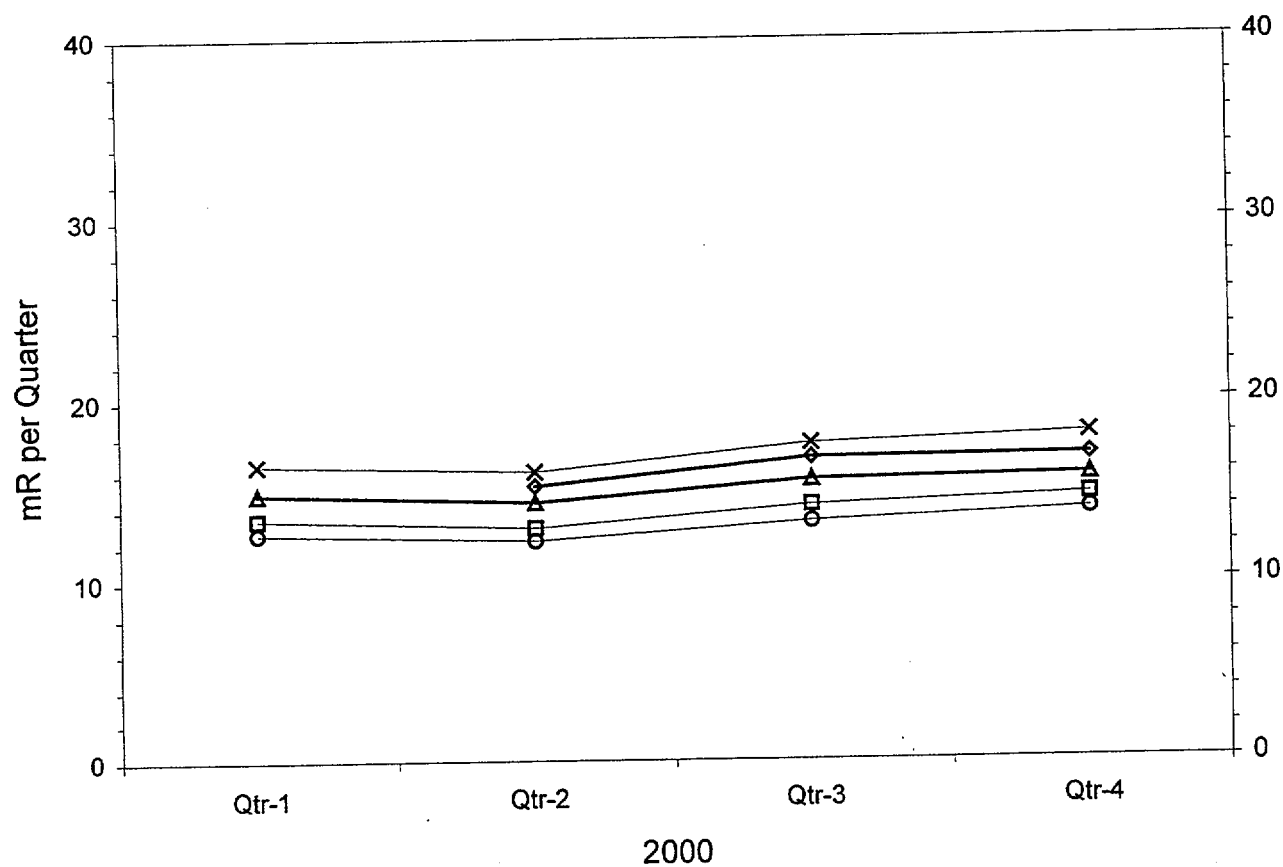


FIGURE 3.7.1

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

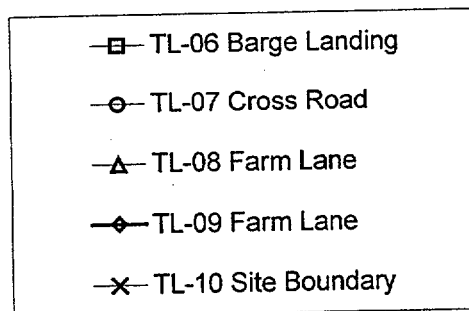
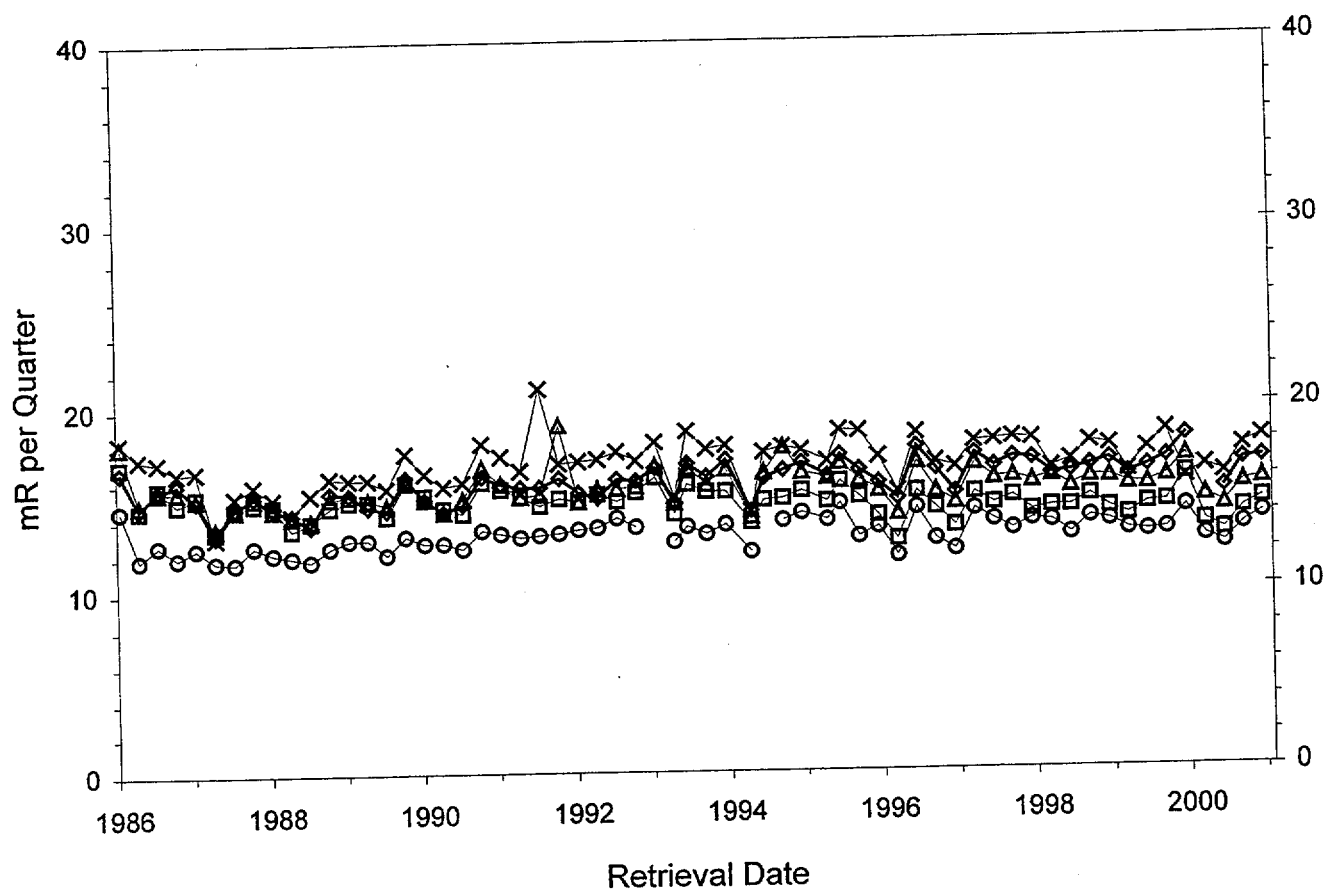


