3913062000

DOCKET NO.: 50-352
50-353

LIMERICK GENERATING STATION
Units 1 and 2

Annual Radiological Environmental Operating Report

Prepared by

PHILADELPHIA ELECTRIC COMPANY
2301 Market Street
Philadelphia, Pennsylvania 19101

Analyses By

TELEDYNE ISOTOPES
50 Van Buren Avenue
Westwood, NJ 07675

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LIMERICK GENERATING STATION

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Annual Radiological Environmental Operating Report Report #7

1 January through 31 December 1990

Prepared By
Philadelphia Electric Company
Nuclear Group Headquarters
955-65 Chesterbrook Blvd.
Wayne, PA 19087-5691

Radiological Analyses Performed By

TELEDYNE ISOTOPES
50 Van Buren Avenue
Westwood, NJ 07675

And

Clean Harbors Analytical Services, Inc.
325 Wood Road
Braintree, Massachusetts 02184

May 1991

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SUMMARY AND CONCLUSIONS

I. Summary and Conclusions

This report on the Radiological Environmental Monitoring Program conducted for the Limerick Generating Station by Philadelphia Electric Company covers the period 1 January 1990 through 31 December 1990. During that time period, 2531 analyses were performed on 2141 samples.

Surface and drinking (potable) water samples were analyzed for concentrations of gross beta (soluble and insoluble fractions), tritium, and gamma emitting nuclides. Tritium activity differences were observed between control and indicator surface water locations and may be due to Station releases. Activities detected from the other analyses were consistent with those observed in other years.

Fish (predator and bottom feeder) and sediment samples were analyzed for concentrations of gamma emitting nuclides. No Station related fission products were detected. Sediment samples collected below the discharge had Cs-137 concentrations consistant with levels observed in the preoperational years. Activities found contributed less than 1% of the 10CFR50 Appendix I design objective. Other nuclides found were consistent with those in other years.

Air particulate samples were analyzed for concentrations of gross beta and gamma emitting nuclides. Concentrations detected were consistent with those observed in other years.

High sensitivity I-131 analyses were performed on weekly air samples. All results were less than the minimum detectable level.

Cow and goat milk samples were analyzed for concentrations of I-131 and gamma emitting nuclides. Iodine-131 results were all less than the minimum detectable level. Concentrations of K-40 were consistent with those observed in other years. Trace amounts of Cs-137 were found in some milk samples. The activity was considered attributable to fallout from Cheronbyl.

Environmental gamma radiation measurements were made monthly and quarterly using thermoluminescent dosimeters. Levels detected were consistent with those observed in other years.

In assessing all the data gathered for this report and comparing these results with preoperational data, it was evident that, the operation of LGS had no adverse impact on the environment.

INTRODUCTION

II. Introduction

The Limerick Generating Station (LGS), consisting of two 1055 MWe boiling water reactors owned and operated by Philadelphia Electric Company (PECo), is located adjacent to the Schuylkill River in Montgomery County, Pennsylvania. Unit No. 1 went critical on 22 December 1984. Unit No. 2 went critical on 11 August 1989. The site is located in Piedmont countryside, transversed by numerous valleys containing small tributaries which feed into the Schuylkill River. On the eastern river bank elevation rises from approximately 110 to 300 feet mean sea level (MSL). On the western river bank elevation rises approximately 50 feet MSL to the western site boundary.

A Radiological Environmental Monitoring Program (REMP) for LGS was initiated in 1971. Review of the 1971 through 1977 REMP data resulted in the modification of the program to comply with changes in the Environmental Report Operating License Stage (EROL) and the Branch Technical Position Paper (Rev. 1, 1979). The preoperational period for most media covers the periods 1 January 1982 through 21 December 1984 and was summarized in a separate report. This report covers those analyses performed by Teledyne Isotopes (TI) on samples collected during the period 1 January 1990 through 31 December 1990.

Clean Harbors Analytical Services (CH) conducted a Quality Control (QC) program for surface and drinking water, air particulates and milk samples.

A. Objectives

The objectives of the Radiological Environmental Monitoring Program are:

1. To provide data on measurable levels of radiation and radioactive materials in the site environs.

2. To evaluate the relationship between quantities of radioactive material released from the plant and resultant radiation doses to individuals from principal pathways of exposure.

