PILGRIM NUCLEAR POWER STATION

ENVIRONMENTAL RADIATION MONITORING PROGRAM

REPORT NO. 14

JANUARY 1 THROUGH DECEMBER 31, 1981

ISSUED: APRIL 1982

BY: NUCLEAR OPERATIONS SUPPORT DEPARTMENT
ENVIRONMENTAL AND RADIOLOGICAL
HEALTH AND SAFETY GROUP

BOSTON EDISON COMPANY

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PILGRIM NUCLEAR POWER STATION

Environmental Radiation Monitoring Program

REPORT NO. 14

January 1, 1981 through December 31, 1981

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Date of Submittal: April 1, 1982

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I. Introduction and Summary

This report presents a summary of the results of measurements of direct radiation and radioactivity in environmental media in the vicinity of the Pilgrim Nuclear Power Station - Unit 1 (PNPS-1) and at selected control locations for the period January 1 - December 31, 1981. The results of this Program indicate that PNPS-1 has had a negligible and most often inmeasurably small impact on the environment in the vicinity of the plant. Conservatively estimated doses resulting from the measured highest station mean concentrations are typically less than 1% of the doses resulting from naturally occurring radionuclides and residual fallout from atmospheric nuclear weapons testing.

Estimates of concentrations of radionuclides in vegetation and milk and estimates of dose to man, as quoted in this report, were made using methods similar to those described in Regulatory Guide 1.109 and 1.111.

The performance record of the PNPS-1 for the calendar year of 1981 reflects an average capacity factor of 58.7%. Monthly capacity factors are given in Table I-1.

A tabulation of radioactive effluents form the PNPS-1 is provided in Appendix B for the 1981 calendar year.

There were six Anomalous Measurement Reports made for the calendar year of 1981. The media involved were mussels, sediment and algae from the discharge canal and on one occasion, cranberries from the Manomet Point Bog.

The measured concentration of Cs-137 in the Cranberry sample from Manomet Point Bog was due to old fallout from weapons testing and a depressed concentration of potassium in the soil. There were no other man-made radionuclides detected in the sample which would be indicative of reactor operation. A detailed study of the presence of cesium in cranberries was performed and included as Appendix C to the Boston Edison Environmental Radiation Monitoring Report No. 11, April, 1979. This report identified fallout from previous nuclear weapons testing as the primary source of cesium

in cranberries. In addition, the report indicated that cesium uptake in cranberries can be increased when conditions of low soil potassium occur, as cesium is a congener of potassium. The Cs-137/K-40 ratio is consistent with the above mentioned report and with past analyses data. Therefore, it is very unlikely that PNPS-1 was the source of the measured concentration.

The measured concentrations of Cs-134 and Cs-137 in a sediment sample of 24-26 cm from the Discharge Canal Outfall Area are unquestionably due to past controlled liquid releases from PNPS-1. The sample underwent confirmatory reanalyses in which neither Cs-134 nor Cs-137 were detected above the LLD (Lower Limit of Detection), and neither nuclide was detected in the other layers of the sediment. This indicates the presence of a "hot" particle in the sediment, and does not present a hazardous situation due to the extremely limited distribution of the activity and the absence of any ingestion pathway or direct radiation hazard.

The measured concentrations of Co-60 in the Discharge Canal samples of mussels and algae (Irish Moss) are unquestionably due to liquid effluents from PNPS-1. However, the maximum dose due to consumption of either mussels or algae with the peak concentrations would result in less than 0.01 mrem to the total body and 0.08 mrem to any organ. Clearly, this dose is not significant when compared to the natural background dose rate of 80 to 100 mrem/year as it is much less than 1% of background.

Essentially, all samples required by the PNPS-1 Technical Specifications were collected on schedule. The only exceptions were the unavailablility of two milk sample locations, and two air sampling locations plus occasional failures of the air samplers. The TLD station for one of the two air sampling sites was discontinued (Plymouth Center) due to inaccessibility of the established location. These incidents affected only about 7% of the total number of samples scheduled for collection.

Both Plimoth Plantation and the Plymouth County Farm were unavailable as milk sampling locations during 1981. Plimoth Plantation informed Boston Edison in January 1981 that milk producing animals would no longer be available as they disposed of their cow. This situation has not changed for 1982. The Plymouth County Farm has not been available as a milk sampling

station since 1979 as they had sold all of their cows. Recently, the Plymouth County Farm has indicated that they may be able to again participate in the Program in December, 1982.

The two air sampling stations which became unavailable during 1981 were the Plymouth Center and Cleft Rock sites. The Cleft Rock air sampling station was lost during the second quarter of 1981 (between 4/6/81 - 4/14/81) when vandals destroyed the equipment and protective facilities. The communications tower at the site was also heavily damaged. This particular site is Boston Edison property. At this time, a lease was being negotiated between Boston Edison and a cable television company. The air sampling station could not be reinitiated until the lease was finalized. The lease was finalized around the first of the year, 1982. At this writing, Boston Edison is in the process of establishing operability at the Cleft Rock (actually Pine Hills) air sampling station site. The air sampling station should be fully operational by April 15, 1982.

The Plymouth Center air sampling station (Old Fire House on Main Street) was lost during the third quarter of 1981 (between 7/28/81 - 8/4/81) when a private individual bought the Old Fire House. The individual refused to participate in the Program. A search for a suitable public building in the Plymouth Center area was then initiated. A suitable public building was located on February 1, 1982 - Plymouth Town Hall. A this writing, Boston Edison is in the process of establishing operability at the Plymouth Center air sampling station site. The air sampling station should be fully operational by April 15, 1982.

TABLE I-1

PNPS-1

CAPACITY FACTORS

1981

(Based on 670 MWe)

Month	Percent Capacity
January	85.7
February	67.0
March	65.6
April	90.7
May	94.6
June	95.0
July	59.8
August	72.1
September	75.4
October	0.0
November	0.0
December	0.0
Average	58.7

I. Description of the Monitoring Program

The Radiological Monitoring Program conducted in accordance with the PNPS-1 Technical Specification is included as Appendix D. The program is essentially identical to that conducted during 1980 and incorporates supplemental provisions as specified in the Settlement Agreement between the Massachusetts Wildlife Federation and Boston Edison Company, June 9, 1977[2]. The exceptions to the program are as follows:

1) There is no TLD station at Saquish Neck since the Mass Wildlife Federation has not yet provided a means for placement and retrival of the TLD as prescribed by the agreement noted above.

2) There is no longer a milk producing cow at the Plymouth County Farm, nor at the Plimoth Plantation. The Plymouth County Farm location has been unavailable since 1979 and the Plimoth Plantation location has been unavailable since 1981. The nearest cow is located approximately 12 miles from PNPS in the W sector. This location is a private residence. Samples have been collected from this location since October, 1980.

3) There is no longer a Karbott Farm. Vegetable samples are now collected at the two nearest gardens near the W and ESE site boundaries.

The 1981 site Census conducted according to Technical Specification requirements determined that there are several vegetable gardens near the site boundary in the W-WNW and SE-ESE sectors (see Appendix E). In the ESE sector, the nearest garden is at the J.B. Work residence (0.6 miles ESE). A sample of lettuce was collected on 9/17/81. In the west direction the location of the nearest observed garden of approximately 500 square feet was at the residence of Mary Lloyd Evans (0.7 miles W). A sample of Chinese Cabbage was collected from this location on 9/15/81. A sample of rubbarb was collected from the Winchester residence (0.7 miles W). The rubbarb collected on 9/15/81 was insufficient to meet sensitivity requirements, and the garden did not contain enough rubbarb for a larger sample. The location of one of the nearest animals which produces milk for human consumption is the King residence (12 miles W). Samples of milk have been collected from this location since October, 1980.

The 1981 Census indicates that 5 goats are located at the Lloyd residence on Long Pond Road, however the owner was unable to be contacted to determine the status of the goats. The owner was contacted during the 1980 Census, and indicated that the goats were not producing milk at that time, but had in the past. When the animals do give milk, it is very little since they are miniature goats (not full size) and she uses the milk for personal consumption only. During the 1981 year, every effort was made to identify and locate milk-producing animals in the near vicinity (5 miles) of PNPS-1. Only one milk sample was obtained early in 1981 (1/27/81) from the residence of Mr. S. Whipple (2 miles WSW). Samples were discontinued from this location when the cows were sold. A milk-producing cow was located at the residence of Mr. F. Shaw (8 miles SSE) in June. Only one sample was collected from this location (July 7, 1981) before Mr. Shaw sold his cow.

In perspective, cows and goat locations within a 5 mile radius of PNPS-1 are rare and transitory at best. It is extremely unlikely that the cow-milk pathway could be responsible for even small doses to any member of the general public.

III. Results of Analyses

This section summarizes the results of the analyses of environmental media samples in compliance with the monitoring program described in Appendix C. The section is divided into sub-sections, each of which describes a particular media or potential exposure pathway.

The results of analyses conducted on environmental media are maintained in a computerized data file which constitutes a data base used for statistical analyses by a computer code entitled ERMAP[3].

ERMAP calculates a set of statistical parameters for each radionuclide whose concentration is reported in a given environmental medium. This set of statistical parameters includes separate analyses for (1) the indicator stations, (2) the control stations, and (3) the station having the highest annual mean concentration. For each of these three groups of data, ERMAP calculates:

1) the mean value of all measured concentrations;

2) the square root of the mean square deviation (this is an estimate of the sample variance);

3) the lowest and highest calculated concentrations;

4) the number of positive measurements divided by the total number of measurements;

Entries listed under the heading LLD* are the mean of all LLD values, where each LLD equals 4.67 times the standard error of the associated background measurement.

*Lower Limit of Detection

The results of ERMAP are provided in each subsection for the appropriate media. In addition, plots of measured concentration as a function of sampling time are included for certain isotopes in certain media in an effort to simplify interpretation of the results.

Sample station identification numbers used by the ERMAP program are provided in Table III-A-1.

TABLE III-A-1

Sample Station Identification Codes

Media	Station Code Number	Station Location
Air Particulate and Iodine Filters	00	Warehouse (0.03 mi-SSE)
	01	Rocky Hill Road (0.8 mi-SE)
	03	Rocky Hill Road (0.3 mi-WNW)
	06	Property Line (0.34 mi-NW)
	07	Pedestrian Bridge (0.14 mi-N)
	08	Overlook Area (0.03 mi-W)
	09	East Breakwater (o.35 mi-ESE)
	10	Cleft Rock (0.9 mi-S)
	15	Plymouth Center (4.5 mi-W-WNW)
	17	Manomet Substation (2.5 mi-SSE)
	21	East Weymouth (control-23 mi-NW)
Waterborne	11	Discharge Canal
	17	Bartlett Pond (1.7 mi-SE)
	23	Power Point (control 7.8 mi-NNW)
Shellfish	11	Discharge Canal Outfall
	12	Plymouth Harbor
	13	Duxbury Bay
	15	Manomet Point
	24	Marshfield (Control)
Algae (Irish Moss)	11	Discharge Canal Outfall
	15	Manomet Point
	22	Ellisville (Control)
Lobster (Arthropods)	11	Vicinity of Discharge Canal Offshore
	15/99	Offshore (Control)
	25	Scituate (Control)
Fish	2	Round Hill Point-Offshore-(Control)
	11	Vicinity of Discharge Canal
	21	Auto Trawl Station-Offshore-(Control)
	22	Offshore-(Control)
	28	Cataumet,Bourne-(Control)
	29	Priest Cove-Offshore-(Control)
Sediment	11	Rocky Point
	12	Plymouth Harbor
	13	Duxbury Bay
	14	Plymouth Beach
	15	Manomet Point
	24	Marshfield (Control)

TABLE III-A-1 (Continued)

Media	Station Code Number	Station Location
Milk	16	Whipple Farm (2 mi-WSW)
	21	Whitman Farm (Control-23 mi-NW)
	22	King Residence (Control-12 mi-W)
	26	Shaw Residence (8 mi-SSW)
Cranberries	13	Manomet Point Bog (2.5 mi-SE)
	14	Bartlett Road Bog (2.8 mi-SSE/S)
	23	Pine Street Bog (Control-17 mi-WNW)
Vegetation	11	Plymouth County Farm (3.5 mi-W)
	16	Work Residence (0.7 mi-ESE)
	17	Evans Garden (0.7 mi-W)
	22	Bridgewater Farm (Control-20 mi-W)
Beef Forage	11	Plymouth County Farm (3.5 mi-W)
	15	Plimoth Plantation (2.2 mi-W)
	21	Whitman Farm (Control-23 mi-NW)
	22	Bridgewater Farm (Control-20 mi-W)

III. A. Air Particulate Filters

Sample collection systems consisting of a cellulose particulate filter and a charcoal filter cartridge are used to collect particulate matter and iodine isotopes respectively. Analyses of the particulate filters for beta radiation is performed weekly. In addition, quarterly composite particulate samples are analysed for gamma emitting isotopes. Table III-A-2 presents the results of the ERMAP for air particulate analyses. (The station identification numbers correspond to the locations identified in Table III-A-1.)

For ease of interpretation of these measurements, a plot of gross beta activity vs. time for all indicator stations is provided in Figure III-A-1 and for the control station in Figure III-A-2.

Positive measurements of specific isotopes characteristic of reactor operation (ie, Ce-144, Ce-141, Ru-103, Ru-106, Zr-95, Nb-95, Cs-137, Mn-54 and Co-60) were observed at just about all of the stations. All of the positive measurements were seen in composite samples primarily for the first, second and third quarters. As can be seen from Figures III-A-1 and III-A-2, a significant increase in airborne gross beta activity was detected for all sampling locations during the first three quarters of 1981 (the gross beta activity for the control station during 1980 was < 0.1 pCi/m^3). This increase in activity is attributable to the October 17, 1980 Chinese weapons test. The quarterly composite samples showed detectable concentrations of fallout fission products related to the Chinese weapons test for the first three quarters of 1981 (Figures III-A-3 to III-A-12). Refer to Section III.A.1, Atmospheric Fallout During 1981, for a more detailed explanation. Even though this section concerning atmospheric fallout makes reference to Maine Yankee specifically, it is still applicable to PNPS-1.

The following positive measurements made were due to the effluents of PNPS-1: Cs-137 at West Rocky Hill Road (Station 03-0.3mi-WNW) and Co-60 at the Pedestrian Bridge (Station 07-0.14mi-N) during the first quarter of 1981; Mn-54 at the Property Line (Station 06-0.34mi-NW)

during the third quarter of 1981; and, Co-60 at the Warehouse (Station 00-0.03 mi-SSE) during the fourth quarter of 1981. However, even if a person were to breathe air with the highest concentrations measured, they would receive an annual dose of less than 0.0004 mrem to the total body and 0.04 mrem to the maximum exposed organ (infant-lung).

In consideration of the natural background dose rate of 80 to 100 mrem/year, there was clearly no significant environmental effect observed in the air particulate media as a result of the operation of PNPS-1.

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 5
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: AIR PARTICULATE FILTERS UNITS: PCI/CU. M

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
GR-B (514)	4.0E-03	(9.8 ± .4)E -2	15	(1.4 ± .2)E -1	(1.0 ± .1)E -1
(0)		(-1.5 - 665.0)E -3		(1.4 - 39.8)E -2	(1.1 - 48.8)E -2
		(453/462)		*(30/ 31)*	*(52/ 52)*
BE-7 (41)	2.0E-02	(3.2 ± .2)E -2	15	(5.1 ± 1.6)E -2	(3.3 ± .4)E -2
(0)		(7.0 - 82.0)E -3		(2.7 - 8.2)E -2	(2.5 - 4.2)E -2
		(36/ 37)		*(3/ 3)*	*(4/ 4)*
K-40 (41)	4.0E-02	(5.7 ± .9)E -3	21	(1.2 ± .2)E -2	(1.2 ± .2)E -2
(0)		(-1.4 - 1.4)E -2		(5.8 - 16.8)E -3	(5.8 - 16.8)E -3
		(3/ 37)		*(1/ 4)*	*(1/ 4)*
CR-51 (41)	2.0E-02	(-1.7 ± 1.4)E -3	15	(2.5 ± 3.4)E -3	(-7.7 ± 14.5)E -4
(0)		(-5.4 - .9)E -2			(-3.6 - 2.8)E -3
		(0/ 37)		*(0/ 3)*	*(0/ 4)*
MN-54 (41)	2.0E-03	(3.7 ± .9)E -4	15	(7.0 ± 3.7)E -4	(5.9 ± 3.3)E -4
(0)		(-1.3 - 1.4)E -3			(3.4 - 147.0)E -5
		(7/ 37)		*(0/ 3)*	*(1/ 4)*
CO-58 (41)	2.0E-03	(1.8 ± 123.6)E -6	15	(1.3 ± .7)E -3	(-1.7 ± 1.1)E -4
(0)		(-3.2 - 2.7)E -3			(-4.6 - .9)E -4
		(0/ 37)		*(0/ 3)*	*(0/ 4)*
FE-59 (41)	3.0E-03	(7.1 ± 21.4)E -5	15	(1.4 ± .9)E -3	(4.7 ± 5.9)E -4
(0)		(-4.7 - 3.1)E -3			(-9.7 - 18.6)E -4
		(0/ 37)		*(0/ 3)*	*(0/ 4)*
CO-60 (41)	2.0E-03	(2.0 ± .8)E -4	07	(5.3 ± 5.1)E -4	(-1.2 ± 1.8)E -4
(0)		(-5.6 - 20.3)E -4		(-2.4 - 20.3)E -4	(-5.7 - 2.8)E -4
		(2/ 37)		*(1/ 4)*	*(0/ 4)*
ZN-65 (41)	4.0E-03	(-5.7 ± 11.6)E -5	10	(1.2 ± 1.0)E -3	(-1.4 ± 2.3)E -4
(0)		(-1.6 - 2.2)E -3			(-4.6 - 5.5)E -4
		(0/ 37)		*(0/ 2)*	*(0/ 4)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-A-2
ERMAP RESULTS
AIR PARTICULATE FILTERS

MEDIUM: AIR PARTICULATE FILTERS UNITS: PCI/CU. M

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATION STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
ZR-95 (41)	3.0E-03	(7.9 ± 1.1)E -3	10	(1.8 ± .7)E -2	(7.9 ± 8.8)E -3
(0)		(-1.2 - 212.0)E -3		(6.9 - 20.9)E -3	(-4.9 - 195.0)E -3
		(27/ 37)		*(2/ 2)*	*(3/ 4)*
NB-95 (41)	1.0E-02	(1.3 ± .2)E -2	15	(1.8 ± .8)E -2	(1.8 ± .7)E -2
(0)		(-7.8 - 378.0)E -3		(8.9 - 33.8)E -3	(5.2 - 345.0)E -3
		(28/ 37)		*(3/ 3)*	*(3/ 4)*
AG-110M(41)	2.0E-03	(3.9 ± 5.1)E -3	15	(8.3 ± 8.3)E -3	(-3.6 ± 15.8)E -3
(0)		(-7.8 - 12.2)E -3			(-3.1 - 2.8)E -3
		(0/ 37)		*(0/ 3)*	*(0/ 4)*
RU-103 (41)	2.0E-03	(2.5 ± .8)E -3	15	(5.5 ± 1.7)E -3	(2.4 ± 1.8)E -3
(0)		(-7.8 - 88.3)E -3		(3.3 - 8.8)E -3	(-2.0 - 50.2)E -3
		(19/ 37)		*(2/ 3)*	*(2/ 4)*
RU-106 (41)	2.0E-02	(8.3 ± .8)E -3	08	(7.1 ± 3.8)E -3	(4.0 ± 3.7)E -3
(0)		(-8.0 - 16.2)E -3		(1.0 - 16.2)E -3	(-8.5 - 13.8)E -3
		(9/ 37)		*(2/ 8)*	*(1/ 4)*
I-131 (41)	3.0E-03	(-1.3 ± 1.5)E -1	15	(2.0 ± 2.0)E -1	(2.8 ± 2.8)E -3
(0)		(-5.5 - .6)E 0			(-1.9 - 10.8)E -3
		(0/ 37)		*(0/ 3)*	*(0/ 4)*
CS-134 (41)	2.0E-03	(-2.7 ± .7)E -3	15	(1.9 ± 21.6)E -5	(-1.7 ± 1.0)E -3
(0)		(-1.6 - 1.0)E -3			(-3.9 - .6)E -3
		(0/ 37)		*(0/ 3)*	*(0/ 4)*
CS-137 (41)	2.0E-03	(8.5 ± 1.2)E -3	01	(1.3 ± .8)E -3	(8.2 ± 3.9)E -3
(0)		(-2.3 - 23.7)E -3		(8.6 - 23.7)E -3	(8.2 - 187.0)E -5
		(14/ 37)		*(2/ 8)*	*(2/ 4)*
BA-140 (41)	5.0E-03	(-7.1 ± 5.3)E -3	01	(9.2 ± 8.1)E -3	(3.5 ± 2.8)E -3
(0)		(-1.8 - .0)E -1			(-3.6 - 6.9)E -3
		(0/ 37)		*(0/ 8)*	*(0/ 4)*
CE-141 (41)	3.0E-03	(1.5 ± .2)E -3	15	(2.1 ± .5)E -3	(1.8 ± .9)E -3
(0)		(-1.0 - 8.8)E -3		(1.1 - 2.6)E -3	(3.1 - 378.0)E -5
		(18/ 37)		*(2/ 3)*	*(2/ 4)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-A-2
(continued)

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 7
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: AIR PARTICULATE FILTERS UNITS: PCI/CU. M

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
CE-144 (41)	2.0E-02	(1.1 ± .2)E -2	10	(1.8 ± .7)E -2	(1.1 ± .5)E -2
(0)		(7.7 - 3330.0)E -5		(6.7 - 29.7)E -3	(6.7 - 265.0)E -4
		(26/ 37)		*(2/ 2)*	*(3/ 4)*
TH-228 (41)	9.0E-03	(9.8 ± 148.5)E -6	10	(7.1 ± 1.7)E -4	(4.6 ± 1.9)E -4
(0)		(-2.8 - 1.0)E -3			(7.5 - 99.2)E -5
		(0/ 37)		*(0/ 2)*	*(0/ 4)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-A-2
(continued)