FIGURE 3.8

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

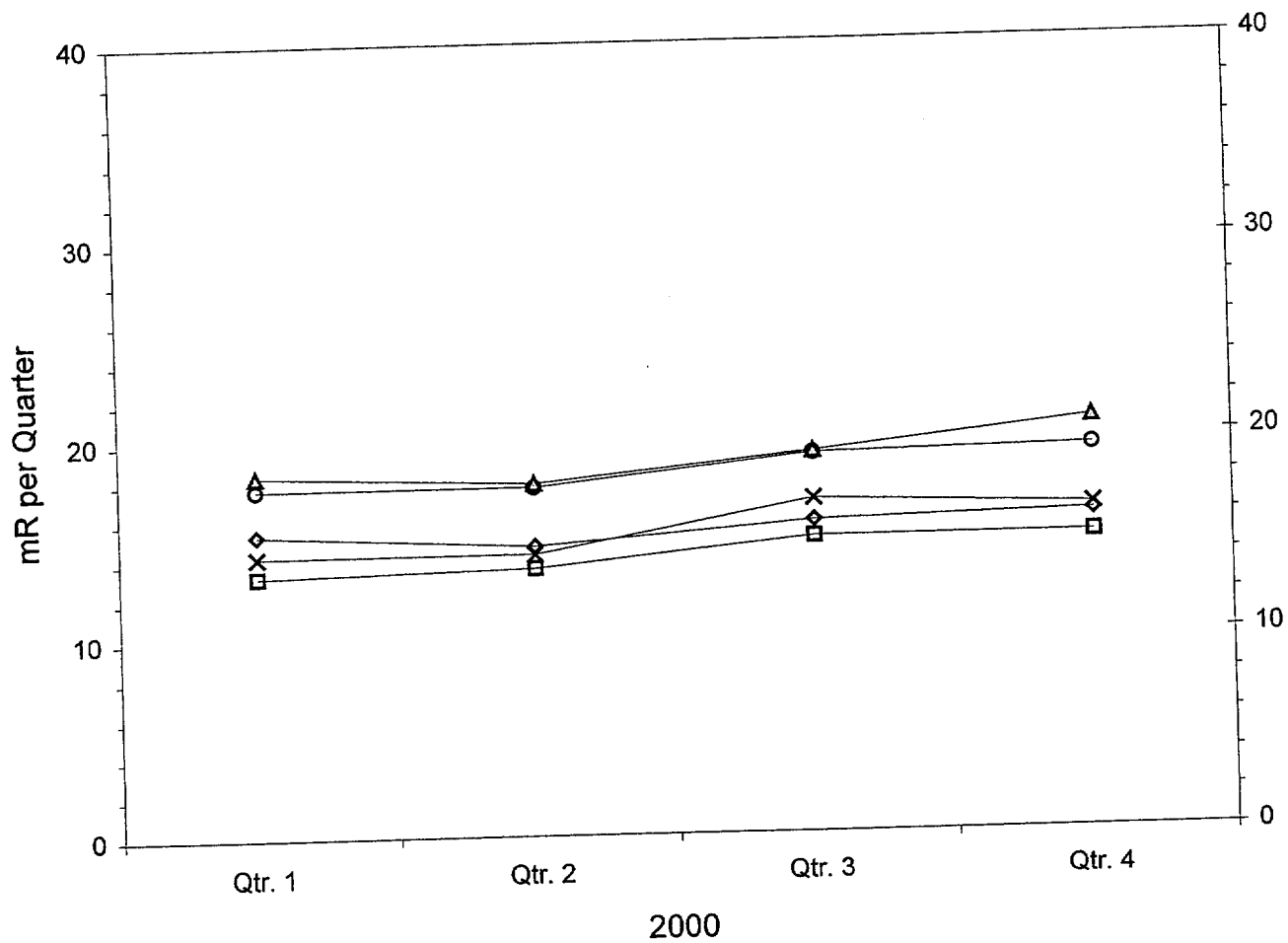




FIGURE 3.8.1

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

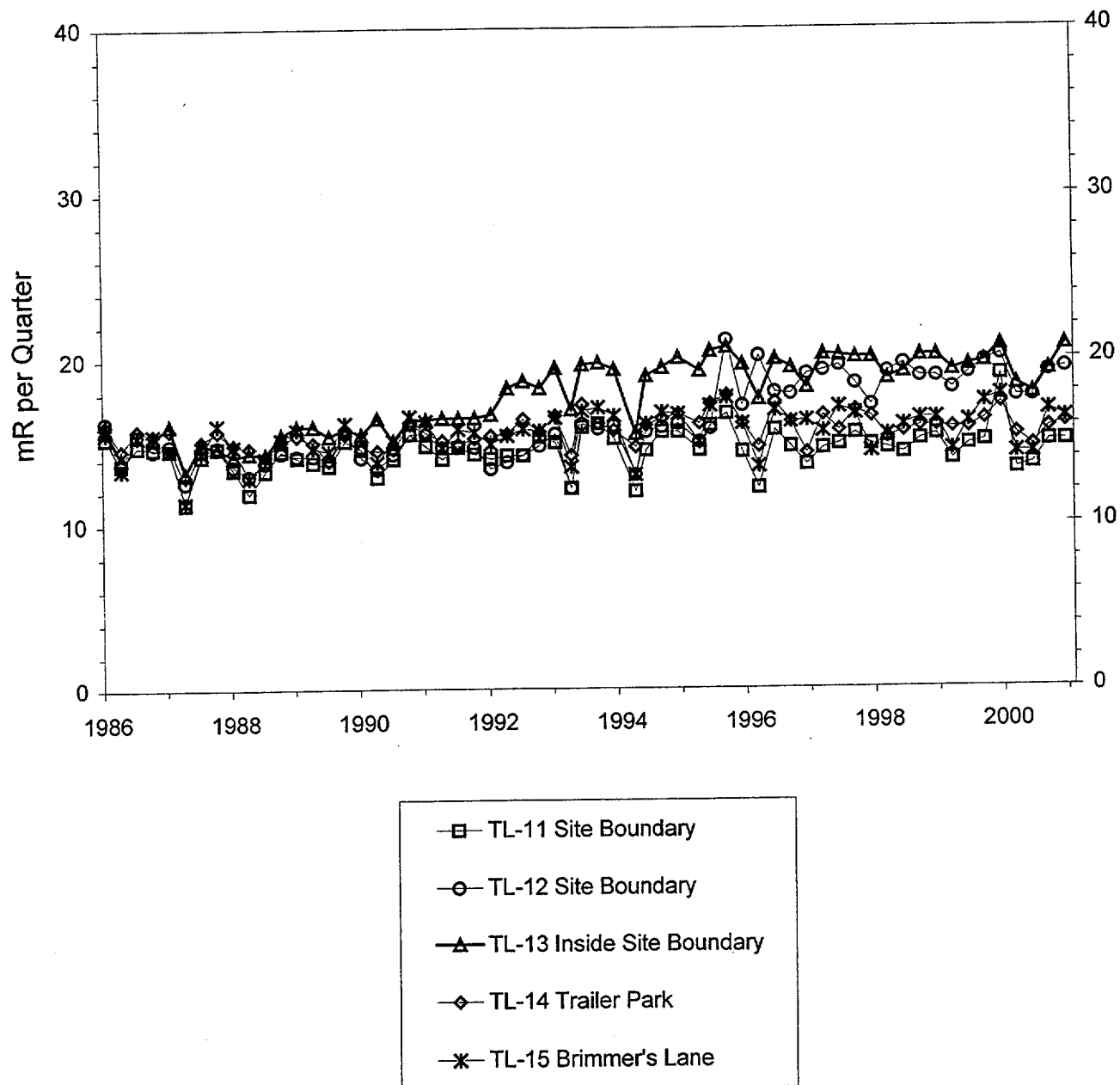


FIGURE 3.9

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