B. Implementation

Implementation of the stated objectives is accomplished by identifying significant exposure pathways, establishing baseline radiological data of media within those pathways, and continuously monitoring those media before and during Station operation to assess Station effects (if any) on man and the environment.

In order to achieve the stated objectives, the current program includes the following analyses on samples collected

1. Concentrations of beta emitters in surface and drinking (potable) water, and air particulates.

2. Concentrations of gamma emitters in surface and drinking (potable) water, air particulates, milk, fish, and sediment.

3. Concentrations of tritium in surface and drinking (potable) water.

4. Concentrations of I-131 in air and milk.

5. Ambient gamma radiation levels at various site environs.

PROGRAM DESCRIPTION

III. Program Description

A. Sample Collection

Samples for the LGS REMP were collected for Philadelphia Electric Company by RMC Environmental Services, Inc. (RMC). This section describes the collection methods used by RMC to obtain environmental samples for the LGS REMP in 1990.

Aquatic Environment

The aquatic environment was examined by analyzing samples of surface water, drinking water, fish, and sediment. Two gallon water samples were collected monthly from continuous samplers located at four surface water locations (10F2, 13B1, 16B2, and 24S1) and five drinking water locations (13H2, 15F4, 15F7, 16C2, and 28F3). Control locations were 10F2, 24S1, and 28F3. All containers used were new unused plastic bottles, which were rinsed at least twice with source water prior to collection. Fish samples comprising the flesh of two groups, catfish/bullhead (bottom feeder) and sunfish (predator), were collected semiannually at three locations: 16C5 and 20S1 (indicator) and 29C1 (control). Sediment samples composed of recently deposited substrate were collected at three locations semiannually: 16B2 and 16C4 (indicator) and 33A2 (control).

Atmospheric Environment

The atmospheric environment was examined by analyzing samples of air particulate, airborne iodine, and milk. Air particulate were collected and analyzed weekly at seventeen locations (2B1, 6C1, 9C1, 10S3, 11S1, 13C1, 13H4, 14S1, 15D1, 17B1, 20D1, 22G1, 26B1, 29B1, 31D1, 34S2, and 35B1). Control locations were 13H4 and 22G1. Airborne iodine samples were collected and analyzed weekly from five locations, (10S3, 11S1, 13C1, 13H4, and 14S1). Control location was 13H4. Air particulate and airborne iodine samples were obtained using a vacuum sampler, glass fiber and charcoal filters, respectively. The filters were replaced weekly and sent to the laboratory for analysis. The vacuum samplers were run continuously at approximately 1 cubic foot per minute.

Milk samples were collected biweekly at five locations (10B1, 19B1, 21B1, 22F1, and 25B1) during April through November, and monthly during December through March and quarterly at six locations (36E1, 9G1, 11E1, 13E2, 18C1, and 22C1). Locations 9G1 and 22F1 were controls. Samples were collected in new unused two gallon plastic bottles from the bulk tank at each location, refrigerated, and shipped promptly to the laboratory. No preservative was added.

Ambient Gamma Radiation

Direct radiation measurements were made using thermoluminescent dosimeters (TLD) consisting of calcium sulfate ($CaSO_4$) doped with dysprosium (Dy). The TLD locations were placed on and around the LGS site using a "three ring concept" consisting of:

A site boundary ring consisting of sixteen locations (36S2, 3S1, 5S1, 7S1, 10S3, 11S1, 14S1, 16S2, 18S1, 21S1, 23S2, 25S1, 26S3, 29S1, 32S1 and 34S2) near and within the site perimeter representing fencepost doses (i.e., at locations where the doses will be potentially greater than maximum annual off-site doses) from LGS release;

A middle ring consisting of twenty-seven locations (2B1, 2E1, 4E1, 6C1, 7E1, 9C1, 10E1, 10F3, 13C1, 13E1, 15D1, 16F1, 17B1, 19D1, 20D1, 20F1, 24D1, 25D1, 26B1, 28D2, 29B1, 29E1, 31D1, 31D2, 34E1, 35B1 and 35F1) extending to approximately 5 miles from the site designed to measure possible exposures to close-in population;

And an outer ring consisting of five locations (5H1, 13H4, 18G1, 22G1 and 32G1) extending from approximately 12 to 30 miles from the site and considered to be unaffected by LGS releases.