FIGURE III-A-1
GROSS BETA ACTIVITY
AIR PARTICULATES
INDICATOR STATIONS

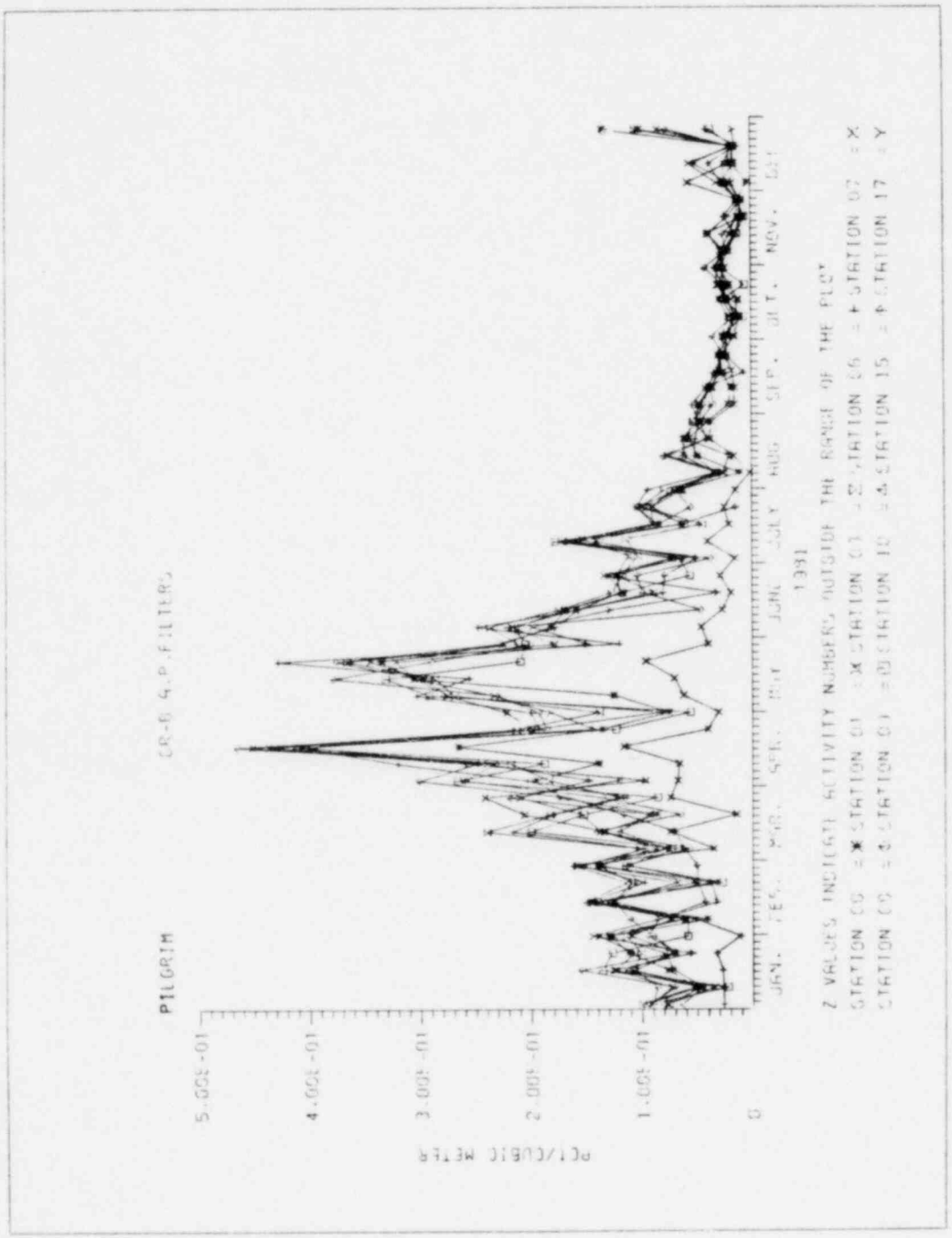


FIGURE III-A-2
GROSS GETA ACTIVITY
AIR PARTICULATES
CONTROL STATION

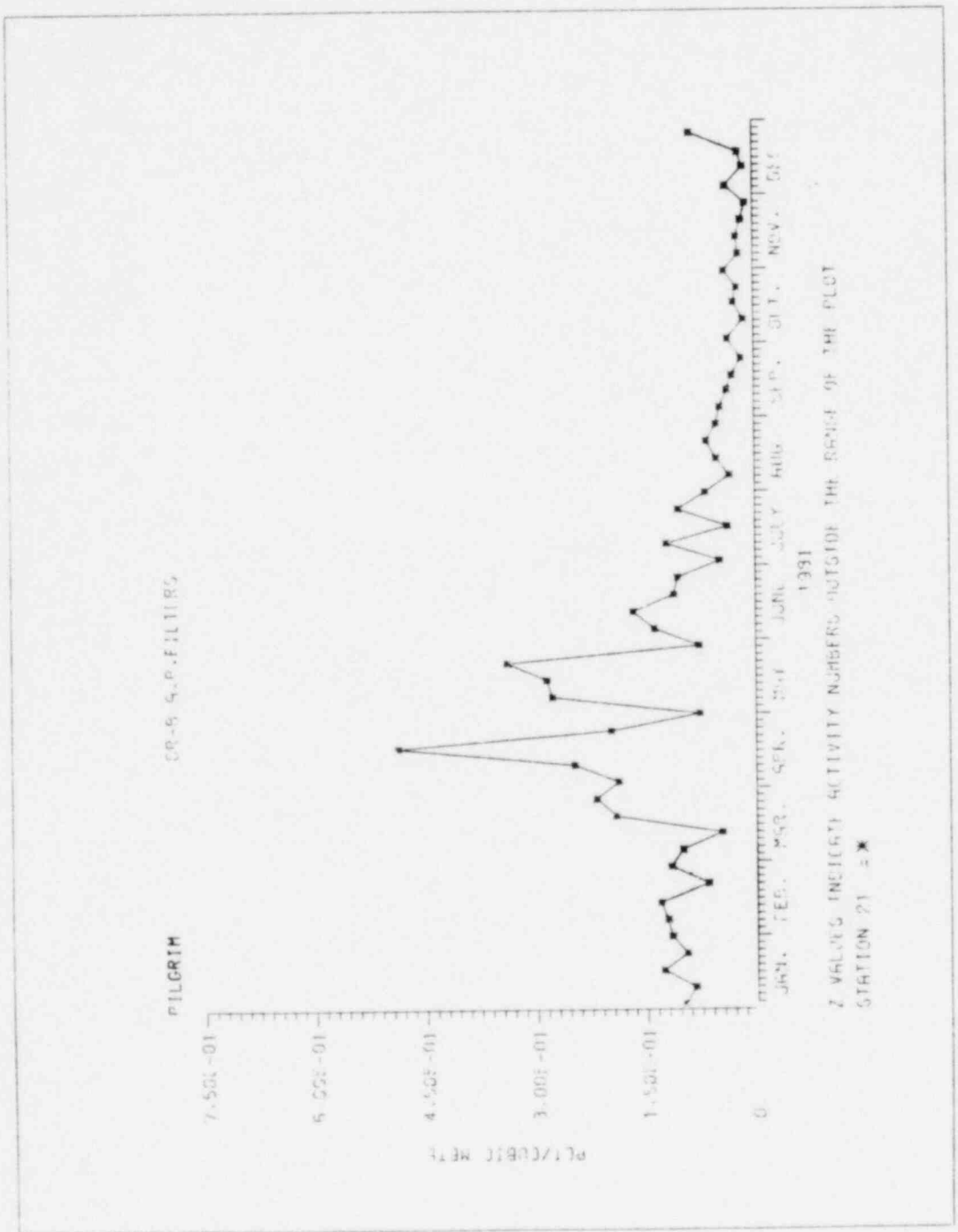


FIGURE III-A-3
CONCENTRATIONS OF Ce-144
AIR PARTICULATES
INDICATOR STATIONS

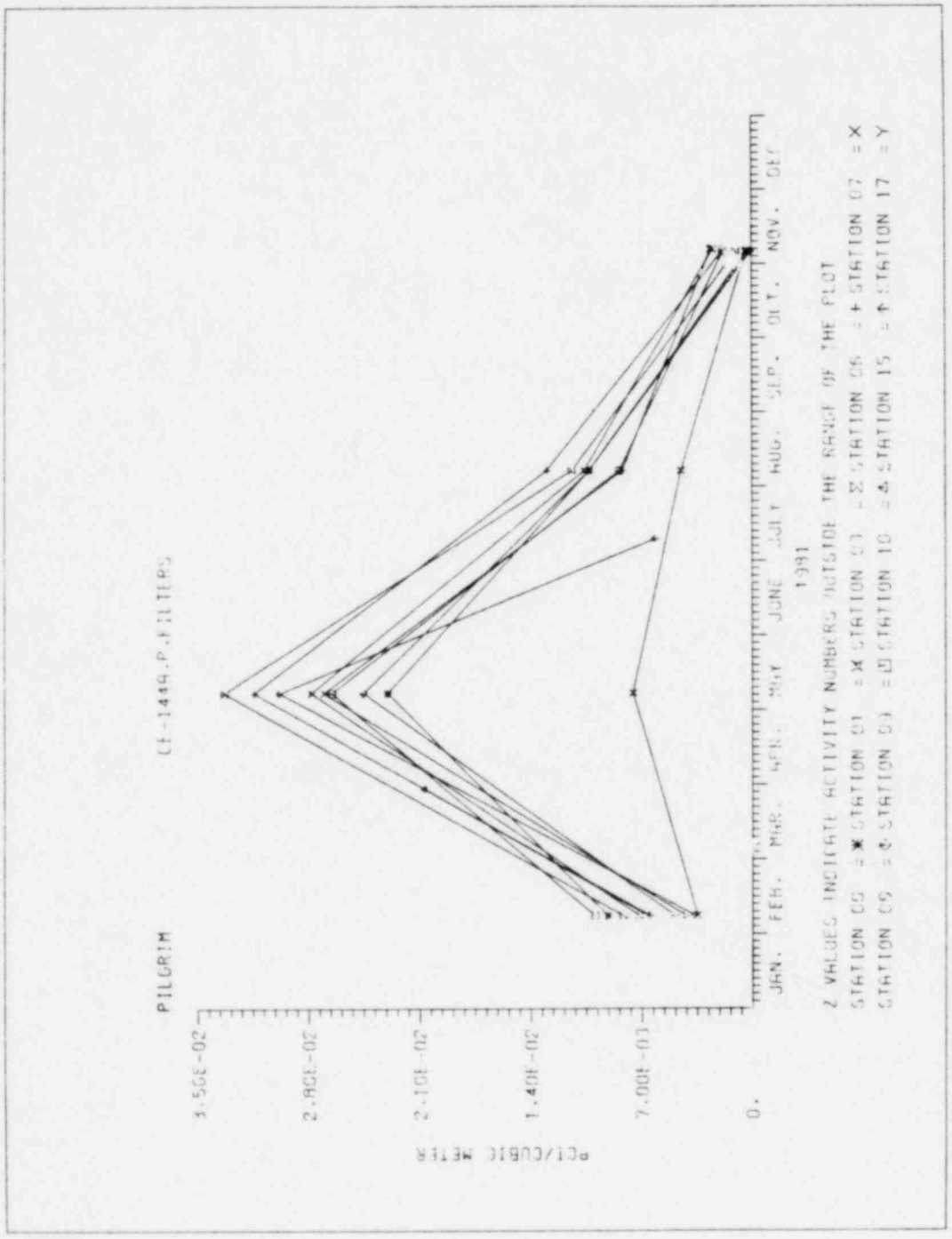


FIGURE III-A-4
CONCENTRATIONS OF Ce-144
AIR PARTICULATES
CONTROL STATION

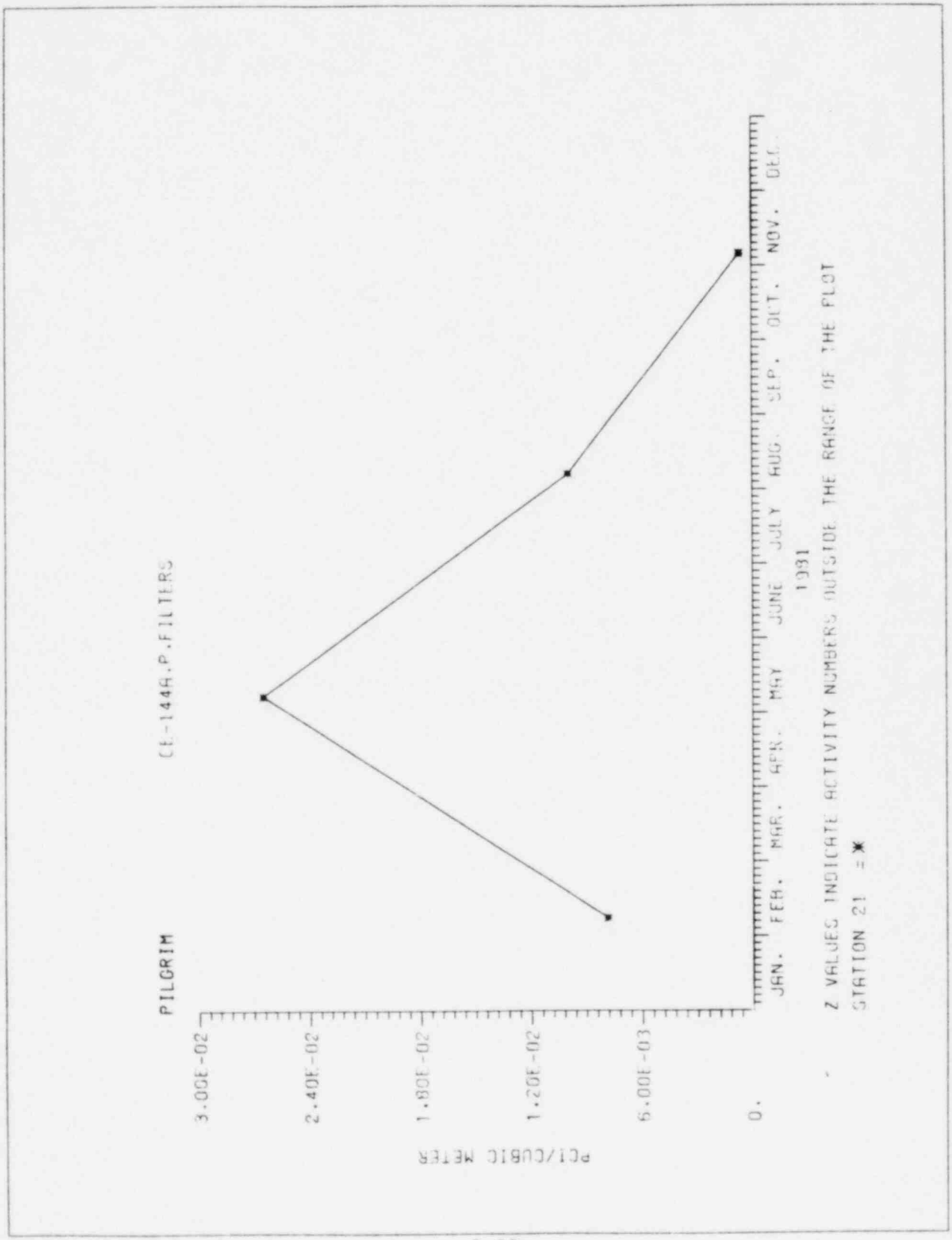


FIGURE III-A-5
CONCENTRATIONS OF Ce-141
AIR PARTICULATES
INDICATOR STATIONS

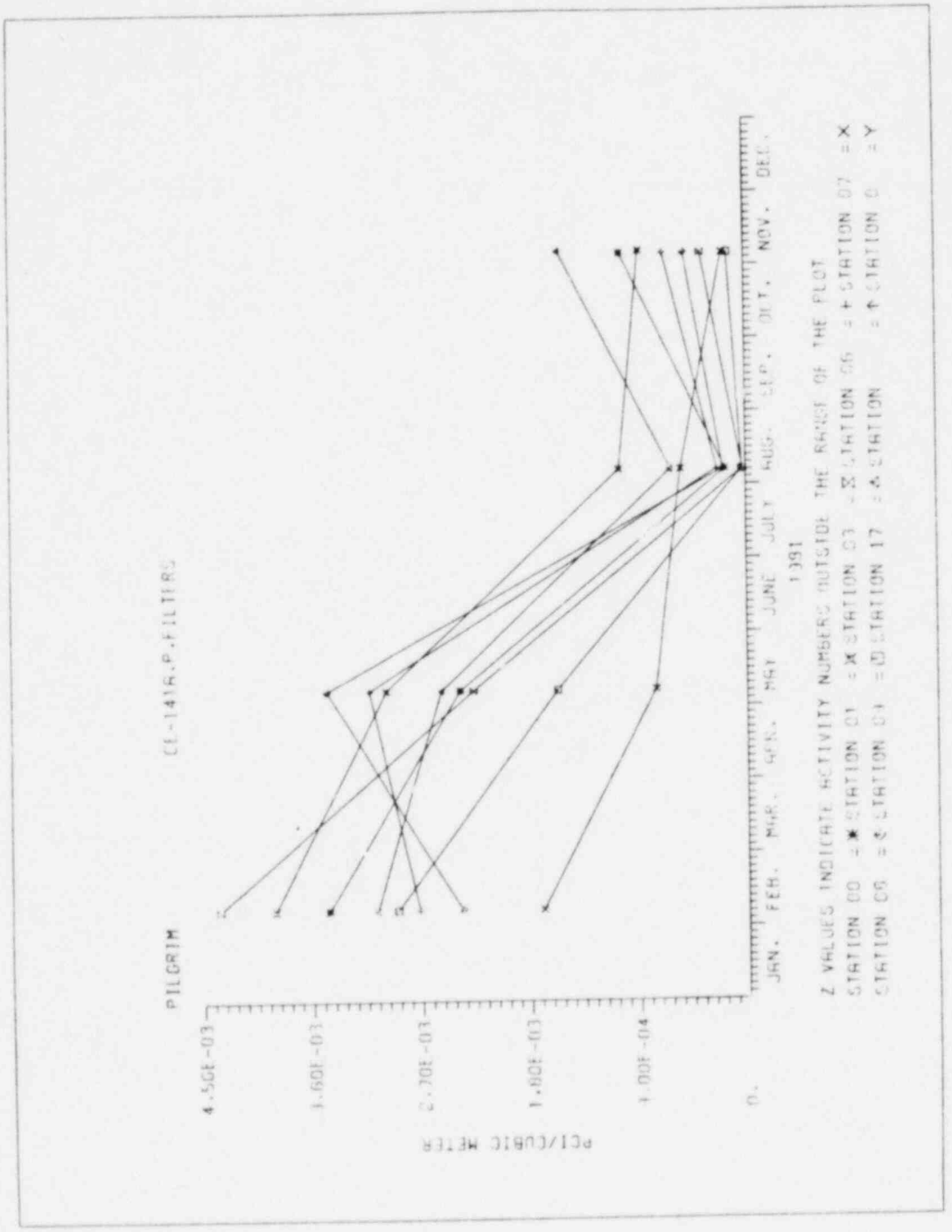


FIGURE III-A-6
CONCENTRATIONS OF Ce-141
AIR PARTICULATES
CONTROL STATION

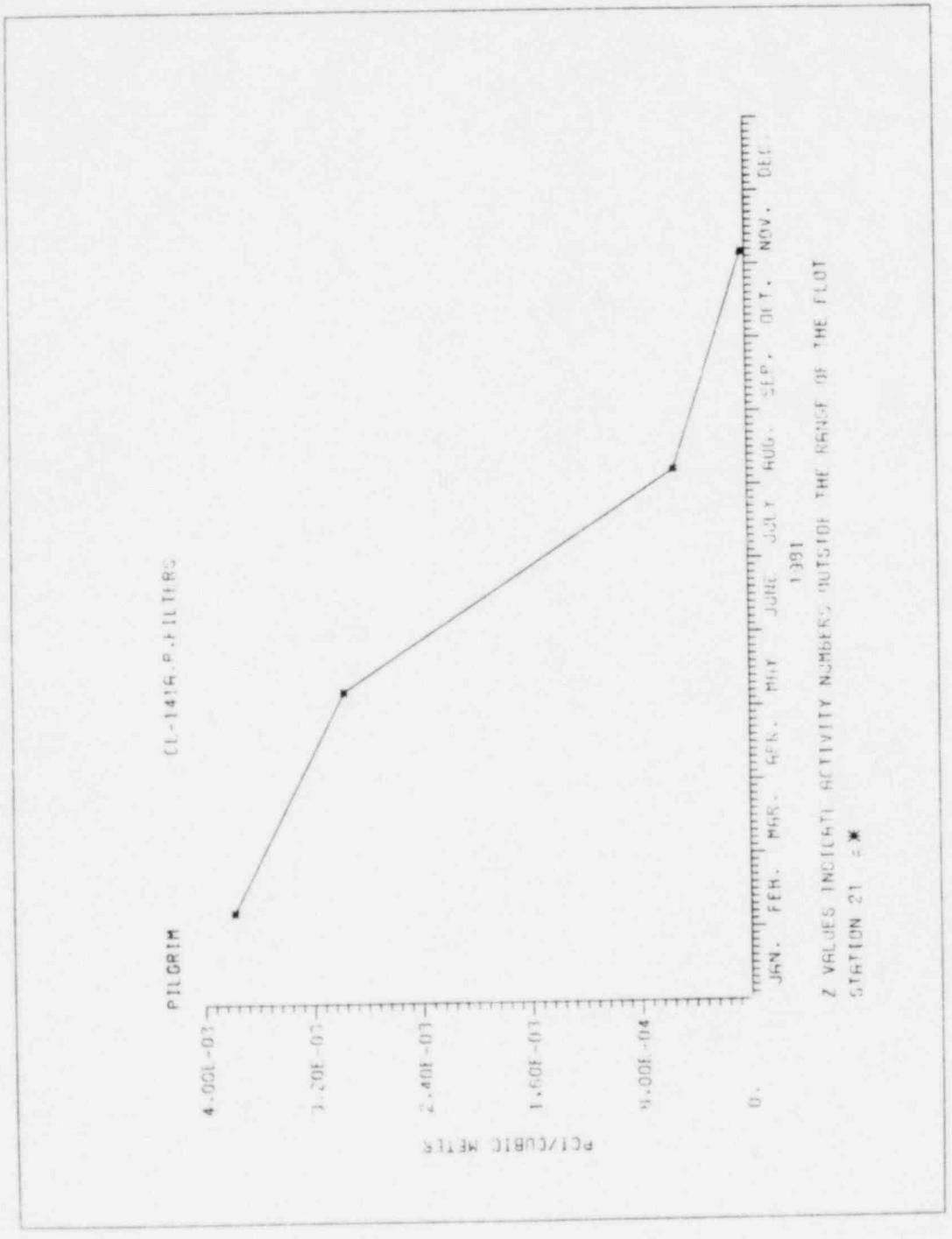


FIGURE III-A-7
CONCENTRATIONS OF RU-103
AIR PARTICULATES
INDICATOR STATIONS

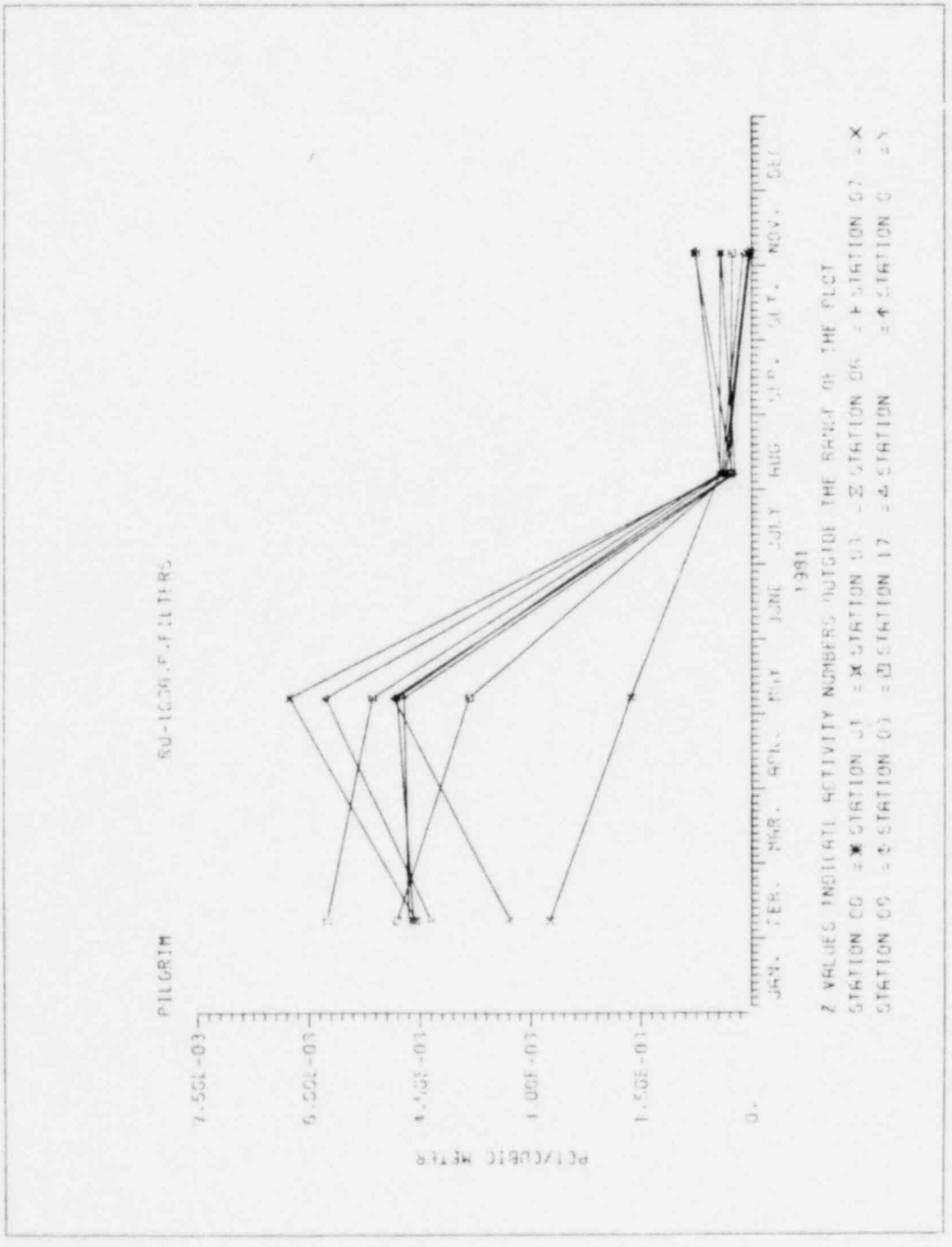


FIGURE III-A-8
CONCENTRATIONS OF RU-103
AIR PARTICULATES
CONTROL STATION

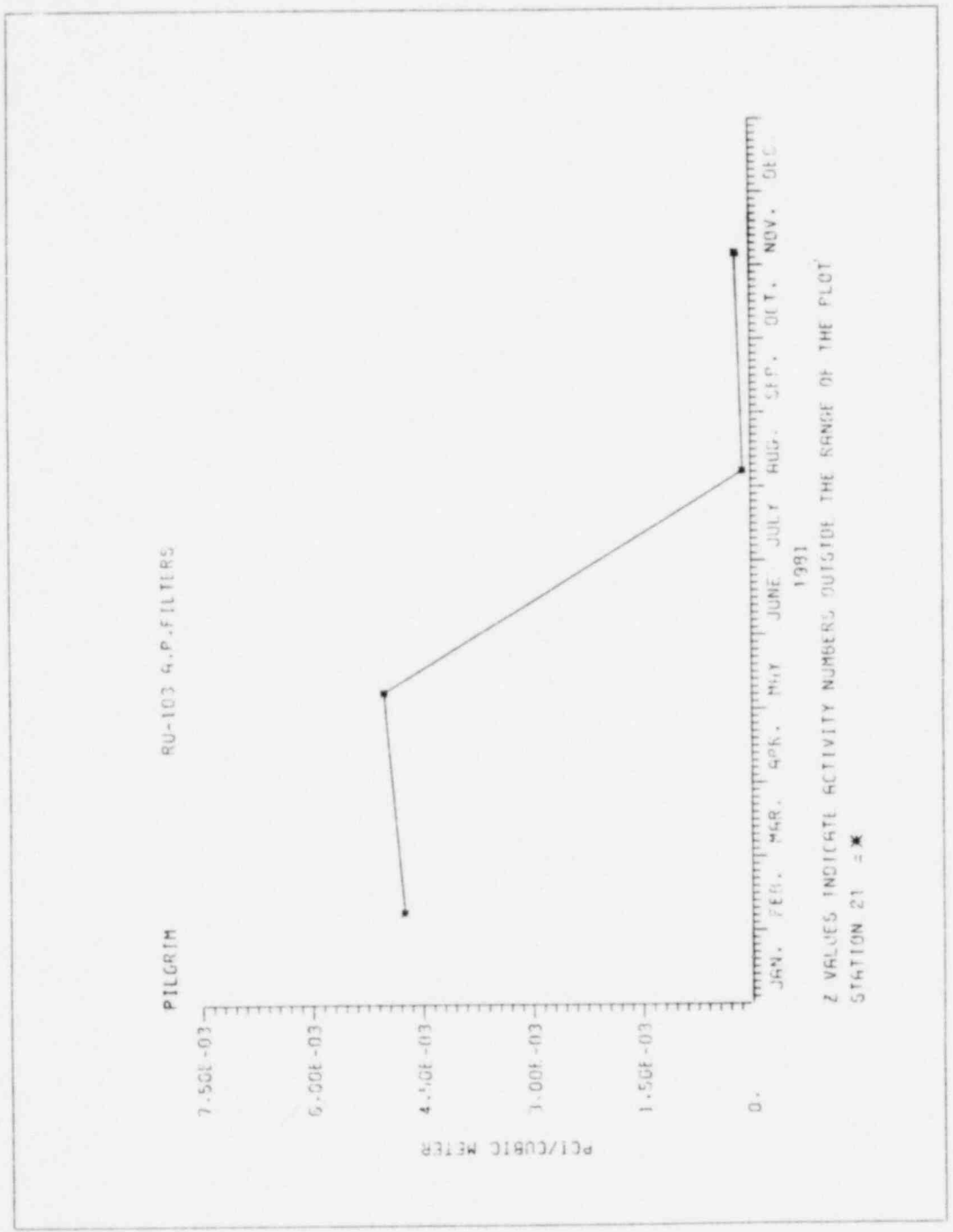


FIGURE III-A-9
CONCENTRATIONS OF Zr-95
AIR PARTICULATES
INDICATOR STATIONS

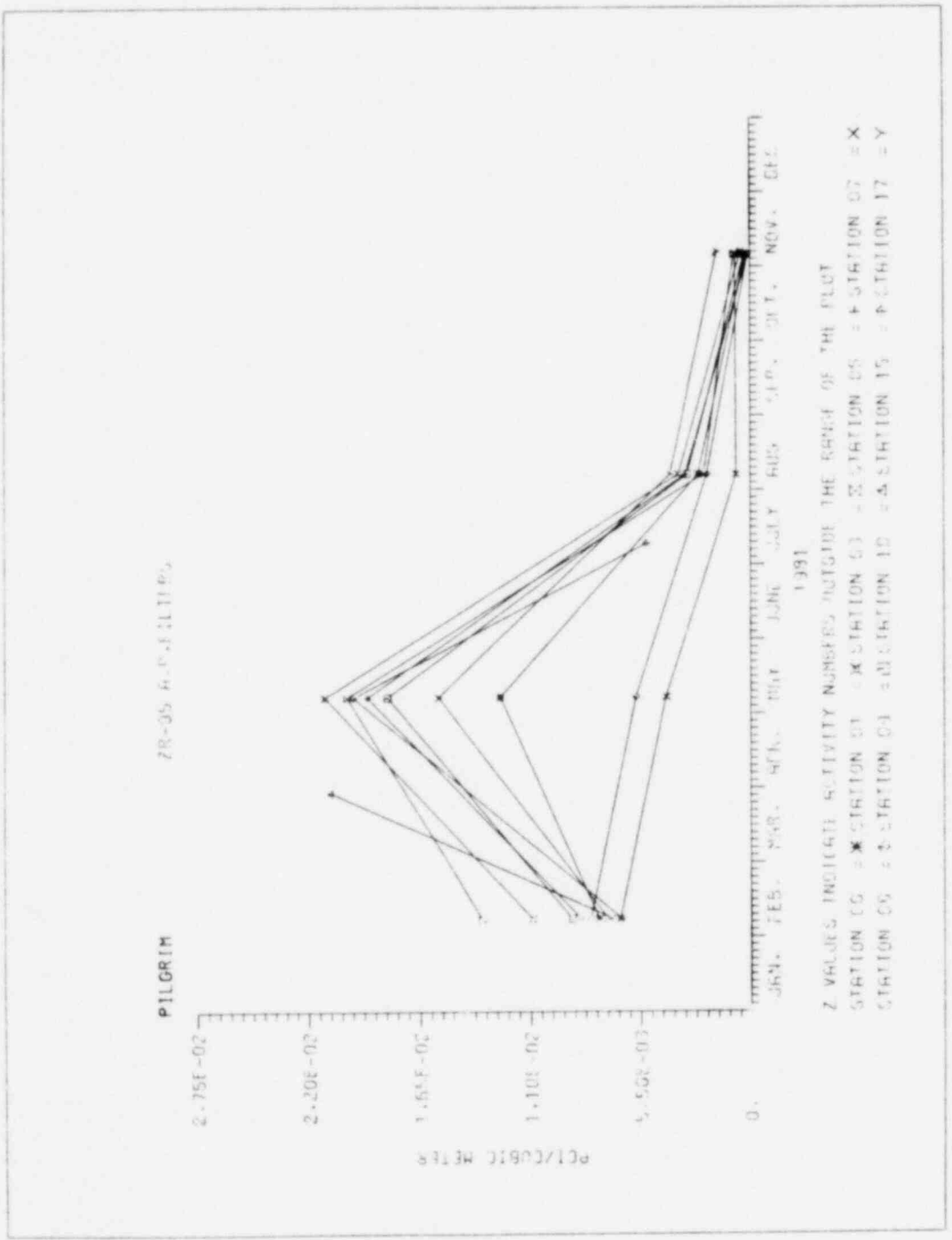


FIGURE III-A-10
CONCENTRATIONS OF Zr-95
AIR PARTICULATES
CONTROL STATION

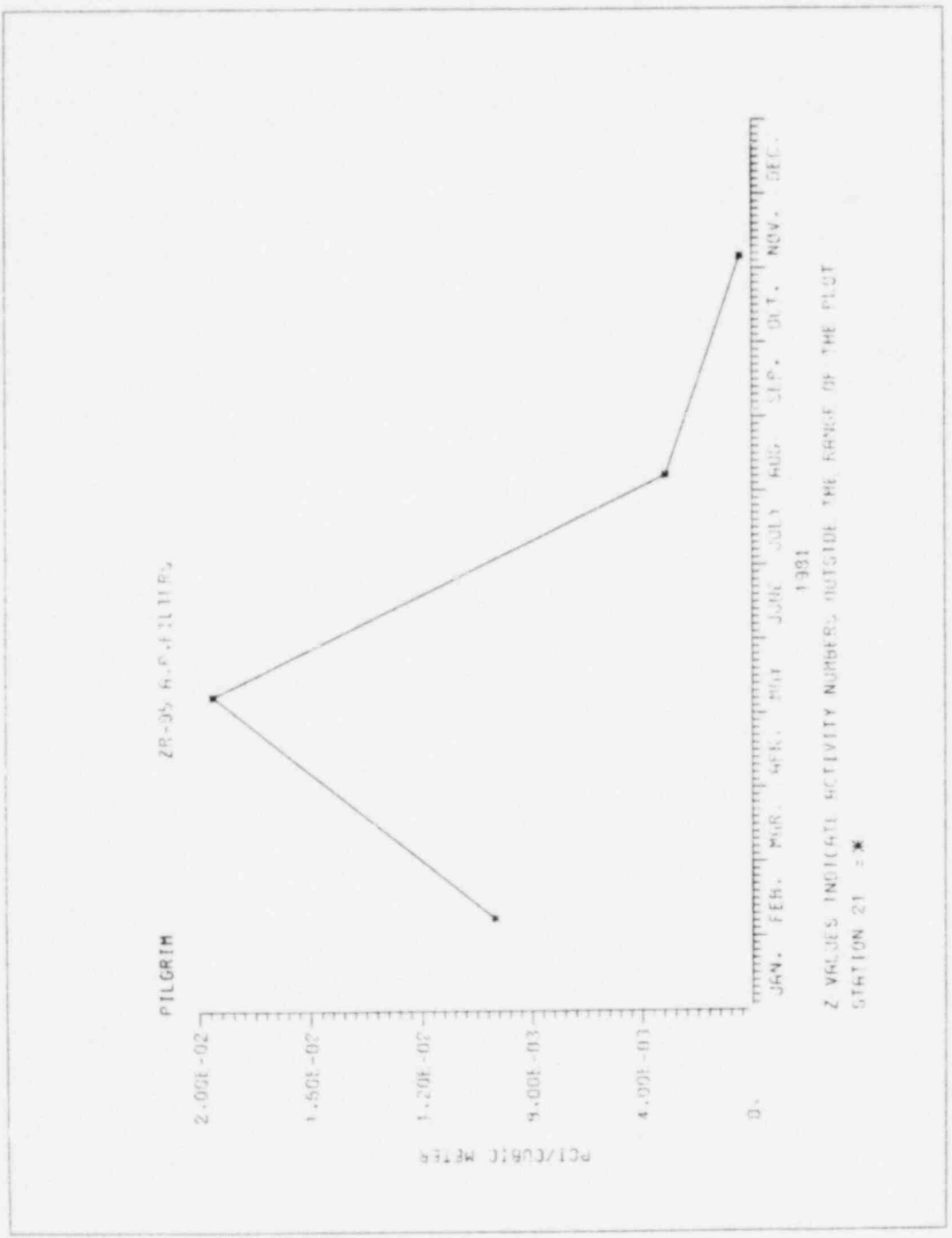
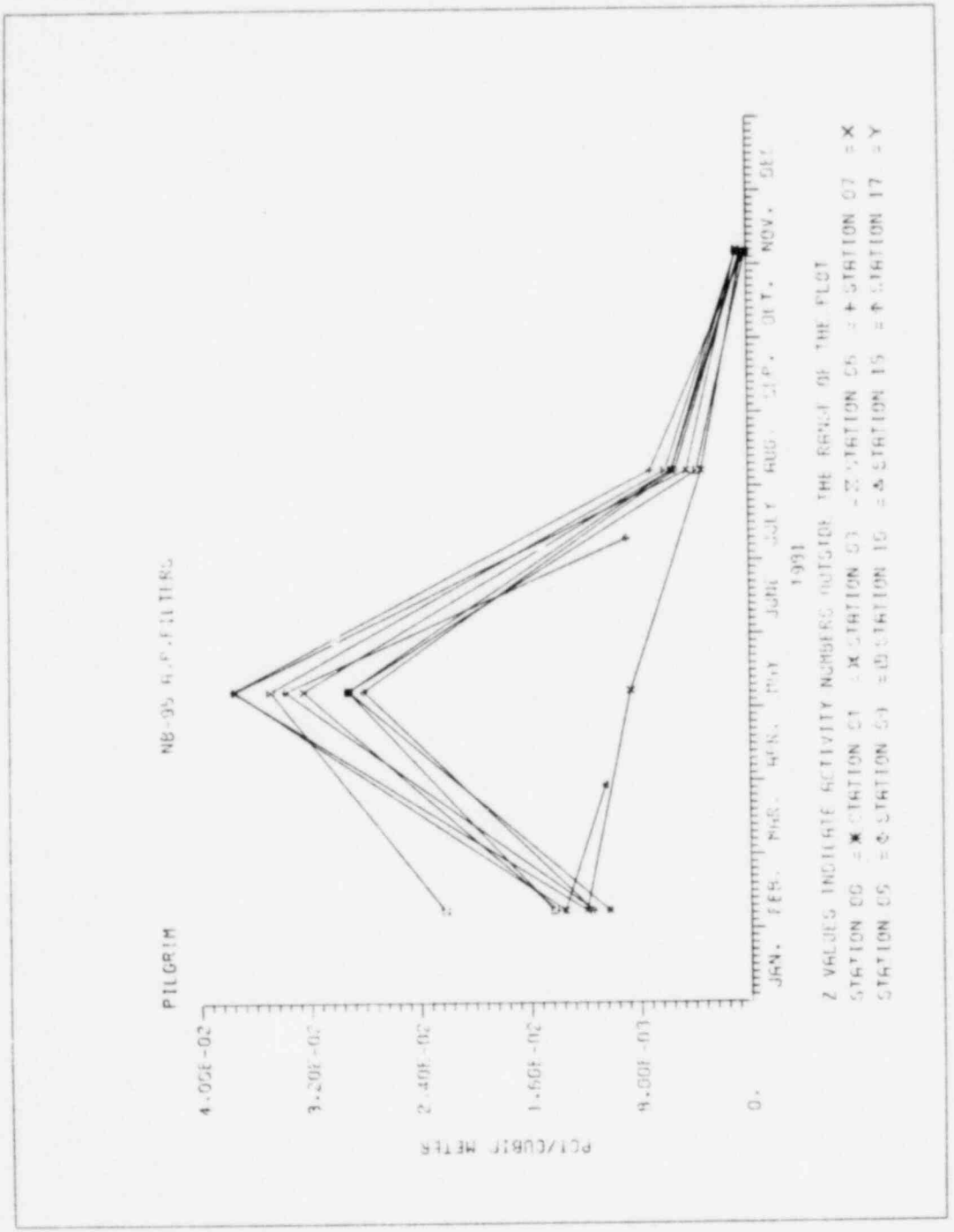


FIGURE III-A-11
CONCENTRATIONS OF Nb-95
AIR PARTICULATES
INDICATOR STATIONS



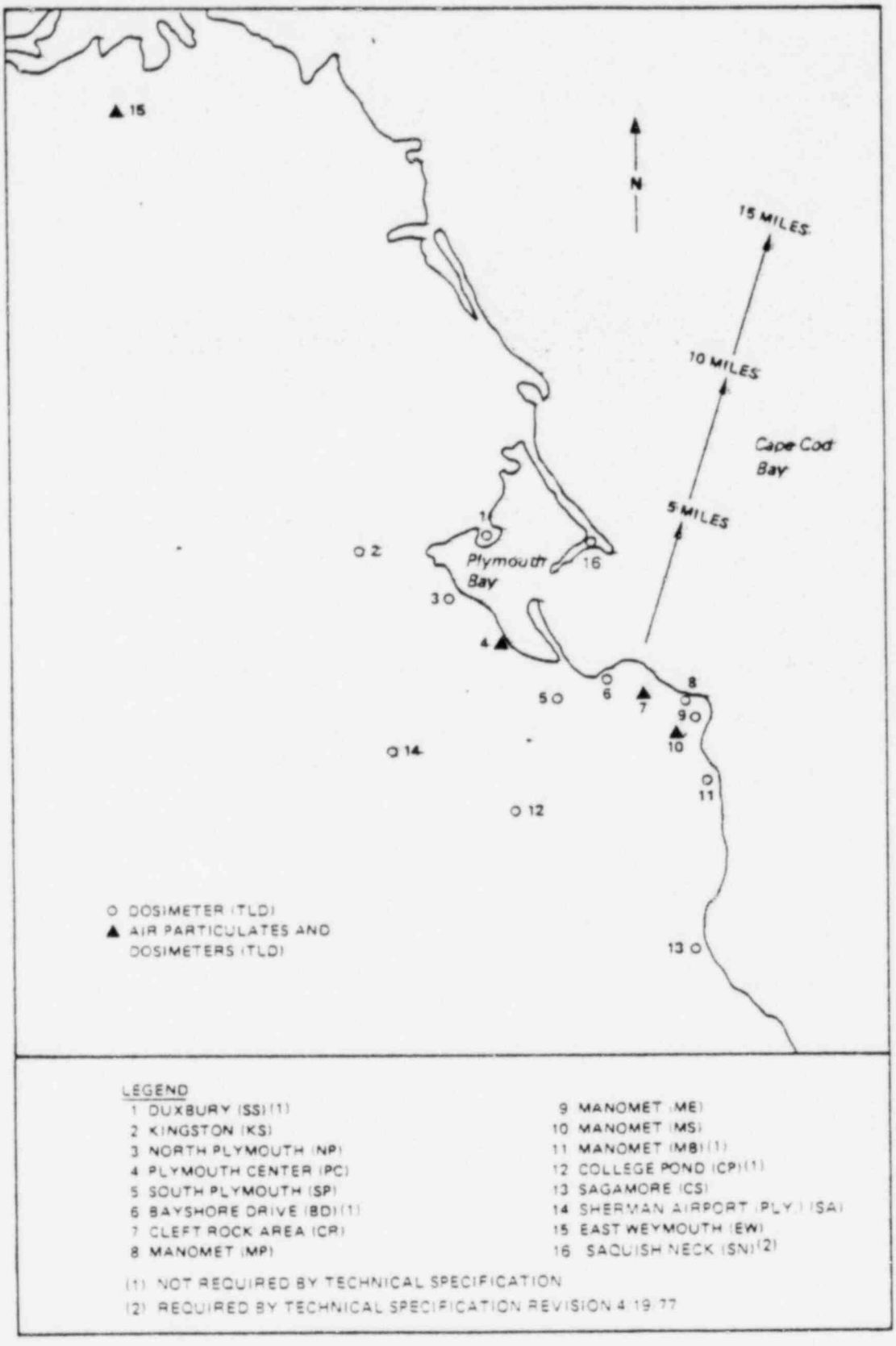
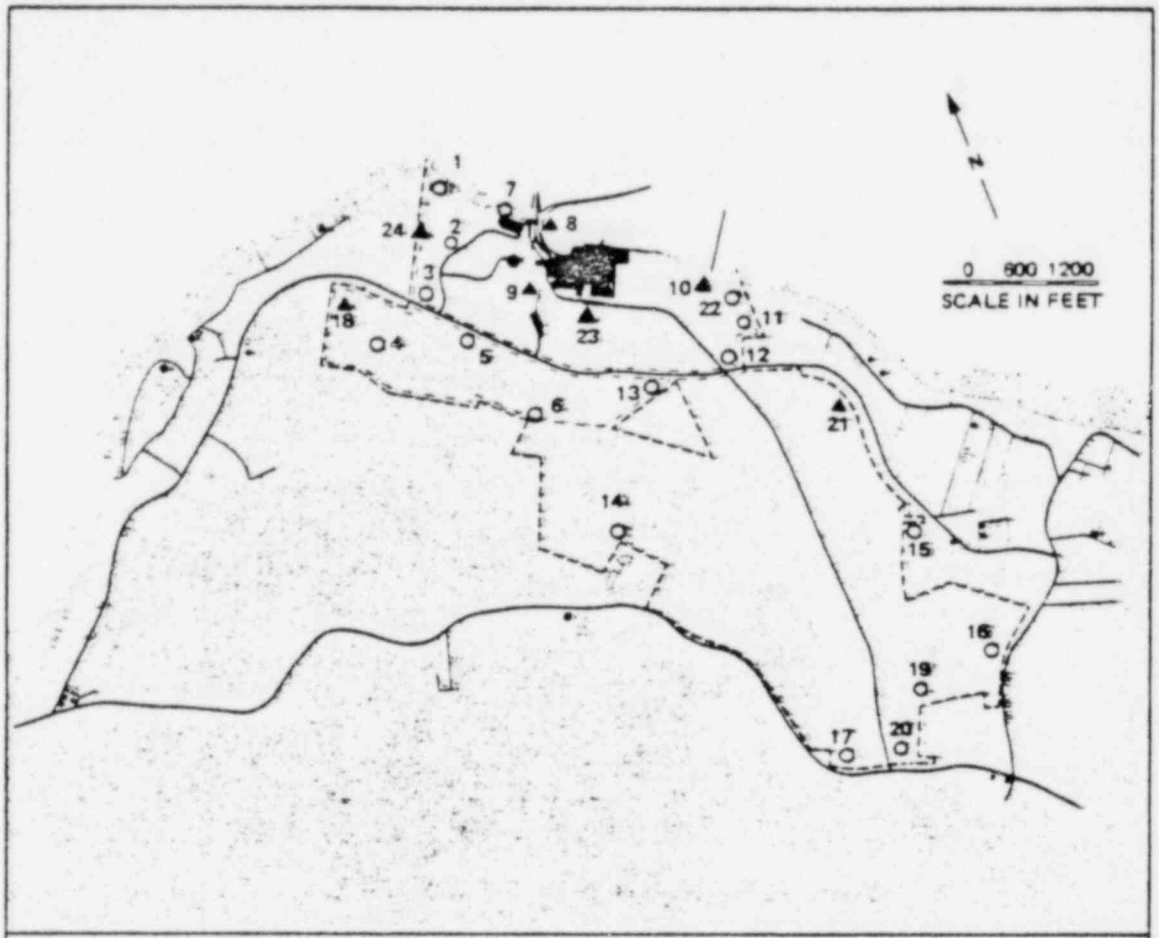


Figure III-D-1 Location of Offsite Monitoring Stations



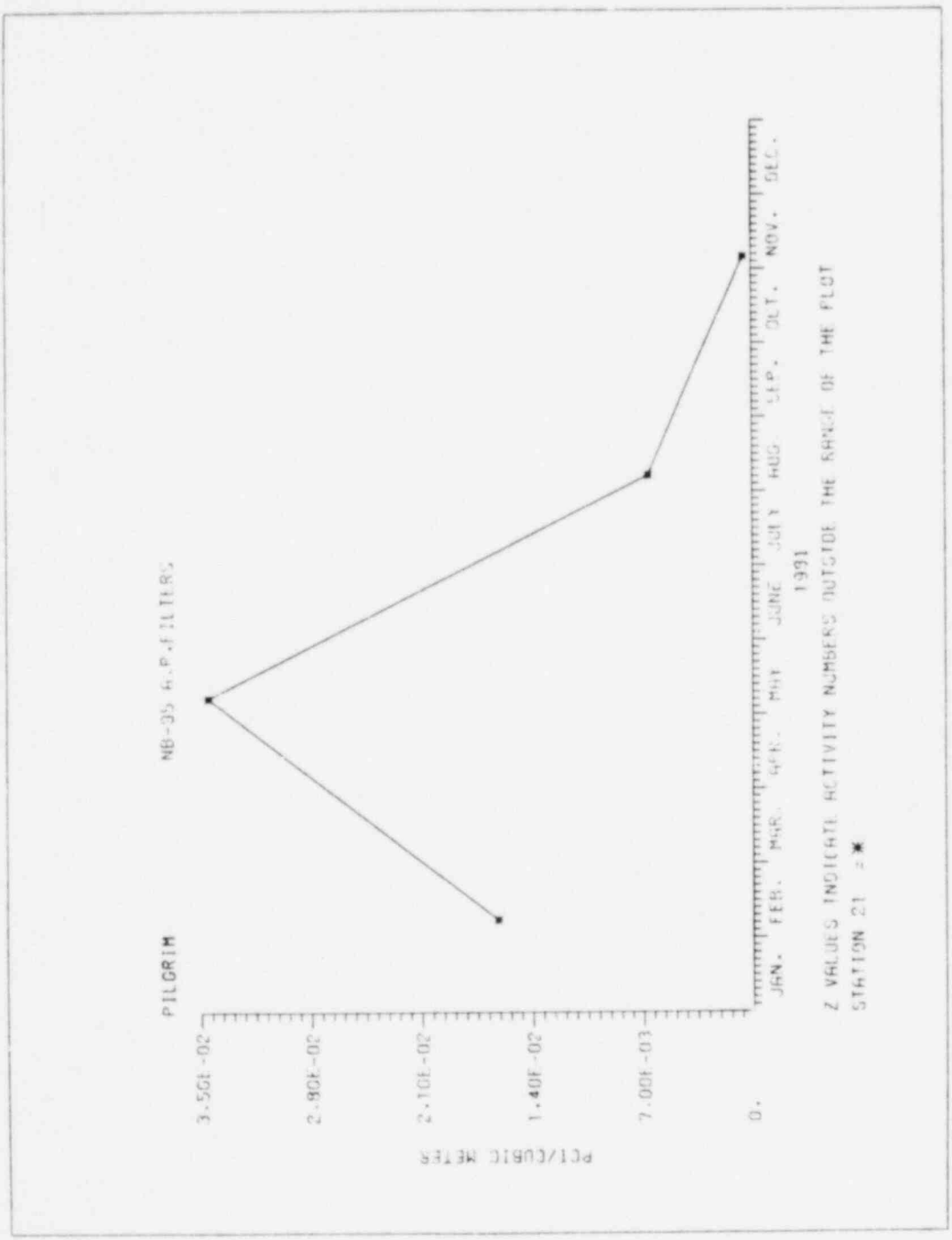
LEGEND

1 PROPERTY LINE (D) (*)
2 PROPERTY LINE (F) (*)
3 PROPERTY LINE (I)
4 PROPERTY LINE (G) (*)
5 ROCKY HILL ROAD (A) (*)
6 PROPERTY LINE (H)
7 PUBLIC PARKING AREA (PA)
8 PEDESTRIAN BRIDGE (PB) (**)
9 OVERLOOK AREA (OA)
10 EAST BREAKWATER (EB) (**)
11 PROPERTY LINE (C) (*)
12 PROPERTY LINE (HB) (*)
13 ROCKY HILL ROAD (B)
14 MICROWAVE TOWER (MT)
15 EMERSON ROAD (EM) (*)
16 WHITE HORSE ROAD (WH) (*)
17 PROPERTY LINE (E) (*)
18 ROCKY HILL ROAD (WR)
19 PROPERTY LINE (J) (*)
20 PROPERTY LINE (K) (*)
21 ROCKY HILL ROAD (ER)
22 PROPERTY LINE (L) (*)
23 WAREHOUSE (WS) (**)
24 PROPERTY LINE (PL) (**)

O DOSIMETER (TLD)
▲ AIR PARTICULATES AND DOSIMETERS (TLD)
(*) NOT REQUIRED BY TECHNICAL SPECIFICATION
(**) TLD'S NOT REQUIRED BY TECHNICAL SPECIFICATIONS AT THESE STATIONS

Figure III-D-2 Location of Onsite Monitoring Stations

FIGURE III-A-12
CONCENTRATIONS OF Nb-95
AIR PARTICULATES
CONTROL STATION



III.A.1 ATMOSPHERIC FALLOUT DURING 1981

On October 17, 1980 the People's Republic of China detonated a nuclear device in the atmosphere at the Lop Nor test site in northwest China. The explosion was estimated by the Department of Energy to be in the 200 kilotons to one megaton yield range. The clouds of radioactive debris began drifting over the western part of the United States on October 19, 1980.

During the beginning of November, 1980, increased airborne beta activity was detected at both indicator and control locations (Figures III-A.1-1 and III-A.1-2). The airborne beta activity continued to increase into 1981, and a gamma analysis of fourth quarter composite filters showed detectable concentrations of fission products which are associated with the October Chinese test (Figures III-A.1-3 to III-A.1-6). As expected, a significant increase in airborne gross beta activity was detected on air particulate filter samples submitted from all sampling locations during the first three quarters of 1981. The highest airborne gross beta activity occurred during the spring and summer months when the intermixing of the stratosphere and troposhere causes additional radioactive debris from weapon testing to be introducted into the troposphere (Figure III-A.1-7). For the first three quarters of 1981, gamma analysis performed quarterly on weekly composite air particulate filter samples showed detectable concentrations of fallout fission products related to the Chinese weapons test (Figures III-A.1-8 to III-A.1-13).

In addition to our required Technical Specification air sampling locations, an additional control air sampler was set up at our Environmental Laboratory in Westborough, Massachusetts. Air particulate samples analyzed from this location showed detectable similar levels of fission products as the filter samples submitted from the environs of Maine Yankee. (Figures III-A.1-14 to III-A.1-20)

Fallout was also detected in other environmental media during 1981. Aquatic and terrestrial vegetation samples collected from indicator and control locations showed fission products related to fallout form the Chinese weapons test.