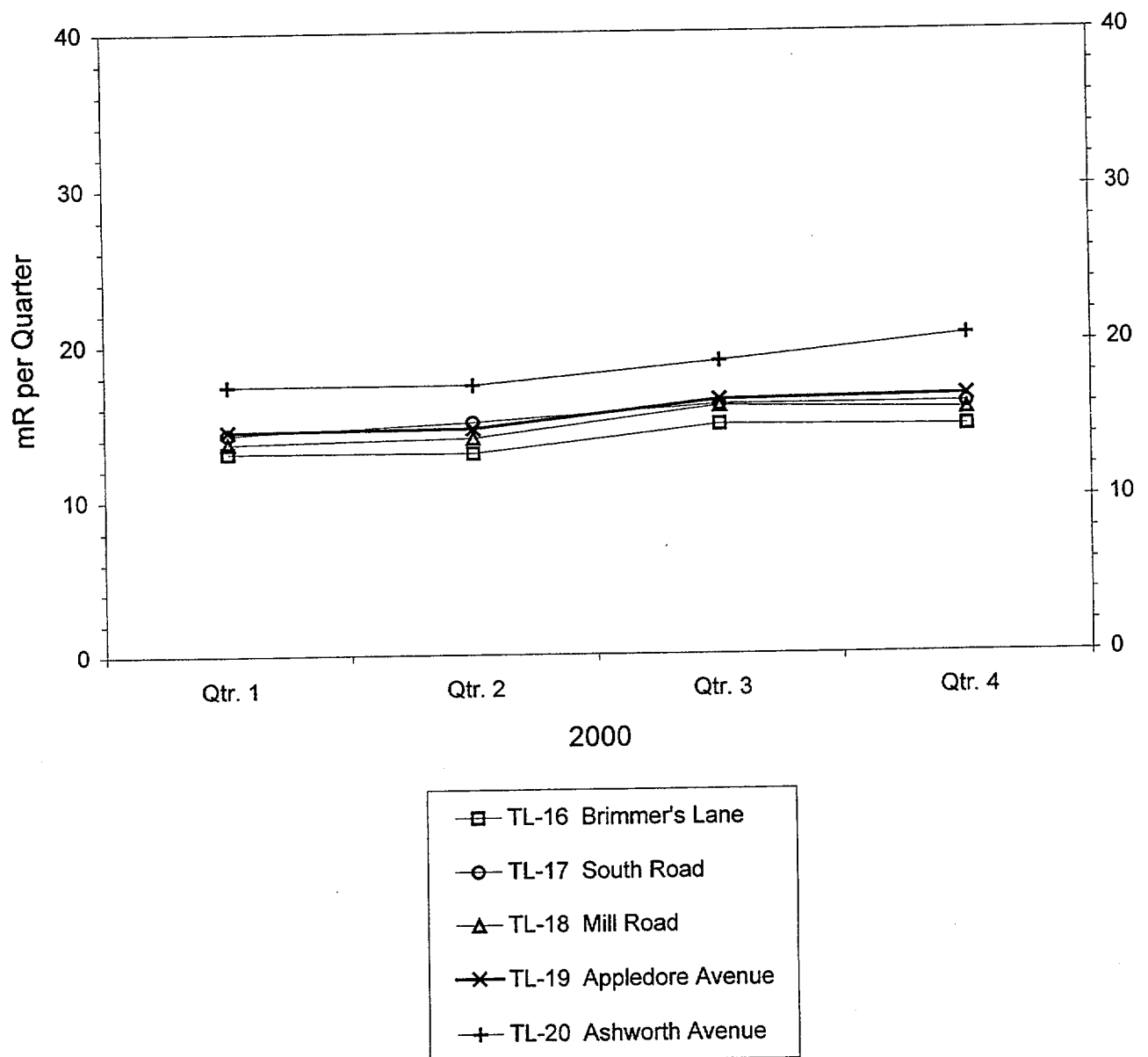


FIGURE 3.9.1

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

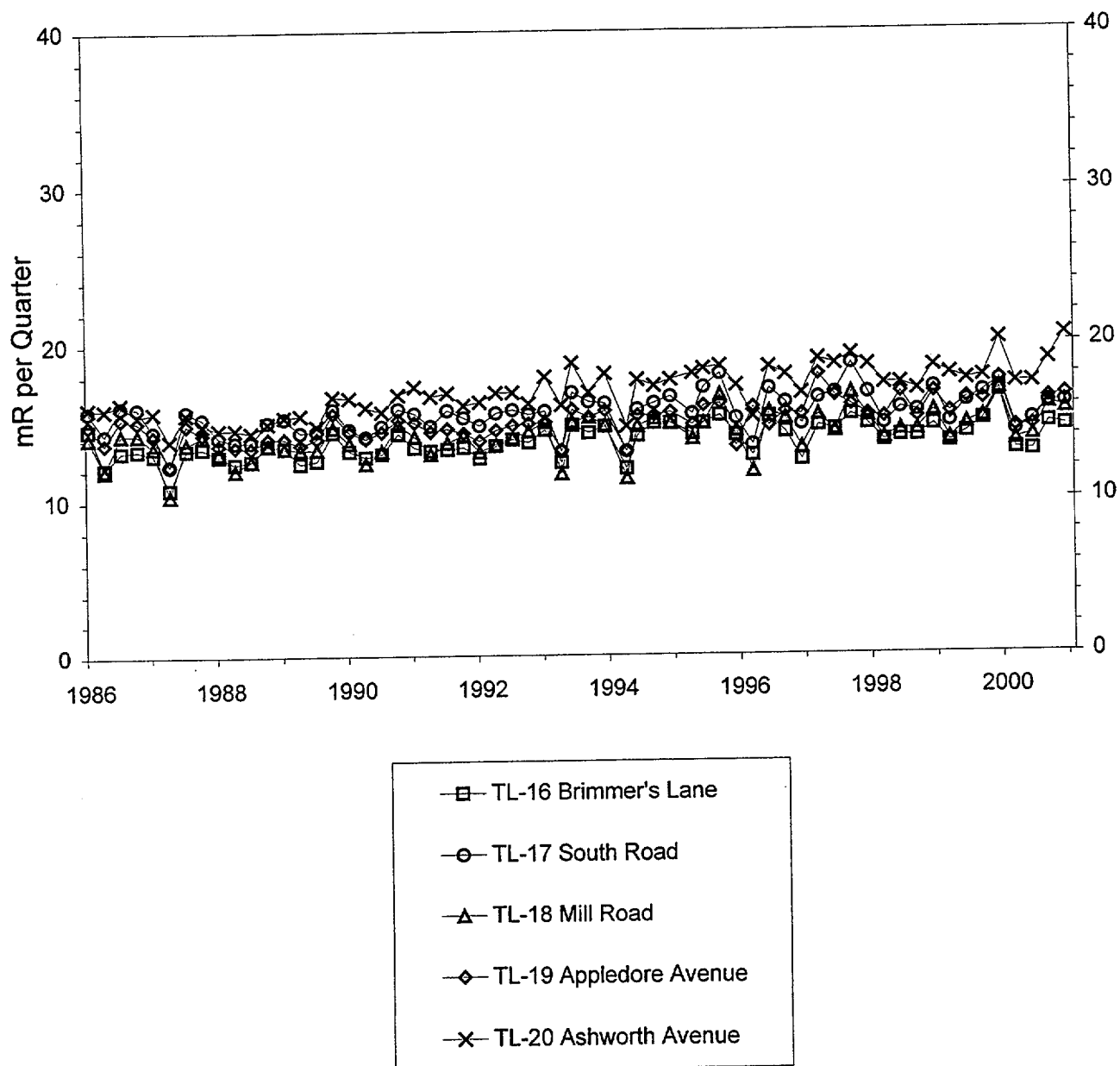


FIGURE 3.10

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

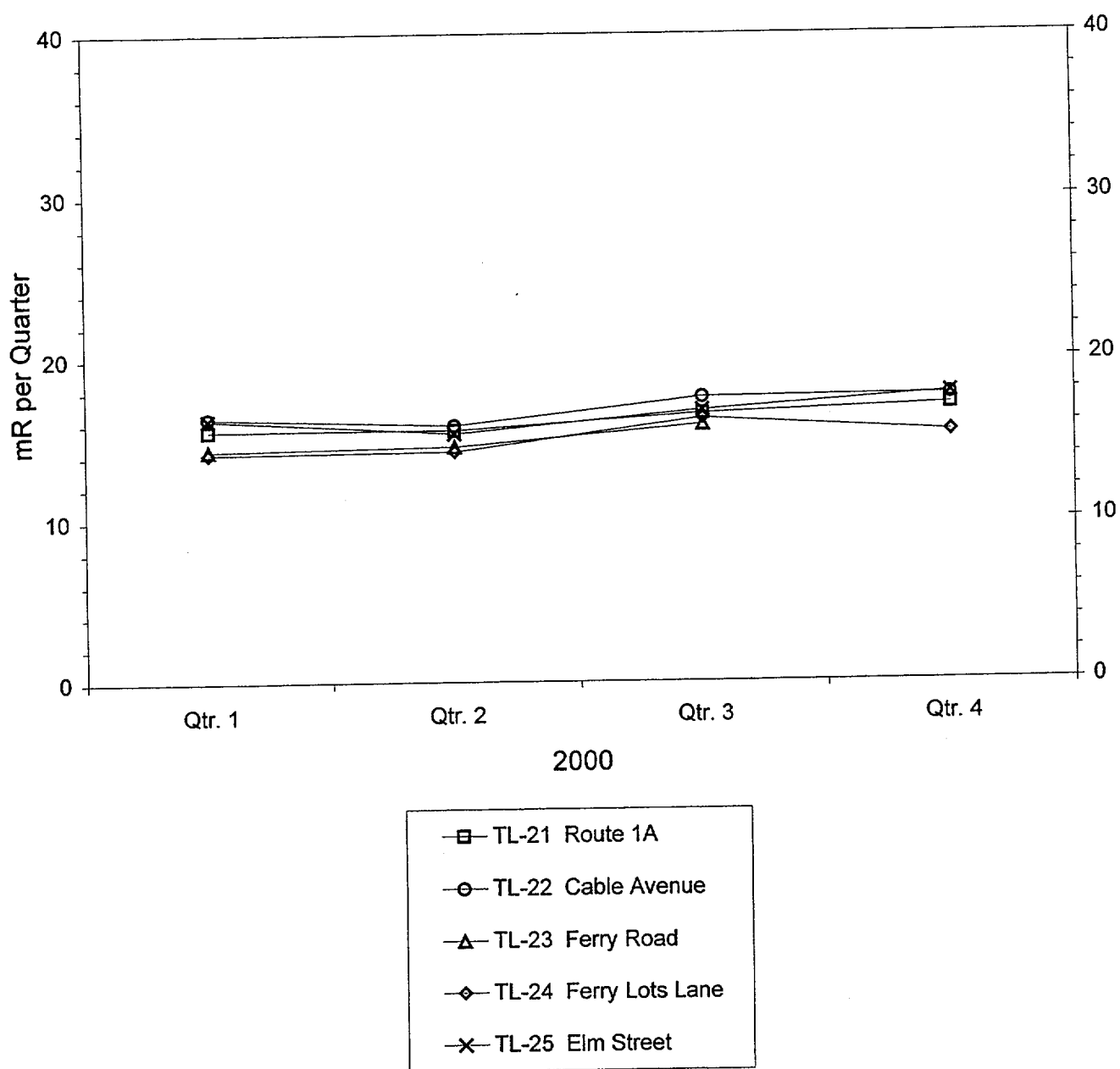


FIGURE 3.10.1