The specific TLD locations were determined by the following criteria:

1. The presence of relatively dense population;

2. Site meteorological data taking into account distance and elevation for each of the 16-22 1/2 degree sectors around the site, where estimated annual dose from LGS, if any, would be most significant;

3. On hills free from local obstructions and within sight of the vents (where practical);

4. And near the closest dwelling to the vents in the prevailing downwind direction.

Two TLDs - each comprised of four thermoluminescent phosphors sealed in plastic - were placed at each location in a PVC conduit located approximately three feet above ground level. One TLD was exchanged monthly and the other quarterly and sent to the laboratory for analysis.

B. Data Interpretation

The radiological and direct radiation data collected prior to LGS becoming operational was used as a baseline with which this operational data will be compared. For the purpose of this report, LGS was considered operational at initial criticality. In addition data will be compared to previous years' operational data for consistency and trending. Several factors are important in the

interpretation of the data. These factors are discussed here to avoid undue repetition in the discussion of the results.

The minimum detectable level (MDL) was defined as the two sigma counting statistic. It represents the range of values into which 95% of repeated counts of the same aliquot would fall. For all analyses (gross beta, I-131, H-3 and gamma) an activity that was greater than or equal to the MDL was reported as "activity plus/minus the two sigma counting statistic". When an activity was less than the MDL, the result was reported as "< the MDL value".

The lower limit of detection (LLD) was defined as the smallest concentration of radioactive material in a sample that would yield a net count (above background) that would be detected with only a 5% probability of falsely concluding that a blank observation represents a "real" signal. The LLD was intended as a before the fact estimate of a system (including instrumentation, procedure and sample type) and not as an after the fact criteria for the presence of activity. All analyses were designed to achieve the required LGS detection capabilities for environmental sample analysis. For a more detailed description of the results calculation, see Appendix E.

Data received from the laboratory were reported using the convention of rounding the result to the same number of significant places as the first significant digit in the error term (i.e., 3.62 ± 1.23 rounds to 4 ± 1; 10.93 ± 0.96 rounds to 10.9 ± 1.0). Results for each type of sample were grouped according to the analyses performed. For gamma analyses, at least those nuclides specified in Technical Specification Table 3.12.1-2 for each sample media and nuclides which had a positive occurrence were reported. Means and standard deviations of these results were calculated. These standard deviations represent the variability of measured results for different samples rather than single analysis uncertainty. For these calculations, all results below the MDL were considered to be at the MDL. As a result, the means were biased high, and the standard deviations were generally biased low.

C. Program Exceptions

For 1990 the LGS REMP had a sample recovery rate of better than 99%. The exceptions to this program are listed below:

1. Air particulate and air iodine samples were not collected from location 13H4 during week No. 12 due to a sample collection error.

2. The air particulate filter was deemed unusable at location 9C1 during week 16 and at location 14S1 during week 32.

3. Air particulate samples at the following locations were not collected due to pump failures: 34S2 (wk. no. 25), 6C1 (wk. no. 28 and 46), 20D1 (wk. no. 33), and 15D1 (wk. no. 34).

4. Air particulate sample was not collected from location 17B1 during week No. 27 due to equipment breakdown.

5. Air particulate and air iodine samples were not collected from location 13C1 during week No. 44 due to a pump failure.

6. QC air particulate sample was not collected from location 11S2 during week No. 28 due to a pump failure.

The specific dates for the above weeks may be found in Table C-IX.1, Apendix C or Table D-IV.1, Appendix D.

7. Surface water samples collected at location 24S1 (LGS Intake) were composites of weekly grabs due to equipment problems during the following dates: 4/27/90, 4/30/90, 5/7/90, 6/9/90, 6/11/90, 6/18/90, and 12/26/90.

8. Surface water samples collected at location 13B1 (Vincent Dam) were composites of weekly grabs due to equipment problems during the following dates: 11/12/90 and 12/26/90.

9. Surface water samples collected at location 10F2 (Perkiomen Pumping Station) were composites of weekly grabs due to equipment problems during the following dates: 3/19/90, 3/26/90, 6/11/90, 6/18/90, 6/25/90, 7/2/90, 7/23/90, 12/10/90, 12/17/90, and 12/26/90.