FIGURE III-A.1-1

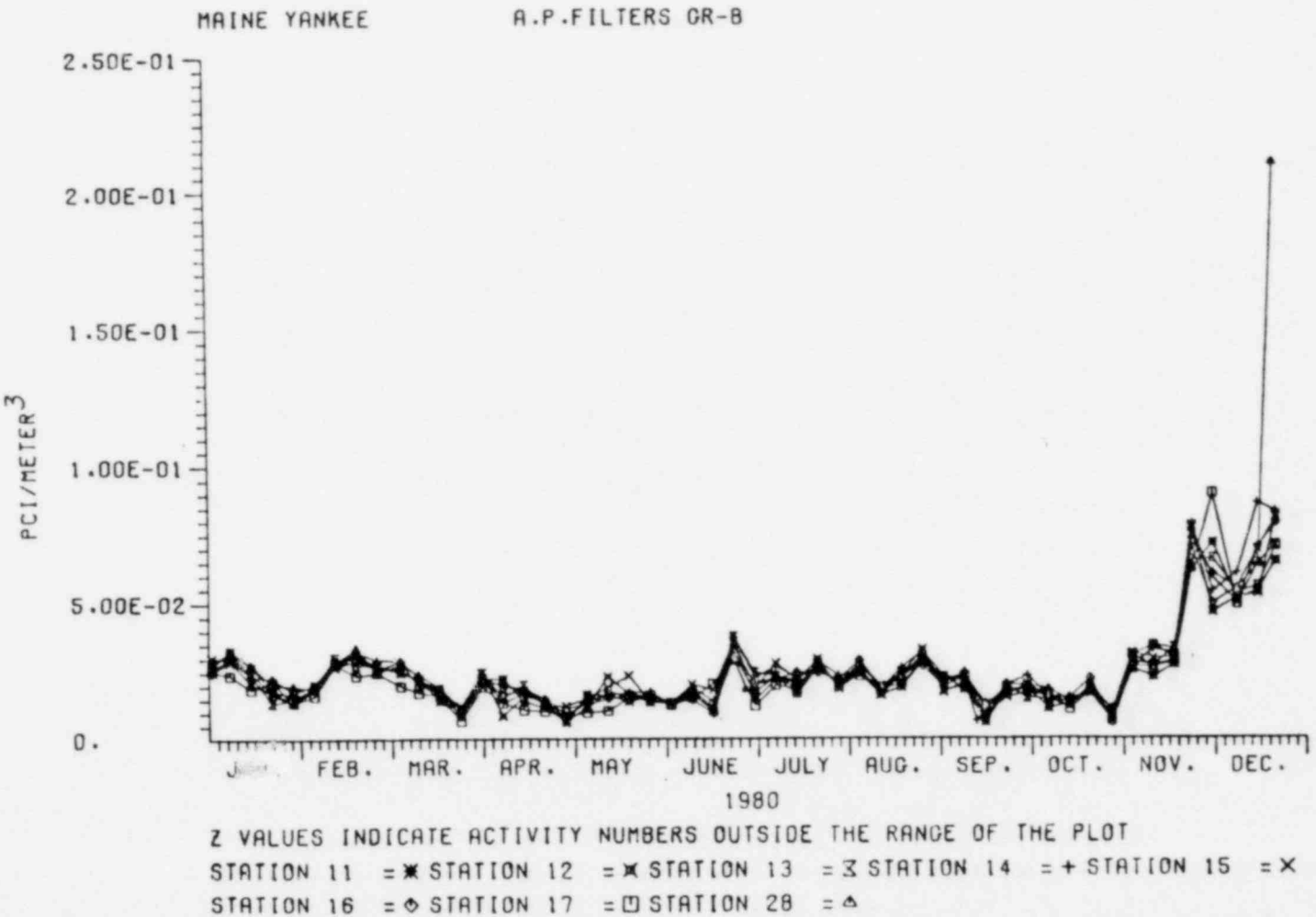


FIGURE III-A.1-2

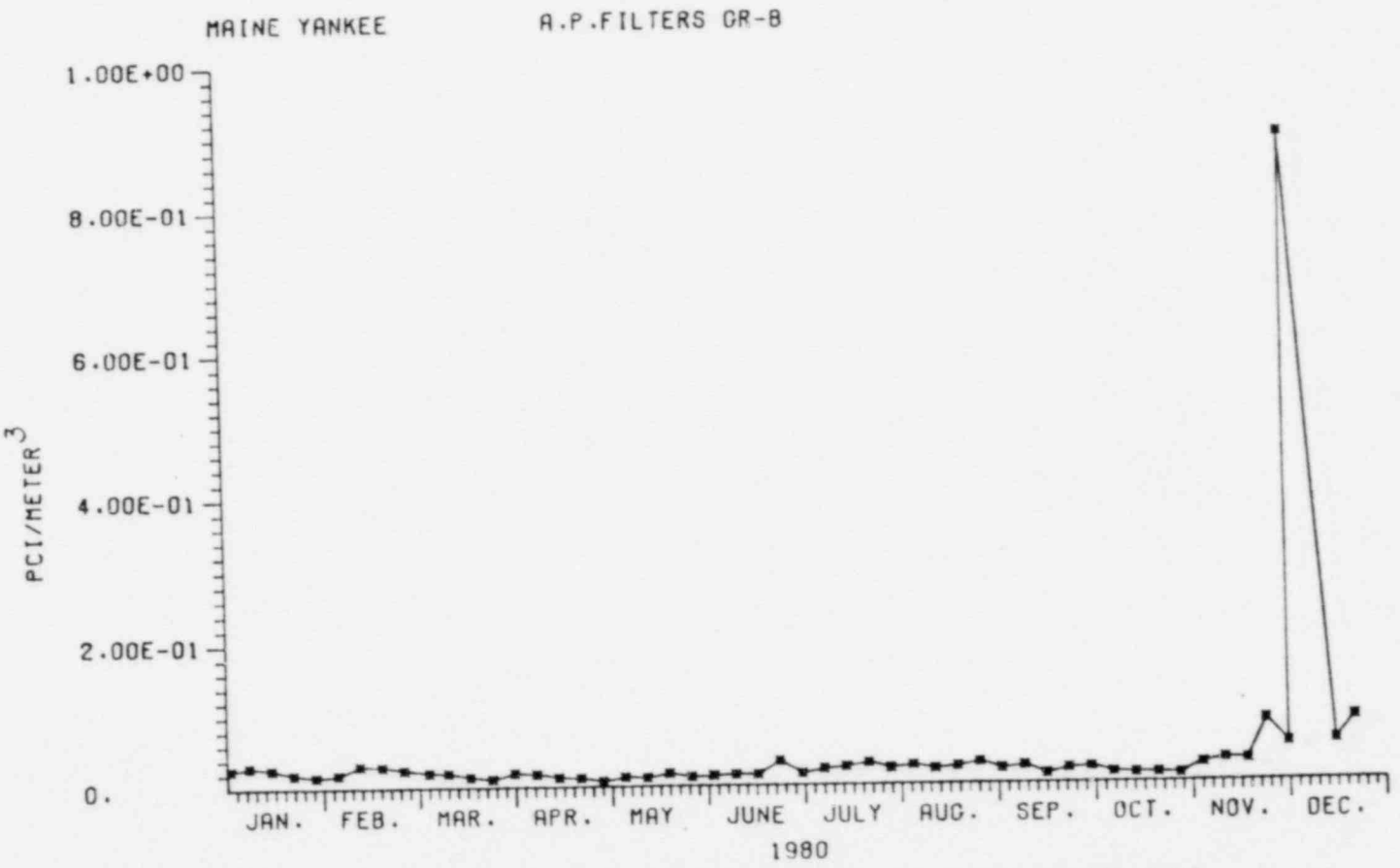


FIGURE III-A.1-3

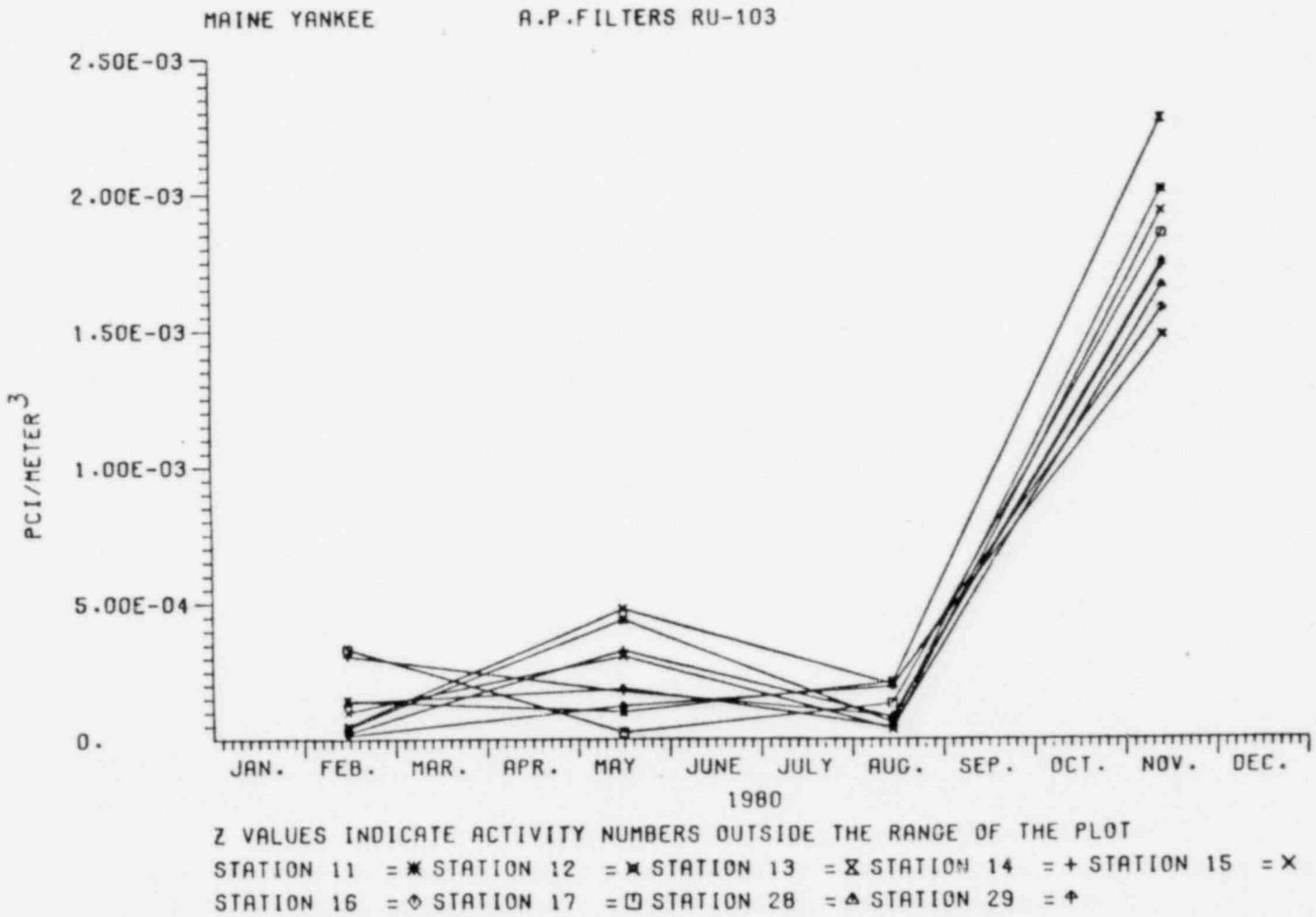


FIGURE III-A.1-4

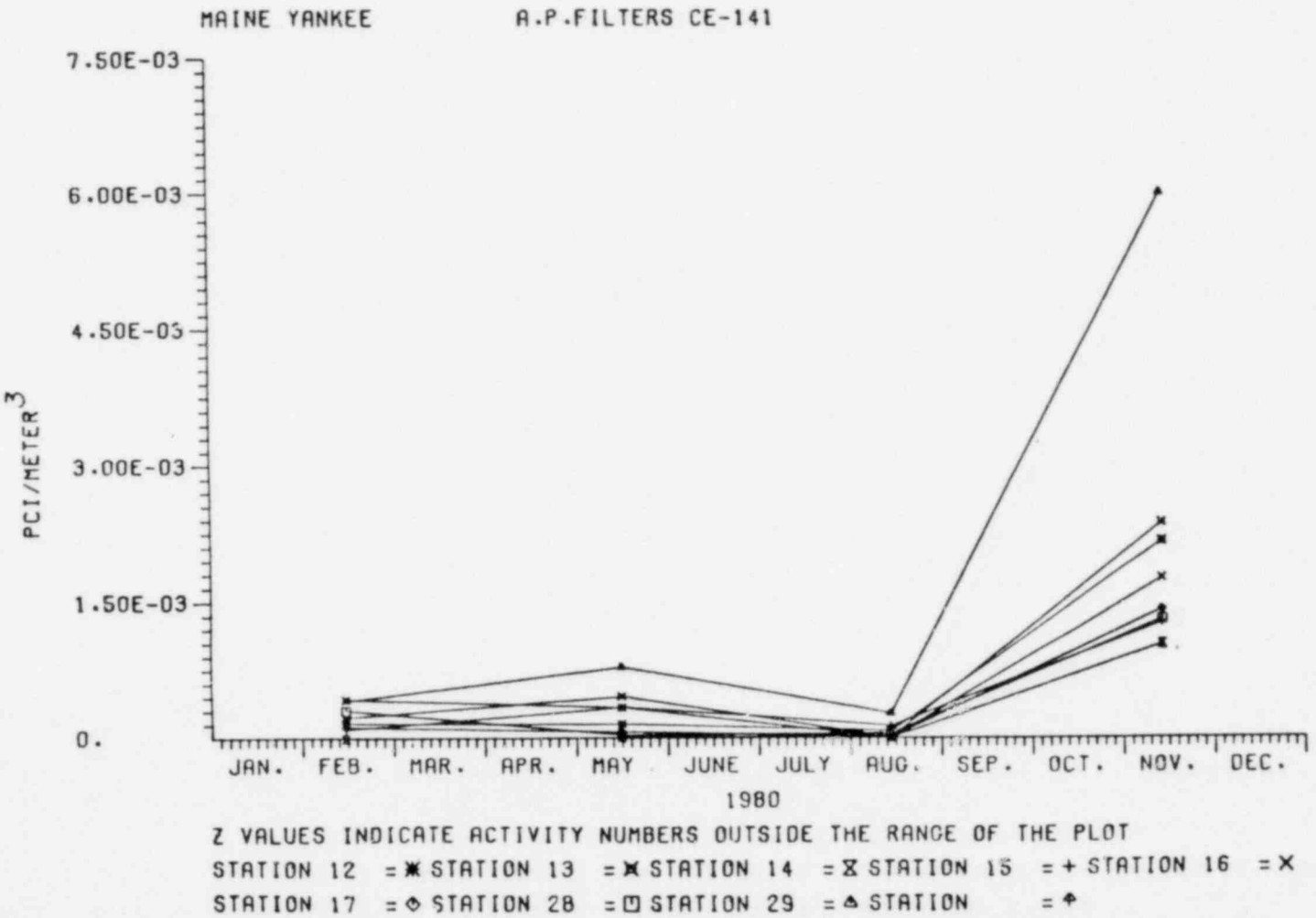


FIGURE III-A.1-5

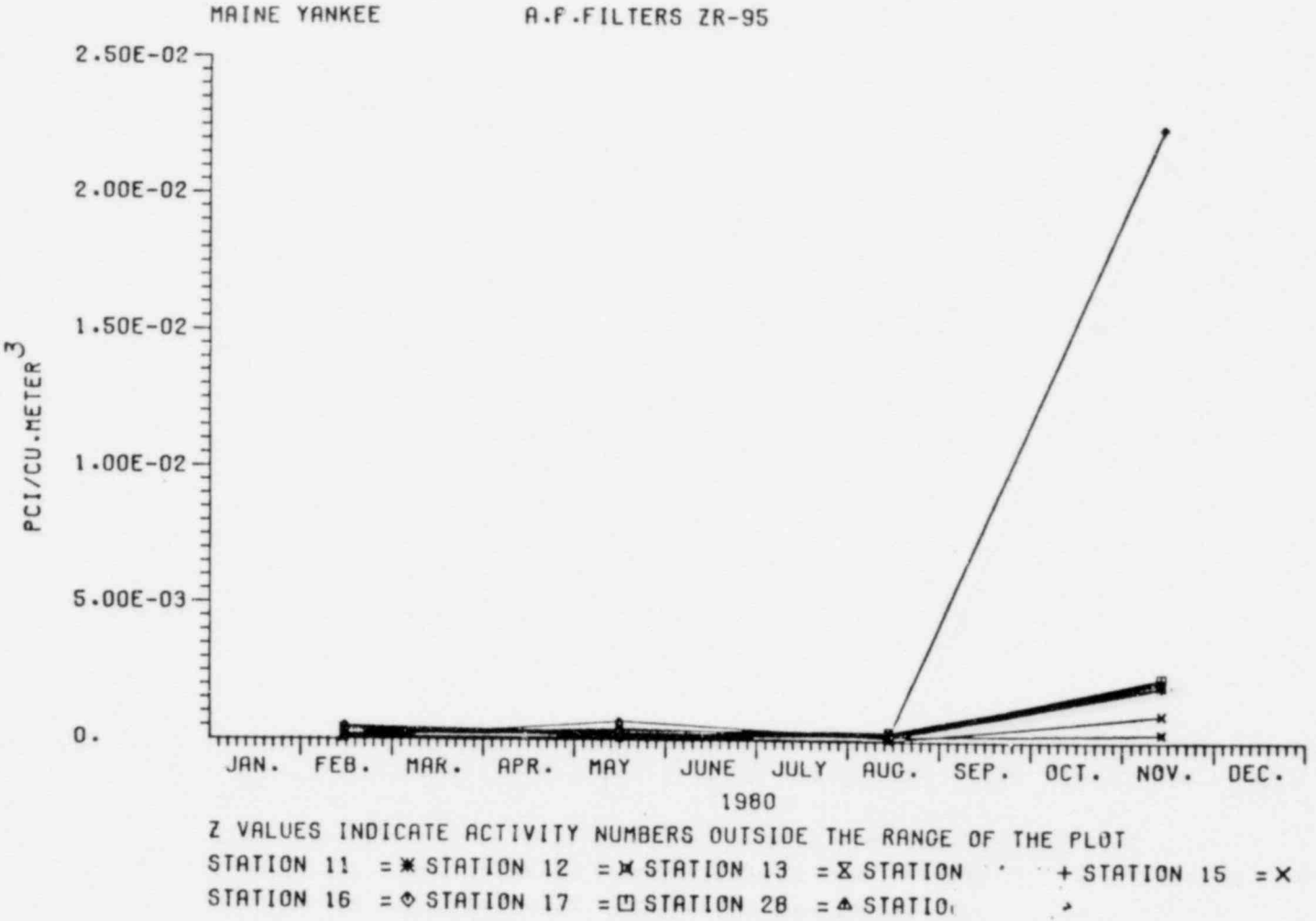


FIGURE III-A.1-6

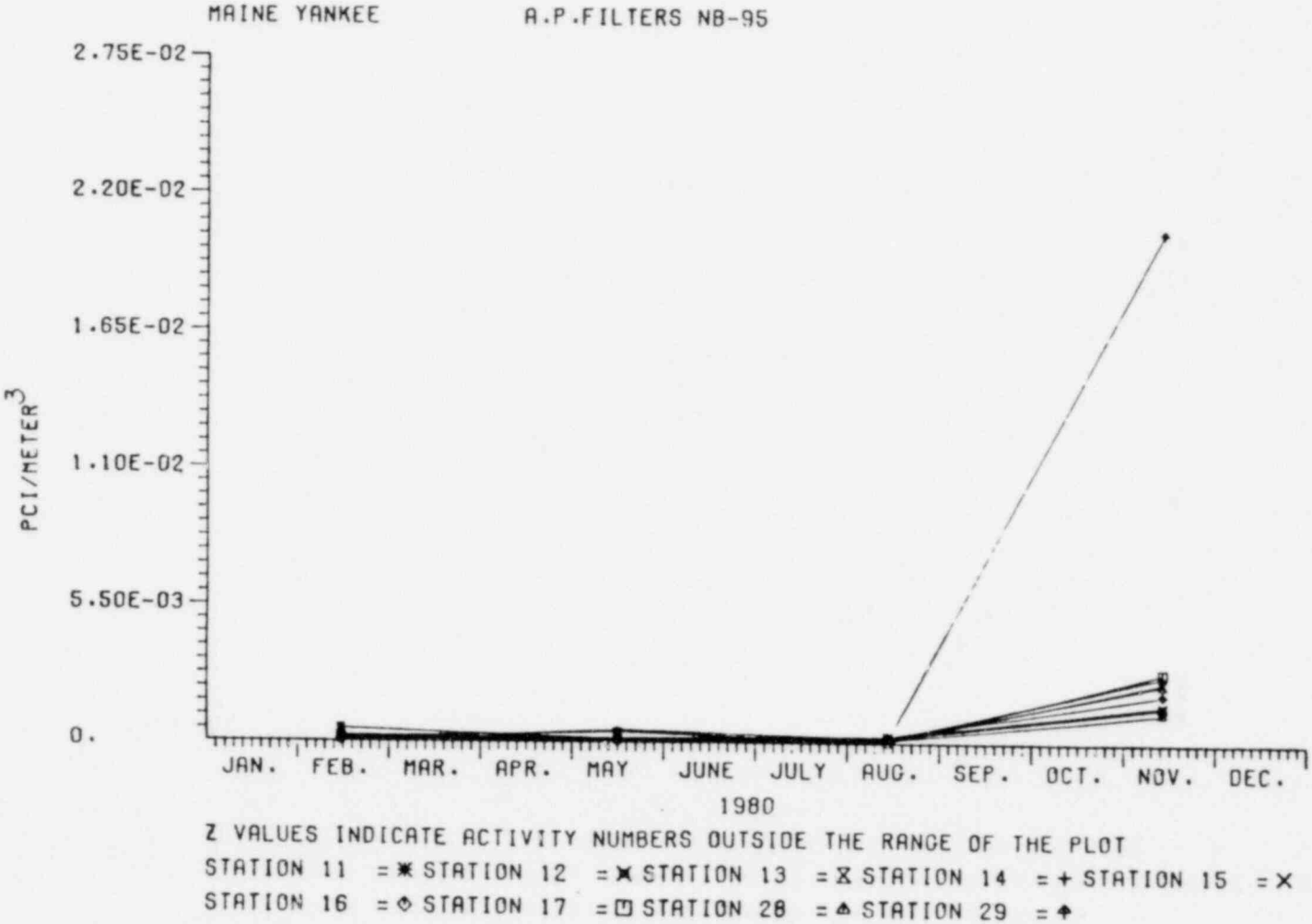


FIGURE III-A.1-7

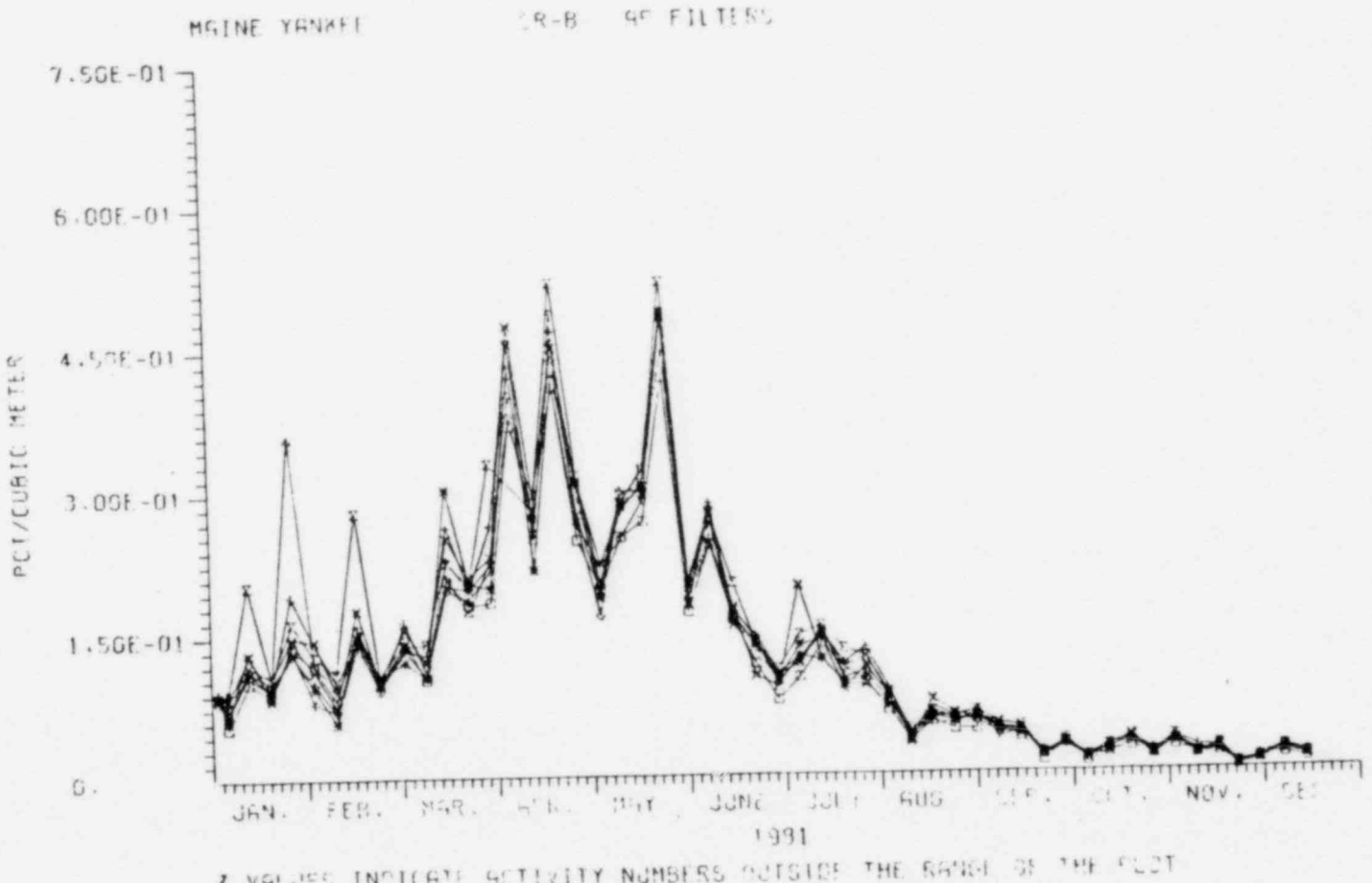


FIGURE III-A.1-8

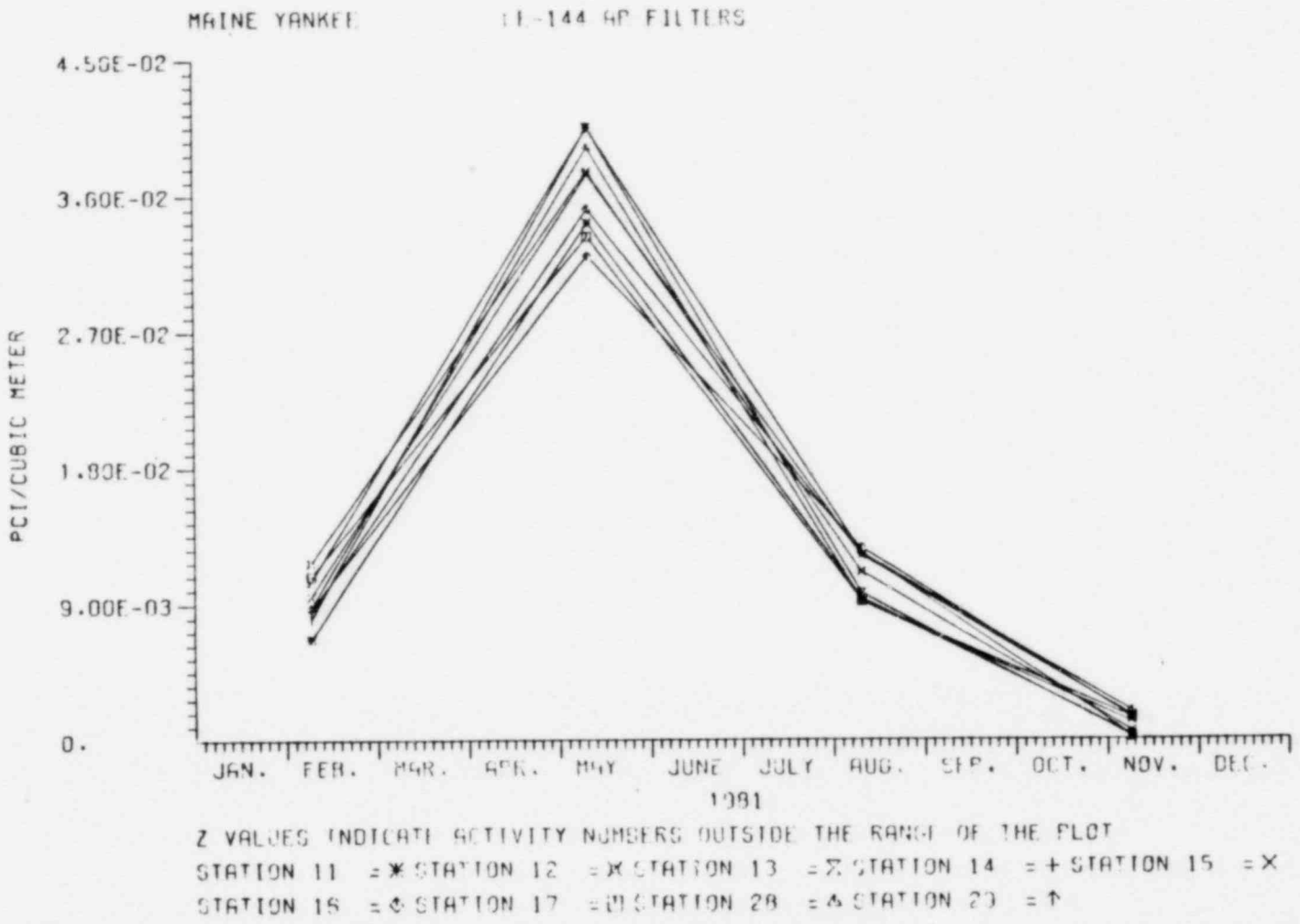


FIGURE III-A.1-9

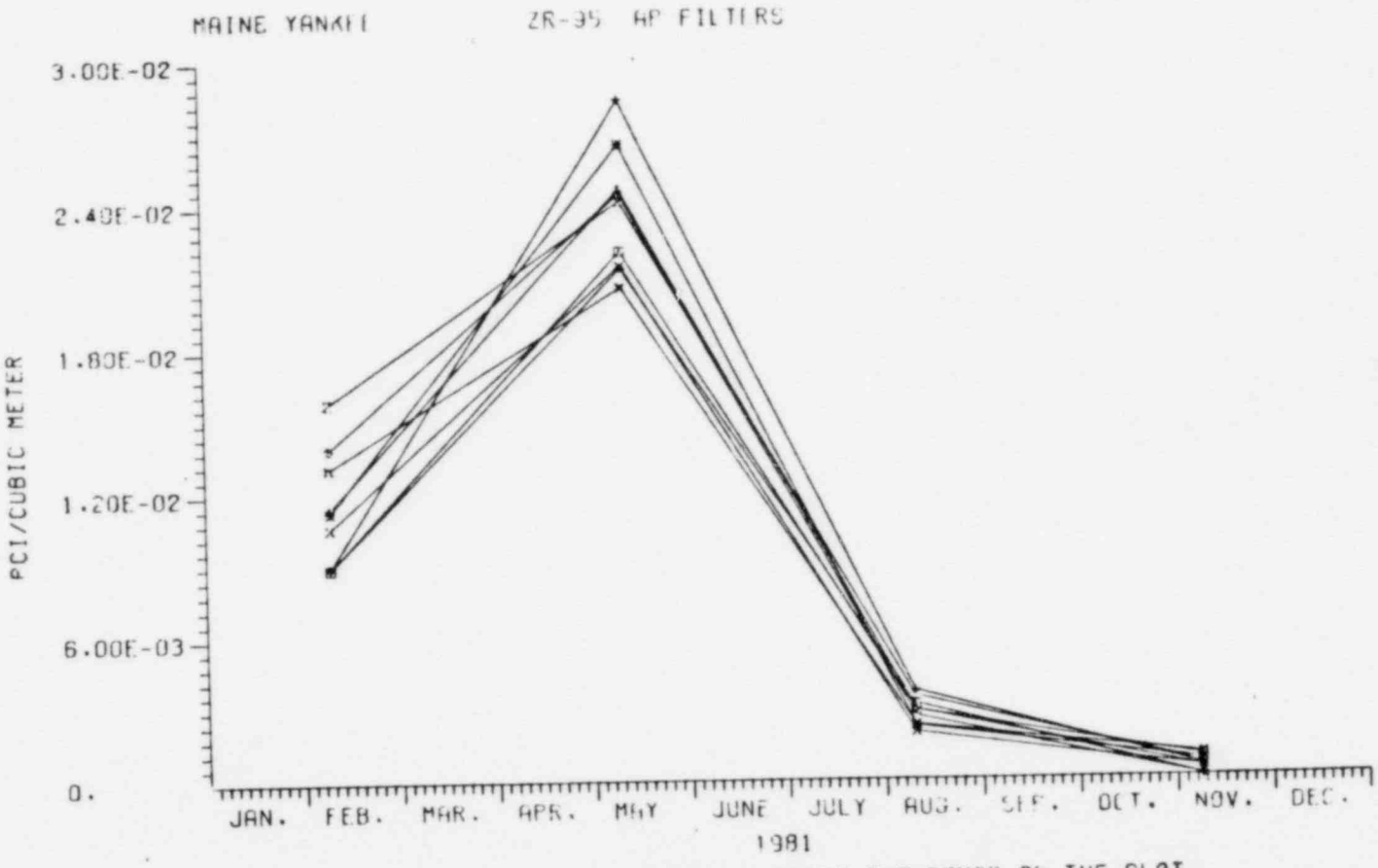


FIGURE III-A.1-10

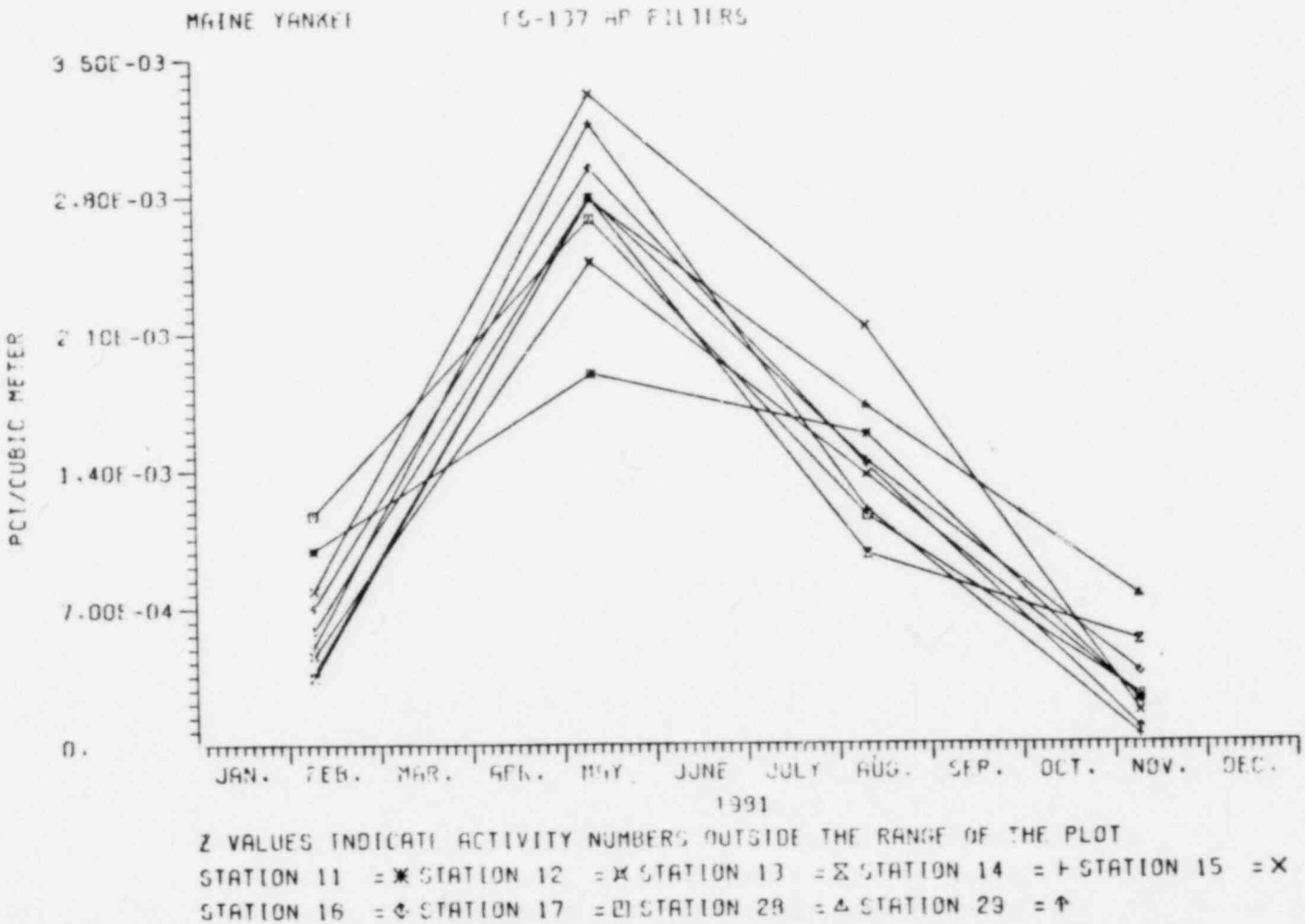


FIGURE III-A.1-11

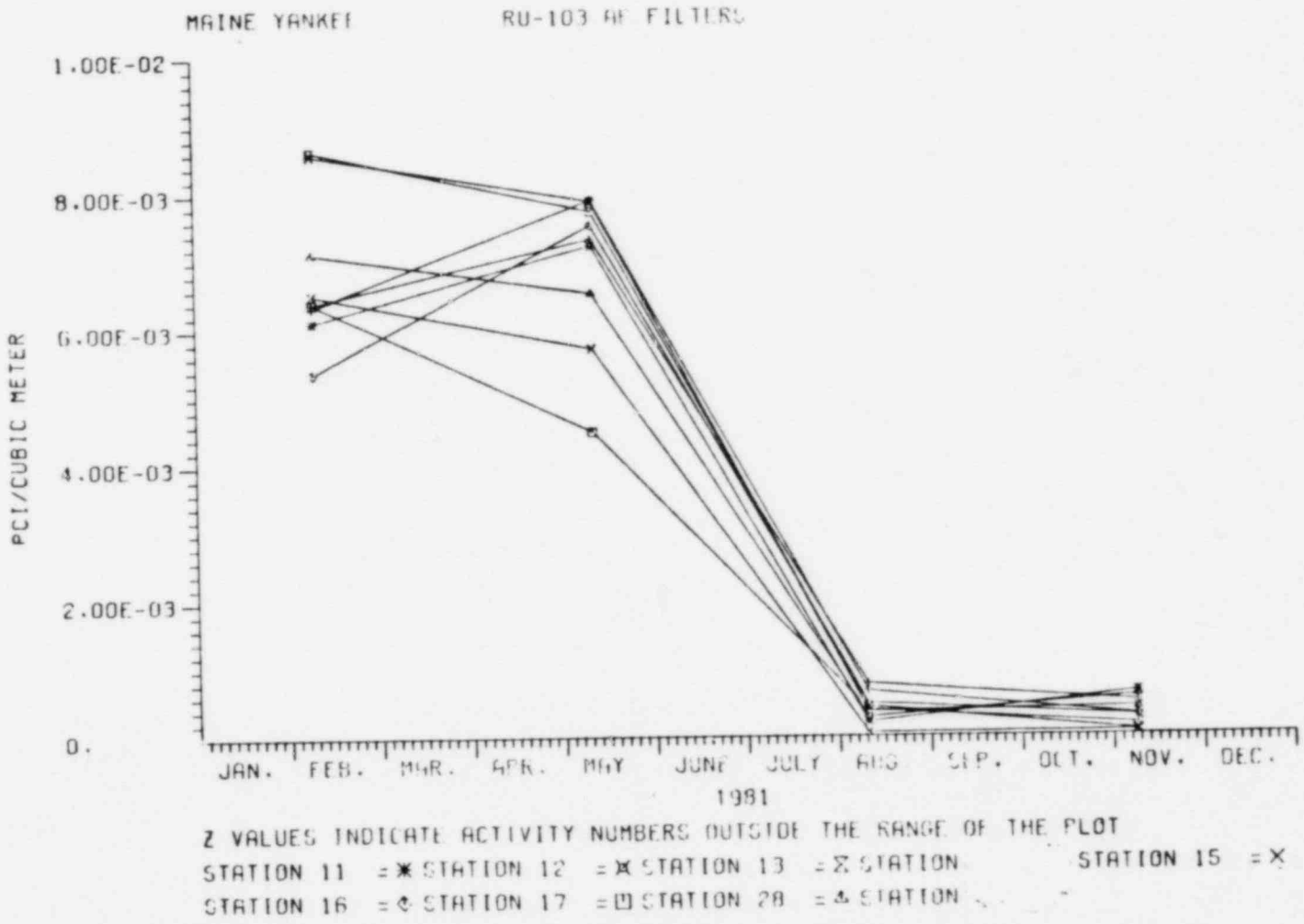


FIGURE III-A.1-12

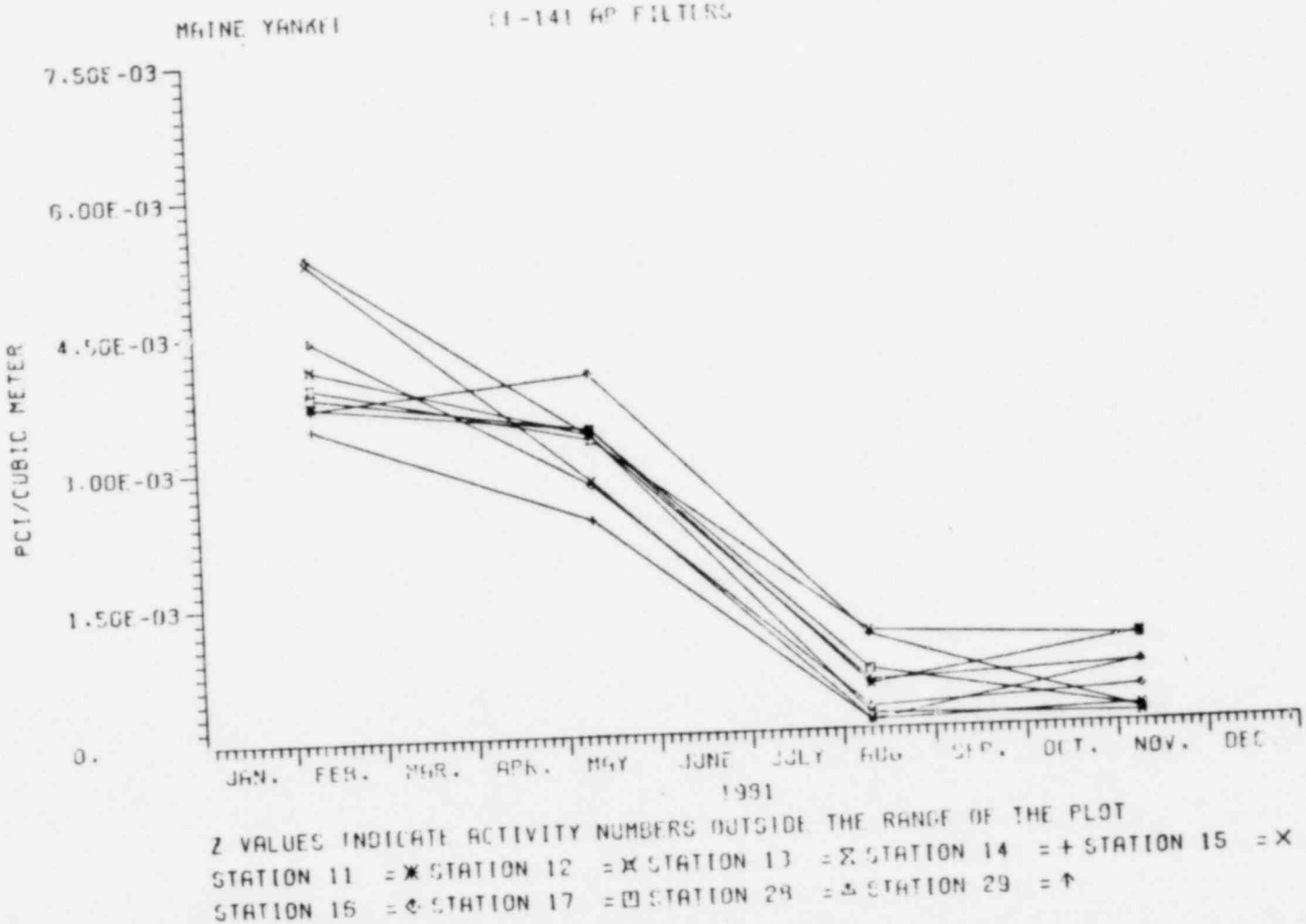


FIGURE III-A.1-13

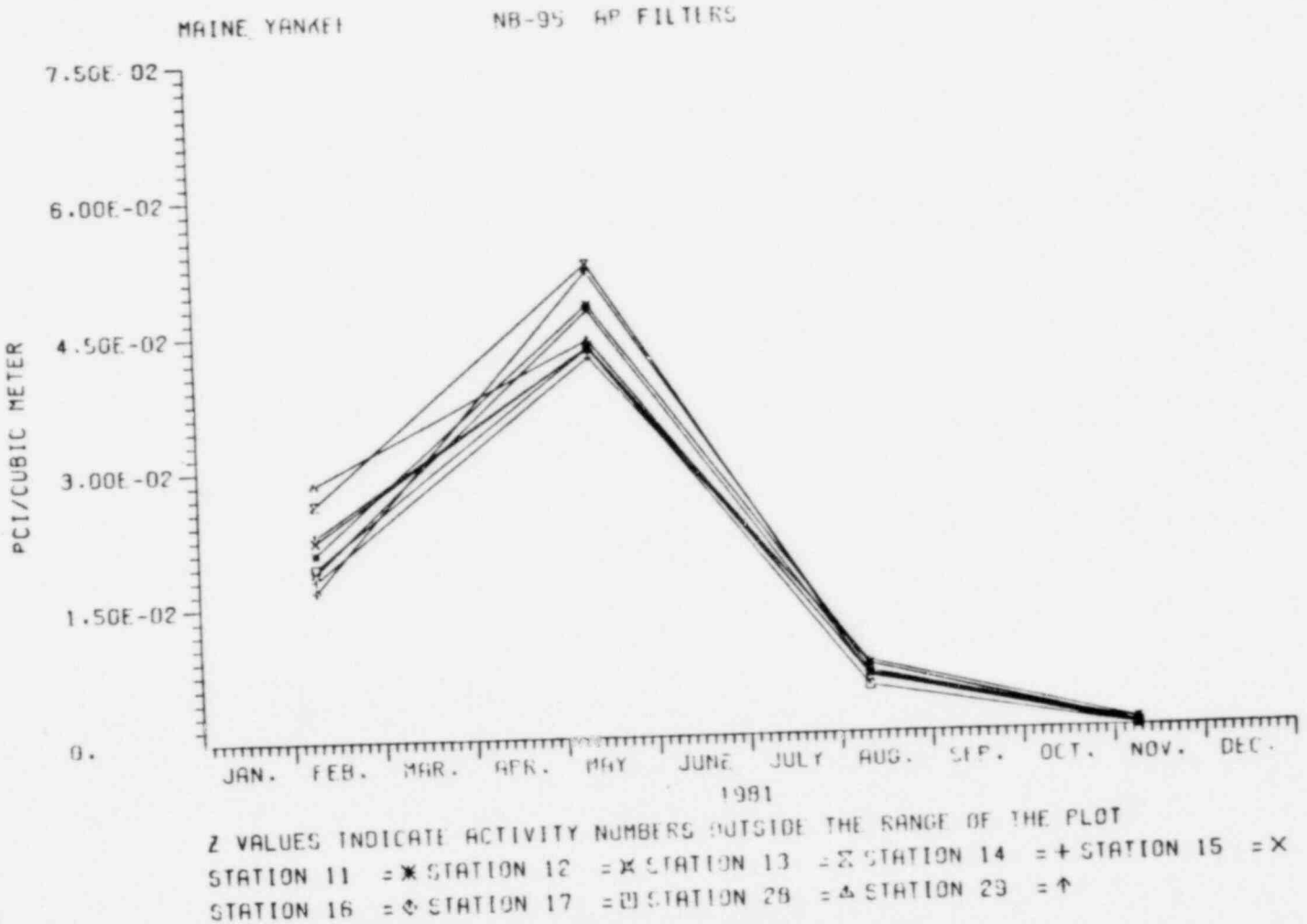


FIGURE III-A.1-14

RU-103 IN AP FILTERS SAMPLES FROM WESTBORO
1981 TIMES E-3

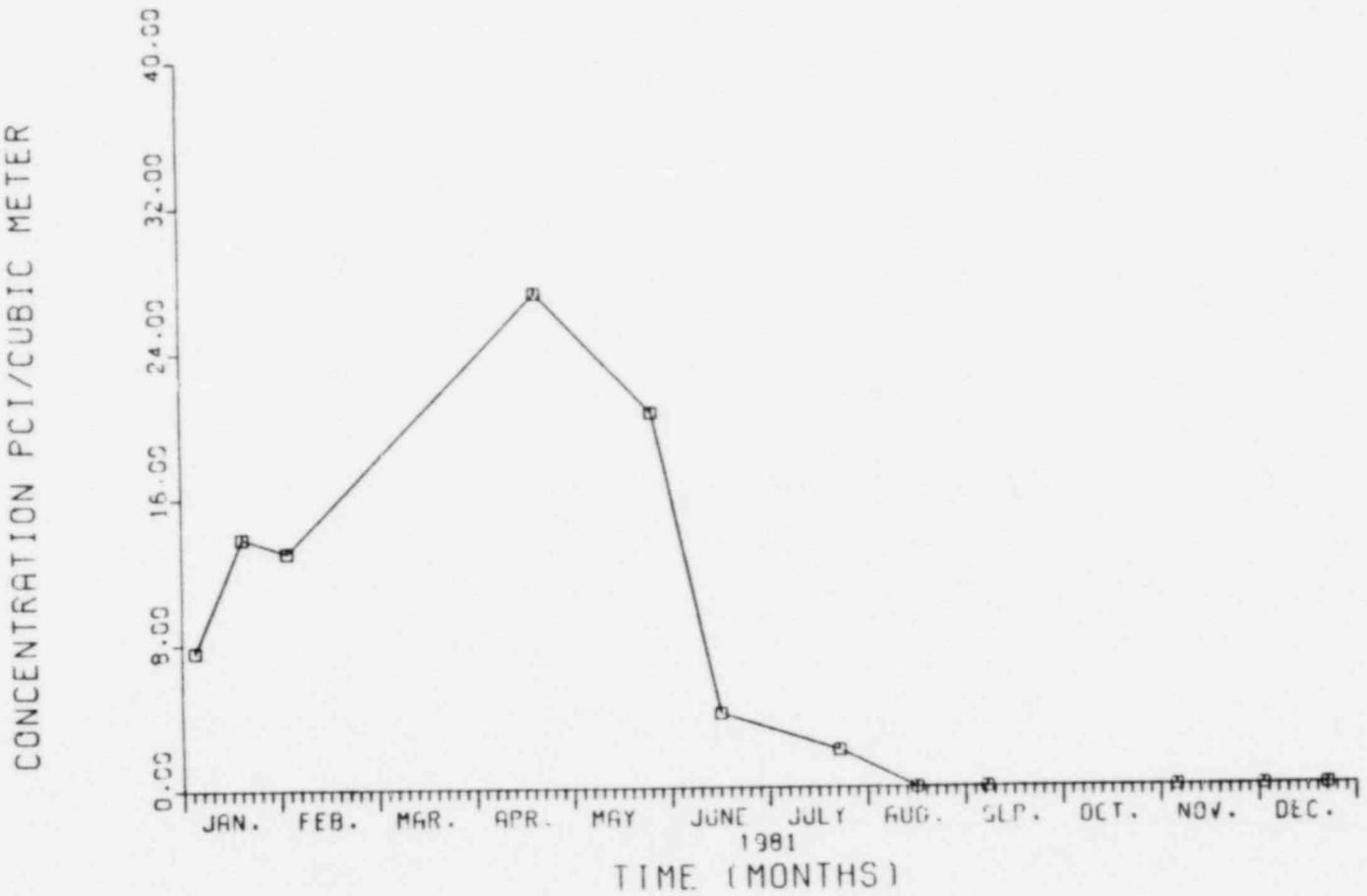


FIGURE III-A.1-15

ZR-95 IN AP FILTERS SAMPLES FROM WESTBORO
1981 TIMES E-3

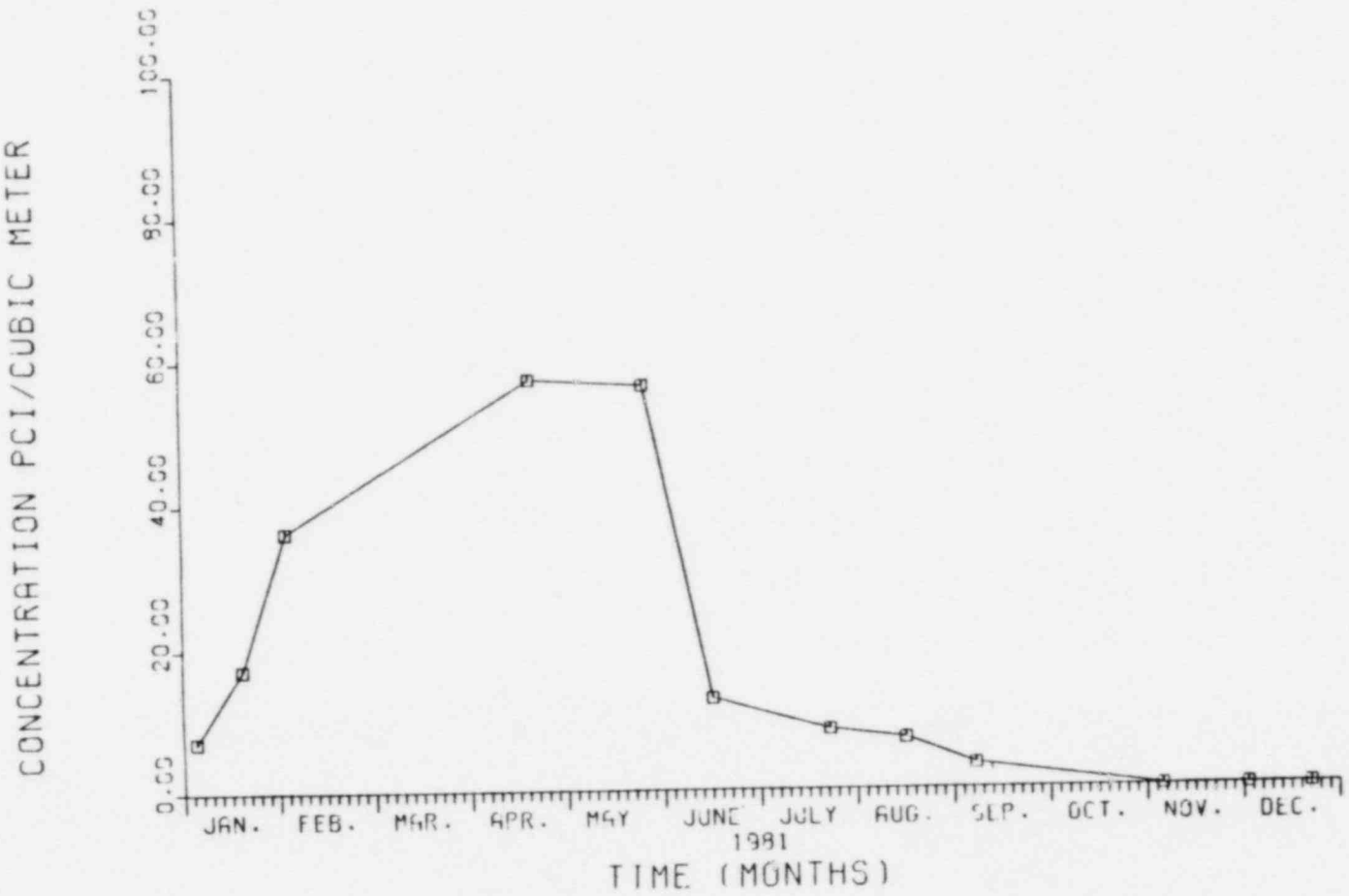


FIGURE III-A.1-16

CE-141 IN AP FILTERS SAMPLES FROM WESTBORO
1981 TIMES L-3

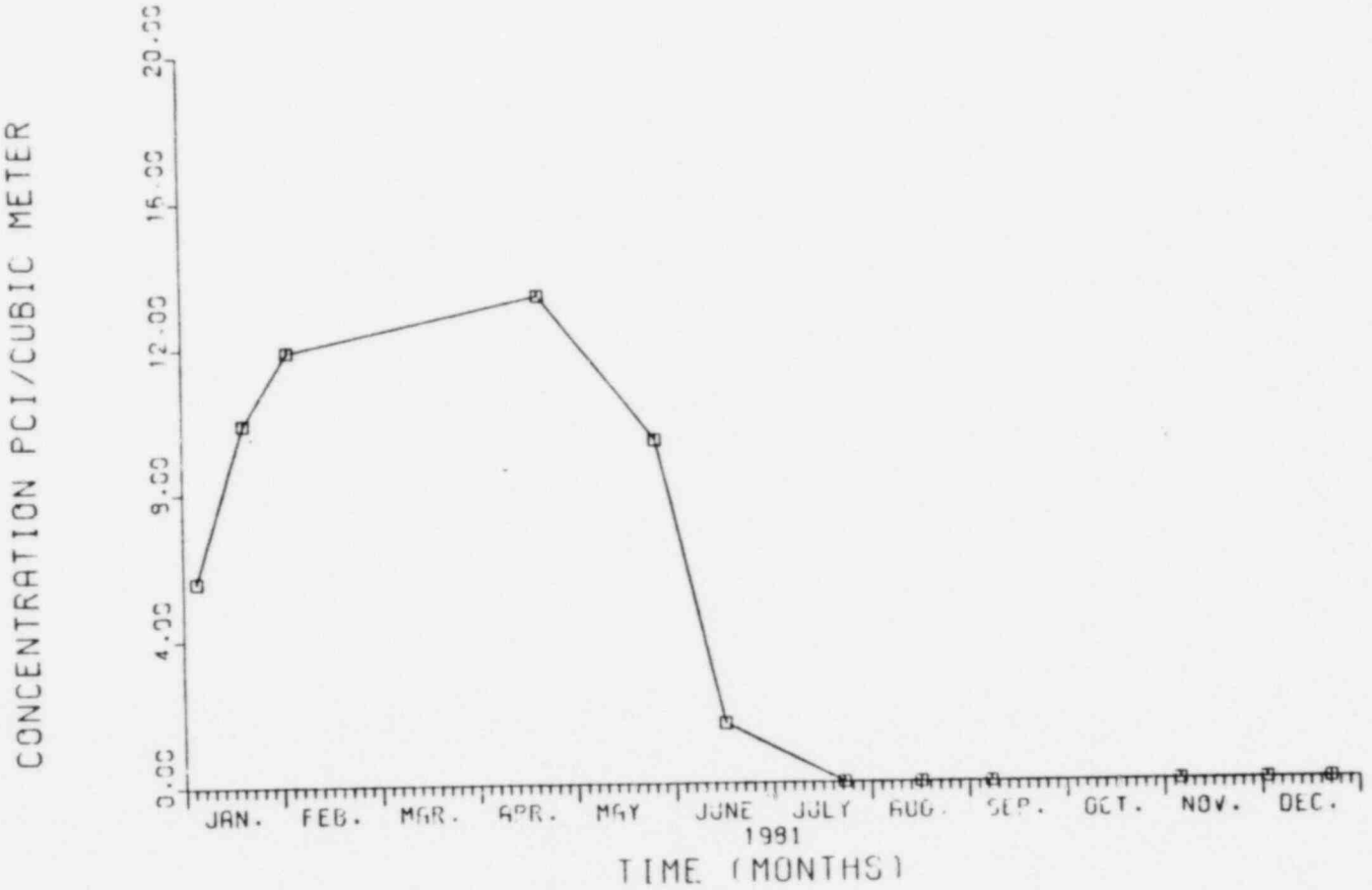


FIGURE III-A.1-17

CE-144 IN AP FILTERS SAMPLES FROM WESTBORO
1981 TIMES E-3

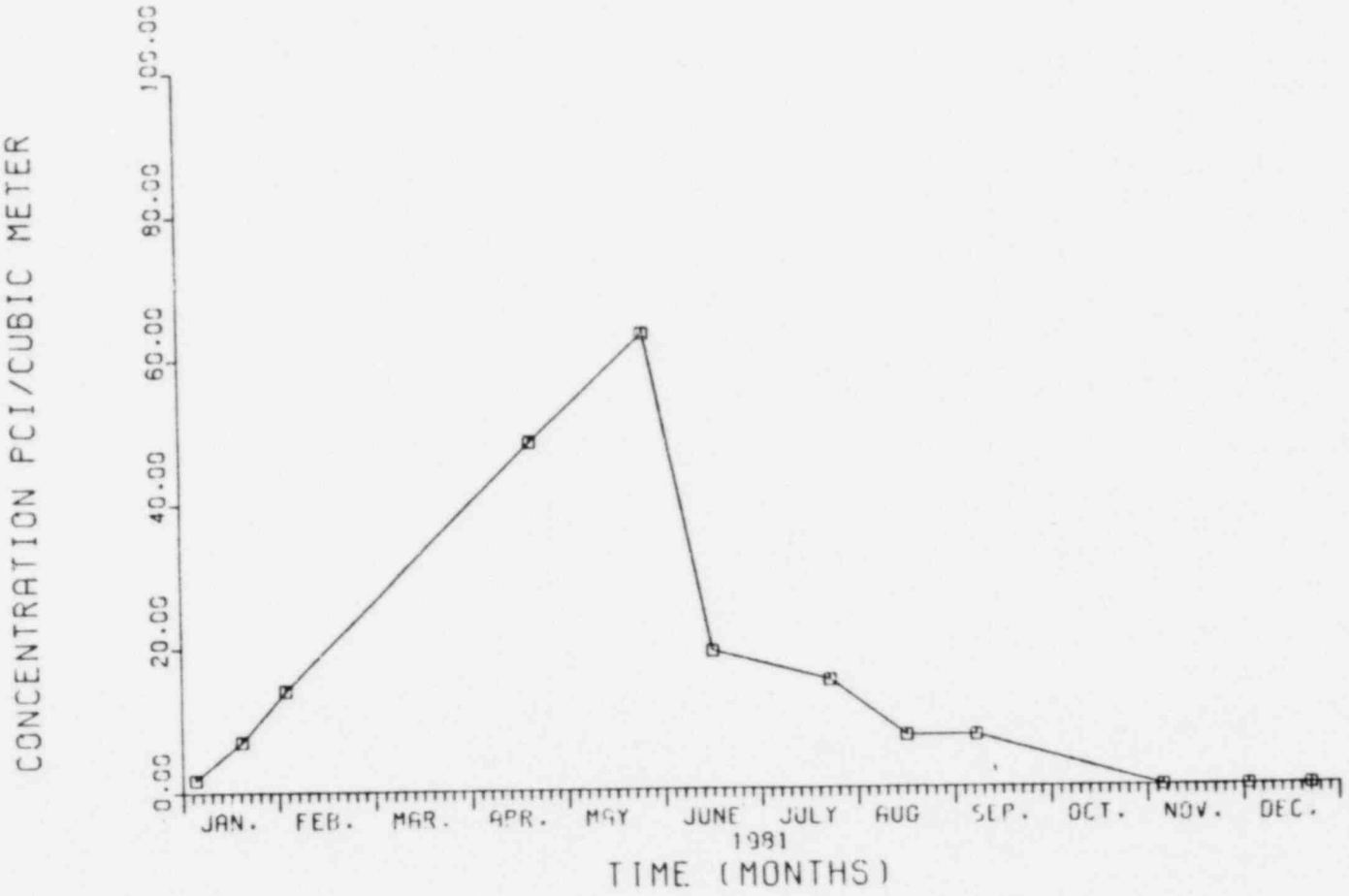


FIGURE III - A.1 - 18

RU-106 IN AP FILTERS SAMPLES FROM WESTBORO
1981 TIMES E-3

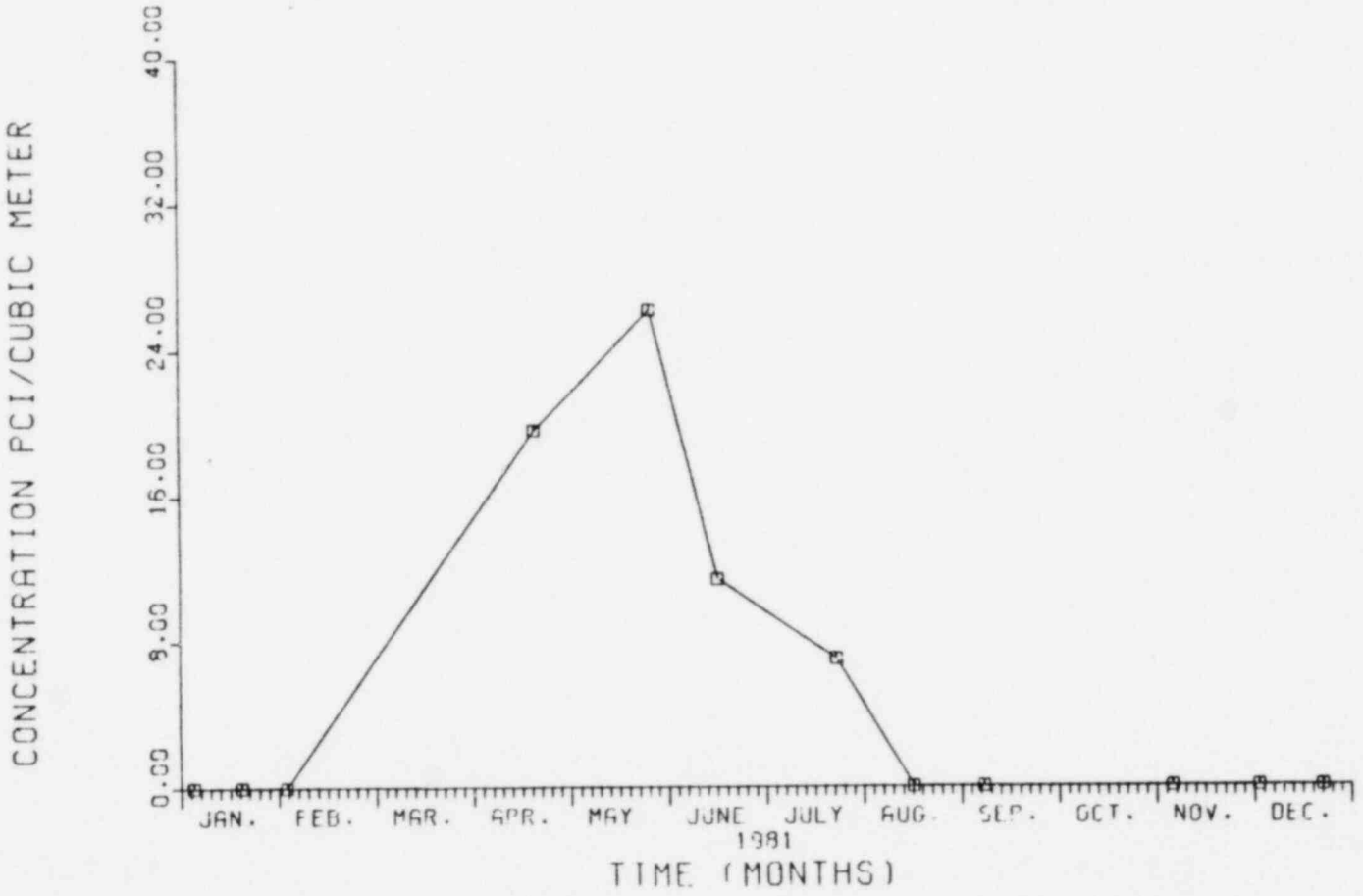


FIGURE III-A.1-19

CS-137 IN AP FILTERS SAMPLES FROM WESTBORO
1981 TIMES E-3

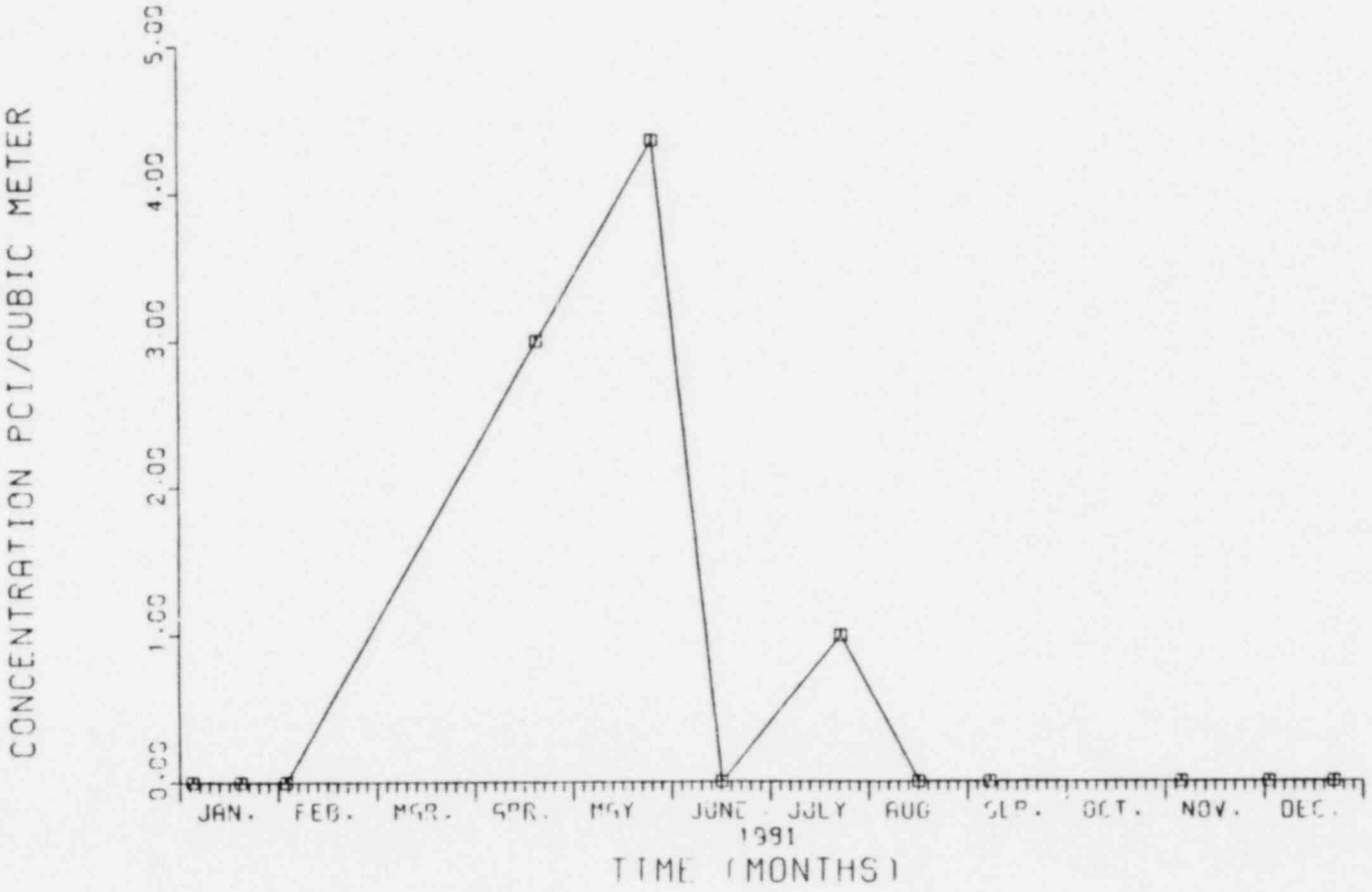
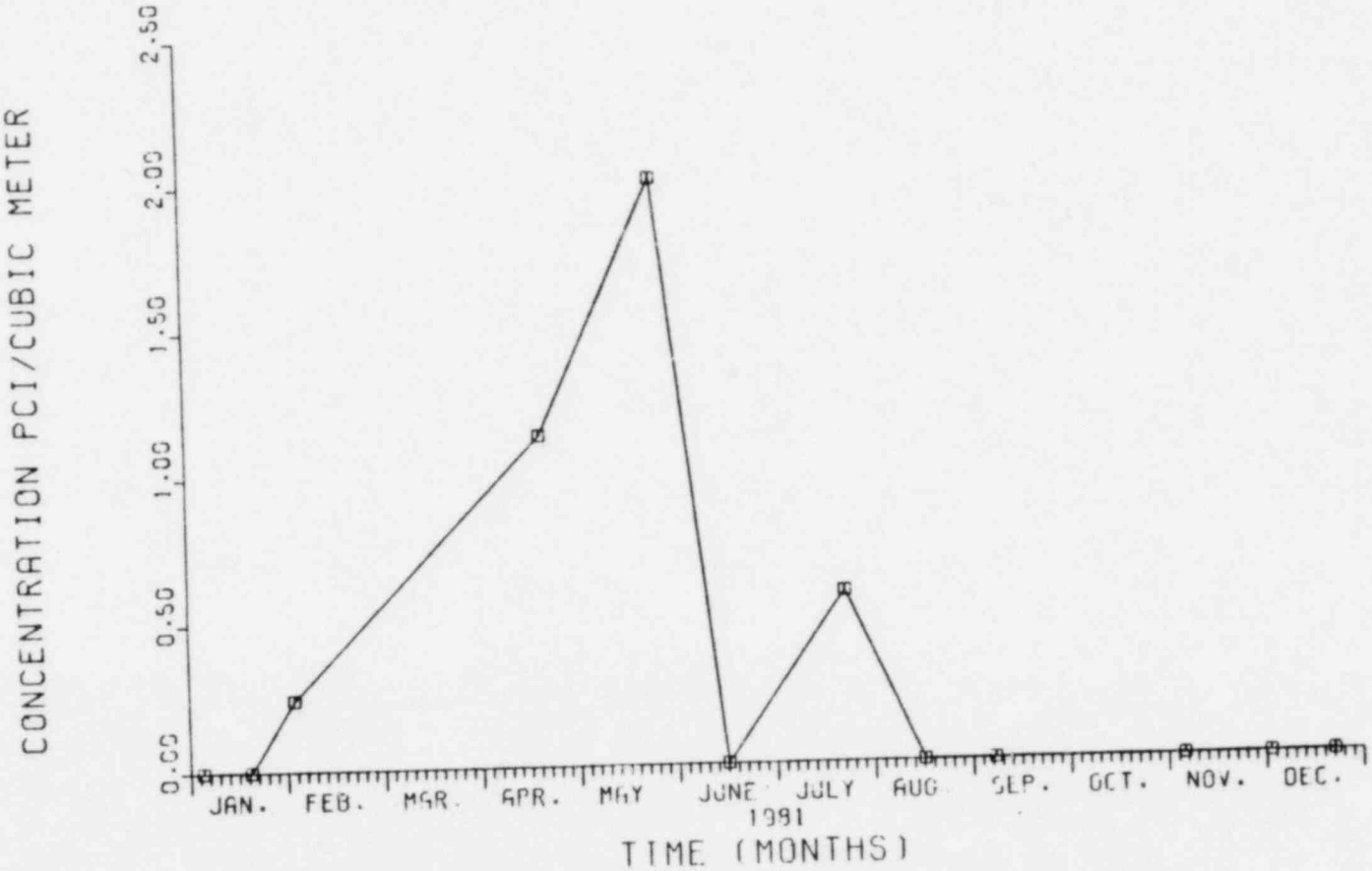