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

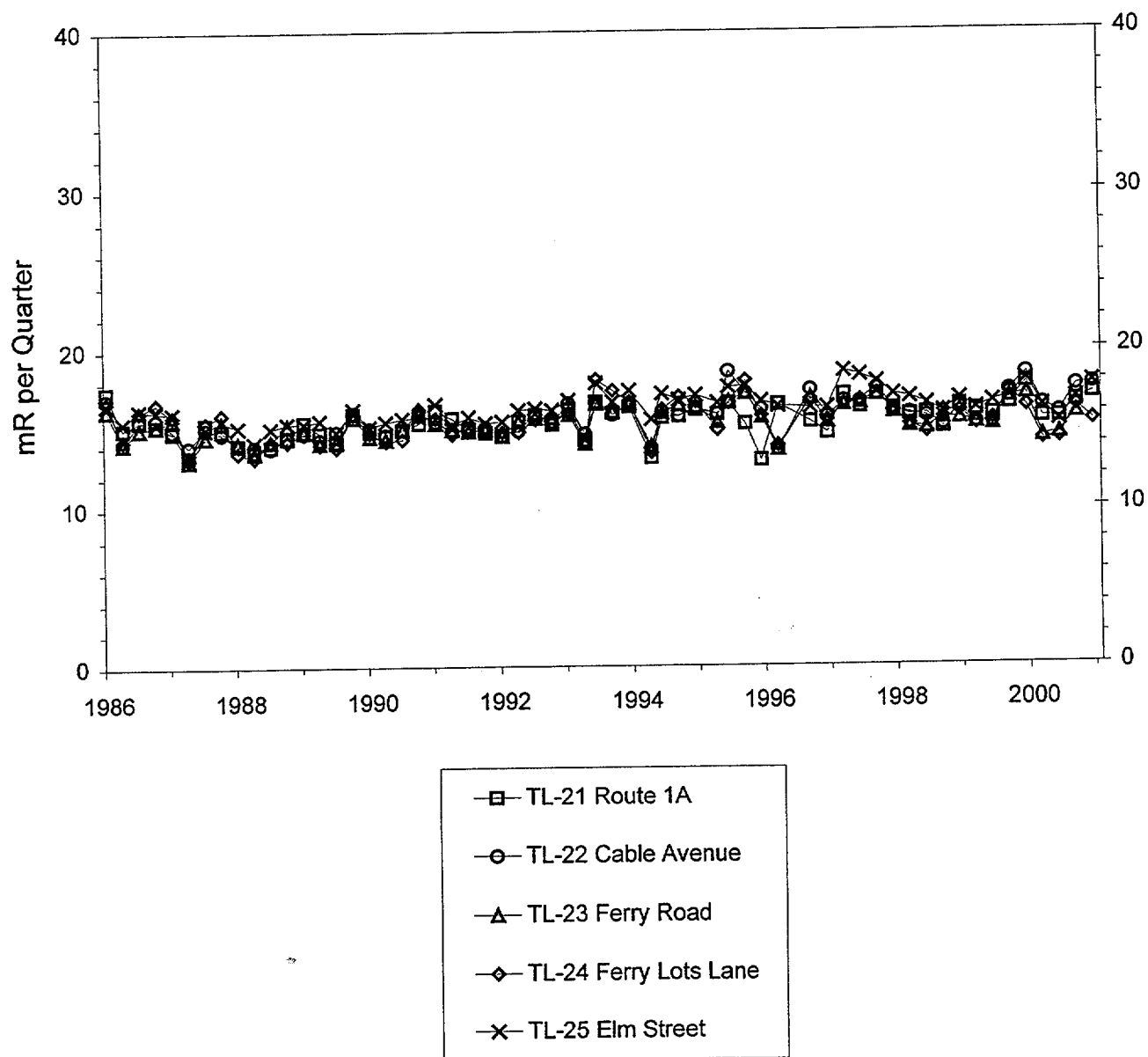
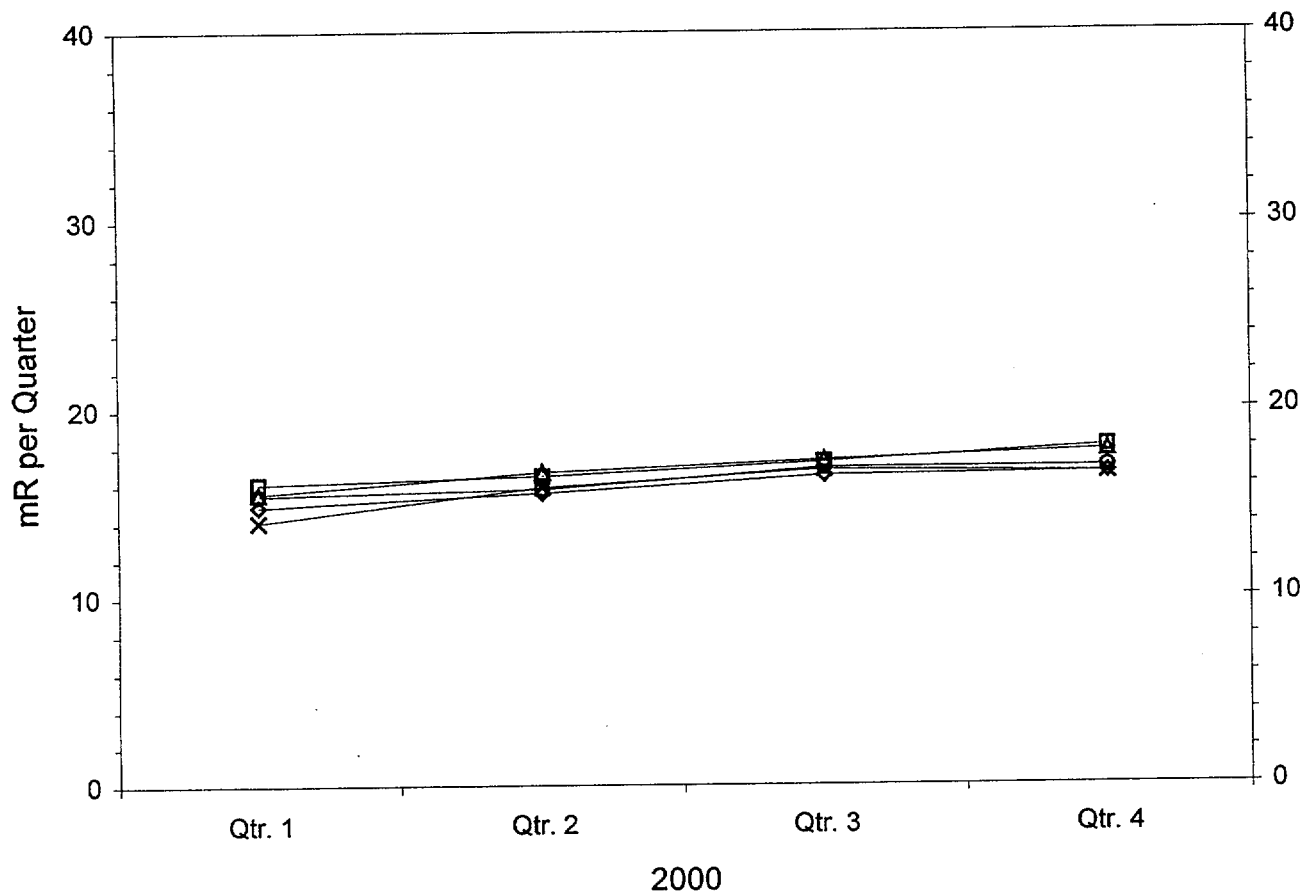


FIGURE 3.11

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION



- TL-26 Route 107A
- TL-27 Highland Street
- TL-28 Route 150
- TL-29 Frying Pan Lane
- TL-30 Route 27