10. Surface water samples collected at location 16B2 (Linfield Bridge) January through December were weekly grab samples due to pump malfunctions.

11. Drinking water samples collected at location 15F7 (Phoenixville Water Works) were composites of weekly grabs due to equipment problems during the following dates: 2/13/90.

12. Drinking water samples collected at location 28F3 (Pottstown Water Authority) were composites of weekly grabs due to equipment problems during the following dates: 1/2/90 and 12/10/90.

13. Drinking water samples collected at location 13H2 (Belmont Water Works) were composites of daily grabs between 1/2/90 and 6/25/90 due to plant maintenance.

14. Milk Farms 11E1 and 13E2 went out of business beginning the second quarter 1990.

15. Goat Milk Farm 10B1 had no available milk for February and March, 1990.

Each program exception was reviewed to understand the causes of the program exception. Sampling and maintenance errors were reviewed with the personnel involved to prevent recurrence. Occasional equipment breakdowns and power outages were unavoidable. The

overall sample recovery rate indicates that the appropriate procedures and equipment are in place to assure reliable program implementation.

The problems observed at location 16B2 (Linfield Bridge) have occurred for many years. We have added another location (13B1) which should be easier to maintain. This location will replace 16B2 in the 1991 REMP.

D. 1990 Program Changes

1. Game, vegetation and well water sampling was discontinued from the REMP.

2. Compositing of air particulate samples for gamma analysis was changed from monthly at seventeen locations to quarterly at five locations.

3. Milk samples from the non Tech. Spec. farms were collected quarterly instead of monthly and analyzed for I-131 only.

4. Surface water locations 13H5, 15F5, and 24S2 were dropped from the REMP.

5. Surface water location 13B1 was added to the REMP beginning in July, 1990.

6. Iodine-131 analysis of air iodine samples was conducted weekly on only five locations instead of the previous year's eight.

7. A QC laboratory was added for the following sample types: air particulates, surface and drinking water, and milk. The results of their analyses are presented in Appendix D.

RESULTS AND DISCUSSION

IV. Results and Discussion

A. Aquatic Environment

1. Surface Water

Samples were taken from four locations on a monthly schedule. Samples were collected from a continuous sampler at all four locations (10F2, 13B1, 16B2, and 24S1). Of these locations, three (13B1 and 16B2) could be affected by Station discharges. The following analyses were performed.

Gross Beta

Samples from all locations were analyzed for concentrations of gross beta in the soluble and insoluble fractions (Tables C-I.1 and C-I.2, Appendix C). Detectable activity was observed in the soluble and insoluble fraction of the surface water samples; the values were consistent with previous years (Figures C-1 and C-2, Appendix C) and ranged from 2.1 to 12 pCi/l for the soluble fraction and from <.3 to 2.3 pCi/l for the insoluble fraction. Similar activity levels were observed between indicator and control locations for the soluble and insoluble fractions.

Tritium

Samples from locations 10F2, 13B1, 16B2, and 24S1 were analyzed for tritium activity (Table C-I.3, Appendix C). Positive tritium activity was observed at each sample location and values ranged from <30 to 210 pCi/l. Activity levels observed at the two indicator locations (13B1 and 16B2) were slightly above those levels observed at the control locations (10F2 and 24S1). The mean values were 140 and 80 pCi/l, respectively. The tritium observed at locations below the LGS discharge may be associated with Station releases of tritium.

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C-I.4, Appendix C). With the exception of naturally occurring K-40, all nuclides searched for were below the minimum detectable level.

2. Drinking (Potable) Water

Monthly samples were taken from five locations (13H2, 15F4, 15F7, 16C2 and 28F3) and were collected from continuous water samplers. Four locations (13H2, 15F4, 15F7 and 16C2) could be affected by Station discharges. The following analyses were performed:

Gross Beta

Samples from all locations were analyzed for concentrations of gross beta in the soluble and insoluble fractions (Tables C-II.1 and C-II.2, Appendix C). The values ranged from 1.9 to 12 pCi/l for the soluble fraction and from <.2 to 6.4 pCi/l for the insoluble fraction. Concentrations detected in both fractions were consistent with those observed in previous years (Figures C-3 and C-4, Appendix C).