FIGURE III-A.1-20

MN-54 IN AP FILTERS SAMPLES FROM WESTBORO
1981 TIMES E-3



III. B. Iodine

The same sample collection systems used to collect airborne particulates are used to collect gaseous iodine on a charcoal filter cartridge. The cartridge is removed and analyzed for I-131 weekly. The results of the ERMAP program for this media are provided in Table III-B-1. It is apparent from this table that the mean value of the calculated concentrations for the indicator stations is greater than the mean value for the control station.

The calculated mean value for the highest indicator station (Station 01 - East Rocky Hill Road - 0.8 mi - SE) is significantly higher than the calculated mean of the control station. However, this measured mean concentration is not the result of a positive measurement, but was probably influenced by the gaseous effluents from PNPS-1. However, even if a person were to breathe air with the highest measured mean concentration, they would receive an annual dose of less than 0.06 mrem to the thyroid and less than 0.0001 mrem to the total body. The results of these analyses are presented graphically in Figure III-B-1 for the indicator stations and Figure III-B-2 for the control station.

There was clearly no significantly environmental effect observed in the airborne gaseous iodine collection media as a result of operation of PNPS-1.

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 11
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

UNITS: PCI/CU. M

MEDIUM: CHARCOAL FILTERS

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
I-131 (516)	3.0E-03	(1.9 & 6.8)E -4	01	(2.8 & 1.5)E -3	(-6.8 & 11.3)E -4
(0)		(-3.6 - 8.6)E -2		*(0/ 52)*	(-1.6 - 1.7)E -2
		(0/862)			*(0/ 52)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-B-1
ERMAP RESULTS
CHARCOAL CARTRIDGES

FIGURE III-B-1
CONCENTRATIONS OF I-131
CHARCOAL FILTERS
INDICATOR STATIONS

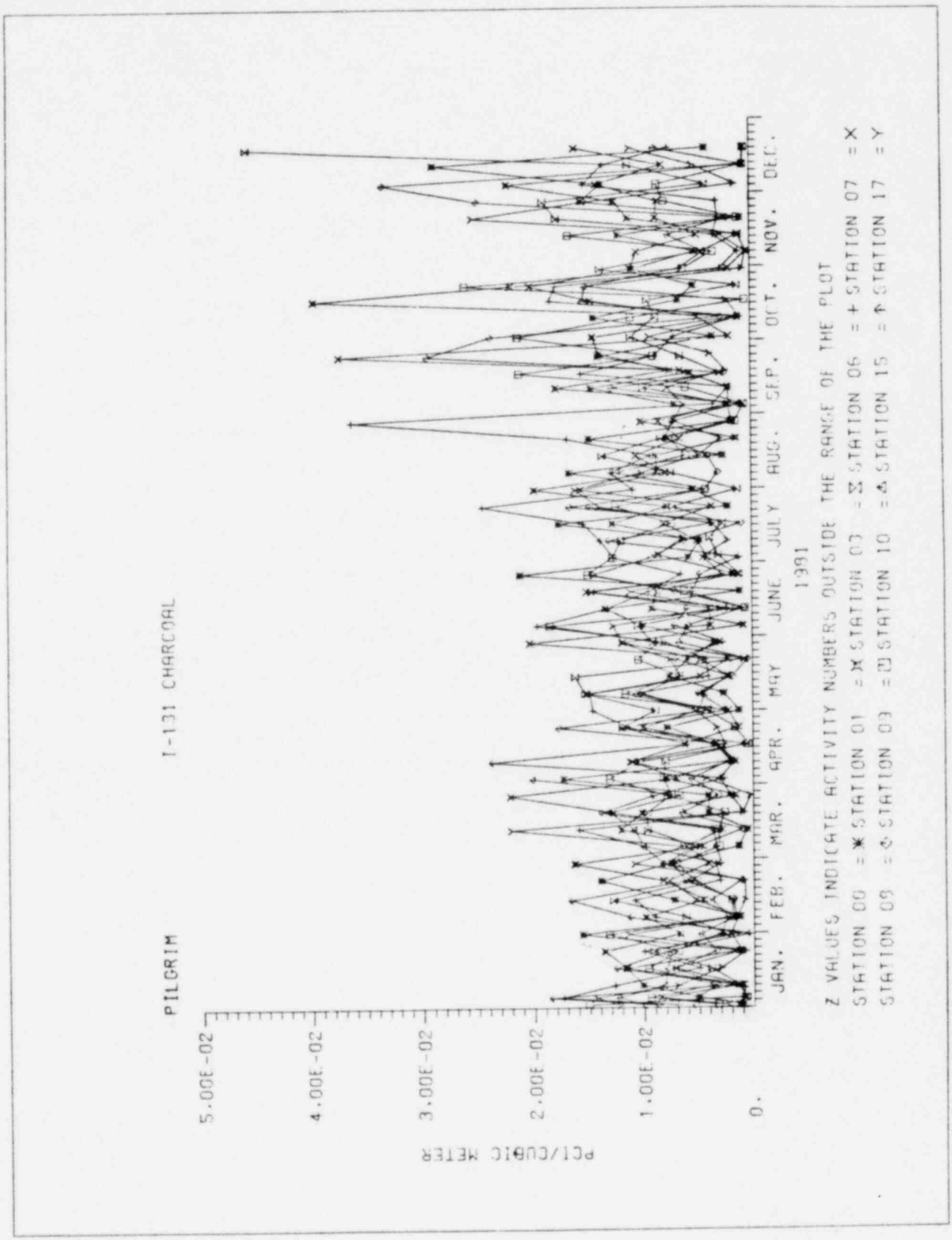
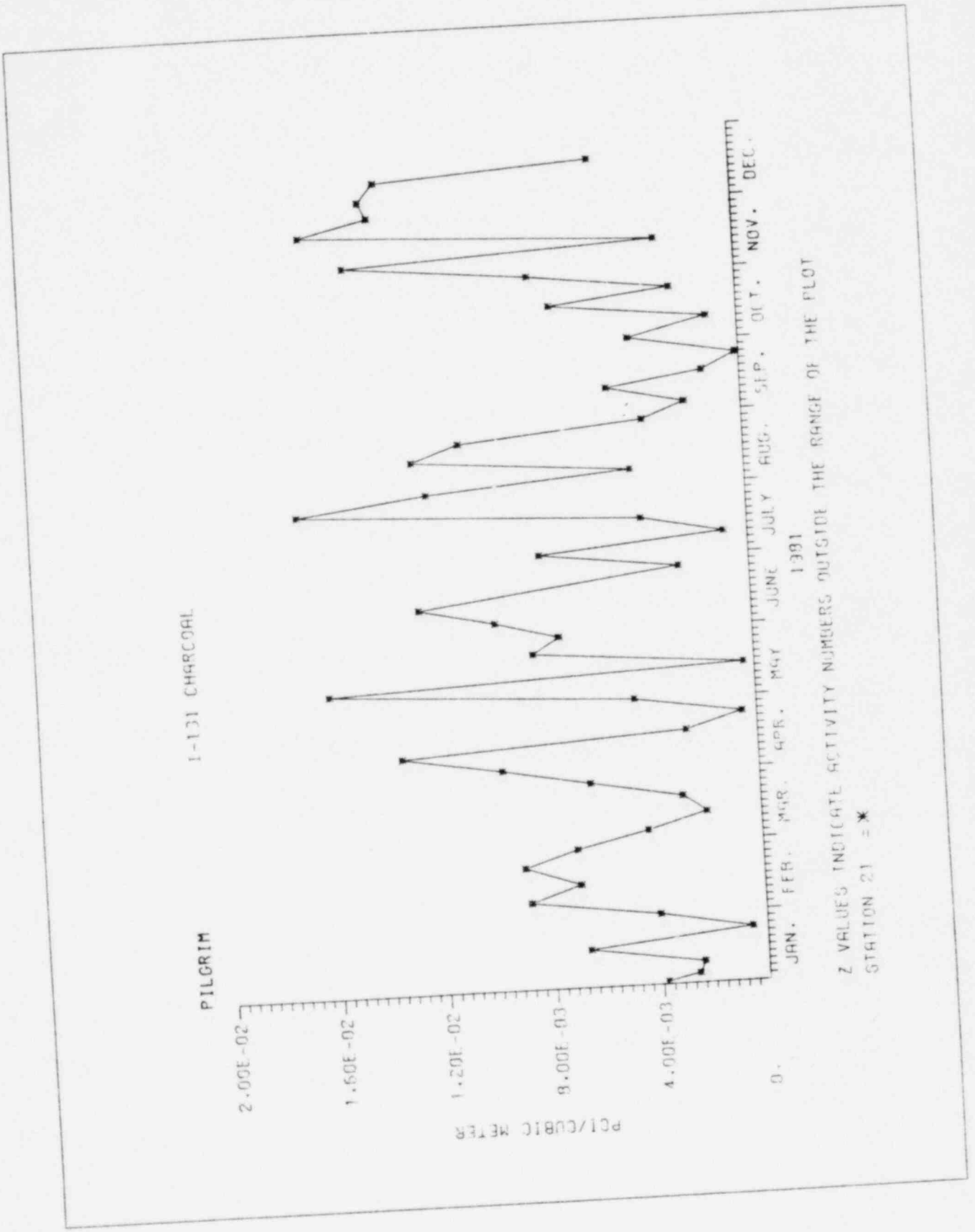


FIGURE III-B-2
CONCENTRATIONS OF I-131
CHARCOAL FILTERS
CONTROL STATION



III. C. Soil

Soil surveys at eleven locations are required once every three years in compliance with the revised Technical Specifications which went into effect on April 19, 1977. These in-situ surveys were conducted during July of 1979. The results of these surveys are included in Appendix C of this report for reference information only. They do not constitute measurements made during the 1981 calendar year.

III. D. Direct Radiation

1. Continuous Thermoluminescent Dosimetry

Thermoluminescent dosimeters (TLD) of the $CaSO_4$(Dy) type are used to record direct gamma radiation from all sources including direct and scattered radiation from Nitrogen-16 in the turbine building, and cosmic and other natural and artificial gamma radiation. TLD's are installed at the locations identified in Table III-D-1 and on Figures III-D-1 and III-D-2.

Tables III-D-2 through III-D-5 show quarterly average doses from direct gamma radiation in uR/hr at these stations.

Prior to 1980, TLD's were read out monthly although the Technical Specification indicated that a quarterly read out frequency was adequate. In an effort to improve the statistics associated with the measurement of extremely low radiation levels around PNPS-1, the frequency of read out was decreased to quarterly at the end of the first quarter of 1980.

As a result, data is available for the year of 1981 on a quarterly basis.

In addition to average doses for each TLD for each read out period, geographic regional average doses for sectors of different nearness are computed; viz, in immediate proximity to PNPS, more distant but near the site boundary, up to several miles away - "neighborhood", and far away (background). Each set of data show consistent trends; the near plant dosimeters (OA, PB, PA, WS) stand out among all readings and have an average above the dose rates further away. The next region has a lower average dose rate, and beyond 0.7 mile (distant neighborhood and background) the dose rates are statistically consistent.

In all cases, the near plant levels are distinctly higher than those off-site and off-site dose rates are not significantly sensitive to distance variations beyond the site itself. Thus, beyond the "exclusion area" (for this purpose, the 0.25-0.7 mile region), dose rates show no significant plant effect; populated areas are therefore beyond the limits of elevated dose rates.

2. Field Survey

A gamma exposure survey of Plymouth Beach and Priscilla/White Horse Beach was conducted during June of 1981. The results of this most recent survey are in agreement with the last four beach surveys conducted for 1980, 1979, 1978 and 1977. In addition, a comprehensive soil survey of 11 locations was conducted during the spring of 1979. This study included both gamma exposure rate measurements and in-situ gamma spectrometry analysis for each location. Laboratory soil analyses were also conducted for selected locations. The results of this study are presented in Appendix C. The latest gamma exposure survey was conducted using a Reuter Stokes RS-111 high pressure ion chamber (HPCI), Serial Number 4-1656. The design and calibration of this instrument were described in the report of the survey of October 1981.[4]

The present survey was designed to detect differences in the external exposure rate encountered at beaches near the plant (Plymouth and Priscilla/White Horse) and a control location (Duxbury). The detector's calibration was checked before each measurement. A survey was not conducted at the control location of Duxbury due to the limited availability of the Mobile Van and associated equipment.

The data (Table III-D-7) indicate that the expsosure rates at Plymouth Inner Beach and Priscilla/White Horse Beach are not significantly greater than the exposure rates measured at the control station in Duxbury for 1980. The small differences

are likely due to the presence of granite beach stones which are essentially absent at the Duxbury location.

It has been demonstrated that proximity to beach stones results in higher exposure rates than in sandy areas (see Annual Report No. 10).

This survey indicates that the natural background exposure rate at beaches near Pilgrim Station is probably 7-9 uR/hr. These results are in complete agreement with similar measurements performed in Maine[5], where the natural background exposure rate at shoreline locations was found to vary between 6.6 and 14.5 uR/hr. These exposure rates were also found to vary directly with the size and proximity of granite outcroppings[5].

These latest measurements are also in agreement with the soil survey mentioned earlier. The results of that survey indicate that off-site dose rates have a range of 8.0 to 8.5 uR/hr with an average of 8.2 uR/hr.

TABLE III-D-1

THERMOLUMINESCENT DOSIMETER LOCATIONS

Surveillance Stations				Station Specification				
Near Plant (0-0.16 miles)	Exclusion Area (0.25-0.7)	Distant Neighborhood (0.96-6.5 miles)	Background (8-23 miles)	Station Code	See Fig.	Item No.	† Distance (miles)	Direction
Overlook Area				OA	II-2	9	0.09	W-WSW
*Warehouse				WS	II-2	23	0.10	S-SSE
*Pedestrian Bridge				PB	II-2	8	0.15	NNW
Public Parking Area				PA	II-2	7	0.16	NW-NNW
	*Property Line			A	II-2	5	0.25	W-WSW
	*Property Line			F	II-2	2	0.27	WNW-NW
	*East Breakwater			EB	II-2	10	0.31	ESE
	Property Line			B	II-2	13	0.32	SSE
	Property Line (SW)			H	II-2	6	0.33	SW
	Property Line			I	II-2	3	0.33	W-WNW
	*Property Line			PL	II-2	24	0.34	WNW-NW
	*Property Line			D	II-2	1	0.37	NW-NNW
	*Property Line			L	II-2	22	0.40	ESE-SE
	*Property Line			HB	II-2	12	0.43	SE
	*Property Line			C	II-2	11	0.44	ESE-SE
	*Property Line			G	II-2	4	0.44	W
	*Property Line (West)			WR	II-2	18	0.51	WNW
	Rocky Hill Road (West)			MT	II-2	14	0.55	S-SSW
	Microwave Tower			CR	II-1	7	0.63	S-SSW
	Cleft Rock Area			ER	II-2	21	0.68	SE
	Rocky Hill Road (East)			BD	II-1	6	0.70	W-WNW
	*Bay Shore Drive			EM	II-2	15	0.97	SSE
		*Emerson Road		J	II-2	19	1.21	S-SSE
		*Property Line		E	II-2	17	1.23	S
		*Property Line (South)		WH	II-2	16	1.31	SSE
		*White Horse Road		K	II-2	20	1.32	S-SSE
		*Property Line		MP	II-1	8	2.25	E-ESE
		Manomet Point		ME	II-1	9	2.50	SE
		Manomet Elem. School		MS	II-1	10	2.50	SSE
		Manomet Substation		SP	II-1	5	3.00	WSW
		South Plymouth		MB	II-1	11	3.50	SE-SSE
		*Manomet Beach		PC	II-1	4	4.50	W-WNW
		Plymouth Center		NP	II-1	3	5.50	WNW
		North Plymouth		SS	II-1	1	6.25	NW
		*Standish Shores (Dux)		CP	II-1	12	6.50	SW
		*College Pond						
			Sherman Airport (Ply)	SA	II-1	14	8.00	WSW
			Cedarville Sub. (Sag)	CS	II-1	13	10.00	S-SSE
			Kingston Substation	KS	II-1	2	10.00	WNW
			East Weymouth	EW	II-1	15	23.00	NW

*Not required by operating license.
† Distances measured from Unit 1 reactor building.

TABLE III-D-2
GAMMA EXPOSURE (TLD) DATA FOR QUARTER #1 1981

TLD No.	Station	Micror/ Hour	+-	2 Sigma
50	CP	36.77	+-	11.95
51	CR	0.00	+-	0.00
52	CS	26.79	+-	5.74
53	ER	21.49	+-	3.11
55	EW	45.59	+-	9.51
3003	KS	21.28	+-	11.71
57	MB	18.61	+-	4.23
3013	ME	23.44	+-	7.33
59	MP	20.95	+-	2.76
60	MS	28.94	+-	7.85
61	NP	19.60	+-	5.34
62	PC	20.90	+-	4.42
63	SA	13.97	+-	3.14
3010	SP	41.93	+-	7.22
65	SS	43.88	+-	11.17
66	WR	20.84	+-	3.57
67	BD	25.16	+-	3.77
68	EB	34.11	+-	6.11
69	EM	16.99	+-	3.44
70	MT	43.70	+-	8.20
71	OA	40.33	+-	11.91
72	PA	46.17	+-	10.37
73	PB	140.45	+-	24.35
74	WH	23.14	+-	5.82
75	A	22.45	+-	5.31
76	B	29.62	+-	6.24
77	C	17.51	+-	2.39
78	D	20.72	+-	6.39
79	E	24.53	+-	5.62
80	F	39.31	+-	6.77
3005	G	19.26	+-	4.54
82	H	30.21	+-	6.37
83	I	18.79	+-	3.07
84	J	55.44	+-	7.54
85	K	22.80	+-	3.12
86	L	0.00	+-	0.00
87	PL	24.59	+-	5.36
205	WS	14.41	+-	2.57
92	HB	23.28	+-	5.33
3014	RL	2.16	+-	0.14
93	RL	1.74	+-	0.18

Geographic Regional Averages this period are:			
Near Plant (0-.16 mi)	60.28	+-	9.7
Exclusion Area (.25-.68 mi)	26.07	+-	1.56
Distant Neighborhood (.7-6.5 mi)	28.14	+-	1.84
Background (8-23 mi)	26.84	+-	5.47

TABLE III-D-3
GAMMA EXPOSURE (TLD) DATA FOR QUARTER #2 1981

TLD No.	Station	Micror/ Hour	+-	2 Sigma
1	CP	42.09	+-	11.67
31	CR	0.00	+-	0.00
32	CS	26.40	+-	7.81
33	ER	24.90	+-	4.37
34	EW	24.30	+-	4.56
35	KS	20.52	+-	7.28
36	MB	30.34	+-	6.91
38	ME	27.88	+-	6.14
39	MP	21.83	+-	6.50
40	MS	24.76	+-	4.79
41	NP	21.27	+-	6.28
42	PC	23.68	+-	6.05
43	SA	23.24	+-	3.27
45	SP	23.14	+-	6.27
46	SS	21.23	+-	6.46
47	WR	32.61	+-	6.40
48	BD	26.53	+-	5.94
3	EB	30.85	+-	5.48
90	EM	23.03	+-	8.66
206	MT	8.91	+-	1.89
94	OA	42.39	+-	5.60
95	PA	23.61	+-	6.00
96	PB	30.44	+-	6.02
97	WH	24.66	+-	2.85
98	A	46.33	+-	16.26
207	B	12.27	+-	2.81
3033	C	23.17	+-	3.10
3001	D	22.34	+-	6.32
3042	E	29.53	+-	5.04
3006	F	34.82	+-	10.12
3044	G	24.69	+-	4.45
214	H	15.00	+-	2.40
20	I	19.44	+-	3.82
3048	J	17.24	+-	4.39
23	K	17.35	+-	4.29
209	L	9.16	+-	1.75
210	PL	9.15	+-	1.98
211	WS	16.73	+-	1.79
218	HB	6.46	+-	1.43
44	RL	2.58	+-	0.28
54	RL	2.06	+-	0.23

Geographic Regional Averages this period are:			
Near Plant (0-.16 mi)	30.57	+-	3.72
Exclusion Area (.25-.68 mi)	23.04	+-	1.84
Distant Neighborhood (.7-6.5 mi)	26.97	+-	1.93
Background (8-23 mi)	25.50	+-	4.34

TABLE III-D-4
GAMMA EXPOSURE (TLD) DATA FOR QUARTER #3 1981

TLD No.	Station	Micror/ Hour	+-	2 Sigma
50	CP	29.49	+-	7.01
225	CR	8.71	+-	1.52
52	CS	26.80	+-	8.13
53	ER	23.87	+-	5.59
55	EW	40.43	+-	12.79
3003	KS	26.07	+-	8.74
57	MB	21.06	+-	4.64
3013	ME	24.26	+-	5.71
59	MP	21.21	+-	6.55
60	MS	41.40	+-	6.53
61	NP	25.60	+-	6.62
62	PC	28.20	+-	10.38
63	SA	21.15	+-	4.79
3010	SP	38.70	+-	10.24
65	SS	32.31	+-	8.38
66	WR	34.70	+-	11.47
67	BD	0.00	+-	0.00
68	EB	30.05	+-	9.86
69	EM	16.76	+-	4.39
70	MT	32.95	+-	7.88
71	OA	59.17	+-	15.76
72	PA	30.88	+-	8.00
73	PB	84.75	+-	20.38
74	WH	21.17	+-	6.24
75	A	30.22	+-	8.08
76	B	26.37	+-	5.46
77	C	18.48	+-	4.01
78	D	28.50	+-	7.36
79	E	27.40	+-	6.29
80	F	44.20	+-	6.43
3005	G	21.27	+-	8.25
82	H	28.54	+-	6.10
83	I	28.76	+-	5.50
84	J	39.67	+-	11.20
85	K	33.18	+-	9.61
224	L	10.93	+-	1.75
87	PL	34.16	+-	12.71
205	WS	35.53	+-	7.51
92	HB	23.40	+-	5.02
3014	RL	1.38	+-	0.14
93	RL	1.55	+-	0.35

Geographic Regional Averages this period are:			
Near Plant (0-.16 mi)	52.58	+-	9.34
Exclusion Area (.25-.68 mi)	26.57	+-	1.95
Distant Neighborhood (.7-6.5 mi)	28.60	+-	2.22
Background (8-23 mi)	28.61	+-	6.04

TABLE III-D-5
GAMMA EXPOSURE (TLD) DATA FOR QUARTER #4 1981

TLD No.	Station	Micror/ Hour	+-	2 Sigma
1	CP	33.85	+-	13.32
226	CR	7.06	+-	1.45
32	CS	28.95	+-	9.21
33	ER	31.30	+-	7.25
34	EW	23.56	+-	6.04
35	KS	28.92	+-	4.79
36	MB	33.11	+-	6.96
38	ME	31.47	+-	11.77
39	MP	25.58	+-	7.10
40	MS	28.56	+-	9.28
41	NP	21.79	+-	5.51
42	PC	0.00	+-	0.00
43	SA	25.20	+-	7.39
45	SP	28.93	+-	7.56
46	SS	27.95	+-	6.02
47	WR	29.80	+-	7.17
48	BD	28.71	+-	7.72
3	EB	36.44	+-	10.88
90	EM	23.65	+-	11.08
206	MT	12.00	+-	2.12
94	OA	28.18	+-	7.53
95	PA	15.51	+-	6.42
96	PB	44.96	+-	15.69
97	WH	27.25	+-	4.49
98	A	51.13	+-	23.60
207	B	15.74	+-	4.35
3033	C	29.63	+-	9.84
3001	D	21.81	+-	4.74
3042	E	31.61	+-	11.41
3006	F	40.32	+-	14.45
3044	G	21.59	+-	5.40
214	H	12.12	+-	3.72
20	I	26.40	+-	5.53
3048	J	0.00	+-	0.00
227	K	5.55	+-	0.90
209	L	12.64	+-	3.34
210	PL	10.28	+-	2.62
211	WS	16.46	+-	3.12
218	HB	12.64	+-	5.62
44	RL	1.86	+-	0.31
54	RL	1.69	+-	0.31

Geographic Regional Averages this period are:			
Near Plant (0-.16 mi)	26.28	+-	6.27
Exclusion Area (.25-.68 mi)	23.18	+-	2.36
Distant Neighborhood (.7-6.5 mi)	26.77	+-	2.58
Background (8-23 mi)	26.66	+-	4.70

TABLE III-D-6
QUARTERLY AVERAGE
EXPOSURE RATES
1981

QUARTERLY AVERAGES FOR GAMMA EXPOSURE RATES

STATION	1ST QUARTER MICROR/HR			2ND QUARTER MICROR/HR			3RD QUARTER MICROR/HR			4TH QUARTER MICROR/HR		
CP	36.77	±	11.95	42.09	±	11.47	29.49	±	7.01	33.85	±	13.32
CR	0.00	±	0.00	0.00	±	0.00	8.71	±	1.52	7.06	±	1.45
CS	26.79	±	5.74	26.40	±	7.81	26.80	±	8.13	28.95	±	9.21
ER	21.49	±	3.11	24.90	±	4.37	23.87	±	5.59	31.30	±	7.25
EW	45.59	±	9.51	24.30	±	4.56	40.43	±	12.79	23.56	±	6.04
KS	21.28	±	11.71	20.52	±	7.28	26.07	±	8.74	28.92	±	4.79
MB	18.61	±	4.23	30.34	±	6.91	21.06	±	4.64	33.11	±	6.96
ME	23.44	±	7.33	27.88	±	6.14	24.26	±	5.71	31.47	±	11.77
MP	20.95	±	2.76	21.83	±	6.50	21.21	±	6.55	29.58	±	7.10
MS	28.94	±	7.85	24.76	±	4.79	41.40	±	6.53	28.56	±	9.28
NP	19.60	±	5.34	21.27	±	6.28	25.60	±	6.62	21.79	±	5.51
PC	20.90	±	4.42	23.68	±	6.05	28.20	±	10.38	0.00	±	0.00
SA	13.97	±	3.14	23.24	±	3.27	21.15	±	4.79	25.20	±	7.39
SP	41.93	±	7.22	23.14	±	6.27	38.70	±	10.24	28.93	±	7.56
SS	43.88	±	11.17	21.23	±	6.46	32.31	±	8.38	27.95	±	6.02
WR	20.84	±	3.57	32.61	±	6.40	34.70	±	11.47	29.80	±	7.17
BD	25.16	±	3.77	26.53	±	5.94	0.00	±	0.00	28.71	±	7.72
EB	34.11	±	6.11	30.85	±	5.48	30.05	±	9.86	36.44	±	10.88
EM	16.99	±	3.44	23.03	±	8.66	16.76	±	4.39	23.65	±	11.08
MT	43.70	±	8.20	8.91	±	1.89	32.95	±	7.88	12.00	±	2.12
OA	40.33	±	11.91	42.39	±	5.60	59.17	±	15.76	28.18	±	7.53
PA	46.17	±	10.37	23.61	±	6.00	30.88	±	8.00	15.51	±	6.42
PB	140.45	±	24.35	30.44	±	6.02	84.75	±	20.38	44.96	±	15.69
WH	23.14	±	5.82	24.66	±	2.85	21.17	±	6.24	27.25	±	4.49
A	22.45	±	5.31	46.33	±	16.26	30.22	±	8.08	51.13	±	23.60
B	29.62	±	6.24	12.27	±	2.81	26.37	±	5.46	15.74	±	4.35
C	17.51	±	2.39	23.17	±	3.10	18.48	±	4.01	29.63	±	9.04
D	20.72	±	6.39	22.34	±	6.32	28.50	±	7.36	21.81	±	4.74
E	24.53	±	5.62	29.53	±	5.04	27.40	±	6.29	31.61	±	11.41
F	39.31	±	6.77	34.82	±	10.12	44.20	±	6.43	40.32	±	14.45
G	19.26	±	4.54	24.69	±	4.45	21.27	±	8.25	21.59	±	5.40
H	30.21	±	6.37	15.00	±	2.40	28.54	±	6.10	12.12	±	3.72
I	18.79	±	3.07	19.44	±	3.82	28.76	±	5.50	26.40	±	5.53
J	55.44	±	7.54	17.24	±	4.39	39.67	±	11.20	0.00	±	0.00
K	22.80	±	3.12	17.35	±	4.29	33.18	±	9.61	5.55	±	0.90
L	0.00	±	0.00	9.16	±	1.75	10.93	±	1.75	12.64	±	3.34
PL	24.59	±	5.36	9.15	±	1.98	34.16	±	12.71	10.28	±	2.62
WS	14.41	±	2.57	16.73	±	1.79	35.53	±	7.51	16.46	±	3.12
HB	23.28	±	5.33	6.46	±	1.43	23.40	±	5.02	12.64	±	5.62
RL	2.16	±	0.14	2.58	±	0.28	1.38	±	0.14	1.86	±	0.31
RL	1.74	±	0.18	2.06	±	0.23	1.55	±	0.35	1.69	±	0.31

TABLE III-D-7

Location	Exposure Rate (uR/Hr)	Beach Terrain
White Horse Beach (near Hill P Avenue)	7.9 ± 0.5	Sand with large amount of course gravel, granite boulders near beach
White Horse Beach (in back of Blue Sail Bar)	6.9 ± 0.4	Sandy with small amount of rocks
Plymouth Beach (outer beach)	6.1 ± 0.3	Sandy
Plymouth Beach (inner beach)	6.4 ± 0.3	Sandy
Plymouth Beach (behind Berts Restaurant)	9.0 ± 0.5	Sandy, granite boulders near beach
Duxbury Beach (Control) - 1980 (ocean side)	5.1 ± 0.4	Sandy with small amounts of gravel

III. E. Waterborne

Samples of seawater are collected at three locations, the Station Discharge Canal, (Station 11), Bartlett Pond (Station 17 - 1.7 mi - SE) and Powder Point (Station 23 - 7.8 mi - NNW). The Discharge Canal sample is collected by a continuously compositing sampler which extracts a sample of about 20 ml of water from the Canal every one-half hour. Grab samples are taken weekly from each of the other two locations.

The results of the ERMAP program for seawater samples are presented in Table III-E-1.

The only positive measurement in this media was Co-60 (peak only) in the Discharge Canal on one occasion (monthly composite for February). No other isotopes characteristic of reactor operation were observed at this station and the mean value of the Co-60 concentration is well within one standard deviation of the mean value at the control station.

Therefore, it is not clear that PNPS-1 is responsible for this observation. There were no positive measurements at the other indicator station (Bartlett Pond - 1.7 mi - SE) and therefore there was clearly no significant environmental effect observed in the seawater media as a result of the operation of PNPS-1.

MEDIUM: WATER - SEA UNITS: PCI/LITER

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*		NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
BE-7	(36)	8.0E+01	(1.4 ± 1.2)E 0	17	(2.5 ± 1.8)E 0	(2.3 ± 1.9)E 0
	(0)		(-8.2 - 13.7)E 0			(-5.5 - 15.2)E 0
			(0/ 24)		*(0/ 12)*	*(0/ 12)*
K-40	(36)	2.0E+02	(1.6 ± .3)E 2	11	(3.2 ± .1)E 2	(2.8 ± .1)E 2
	(0)		(-1.8 - 38.0)E 1		(2.9 - 3.8)E 2	(2.2 - 3.3)E 2
			(13/ 24)		*(12/ 12)*	*(12/ 12)*
CR-51	(36)	1.7E+01	(-2.9 ± 1.6)E 0	23	(-2.1 ± 1.8)E 0	(-2.1 ± 1.8)E 0
	(0)		(-1.6 - 1.7)E 1			(-1.3 - .7)E 1
			(0/ 24)		*(0/ 12)*	*(0/ 12)*
MN-54	(36)	8.	(-1.7 ± 1.5)E -1	23	(-1.0 ± 1.0)E -1	(-1.0 ± 1.0)E -1
	(0)		(-1.8 - 1.1)E 0			(-6.1 - 4.2)E -1
			(0/ 24)		*(0/ 12)*	*(0/ 12)*
CO-58	(36)	8.	(-2.1 ± 1.3)E -1	23	(7.6 ± 17.0)E -2	(7.6 ± 17.0)E -2
	(0)		(-1.6 - .7)E 0			(-7.5 - 11.7)E -1
			(0/ 24)		*(0/ 12)*	*(0/ 12)*
FE-59	(36)	1.0E+01	(3.1 ± 3.0)E -1	23	(9.1 ± 6.6)E -1	(9.1 ± 6.6)E -1
	(0)		(-3.3 - 2.1)E 0			(-2.5 - 4.1)E 0
			(0/ 24)		*(0/ 12)*	*(0/ 12)*
CO-60	(36)	8.	(-1.7 ± 2.8)E -1	11	(1.9 ± 4.1)E -1	(2.8 ± 22.8)E -2
	(0)		(-2.0 - 2.6)E 0			(-1.8 - 1.3)E 0
			(0/ 24)		*(0/ 12)*	*(0/ 12)*
ZN-65	(36)	4.	(2.6 ± 3.0)E -1	11	(8.9 ± 3.8)E -1	(-5.3 ± 8.8)E -1
	(0)		(-2.6 - 3.5)E 0			(-2.5 - 2.7)E 0
			(0/ 24)		*(0/ 12)*	*(0/ 12)*
ZR-95	(36)	1.0E+01	(-8.3 ± 21.8)E -2	23	(1.6 ± 2.8)E -1	(1.6 ± 2.8)E -1
	(0)		(-2.2 - 1.5)E 0			(-1.7 - 1.8)E 0
			(0/ 24)		*(0/ 12)*	*(0/ 12)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: WATER - SEA UNITS: PCI/LITER

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
NB-95 (36) (0)	2.	(5.1 ± 10.3)E -2 (-8.7 - 9.3)E -1 *(0/ 24)*	17	(2.9 ± 1.8)E -1 *(0/ 12)*	(2.7 ± 2.5)E -1 (-1.0 - 1.7)E 0 *(0/ 12)*
AG-110M(36) (0)	1.4E+01	(-4.7 ± 11.3)E -1 (-9.0 - 13.0)E 0 *(0/ 24)*	17	(7.4 ± 15.0)E -1 *(0/ 12)*	(-3.5 ± 1.6)E 0 (-1.6 - .8)E 1 *(0/ 12)*
RU-103 (36) (0)	8.	(-7.5 ± 1.5)E -1 (-2.1 - .9)E 0 *(0/ 24)*	23	(-4.5 ± 2.9)E -1 *(0/ 12)*	(-4.5 ± 2.9)E -1 (-2.2 - 1.2)E 0 *(0/ 12)*
RU-106 (36) (0)	8.0E+01	(-1.5 ± 1.4)E 0 (-2.1 - .8)E 1 *(0/ 24)*	23	(2.4 ± 1.5)E 0 *(0/ 12)*	(2.4 ± 1.5)E 0 (-5.2 - 9.3)E 0 *(0/ 12)*
I-131 (36) (0)	0.	(-5.0 ± 8.5)E -1 (-1.6 - .8)E 1 *(0/ 24)*	17	(4.9 ± 6.3)E -1 *(0/ 12)*	(-1.0 ± .7)E 0 (-5.2 - 2.9)E 0 *(0/ 12)*
CS-134 (36) (0)	9.	(-5.0 ± 1.8)E -1 (-2.2 - 1.1)E 0 *(0/ 24)*	11	(-4.9 ± 3.2)E -1 *(0/ 12)*	(-5.6 ± 1.7)E -1 (-1.6 - .5)E 0 *(0/ 12)*
CS-137 (36) (0)	9.	(4.3 ± 2.1)E -1 (-1.9 - 3.7)E 0 *(1/ 24)*	11	(4.4 ± 3.9)E -1 (-1.9 - 3.7)E 0 *(1/ 12)*	(-8.0 ± 16.6)E -2 (-1.0 - .8)E 0 *(0/ 12)*
BA-140 (36) (0)	1.5E+01	(-2.8 ± 8.1)E -1 (-8.2 - 5.0)E 0 *(0/ 24)*	23	(9.8 ± 5.3)E -1 *(0/ 12)*	(9.8 ± 5.3)E -1 (-1.2 - 8.0)E 0 *(0/ 12)*
CE-141 (36) (0)	2.0E+01	(1.1 ± 2.7)E -1 (-2.3 - 2.8)E 0 *(0/ 24)*	23	(3.0 ± 8.6)E -1 *(0/ 12)*	(3.0 ± 8.6)E -1 (-2.2 - 3.2)E 0 *(0/ 12)*
CE-144 (36) (0)	8.0E+01	(-2.1 ± 8.6)E -1 (-7.3 - 9.1)E 0 *(0/ 24)*	11	(1.2 ± 1.2)E 0 *(0/ 12)*	(8.0 ± 12.6)E -1 (-5.1 - 9.8)E 0 *(0/ 12)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-E-1
(continued)

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 38
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: WATER - BEA UNITS: PCI/LITER

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
TH-228 (36)	1.0E+01	(-5.8 ± 8.0)E -1	23	(-2.5 ± 3.5)E -1	(-2.5 ± 3.5)E -1
(0)		(-6.0 - 5.1)E 0			(-1.9 - 1.8)E 0
		(0/ 24)		*(0/ 12)*	*(0/ 12)*
H-3 (15)	9.0E+01	(4.8 ± 3.0)E 1	17	(1.1 ± .6)E 2	(4.4 ± 3.7)E 1
(0)		(-1.2 - 2.8)E 2			(-6.6 - 12.6)E 1
		(0/ 10)		*(0/ 5)*	*(0/ 5)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-E-1
(continued)

III. F. Shellfish

Shellfish are normally sampled quarterly from 5 locations, the Station Discharge Canal, Duxbury Bay, Manomet Point, Plymouth Harbor and Marshfield. The results of the ERMAP program for shellfish are presented in Table III-F-1. It is clear from this table that there have been positive measurements of many isotopes (Ce-141, Ru-103, Mn-54, and Co-60) in the Discharge Canal. In addition there have been positive measurements of: Ru-103, Be-7, Zr-95, Mn-54, and Co-60 at Manomet Point; Ce-144, Ce-141, Ru-103, Be-7, and Zr-95 at Plymouth Harbor; and, Ce-141, Ru-103, Be-7 and Zr-95 at the control station in Marshfield.

The observed concentrations of Co-60 and Mn-54 are most probably the result of PNPS-1 liquid releases. However, the observed concentrations of Ce-144, Ce-141, Ru-103, Be-7 and Zr-95 during the first two quarters of 1981 are the result of fission products related to fallout from the Chinese weapons test of October, 1980 (Refer to Section III.A.1).

However, even if a person were to consume the maximum annual quantity of seafood (5 kilograms/year) with the highest mean concentrations of Co-60 and Mn-54, they would receive a dose of less than 0.002 mrem to the total body and about 0.01 mrem to the most restrictive organ (Adult, GI-LLI).

When compared to the natural background dose rate of 80-100 mrem/year, there was clearly no significant environmental impact observed in shellfish as a result of the operations of PNPS-1.