FIGURE 3.11.1

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

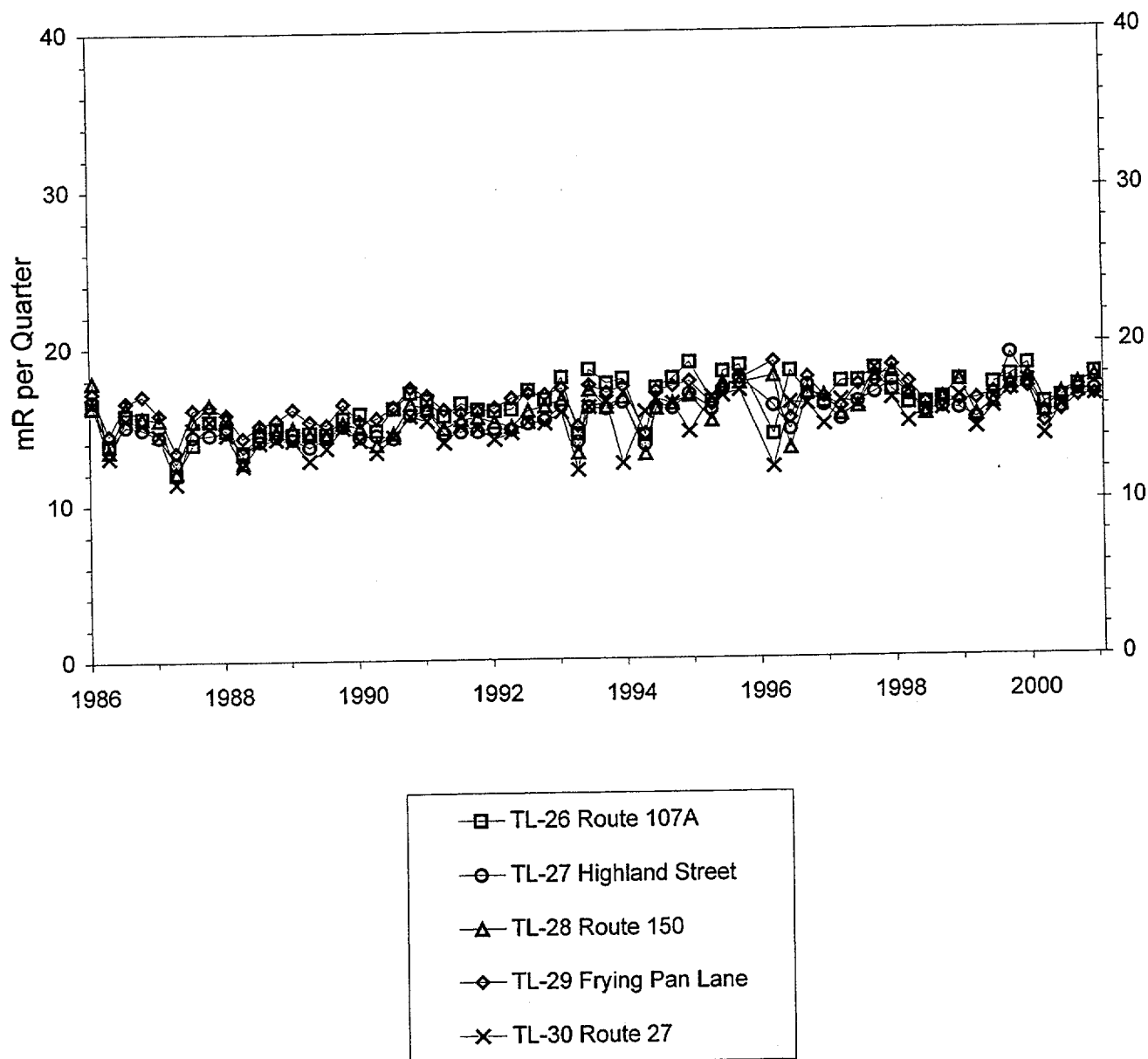


FIGURE 3.12

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

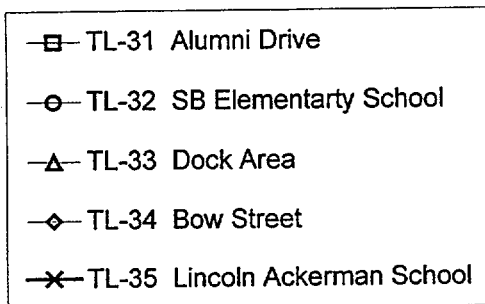
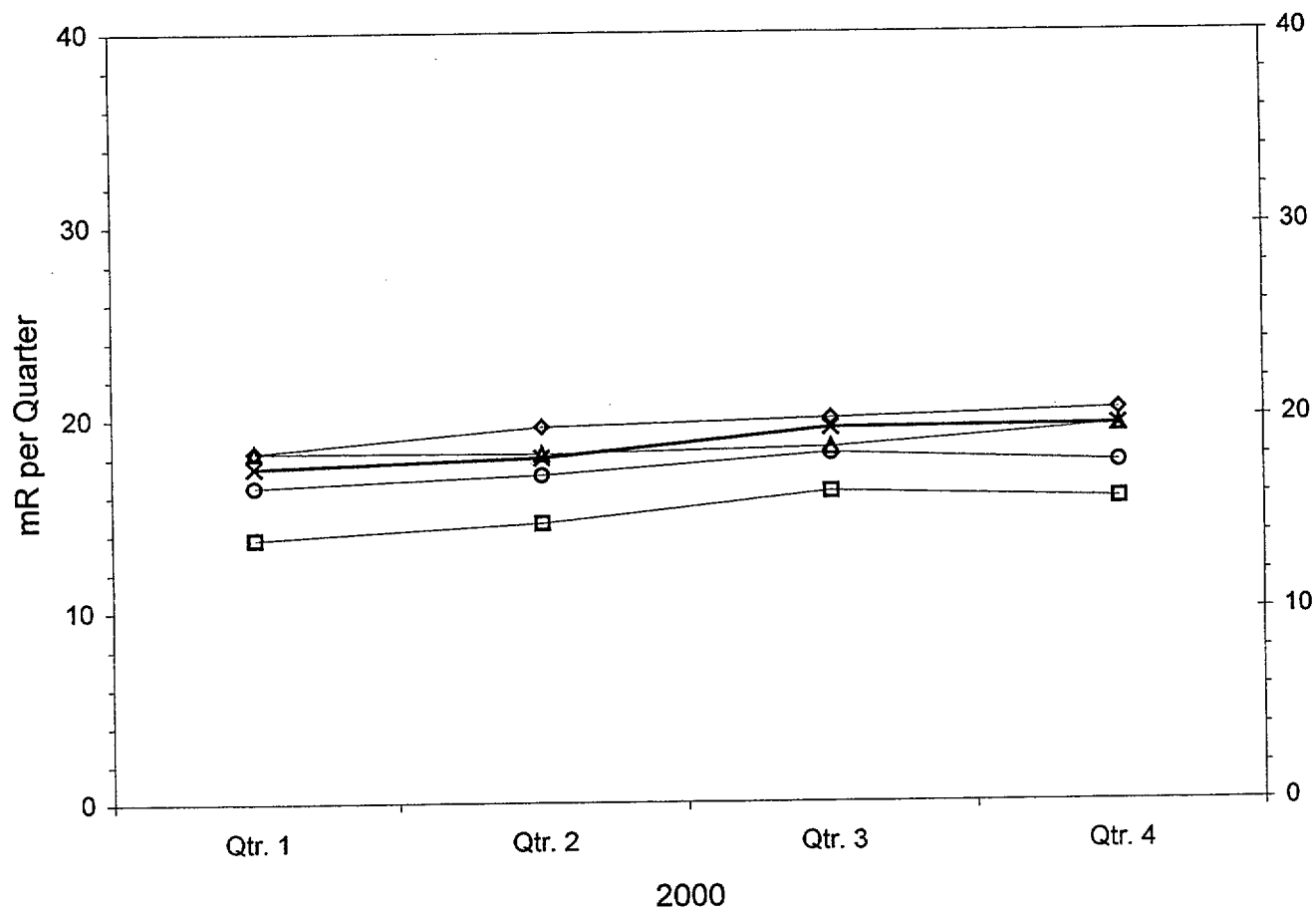




FIGURE 3.12.1

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

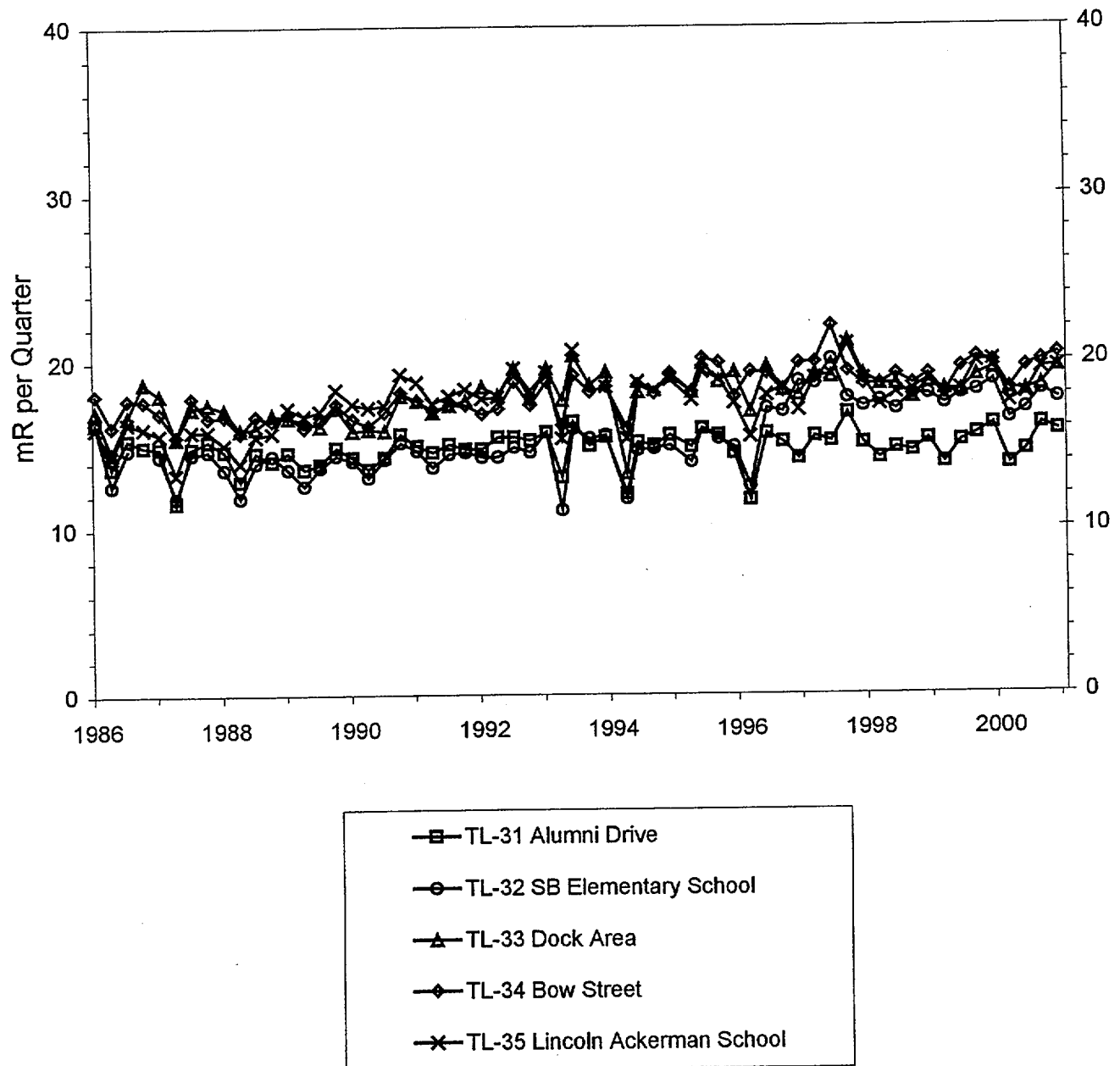
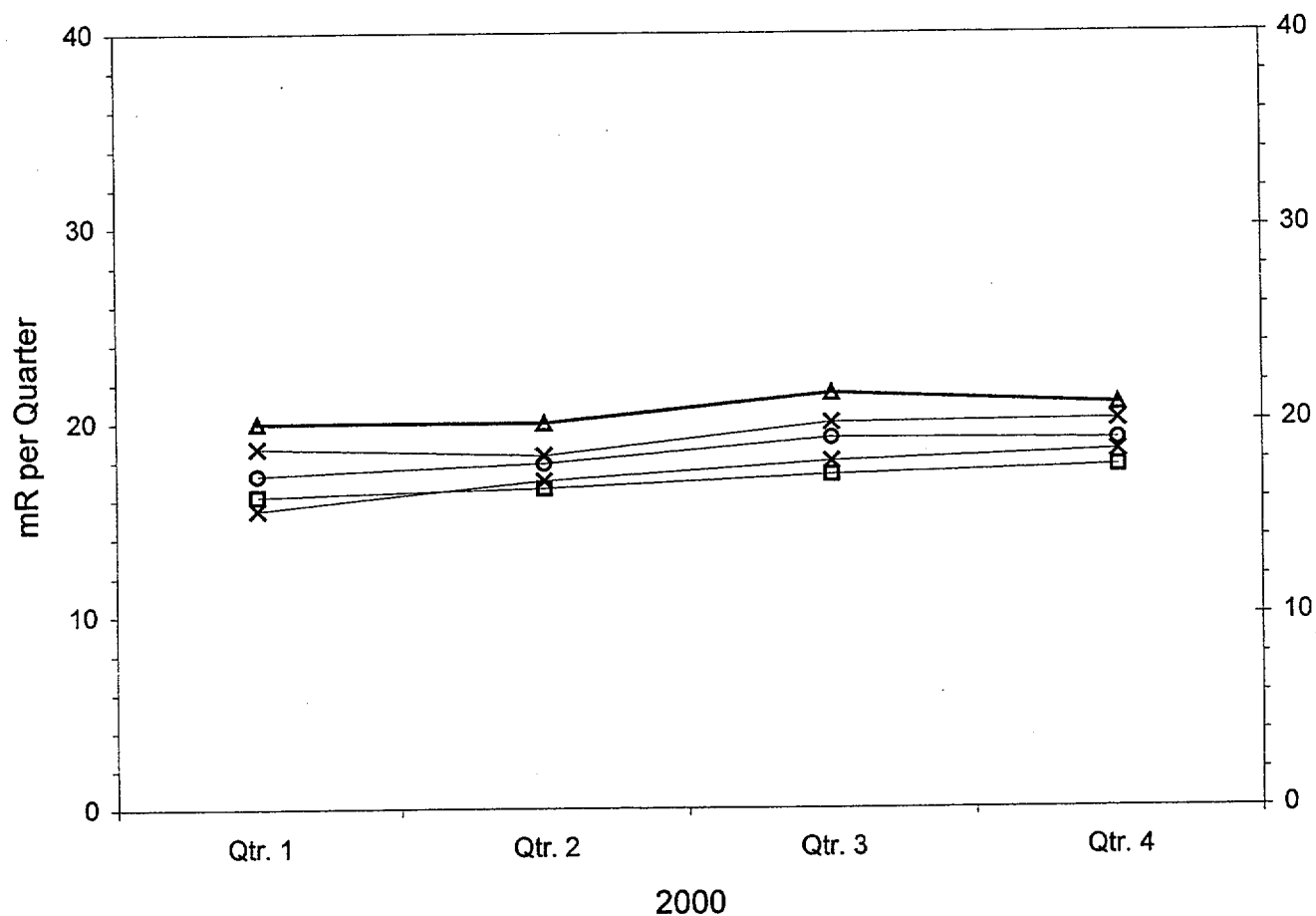