Tritium

Samples from locations 13H2, 15F4, 15F7, 16C2 and 28F3 were analyzed for tritium activity (Table C-II.3, Appendix C). Positive tritium activity was observed at each sample location. The measurements ranged from 40 to 170 pCi/l. Similar activity levels were observed at all locations.

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C-II.4, Appendix C). With the exception of naturally occurring K-40, all nuclides searched for were below the minimum detectable level.

3. Fish

Fish samples comprised of catfish/bullhead (bottom feeder) and redbreast/pumpkinseed (predator) were collected at three locations (16C5, 20S1 and 29C1) semiannually. Two locations (16C5 and 20S1) could be affected by Station discharges. The following analysis was performed:

Gamma Spectrometry

The edible portion of fish samples from all three locations was analyzed for gamma emitting nuclides (Table C-III.1, Appendix C). With the exception of naturally occurring K-40, all nuclides searched for were below the minimum detectable level. Historical levels of Cs-137 are shown in Figure C-5, Appendix C.

4. Sediment

Aquatic sediment samples were collected at three locations (16B2, 16C4 and 33A2) semiannually. Of these locations, two (16B2 and 16C4) could be affected by Station discharge. The following analysis was performed:

Gamma Spectrometry

Sediment samples from all three locations were analyzed for gamma emitting nuclides (Table C-IV.1, Appendix C). Nuclides detected were naturally occurring Be-7, K-40, Ra-226 and

Th-228, and fission products Cs-137. The nuclides Th-228 and Ra-226 commonly occur in sediment from daughter decay of natural uranium.

Concentrations of Cs-137 were found in sediment samples from both control and indicator locations. Location 16C4 had the highest average concentration of .29 pCi/g dry. This activity was consitent with those observed in the preoperational years (Figure C-6, Appendix C). The activity of Cs-137, which commonly occurs in sediment from worldwide fallout, was not attributed to LGS releases because Cs-134 was not also found.

B. Atmospheric Environment

1. Airborne

a. Particulates

Continuous air particulate samples were collected from several locations on a weekly basis. The seventeen locations are separated into three groups: Group I represents locations within the LGS site boundary (10S3, 11S1, 14S1 and 34S2), Group II represents locations near the LGS site (2B1, 6C1, 9C1, 13C1, 15D1, 17B1, 20D1, 26B1, 29B1, 31D1, 35B1), and Group III represents control locations at remote distances from LGS (13H4 and 22G1). The following analyses were performed:

Gross Beta

Weekly samples were analyzed for concentrations of beta emitters (Table C-V.1, Appendix C).

Detectable gross beta activity was observed at all locations. Comparison of results among the three groups aid in determining the effects, if any, resulting from the operation of LGS. The results from the On-Site locations (Group I) ranged from 3 to 47 E-3 pCi/m^3 with a mean of 16.4 E-3 pCi/m^3. The results from the Intermediate Distance locations (Group II) ranged from 4 to 36 E-3 pCi/m^3 with a mean of 16.3 E-3 pCi/m^3. The results from the Distanct locations (Group III) ranged from <2 to 34 E-3 pCi/m^3 with a mean of 17.9 E-3 pCi/m^3. Comparison of the weekly mean values indicate no notable differences among the three groups (Figure C-7, Appendix C). Comparison of the 1990 air particulate data with previous years data suggest no effects from the operation of LGS (Figure C-8, Appendix C).

Gamma Spectrometry

Weekly samples from five lcoations (10S3, 11S1, 14S1, 13C1, and 13H4) were composited and analyzed quarterly for gamma-emitting nuclides (Table C-V.2, Appendix C). Naturally occurring Be-7 due to cosmic ray activity was

detected in all samples. These values ranged from 43 to 88 E-3 pCi/m^3. K-40, also naturally occurring, was detected in 6 of 20 samples. The positive K-40 values ranged from 4 to 10 E-3 pCi/m^3. All other nuclides searched for were below the minimum detectable level. No significant difference in activity was observed between the control and indicator locations.

b. Airborne Iodine

Continuous air samples were collected from five (10S3, 11S1, 14S1, 13C1, and 13H4) locations and analyzed weekly for I-131. Results of the I-131 analysis are found in Table C-VI.1, Appendix C. All results were less than the minimum detectable level.