MEDIUM: SHELLFISH UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
BE-7 (24) (0)	.2	(1.2 ± 1.1)E 1 (-1.2 - 1.0)E 2 *(5/ 20)*	12	(3.5 ± 1.5)E 1 (-3.7 - 10.1)E 1 *(2/ 8)*	(2.5 ± .7)E 1 (1.5 - 4.4)E 1 *(2/ 8)*
K-40 (24) (0)	.5	(1.5 ± .1)E 3 (1.0 - 1.9)E 3 *(20/ 20)*	13	(1.6 ± .1)E 3 (1.3 - 1.9)E 3 *(8/ 8)*	(1.5 ± .1)E 3 (1.4 - 1.7)E 3 *(8/ 8)*
CR-51 (24) (0)	3.2E+02	(2.0 ± 1.1)E 1 (-2.1 - 19.3)E 1 *(0/ 20)*	13	(5.9 ± 4.9)E 1 *(0/ 8)*	(-5.9 ± 5.0)E 0 (-2.1 - .0)E 1 *(0/ 8)*
MN-54 (24) (1)	2.0E-02	(10.0 ± 15.2)E -1 (-1.1 - 2.1)E 1 *(1/ 20)*	11	(6.0 ± 5.1)E 0 (4.1 - 212.0)E -1 *(1/ 8)*	(3.1 ± 3.4)E -1 (-1.8 - 13.3)E -1 *(0/ 8)*
CO-58 (24) (0)	2.0E-02	(-6.1 ± 11.7)E -1 (-2.0 - .5)E 1 *(0/ 20)*	11	(8.3 ± 8.2)E -1 *(0/ 8)*	(2.0 ± 73.1)E -2 (-1.6 - 1.8)E 0 *(0/ 8)*
FE-59 (24) (0)	3.0E+01	(-8.8 ± 3.0)E 0 (-8.0 - .9)E 1 *(0/ 20)*	24	(8.5 ± 7.9)E -1 *(0/ 8)*	(8.5 ± 7.9)E -1 (-6.9 - 30.7)E -1 *(0/ 8)*
CO-60 (24) (8)	2.0E-02	(1.3 ± .5)E 1 (-8.5 - 88.8)E 0 *(8/ 20)*	11	(4.8 ± 1.4)E 1 (2.4 - 8.5)E 1 *(4/ 8)*	(-1.3 ± 4.4)E -1 (-8.5 - 11.5)E -1 *(0/ 8)*
ZN-65 (24) (0)	6.7E+01	(-1.3 ± 2.1)E 0 (-2.3 - 1.6)E 1 *(0/ 20)*	24	(3.5 ± 1.4)E 0 *(0/ 8)*	(3.5 ± 1.4)E 0 (-2.2 - 68.1)E -1 *(0/ 8)*
ZR-95 (24) (0)	4.0E-02	(2.7 ± 1.5)E 0 (-1.5 - 1.1)E 1 *(3/ 20)*	24	(5.6 ± 1.8)E 0 (3.5 - 11.1)E 0 *(1/ 8)*	(5.6 ± 1.8)E 0 (3.5 - 11.1)E 0 *(1/ 8)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-F-1
ERMAP RESULTS
SHELLFISH

MEDIUM: SHELLFISH UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
NB-95 (24) (0)	3.9E+01	(8.6 ± 2.8)E 0 (-1.6 - 2.9)E 1 *(11/ 20)*	12	(1.0 ± .6)E 1 (-1.6 - 2.9)E 1 *(0/ 8)*	(8.7 ± 2.8)E 0 (3.0 - 14.7)E 0 *(3/ 8)*
AG-110M(24) (0)	2.5E+02	(3.9 ± 88.3)E -1 (-5.2 - 5.1)E 1 *(0/ 20)*	13	(9.5 ± 19.2)E 0 *(0/ 8)*	(-6.9 ± 2.8)E 0 (-1.8 - 0.0)E 1 *(0/ 8)*
RU-103 (24) (0)	2.0E-02	(6.1 ± 1.9)E 0 (-5.6 - 28.7)E 0 *(7/ 20)*	12	(8.2 ± 3.5)E 0 (-5.0 - 28.7)E 0 *(3/ 8)*	(5.9 ± 3.2)E 0 (-2.0 - 180.0)E -1 *(2/ 8)*
RU-106 (24) (0)	.2	(1.2 ± .7)E 1 (-2.6 - 10.9)E 1 *(0/ 20)*	13	(1.9 ± 2.0)E 1 *(0/ 8)*	(3.0 ± 36.0)E -1 (-5.9 - 10.7)E 0 *(0/ 8)*
I-131 (24) (0)	0.	(-8.3 ± 81.8)E -1 (-1.0 - 1.0)E 2 *(0/ 20)*	12	(7.1 ± 20.0)E 0 *(0/ 8)*	(-2.1 ± .9)E 0 (-4.9 - 0.0)E 0 *(0/ 8)*
CS-134 (24) (0)	2.0E-02	(-2.1 ± 1.0)E 0 (-1.8 - .8)E 1 *(0/ 20)*	24	(-8.2 ± 6.8)E -1 *(0/ 8)*	(-8.2 ± 6.8)E -1 (-2.1 - .6)E 0 *(0/ 8)*
CS-137 (24) (0)	2.0E-02	(1.0 ± .6)E 0 (-8.2 - 4.0)E 0 *(0/ 20)*	13	(3.2 ± 1.4)E 0 *(0/ 8)*	(1.1 ± .8)E 0 (-4.6 - 1620.0)E -3 *(0/ 8)*
BA-140 (24) (0)	8.0E-02	(1.6 ± 2.8)E 0 (-3.6 - 2.7)E 1 *(0/ 20)*	13	(1.1 ± .8)E 1 *(0/ 8)*	(-1.6 ± .7)E 0 (-3.5 - 0.0)E 0 *(0/ 8)*
CE-141 (24) (0)	4.0E-02	(4.0 ± 2.8)E 0 (-1.9 - 8.9)E 1 *(6/ 20)*	12	(9.7 ± 6.3)E 0 (-8.6 - 89.8)E 0 *(3/ 8)*	(3.3 ± 2.6)E 0 (-2.6 - 9.5)E 0 *(1/ 8)*
CE-144 (24) (1)	.2	(8.8 ± 5.2)E 0 (-8.9 - 6.2)E 1 *(1/ 20)*	12	(1.2 ± 1.2)E 1 (-8.9 - 6.2)E 1 *(1/ 8)*	(2.8 ± 8.1)E 0 (-9.6 - 7.7)E 0 *(0/ 8)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-F-1
(continued)

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 26
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: SHELLFISH UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
TH-228 (24)	2.0E-02	(1.0 ± .6)E 1	12	(1.9 ± 1.3)E 1	(5.2 ± 2.8)E 0
(1)		(-2.1 - 10.9)E 1		(-5.3 - 109.0)E 0	(-3.7 - 18A.0)E -1
		(1/ 20)		*(1/ 8)*	*(0/ 8)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-F-1
(continued)

III. G. Algae (Irish Moss)

Algae, referred to as Irish Moss or Chondrus Chrispus, is sampled quarterly at three locations, the Station Discharge Canal, Manomet Point and Ellisville. The results of the ERMAP program for Algae are presented in Table III-G-1.

It is clear from this table that there have been positive measurements of Ce-144, Ce-141, Ru-103, Be-7, Zr-95, Co-58, Co-60, Mn-54, Zn-65 and Cs-137 in the Discharge Canal primarily during the first three quarters of 1981. In addition, there have been positive measurements of: Ce-144, Ce-141, Ru-103, Be-7, Zr-95, Co-58, Co-60 and Mn-54 at Manomet Point (Station 15-3 miles-SE); and, Ce-144, Ce-141, Be-7, Zr-95 and Co-60 (first quarter only) at the control station of Ellisville (Station 22- 8 mi-SSE).

The measured concentrations of Co-58, Co-60, Zn-65, Mn-54 and Cs-137 in the Discharge Canal are certainly due to liquid effluents from PNPS-1. The observed concentrations of Co-58, Co-60 and Mn-54 at Manomet Point are most probably the result of PNPS-1 liquid releases. There was also one positive measurement of Co-60 at the control station in Ellisville, approximately eight miles away. This suggests the presence of a source other than PNPS. However, the observed concentrations of Ce-144, Ce-141, Ru-103, Be-7 and Zr-95 during the first three quarters of 1981, primarily, are the result of fission products related to the fallout from the Chinese weapons test of October 1980 (Refer to Section III.A.1).

It is important to note that due to processing and market dilution, the presence of the Co-58, Co-60, Cs-137, Mn-54 and Zn-65 concentrations do not represent a significant potential source of dose to the general public. In fact, even direct human consumption of Algae (which to our knowledge, does not occur) with the highest mean concentrations would result in a dose rate of less than 0.02 mrem/yr to the total body and 0.07 mrem/yr to the most sensitive organ (Adult-GI-LLI, using the models presented in Regulatory Guide 1.109) and assuming consumption of 5 kg/ year of unprocessed material.

When compared with the natural background dose rate of 80-100 mrem/yr there was clearly no significant environmental impact observed in Algae as a result of the operation of PNPS-1.

UNITS: PCI/KG WET

MEDIUM: VEGETATION - AQUATIC

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*		NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
BE-7	(13) (0)	.2	(1.3 ± .7)E 2 (-8.9 - 314.0)E 0 *(4/ 8)*	22	(2.0 ± .8)E 2 (7.7 - 52.2)E 1 *(2/ 5)*	(2.0 ± .8)E 2 (7.7 - 52.2)E 1 *(2/ 5)*
K-40	(13) (0)	.5	(6.0 ± .5)E 3 (3.6 - 9.1)E 3 *(8/ 8)*	11	(6.8 ± .8)E 3 (5.7 - 9.1)E 3 *(4/ 4)*	(6.1 ± .7)E 3 (4.6 - 7.8)E 3 *(5/ 5)*
CR-51	(13) (0)	-1.0-100	(-3.3 ± 16.2)E 0 (-7.9 - 8.8)E 1 *(0/ 8)*	11	(-1.2 ± 29.3)E 0 *(0/ 4)*	(-1.6 ± 1.8)E 1 (-4.8 - 2.8)E 1 *(0/ 5)*
MN-54	(13) (5)	2.0E-02	(2.5 ± .6)E 1 (3.8 - 54.0)E 0 *(5/ 8)*	11	(3.7 ± .7)E 1 (2.3 - 5.4)E 1 *(4/ 4)*	(1.4 ± 1.3)E 0 (-3.0 - 8.7)E 0 *(0/ 5)*
CO-58	(13) (2)	2.0E-02	(7.5 ± 2.6)E 0 (-1.9 - 22.8)E 0 *(2/ 8)*	11	(1.0 ± .5)E 1 (2.6 - 22.8)E 0 *(1/ 4)*	(1.0 ± 2.6)E 0 (-5.4 - 9.1)E 0 *(0/ 5)*
FE-59	(13) (0)	3.0E+01	(4.8 ± 4.3)E 0 (-1.1 - 2.2)E 1 *(0/ 8)*	11	(1.1 ± .6)E 1 *(0/ 4)*	(-5.1 ± 3.5)E 0 (-1.5 - .5)E 1 *(0/ 5)*
CO-60	(13) (4)	2.0E-02	(1.7 ± .6)E 2 (7.3 - 800.0)E 0 *(7/ 8)*	11	(2.7 ± .8)E 2 (1.0 - 8.4)E 2 *(4/ 4)*	(1.2 ± .8)E 1 (5.1 - 28.2)E 0 *(1/ 5)*
ZN-65	(13) (1)	-1.0-100	(8.2 ± 3.8)E 0 (-7.3 - 23.5)E 0 *(1/ 8)*	11	(1.5 ± .5)E 1 (1.7 - 23.5)E 0 *(1/ 4)*	(3.0 ± 10.0)E 0 (-1.3 - 8.1)E 1 *(0/ 5)*
ZR-95	(13) (0)	4.0E-02	(4.6 ± .0)E 1 (1.7 - 9.6)E 1 *(8/ 8)*	11	(5.6 ± 1.5)E 1 (2.9 - 9.6)E 1 *(4/ 4)*	(4.9 ± 1.1)E 1 (2.6 - 8.5)E 1 *(3/ 5)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-G-1
ERMAP RESULTS
ALGAE

SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

UNITS: PCI/KG WET

MEDIUM: VEGETATION - AQUATIC

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
MN-54 (13) (0)	-1.0-100	(1.5 ± .3)E 2 (6.8 - 27.0)E 1 *(8/ 8)*	11	(1.6 ± .4)E 2 (8.3 - 27.0)E 1 *(4/ 4)*	(1.2 ± .8)E 2 (1.7 - 23.6)E 1 *(4/ 5)*
AG-110M(13) (0)	-1.0-100	(-8.7 ± 11.4)E 0 (-8.0 - 6.5)E 1 *(0/ 8)*	15	(6.0 ± 20.9)E 0 *(0/ 4)*	(-7.3 ± 24.3)E 0 (-8.3 - 5.0)E 1 *(0/ 5)*
RU-103 (13) (0)	2.0E-02	(1.2 ± .8)E 1 (-8.4 - 25.5)E 0 *(4/ 8)*	15	(1.8 ± .5)E 1 (1.2 - 25.5)E 0 *(2/ 4)*	(9.9 ± 6.6)E 0 (-2.3 - 33.8)E 0 *(1/ 5)*
RU-106 (13) (0)	.2	(1.4 ± 10.7)E 0 (-8.9 - 8.0)E 1 *(0/ 8)*	22	(3.0 ± 2.3)E 1 *(0/ 5)*	(3.0 ± 2.3)E 1 (-3.5 - 10.0)E 1 *(0/ 5)*
I-131 (13) (0)	0.	(3.8 ± 1.9)E 1 (-8.8 - 131.0)E 0 *(0/ 8)*	22	(8.1 ± 5.2)E 1 *(0/ 5)*	(8.1 ± 5.2)E 1 (-6.1 - 23.9)E 1 *(0/ 5)*
CS-134 (13) (0)	2.0E-02	(-2.2 ± 11.9)E -1 (-3.2 - 6.1)E 0 *(0/ 8)*	11	(1.5 ± 2.1)E 0 *(0/ 4)*	(-2.3 ± 1.5)E 0 (-5.9 - 1.2)E 0 *(0/ 5)*
CS-137 (13) (2)	2.0E-02	(6.7 ± 3.9)E 0 (-8.0 - 32.5)E 0 *(2/ 8)*	11	(1.2 ± .7)E 1 (2.5 - 32.5)E 0 *(2/ 4)*	(1.1 ± .9)E 0 (-1.0 - 3.2)E 0 *(0/ 5)*
BA-140 (13) (0)	8.0E-02	(-9.1 ± 6.9)E 0 (-5.5 - .8)E 1 *(0/ 8)*	22	(5.2 ± 20.0)E 0 *(0/ 5)*	(5.2 ± 20.0)E 0 (-8.0 - 8.0)E 1 *(0/ 5)*
CE-141 (13) (0)	4.0E-02	(2.1 ± .7)E 1 (-3.6 - 51.6)E 0 *(0/ 8)*	22	(3.7 ± 1.6)E 1 (8.8 - 91.8)E 0 *(1/ 5)*	(3.7 ± 1.6)E 1 (8.8 - 91.8)E 0 *(1/ 5)*
CE-144 (13) (0)	.2	(1.0 ± .2)E 2 (2.2 - 19.8)E 1 *(6/ 8)*	11	(1.1 ± .4)E 2 (8.3 - 19.8)E 1 *(3/ 4)*	(8.6 ± .9)E 1 (5.8 - 11.6)E 1 *(3/ 5)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-G-1
(continued)

PILGRIM 1 OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 32
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: VEGETATION - AQUATIC UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
TH-228 (13)	2.0E-02	(1.7 & .9)E 1	22	(6.6 & 3.4)E 1	(6.6 & 3.4)E 1
(0)		(-2.4 - 4.8)E 1		(3.0 - 200.0)E 0	(3.0 - 200.0)E 0
		(3/ 8)		*(2/ 5)*	*(2/ 5)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-G-1
(continued)

III. H. Lobster (Arthropods)

Lobster samples are collected four times per season at two locations, the vicinity of the discharge outfall area and at a distant point offshore. The results of the ERMAP program for Lobsters are presented in Table III-H-1. These results are unremarkable in that there were no positive measurements of any isotopes other than K-40 in either the indicator or the control samples. Therefore, there is no evidence of any environmental impact on this media as a result of the operation of PNPS-1.

TABLE III-H-1
ERMAP RESULTS
LOBSTERS

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 8
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: ARTHROPODS UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*		NOMINAL LLD	INDICATION STATIONS MEAN, RANGE, AND NO. DETECTED**	STA.	HIGHEST STATION MEAN, RANGE, AND NO. DETECTED**	CONTROL LOCATIONS MEAN, RANGE, AND NO. DETECTED**
BE-7	(5)	.2	(-8.1 ± 2.8)E 1	15	(-5.7 ± 59.8)E 0	NO DATA
	(0)		(-1.1 - .3)E 2			
			(0/ 5)		*(0/ 1)*	
K-40	(5)	.5	(2.2 ± .2)E 3	11	(2.3 ± .2)E 3	NO DATA
	(0)		(1.9 - 2.8)E 3		(2.0 - 2.8)E 3	
			(5/ 5)		*(4/ 4)*	
CR-51	(5)	3.2E+02	(5.0 ± 8.8)E 1	11	(8.5 ± 3.8)E 1	NO DATA
	(0)		(-9.1 - 17.7)E 1			
			(0/ 5)		*(0/ 4)*	
MN-54	(5)	2.0E-02	(3.8 ± 4.4)E 0	15	(5.1 ± 6.8)E 0	NO DATA
	(0)		(-9.9 - 13.8)E 0			
			(0/ 5)		*(0/ 1)*	
CO-58	(5)	2.0E-02	(-5.5 ± 2.4)E 0	11	(-4.2 ± 2.6)E 0	NO DATA
	(0)		(-1.1 - .1)E 1			
			(0/ 5)		*(0/ 4)*	
FE-59	(5)	3.0E+01	(-6.2 ± 8.8)E 0	11	(-8.9 ± 5.9)E 0	NO DATA
	(0)		(-1.9 - .5)E 1			
			(0/ 5)		*(0/ 4)*	
CO-60	(5)	2.0E-02	(-1.9 ± 4.2)E 0	15	(4.4 ± 10.4)E 0	NO DATA
	(0)		(-1.8 - .6)E 1			
			(0/ 5)		*(0/ 1)*	
ZN-65	(5)	6.7E+01	(-6.1 ± 10.5)E 0	15	(2.2 ± 1.3)E 1	NO DATA
	(0)		(-2.6 - 2.2)E 1			
			(0/ 5)		*(0/ 1)*	
ZR-95	(5)	4.0E-02	(7.1 ± 8.7)E 0	15	(8.8 ± 14.5)E 0	NO DATA
	(0)		(-8.8 - 18.5)E 0			
			(0/ 5)		*(0/ 1)*	

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

PILGRIM I NRC/ITS ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/24. PAGE 9
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: ARTHROPODS UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
NB-95 (5)	3.9E+01	(1.4 ± 3.8)E 0	11	(2.6 ± 8.2)E 0	NO DATA
(0)		(-9.4 = 8.6)E 0			
		(0/ 5)		*(0/ 4)*	
AG-110M(5)	2.5E+02	(-3.5 ± 19.4)E 0	11	(2.5 ± 28.1)E 0	NO DATA
(0)		(-5.2 = 4.8)E 1			
		(0/ 5)		*(0/ 4)*	
RU-103 (5)	2.0E-02	(-3.8 ± 12.9)E -1	15	(1.6 ± 8.5)E 0	NO DATA
(0)		(-5.0 = 2.8)E 0			
		(0/ 5)		*(0/ 1)*	
RU-106 (5)	.2	(-9.7 ± 27.6)E 0	11	(-7.5 ± 35.5)E 0	NO DATA
(0)		(-8.5 = 7.5)E 1			
		(0/ 5)		*(0/ 4)*	
I-131 (5)	0.	(-2.8 ± 17.9)E 0	15	(1.1 ± 4.5)E 1	NO DATA
(0)		(-3.6 = 6.1)E 1			
		(0/ 5)		*(0/ 1)*	
CS-134 (5)	2.0E-02	(-3.0 ± 4.6)E 0	11	(-2.9 ± 6.0)E 0	NO DATA
(0)		(-2.0 = .8)E 1			
		(0/ 5)		*(0/ 4)*	
CS-137 (5)	2.0E-02	(-8.2 ± 4.1)E 0	11	(-3.6 ± 5.2)E 0	NO DATA
(0)		(-1.9 = .8)E 1			
		(0/ 5)		*(0/ 4)*	
BA-140 (5)	8.0E-02	(-3.1 ± 4.7)E 0	11	(8.0 ± 851.6)E -2	NO DATA
(0)		(-1.5 = 1.1)E 1			
		(0/ 5)		*(0/ 4)*	
CE-141 (5)	4.0E-02	(9.6 ± 33.8)E -1	15	(9.7 ± 12.0)E 0	NO DATA
(0)		(-8.8 = 9.7)E 0			
		(0/ 5)		*(0/ 1)*	
CE-144 (5)	.2	(-1.9 ± 2.1)E 1	11	(-1.5 ± 2.6)E 1	NO DATA
(0)		(-8.7 = 3.9)E 1			
		(0/ 5)		*(0/ 4)*	

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-H-1
(continued)

PILGRIM 1 OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 10
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: ARTHROPODS UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
TH-228 (5)	2.0E-02	(-1.9 & 1.5)E 1	15	(5.4 & 29.7)E 0	ND DATA
(0)		(-7.8 - .5)E 1			
		(0/ 5)		*(0/ 1)*	

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-H-1
(continued)

III. I Fish

Fish samples of Bottom Oriented (Group I) and Near Bottom (Group II) species are collected quarterly in the vicinity of the Discharge Outfall. In addition, samples of Anadromous (Group III) and Coastal Migratory (Group IV) species are collected when in season, in this same area. Lastly, a sample from each group is collected once per year at a distant location offshore.

The results of the ERMAP program of fish are presented in Table III-I-1. There were no positive measurements of any isotope (other than naturally occuring K-40) at the indicator station (Discharge Canal - Station 11).

However, there was some indication that Cs-137 (activity greater than 3 times standard deviation) was present in one Striped Bass sample collected on 10/14/81, and one Atlantic Herring sample collected on 3/11/81 at the Discharge Canal Outfall Area. Since Striped Bass is in the Group III category (Anadromous) and Atlantic Herring is in the Group IV category (Coastal Migratory), it is possible that the indication of Cs-137 is from a source other than PNPS-1. Even if an individual were to consume the maximum annual quantity of fish (21 kilograms/year) with the highest mean concentration of Cs-137, they would receive a dose of less than 0.03 mrem to the total body and about 0.04 mrem to the most restrictive organ (Adult-Liver).

Therefore, there is little of any evidence of any environmental impact on this media as a result of the operation of PNPS-1.

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 18
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: FISH UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
BE-7 (31) (0)	.2	(8.7 ± 13.9)E 0 (-1.7 - 1.5)E 2 *(0/ 27)*	29	(6.5 ± 21.3)E 1 *(0/ 2)*	(-2.5 ± 10.3)E 1 (-1.6 - 2.8)E 2 *(0/ 4)*
K-40 (31) (0)	.5	(3.2 ± .8)E 3 (2.7 - 3.8)E 3 *(27/ 27)*	28	(3.3 ± .2)E 3 *(1/ 1)*	(2.6 ± .7)E 3 (2.9 - 37.8)E 2 *(3/ 4)*
CR-51 (31) (0)	3.2E+02	(-1.1 ± 1.8)E 1 (-2.1 - 2.0)E 2 *(0/ 27)*	29	(1.3 ± 1.1)E 2 *(0/ 1)*	(7.6 ± 6.2)E 1 (-7.5 - 21.1)E 1 *(0/ 4)*
MN-54 (31) (0)	2.0E+02	(-1.2 ± 1.1)E 0 (-1.6 - .8)E 1 *(0/ 27)*	29	(4.8 ± 8.7)E 0 *(0/ 1)*	(1.3 ± 2.0)E 0 (-3.9 - 4.8)E 0 *(0/ 4)*
CO-58 (31) (0)	2.0E+02	(-2.5 ± 1.5)E 0 (-2.5 - .8)E 1 *(0/ 27)*	23	(1.7 ± 1.2)E 1 *(0/ 2)*	(5.3 ± 8.9)E 0 (-1.2 - 3.0)E 1 *(0/ 4)*
FE-59 (31) (0)	3.0E+01	(5.9 ± 3.8)E 0 (-3.8 - 4.3)E 1 *(0/ 27)*	29	(1.4 ± 2.3)E 1 *(0/ 1)*	(-1.4 ± 1.7)E 1 (-8.3 - 1.4)E 1 *(0/ 4)*
CO-60 (31) (0)	2.0E+02	(9.4 ± 19.9)E -1 (-2.7 - 2.1)E 1 *(0/ 27)*	12	(1.6 ± .9)E 1 *(0/ 1)*	(2.8 ± 2.2)E 0 (-2.0 - 8.2)E 0 *(0/ 4)*
ZN-65 (31) (0)	6.7E+01	(4.9 ± 2.8)E 0 (-3.1 - 3.6)E 1 *(0/ 27)*	29	(7.6 ± 22.3)E 0 *(0/ 1)*	(-1.6 ± 9.5)E 0 (-2.6 - 1.8)E 1 *(0/ 4)*
ZR-95 (31) (0)	4.0E+02	(-4.3 ± 2.9)E 0 (-4.3 - 2.3)E 1 *(0/ 27)*	23	(1.6 ± .5)E 1 *(0/ 2)*	(7.7 ± 5.3)E 0 (-3.3 - 21.0)E 0 *(0/ 4)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-I-1
ERMAP RESULTS
FISH

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING [illegible]
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

UNITS: PCI/KG WET

MEDIUM: FISH

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
MN-54 (31) (0)	3.0E+01	(8.2 & 16.8)E -1 (-2.2 - 2.3)E 1 *(0/ 27)*	29	(6.7 & 11.1)E 0 *(0/ 1)*	(4.0 & 8.8)E 0 (-7.3 - 13.8)E 0 *(0/ 8)*
AG-110M(31) (0)	2.5E+02	(-1.8 & 1.0)E 1 (-1.2 - 1.3)E 2 *(0/ 27)*	28	(8.3 & 8.9)E 1 *(0/ 1)*	(3.1 & 3.8)E 1 (-8.6 - 10.2)E 1 *(0/ 8)*
RU-103 (31) (0)	2.0E+02	(-1.8 & 2.1)E 0 (-1.9 - 3.1)E 1 *(0/ 27)*	12	(5.1 & 6.8)E 0 *(0/ 1)*	(-8.5 & 5.3)E 0 (-1.9 - .5)E 1 *(0/ 8)*
RU-106 (31) (0)	.2	(-1.8 & 1.1)E 1 (-9.7 - 18.0)E 1 *(0/ 27)*	29	(1.3 & .8)E 2 *(0/ 1)*	(3.5 & 8.1)E 1 (-8.2 - 12.5)E 1 *(0/ 8)*
I-131 (31) (0)	0.	(-5.2 & 12.8)E 0 (-1.8 - 1.1)E 2 *(0/ 27)*	23	(1.1 & 2.6)E 2 *(0/ 2)*	(2.2 & 12.2)E 1 (-1.5 - 3.7)E 2 *(0/ 8)*
CS-134 (31) (0)	2.0E+02	(-2.0 & 1.3)E 0 (-1.8 - 1.2)E 1 *(0/ 27)*	29	(1.7 & .9)E 1 *(0/ 1)*	(-2.8 & 8.8)E 0 (-2.1 - 1.7)E 1 *(0/ 8)*
CS-137 (31) (3)	2.0E+02	(5.8 & 1.8)E 0 (-5.6 - 25.8)E 0 *(3/ 27)*	12	(1.8 & .6)E 1 *(0/ 1)*	(-8.8 & 7.0)E 0 (-2.3 - 1.0)E 1 *(0/ 8)*
BA-140 (31) (0)	8.0E+02	(6.1 & 6.2)E 0 (-6.8 - 9.0)E 1 *(0/ 27)*	29	(9.6 & 8.1)E 1 *(0/ 2)*	(8.8 & 8.5)E 1 (-2.7 - 17.7)E 1 *(0/ 8)*
CE-141 (31) (0)	4.0E+02	(3.8 & 8.2)E 0 (-8.7 - 6.2)E 1 *(0/ 27)*	29	(8.8 & 2.0)E 1 *(0/ 1)*	(9.4 & 12.2)E 0 (-7.7 - 88.8)E 0 *(0/ 8)*
CE-144 (31) (0)	.2	(-1.2 & .6)E 1 (-8.0 - 5.7)E 1 *(0/ 27)*	12	(-8.3 & 29.0)E 0 *(0/ 1)*	(-5.6 & 1.8)E 1 (-8.2 - 8.0)E 1 *(0/ 8)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-I-1
(continued)

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 20
SUMMARY FOR THE PERIOD 12/23/81 - 12/31/81

UNITS: PCI/KG WET

MEDIUM: FISH

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATION STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
TH-228 (31)	2.0E-02	(9.7 & 42.4)E -1	28	(3.1 & 3.4)E 1	(-2.1 & 11.7)E 0
(0)		(-8.1 - 5.4)E 1		*(0/ 1)*	(-2.2 - 3.1)E 1
		(0/ 29)			*(0/ 4)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-I-1
(continued)

III. J. Sediments

Sediment samples are taken semi-annually at five indicator stations including Rocky Point, Plymouth Harbor, Duxbury Bay, Plymouth Beach and Manomet Point and a control sample is taken from Marshfield. There is a detailed subdivision of individual sample cores in which samples are sectioned into 2 cm increments during the first half of the year (this applies to all locations except Plymouth Beach and Marshfield), and samples are sectioned into 5 cm increments during the second half of the year.

The surface and alternate sections are analyzed for gamma emitting isotopes. In addition, the surface section from each core and a mid-depth section from Rocky Point and Plymouth Harbor are analyzed for Pu-238 and Pu-239, 240.

The results of the ERMAP program for sediments are presented in Table III-J-1. It is clear from this table that Co-60, Cs-134 and Cs-137 were observed in sediment samples taken from Rocky Point (Station 11) which is near the Discharge Canal Outfall. These samples were collected on 5/27/81. Subsequent samples collected from the same location on 11/2/81 showed no evidence of any isotopes characteristic of reactor operation. The observation of Co-60, Cs-134 and Cs-137 at the 24-26 cm level was due to the existence of a "hot" particle, most likely due to past controlled liquid releases from PNPS-1. The "hot" particle does not present a hazard to the general public due to the extremely limited distribution of the activity and the absence of any ingestion pathway or direct radiation hazard. Therefore, the observations of Co-60 peak at the other depths are most probably a transient effect. The only other noteworthy values are the measured concentrations of Cs-137 at Plymouth Harbor for both sediment samples, and Cs-137, Be-7, Ce-141, Zr-95 and Np-239 in Duxbury Bay samples. The concentrations of Cs-137 may be explained by the fact that the sediment samples taken at Duxbury have a silty character not common to the other samples. The Plymouth Harbor sediment is very similar to Duxbury Bay. It may be that the nature of the Duxbury sediment is such that certain materials are retained more strongly than others. This theory is supported by the

fact that the Duxbury indicator station also had the highest mean concentration of K-40, an isotope which is chemically similar to Cs-137. In addition, a Co-60 peak was detected during the second half of 1981 in the 0-5 cm level at Manomet Point. Since Co-60 was not detected during the first half of the year, the observation is most probably a transient effect. The measured concentrations of Ce-141, Be-7, Zr-95 and Np-239 at Duxbury Bay, and to some extent Cs-137 at Duxbury Bay and Plymouth Harbor, are attributed to the fission products related to fallout from the Chinese weapons test of October, 1980 (Refer to Section III.A.1).

Analyses for plutonium isotopes in sediment samples were performed by the EAL Corporation (formally LFE Environmental Analyses Laboratories) in Richmond, California. The results of these analyses are presented in Table III-J-2. There is no apparent trend in these data to indicate that the PNPS-1 is contributing measurably to levels of Pu-238 or 239, 240 in the environment since levels of plutonium at Rocky Point are among the lowest measured at any location.

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 27
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: SEDIMENT/SILT UNITS: PCI/KG DRY

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
BE-7 (58) (1)	.2	(3.0 ± 2.1)E 1 (-2.0 - 7.1)E 2 *(1/ 89)*	28	(1.0 ± .5)E 2 *(0/ 5)*	(1.0 ± .5)E 2 (-3.8 - 28.2)E 1 *(0/ 5)*
K-40 (58) (0)	.5	(9.8 ± .8)E 3 (7.1 - 10.9)E 3 *(89/ 89)*	13	(1.4 ± .1)E 4 (1.0 - 1.7)E 4 *(10/ 10)*	(9.4 ± .3)E 3 (8.5 - 10.1)E 3 *(5/ 5)*
CR-51 (58) (0)	3.7E+02	(-5.2 ± 2.5)E 1 (-8.9 - 3.2)E 2 *(0/ 89)*	18	(3.9 ± 7.1)E 1 *(0/ 5)*	(-1.4 ± .3)E 2 (-2.3 - 0.0)E 2 *(0/ 5)*
MN-54 (58) (0)	2.0E-02	(7.8 ± 9.5)E -1 (-1.7 - 1.5)E 1 *(0/ 89)*	28	(3.4 ± 1.1)E 0 *(0/ 5)*	(3.4 ± 1.1)E 0 (5.4 - 64.0)E -1 *(0/ 5)*
CO-58 (58) (0)	2.0E-02	(-3.0 ± 1.7)E 0 (-2.2 - 3.3)E 1 *(0/ 89)*	18	(-1.8 ± 59.7)E -1 *(0/ 5)*	(-5.1 ± 1.9)E 0 (-1.0 - .1)E 1 *(0/ 5)*
FE-59 (58) (0)	5.0E+01	(-2.4 ± 4.9)E 0 (-9.1 - 6.7)E 1 *(0/ 89)*	11	(6.6 ± 9.9)E 0 *(0/ 12)*	(-2.1 ± 1.5)E 1 (-5.8 - 3.1)E 1 *(0/ 5)*
CO-60 (58) (1)	2.0E-02	(9.9 ± 7.1)E 0 (-1.7 - 38.4)E 1 *(1/ 89)*	11	(3.9 ± 2.8)E 1 (2.5 - 388.0)E 0 *(1/ 12)*	(2.3 ± 5.7)E 0 (-1.7 - 1.7)E 1 *(0/ 5)*
ZN-65 (58) (0)	6.8E+01	(3.7 ± 3.5)E 0 (-8.7 - 8.8)E 1 *(0/ 89)*	13	(10.0 ± 6.3)E 0 *(0/ 10)*	(-6.6 ± 14.1)E 0 (-8.5 - 3.7)E 1 *(0/ 5)*
ZR-95 (58) (3)	4.0E-02	(1.9 ± .8)E 1 (-2.7 - 25.2)E 1 *(3/ 89)*	13	(8.8 ± 2.8)E 1 (-2.0 - 25.2)E 1 *(2/ 10)*	(3.9 ± .6)E 1 (2.7 - 6.0)E 1 *(0/ 5)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-J-1
ERMAP RESULTS
SEDIMENTS

MEDIUM: SEDIMENT/SILT UNITS: PCI/KG DRY

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
NB-95 (54) (1)	3.1E+01	(2.5 ± 1.2)E 1 (-2.1 - 57.1)E 1 *(4/ 89)*	19	(8.2 ± 5.7)E 1 (-6.6 - 571.0)E 0 *(3/ 10)*	(4.2 ± 1.7)E 1 (1.6 - 10.8)E 1 *(2/ 5)*
AG-110M(54) (0)	1.9E+02	(1.1 ± .9)E 1 (-1.1 - 1.8)E 2 *(0/ 89)*	15	(4.3 ± 2.1)E 1 *(0/ 11)*	(-9.8 ± 183.5)E -1 (-5.6 - 3.8)E 1 *(0/ 5)*
RU-103 (54) (0)	2.0E-02	(3.9 ± 2.8)E 0 (-3.9 - 5.2)E 1 *(0/ 89)*	11	(1.1 ± .5)E 1 *(0/ 12)*	(-2.8 ± 6.1)E 0 (-2.0 - 1.6)E 1 *(0/ 5)*
RU-106 (54) (0)	.2	(-1.2 ± 1.1)E 1 (-1.8 - 1.5)E 2 *(0/ 89)*	24	(5.1 ± 2.0)E 1 *(0/ 5)*	(5.1 ± 2.0)E 1 (10.0 - 1120.0)E -1 *(0/ 5)*
I-131 (54) (0)	0.	(4.1 ± 7.9)E 1 (-1.3 - 1.1)E 3 *(0/ 89)*	19	(3.5 ± 1.8)E 2 *(0/ 5)*	(-2.5 ± 1.8)E 2 (-5.6 - 1.2)E 2 *(0/ 5)*
CS-134 (54) (1)	2.0E-02	(2.6 ± 3.1)E 1 (-2.4 - 149.0)E 1 *(1/ 89)*	11	(1.2 ± 1.2)E 2 (-2.1 - 149.0)E 1 *(1/ 12)*	(-3.2 ± 4.1)E 0 (-9.8 - 11.8)E 0 *(0/ 5)*
CS-137 (54) (16)	2.0E-02	(3.8 ± 3.6)E 2 (-1.1 - 1770.0)E 1 *(16/ 89)*	11	(1.5 ± 1.5)E 3 (-5.5 -17700.0)E 0 *(1/ 12)*	(8.2 ± 1.7)E 0 (3.6 - 14.2)E 0 *(0/ 5)*
BA-140 (54) (0)	8.0E-02	(-8.0 ± 2.8)E 1 (-7.0 - 4.5)E 2 *(0/ 89)*	19	(-5.8 ± 5.4)E 1 *(0/ 5)*	(-6.0 ± 3.3)E 1 (-1.4 - .2)E 2 *(0/ 5)*
CE-141 (54) (2)	8.0E-02	(1.0 ± .8)E 1 (-6.1 - 8.6)E 1 *(2/ 89)*	13	(3.0 ± .9)E 1 (-2.0 - 8.6)E 1 *(2/ 10)*	(2.4 ± .7)E 1 (1.1 - 4.7)E 1 *(0/ 5)*
CE-144 (54) (2)	.2	(-2.3 ± .9)E 1 (-1.2 - 2.5)E 2 *(2/ 89)*	24	(2.1 ± 3.3)E 1 *(0/ 5)*	(2.1 ± 3.3)E 1 (-8.9 - 9.5)E 1 *(0/ 5)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH ARE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-J-1
(continued)

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 29
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: SEDIMENT/SILT UNITS: PCI/KG DRY

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
TH-228 (56)	2.0E-02	(3.5 & .2)E 2	13	(5.3 & .5)E 2	(2.9 & .3)E 2
(0)		(8.1 - 75.3)E 1		(2.9 - 7.5)E 2	(2.5 - 8.2)E 2
		(48/ 89)		*(10/ 10)*	*(5/ 5)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-J-1
(continued)

TABLE III-J-2
RESULTS OF SEDIMENT ANALYSES
FOR PLUTONIUM

Location	Depth (cm)	Results pCi/Kg (dry) ± % Error (1σ) (a) ^{238}Pu	$^{239,240}Pu$
Duxbury	0-2	1.30 ± 10%	36.1 ± 3%
Duxbury	16-18	0.43 ± 21%	11.4 ± 4%
Plymouth Harbor	0-2	0.34 ± 22%	10.7 ± 4%
Rocky Point	0-2	-0.071 ± 100%	1.30 ± 14%
Rocky Point	16-18	-0.079 ± 133%	1.81 ± 13%
Manomet Point	0-2	0 ± 0.007%	1.55 ± 10%
Marshfield	0-5	0.14 ± 33%	4.38 ± 5%

(a) If the result is zero, the error is in pCi/Kg

(b) Sample analyses for mid-depth sample at Plymouth Harbor not available as of this date.

III. K Milk

Milk samples were collected at essentially two locations during 1981, the King Residence (Station 22-12 mi-W) and the Whitman Farm (Station 21-23 mi-NW). As stated in Section I, one sample was collected from the Whipple Residence (Station 16-2 mi-WSW) in January and one sample was collected from the Shaw Residence (Station 26- 8 mi-SSE) in July. Both of these milk locations were lost when the individuals sold their cows. Thus, there was no dependable indicator station (within 5 miles) for milk near PNPS-1 during 1981. This was confirmed in the 1981 Census (see Appendix E). Milk sampling from the King Residence was interrupted during the later half of 1981. The King Residence provides milk from two sources, a cow (two) and a goat. One of the cows gave birth to a calf between 6/25/81 and 7/7/81. A milk sample from a cow was unavailable during the week of July 5, 1981. Between 8/27/81 and 9/10/81, the cow which had a calf approximately two months earlier had died. Therefore, milk samples from the King Residence were unavailable for the remainder of 1981 as the calf required the milk from the other cow and from the goat.

When available, samples were collected semi-monthly when animals are on pasture and monthly at other times.

The results of the ERMAP program for the milk media are presented in Table III-K-1. The results of analyses for Cs-137 and Sr-90 are presented graphically in Figures III-K-1 and III-K-2 respectively. There were positive measurements of these isotopes at all stations, and there were positive measurements of Sr-89.

The highest mean concentration of Sr-90 occurred at the Whipple Residence and the highest mean concentration of Sr-89 occurred at the Shaw Residence. Station releases for this period exhibited a Sr-89/Sr-90 ratio of greater than 100/1 and therefore it is unlikely that PNPS-1 is the major source of the indicator station activity since the measured Sr-89/Sr-90 ratio was at most 1/4.

In the case of Cs-137, the highest mean value of concentration occured at the King Residence (12 mi - W). As can be seen in Figure III K-1, the Cs-137 concentration for the King Residence - cow rises sharply over two months and peaks in late June. This increase in Cs-137 parallels the pregnancy of the cow very well. It is not uncommon to find a marked increase of Cs-137 associated with a cows pregnancy, and this was most likely the cause.

In addition, the measured average concentration of Cs-137, Sr-90 and Sr-89 were respectively 10,000, 1,000,000, and 10,000 times in excess of the concentrations expected to be present based on measured releases from PNPS-1 and the conservative dose estimation methodology described in Regulatory Guide 1.109 and 1.111. In other words, PNPS-1 probably contributed much less than 0.01% of the measured concentration of Sr-90, Sr-89 and Cs-137 in milk at the indicator stations. Since the King Residence is greater than 10 miles from PNPS-1, it is highly unlikely that PNPS-1 contributed to the measured concentration of Cs-137 at this location. The remainder of the measured cesium and strontium radioactivity is unquestionably due to atmospheric fallout resulting from atmospheric weapons testing.

When compared with the natural background dose rate of 80 to 100 mrem/year, there was clearly no significant environmental impact on the milk media as a result of operation of PNPS-1.

UNITS: PCI/LITER

MEDIUM: MILK

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
BR-89 (40) (0)	A.	(1.5 & 1.6)E 0 *(0/ 1)*	26	(3.8 & .7)E 0 *(1/ 1)*	(1.3 & .2)E 0 (2.2 - 57.8)E -1 *(18/ 39)*
BR-90 (40) (0)	.8	(1.1 & .1)E 1 *(1/ 1)*	16	(1.1 & .1)E 1 *(1/ 1)*	(3.9 & .8)E 0 (1.1 - 9.9)E 0 *(39/ 39)*
BE-7 (40) (0)	8.0E+01	(-5.8 & 15.2)E 0 (-5.8 - 0.0)E 0 *(0/ 11)*	22	(1.2 & .8)E 0 *(0/ 11)*	(-1.7 & 11.8)E -1 (-2.1 - 1.6)E 1 *(0/ 39)*
K-40 (40) (0)	2.0E+02	(8.2 & .9)E 2 *(1/ 1)*	23	(1.6 & .1)E 3 (1.1 - 1.8)E 3 *(9/ 9)*	(1.9 & .0)E 3 (8.7 - 17.8)E 2 *(39/ 39)*
CR-51 (40) (0)	-1.0-100	(-1.2 & 1.3)E 1 (-1.2 - 3.0)E 1 *(0/ 1)*	23	(1.7 & 2.8)E 0 *(0/ 9)*	(6.3 & 10.8)E -1 (-1.1 - 1.5)E 1 *(0/ 39)*
MN-54 (40) (0)	8.	(2.5 & 1.6)E 0 *(0/ 1)*	16	(2.5 & 1.6)E 0 *(0/ 1)*	(1.1 & 1.4)E -1 (-1.6 - 1.7)E 0 *(0/ 39)*
CO-58 (40) (0)	8.	(1.6 & 1.9)E 0 *(0/ 1)*	16	(1.6 & 1.5)E 0 *(0/ 1)*	(-2.8 & 1.1)E -1 (-1.7 - 1.8)E 0 *(0/ 39)*
FE-59 (40) (0)	1.0E+01	(1.8 & 3.3)E 0 *(0/ 1)*	26	(1.9 & 2.1)E 0 *(0/ 1)*	(7.5 & 3.4)E -1 (-3.7 - 6.6)E 0 *(0/ 39)*
CO-60 (40) (0)	8.	(-1.2 & 2.5)E 0 (-1.2 - 0.0)E 0 *(0/ 1)*	21	(-2.7 & 28.0)E -2 *(0/ 18)*	(-1.8 & 1.7)E -1 (-2.5 - 2.3)E 0 *(0/ 39)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-K-1
ERMAP RESULTS
MILK

UNITS: PCI/LITER

MEDIUM: MILK

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
ZN-65 (40) (0)	-1.0-100	(-8.9 ± 8.9)E 0 (-8.9 - 9.0)E 0 *(0/ 1)*	26	(2.3 ± 2.3)E 0 *(0/ 1)*	(-9.5 ± 3.3)E -1 (-9.2 - 8.0)E 0 *(0/ 39)*
ZR-95 (40) (0)	1.0E+01	(5.5 ± 2.9)E 0 *(0/ 1)*	16	(5.5 ± 2.9)E 0 *(0/ 1)*	(-2.6 ± 21.3)E -3 (-9.1 - 2.7)E 0 *(0/ 39)*
NB-95 (40) (0)	-1.0-100	(8.8 ± 16.6)E -1 *(0/ 1)*	16	(8.8 ± 16.6)E -1 *(0/ 1)*	(7.7 ± 14.2)E -2 (-1.8 - 2.0)E 0 *(0/ 39)*
AG-110M(40) (0)	-1.0-100	(-1.6 ± 12.7)E 0 (-1.6 - 0.0)E 0 *(0/ 1)*	23	(1.5 ± 1.2)E 0 *(0/ 9)*	(-9.9 ± 8.8)E -1 (-1.8 - .9)E 1 *(0/ 39)*
RU-103 (40) (0)	8.	(-2.2 ± 19.1)E -1 (-2.2 - 0.0)E -1 *(0/ 1)*	16	(-2.2 ± 19.1)E -1 *(0/ 1)*	(-8.7 ± 1.1)E -1 (-2.5 - .5)E 0 *(0/ 39)*
RU-106 (40) (0)	8.0E+01	(7.8 ± 15.6)E 0 *(0/ 1)*	16	(7.8 ± 15.6)E 0 *(0/ 1)*	(5.8 ± 13.6)E -1 (-1.9 - 1.7)E 1 *(0/ 39)*
I-131 (40) (0)	.5	(-1.9 ± 3.2)E -2 (-1.9 - 0.0)E -2 *(0/ 1)*	23	(1.6 ± 1.9)E -2 (-7.2 - 9.0)E -2 *(1/ 9)*	(2.5 ± 76.7)E -4 (-1.1 - 1.3)E -1 *(1/ 39)*
CS-134 (40) (0)	9.	(1.9 ± 1.7)E 0 *(0/ 1)*	16	(1.9 ± 1.7)E 0 *(0/ 1)*	(-3.2 ± 1.0)E -1 (-1.9 - .8)E 0 *(0/ 39)*
CS-137 (40) (0)	9.	(2.6 ± .3)E 1 *(1/ 1)*	22	(2.9 ± .7)E 1 (6.6 - 88.2)E 0 *(11/ 11)*	(1.6 ± .3)E 1 (1.2 - 88.2)E 0 *(37/ 39)*
BA-140 (40) (0)	1.5E+01	(-9.9 ± 2.7)E 0 (-9.9 - 0.0)E 0 *(0/ 1)*	26	(1.6 ± 1.3)E 0 *(0/ 1)*	(1.7 ± 1.6)E -1 (-1.7 - 1.9)E 0 *(0/ 39)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-K-1
(continued)

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 23
SUMMARY FOR THE PERIOD 12/29/80 - 12/31/81

MEDIUM: MILK UNITS: PCI/LITER

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
CE-141 (40)	2.0E+01	(1.9 & 2.8)E 0	16	(1.9 & 2.8)E 0	(-2.8 & 2.3)E -1
(0)		*(0/ 1)*		*(0/ 1)*	(-3.8 - 2.0)E 0
					(0/ 39)
CE-144 (40)	8.0E+01	(1.1 & .9)E 1	16	(1.1 & .9)E 1	(1.8 & 7.0)E -1
(0)		*(0/ 1)*		*(0/ 1)*	(-1.2 - 1.0)E 1
					(0/ 39)
TH-228 (40)	1.0E+01	(-3.3 & 7.8)E 0	26	(1.0 & 3.9)E 0	(-6.7 & 8.5)E -1
(0)		(-3.3 - 0.0)E 0		*(0/ 1)*	(-6.1 - 7.6)E 0
		(0/ 1)			*(0/ 39)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-K-1
(continued)

FIGURE III-K-1
CONCENTRATIONS OF Cs-137 in MILK
ALL STATIONS

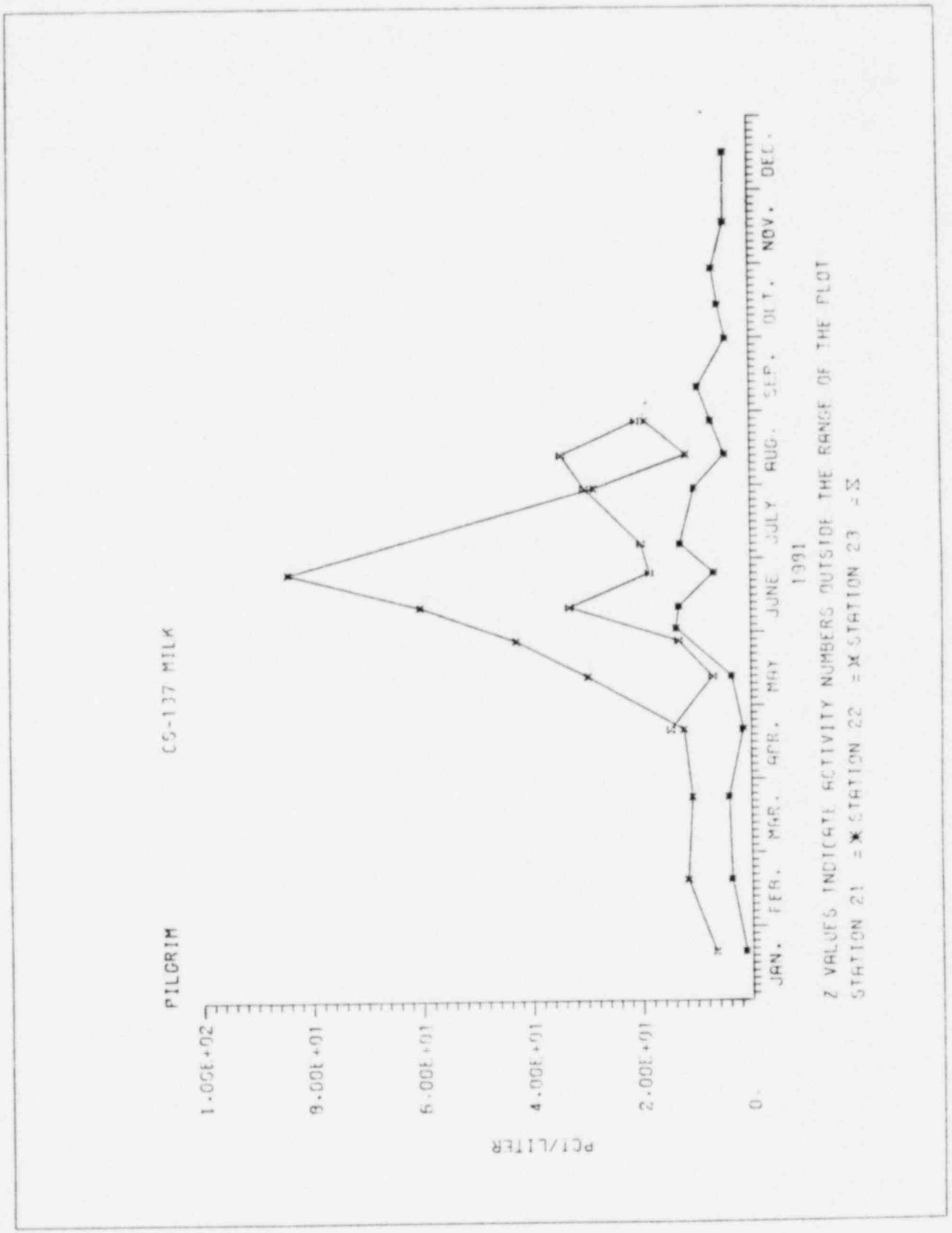
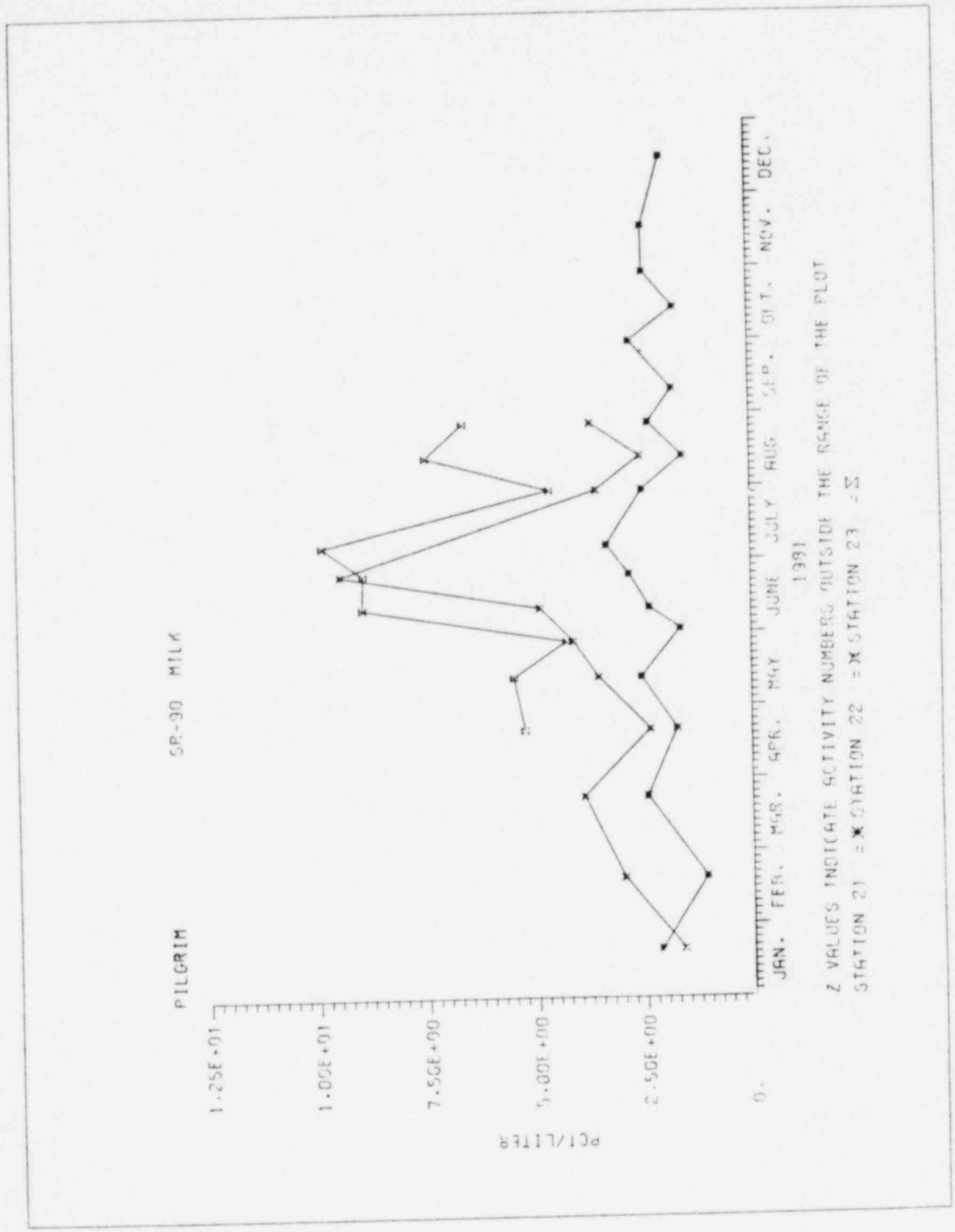


FIGURE III-K-2
CONCENTRATIONS OF Sr-90 in MILK
ALL STATIONS



III.L. Cranberries

Cranberries are collected from three locations, the Manomet Point Bog (2.5 mi- SE - Station 13), the Bartlett Road Bog (2.8 mi - SSE/S Station 14) and the Pine Street Bog (17 mi - WNW - Station 23) at the time of harvest. The results of the ERMAP program for this media are presented in Table III-L-1. The only man-made radionuclide detected in a sample (other than naturally occuring K-40) was Cs-137 which appeared in the Manomet Point Bog. A comprehensive study of cesium uptake in cranberries was performed during 1978. The results of this study are published in the 1978 Environmental Radiation Monitoring Program Report No. 11. This report identified fallout from previous nuclear weapons testing as the primary source of cesium in cranberries. In addition, this report indicated that cesium uptake in cranberries can be increased when conditions of low soil potassium occur, as cesium is a chemical congener of potassium. The results of this study and the fact that no other reactor related isotopes were measured above LLD in cranberry samples makes it extremely unlikely that there was any environmental impact on cranberries due to operation of PNPS-1, but rather that the measured concentration was due to fallout from previous weapons testing and a lack of adequate potassium in the soil.