FIGURE 3.13

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION



- TL-36 Route 97 (Control)
- TL-37 Plaistow, NH (Control)
- TL-38 Hampstead NH (Control)
- TL-39 Fremont, NH (Control)
- TL-40 Newmarket, NH (Control)

FIGURE 3.13.1

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

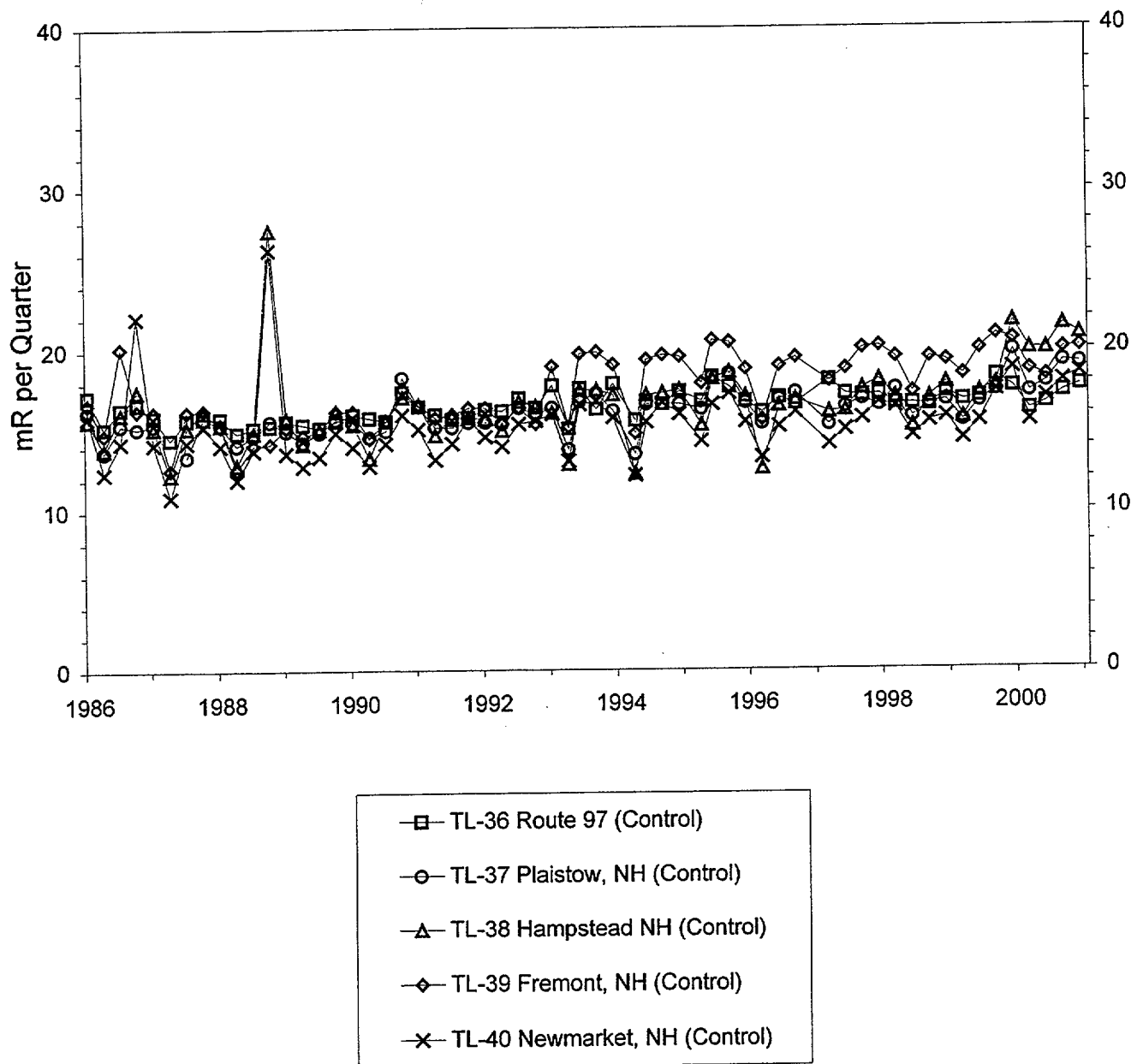


FIGURE 3.14

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION

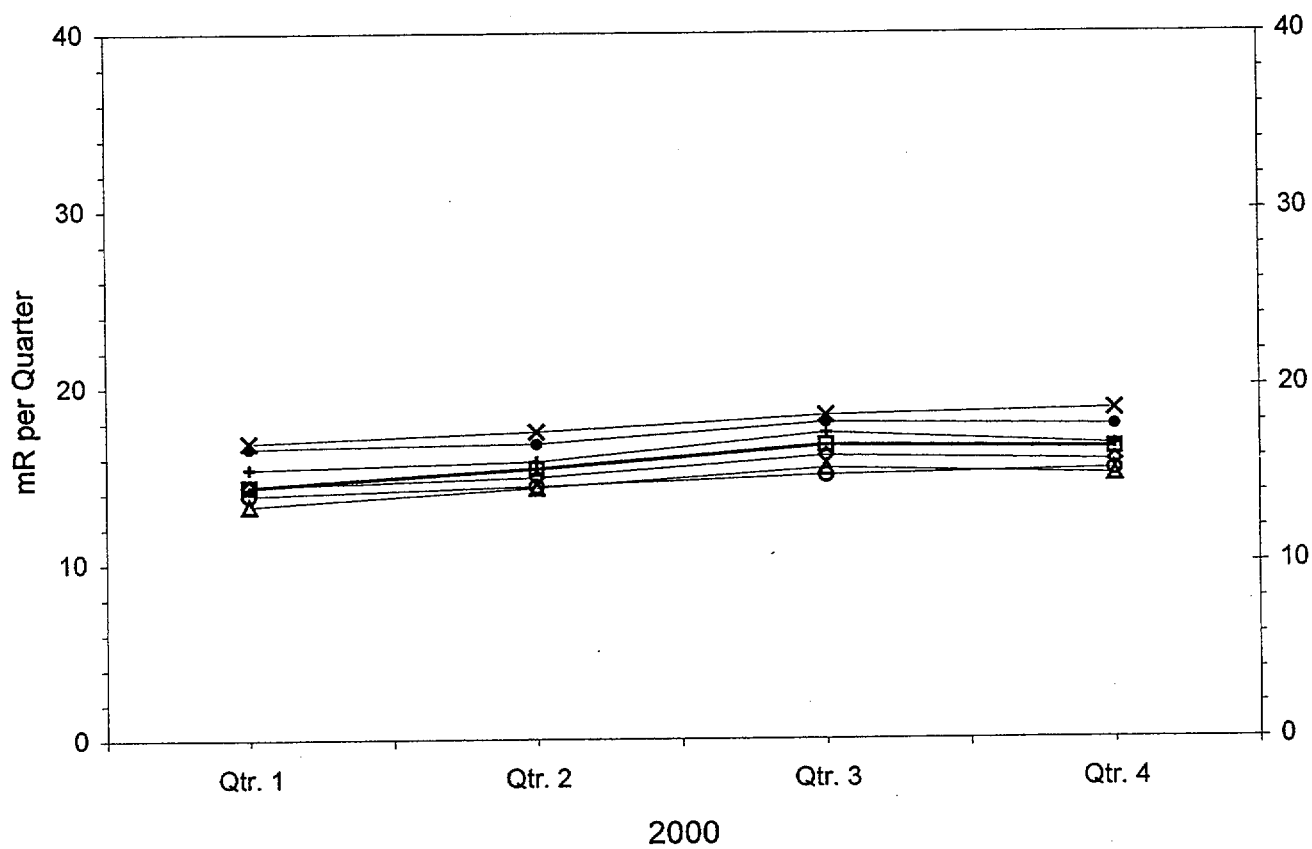
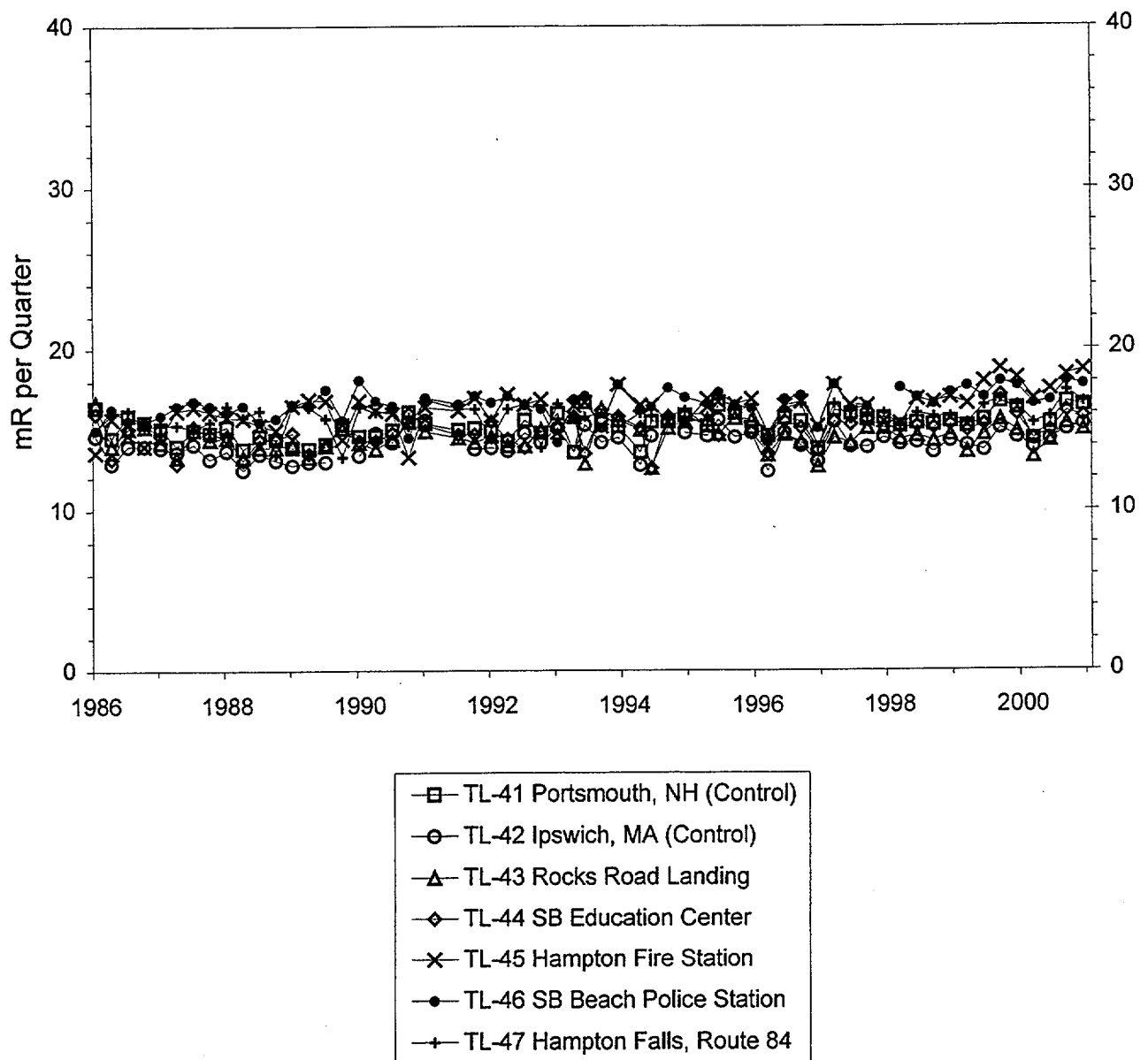