2. Terrestrial

a. Milk

Samples were taken from five locations (10B1, 19B1, 21B1, 22F1 and 25B1) biweekly during the grazing season (April-November) and monthly at other times. Samples from six additional locations (9G1, 11E1, 13E2, 18C1, 22C1 and 36E1) were taken quarterly. The following analyses were performed:

Iodine-131

All milk samples from all locations were analyzed for concentrations of I-131 (Table C-VII.1, Appendix C). All results were less than the minimum detectable level.

Gamma Spectrometry

Each milk sample from locations 10B1, 19B1, 21B1, 22F1 and 25B1 were analyzed for concentrations of gamma emitting nuclides (Table C-VII.2, Appendix C).

With the exception of Cs-137 and K-40, all nuclides searched for were below the minimum detectable level. The values for K-40 ranged from 320 to 1700 pCi/l. One K-40 value (320 ± 40) which was collected from the goat farm was investicated for being lower than expected. The conclusion reached suggested that the goats were beginning to end lactation. No milk was available from this farm in February and March due to this condition.

Positive concentrations of Cs-137 were found in goat milk (10B1) ranging from 3 to 7 pCi/l. Cesium-137 was also found in 4 of 44 cow milk farms. The positive values ranged from 4 to 5 pCi/l. This activity was attributed to residual fallout from Chernobyl (Figure C-9, Appendix C).

C. Ambient Gamma Radiation

Ambient gamma radiation levels were measured utilizing $CaSO_4$:Dy thermoluminescent dosimeters. Forty-eight TLD locations were established around the site in a three ring concept for comparison purposes: an "inner ring" of sixteen locations around the site boundary; a "middle ring" of twenty-seven locations within a ten mile radius of the site; and an "outer ring" of five locations at distances outside the ten mile radius of the site. Results of TLD measurements are listed in Tables C-VIII.1 to C-VIII.4, Appendix C.

Most of the TLD measurements were below 10 mrad/std. month, with a range of 3.6 to 11.0 mR/std. month for the monthly TLDs and from 1.9 to 8.2 mR/std. month for the quarterly TLDs. Levels measured were consistent with those observed in previous years (Figure C-10, Appendix C).

REFERENCES

V. References

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2. Branch Technical Position Paper, Regulatory Guide 4.8, Revision 1, November 1979.

3. Preoperational Radiological Environmental Monitoring Program Report, Limerick Generating Station Units 1 and 2, 1 January 1982 through 21 December 1984, Teledyne Isotopes and Radiation Management Corporation.

4. Radiological Environmental Operating Report No. 2, Limerick Generating Station Units 1 and 2, 1 January through 31 December 1985, Philadelphia Electric Company, analyses by Teledyne Isotopes.

5. Radiological Environmental Operating Report No. 3, Limerick Generating Station Units 1 and 2, 1 January through 31 December 1986, Philadelphia Electric Company, analyses by Teledyne Isotopes.

6. Radiological Environmental Operating Report No. 4, Limerick Generating Station Units 1 and 2, 1 January through 31 December 1987, Philadelphia Electric Company, analyses by Teledyne Isotopes.

7. Radiological Environmental Operating Report No. 5, Limerick Generating Station Units 1 and 2, 1 January through 31 December 1988, Philadelphia Electric Company, analyses by Teledyne Isotopes.

8. Radiological Environmental Operating Report No. 6, Limerick Generating Station Units 1 and 2, 1 January through 31 December 1989, Philadelphia Electric Company, analyses by Teledyne Isotopes.