TABLE III-L-1
ERMAP RESULTS
CRANBERRIES

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 12
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: FOOD CRANBERRIES UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*		NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
BE-7	(3)	.2	(1.5 ± 6.8)E 1	13	(8.3 ± 8.5)E 1	(7.7 ± 8.9)E 1
	(0)		(-5.3 - 8.3)E 1			
			(0/ 2)		*(0/ 1)*	*(0/ 1)*
K-40	(3)	.5	(6.1 ± .2)E 2	23	(9.5 ± .8)E 2	(9.5 ± .8)E 2
	(0)		(5.8 - 6.3)E 2			
			(2/ 2)		*(1/ 1)*	*(1/ 1)*
CR-51	(3)	3.2E+02	(7.0 ± 2.1)E 1	14	(9.0 ± 6.8)E 1	(-2.8 ± 8.9)E 1
	(0)		(8.9 - 9.0)E 1			(-2.8 - 0.0)E 1
			(0/ 2)		*(0/ 1)*	*(0/ 1)*
MN-54	(3)	2.0E+02	(-2.8 ± 1.5)E 0	23	(7.7 ± 44.3)E -1	(7.7 ± 44.3)E -1
	(0)		(-3.9 - 0.0)E 0			
			(0/ 2)		*(0/ 1)*	*(0/ 1)*
CO-58	(3)	2.0E+02	(6.8 ± 52.6)E -1	13	(5.9 ± 8.8)E 0	(-1.9 ± 57.5)E -1
	(0)		(-4.6 - 5.0)E 0			(-1.9 - 0.0)E -1
			(0/ 2)		*(0/ 1)*	*(0/ 1)*
FE-59	(3)	3.0E+01	(-1.8 ± 7.5)E 0	23	(2.3 ± 1.8)E 1	(2.3 ± 1.8)E 1
	(0)		(-9.3 - 5.6)E 0			
			(0/ 2)		*(0/ 1)*	*(0/ 1)*
CO-60	(3)	2.0E+02	(-7.8 ± 9.2)E 0	13	(1.4 ± 6.1)E 0	(-9.8 ± 61.4)E -1
	(0)		(-1.7 - .1)E 1			(-9.8 - 0.0)E -1
			(0/ 2)		*(0/ 1)*	*(0/ 1)*
ZN-65	(3)	6.7E+01	(-5.3 ± 8.7)E 0	23	(3.8 ± 11.2)E 0	(3.8 ± 11.2)E 0
	(0)		(-9.9 - 0.0)E 0			
			(0/ 2)		*(0/ 1)*	*(0/ 1)*
ZR-95	(3)	4.0E+02	(2.8 ± .0)E 0	14	(2.9 ± 10.9)E 0	(-1.4 ± 10.8)E 0
	(0)		(2.8 - 2.9)E 0			(-1.8 - 0.0)E 0
			(0/ 2)		*(0/ 1)*	*(0/ 1)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-L-1
(continued)

MEDIUM: FOOD CRANBERRIES UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
MN-54 (3)	3.9E+01	(-3.5 & 4.0)E +1	13	(9.2 & 530.0)E -2	(-1.7 & 6.7)E 0
(0)		(+8.0 = .0)E +1			(-1.7 = 0.0)E 0
		(0/ 2)		*(0/ 1)*	*(0/ 1)*
AG-110M(3)	2.9E+02	(1.0 & .0)E 1	23	(2.0 & 3.7)E 1	(2.0 & 3.7)E 1
(0)		(1.2 = 18.0)E 0			
		(0/ 2)		*(0/ 1)*	*(0/ 1)*
RU-103 (3)	2.0E-02	(-3.0 & 4.3)E 0	23	(9.7 & 7.3)E 0	(9.7 & 7.3)E 0
(0)		(-7.2 = 1.3)E 0			
		(0/ 2)		*(0/ 1)*	*(0/ 1)*
RU-106 (3)	.2	(5.1 & 3.8)E 0	23	(9.2 & 40.5)E 0	(9.2 & 40.5)E 0
(0)		(1.7 = 8.5)E 0			
		(0/ 2)		*(0/ 1)*	*(0/ 1)*
I-131 (3)	0.	(6.2 & 1.0)E 1	13	(7.2 & 6.0)E 1	(-3.8 & 1.9)E 2
(0)		(5.3 = 7.2)E 1			(-3.8 = 0.0)E 2
		(0/ 2)		*(0/ 1)*	*(0/ 1)*
CS-134 (3)	2.0E-02	(-8.6 & 1.4)E 0	23	(-2.7 & 8.3)E 0	(-2.7 & 8.3)E 0
(0)		(-6.0 = 0.0)E 0			(-2.7 = 0.0)E 0
		(0/ 2)		*(0/ 1)*	*(0/ 1)*
CS-137 (3)	2.0E-02	(1.2 & 1.1)E 2	13	(2.3 & .1)E 2	(6.3 & 8.8)E 0
(1)		(1.0 = 22.7)E 1			
		(1/ 2)		*(0/ 1)*	*(0/ 1)*
BA-140 (3)	8.0E-02	(-3.8 & 9.9)E 0	14	(5.7 & 19.5)E 0	(-7.2 & 5.6)E 1
(0)		(-1.3 = .6)E 1			(-7.2 = 0.0)E 1
		(0/ 2)		*(0/ 1)*	*(0/ 1)*
CE-141 (3)	4.0E-02	(-9.5 & 5.1)E 0	23	(1.8 & 1.8)E 1	(1.8 & 1.8)E 1
(0)		(-1.5 = 0.0)E 1			
		(0/ 2)		*(0/ 1)*	*(0/ 1)*
CE-144 (3)	.2	(4.8 & 12.0)E 0	14	(1.7 & 3.2)E 1	(-3.6 & 2.5)E 1
(0)		(-8.8 = 17.3)E 0			(-3.6 = 0.0)E 1
		(0/ 2)		*(0/ 1)*	*(0/ 1)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 19
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

UNITS: PCI/KG WET

MEDIUM: FOOD CRANBERRIES

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATION STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
TH-228 (3)	2.0E-02	(8.2 & 10.8)E 0	13	(1.9 & 1.8)E 1	(-1.2 & 1.9)E 1
(0)		(-2.5 - 19.0)E 0		*(0/ 1)*	(-1.2 - 3.0)E 1
		(0/ 2)			*(0/ 1)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-L-1
(continued)

III. M. Vegetation

Samples of tuberous and green leafy vegetables are collected at the time of harvest at four locations, Plymouth County Farm (3.5 mi - W), Bridgewater Farm (20 mi - W), the Evans Residence (0.7 mi - W) and the Work Residence (0.6 mi - ESE). Rhubbarb was also collected from the Winchester Residence (0.7 mi - W). However, the crop was not sufficient to allow a large enough sample to be collected in order to meet sensitivity requirements. The results of the ERMAP program for this media are presented in Table III-M-1.

The only isotope observed (other than naturally occuring K-40) was Be-7 at the Work Residence. Since Be-7 is not produced by PNPS-1, it is extremely unlikely that there was any environmental impact on vegetation due to operation of PNPS-1.

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 15
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: FOOD/GARDEN CROPS UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN, RANGE, AND NO. DETECTED**	STA.	HIGHEST STATION MEAN, RANGE, AND NO. DETECTED**	CONTROL LOCATIONS MEAN, RANGE, AND NO. DETECTED**
BE-7 (10) (1)	.2	(2.4 & 3.9)E 1 (-8.6 - 19.8)E 1 *(1/ 7)*	1A	(2.0 & .5)E 2 *(1/ 1)*	(9.6 & 5.1)E 1 (1.3 - 18.9)E 1 *(0/ 3)*
K-40 (10) (0)	.5	(2.9 & .8)E 3 (1.7 - 3.9)E 3 *(7/ 7)*	17	(3.9 & .2)E 3 *(1/ 1)*	(2.3 & .5)E 3 (1.6 - 3.3)E 3 *(3/ 3)*
CR-51 (10) (0)	3.2E+02	(-2.8 & 18.2)E 0 (-8.7 - 5.5)E 1 *(0/ 7)*	11	(2.6 & 2.3)E 1 *(0/ 4)*	(-3.3 & 1.3)E 1 (-5.8 - 0.0)E 1 *(0/ 3)*
MN-54 (10) (0)	2.0E-02	(-3.3 & 3.9)E 0 (-2.1 - 1.1)E 1 *(0/ 7)*	11	(2.4 & 3.9)E 0 *(0/ 4)*	(1.8 & 3.2)E 0 (-3.5 - 7.6)E 0 *(0/ 3)*
CO-58 (10) (0)	2.0E-02	(-3.1 & 3.4)E 0 (-1.5 - 1.3)E 1 *(0/ 7)*	11	(7.5 & 47.7)E -1 *(0/ 4)*	(-6.2 & 4.3)E 0 (-1.1 - .2)E 1 *(0/ 3)*
FE-59 (10) (0)	3.0E+01	(1.1 & 4.3)E 0 (-1.3 - 1.9)E 1 *(0/ 7)*	1A	(1.9 & 3.7)E 1 *(0/ 1)*	(-1.8 & 4.4)E 0 (-9.2 - 6.1)E 0 *(0/ 3)*
CO-60 (10) (0)	2.0E-02	(-5.1 & 4.0)E 0 (-1.9 - 1.0)E 1 *(0/ 7)*	11	(-3.4 & 7.2)E 0 *(0/ 4)*	(-5.9 & 3.8)E 0 (-1.3 - 0.0)E 1 *(0/ 3)*
ZN-65 (10) (0)	6.7E+01	(1.9 & 6.8)E 0 (-2.7 - 2.2)E 1 *(0/ 7)*	1A	(2.2 & 3.9)E 1 *(0/ 1)*	(-9.7 & 3.8)E 0 (-1.5 - 0.0)E 1 *(0/ 3)*
ZR-95 (10) (0)	4.0E-02	(-4.5 & 6.0)E 0 (-3.4 - 1.5)E 1 *(0/ 7)*	11	(1.1 & 6.6)E 0 *(0/ 4)*	(-5.1 & 8.1)E 0 (-2.0 - .7)E 1 *(0/ 3)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-M-1
ERMAP RESULTS
VEGETATION

SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

UNITS: PCI/KG WET

MEDIUM: FOOD/GARDEN CROPS

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
K3-95 (10) (0)	3.9E+01	(4.1 ± 7.1)E 0 (-2.8 - 2.8)E 1 *(1/ 7)*	1A	(2.8 ± 1.8)E 1 *(0/ 1)*	(6.7 ± 6.7)E 0 (-2.9 - 10.7)E 0 *(0/ 3)*
AG-110M(10) (0)	2.5E+02	(2.5 ± 17.0)E 0 (-4.1 - 4.7)E 1 *(0/ 7)*	1A	(8.7 ± 12.3)E 1 *(0/ 1)*	(2.5 ± 125.5)E -1 (-2.3 - 2.0)E 1 *(0/ 3)*
RU-103 (10) (0)	2.0E-02	(7.7 ± 4.0)E 0 (-3.3 - 34.6)E 0 *(0/ 7)*	1A	(3.5 ± 2.2)E 1 *(0/ 1)*	(4.2 ± 3.7)E 0 (-9.3 - 113.0)E -1 *(0/ 3)*
RU-106 (10) (0)	.2	(-3.7 ± 2.5)E 1 (-1.2 - .7)E 2 *(0/ 7)*	1A	(-1.4 ± 14.6)E 1 *(0/ 1)*	(-9.6 ± 2.1)E 1 (-1.3 - 0.0)E 2 *(0/ 3)*
I-131 (10) (0)	0.	(-2.3 ± 5.8)E 0 (-2.2 - 2.5)E 1 *(0/ 7)*	17	(2.4 ± 2.3)E 1 *(0/ 1)*	(-2.1 ± 2.1)E 1 (-6.2 - .7)E 1 *(0/ 3)*
CS-134 (10) (0)	2.0E-02	(-3.0 ± 3.2)E 0 (-1.8 - .7)E 1 *(0/ 7)*	1A	(7.1 ± 5.9)E 0 *(0/ 1)*	(-9.7 ± 8.2)E 0 (-1.6 - 0.0)E 1 *(0/ 3)*
CS-137 (10) (0)	2.0E-02	(7.6 ± 5.2)E 0 (-9.7 - 35.2)E 0 *(0/ 7)*	1A	(3.5 ± 1.7)E 1 *(0/ 1)*	(1.5 ± .9)E 1 (4.7 - 34.1)E 0 *(1/ 3)*
BA-140 (10) (0)	8.0E-02	(-1.2 ± 1.1)E 1 (-6.2 - 1.7)E 1 *(0/ 7)*	17	(1.7 ± 1.7)E 1 *(0/ 1)*	(-1.5 ± 1.1)E 1 (-3.4 - .3)E 1 *(0/ 3)*
CE-141 (10) (0)	4.0E-02	(4.1 ± 6.0)E 0 (-1.7 - 2.1)E 1 *(0/ 7)*	1A	(1.7 ± 2.7)E 1 *(0/ 1)*	(**** ± 9.0)E 0 (-1.9 - .8)E 1 *(0/ 3)*
CE-144 (10) (0)	.2	(4.2 ± 184.0)E -1 (-5.1 - 9.5)E 1 *(0/ 7)*	1A	(9.5 ± 7.5)E 1 *(0/ 1)*	(-1.6 ± 4.9)E 1 (-9.5 - 7.3)E 1 *(0/ 3)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-M-1
(continued)

UNITS: PCI/KG WET

MEDIUM: FOOD/GARDEN CROPS

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
TH-228 (10)	2.0E-02	(-5.8 ± 21.9)E 0	17	(5.8 ± 4.1)E 1	(-4.5 ± 10.6)E 0
(0)		(-1.2 - .4)E 2			(-3.7 - 3.1)E 1
		(0/ 7)		*(0/ 11)*	*(0/ 3)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-M-1
(continued)

III.N. Forage

Beef Forage is collected from three locations annually, the Plymouth County Farm (3.5 mi - W - Station Number 11), Whitman Farm (23 mi - NW - Station Number 21) and Plimoth Plantation (2.2 mi - W - Station Number 15). The results of the ERMAP program for the media are presented in Table III-N-1. The following positive measurements were made: Ce-144, Be-7, Ru-103, Cs-137 and Zr-95 at the Plymouth County Farm; Ce-144, Be-7, Cs-137, and Zr-95 at the Plimoth Plantation; and, an indication of Zr-95 (activity greater than 3 times standard deviation) at the Whitman Farm. All of the above nuclides, with the possible exception of Cs-137, is attributable to fission products related to fallout from the Chinese weapons test of October, 1980 (Refer to Section III.A.1).

The highest mean concentration of Cs-137 occurred at the Plymouth County Farm. However, the absence of Cs-134 and the fact that the measured mean Cs-137 concentration (120 pCi/Kg) is in excess of 100,000 times what would be expected based on releases from PNPS-1, strongly indicates that fallout, not PNPS-1, is the primary source of this Cesium-137. Therefore, it is extremely unlikely that there was any environmental impact on forage due to operation of PNPS-1.

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 33
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: VEGETATION - TERRESTRIAL UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*		NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
BE-7	(3) (2)	.2	(1.8 ± .5)E 3 (1.3 - 2.3)E 3 *(2/ 2)*	15	(2.3 ± .2)E 3 *(1/ 1)*	(5.1 ± 2.0)E 2 *(0/ 1)*
K-40	(3) (0)	.5	(9.1 ± .2)E 3 (8.9 - 9.3)E 3 *(2/ 2)*	21	(1.6 ± .1)E 0 (1.0 - 1.6)E 0 *(1/ 1)*	(1.6 ± .1)E 0 (1.0 - 1.6)E 0 *(1/ 1)*
CR-51	(3) (0)	-1.0-100	(-8.3 ± 1.7)E 2 (-8.1 - 8.0)E 2 *(0/ 2)*	21	(-1.7 ± 2.1)E 2 *(0/ 1)*	(-1.7 ± 2.1)E 2 (-1.7 - 0.0)E 2 *(0/ 1)*
MN-54	(3) (0)	2.0E-02	(2.6 ± 2.3)E 1 (2.1 - 49.0)E 0 *(0/ 2)*	11	(4.9 ± 2.3)E 1 *(0/ 1)*	(-8.3 ± 2.8)E 1 (-8.3 - 0.0)E 1 *(0/ 1)*
CO-58	(3) (0)	2.0E-02	(9.0 ± 4.5)E 0 (4.6 - 13.5)E 0 *(0/ 2)*	11	(1.3 ± 2.8)E 1 *(0/ 1)*	(-8.3 ± 2.8)E 1 (-8.3 - 0.0)E 1 *(0/ 1)*
FE-59	(3) (0)	3.0E+01	(-5.3 ± 5.6)E 1 (-1.1 - .0)E 2 *(0/ 2)*	21	(8.2 ± 57.8)E 0 *(0/ 1)*	(8.2 ± 57.8)E 0 *(0/ 1)*
CO-60	(3) (0)	2.0E-02	(3.6 ± 12.9)E 0 (-9.2 - 16.5)E 0 *(0/ 2)*	21	(4.8 ± 3.7)E 1 *(0/ 1)*	(4.8 ± 3.7)E 1 *(0/ 1)*
ZN-65	(3) (0)	-1.0-100	(-2.5 ± .8)E 1 (-3.2 - 0.0)E 1 *(0/ 2)*	11	(-1.7 ± 6.0)E 1 *(0/ 1)*	(-3.7 ± 5.0)E 1 (-3.7 - 0.0)E 1 *(0/ 1)*
ZR-95	(3) (0)	4.0E-02	(2.3 ± .8)E 2 (2.0 - 2.7)E 2 *(2/ 2)*	15	(2.7 ± .8)E 2 *(1/ 1)*	(1.7 ± .5)E 2 *(1/ 1)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

MEDIUM: VEGETATION - TERRESTIAL UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
NB-95 (3) (0)	-1.0-100	(5.0 ± 1.4)E 2 (3.5 - 6.4)E 2 *(2/ 2)*	15	(6.4 ± .6)E 2 *(1/ 1)*	(2.6 ± .3)E 2 *(1/ 1)*
AG-110M(3) (0)	-1.0-100	(2.0 ± 1.0)E 2 (1.1 - 3.0)E 2 *(0/ 2)*	11	(3.0 ± 1.9)E 2 *(0/ 1)*	(7.2 ± 20.0)E 1 *(0/ 1)*
RU-103 (3) (1)	2.0E-02	(5.7 ± 2.8)E 1 (2.9 - 8.5)E 1 *(1/ 2)*	11	(8.5 ± 2.4)E 1 *(1/ 1)*	(1.9 ± 2.5)E 1 *(0/ 1)*
RU-106 (3) (0)	.2	(-6.4 ± 28.1)E 1 (-3.5 - 2.2)E 2 *(0/ 2)*	15	(2.2 ± 1.6)E 2 *(0/ 1)*	(8.8 ± 20.8)E 1 *(0/ 1)*
I-131 (3) (0)	0.	(3.6 ± 3.5)E 2 (7.9 - 704.0)E 0 *(0/ 2)*	15	(7.0 ± 3.9)E 2 *(0/ 1)*	(-4.5 ± 6.8)E 1 (-4.5 - 0.0)E 1 *(0/ 1)*
CS-134 (3) (0)	2.0E-02	(-3.5 ± 1.5)E 1 (-5.0 - 0.0)E 1 *(0/ 2)*	21	(-5.2 ± 24.0)E 0 *(0/ 1)*	(-5.2 ± 24.0)E 0 (-5.2 - 0.0)E 0 *(0/ 1)*
CS-137 (3) (2)	2.0E-02	(1.0 ± .2)E 2 (8.6 - 12.2)E 1 *(2/ 2)*	11	(1.2 ± .3)E 2 *(1/ 1)*	(3.7 ± 2.8)E 1 *(0/ 1)*
BA-140 (3) (0)	8.0E-02	(-8.4 ± 8.2)E 1 (-1.7 - 0.0)E 2 *(0/ 2)*	11	(-2.3 ± 50.5)E 0 *(0/ 1)*	(-1.2 ± .6)E 2 (-1.2 - 0.0)E 2 *(0/ 1)*
CE-141 (3) (0)	4.0E-02	(5.7 ± 5.6)E 1 (1.9 - 113.0)E 0 *(0/ 2)*	15	(1.1 ± .4)E 2 *(0/ 1)*	(1.8 ± 31.4)E 0 *(0/ 1)*
CE-144 (3) (2)	.2	(5.4 ± 1.6)E 2 (3.8 - 7.0)E 2 *(2/ 2)*	15	(7.0 ± .9)E 2 *(1/ 1)*	(2.9 ± 1.1)E 2 *(0/ 1)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-N-1
(continued)

PILGRIM I OFFSITE ENVIRONMENTAL RADIOLOGICAL MONITORING 82/02/23. PAGE 35
SUMMARY FOR THE PERIOD 12/23/80 - 12/31/81

MEDIUM: VEGETATION - TERRESTIAL UNITS: PCI/KG WET

RADIONUCLIDES (NO. ANALYSES) (NON-ROUTINE)*	NOMINAL LLD	INDICATOR STATIONS MEAN,RANGE,AND NO. DETECTED**	STA.	HIGHEST STATION MEAN,RANGE,AND NO. DETECTED**	CONTROL LOCATIONS MEAN,RANGE,AND NO. DETECTED**
TH-228 (3)	2.0E-02	(1.2 & .5)E 2	11	(1.7 & 1.0)E 2	(8.6 & 10.6)E 1
(0)		(7.1 - 16.8)E 1			
		(0/ 2)		*(0/ 1)*	*(0/ 1)*

* NON-ROUTINE REFERS TO THE NUMBER OF SEPARATE MEASUREMENTS WHICH WERE GREATER THAN TEN (10) TIMES THE AVERAGE BACKGROUND FOR THE PERIOD OF THE REPORT

** THE FRACTION OF SAMPLE ANALYSES YIELDING DETECTABLE MEASUREMENTS (I.E. >3SIGMA) IS INDICATED WITHIN *( )*.

TABLE III-N-1
(continued)

IV. References

1. Regulatory Guide 1.109 - CALCULATION OF ANNUAL DOSES TO MAN FROM ROUTINE RELEASES OF REACTOR EFFLUENTS FOR THE PURPOSE OF EVALUATING COMPLIANCE WITH 10 CFR PART 50, APPENDIX I - Revision 1, October 1977

2. SETTLEMENT AGREEMENT BETWEEN MASSACHUSETTS WILDLIFE FEDERATION AND BOSTON EDISON COMPANY RELATING TO OFFSITE RADIOLOGICAL MONITORING - June 9, 1977

3. Yankee Atomic Electric Company - Program "ERMAP", Version 3.1 - January 9, 1979, Author - J. E. Vossahlik

4. Memorandum, Yankee Atomic Electric Company, 1981 Annual Direct Radiation Survey, REG 203/81, October 1981, C. A. Pierno.

5. Memorandum, Yankee Atomic Electric Company, Reg 211/76, A. E. Desrosiers

6. Report on Accumulation of Cesium - 137 in Cranberries, March, 1979 Yankee Atomic Electric Company, M. Strum

Appendix A - Anomalous Measurement Reports

BOSTON Edison COMPANY

PILGRIM NUCLEAR POWER STATION
RFD #1 ROCKY HILL ROAD
PLYMOUTH, MASSACHUSETTS 02360

January 14, 1981

BECo Ltr. #81-08

Director, Region I
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pa 19406

Licensee Event Report 80-094/04T-0

Docket Number 50-293
License DPR-35

Gentlemen:

The attached Licensee Event Report 80-094/04T-0, entitled "Anomolous Measurement", is hereby submitted in accordance with the requirements of Pilgrim Nuclear Power Station Technical Specification 6.9.C.2.b.

If there are any questions on this subject, please contact us.

Respectfully submitted,

R. D. Machon
Nuclear Operations Manager
Pilgrim Station

MTM:bl
Enclosures: (3 copies)
LER 80-094/04T-0

cc: Director (40 Copies)
Office of Management Information and Program Control
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

bcc: Messrs. J.E. Howard
W.J. Armstrong
H.F. Brannan
P.A. Foulsham (2)
P.F. Giardiello
E.J. Ziemianski
C.J. Mathis
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W.F. Olsen
K.P. Roberts
J.A. Seery
P.D. Smith
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G.G. Whitney
Ms. K. Calderone
NOD Licensing
PNPS Records Center
NRC Resident Inspector
RDM (LB)

NRC FORM 366
(7-77)

LICENSEE EVENT REPORT

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CONTROL BLOCK: (1)

0 1 | M A P P 1 | (2) | 0 0 - 0 0 0 0 0 - 0 0 (3) | 4 1 1 1 1 (4) | (5)

LICENSEE CODE — LICENSE NUMBER — LICENSE TYPE — CAT

0 1 T | REPORT SOURCE: L (6) | 0 5 0 - 0 2 9 3 (7) | 0 1 0 5 8 0 (8) | 0 1 1 3 8 1 (9)

DOCKET NUMBER — EVENT DATE — REPORT DATE

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

0 2 | On December 29, 1980, Boston Edison received an analysis report from

0 3 | Yankee Atomic Electric Laboratory which indicated that a reportable

0 4 | concentration of Iodine-131 (1.7 + 0.1 pCi/Kg) existed in a sample of

0 5 | milk collected from indicator station (Plimouth Plantation-2.2 miles west)

0 6 | on November 20, 1980. This concentration was in excess of 10 times the

0 7 | measured I-131 concentration at the control station (Whitman Farm-21 mi. N.W)

0 8 | which was 0.056 ± .02pCi/Kg.

0 9 | SYSTEM CODE: X X (11) | CAUSE CODE: X (12) | CAUSE SUBCODE: Z (13) | COMPONENT CODE: Z Z Z Z Z Z (14) | COMP. SUBCODE: Z (15) | VALVE SUBCODE: Z (16)

(17) LER/RO REPORT NUMBER: EVENT YEAR 8 0 | — | SEQUENTIAL REPORT NO. 0 9 4 | / | OCCURRENCE CODE 0 4 | REPORT TYPE T | — | REVISION NO. 0

ACTION TAKEN: Z (18) | FUTURE ACTION: Z (19) | EFFECT ON PLANT: Z (20) | SHUTDOWN METHOD: Z (21) | HOURS (22): 0 0 0 0 | ATTACHMENT SUBMITTED: N (23) | NPRD-4 FORM SUB.: N (24) | PRIME COMP. SUPPLIER: Z (25) | COMPONENT MANUFACTURER: Z 9 9 9 (2

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

1 0 | This measurement of I-131 is unquestionably the result of recent Chinese

1 1 | weapons test. For comparison, consumption of milk with the measured

1 2 | concentration of 1.7 pCi/Kg by the maximum exposed individual for a full

1 3 | year would result in only about 3 mrem to the thyroid of a child while

1 4 | the annual dose due to natural background is about 100 mrem/yr.

1 5 | FACILITY STATUS: E (28) | % POWER: 1 0 0 (29) | OTHER STATUS (30): NA | METHOD OF DISCOVERY: n (31) | DISCOVERY DESCRIPTION (32): Environmental Lab Notification

1 6 | ACTIVITY RELEASED: Z (33) | CONTENT OF RELEASE: Z (34) | AMOUNT OF ACTIVITY (35): NA | LOCATION OF RELEASE (36): NA

1 7 | PERSONNEL EXPOSURES — NUMBER: 0 0 0 (37) | TYPE: Z (38) | DESCRIPTION (39): This does not represent a significant threat to the health of the public.

1 8 | PERSONNEL INJURIES — NUMBER: 0 0 0 (40) | DESCRIPTION (41): NA

1 9 | LOSS OF OR DAMAGE TO FACILITY — TYPE: Z (42) | DESCRIPTION: NA

2 0 | PUBLICITY ISSUED: N (44) | DESCRIPTION (45): NA | NRC USE ONLY

NAME OF PREPARER: Mr. M. Thomas McLoughlin | PHONE: 617-746-7900

BOSTON Edison COMPANY

PILGRIM NUCLEAR POWER STATION
RFD #1 ROCKY HILL ROAD
PLYMOUTH, MASSACHUSETTS 02360

January 19, 1981

BECo Ltr. # 81-11

Director, Region I
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pa 19406

Licensee Event Report 80-094/04T-1

Docket Number 50-293
License DPR-35

Gentlemen:

The attached Licensee Event Report 80-094/04T-1, entitled "Anomolous Measurement", is hereby submitted in accordance with the requirements of Pilgrim Nuclear Power Station Technical Specification 6.9.C.2.b.

This supplement report is issued to correct the event date of the previous report. An attachment has also been added to maximize your understanding of the cause of this event.

If there are any questions on this subject, please contact us.

Respectfully submitted,

R. D. Machon
Nuclear Operations Manager
Pilgrim Station

MTM:bl
Enclosures: (3 copies)
LER 80-094/04T-1

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Washington, D.C. 20555

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(7-77)

LICENSEE EVENT REPORT

CONTROL BLOCK: (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

0 1 | M A P P 1 (2) | 0 0 - 0 0 0 0 0 - 0 0 (3) | 4 1 1 1 1 (4) | (5)

LICENSEE CODE | LICENSE NUMBER | LICENSE TYPE | CAT

T

0 1 | REPORT SOURCE: L (6) | 0 5 0 - 0 2 9 3 (7) | 1 2 2 9 8 0 (8) | 0 1 1 8 8 1 (9)

DOCKET NUMBER | EVENT DATE | REPORT DATE

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

0 2 | On December 29, 1980, Boston Edison received an analysis report from

0 3 | Yankee Atomic Electric Laboratory which indicated that a reportable

0 4 | concentration of Iodine-131 (1.7 + 0.1 pCi/Kg) existed in a sample of

0 5 | milk collected from indicator station (Plimouth Plnatation 2.2 mi. west)

0 6 | on November 20, 1980. This concentration was in excess of 10 times the

0 7 | measure I-131 concentration at the control station (Whitman Farm 21 mi. N.W.)

0 8 | which was 0.056 ± .02 pCi/Kg.

0 9 | SYSTEM CODE: X X (11) | CAUSE CODE: X (12) | CAUSE SUBCODE: Z (13) | COMPONENT CODE: Z Z Z Z Z Z (14) | COMP. SUBCODE: Z (15) | VALVE SUBCODE: Z (16)

(17) LER/RO REPORT NUMBER: EVENT YEAR 8 0 | — | SEQUENTIAL REPORT NO. 0 9 4 | / | OCCURRENCE CODE 0 4 | REPORT TYPE T | — | REVISION NO. 1

ACTION TAKEN: Z (18) | FUTURE ACTION: Z (19) | EFFECT ON PLANT: Z (20) | SHUTDOWN METHOD: Z (21) | HOURS (22): 0 0 0 0 | ATTACHMENT SUBMITTED: Y (23) | NPRD-4 FORM SUB.: N (24) | PRIME COMP. SUPPLIER: A (25) | COMPONENT MANUFACTURER: Z 9 9 9 (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

1 0 | This measurement of I-131 is unquestionable the result of recent Chinese

1 1 | weapons test. For comparison, consumption of milk with the measured

1 2 | concentration of 1.7 pCi/Kg by the maximum exposed individual for a full

1 3 | year would result in only about 3 mrem to the thyroid of a child while

1 4 | the annual dose due to natural background is about 100 mrem/yr.

1 5 | FACILITY STATUS: E (28) | % POWER: 1 0 0 (29) | OTHER STATUS (30): NA | METHOD OF DISCOVERY: D (31) | DISCOVERY DESCRIPTION (32): Environmental Lab Notification

1 6 | ACTIVITY RELEASED: Z (33) | CONTENT OF RELEASE: Z (34) | AMOUNT OF ACTIVITY (35): NA | LOCATION OF RELEASE (36): NA

1 7 | PERSONNEL EXPOSURES NUMBER: 0 0 0 (37) | TYPE: Z (38) | DESCRIPTION (39): This does not represent a significant threat to the health of the public.

1 8 | PERSONNEL INJURIES NUMBER: 0 0 0 (40) | DESCRIPTION (41): NA

1 9 | LOSS OF OR DAMAGE TO FACILITY (43) TYPE: Z (42) | DESCRIPTION: NA

2 0 | PUBLICITY ISSUED: N (44) | DESCRIPTION (45): NA

NRC USE ONLY

NAME OF PREPARER: Mr. M. Thomas McLoughlin PHONE: 617-746-7900

BOSTON EDISON COMPANY
PILGRIM NUCLEAR POWER STATION

Attachment to LER 80-094/04T-1

Docket Number 50-293

On December 29, 1980 Boston Edison Company received an analyses report from the Yankee Atomic Electric Environmental Laboratory which indicated that a milk sample taken from an indicator station (Plimouth Plantation 2.2 mi. west) on November 20, 1980 contained a concentration of I-131 of 1.7 ± o.1 pCi/kg. This concentration was in excess of 10 times the measured I-131 concentration at the control station (Whitman Farm - 21 mi. N.W.) which was 0.056 ± .02 pCi/kg.

This measurement is unquestionably the result of the recent Chinese weapons test which was first witnessed by the presence of airborne gaseous I-131 measurements by Boston Edison and other organizations which conduct environmental radiation measurement programs in the Northeast region. Elevated airborne gaseous I-131 activity was observed in two of Boston Edison indicator station charcoal filter samples which sampled air during the period from 10/29/80 to 11/4/80.

The presence of an elevated concentration of I-131 at the control station in the milk sample is conclusive evidence that the source of the activity is fresh weapons fallout affecting a large area.

For comparison, consumption of milk with the measured concentration of 1.7 pCi/kg by the maximum exposed individual for a full year would result in only about 3 mrem to the thyroid of a child. When compared to the annual dose due to natural background of about 100 mrem/yr. this increase does not represent a significant threat to the health and safety of the public.

April 21, 1981

BECo. Ltr. #81-81

Director, Region I
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Licensee Event Report #81-010/04 T-0

Docket Number 50-293
License DPR-35

Gentlemen:

The attached Licensee Event Report #81-010/04 T-0 entitled "Anomolous Measurement" is hereby submitted in accordance with the requirements of Pilgrim Nuclear Power Station Technical Specification 6.9.C.2.6.

If there are any questions on this subject, please contact us.

Respectfully submitted,

Charles J Mathon Jr

R. D. Machon
Nuclear Operations Manager
Pilgrim Station

GGW/tmt
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LER #81-010/04 T-0

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NRC FORM 366 (7-77)

U. S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

CONTROL BLOCK: [| | | | |] (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

0 1	M A P P S 1 (2)	0 0 - 0 0 0 0 0 - 0 0 (3)	4 1 1 1 1 (4)	(5)
	LICENSEE CODE	LICENSE NUMBER	LICENSE TYPE	CAT

CON'T

0 1	REPORT SOURCE L (6)	0 5 0 - 0 2 9 3 (7)	0 4 0 7 8 1 (8)	0 4 2 1 8 1 (9)
		DOCKET NUMBER	EVENT DATE	REPORT DATE

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

0 2 On April 7, 1981, Boston Edison received a report from Yankee Atomic Laboratory

0 3 in indicating a concentration of Co-60 (53.2 ± 16 pCi/kg) in a mussel sample taken from

0 4 the PNPS discharge canal. This exceeds the 10 times LLD at the Control Station in

0 5 Marshfield. (4.8 pCi/kg). The maximum dose to an individual for a full year would

0 6 be only 1.07 x 10^{-2} mrem to the most restrictive organ (adult). It is concluded

0 7 that there is no risk to the health and safety of the public.

0 8 (See attachment for full report.)

	SYSTEM CODE	CAUSE CODE	CAUSE SUBCODE	COMPONENT CODE	COMP. SUBCODE	VALVE SUBCODE
0 9	X X (11)	X (12)	Z (13)	Z Z Z Z Z Z (14)	Z (15)	Z (16)

(17) LER/RO REPORT NUMBER	EVENT YEAR		SEQUENTIAL REPORT NO.		OCCURRENCE CODE	REPORT TYPE		REVISION NO.
	81	—	0 1 0	/	0 4	T	—	0

ACTION TAKEN	FUTURE ACTION	EFFECT ON PLANT	SHUTDOWN METHOD	HOURS (22)	ATTACHMENT SUBMITTED	NPRD-4 FORM SUB.	PRIME COMP. SUPPLIER	COMPONENT MANUFACTURER
Z (18)	Z (19)	Z (20)	Z (21)	0 0 0 0	Y (23)	N (24)	Z (25)	Z 9 9 9 (26)

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

1 0 Improved analytical techniques have resulted in sensitivities for isotopes which are

1 1 below detection capabilities specified in Technical Specifications Table 4.8.4.

1 2 Comparisons at these low levels resulted in a ratio greater than 10 which necessit-

1 3 ated this report.

1 4

	FACILITY STATUS	% POWER	OTHER STATUS (30)	METHOD OF DISCOVERY	DISCOVERY DESCRIPTION (32)
1 5	C (28)	1 0 0 (29)	N.A.	D (31)	Notification by Environmental Lab.

	ACTIVITY RELEASED	CONTENT OF RELEASE	AMOUNT OF ACTIVITY (35)	LOCATION OF RELEASE (36)
1 6	Z (33)	Z (34)	N.A.	N.A.

PERSONNEL EXPOSURES

	NUMBER	TYPE	DESCRIPTION (39)
1 7	0 0 0 (37)	(38)	N.A.

PERSONNEL INJURIES

	NUMBER	DESCRIPTION (41)
1 8	0 0 0 (40)	N.A.

LOSS OF OR DAMAGE TO FACILITY (43)

	TYPE	DESCRIPTION
1 9	Z (42)	N.A.

PUBLICITY

	ISSUED	DESCRIPTION (45)	NRC USE ONLY
2 0	N (44)	N.A.	

NAME OF PREPARER Mr. G. G. Whitney PHONE: (617) 746-7900

GPO 917-928

BOSTON EDISON COMPANY

PILGRIM NUCLEAR POWER STATION

DOCKET NO. 50-293

Attachment to LER 81-063 / 04T-0

On 11/30/81, Boston Edison received an analysis report from the Yankee Atomic Environmental Laboratory which indicated that a reportable concentration of Cs-137 (227.4 ± 8.7 pCi/kg) existed in a cranberry sample taken from the Manomet Point Bog on October 1, 1981.

This concentration is in excess of ten times the Pine Street Bog (control station) Lower Limit of Detection concentration of Cs-137 (15.0 pCi/kg). There were no other man-made radionuclides detected in either sample which would be indicative of reactor operation. The Cs-137 concentrations in cranberry samples from the Manomet Point Bog have been fairly consistent over the past several years.

A detailed study of the presence of cesium in cranberries was performed and included as Appendix C to the Boston Edison Environmental Radiation Monitoring Report No. 11, April, 1979. This report identified fallout from previous nuclear weapons testing as the primary source of cesium in cranberries. In addition, the report indicated that cesium uptake in cranberries can be increased when conditions of low soil potassium occur, as cesium is a chemical congener of potassium. The K-40 concentration for the indicator sample was (585 ± 80 pCi/kg) and for the control station was (947 ± 80 pCi/kg). The Cs-137/K-40 ratio for the indicator sample versus the control sample is greater than an order of magnitude. The Cs-137/K-40 ratio is consistent with the above mentioned report and with past analyses data.

The indicator station concentration of Cs-137 was greater than ten times the control station concentration; however, there were no other detectable man-made radionuclides in either sample. Therefore, it is very unlikely that Pilgrim Station was the source of the measured concentration, but rather that this level was due to old fallout from previous weapons testing and a lack of adequate potassium in the soil.

BOSTON EDISON COMPANY
PILGRIM NUCLEAR POWER STATION
DOCKET NO. 50-293

Attachment to LER 81-010/04 T-0

On April 7, 1981, Boston Edison received an analyses report from the Yankee Atomic Electric Laboratory which indicated that a reportable concentration of Co-60 (53.2 $\pm$ 16 pCi/kg) existed in a mussel sample taken from the Pilgrim Station Discharge Canal on March 12, 1981.

This concentration is in excess of 10 times the Lower Limit of Detection at the Control Station in Marshfield (LLD for Co-60 was 4.8 pCi/kg).

The maximum dose to an individual consuming seafood with this concentration for a full year would be only 1.4×10^{-3} mrem to the total body (child), and 1.07×10^{-2} mrem to the most restrictive organ (adult GI-LLI). Clearly, this dose is not significant when compared to the natural background dose rate of 80 to 100 mrem/year. Therefore, it is concluded that there is no risk to the health and safety of the public.

BOSTON Edison COMPANY

PILGRIM NUCLEAR POWER STATION
RFD #1 ROCKY HILL ROAD
PLYMOUTH, MASSACHUSETTS 02360

May 8, 1981

BECo Ltr. #81-91

R. D. MACHON
NUCLEAR OPERATIONS MANAGER
PILGRIM STATION

Director, Region I
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Licensee Event Report 81-013/04T-0

Docket Number 50-293
License DPR-35

Genelemen:

The attached Licensee Event Report No. 81-013/04T-0, entitled "Anomolous Measurement", is hereby submitted in accordance with the requirements of Pilgrim Nuclear Power Station Technical Specification 6.9.C.2.b.

If there are any questions on this subject, please contact us.

Respectfully submitted,

R. D. Machon
Nuclear Operations Manager
Pilgrim Station

MTM:ep
Enclosures: (3 copies)
LER 81-013/04T-0

cc: Director (40 copies)
Office of Management Information and Program Control
U. S. Nuclear Regulatory Commission
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NRC FORM 366 (7-77)

U. S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

CONTROL BLOCK: | | | | | | | (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

Line	Field	Entry
0 1	Licensee Code (2)	M A P P S 1
	License Number (3)	0 0 - 0 0 0 0 0 - 0 0
	License Type (4)	4 1 1 1 1
	CAT (5)	
0 1	Report Source (6)	L
	Docket Number (7)	0 5 0 - 0 2 9 3
	Event Date (8)	0 4 3 0 8 1
	Report Date (9)	0 5 0 8 8 1

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

0 2 On April 30, 1981, Boston Edison received a report from Yankee Atomic Laboratory

0 3 indicating a concentration of Co-60 (440 ± 11pCi/kg) in an Irish Moss sample taken

0 4 from Pilgrim Station discharge canal outfall area on February 18, 1981. This con-

0 5 centration is in excess of 10 times the measured concentration at the station in

0 6 Ellisville (28.2 ± 5.3pCi/kg). Refer to attachment for details.

0 7

0 8

0 9	System Code (11)	Cause Code (12)	Cause Subcode (13)	Component Code (14)	Comp. Subcode (15)	Valve Subcode (16)
	X X	X	Z	Z Z Z Z Z Z	Z	Z

(17) LER/RO Report Number	Event Year		Sequential Report No.		Occurrence Code	Report Type		Revision No.
	8 1	—	0 1 3	/	0 4	T	—	0

Action Taken (18)	Future Action (19)	Effect on Plant (20)	Shutdown Method (21)	Hours (22)	Attachment Submitted (23)	NPRD-4 Form Sub. (24)	Prime Comp. Supplier (25)	Component Manufacturer (26)
Z	Z	Z	Z	0 0 0 0	Y	N	Z	Z 9 9 9

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

1 0 The analyses reports indicate that the source of activity is not due to the operation

1 1 of Pilgrim Station but is most likely due to fallout from recent atmospheric weapons

1 2 tests. However, assuming that the source was Pilgrim Station, the annual dose to an

1 3 individual would be only 0.0023 mrem to the total body (child), and 0.018 mrem to

1 4 the maximum exposed organ (GI-LLI, Adult).See Attachment for further details.