FIGURE 3.14.1

ENVIRONMENTAL RADIATION MEASUREMENTS (USING TLDs)  
SEABROOK STATION



#### 4.0 Quality Assurance Program

The quality assurance program at the Duke Engineering & Services Environmental Laboratory is designed to serve two overall purposes: 1) Establish a level of confidence in the measurement process to assure the licensee, regulatory agencies and the public that analytical results are accurate and precise; and 2) Identify deficiencies in the sampling or the measurement process to those responsible for these operations so that corrective actions can be taken. Quality assurance is applied to all steps of the measurement process, including the collection, reduction, evaluation and the reporting of data, as well as the record keeping of the final results. Quality control, as part of the quality assurance program, provides a means to control and measure the characteristics of measurement equipment and processes, relative to established requirements.

The DESEL employs a comprehensive program to monitor the quality of analytical processing to ensure reliable environmental monitoring data. The program includes the use of approved and controlled procedures for all work activities, a nonconformance and corrective action tracking program, systematic internal audits, audits by external groups, a laboratory quality control program, and a staff training and retraining program. Monitoring programs include the Intralaboratory Quality Control Program administered by the Laboratory QA Officer (used in conjunction with National Institute Standards and Technology's Measurement Assurance Program, NIST MAP) and the third party interlaboratory programs administered by the US EPA and Analytics, Inc. These programs are targeted to supply QC/QA sources at 5% of the routine sample analysis load. In addition, the Laboratory Quality Control Audit Committee administers and approves a blind duplicate quality assurance program.

##### Environmental TLD Program

The Panasonic environmental dosimeters are processed by the DESEL, which is a National Voluntary Laboratory Accreditation Program (NVLAP) certified laboratory. The NVLAP is conducted through the Battelle Pacific Northwest Laboratories. The DESEL environmental TLD program has its own quality assurance program, through the Laboratory Quality Assurance Officer, as well as the NVLAP program. Under these programs, dosimeters are irradiated to ANSI specified testing criteria and submitted for processing to the Dosimetry Services Group as "unknowns". The bias and precision of TLD processing is measured against this standard and is used to indicate trends and changes in performance. Instrument checks, although routinely performed by the Dosimetry Services Group and representing between 5-10% of the TLD's processed, are not part of this report because they do not represent a true process check sample since the doses are known.

The DESEL and the third party tester conducted seventy-eight independent performance tests in 2000. Of these, 54 TLD's were submitted to the Dosimetry Services Group and 24 were submitted to the Battelle Pacific Northwest Laboratories testing program. The TLD's met the acceptance criteria for bias (+/- 20.1%) and precision (+/- 12.8%).

Test Organization	No. of Dosimeters	Bias +/- Std Dev %	Precision (Std Dev)%
Battelle 1 <sup>st</sup> half '99	12	-7.5 +/- 9.7	5.3
Battelle 2 <sup>nd</sup> half '99	12	2.1 +/- 2.7	0.8
DESEL 1 <sup>st</sup> Half '99	18	-0.25 +/- 1.8	1.3
DESEL 2 <sup>nd</sup> Half '99	36	-0.2 +/- 3.6	1.0

### **Intralaboratory Quality Control Program**

The DESEL conducts an extensive intralaboratory quality control program to assure the validity and reliability of the data. This program includes quality control of laboratory equipment, use of reference standards for calibration, and analysis of blank and spiked samples. Process check samples are either samples submitted in duplicate to evaluate the precision of the measurement or spiked with a known quantity of radioactive material to assess the bias in the measurement. The Laboratory QA Officer reviews the records of the quality control program. Corrective measures are taken whenever applicable. Summaries of the program process check results are found in Table 4.1.

Ninety nine percent (250) of the samples analyzed for bias were acceptable as well as 100 % of the samples analyzed for precision.

### **Third Party Intercomparison Program**

The DESEL participates in a third party intercomparison program managed by Analytics Inc. to satisfy the requirement of the Environmental Technical Specification/ODCM. The DESEL Analytics program was originally used to augment the EPA Intercomparison Program that it now replaces. The current program is designed to be comparable to the pre-1996 EPA PE Program in terms of the number of samples, matrices and nuclides. The results for the 4<sup>th</sup> quarter 1999 through the 3<sup>rd</sup> quarter 2000 are summarized in Table 4.2. Each sample is analyzed in triplicate and the results are evaluated against the acceptance criteria described in the DESEL Manual 100-Laboratory Quality Assurance Plan. The DESEL acceptance criteria are summarized at the end of Table 4.2. This acceptance protocol is used for all interlaboratory programs with no pre-set acceptance criteria. When results fall outside of the acceptance criteria, an investigation is initiated to determine the cause of the problem and if appropriate, corrective measures are taken.

Four Analytics results fell in the 'non-agreement' category and the following Condition Reports (CR) were issued to investigate the failures.

- DESEL CR00-26 non-agreement for gross alpha/radium in water -
- Evaluation pending as of 12/31/2000.
- DESEL CR00-31 non-agreement for Cr-51 in milk - Evaluation pending as of 12/31/2000.
- DESEL CR01-07 non-agreement for I-131 in milk - Evaluation pending.

### Blind Duplicate Quality Assurance Program

The Laboratory Quality Control Audit Committee (LQCAC) is comprised of a representative from each of five New England power plants that are serviced by the DESEL. Two of the primary functions of the LQCAC have been to conduct an annual audit of Laboratory operations and to coordinate the Blind Duplicate Quality Assurance Program. Under the Blind Duplicate Quality Assurance Program, paired samples are submitted by the five clients. Samples are split from homogeneous environmental media by the client and sent to the DESEL for analysis. They are "blind" in that the identification of the matching sample is not identified to the Laboratory. The LQCAC analyses the results of the paired analyses to evaluate precision in Laboratory measurements.

The participating clients submitted a total of thirty-six paired samples under this program during 2000. The measurements were evaluated for twenty-five gamma emitting radionuclides, H-3, Sr-89, Sr-90, I-131 and gross-beta. Each measurement is evaluated, whether the results are statistically positive or not, and whether the net concentration is positive or negative. Of the 934 paired measurements evaluated in 2000, 933 or 99.9% fell within the established acceptance criteria.



TABLE 4.1

SUMMARY OF PROCESS CONTROL ANALYSES RESULTS  
JANUARY-DECEMBER 2000

Media Analysis	Bias Criteria (1)				Precision Criteria (2)			
	1	2	3	4	1	2	3	4
<b>I. Air Charcoal</b>								
Gamma	47	2	1					
<b>II. Air Filter</b>								
Beta	105	9	4					
Alpha	1	5			6			
<b>III. Milk</b>								
Gamma	3				3			
Iodine-LL	3				3			
<b>IV. Water</b>								
Gross Alpha	6	2			5			
Gross Beta	5	1	3	4	3	2		
Gamma	7	2			15	6	6	
Iodine-LL	4	2	2		5	2	1	
Radium-226	3	2			3			
Radium-228	1	9	2		10		2	
Tritium	8	5	2		13			
Strontium-89			3		1	1	1	
Strontium-90	1	1	1		3			
Am-241		4	3		7			
<b>V. Sediment/Soil</b>								
Gamma					10	4		
Radium-226	4	2			3	2		
<b>VI. Vegetation</b>								
Gamma					4			
<b>Total Number in Range</b>	198	37	15	4	94	17	10	0
<b>% of Total Processed</b>	78	15	6	1	78	14	8	3
<b>Sum of Analyses</b>	254				121			

## (1) Percent Bias Criteria by Category

Bias Category 1 > 0% & <= 5%  
 Bias Category 2 > 5% & <=10%  
 Bias Category 3 > 10% & <= 15%  
 Gross alpha, Sr89/90 >10% & <=25%  
 TRU >10% & <= 20%  
 Bias Category 4 = OUTSIDE CRITERIA

## (2) Percent Precision by Category

Precision Category 1 > 0% & <= 5%  
 Precision Category 2 > 5% & <=10%  
 Precision Category 3 >10% & <=15%  
 Gross alpha, Sr89/90 >10% & <=25%  
 TRU >10 % & <=20%  
 Precision Category = OUTSIDE CRITERIA