1 5	Facility Status (28)	% Power (29)	Other Status (30)	Method of Discovery (31)	Discovery Description (32)
	E	1 0 0	N.A.	D	Environmental Laboratory Notification

1 6	Activity Released (33)	Content of Release (34)	Amount of Activity (35)	Location of Release (36)
	Z	Z	N.A.	N.A.

PERSONNEL EXPOSURES

1 7	Number (37)	Type (38)	Description (39)
	0 0 0	Z	N.A.

PERSONNEL INJURIES

1 8	Number (40)	Description (41)
	0 0 0	N.A.

LOSS OF OR DAMAGE TO FACILITY (43)

1 9	Type (42)	Description
	Z	N.A.

PUBLICITY

2 0	Issued (44)	Description (45)	NRC USE ONLY
	N	N.A.	

Mr. M. Thomas McLoughlin PHONE: 617-746-7900

BOSTON EDISON COMPANY
PILGRIM NUCLEAR POWER STATION
DOCKET NO. 50-293

Attachment to LER 81-013/04T-0

ANOMALOUS MEASUREMENT REPORT

On April 30, 1981, Boston Edison received the control station analyses report for Irish Moss from the Yankee Atomic Environmental Laboratory. A comparison to the other sample stations indicated that a reportable concentration of Co-60 (440 ± 11pCi/kg) existed in an Irish Moss sample taken from the Pilgrim Station discharge canal outfall area on February 18, 1981.

This concentration is in excess of 10 times the measured concentration at the control station in Ellisville (28.2 ± 5.3 pCi/kg).

However, the control station sample analysis showed that there were detectable quantities of the following nuclides:

Nuclide	Ellisville (Control)	Rocky Point (discharge cana
	pCi/kg	pCi/kg
Ce-144	116 ± 20	43 ± 10
Ce-141	91.8 ± 7.4	43.9±3.5
Be-7	121 ± 30	77 ± 22
Ru-103	33.8 ± 4.7	24.3 ± 3.5
Zr-95	62.4 ± 8.4	29.0 ± 5.9
AcTh -228	47 ± 14	1 ± 15
Co-60	28.2 ± 5.3	440 ± 11
K-40	7810 ± 150	5960 ± 120

As can be seen, there are several nuclides (e.g., Ce-144) with a higher concentration at the control station than was detected in the sample taken from the discharge canal outfall area. This indicates that there is an additional source of these isotopes present which significantly contributes to these concentrations and is not due to the operation of Pilgrim Station. This source is undoubtly fallout from recent atmospheric weapons tests.

Even if it were assumed that the activity was due only to Pilgrim Station, due to processing and market dilution it is extremely unlikely that any individual would consume any material with the measured concentration of Co-60. However, even if a person were to directly consume this algae at the seafood

individual would be only 0.0023 mrem to the total body (child) and 0.018 mrem to the maximum exposed organ (GI-LLI, Adult).

It is concluded that there is no risk to public health and safety, as the above calculated doses are extremely small when compared to the natural background dose rate in this area of about 80 mrem/yr.

PILGRIM NUCLEAR POWER STATION
RTE 3A ROCKY HILL ROAD
PLYMOUTH, MASSACHUSETTS 02360

July 16, 1981

BECo Ltr. #81-164

R. D. MACHON
NUCLEAR OPERATIONS MANAGER
PILGRIM STATION

Director, Region I
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Licensee Event Report 81-030/04T-0

Docket Number 50-293
License DPR-35

Gentlemen:

The attached Licensee Event Report 81-030/04T-0, entitled "Anomolous Measurement", is hereby submitted in accordance with the requirements of Pilgrim Nuclear Power Station Technical Specification 6.9.C.2.6.

If there are any questions on this subject, please contact us.

Respectfully submitted,

R. D. Machon
Nuclear Operations Manager
Pilgrim Station

MTM:ep
Enclosures: (3 copies)
LER 81-030/04T-0

cc: Director (40 copies)
Office of Management Information and Program Control
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Ms. K. Calderone
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PNPS Records Center
NRC Resident Inspector
NSRAC Secretary
RDM (LB)

NRC FORM 366 (7-77)

U. S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

CONTROL BLOCK: | | | | | | | (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

Line	Field	Value
01	Licensee Code (2)	M A P P S 1
01	License Number (3)	0 0 - 0 0 0 0 0 - 0 0
01	License Type (4)	4 1 1 1 1
01	CAT (5)	
01	CON'T Report Source (6)	L
01	Docket Number (7)	0 5 0 - 0 2 9 3
01	Event Date (8)	0 7 0 8 8 1
01	Report Date (9)	0 7 1 6 8 1

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

02 On June 3, 1981, Boston Edison received a report from Yankee Atomic Laboratory

03 indicating a concentration of Co-60 (84.8 ± 2.5 pCi/KG) in a mussel taken from the

04 discharge canal outfall on May 5, 1981. This concentration is in excess of 10

05 times the measured concentration at the station in Marshfield (5.0 pCi/kg).

06 Refer to Attachment for details.

07

08

Line	Field	Value
09	System Code (11)	X X
09	Cause Code (12)	X
09	Cause Subcode (13)	Z
09	Component Code (14)	Z Z Z Z Z Z
09	Comp. Subcode (15)	Z
09	Valve Subcode (16)	Z
(17) LER/RO Report Number	Event Year	8 1
		—
	Sequential Report No.	0 3 0
		/
	Occurrence Code	0 4
	Report Type	T
		—
	Revision No.	0
	Action Taken (18)	Z
	Future Action (19)	Z
	Effect on Plant (20)	Z
	Shutdown Method (21)	Z
	Hours (22)	0 0 0 0
	Attachment Submitted (23)	Y
	NPRD-4 Form Sub. (24)	N
	Prime Comp. Supplier (25)	Z
	Component Manufacturer (26)	Z 9 9 9

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

10 Improved analytical techniques have resulted in sensitivities for isotopes which

11 are below detection capabilities specified in Technical Specification 4.8.4. Com-

12 parisons at these low levels resulted in a ratio greater than 10 which necessitated

13 this report.

14

Line	Field	Value
15	Facility Status (28)	E
15	% Power (29)	1 0 0
15	Other Status (30)	N.A.
15	Method of Discovery (31)	D
15	Discovery Description (32)	Notification by Environmental Lab
16	Activity Released (33)	Z
16	Content of Release (34)	Z
16	Amount of Activity (35)	N.A.
16	Location of Release (36)	N.A.
17	Personnel Exposures Number (37)	0 0 0
17	Type (38)	Z
17	Description (39)	N.A.
18	Personnel Injuries Number (40)	0 0 0
18	Description (41)	N.A.
19	Loss of or Damage to Facility Type (42)	Z
19	Description (43)	N.A.
20	Publicity Issued (44)	N
20	Description (45)	N.A.
20	NRC Use Only	

NAME OF PREPARER M. T. McLoughlin PHONE: 617-746-7900

GPO 917-926

BOSTON EDISON COMPANY
PILGRIM NUCLEAR POWER STATION
DOCKET NO. 50-293

Attachment to LER 81-030/04T-0

On June 3, 1981, Boston Edison received an analysis report from the Yankee Atomic Environmental Laboratory (YAEL) which indicated that a potentially reportable concentration of Co-60 (84.8 ± 2.5) pCi/kg existed in a mussel sample collected from the Discharge Canal Outfall (indicator station) on May 5, 1981.

At this time (June 3, 1981), the Mass. Division of Fisheries (DMF) was requested to collect a mussel sample from Green Harbor in Marshfield (control station) as soon as possible. The control station sample was collected on June 4, 1981. The analysis report for the control station mussel sample was received from YAEL on July 6, 1981, and the Co-60 concentration in this sample was the Lower Limit of Detection (LLD) - 5.0 pCi/kg.

The indicator station concentration of Co-60 is in excess of 10 times the LLD of the control station in Marshfield. The Co-60 concentration in the indicator station sample is due to the operation of Pilgrim Station.

The maximum dose to an individual consuming seafood with this concentration of Co-60 ((84.8 ± 2.5) pCi/kg.) for a full year would be only 2.2×10^{-3} mrem to the total body (child) and 1.7×10^{-2} mrem to the most restrictive organ (Adult, GI-LLI). The above doses were calculated as per Regulatory Guide 1.109.

Clearly, the above calculated doses are not significant when compared to the natural background dose rate of about 80 mrem/year. Therefore, it is concluded that there is no risk to the health and safety of the public.

Boston Edison Company

PILGRIM NUCLEAR POWER STATION
RFD #1 ROCKY HILL ROAD
PLYMOUTH, MASSACHUSETTS 02360

R. D. MACHON
NUCLEAR OPERATIONS MANAGER
PILGRIM STATION

July 24, 1981

BECo Ltr. #81-172

Director, Region I
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Licensee Event Report #81-034/04T-0

Docket Number 50-293
License DPR-35

Gentlemen:

The attached Licensee Event Report #81-034/04T-0, entitled "Anomolous Measurements", is hereby submitted in accordance with the requirements of Pilgrim Nuclear Power Station Technical Specification 6.9.C.2.b.

If there are any questions on this subject, please contact us.

Respectfully submitted,

R. D. Machon
Nuclear Operations Manager
Pilgrim Station

GGW:ep
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LER 81-034/04T-0

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PNPS Records Center
NRC Resident Inspector
~~NSRAG Secretary~~
RDM (LB)

NRC FORM 366 (7-77)

U. S. NUCLEAR REGULATORY COMMISSION

LICENSEE EVENT REPORT

CONTROL BLOCK: [| | | | | |] (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

Line	Field	Value
0 1	LICENSEE CODE (2)	M A P P S 1
	LICENSE NUMBER (3)	0 0 - 0 0 0 0 0 - 0 0
	LICENSE TYPE (4)	4 1 1 1 1
	CAT (5)	
0 1 (CON'T)	REPORT SOURCE (6)	L
	DOCKET NUMBER (7)	0 5 0 - 0 2 9 3
	EVENT DATE (8)	0 5 1 7 8 0
	REPORT DATE (9)	0 7 2 4 8 1

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

0 2 On or about March 21, 1980, Boston Edison received an analysis report from the

0 3 Yankee Atomic Environmental Laboratory which indicated that a potentially reportable

0 4 concentration of Sr-90 existed in a milk sample collected on January 28, 1980.

0 5 Refer to Attachment for further information.

Line	Field	Value
0 9	SYSTEM CODE (11)	X X
	CAUSE CODE (12)	X
	CAUSE SUBCODE (13)	Z
	COMPONENT CODE (14)	Z Z Z Z Z Z
	COMP. SUBCODE (15)	Z
	VALVE SUBCODE (16)	Z
(17) LER/RO REPORT NUMBER	EVENT YEAR	8 1
	SEQUENTIAL REPORT NO.	0 3 4
		/
	OCCURRENCE CODE	0 4
	REPORT TYPE	T
		—
	REVISION NO.	0
	ACTION TAKEN (18)	Z
	FUTURE ACTION (19)	Z
	EFFECT ON PLANT (20)	Z
	SHUTDOWN METHOD (21)	Z
	HOURS (22)	0 0 0 0
	ATTACHMENT SUBMITTED (23)	Y
	NPRD-4 FORM SUB. (24)	N
	PRIME COMP. SUPPLIER (25)	Z
	COMPONENT MANUFACTURER (26)	Z 9 9 9

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

1 0 No corrective action is contemplated. It appears that this level was due to the

1 1 deposition of old fallout from previous weapons testing.

Line	Field	Value
1 5	FACILITY STATUS (28)	H
	% POWER (29)	0 0 0
	OTHER STATUS (30)	N.A.
	METHOD OF DISCOVERY (31)	D
	DISCOVERY DESCRIPTION (32)	Notification by Environmental Lab
1 6	ACTIVITY RELEASED (33)	Z
	CONTENT OF RELEASE (34)	Z
	AMOUNT OF ACTIVITY (35)	N.A.
	LOCATION OF RELEASE (36)	N.A.
1 7	PERSONNEL EXPOSURES NUMBER (37)	0 0 0
	TYPE (38)	Z
	DESCRIPTION (39)	N.A.
1 8	PERSONNEL INJURIES NUMBER (40)	0 0 0
	DESCRIPTION (41)	N.A.
1 9	LOSS OF OR DAMAGE TO FACILITY TYPE (42)	Z
	DESCRIPTION (43)	N.A.
2 0	PUBLICITY ISSUED (44)	N
	DESCRIPTION (45)	N.A.
	NRC USE ONLY	

NAME OF PREPARER C. E. Bowman/G. G. Whitney PHONE: 617-746-7900

GPO 917-929

BOSTON EDISON COMPANY
PILGRIM NUCLEAR POWER STATION
DOCKET NO. 50-293

Attachment to LER #81-034/04T-0

Event Description and Probable Consequences

On or about March 21, 1980, Boston Edison received an analysis report from the Yankee Atomic Environmental Laboratory (YAEL) which indicated that a potentially reportable concentration of Sr-90 (34.02 ± 0.74) pCi/kg existed in a milk sample collected from the Plimouth Plantation (indicator station, 2.2 miles-west of PNPS) on January 28, 1980. The analysis report from YAEL for the control station milk sample collected on January 24, 1980 was not received until May 17, 1980. The control station milk sample concentration was (1.92 ± 0.41) pCi/kg. The time delay between the receipt of the indicator station analysis report and the control station analysis report resulted in an administrative error on the part of Boston Edison in not reporting the anomolous measurement at that time. Corrective steps are outlined in BECo's response to Inspection 81-06.

The indicator station concentration of Sr-90 was greater than ten times the control station concentration, however there was no detectable Sr-89 or I-131 in the indicator sample. Therefore, it is very unlikely that Pilgrim Station was the source of the measured concentration, but rather that this level was due to the deposition of old fallout from previous weapons testing.

August 24, 1981

BECo. Ltr. #81-195

Director, Region I
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 1940(

Licensee Event Report

Docket Number 50-293
License DPR-35

Gentlemen:

The attached Licensee Event Report #81-042/04T-0, entitled "Anomolous Measurements" is hereby submitted in accordance with the requirements of Pilgrim Nuclear Power Station Technical Specification 6.9.C.2.b.

If there are any questions on this subject, please contact us.

Respectfully submitted,

R. D. Machon
Nuclear Operations Manager
Pilgrim Station

GGN/js
Enclosures: (3 copies)
LER #81-042/04T-0

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G. G. Whitney
E. J. Ziemianski
Ms. K. Calderone
NOD Licensing
PNPS Records Center
NRC Resident Inspector
NSRAC Secretary
RDM (LB)

U.S. NUCLEAR REGULATORY COMMISSION

NRC FORM 366
(7-77)

LICENSEE EVENT REPORT

CONTROL BLOCK: [ ] (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

[0 1] [M A P P S 1] (2) [0 0 - 0 0 0 0 0 - 0 0] (3) [4 1 1 1 1] (4) [ ] (5)
7 8 9 LICENSEE CODE 14 15 LICENSE NUMBER 25 26 LICENSE TYPE 30 57 CAT 58

ON'T
[0 1]
7 8

REPORT SOURCE [L] (6) [0 5 0 - 0 2 9 3] (7) [0 8 1 4 8 1] (8) [0 8 2 4 8 1] (9)
60 61 DOCKET NUMBER 68 69 EVENT DATE 74 75 REPORT DATE 80

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

[0 2] On August 14, 1981, Boston Edison received an analysis report from the Yankee
[0 3] Atomic Environmental Laboratory which indicated that a reportable concentration
[0 4] of Cs-134 and Cs-137 existed in a sediment sample collected on May 27, 1981.
[0 5] The above sediment sample concentrations do not present a hazard to the health
[0 6] and safety of the public due to the extremely limited distribution of the
[0 7] activity and the absence of any ingestion pathway or direct radiation hazard.
[0 8] REFER TO ATTACHMENT FOR FURTHER INFORMATION.
7 8 9 80

[0 9]
7 8

SYSTEM CODE [X X] (11) 9 10
CAUSE CODE [X] (12) 11
CAUSE SUBCODE [Z] (13) 12
COMPONENT CODE [Z Z Z Z Z Z] (14) 13 18
COMP SUBCODE [Z] (15) 19
VALVE SUBCODE [Z] (16) 20

(17) LER/RO REPORT NUMBER: EVENT YEAR [8 1] 21 22 — 23 SEQUENTIAL REPORT NO. [0 4 2] 24 26 / 27 OCCURRENCE CODE [0 4] 28 29 REPORT TYPE [T] 30 — 31 REVISION NO. [0] 32

ACTION TAKEN [Z] (18) 33 FUTURE ACTION [Z] (19) 34 EFFECT ON PLANT [Z] (20) 35 SHUTDOWN METHOD [Z] (21) 36
HOURS (22) [0 0 0 0] 37 40 ATTACHMENT SUBMITTED [Y] (23) 41 NPRD-4 FORM SUB. [N] (24) 42 PRIME COMP. SUPPLIER [Z] (25) 43 COMPONENT MANUFACTURER [Z 9 9 9] (26) 44 47

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

[1 0] These concentrations were most likely due to a hot particle contained in the
[1 1] controlled releases from PNPS-1 sometime during the past year.
[1 2]
[1 3]
[1 4]
7 8 9 80

FACILITY STATUS [F] (28) 9 10 % POWER [1 0 0] (29) 10 12 OTHER STATUS (30) N.A. 13 44 METHOD OF DISCOVERY [D] (31) 45 46 DISCOVERY DESCRIPTION (32) Notification by Environmental Lab 46 80
[1 5]
7 8

ACTIVITY RELEASED [Z] (33) 9 CONTENT OF RELEASE [Z] (34) 10 AMOUNT OF ACTIVITY (35) N.A. 11 44 LOCATION OF RELEASE (36) N.A. 45 80
[1 6]
7 8

PERSONNEL EXPOSURES
NUMBER [0 0 0] (37) 9 11 TYPE [Z] (38) 12 DESCRIPTION (39) N.A. 13 80
[1 7]
7 8

PERSONNEL INJURIES
NUMBER [0 0 0] (40) 9 11 DESCRIPTION (41) N.A. 12 80
[1 8]
7 8

LOSS OF OR DAMAGE TO FACILITY
TYPE [Z] (42) 9 DESCRIPTION (43) N.A. 10 80
[1 9]
7 8

PUBLICITY
ISSUED [N] (44) 9 DESCRIPTION (45) N.A. 10 68
[2 0]
7 8

NRC USE ONLY [ ] 69 80

NAME OF PREPARER C.E. Bowman/G.G. Whitney PHONE: 617-746-7900

BOSTON EDISON COMPANY

PILGRIM NUCLEAR POWER STATION

DOCKET NO. 50-293

Attachment to LER #81-042/04T-0

On August 14, 1981, Boston Edison received an analysis report from the Yankee Atomic Environmental Laboratory (YAEL) which indicated that a reportable concentration of Cs-134(1491.±27.pCi/kg) and Cs-137(17733.±80 pCi/Ku.pCi/kg) existed in a sediment sample of 24-26cm taken from the Rocky Point Discharge Canal Outfall area on May 27, 1981.

The above concentrations are in excess of ten (10) times the Cs-134 LLD (29.0pCi/kg) and Cs-137 (36.0±7.9pCi/kg) concentrations for the control station sediment sample of 24-26cm taken from Duxbury Beach of May 28, 1981.

The Cs-134/Cs-137 ratio of the indicator sample is indicative of older controlled liquid releases from PNPS-1.

The indicator sample underwent confirmatory reanalyses, and neither Cs-134 nor Cs-137 were detected above the LLD. In addition, neither Cs-134 nor Cs-137 were detected above the LLD in the other indicator sediment samples (top layer 0-2cm, bottom layer 28-30cm). This would indicate the existance of a "hot" particle, most likely due to past controlled liquid releases from PNPS-1.

The above sediment sample concentrations do not present a hazard to the health and safety of the public due to the extremely limited distribution of the activity and the absence of any ingestion pathway or direct radiation hazard.

PILGRIM NUCLEAR POWER STATION
RTE 3A, ROCKY HILL ROAD
PLYMOUTH, MASSACHUSETTS 02360

December 9, 1981

BECo Ltr. #81-289

R. D. MACHON
NUCLEAR OPERATIONS MANAGER
PILGRIM STATION

Director, Region I
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Docket Number 50-293
License DPR-35

Gentlemen:

The attached Licensee Event Report 81-063/04T-0, Anomolous Measurement" is hereby submitted in accordance with the requirements of Pilgrim Nuclear Power Station Technical Specification 6.9.C.2.b.

In response to a telecon with the NRC Region 1 Office, PNPS has determined that the reporting requirements of PNPS Technical Specification 6.9.C.2.b do not fall within the criteria used for Reportable Occurrences (Licensee Event Reports). Therefore, this LER will be the last Anomolous Measurement Report to be issued under the LER format. All future reports of this type will be in letter format.

If there are any questions on this subject, please contact us.

Respectfully submitted,

R. D. Machon
Nuclear Operations Manager
Pilgrim Station

GGW:ep

Enclosure: LER 81-063/04T-0

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

Standard BECo LER Distribution

(7-77)

LICENSEE EVENT REPORT

CONTROL BLOCK: | | | | | | | (1) (PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

01 | LICENSEE CODE: M A P P S 1 (2) | LICENSE NUMBER: 0 0 - 0 0 0 0 0 - 0 0 (3) | LICENSE TYPE: 4 1 1 1 1 (4) | CAT: (5)

CON'T 01 | REPORT SOURCE: L (6) | DOCKET NUMBER: 0 5 0 - 0 2 9 3 (7) | EVENT DATE: 1 1 3 0 8 1 (8) | REPORT DATE: 1 2 0 9 8 1 (9)

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

02 On 11/30/81, Boston Edison received an analysis report from the Yankee Atomic En-
03 vironmental Laboratory which indicated that a reportable concentration of Cs-137
04 (227.4 ± 8.7 pCi/kg) existed in a cranberry sample taken from the Manomet Point Bog
05 on October 1, 1981. This concentration is in excess of 10 times the measured con-
06 centration at the control station Lower Limit of Detection (15.0 pCi/kg).
07 Refer to attachment for details.
08

	SYSTEM CODE	CAUSE CODE	CAUSE SUBCODE	COMPONENT CODE	COMP SUBCODE	VALVE SUBCODE
09	X X (11)	X (12)	Z (13)	Z Z Z Z Z Z (14)	Z (15)	Z (16)

(17) LER/RO REPORT NUMBER	EVENT YEAR		SEQUENTIAL REPORT NO.		OCCURRENCE CODE	REPORT TYPE		REVISION NO.
	8 1	—	0 6 3	/	0 4	T	—	0

ACTION TAKEN	FUTURE ACTION	EFFECT ON PLANT	SHUTDOWN METHOD	HOURS (22)	ATTACHMENT SUBMITTED	NPRD-4 FORM SUB.	PRIME COMP. SUPPLIER	COMPONENT MANUFACTURER
Z (18)	Z (19)	Z (20)	Z (21)	0 0 0 0	Y (23)	N (24)	Z (25)	Z 9 9 9

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

10
11 Refer to Attachment for details.
12
13
14

15 | FACILITY STATUS: H (28) | % POWER: 0 0 0 (29) | OTHER STATUS (30): N.A. | METHOD OF DISCOVERY: D (31) | DISCOVERY DESCRIPTION (32): Notification by environmental Lab.

16 | ACTIVITY RELEASED: Z (33) | CONTENT OF RELEASE: Z (34) | AMOUNT OF ACTIVITY (35): N.A. | LOCATION OF RELEASE (36): N.A.

PERSONNEL EXPOSURES

17 | NUMBER: 0 0 0 (37) | TYPE: Z (38) | DESCRIPTION (39): N.A.

PERSONNEL INJURIES

18 | NUMBER: 0 0 0 (40) | DESCRIPTION (41): N.A.

LOSS OF OR DAMAGE TO FACILITY (43)

19 | TYPE: Z (42) | DESCRIPTION: N.A.

PUBLICITY

20 | ISSUED: N (44) | DESCRIPTION (45): N.A. | NRC USE ONLY

NAME OF PREPARER G. Whitney/C. Bowman PHONE: 617-746-7900

Appendix B - Radioactive Effluents

CEB

BOSTON EDISON COMPANY
GENERAL OFFICES 800 BOYLSTON STREET
BOSTON, MASSACHUSETTS 02199

A. V. MORISI
MANAGER
NUCLEAR OPERATIONS SUPPORT DEPARTMENT

December 15, 1981

BECo. Ltr. #81-292

Mr. Ronald C. Haynes, Director
Office of Inspection and Enforcement
Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

License No. DPR-35
Docket No. 50-293

Anomalous Measurement Report
Ltr. No. 81-1 - Irish Moss Sample

Dear Sir:

On December 8, 1981, Boston Edison received an analysis report from the Yankee Atomic Environmental Laboratory (YAEL) which indicated that a potentially reportable concentration of Co-60 (361 ± 17 pCi/kg) existed in an irish moss sample collected from the Discharge Canal Outfall (indicator station) on October 13, 1981.

At this time, an irish moss sample has not been collected at the control station (Ellisville). On December 9, 1981, the Massachusetts Division of Marine Fisheries (DMF) was requested to collect an irish moss sample from the Ellisville station as soon as possible.

Since a fourth quarter control station analyses of an irish moss sample was unavailable for comparison, the indicator sample was compared to the third quarter control station irish moss sample analyses. From this comparison, the indicator station concentration of Co-60 is in excess of ten times the Lower Limit of Detection Co-60 concentration (17 pci/kg) of the control station in Ellisville. The Co-60 concentration in the indicator station sample is due to the operation of Pilgrim Station.

The maximum dose to an individual consuming irish moss with this concentration of Co-60 (361 + 17 pCi/kg) for a full year would be only 9.6×10^{-3} mrem to the total body (child) and 7.26×10^{-2} mrem to the most restrictive organ (adult, GI-LLI). The above doses were calculated as per Reg. Guide 1.109.

Clearly, the above calculated doses are not significant when compared to the natural background dose rate of about 80 mrem/year. Therefore, it is concluded that there is no risk to the health and safety of the public.

Very truly yours,

for AVM

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

Supplemental Information

January - June, 1981

Facility Pilgrim Nuclear Power Station License DPR-35

1. Regulatory Limits

   a. Fission and activation gases: $\frac{Qs}{0.25/\bar{E}} + \frac{Qv}{0.10/\bar{E}} \leq 1$

   b. Iodines: 2 Ci/Quarter

   c. Particulates, half-lives >8 days: 13(1.8E4Qs+1.8E5Qv)≤1

   d. Liquid effluents: 10 Ci/Quarter

2. Maximum Permissible Concentration

   Provide the MPC's used in determining allowable release rates or concentrations.

   a. Fission and activation gases: } 10 CFR 20
   b. Iodines: } Appendix B
   c. Particulates, half-lives >8 days: } Table II

   d. Liquid effluents: H - 3 = 1 X 10^{-5} μCi/ml; all rest, 10 CFR 20, Appendix B, Table II

3. Average Energy

   Provide the average energy ($\bar{E}$) of the radionuclide mixture in releases of fission and activation gases, if applicable. $\bar{E}$ = 1 Mev

   1ST: MS=0.316,RBV=0.446 2ND: MS=0.114,RBV=0.390

4. Measurements and Approximations of Total Radioactivity

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

   a. Fission and activation gases: } GeLi
   b. Iodines: } Istopic
   c. Particulates: } Analysis
   d. Liquid effluents: }

5. Batch Releases

   Provide the following information relating to batch releases of radioactive materials in liquid and gaseous effluents.

   a. Liquid

      1. Number of batch releases: 75
      2. Total time period for batch releases: 95.88hrs.
      3. Maximum time period for a batch release: - 13.25hrs.
      4. Average time period for batch releases: 1.28hrs.
      5. Minimum time period for a batch release: -25min.
      6. Average stream flow during periods of release of effluent into a flowing stream: 3.07E+5GPM

   b. Gaseous (Not Applicable)

6. Abnormal Releases

   a. NONE
   b. NONE

TABLE 1A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES
January - June, 1981

	Unit	Quarter	Quarter	Est. Total Error, %
A. Fission and activation gases				
1. Total release	Ci	<3.76E+3	<1.00E+3	3.00E+1
2. Average release rate for period	μCi/sec	<4.84E+2	<1.27E+2	
3. Percent of Technical Specification limit	%	6.76E-2	1.19E-2	
B. Iodines				
1. Total iodine-131	Ci	1.60E-2	1.00E-2	2.50E+1
2. Average release rate for period	μCi/sec	2.06E-3	1.27E-3	
3. Percent of Technical Specification limit	%	8.00E-1	5.00E-1	
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	4.88E-3	4.87E-3	3.00E+1
2. Average release rate for period	μCi/sec	6.28E-4	6.19E-4	
3. Percent of Technical Specification limit	%	7.86E-2	6.32E-2	
4. Gross alpha radioactivity	Ci	<5.58E-7	<2.97E-7	
D. Tritium				
1. Total release	Ci	1.91E+1	1.84E+1	3.30E+1
2. Average release rate for period	μCi/sec	2.46E0	2.34E0	
3. Percent of Technical Specification limit	%	NA	NA	

TABLE 1B
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1981)
GASEOUS EFFLUENTS – ELEVATED RELEASE

January - June, 1981

		CONTINUOUS MODE		BATCH MODE	
Nuclides Released	Unit	Quarter	Quarter	Quarter	Quarter
1. Fission gases					
krypton-85	Ci	1.33E-2	2.26E-2		
krypton-85m	Ci	7.26E+2	4.23E+1		
krypton-87	Ci	1.12E+2	1.69E0		
krypton-88	Ci	7.37E+2	7.67E0		
xenon-133	Ci	1.91E+3	7.88E+2		
xenon-135	Ci	8.42E+1	1.47E+1		
xenon-135m	Ci	<4.20E0	<2.08E0		
xenon-138	Ci	<1.06E+1	<8.64E0		
xenon-131m	Ci				
xenon-137	Ci				
xenon-133m	Ci	1.48E+1			
Total for period	Ci	3.60E+3	8.65E+2		
2. Iodines					
iodine-131	Ci	1.21E-2	4.37E-3		
iodine-133	Ci	3.91E-2	2.97E-2		
iodine-135	Ci	2.52E-2	4.87E-2		
Total for period	Ci	7.64E-2	8.28E-2		
3. Particulates					
strontium-89	Ci	5.38E-4	6.94E-4		
strontium-90	Ci	6.04E-6	5.40E-6		
cesium-134	Ci	7.98E-7			
cesium-137	Ci	3.32E-5	1.94E-5		
barium-lanthanum-140	Ci	1.86E-3	2.28E-3		
chromium-51	Ci				
manganese-54	Ci	3.20E-6	1.36E-6		
cobalt-58	Ci	1.04E-6			
iron-59	Ci				
cobalt-60	Ci	7.26E-5	3.91E-5		
zinc-65	Ci				
zirconium-niobium-95	Ci				
cerium-141	Ci				
cerium-144	Ci		8.35E-6		
ruthenium-103	Ci				
ruthenium-106	Ci				

TABLE 1C

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1981)

GASEOUS EFFLUENTS - GROUND LEVEL RELEASE

January - June, 1981

		CONTINUOUS MODE		BATCH MODE	
Nuclides Released	Unit	Quarter	Quarter	Quarter	Quarter
1. Fission gases					
krypton-85	Ci	<2.27E-6	<3.81E-6		
krypton-85m	Ci	<1.12E+1	<1.02E+1		
krypton-87	Ci	<6.46E0	<5.52E0		
krypton-88	Ci	<1.72E+1	<1.39E+1		
xenon-133	Ci	<3.16E+1	<1.89E+1		
xenon-135	Ci	9.18E+1	9.06E+1		
xenon-135m	Ci				
xenon-138	Ci				
Total for period	Ci	<1.58E+2	<1.39E+2		
2. Iodines					
iodine-131	Ci	3.91E-3	5.67E-3		
iodine-133	Ci	1.43E-2	4.02E-2		
iodine-135	Ci	1.83E-2	7.42E-2		
Total for period	Ci	3.65E-2	1.20E-1		
3. Particulates					
strontium-89	Ci	1.13E-2	9.66E-4		
strontium-90	Ci	2.85E-6	2.09E-6		
cesium-134	Ci		1.80E-6		
cesium-137	Ci	3.78E-5	2.91E-5		
barium-lanthanum-140	Ci	1.10E-3	7.50E-4		
manganese-54	Ci		4.10E-6		
cobalt-58	Ci				
iron-59	Ci				
cobalt-60	Ci	9.77E-5	6.81E-5		
zinc-65	Ci				
zirconium-niobium-95	Ci				
cerium-141	Ci				
ruthenium-103	Ci				
ruthenium-106	Ci				

TABLE 2A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1981)
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES
January - June, 1981

	Unit	Quarter	Quarter	Est. Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, noble gases, or alpha)	Ci	1.53E0	1.02E-1	3.00E+1
2. Average diluted concentration during period	μCi/ml	3.67E-7	4.05E-8	
3. Percent of applicable limit	%	1.53E+1	1.02E0	
B. Tritium				
1. Total release	Ci	6.10E-1	2.77E-2	3.00E+1
2. Average diluted concentration during period	μCi/ml	1.46E-7	1.10E-8	
3. Percent of applicable limit	%	1.46E0	1.10E-1	
C. Dissolved and entrained gases				
1. Total release	Ci	———	———	———
2. Average diluted concentration during period	μCi/ml			
3. Percent of applicable limit	%			
D. Gross alpha radioactivity				
1. Total release	Ci	< 3.23E-5	< 1.44E-5	4.00E+1
E. Volume of waste released (prior to dilution)	liters	1.60E+5	1.74E+5	2.00E+1
F. Volume of dilution water used during period	liters	4.17E+9	2.52E+9	2.00E+1

TABLE 2B
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1981)

LIQUID EFFLUENTS

January - June, 1981

		BATCH ~~CONTINUOUS~~ MODE		~~BATCH~~ MODE	
Nuclides Released	Unit	Quarter	Quarter	Quarter	Quarter
strontium-89	Ci	2.19E-2	1.71E-5		
strontium-90	Ci	4.91E-3	3.55E-5		
cesium-134	Ci	5.70E-2	5.92E-4		
cesium-137	Ci	3.28E-1	5.25E-3		
iodine-131	Ci	7.27E-5	--		
cobalt-58	Ci	3.23E-2	1.07E-3		
cobalt-60	Ci	5.15E-1	3.00E-2		
iron-59	Ci	1.39E-3	3.03E-4		
zinc-65	Ci	3.06E-3	6.41E-5		
manganese-54	Ci	6.31E-2	9.40E-3		
chromium-51	Ci	1.63E-2	--		
zirconium-niobium-95	Ci	6.16E-4	4.54E-5		
molybdenum 99-technetium 99m	Ci	2.92E-3	3.54E-6		
barium-lanthanum-140	Ci	1.42E-2	5.50E-5		
cerium-141	Ci	2.38E-5	--		
iodine-133	Ci	1.45E-3	--		
cerium-144	Ci	--	--		
silver-110m	Ci	--	--		
iron-55	Ci	3.13E-1	4.84E-2		
unidentified	Ci	1.59E-1	6.60E-3		
Total for period (above)	Ci	1.53E0	1.02E-1		
xenon-133	Ci	--	--		
xenon-135	Ci	--	--		

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

Supplemental Information

July - December, 1981

Facility Pilgrim Nuclear Power Station License DPR-35

1. Regulatory Limits

   a. Fission and activation gases $\frac{Qs}{0.25/\bar{E}} + \frac{Qv}{0.10/\bar{E}} \leq 1$

   b. Iodines 2 Ci/quarter

   c. Particulates, half-lives >8 days 13 (1.8E+4Qs + 1.8E+5Qv) ≤1

   d. Liquid effluents 10 Ci/quarter

2. Maximum Permissible Concentration

   Provide the MPC's used in determining allowable release rates or concentrations.

   a. Fission and activation gases: } 10 CFR 20
   b. Iodines: } Appendix B
   c. Particulates, half-lives >8 days: } Table II
   d. Liquid effluents: H - 3 = 1 X 10^{-5} μCi/ml; all rest, 10 CFR 20, Appendix B, Table II

3. Average Energy

   Provide the average energy ($\bar{E}$) of the radionuclide mixture in releases of fission and activation gases, if applicable. $\bar{E}$ = 1 Mev

4. Measurements and Approximations of Total Radioactivity

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

   a. Fission and activation gases: } GeLi
   b. Iodines: } Istopic
   c. Particulates: } Analysis
   d. Liquid effluents: }

5. Batch Releases

   Provide the following information relating to batch releases of radioactive materials in liquid and gaseous effluents.

   a. Liquid

      1. Number of batch releases: 215
      2. Total time period for batch releases: 317.95 hrs
      3. Maximum time period for a batch release: -8.08 hrs
      4. Average time period for batch releases: 1.48 hrs
      5. Minimum time period for a batch release: -10 min
      6. Average stream flow during periods of release of effluent into a flowing stream: 2.06E+5 GPM

   b. Gaseous (Not Applicable)

6. Abnormal Releases

   a.
   b. None

TABLE 1A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

JULY - DECEMBER, 1981

	Unit	Quarter (3)	Quarter (4)	Est. Total Error, %
A. Fission and activation gases				
1. Total release	Ci	<5.03E+2	<3.25E+1	2.50E+1
2. Average release rate for period	μCi/sec	<6.33E+1	<4.09E0	
3. Percent of Technical Specification limit	%	<9.32E-3	<2.29E-4	
B. Iodines				
1. Total iodine-131	Ci	2.42E-2	<2.15E-3	2.60E+1
2. Average release rate for period	μCi/sec	3.04E-3	<2.70E-4	
3. Percent of Technical Specification limit	%	1.21E0	1.08E-1	
C. Particulates				
1. Particulates with half-lives > 8 days	Ci	6.03E-3	5.64E-4	3.05E+1
2. Average release rate for period	μCi/sec	7.59E-4	7.09E-5	
3. Percent of Technical Specification limit	%	1.10E-1	1.49E-2	
4. Gross alpha radioactivity	Ci	<3.93E-7	<6.32E-7	
D. Tritium				
1. Total release	Ci	3.51E+1	4.26E0	3.15E+1
2. Average release rate for period	μCi/sec	4.42E0	5.36E-1	
3. Percent of Technical Specification limit	%	—	—	

TABLE 1B
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1981)
GASEOUS EFFLUENTS – ELEVATED RELEASE

JULY - DECEMBER, 1981

		CONTINUOUS MODE		BATCH MODE	
Nuclides Released	Unit	Quarter(3)	Quarter(4)	Quarter	Quarter
1. Fission gases					
krypton-85	Ci	< 2.73E-2	—		
krypton-85m	Ci	1.78E+1	—		
krypton-87	Ci	< 1.70E0	—		
krypton-88	Ci	< 2.26E0	—		
xenon-133	Ci	2.67E+2	< 1.27E+1		
xenon-135	Ci	1.81E+1	—		
xenon-135m	Ci	< 2.90E0	—		
xenon-138	Ci	< 1.30E+1	—		
xenon-131m	Ci	—	—		
xenon-137	Ci	—	—		
xenon-133m	Ci	—	—		
Total for period	Ci	< 3.23E+2	< 1.27E+1		
2. Iodines					
iodine-131	Ci	1.38E-2	< 1.09E-5		
iodine-133	Ci	4.26E-2	< 3.29E-5		
iodine-135	Ci	4.87E-2	< 3.31E-4		
Total for period	Ci	1.05E-1	< 3.75E-4		
3. Particulates					
strontium-89	Ci	5.68E-4	1.55E-5		
strontium-90	Ci	6.32E-6	1.48E-6		
cesium-134	Ci	—	—		
cesium-137	Ci	1.82E-5	1.24E-5		
barium-lanthanum-140	Ci	1.92E-3	7.82E-6		
chromium-51	Ci	—	—		
manganese-54	Ci	4.20E-6	2.11E-6		
cobalt-58	Ci	—	—		
iron-59	Ci	—	—		
cobalt-60	Ci	2.30E-5	2.65E-5		
zinc-65	Ci	—	—		
zirconium-niobium-95	Ci	—	—		
cerium-141	Ci	—	—		
cerium-144	Ci	8.64E-6	—		
ruthenium-103	Ci	—	—		
ruthenium-106	Ci	—	—		

TABLE 1C

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1981)

GASEOUS EFFLUENTS - GROUND LEVEL RELEASE

JULY - DECEMBER, 1981

		CONTINUOUS MODE		BATCH MODE	
Nuclides Released	Unit	Quarter(3)	Quarter (4)	Quarter	Quarter
1. Fission gases					
krypton-85	Ci	< 1.70E-6	—		
krypton-85m	Ci	< 4.15E0	—		
krypton-87	Ci	< 5.17E0	—		
krypton-88	Ci	< 8.09E0	—		
xenon-133	Ci	3.98E+1	< 1.98E+1		
xenon-135	Ci	1.23E+2	—		
xenon-135m	Ci	—	—		
xenon-138	Ci	—	—		
Total for period	Ci	< 1.80E+2	< 1.98E+1		
2. Iodines					
iodine-131	Ci	1.04E-2	< 2.14E-3		
iodine-133	Ci	3.79E-2	< 1.13E-4		
iodine-135	Ci	6.28E-2	< 1.10E-3		
Total for period	Ci	1.11E-1	< 3.35E-3		
3. Particulates					
strontium-89	Ci	1.49E-3	3.62E-6		
strontium-90	Ci	3.11E-6	2.07E-7		
cesium-134	Ci	—	5.58E-6		
cesium-137	Ci	2.93E-5	3.59E-5		
barium-lanthanum-140	Ci	1.92E-3	< 4.49E-5		
manganese-54	Ci	2.84E-6	3.80E-5		
cobalt-58	Ci	—	9.46E-6		
iron-59	Ci	—	—		
cobalt-60	Ci	3.58E-5	3.60E-4		
zinc-65	Ci	—	—		
zirconium-niobium-95	Ci	—	—		
cerium-141	Ci	—	—		
ruthenium-103	Ci	—	—		
ruthenium-106	Ci	—	—		

TABLE 2A
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1981)
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

JULY - DECEMBER, 1981

	Unit	Quarter (3)	Quarter (4)	Est. Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, noble gases, or alpha)	Ci	1.57E-2	2.95E-1	3.00E+1
2. Average diluted concentration during period	μCi/ml	2.75E-9	3.23E-8	
3. Percent of applicable limit	%	1.57E-1	2.95E0	
B. Tritium				
1. Total release	Ci	4.06E0	2.94E+1	3.00E+1
2. Average diluted concentration during period	μCi/ml	7.11E-7	3.22E-6	
3. Percent of applicable limit	%	7.11E0	3.22E+1	
C. Dissolved and entrained gases				
1. Total release	Ci	2.36E-4	2.53E-4	4.00E+1
2. Average diluted concentration during period	μCi/ml	4.13E-11	2.77E-11	
3. Percent of applicable limit	%	NA	NA	
D. Gross alpha radioactivity				
1. Total release	Ci	< 3.50E-5	< 3.46E-4	4.00E+1
E. Volume of waste released (prior to dilution)	liters	4.61E+5	3.88E+6	2.00E+1
F. Volume of dilution water used during period	liters	5.71E+9	9.14E+9	2.00E+1

TABLE 2B
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1981)

LIQUID EFFLUENTS

JULY - DECEMBER, 1981

		CONTINUOUS MODE		BATCH MODE	
Nuclides Released	Unit	Quarter	Quarter	Quarter (3)	Quarter (4)
strontium-89	Ci			2.68E-4	< 4.06E-4
strontium-90	Ci			3.34E-5	< 2.00E-4
cesium-134	Ci			2.37E-4	2.58E-3
cesium-137	Ci			2.65E-3	1.20E-2
iodine-131	Ci			4.80E-5	2.07E-3
cobalt-58	Ci			9.36E-5	7.03E-3
cobalt-60	Ci			4.03E-3	7.45E-2
iron-59	Ci			5.25E-5	6.58E-4
zinc-65	Ci			1.51E-6	9.68E-4
manganese-54	Ci			5.65E-4	1.12E-2
chromium-51	Ci			3.04E-4	1.33E-3
zirconimum-niobium-95	Ci			1.04E-6	1.27E-5
molybdenum 99-technetium 99m	Ci			7.27E-5	6.11E-5
barium-lanthanum-140	Ci			4.53E-5	1.47E-3
cerium-141	Ci			1.18E-6	5.63E-5
iodine-133	Ci			1.04E-5	—
cerium-144	Ci			—	—
silver-110m	Ci			—	—
iron-55	Ci			2.78E-3	< 1.54E-1
unidentified	Ci			4.51E-3	2.62E-2
Total for period (above)	Ci			1.57E-2	< 2.95E-1
xenon-133	Ci			6.43E-5	2.53E-4
xenon-135	Ci			1.72E-4	—

Appendix C - 1979 Soil Survey

INTRODUCTION

In order to comply with Boston Edison's technical specification 4.8 for environmental monitoring of soil, gamma *in situ* spectrometry analyses were performed at the 11 stations listed on Table A during the period from the 25th to 27th of July, 1979. The gamma *in situ* spectra analyses were generated using the mobile van equipped with the downlooker Ge(Li) detector, its associated electronic equipment and computer software according to Reference 1. Ion chamber measurements at the 11 stations and core sampling at 3 stations were also performed according to Reference 1 to augment the *in situ* measurements. All spectral data obtained is available and on file at the environmental lab. The final tabulated results of the soil analyses are presented in this report.

RESULTS

Tables 1 to 11 were generated for each soil surveillance station to contain the date, counting time of analysis and both exposure rates (μR/hr) and concentrations (pCi/Kg) for natural, fission, fallout and plant related activation nuclides. The exposure rates were derived using the exposure rate method in Reference 1. For the natural emitters, a uniform distribution throughout the soil was assumed ($\alpha/\rho = 0$). If a nuclide gamma peak was found for the fission, fallout and plant-related nuclides an exponential depth distribution was assumed ($\alpha/\rho = .206$). If a nuclide peak was not found for these manmade nuclides, a planar distribution was assumed ($\alpha/\rho = \infty$) for the apparent exposure rate calculation. The conversion factors used in transforming the exposure rates to activity concentrations (pCi/Kg) are listed in Table B. Table B was generated from Tables 8 and 9 of HASL-258, Reference 5. The data format[1], standard deviations and LLDs used in Tables 1 to 11 are quoted based on Reference 4.

Table 12 compares the gamma *in situ* result (μR/hr) with the ion chamber measurement (μR/hr) that was obtained at each of the 11 stations. The positive gamma *in situ* exposure rates are divided into five categories, the exposure rate for the U-238 series, Th-232 series, Cs-137, K-40 and others. The "other" category notes other nuclides found positive by the *in situ* analyses. If the source term of the "other" nuclides could not be assumed to be soil, then the detector efficiency is unknown for these nuclides and the exposure rates were not reported or included in the gamma *in situ* exposure rate subtotal. A sealevel cosmic exposure rate of 3.6μR/hr was added to the subtotal of the positive nuclide exposure rates in order to facilitate the comparison of the *in situ* results to the ion chamber results.

As shown by inspection of Table 12, the gamma *in situ* exposure rates were calculated to be greater than the ion chamber measurements at all eleven sites evaluated at eight of the sites not directly adjacent or possibly influenced by the plant's operation or rad waste storage facilities, the *in situ* measurements were higher by 0.4 to 3μR/hr (or 5% to 37.5% greater) than the ion chamber results.

[1] 6E-02 = 6×10^{-02}

The other three measurement sites were in close proximity to the plant and, as a consequence of the plant's influence, the ion chamber results at these sites were found to be 1.6 to 5.5 times greater than the calculated *in situ* results.

Tables 13 - 15 present the results obtained when the gamma field measurement of two on-site stations and the control station were compared to laboratory analyses of core samples obtained from the same station. Only the naturally-occurring radionuclides were compared. A comparison for the naturally-occurring radionuclides was made between the *in situ* result (pCi/Kg) and the average of the laboratory analyses of the core sections by using Equation 1.

$$\left[\% \text{ Difference} = \frac{I-X}{X} * 100 \right]$$

Equation 1.

I = *In situ* result (pCi/Kg)

X = $\frac{A+I}{2}$ (pCi/Kg)

A = Average laboratory soil results (pCi/Kg)

Equation 1 was derived using the assumption that the *in situ* and the laboratory measurement were duplicate analyses.

All the calculated percent differences listed in Tables 13 - 15 are less than 15%.

DISCUSSION

Data concerning six of the eleven stations will be commented on in this discussion. These six stations either had a high ion chamber result relative to the *in situ* result, showed positive Co-60, Mn-54 or Cs-134 in the gamma measurement, or had both a high ion chamber measurement and showed Co-60, Mn-54 or Cs-134.

The stations with the relatively high ionization chamber measurements were the Warehouse, Pedestrian Bridge and Overlook Area. According to Table A, these stations are the closest to the reactor and therefore, the high ion chamber measurements at these sites were probably due to some source other than the soil.