TABLE 4.2

**DESEL RESULTS IN THE ANALYTICS INC. CROSS CHECK PROGRAM**  
**Fourth Quarter 1999 - Third Quarter 2000**

Sample	Quarter Year	Sample Media	Nuclide	Reporte d Value *	Known Value *	Ratio DESEL/ Analytics	Evaluation
E1994-162	4 <sup>th</sup> /99	Filter	Sr-89	107	114	0.94	Agreement
			Sr-90	52	54	0.96	Agreement
E1995-162	4 <sup>th</sup> /99	Filter	Gross alpha	19	20	0.95	Agreement
			Gross beta	134	123	1.09	Agreement
E1996-162	4 <sup>th</sup> /99	Water	H-3	6940	8015	0.87	Agreement
E1997-162	4 <sup>th</sup> /99	Milk	I-131LL	77	77	1.00	Agreement
			I-131	76	77	0.99	Agreement
			Ce-141	127	117	1.09	Agreement
			Cr-51	268	322	0.83	Non- agreement
			Cs-134	136	138	0.99	Agreement
			Cs-137	112	106	1.06	Agreement
			Co-58	117	121	0.97	Agreement
			Mn-54	109	111	0.98	Agreement
			Fe-59	113	104	1.09	Agreement
			Zn-65	214	206	1.04	Agreement
			Co-60	155	146	1.06	Agreement
E2127-162	1 <sup>st</sup> /00	Water	I-131LL	77	74	1.04	Agreement
			I-131	70	74	0.95	Agreement
			Ce-141	426	427	1.00	Agreement
			Cr-51	205	238	0.86	Agreement
			Cs-134	135	139	0.97	Agreement
			Cs-137	126	128	0.98	Agreement
			Co-58	46	44	1.05	Agreement
			Mn-54	165	159	1.04	Agreement
			Fe-59	94	92	1.02	Agreement
			Zn-65	191	196	0.97	Agreement
			Co-60	117	116	1.01	Agreement
E2128-162	1 <sup>st</sup> /00	Water	Gross alpha	60	82	0.73	Non- agreement
			Gross beta	223	210	1.06	Agreement
E2129-162	1 <sup>st</sup> /00	Water	U-234	62	57	1.09	Agreement
			U-235	2.5	2.7	0.93	Agreement
			U-238	64	59	1.08	Agreement
			Pu-238	80	73	1.10	Agreement
			Pu-239	69	62	1.11	Agreement
			Ra-226	87	89	0.98	Agreement
			Ra-228	77	66	1.17	Non- agreement

**DESEL RESULTS IN THE ANALYTICS INC. CROSS CHECK PROGRAM**  
**Fourth Quarter 1999 - Third Quarter 2000**

Sample	Quarter Year	Sample Media	Nuclide	Reported Value *	Known Value *	Ratio DESEL/ Analytics	Evaluation
E2130-162	1 <sup>st</sup> /00	Milk	I-131LL	86	84	1.02	Agreement
			I-131	84	84	1.00	Agreement
			Ce-141	483	460	1.05	Agreement
			Cr-51	279	256	1.09	Agreement
			Cs-134	145	150	0.97	Agreement
			Cs-137	138	138	1.00	Agreement
			Co-58	43	47	0.91	Agreement
			Mn-54	166	171	0.97	Agreement
			Fe-59	103	99	1.04	Agreement
			Zn-65	197	208	0.95	Agreement
			Co-60	124	125	0.99	Agreement
E2131-162	1 <sup>st</sup> /00	Milk	Sr-89	90	90	1.00	Agreement
			Sr-90	57	59	0.97	Agreement
E2214-162	2 <sup>nd</sup> /00	Filter	Ce-141	75	80	0.94	Agreement
E2214-162			Cr-51	242	243	1.00	Agreement
E2214-162			Cs-134	89	105	0.85	Agreement
E2214-162			Cs-137	230	219	1.05	Agreement
E2214-162			Co-58	119	120	0.99	Agreement
E2214-162			Mn-54	143	136	1.05	Agreement
E2214-162			Fe-59	63	58	1.09	Agreement
E2214-162			Zn-65	182	170	1.07	Agreement
E2214-162			Co-60	159	163	0.98	Agreement
E2215-162	2 <sup>nd</sup> /00	Filter	Sr-89	87	109	0.80	Agreement
E2215-162			Sr-90	62	66	0.94	Agreement
E2216-162	2 <sup>nd</sup> /00	Filter	Gross Alpha	25	24	1.04	Agreement
E2216-162			Gross Beta	97	93	1.04	Agreement
E2217-162	2 <sup>nd</sup> /00	Water	H-3	10627	11400	0.93	Agreement
E2218-162	2 <sup>nd</sup> /00	Milk	I-131LL	81	81	1.00	Agreement
E2218-162			I-131	86	81	1.06	Agreement
E2218-162			Ce-141	75	69	1.09	Agreement
E2218-162			Cr-51	236	211	1.12	Agreement
E2218-162			Cs-134	85	91	0.93	Agreement
E2218-162			Cs-137	199	190	1.05	Agreement
E2218-162			Co-58	98	104	0.94	Agreement
E2218-162			Mn-54	122	118	1.03	Agreement

**DESEL RESULTS IN THE ANALYTICS INC. CROSS CHECK PROGRAM**  
**Fourth Quarter 1999 - Third Quarter 2000**

Sample	Quarter Year	Sample Media	Nuclide	Reported Value *	Known Value *	Ratio DESEL/ Analytics	Evaluation
E2218-162	2 <sup>nd</sup> /00	Milk	Fe-59	52	50	1.04	Agreement
			Zn-65	136	148	0.92	Agreement
			Co-60	151	142	1.06	Agreement
E2359-162	3 <sup>rd</sup> /00	Water	I-131LL	72	75	0.95	Agreement
			I-131	79	75	1.05	Agreement
			Ce-141	192	191	1.00	Agreement
			Cr-51	219	230	0.95	Agreement
			Cs-134	121	128	0.95	Agreement
			Cs-137	225	218	1.03	Agreement
			Co-58	58	60	0.97	Agreement
			Mn-54	92	89	1.04	Agreement
			Fe-59	56	54	1.03	Agreement
			Zn-65	129	134	0.97	Agreement
			Co-60	247	246	1.01	Agreement
E2361-162	3 <sup>rd</sup> /00	Water	Sr-89	90	85	1.06	Agreement
			Sr-90	52	54	0.97	Agreement
E2360-162	3 <sup>rd</sup> /00	Water	Gross Alpha	55	50	1.10	Agreement
			Gross Beta	228	205	1.11	Agreement
E2363-162	3 <sup>rd</sup> /00	Milk	Sr-89	65	74	0.88	Agreement
			Sr-90	41	39	1.06	Agreement
E2362-162	3 <sup>rd</sup> /00	Milk	I-131LL	66	58	1.14	Agreement
			I-131	69	58	1.20	Non- Agreement
			Ce-141	176	164	1.07	Agreement
			Cr-51	195	198	0.99	Agreement
			Cs-134	108	110	0.98	Agreement
			Cs-137	193	188	1.02	Agreement
			Co-58	50	51	0.99	Agreement
			Mn-54	81	77	1.05	Agreement
			Fe-59	50	47	1.06	Agreement
			Zn-65	117	115	1.02	Agreement
			Co-60	212	212	1.00	Agreement

Bias Acceptance Criteria +/- 15%, or as noted below:  
Gross alpha, Sr89/90 +/- 25%  
TRU and Radium +/- 20% or, if known value falls  
Within 2 sigma range acceptance criteria is met

Precision Acceptance Criteria +/- 15%, or  
as noted below:  
Gross alpha, Sr89/90 +/-25%  
TRU and Radium +/- 20 %

**TABLE 4.3**  
**SUMMARY OF BLIND DUPLICATE SAMPLES SUBMITTED TO**  
**January - December 2000**

TYPE OF SAMPLE	NUMBER OF PAIRED SAMPLES SUBMITTED
Cow Milk	10
Ground Water	4
Surface Water	15
Irish Moss	2
Mussels	4
Food Product - Cranberries	1
TOTAL	36

TABLE 4.4  
SUMMARY OF BLIND DUPLICATE RESULTS  
January - December 2000

Number of Analyses *						
Analysis Type	Milk	Water	Food Products	Marine Algae	Mussel	Total
Gamma	250 (1)	475	25	50	100	900 (1)
Sr-89/90	8	---	---	---	---	8
H-3	---	8	---	---	---	8
Gross Beta	---	8	---	---	---	8
I-131	6	4	---	---	---	10

\* The number of paired measurements that did not meet the acceptance criteria is given in parenthesis

## 5.0 Land Use Census

Technical Requirements Program (TRP 5.2C.9.2.1) requires that a Land Use Census be conducted annually to identify the location of the nearest residence, milk animal and nearest garden of greater than 50 square meters producing broad leaf vegetation in each of the 16 meteorological sectors within five miles of the plant. The 2000 census was completed in accordance with the requirements of the ODCM. The census is used to identify the location of the nearest milk animal, the nearest residence, and the nearest garden of 50 square meters within five miles of plant. In 2000, A global positioning system was used.

The nearest resident, garden and milk animal locations identified in the 2000 Land Use Census and their distances are shown in Table 5.1. The results of this census showed that the sampling locations currently being used have the highest calculated dose commitment.

**Table 5.1**

**Land Use Census Results**

<b>Sector</b>	<b>Nearest Residence (km)</b>	<b>Nearest Garden (km)</b>	<b>Nearest Milk Animal (km)</b>
<b>N</b>	4.3	4.4	
<b>NNE</b>	3.0	3.1	
<b>NE</b>	2.9	3.0	
<b>ENE</b>	2.3		
<b>E</b>	2.6		
<b>ESE</b>	2.7		
<b>SE</b>	2.4		
<b>SSE</b>	3.4		
<b>S</b>	1.2	1.2	
<b>SSW</b>	1.1	1.2	
<b>SW</b>	1.1	1.3	5.2
<b>WSW</b>	1.6	1.4	8.9
<b>W</b>	1.3	1.3	
<b>WNW</b>	1.1	1.4	6.1
<b>NW</b>	1.3	1.3	6.9
<b>NNW</b>	1.0	1.2	5.3



## 6.0 Reference

- 6.1 Seabrook Station Technical Requirements Manual
- 6.2 Seabrook Station Off-Site Dose Calculation Manual