The *in situ* gamma results at the Warehouse and Pedestrian Bridge showed positive Co-60, Mn-54 or Cs-134. For the Warehouse and Pedestrian Bridge the source term for the positive Co-60, Mn-54 or Cs-134 was quoted as unknown. Because of these station's relatively high ion chamber measurement with respect to the *in situ* result and the stations closeness to the reactor, the source term of the positive plant related nuclides was not assumed to be the soil. Since the source term is unknown the exposure rates for these nuclides were not reported. However, the source term of the positive Co-60 or Mn-54 at the Property Line, East Breakwater, and Clift Rock Area sites was assumed to be the soil. The soil was assumed to be the source term for these stations because of the agreement of the two independent measurements and the distance the sites were from the facility.

Table A

Soil Surveillance Stations

Station Number*	Sampling Location	Distance and Direction from Reactor
00	Warehouse (WS)	.03 miles SSE
01	Rocky Hill Road (ER)	0.8 miles SE
03	Rocky Hill Road (WR)	0.3 miles W-WNW
06	Property Line (PL)	0.34 miles NW
07	Pedestrian Bridge (PB)	0.14 miles N
08	Overlook Area (OA)	0.03 miles W
09	East Breakwater (EB)	0.35 miles ESE
10	Cleft Rock Area (CR)	0.9 miles S
15	Plymouth Center (PC)	4.5 miles W-WNW
17	Manomet Substation (MS)	2.5 miles SE
21	East Weymouth (EW)**	2.3 miles NW*

*Obtained from the air particulate station codes.

**Control Station.

Table B

Exposure Rate to Concentration
Conversion Values

Nuclide Name	Energy (Kev)	Conversion $\alpha/\rho=0.206$ (μR/hr/pCi/gm)	Conversion $\alpha/\rho=\infty$ (μR/hr/pCi/gm)	Conversion $\alpha/\rho=0$ (μR/hr/pCi/gm)
Ce-144	133.50	0.00913	0.02229	
Ce-141	145.44	0.03709	0.09291	
I-131	364.46	0.29314	0.73085	
Sb-125	427.88	0.35482	0.88332	
Ru-103	497.09	0.41724	1.05107	
Ba-140	537.30	0.17021	0.42963	
Rh-106	622.00	0.17813	0.45466	
Cs-137	661.61	0.55007	1.35915	
Zr-95	756.72	0.75624	1.85287	
Nb-95	765.80	0.79129	1.94376	
Mn-54	834.84	0.89883	2.20063	
Co-60	1332.51	3.24207	7.78098	
La-140	1596.20	3.22581	7.83693	
K-40	1460.76			0.179
Th-232	Average			2.82
U-238	Average			1.82

In Situ nting Results Table . Date of Count: 07/23/89

Location: Warehouse Station Number 00 Counting Time: 6000 (sec)

Nuclide Identification		Exposure Rate (μR/hr)			Concentration (pCi/Kg)		
Nuclide Name	Energy (Kev)	Exposure Rate	Standard Deviation	LLD	Conc.	Standard Deviation	LLD
Ce-144	133.50	5E-03	4E-03	15E-03	2E+02	2E+02	7E+02
Ce-141	145.44	9E-03	4E-03	13E-03	9E+01	4E+01	14E+01
I-131	364.50	-13E-03	7E-03	26E-03	-2E+01	1E+01	4E+01
Sb-125	427.88	3E-02	2E-02	8E-02	3E+01	3E+01	9E+01
Ru-103	497.09	-2E-03	7E-03	26E-03	-2E+0	7E+0	25E+0
Ba-140	537.30	-20E-03	10E-03	36E-03	-5E+01	2E+01	8E+01
Cs-134	604.70	-	-	-	-	-	-
Ru-106	622.10	2E-02	2E-02	7E-02	4E+01	4E+01	16E+01
Cs-137*	661.61	76E-03	7E-03	23E-03	14E+01	1E+01	4E+01
Zr-95	756.72	-3E-02	1E-02	4E-02	-16E+0	6E+0	24E+0
Sb-95	765.80	-0.5E-03	7E-03	24E-03	-0.3E+0	3E+0	13E+0
Sn-113	833.34	8E-03	7E-03	24E-03	4E+0	3E+0	11E+0
Co-60+	1332.51	-	-	-	-	-	-
K-40**	1460.75	226E-02	3E-02	4E-02	126E+02	2E+02	2E+02
La-140	1596.20	-3E-02	1E-02	4E-02	-3E+0	1E+0	6E+0
Th-232**		160E-02	5E-02		57E+01	2E+01	
U-238**		87E-02	5E-02		48E+01	2E+01	

*Calculated based on peak and baseline counts in the actual peak found assuming (σ_b = .206)

**Calculated based on weighted average (σ_b = 0) for Th-232 & U-238 and single peak (σ_b = 0) for K-40.

+Unknown Source Term

In Situ nting Results Table Date of Count: 07/25/79

Location: East Rocky Hill Station Number 01 Counting Time: 6000 (sec)

Nuclide Identification		Exposure Rate (μR/hr)			Concentration (pCi/Kg)		
Nuclide Name	Energy (Kev)	Exposure Rate	Standard Deviation	LLD	Conc.	Standard Deviation	LLD
Ce-144	133.50	-0E-03	1E-03	4E-03	0E+01	5E+01	16E+01
Ce-141	145.44	16E-04	9E-04	32E-04	2E+01	1E+01	3E+01
I-131	364.50	-0.4E-03	3E-03	10E-03	-0.6E+0	4E+0	13E+0
Sb-125	427.88	18E-03	10E-03	34E-03	2E+01	1E+01	4E+01
Ru-103	497.09	2E-03	3E-03	12E-03	2E+0	3E+0	11E+0
Ba-140	537.30	2E-03	5E-03	18E-03	0.4E+01	1E+01	4E+01
Cs-134	604.70	-	-	-	-	-	-
Rh-106	622.10	-0.2E-02	1E-02	4E-02	-0.4E+01	2E+01	9E+01
Cs-137*	661.61	363E-03	8E-03	16E-03	66E+01	1E+01	3E+01
Zr-95	756.72	1E-03	7E-03	26E-03	0.5E+01	4E+01	1E+01
Sb-95	765.80	17E-03	4E-03	14E-03	9E+0	2E+0	7E+0
Sn-113	841.33	3E-03	5E-03	16E-03	1E+0	2E+0	7E+0
Co-60	1332.51	3E-02	1E-02	4E-02	4E+0	2E+0	5E+0
K-40**	1460.8	207E-02	3E-02	3E-02	116E+02	2E+02	2E+02
La-140	1596.29	-6E-02	1E-02	4E-02	-7E+0	1E+0	6E+0
Th-232**		237E-02	5E-02		84E+01	2E+01	
U-238 **		141E-02	4E-02		78E+01	2E+01	

*Calculated based on peak and baseline counts in the actual peak found assuming (σ_f = .206)

**Calculated based on weighted average (σ_f = 0) for Th-232 & U-238 and single peak (σ_f = 0) for K-40.

In Situ C ing Results — Table 3 — Date of Count: 07/27/79

Location: West Rocky Hill — Station Number 03 — Counting Time: 6000 (sec)

Nuclide Identification		Exposure Rate (μR/hr)			Concentration (pCi/Kg)		
Nuclide Name	Energy (Kev)	Exposure Rate	Standard Deviation	LLD	Conc.	Standard Deviation	LLD
Ce-144	133.50	0.8E-03	1E-03	4E-03	4E+01	5E+01	16E+01
Ce-141	145.44	23E-04	9E-04	33E-04	2E+01	1E+01	4E+01
I-131	364.50	-5E-03	3E-03	10E-03	-7E+0	4E+0	14E+0
Sb-125	427.35	-9E-03	10E-03	36E-03	-1E+01	1E+01	4E+01
Ru-103	497.09	2E-03	3E-03	12E-03	2E+0	3E+0	12E+0
Ba-140	537.30	-2E-03	5E-03	19E-03	-0.4E+01	1E+01	5E+01
Cs-134	604.70	-	-	-	-	-	-
Rh-106	622.10	0.9E-02	1E-02	4E-02	2E+01	3E+01	9E+01
Cs-137*	661.61	77E-03	6E-03	17E-03	14E+01	1E+01	3E+01
Zr-95	756.72	6E-03	8E-03	29E-03	3E+0	4E+0	15E+0
Sb-95	765.80	0.3E-03	5E-03	17E-03	0.2E+0	2E+0	9E+0
Nb-95	834.84	-5E-03	5E-03	19E-03	-2E+0	2E+0	9E+0
Co-60	1332.51	1E-02	1E-02	5E-02	1E+0	2E+0	6E+0
K-40**	1460.76	290E-02	4E-02	3E-02	162E+02	2E+02	2E+02
La-140	1596.20	0.9E-02	1E-02	4E-02	1E+0	1E+0	5E+0
Th-232**		292E-02	6E-02		194E+01	2E+01	
U-238**		146E-02	4E-02		80E+01	2E+01	

*Calculated based on peak and baseline counts in the actual peak found around (c/ = .206)

**Calculated based on weighted average (c/ = 0) for Th-232 & U-238 and single peak (c/s = 0) for K-40.

In S[illegible] Counting Results Table Date of C[illegible]: [illegible]/26,[illegible]

Location. Property Line Station Number 06 Counting Time: 6000 (sec)

Nuclide Identification		Exposure Rate (μR/hr)			Concentration (pCi/Kg)		
Nuclide Name	Energy (Kev)	Exposure Rate	Standard Deviation	LLD	Conc.	Standard Deviation	LLD
Ce-144	133.50	0.2E-03	1E-03	4E-03	0.7E+01	5E+01	17E+01
Ce-141	145.44	0.1E-04	9E-04	33E-04	0.2E+01	1E+01	4E+01
I-131	364.46	1E-03	3E-03	9E-03	2E+0	4E+0	13E+0
Sb-125	427.88	0.9E-03	9E-03	34E-03	0.1E+01	1E+01	4E+01
Ru-103	497.09	-2E-03	3E-03	12E-03	-2E+0	3E+0	11E+0
Ba-140	537.30	7E-03	5E-03	17E-03	2E+01	1E+01	4E+01
Cs-134	604.70	-	-	-	-	-	-
Rh-106	622.10	-1E-02	1E-02	4E-02	-3E+01	2E+01	9E+01
Cs-137*	661.61	155E-03	7E-03	16E-03	28E+01	1E+01	3E+01
Zr-95	756.72	4E-03	7E-03	25E-03	2E+0	4E+0	13E+0
Nb-95	765.80	4E-03	4E-03	15E-03	2E+0	2E+0	8E+0
Mn-54	834.84	5E-03	4E-03	16E-03	2E+0	2E+0	7E+0
C0-60+	1332.51	0.9E-02	1E-02	4E-02	1E+0	1E+0	5E+0
K-40**	1460.75	208E-02	3E-02	3E-02	116E+02	2E+02	2E+02
La-140	1596.20	-10E-03	10E-03	38E-03	-1E+0	1E+0	5E+0
Th-232**		196E-02	5E-02		70E+01	2E+01	
U-238 **		112E-02	3E-02		61E+01	2E+01	

*Calculated based on peak and baseline counts in the actual peak found assuming (α/ρ = .206)

**Calculated based on weighted average (α/ρ = 0) for Th-232 & U-238 and single peak (α/ρ = 0) for K-40.

+Source Term assumed to be soil.

In Situ nting Results Table ' Date of Count: 07/20/79

Location: Pedestrian Bridge Station Number 07 Counting Time: 6000 (sec)

Nuclide Identification		Exposure Rate (μR/hr)			Concentration (pCi/Kg)		
Nuclide Name	Energy (Kev)	Exposure Rate	Standard Deviation	LLD	Conc.	Standard Deviation	LLD
Ce-144	133.50	2E-03	4E-03	13E-03	0.9E+02	2E+02	6E+02
Ce-141	145.44	-5E-03	3E-03	11E-03	-5E+01	3E+01	12E+01
I-131	364.46	4E-03	6E-03	20E-03	6E+0	8E+0	27E+0
Sb-125	427.88	2E-02	2E-02	6E-02	2E+01	2E+01	7E+01
Ru-103	497.09	-2E-03	6E-03	20E-03	-2E+0	5E+0	19E+0
Ba-140	537.30	2E-03	8E-03	28E-03	-0.4E+01	2E+01	6E+01
Cs-134	604.70	-	-	-	-	-	-
Rh-106	622.10	5E-02	2E-02	6E-02	11E+01	4E+01	13E+01
Cs-137*	661.61	319E-03	10E-03	24E-03	58E+01	2E+01	4E+01
Zr-95	756.72	-1E-03	10E-03	36E-03	-0.5E+0	5E+0	20E+0
Nb-95	765.80	-4E-03	6E-03	22E-03	-2E+0	3E+0	11E+0
Mn-54+	834.84						
Co-60+	1332.51						
K-40**	1460.79	218E-02	3E-02	4E-02	122E+02	2E+02	2E+02
La-140	1596.20	-2E-02	1E-02	5E-02	-2E+0	2E+0	6E+0
Th-232**		243E-02	6E-02		86E+01	2E+01	
U-238 **		129E-02	4E-02		71E+01	2E+01	

*Calculated based on peak and baseline counts in the actual peak found assuming (α/β = .206)

**Calculated based on weighted average (α/β = 0) for Th-232 & U-238 and single peak (α/β = 0) for K-40.

+Source Term Unknown.

APPENDIX D

4.8.D Environmental Monitoring Program

An environmental monitoring program shall be conducted as follows:

1. Environmental samples shall be selected and analyzed according to Table 4.8.1 at the locations described in Tables 4.8.2 and 4.8.3 and shown in Figures 4.8.1, 4.8.2 and 4.8.3.

2. Analytical techniques used shall be such that the detection capabilities in Table 4.8.4 are achieved.

3. A census of gardens producing fresh leafy vegetables for human consumption (e.g., lettuce, spinach, etc.) shall be conducted near the end of the growing season to determine or verify the location of the garden (available for sampling) yielding the highest calculated thyroid dose. This census is limited to gardens having an area of 500 square feet or more and shall be conducted under the following conditions as necessary to meet the above requirement:

   a. Within a 1-mile radius of the plant site, enumeration by a door-to-door, or equivalent counting technique.

   b. If no milk-producing animals are located in the vicinity of the site, as determined by item 4 below, the census described in item 3a above shall be extended to a distance of 5 miles from the site.

   If the census indicates the existence of a garden at a location yielding a calculated thyroid dose greater than that from the previously sampled garden, the new location shall replace the garden previously having the maximum calculated iodine concentration. Also, any location from which fresh leafy vegetables can no longer be obtained may be dropped from the surveillance program as long as the NRC is notified in writing, as soon as possible that such vegetables are no longer grown or no longer available at that location.

4. A census of animals producing milk for human consumption shall be conducted at or near the middle of the grazing season to determine or verify the location yielding the highest calculated annual average thyroid dose. The census shall be conducted under the following conditions as necessary to meet the above requirement:

   a. Within a 1-mile radius from the plant site or within the 15 mrem/yr isodose line, whichever is larger, enumeration by a door-to-door or equivalent, counting technique.

   b. Within a 5-mile radius for cows and for goats, enumeration derived from referenced information from county agricultural agents or other reliable sources.

   If it is learned from this census that animals are present at a location which yields a calculated thyroid dose greater than from previously sampled animals, the new location shall be added to the surveillance program as soon as practicable. The sampling location having the lowest calculated dose may then be dropped from the surveillance program at the end of the grazing season during which the census was conducted. Also, any location from which milk can no longer be obtained may be dropped from the surveil-

lance program as long as the NRC is notified in writing, as soon as practicable, that milk-producing animals are no longer present, or milk samples are no longer available at that location.

5. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability or to malfunction of automatic sampling equipment. In the event of equipment malfunction, every reasonable effort shall be made to complete corrective action prior to the end of the next sampling period. Any significant deviations from the sampling schedule shall be explained in the annual report.

6. Detailed written procedures, including applicable check lists and instructions, shall be prepared and followed for all activities involved in carrying out the environmental monitoring program. Procedures shall include sampling, data recording and storage, instrument calibration, measurements and analyses, and actions to be taken when anomalous measurements are discovered.

Procedures shall be prepared for insuring the quality of program results, including analytical measurements. These procedures will identify the responsible organizations, include purchased services (e.g., contractual lab), include independent audits, and include systems (such as participation in IAEA and/or NBS intercalibration exercises and submission of "blind" quality control samples for analyses by the contractors) to identify and correct deficiencies, investigate anomalous or suspect results, and review and evaluate program results and reports. **

SES 3.8.D and 4.8.D Environmental Monitoring Program

An Environmental radiological monitoring program is conducted to verify the adequacy of in-plant controls on the release of radioactive materials. The program is designed to detect radioactivity concentrations which could result in radiation doses to individuals not exceeding the levels set forth in 10CFR50 Appendix I.

An example of this is the detection of I-131 in milk. Calculational Models (Regulatory Guide 1.109 March 1976) have shown that a constant concentration of 3.5 pCi I-131 per liter milk would result in a dose of 15 millirem to the thyroid of an infant consuming that milk for a year. Allowing for an open grazing season of six months, and a maximum of two half-lives between event and sampling, the lower limit of detection at time of sampling must be 2 pCi/l (3.5 x 12/6 x 1/4 = 1.8).

A supplemental monitoring program for sediments and mussels has been incorporated into the basic program (see notes f and g to Table 4.8.1) as a result of an agreement with the Massachusetts Wildlife Federation. This supplemental program is designed to provide information on radioactivity levels at substantially higher sensitivity levels in selected samples to verify the adequacy (or, alternatively, to provide a basis for later modifications) of the long-term marine sampling schedules. As part of the supplemental program, analysis of mussels for isotopes of plutonium will be performed if radiocesium activity should exceed 200 pCi/Kgm in the edible portions. **

**supplemental provision

The 200 pCi/Kgm radiocesium "action level" is based on calculations which showed that if radiocesium from plant releases reached this level, plutonium could possibly appear at levels of potential interest.* The calculations also showed that the dose delivered from these levels of plutonium would not be a significant portion of the total dose attributable to liquid effluents.

The program was also designed to be consistent, wherever applicable with Regulatory Guide 4.8 (Issued for comment December 1975). The following exceptions to the generic recommendations stated in Regulatory Guide 4.8 are justified due to site specific considerations:

1. The required detection capability for I-131 in milk is about twice the value suggested in Regulatory Guide 4.8. The justification for the higher value is presented in the second paragraph of this section. This is a conservative estimate of the capability of the milk surveillance program to detect concentrations at the appropriate annual dose level since the annual dose is proportional to the annual average concentration in milk. The detection limit for a group of samples is less than that for a single sample and is inversely proportional to the square root of the number of samples. The conservatism in this case is approximately $\sqrt{12}$, or about a factor of 3.

2. Air particulates are not analyzed for radiostrontium. The program instead calls for this analysis in milk samples. This is justified because the air-cow-milk exposure pathway can be better monitored at Pilgrim after the very low level releases of radiostrontium are reconcentrated in cow's milk (Ref. 1).

3. Soils and sediments are not routinely analyzed for Sr-90, but rather the analysis is done on a contingency basis. The rationale behind this is that Sr-90 will not contribute to long-term radionuclide buildup until the more abundant gamma emmitting nuclides appear in relatively large concentrations. Both Items 2 and 3 reflect the fact that in 3½ years of operation, Pilgrim Station liquid releases of Sr-90 have amounted to only 1/1000 of the Sr-90 inventory in Cape Cod Bay water (from weapons testing fallout) and about 4/1000,000 of the direct deposition on the Bay. Also, gaseous releases of Sr-90 have been only 1/100,000 of the terrestrial Sr-90 inventory within five miles of the station (Ref. 1).

4. Surveys are conducted annually, if necessary, to determine appropriate locations for sampling of leafy vegetables and milk. The objective of these surveys is to ensure that the environmental samples are representative of realistic food chain pathways, considering local conditions. Results of the monitoring program will be used as "benchmarks" to verify calculational models used to predict the consequences of effluent releases from the station. The models can then be employed to predict doses attributable to radiation deposition at any other location of interest. The combination of monitoring results and calculational model predictions is a practical method of demonstrating compliance with 10CFR50 Appendix I. This approach does not require (nor is it always practical) that environmental media always be sampled from the "worst case" locations: although sensitivity of the monitoring results might be improved by sampling from locations which are reasonably close to "worst case" conditions.

* in measurable quantities having a potential dose (human food chain) significance comparable to other nuclides if present at their detection limits.

Verification of the appropriate milk sampling locations on an annual basis is satisfactory as there are very few locations suitable for the grazing of dairy herds in the vicinity of the plant (Ref. 2). This situation makes it unlikely the location of the nearest dairy herd (3.5 miles-W) will change.

5. Annual sampling of beef forage (in place of beef) is adequate because beef cattle are not raised commercially in the vicinity of the site. However, dairy cows from the Plymouth County Farm are periodically sold for beef. Feed (hay) from this location will be sampled to monitor this potential pathway for ingestion of radioactivity. If beef cattle feeding on local forage are found at locations closer to the site, forage samples from the closer location will replace the sample from the County Farm.

6. Goundwater flow at the plant site is into Cape Cod Bay; therefore, terrestrial monitoring of groundwater is not included in this program.

7. Poultry sampling is not performed because poultry in Plymouth County feed almost exclusively on imported grain and are usually raised under shelter.

8. Field gamma isotopic surveys are conducted to monitor radioactivity in soil in lieu of laboratory analysis of soil samples. The technique has several advantages over laboratory analysis. First, analysis can be performed on the same plot of land from survey to survey, and radioactivity build-up at the location can be accurately determined. Secondly, gamma exposure rate is determined directly from this technique: hence compliance with 10CFR50 Appendix I levels can be investigated directly rather than indirectly through soil sampling.

References:

1. Wrenn, M.E., "Review of Sr-90 Releases from Pilgrim 1 Nuclear Plant and a Comparison with Extant Environmental Levels", 1976.

2. Pilgrim Station Unit #2 PSAR, Appendix 11F, pp. 11FC-11 and 11A, amended June 15, 1976.

TABLE 4.8.1

OPERATIONAL RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway or Sample Type	Locations (Direction-Distance) from Reactor	Sampling and Collection Frequency	Type and Frequency of Analysis
AIRBORNE			
Particulates	11 (see Table 4.8.2)	Continuous sampling over one week	Gross beta radioactivity at least 24 hours after filter change. (a) Quarterly composite (by location) for gamma isotopic. (b)
Radioiodine	11 (see Table 4.8.2)	Continuous sampling with canister collection weekly	Analyze weekly for I-131
Soil	11 (see Table 4.8.2)	Once per three years	Field gamma isotopic. (c)
DIRECT	20 (see Table 4.8.3)	Quarterly	Gamma exposure quarterly.
	Plymouth Beach and Priscilla/White Horse Beach	Annually (Spring)	Gamma exposure survey.*
WATERBORNE	Discharge Canal	Continuous Composit Sample	Gamma isotopic (b) monthly; and composite for H-3 analysis quarterly, (c).
	Bartlett Pond (SE-1.7 mi.)	Weekly grab sample	
	Powder Point (NNW-7.8 mi.)(d)	Weekly grab sample	
AQUATIC			
Shellfish	Discharge outfall Duxbury Bay Manomet Pt. Plymouth or Kingston Harbor Marshfield (d)	Quarterly (at approximate 3-month intervals)	Gamma isotopic (b); also see note (f). *

* Note (f) and beach surveys are supplemental provision.

TABLE 4.8.1
(Cont'd)

Exposure Pathway or Sample Type	Locations (Direction-Distance) from Reactor	Sampling and Collection Frequency	Type and Frequency of Analysis
Irish Moss	Discharge outfall Manomet Pt. Ellisville (d)	Semi-annually	Gamma isotopic (b)
Lobster	Vicinity of discharge point Offshore (d)	Four times per season Once per season	Gamma isotopic (b) on edible portions.
Fish	Vicinity of discharge point Offshore (d)	Quarterly, Groups I and II (e) In season, Groups III and IV (e) Annually, each group	Gamma isotopic (b) on edible portions(e)
Sediments	Rocky Point Plymouth Harbor Duxbury Bay Plymouth Beach Manomet Pt. Marshfield (d)	Semi-annually	Gamma isotopic (b) (c), see also note (g) *
INGESTION (Terrestrial)			
Milk	Plymouth County Farm (W-3.5 mi.)(h): Whitman Farm (NW-21 mi.) (d)	Semi-monthly during periods when animals are on pasture, otherwise monthly	Gamma isotopic (b) Sr-89, 90 monthly; radioiodine analysis all samples.
Cranberries	Manomet Pt. Bog (SE-2.6 mi.) Bartlett Rd. Bog (SSE/S-2.8 mi.) Pine St. Bog (WNW-17 mi.) (d)	At time of harvest	Gamma isotopic (b) on edible portions.

*Note (g) is supplemental provision

TABLE 4.8.1
(Cont'd)

Exposure Pathway or Sample Type	Locations (Direction-Distance) from Reactor	Sampling and Collection Frequency	Type and Frequency of Analysis
Tuberous and green leafy vegetables	Karbott Farm (SSE-2.0 mi.)(h) Bridgewater Farm (W-20 mi.) (d)	At time of harvest	Gamma isotopic (b) on edible portions.
Beef Forage	Plymouth County Farm (W-3.5 mi.) (h)	Annually	Gamma isotopic (b)

Notes

(a) If gross beta radioactivity is greater than 10 times the control value, gamma isotopic will be performed on the sample.

(b) Gamma isotopic means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.

(c) If integrated gamma activity (less K-40) is greater than 10 times the control value (less K-40), strontium-90 analysis will be performed on the sample.

(d) Indicates control location.

(e) Fish analyses will be performed on a minimum of 2 sub-samples, consisting of approximately 400 grams each from each of the following groups:

I. Bottom Oriented	II. NearBottom Distribution	III. Anadromous	IV. Coastal Migratory
Winter flounder	Tautog	Alewife	Bluefish
Yellowtail flounder	Cunner	Rainbow smelt	Atlantic herring
	Atlantic cod	Striped bass	Atlantic menhaden
	Pollock		Atlantic mackerel
	Hakes		

(f)* Mussel samples from four locations (immediate vicinity of discharge outfall, Manomet Pt., Plymouth or Kingston Harbor, and Green Harbor in Marshfield) will be analyzed quarterly as follows:

One kilogram wet weight of mussel bodies, including fluid within shells will be collected. Bodies will be reduced in volume by drying at about 100°C. Sample will be compacted and analyzed by GE(Li) gamma spectrometry or alternate technique, if necessary, to achieve a sensitivity** of 5 pCi/kg for Cs-134, Cs-137, Co-60, Zn-65 and Zr-95 and 15 pCi/kg for Ce-144.

The mussel shell sample from one location (the location nearest the discharge canal unless otherwise specified pursuant to licensee's agreement with Mass, Wildlife Federation) will be analyzed each quarter. One additional mussel shell sample (from the Green Harbor location, unless otherwise specified pursuant to Licensee's agreement with Mass Wildlife Federation) will be analyzed semi-annually. Unscrubbed shells to be analyzed will be dried, processed, and analyzed similarly to the mussel bodies.

Because of the small volume reduction in pre-processing of shells, sensitivities attained will be less than that for mussel bodies. The equipment and counting times to be employed for analyses of shells will be the same or comparable to that employed for mussel bodies so that the reduction in sensitivities (relative to those for mussel bodies) will be strictly limited to the effects of poorer geometry related to lower sample volume reduction. Shell samples not scheduled for analysis will be reserved (unscrubbed) for possible later analysis, depending upon recommendations of the review committee.

* Supplemental provision.

**All sensitivity values to be determined in accordance with footnote (a) to Table 4.8.4., viz., LLD at 95% confidence level on K_{α} ; 50% confidence level on K_{β} (See HASL-300 for definitions).

Notes (Cont'd)

If radiocesium (Cs-134 and Cs-137) activity exceeds 200 pCi/kg (wet) in mussel bodies, these samples will be analyzed by radiochemical spearation, electrodeposition, and alpha spectrometry for radioisotopes of plutonium, with a sensitivity of 0.4 pCi/kg.

(g)* Sediment samples from four locations (Manomet Pt., Rocky Pt., Plymouth Harbor, and head of Duxbury Bay) will be analyzed once per year (preferably early summer) as follows:

Cores will be taken to depths of 30-cm, minimum depth wherever sediment conditions permit by a hand-coring sampling device. If sediment conditions do not permit 30-cm deep cores, the deepest cores achievable with a hand-coring device will be taken. In any case, core depths will not be less than 14-cm. Core samples will be sectioned into 2-cm increments, and surface and alternate increments analyzed, others reserved. Sediment sample volumes (determined by core diameter and/or number of individual cores taken from any single location) and counting technique will be sufficient to achieve sensitivities of 50 pCi/kg dry sediment for Cs-134, Cs-137, Co-60, Zn-65, and Zr-95 and 150 pCi/kg for Ce-144. In any case individual core diameters will not be less than 2 inches.

The top 2-cm section from each core will be analyzed for Pu isotopes (Pu-238, Pu-239, 240) using radiochemical separations, electrodeposition, and alpha spectrometry with target sensitivity of 25 pCi/kg dry sediment. Two additional core slices per year (mid-depth slice from core samples taken at Rocky Point and Plymouth Harbor, unless otherwise specified pursuant to licensee's agreement with Mass Wildlife Federation) will be similarly analyzed.

(h) These locations may be altered in accordance with results of surveys discussed in paragraphs 4.8.D-3 and 4.8.D-4.

* Supplemental provision

TABLE 4.8.2

AIR PARTICULATES, GASEOUS RADIOIODINE AND SOIL SURVEILLANCE STATIONS

Sampling Location (Sample Designation)	Distance and Direction from Reactor
Offsite Stations	
East Weymouth (EW) *	23 miles NW *
Plymouth Center (PC)	4.5 miles W-WNW
Manomet Substation (MS)	2.5 miles SE
Cleft Rock Area (CR)	0.9 miles S
Onsite Stations	
Rocky Hill Road (ER)	0.8 miles SE
Rocky Hill Road (WR)	0.3 miles W-WNW
Overlook Area (OA)	0.03 miles W
Property Line (PL)	0.34 miles NW
Pedestrian Bridge (PB)	0.14 miles N
East Breakwater (EB)	0.35 miles ESE
Warehouse (WS)	0.03 miles SSE

* Control Station

TABLE 4.8.3

EXTERNAL GAMMA EXPOSURE SURVEILLANCE STATIONS (TLD)

Dosimeter Location (Designation)	Distance and Direction from Station
Offsite Stations	
East Weymouth (EW)*	23 miles NW *
Kingston (KS)	10 miles WNW
Sagamore (CS)	10 miles SSE-S
Plymouth Airport (SA)	8 miles WSW
North Plymouth (NP)	5.5 miles WNW
Plymouth Center (PC)	4.5 miles W-WNW
South Plymouth (SP)	3 miles WSW
Manomet (MS)	2.5 miles SSE
Manomet (ME)	2.5 miles SE
Manomet (MP)	2.25 miles ESE-S
Cleft Rock Area (CR)	0.9 miles S
Saquish Neck (SN)**	4.6 miles NNW ***
Onsite Stations	
Rocky Hill Road (ER)	0.8 miles SE
Microwave Tower (MT)	0.38 miles S
Rocky Hill Road (WR)	0.3 miles W-WNW
Rocky Hill Road (B)	0.26 miles SSE
Property Line (H)	0.21 miles SSW
Property Line (I)	0.14 miles W
Public Parking Area (PA)	0.07 miles N-NNE
Overlook Area (OA)	0.03 miles W

* Control Station

** Data from this surveillance station is subject to detector maintenance and retrieval by a private party not subject to control by the licensee. Therefore, the requirement to maintain this station is contingent on station availability and maintenance by the outside party.

*** Supplemental provision

TABLE 4.8.4

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS (d)

Analysis	Lower Limit of Detection (a) Water pCi/l	Airborne particulate or gas - pCi/M^3	Wet solids pCi/Kg	Dry solids pCi/Kg	Milk pCi/l
Gross beta	2	1×10^{-2}			
H-3	330				
Mn-54	15		130	60	
Fe-59	30		260	120	
CO-58,60	15	2×10^{-2}	130	60	
Zn-65	30		260	120	
Sr-89	10		40		10
Sr-90	2		8	150	2
Zr/Nb-95	10				
I-131		7×10^{-2}	80(b)		2 (c)
Cs-134,137	15	1×10^{-2}	80	150	15
Ba/La-140	15				15

(a) The nominal lower limits of detection at the 95% confidence level (defined in the ERDA Health and Safety Laboratory procedures manual, HASL-300).

(b) Applies only to analysis of green leafy vegetables.

(c) Sensitivity with 25% error at the 95% confidence level.

(d) This table applies to all analyses other than those for which higher sensitivities appl in accordance with Notes (f) and (g) to Table 4.8.1.

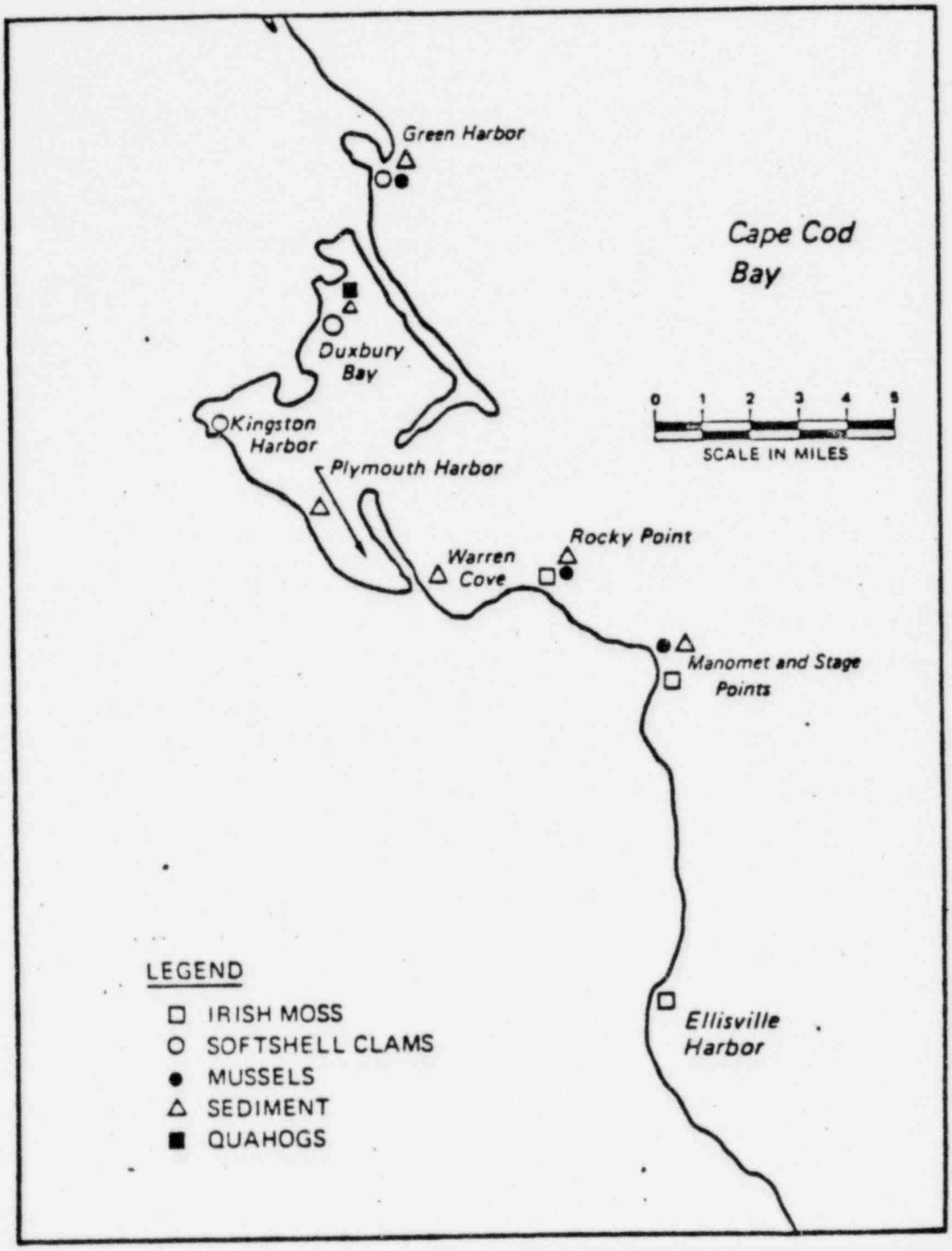

Figure 4.8-1 Typical Mollusc, Algae and Sediment Sampling Stations

6.9.C Unique Reporting Requirements

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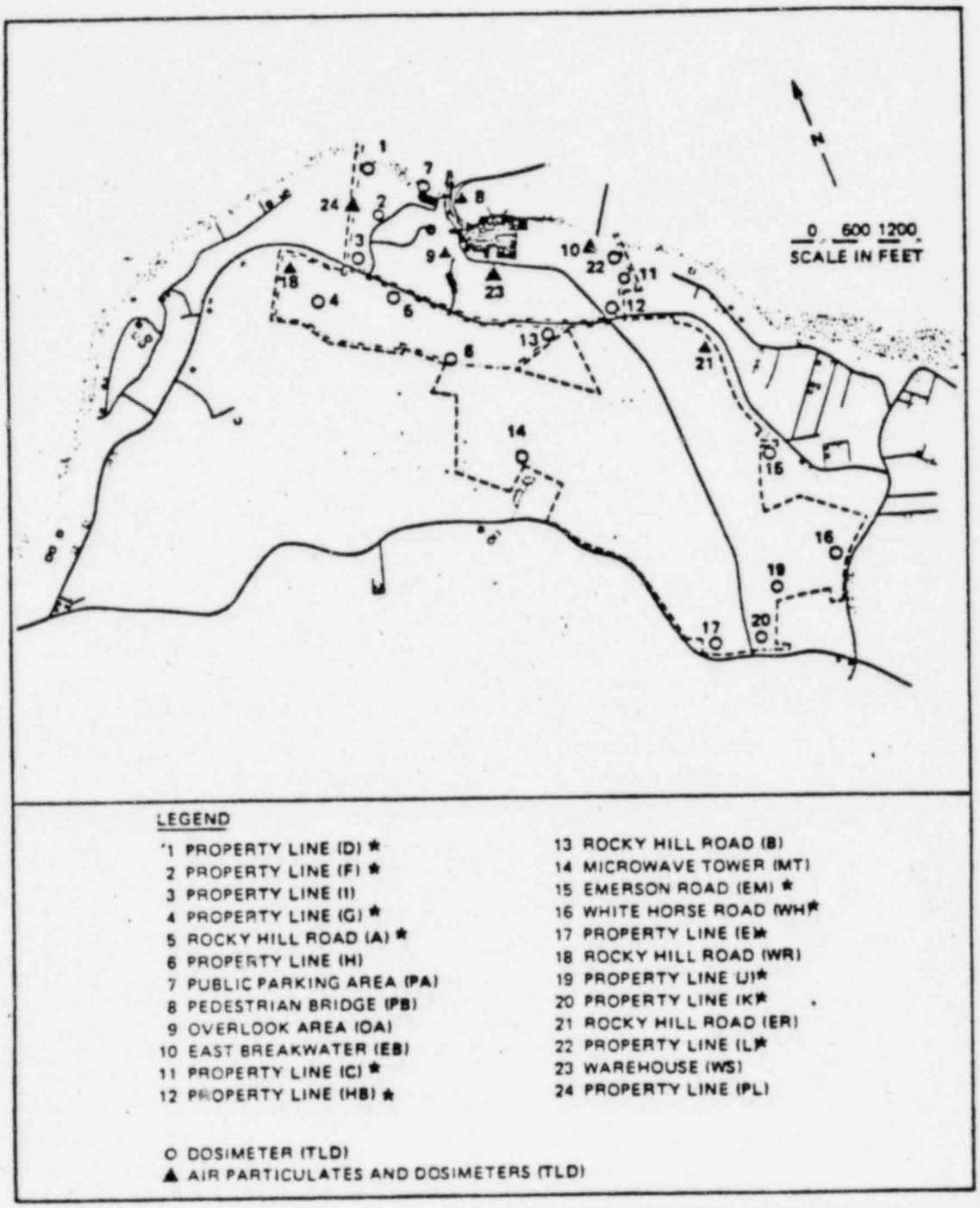
2. Environmental Program Data

a. Annual Report. A report on the radiological environmental surveillance program for the previous 12 months of operation shall be submitted to the Director of the NRC Regional Office (with a copy to the Director, Office of Nuclear Reactor Regulation) as a separate document within 90 days after January 1 of each year. The reports shall include summaries, interpretations, and statistical evaluation of the results of the radiological environmental surveillance activities for the report period, including a comparison with preoperational studies, operational controls (as appropriate), and previous environmental surveillance reports, and an assessment of the observed impacts of the plant operation on the environment. The reports shall also include the results of any land use surveys which affect the choice of sample locations. If harmful effects or evidence of irreversible damage are detected by the monitoring, the licensee shall provide an analysis of the problem and a proposed course of action to alleviate the problem.

Results of all radiological environmental samples shall be summarized and tabulated on an annual basis. In the event that some results are not available within the 90-day period, the report shall be submitted, noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

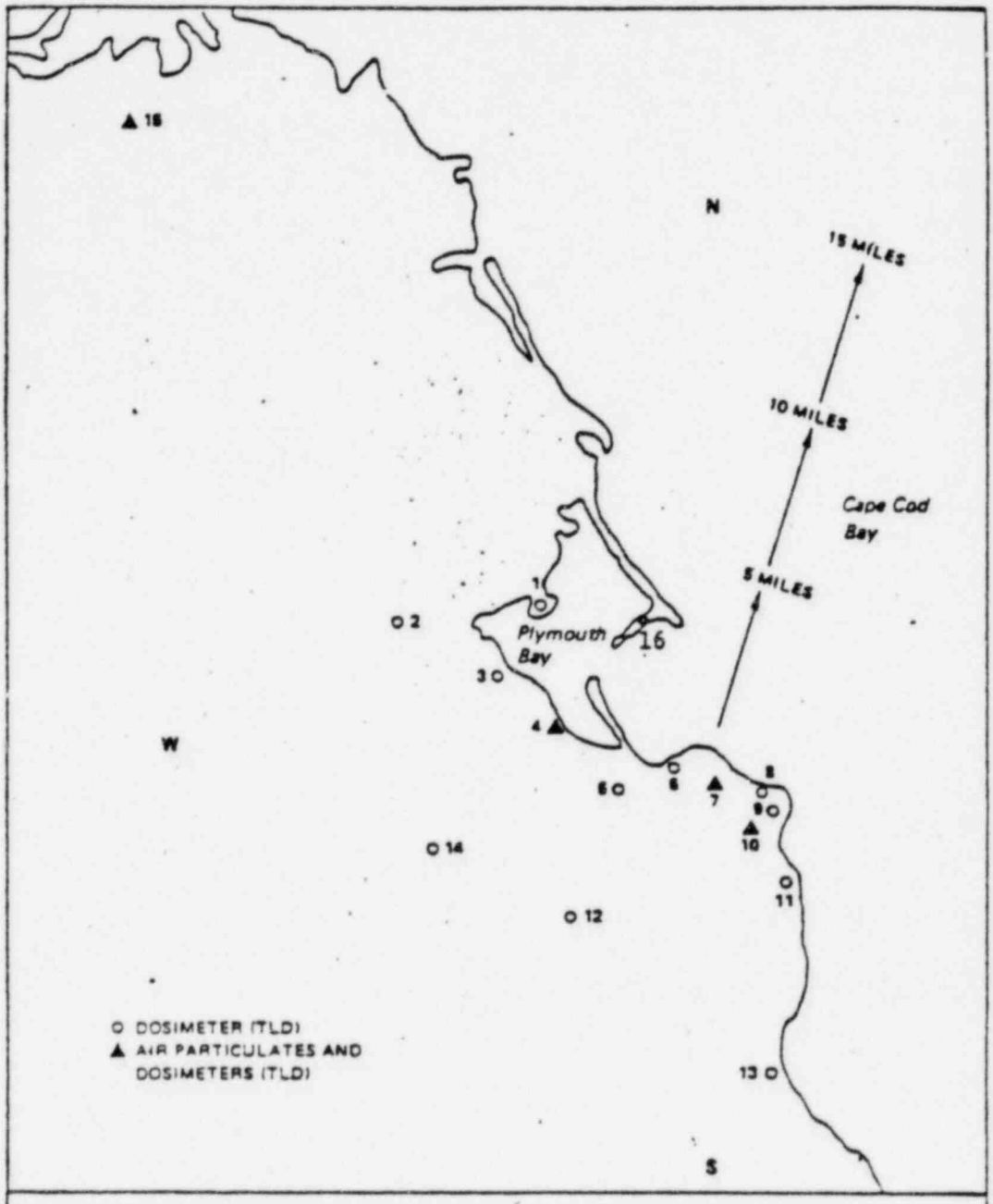
b. Anomalous measurement report. If radioactivity in an indicator medium from an off-site location is found and confirmed at a level exceeding ten times the control station value, a written report shall be submitted to the Director of the NRC Regional Office (with a copy to the Director, Office of Nuclear Reactor Regulation) within 10 days after confirmation.** This report shall include an evaluation of any release conditions, environmental factors, or other aspects necessary to explain the anomalous result.

** A confirmatory reanalysis of the original, a duplicate, or a new sample may be desirable, as appropriate. The results of the confirmatory analysis shall be completed at the earliest time consistent with the analysis, but in any case within 30 days of receipt of the anomalous result.



*additional station not required by Specification 4.8.D.1

Figure 4.8.2 Location of Onsite Monitoring Stations



*additional stations not required by Specification 4.8.D.1

Figure 4.8.3 Location of Offsite Monitoring Stations

APPENDIX E - 1981 GARDEN AND MILK ANIMAL SURVEY

(memo on results of survey)

BOSTON Edison COMPANY

OFFICE MEMORANDUM

RECORD CATEGORY:	
UNIT APPLICABILITY:	
PNPS FILE NUMBER:	

To T.L. Sowdon Prepared by C.E. Bowman C E Bowman

Date January 8, 1982 Reviewed by

cc: Nuclear Records Center Approved by

Title:

1981 GARDEN & MILK ANIMAL CENSUS

As required by the PNPS Environmental Technical Specification, the 1981 Census was conducted on 9/14/81 in a street by street search of the area within 1 mile of PNPS.

The existance of gardens near the site boundaries 0.7 miles West and 0.6 miles ESE was confirmed. These gardens are the closest and largest in the vicinity of PNPS, and are probably less than 500 ft.^{2}. They do represent conservative garden locations for sampling analyses and dose calculation. At my request, Mr. Jack Goggin obtained samples on 9/15/81 and 9/17/81. The smallest garden was located at the Winchester Residence on Bay Shore Drive (0.7 miles W), and the rubbarb collected on 9/15/81 was insufficient to meet the sensitivity requirements - however, there was very little rubbarb left in the garden to obtain a larger sample. Samples were obtained from the other two gardens during the 1980 Census. Chinese cabbage was obtained on 9/15/81 from the Lloyd-Evans Residence (0.7 miles W) on Gate Road, and lettuce was obtained on 9/17/81 from the Work Residence (0.6 miles ESE) on John Alden Road.

In addition, no cows or goats or structures which would indicate the presence of such animals within 1 mile of PNPS were found. Also, the Plymouth Animal Inspector was contacted (747-1620), and sent me a letter with the following locations of cows and goats:

Owner	Animal	Location	Status
Nancy Lloyd	5 goats	Long Pond Road	no response
Lauren Raymond	2 goats	White Horse Beach Road	no goats
Fred Wood	1 cow	Federal Furnace Road	not milked for consumption
John Davis	1 heifer, 3 beef cows	Beaver Dam Road	no response
Kenney Craig	1 heifer	Beach Street	no response
John Almeida	2 goats	White Oak Drive	no goats

BOSTON Edison COMPANY

OFFICE MEMORANDUM

RECORD CATEGORY:	
UNIT APPLICABILITY:	
PNPS FILE NUMBER:	

To T.L. Sowdon Prepared by C.E. Bowman

Date January 8, 1982 Reviewed by

cc: Nuclear Records Center Approved by

Title:

The status of the milk producing animals was determined by contacting the owners. Mr. Jack Goggin contacted the owners at my request. Those owners with a status of no response were telephoned many times over a two week period.

In conclusion, the 1981 Census indicates that there isn't an indicator station available for milk sampling.

/lr

GARDEN CENSUS FORM

No. Streets Surveyed 30 **Date** 9/14/81

Street Name	House Number	Garden, 500 ft^2	Leafy Vegetables	Distance and and Azimuth	Initials
BAY SHORE DRIVE (Winchester Residence)	N/A	$\ll$ 500 ft^2	Rubbarb	0.7 miles W	CEB
GATE ROAD (Lloyd-Evans Residence)	N/A	$<$ 500 ft^2	Chinese Cabbage	0.7 miles W	CEB
JOHN ALDEN ROAD (J. Work Residence)	393	$<$ 500 ft^2	Lettuce	0.6 miles, ESE	CEB

MILK ANIMAL CENSUS FORM

No. Streets Surveyed 30 Date 9/14/81

Street Name	House Number	No. of Animals	Type of Animals	Owner	Distance and Azimuth	Initials

NONE OF THE STREETS SURVEYED HAD COWS OR GOATS OR STRUCTURES

CEB

WHICH WOULD INDICATE THE PRESENCE OF SUCH ANIMALS