RADIOLOGICAL ENVIRONMENTAL MONITORING
REPORT SUMMARY

APPENDIX A
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

NAME OF FACILITY: LIMERICK GENERATING STATION — DOCKET NO.: 50-352 & 50-353
LOCATION OF FACILITY: MONTGOMERY COUNTY, PA — REPORTING PERIOD: 1990

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATIONS MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN STATION # NAME DISTANCE & DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (PCI/LITER)	GROSS BETA SOLUBLE	42	4	4.4 (18/18) (2.8-12.0)	5.0 (24/24) (2.1-10.0)	5.9 (12/12) (2.4-10.0)	1052 (CONTROL) PERKIOMEN PUMPING STATION 7.1 MILES E OF SITE	0
	GROSS BETA INSOLUBLE	42	4	1.0 (10/18) (0.6-1.7)	0.8 (13/24) (0.4-2.3)	1.0 (3/6) (0.6-1.3)	1381 (INDICATOR) VINCENT DAM 1.8 MILES ESE OF SITE	0
	H-3 AQUEOUS LIQ. SCINT. W/ENR	14	2000	140 (6/6) (60-210)	80 (6/8) (50-120)	140 (4/4) (70-210)	1682 (INDICATOR) LINFIELD BRIDGE 1.1 MILES SSE OF SITE	0
	GAMMA	42						
	K-40		N/A	10 (5/18) (7-17)	8 (8/24) (7-13)	11 (4/12) (8-17)	1682 (INDICATOR) LINFIELD BRIDGE 1.1 MILES SSE OF SITE	0
	MN-54		15	< LLD	< LLD	< LLD		0
	CO-58		15	< LLD	< LLD	< LLD		0
	FE-59		30	< LLD	< LLD	< LLD		0
	CO-60		15	< LLD	< LLD	< LLD		0
	ZN-65		30	< LLD	< LLD	< LLD		0
	ZR-95		30	< LLD	< LLD	< LLD		0
	NB-95		15	< LLD	< LLD	< LLD		0
	CS-134		15	< LLD	< LLD	< LLD		0
	CS-137		18	< LLD	< LLD	< LLD		0
	BA-140		60	< LLD	< LLD	< LLD		0
	LA-140		15	< LLD	< LLD	< LLD		0
DRINKING WATER (PCI/LITER)	GROSS BETA SOLUBLE	60	4	4.1 (48/48) (1.9-12.0)	3.7 (12/12) (3.0-5.0)	5.0 (12/12) (3.0-6.0)	1584 (INDICATOR) PHILA. SUB. WATER CO. 7.8 MILES SSE OF SITE	0

MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES. (F)

APPENDIX A
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

NAME OF FACILITY: LIMERICK GENERATING STATION
LOCATION OF FACILITY: MONTGOMERY COUNTY, PA

DOCKET NO.: 50-352 & 50-353
REPORTING PERIOD: 1990

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATIONS MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN STATION # NAME DISTANCE & DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
DRINKING WATER (PCI/LITER)	GROSS BETA INSOLUBLE	60	4	1.3 (18/48) (0.3-6.4)	1.0 (2/12) (0.4-1.5)	1.6 (9/12) (0.5-6.4)	16C2 (INDICATOR) CITIZENS HOME WATER CO. 2.4 MILES SSE OF SITE	0
	H-3 AQUEOUS LIQ. SCINT. W/ENR	20	2000	90 (12/16) (50-170)	60 (3/4) (40-90)	100 (4/4) (60-170)	13H2 (INDICATOR) BELMONT WATER WORKS (PHILA.) 25.5 MILES SE OF SITE	0
	GAMMA K-40	60	N/A	11 (10/48) (5-18)	20 (3/12) (12-30)	20 (3/12) (12-30)	28F3 (CONTROL) POTTSTOWN WATER AUTHORITY 5.9 MILES WNW OF SITE	0
	MN-54		15	< LLD	< LLD	< LLD		0
	CO-58		15	< LLD	< LLD	< LLD		0
	FE-59		30	< LLD	< LLD	< LLD		0
	CO-60		15	< LLD	< LLD	< LLD		0
	ZN-65		30	< LLD	< LLD	< LLD		0
	ZR-95		30	< LLD	< LLD	< LLD		0
	NB-95		15	< LLD	< LLD	< LLD		0
	CS-134		15	< LLD	< LLD	< LLD		0
	CS-137		18	< LLD	< LLD	< LLD		0
	BA-140		60	< LLD	< LLD	< LLD		0
	LA-140		15	< LLD	< LLD	< LLD		0
FISH PREDATOR (PCI/GRAM WET)	GAMMA K-40	6	N/A	3.0 (4/4) (2.6-3.2)	3.2 (2/2) (3.1-3.4)	3.2 (2/2) (3.1-3.4)	29C1 (CONTROL) POTTSTOWN VICINITY UPSTREAM OF DISCHARGE	0

MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES. (F)

APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

NAME OF FACILITY: LIMERICK GENERATING STATION — DOCKET NO.: 50-352 & 50-353

LOCATION OF FACILITY: MONTGOMERY COUNTY, PA — REPORTING PERIOD: 1990

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATIONS MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN STATION # NAME DISTANCE & DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
FISH	GAMMA							
PREDATOR	MN-54		.[illegible]	< LLD	< LLD	< LLD		0
(PCI/GRAM WET)	CO-58		.[illegible]	< LLD	< LLD	< LLD		0
	FE-59		.[illegible]	< LLD	< LLD	< LLD		0
	CO-60		.13	< LLD	< LLD	< LLD		0
	ZN-65		.26	< LLD	< LLD	< LLD		0
	CS-134		.13	< LLD	< LLD	< LLD		0
	CS-137		.15	< LLD	< LLD	< LLD		0
FISH	GAMMA	6						
BOTTOM FEEDER	K-40		N/A	3.4 (4/4) (3.1-3.7)	3.2 (2/2) (3.1-3.3)	3.5 (2/2) (3.4-3.6)	16C5 (INDICATOR) VINCENT POOL DOWNSTREAM OF DISCHARGE	0
(PCI/GRAM WET)	MN-54		.13	< LLD	< LLD	< LLD		0
	CO-58		.13	< LLD	< LLD	< LLD		0
	FE-59		.26	< LLD	< LLD	< LLD		0
	CO-60		.13	< LLD	< LLD	< LLD		0
	ZN-65		.26	< LLD	< LLD	< LLD		0
	CS-134		.13	< LLD	< LLD	< LLD		0
	CS-137		.15	< LLD	< LLD	< LLD		0
SILT	GAMMA	6						
(PCI/GRAM D-Y)	BE-7		N/A	2.5 (4/4) (0.7-5.5)	2.8 (1/2) (2.8-2.8)	3.5 (2/2) (1.5-5.5)	16C4 (INDICATOR) VINCENT DAM DOWNSTREAM OF DISCHARGE	0

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APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

NAME OF FACILITY: LIMERICK GENERATING STATION
LOCATION OF FACILITY: MONTGOMERY COUNTY, PA

DOCKET NO.: 50-352 & 50-353
REPORTING PERIOD: 1990

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATIONS MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN STATION # NAME DISTANCE & DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SILT (PCI/GRAM DRY)	GAMMA K-40		N/A	15 (4/4) (14-16)	11 (2/2) (10-12)	15 (2/2) (15-16)	16C4 (INDICATOR) VINCENT DAM DOWNSTREAM OF DISCHARGE	0
	CS-134		.15	< LLD	< LLD	< LLD		0
	CS-137		.18	0.24 (4/4) (0.12-0.35)	0.11 (1/2) (0.11-0.11)	0.29 (2/2) (0.27-0.31)	16C4 (INDICATOR) VINCENT DAM DOWNSTREAM OF DISCHARGE	0
	RA-226		N/A	2.2 (4/4) (1.6-2.5)	2.0 (2/2) (1.9-2.2)	2.3 (2/2) (2-2.5)	16C4 (INDICATOR) VINCENT DAM DOWNSTREAM OF DISCHARGE	0
	TH-228		N/A	1.4 (4/4) (1.2-1.9)	1.2 (2/2) (1.0-1.4)	1.6 (2/2) (1.2-1.9)	16C4 (INDICATOR) VINCENT DAM DOWNSTREAM OF DISCHARGE	0
AIR PARTICULATE (E-3 PCI/CU. METER)	GROSS BETA	875		16 (772/772) (5-67)	18 (102/103) (5-34)	20 (51/51) (5-34)	13H4 (CONTROL) 2301 MARKET ST. (PHILA.) 28.8 MILES SE OF SITE	0
	GAMMA BE-7	20	N/A	55 (16/16) (43-88)	60 (4/4) (53-67)	60 (4/4) (46-88)	13C1 (INDICATOR) KING ROAD 2.9 MILES SE OF SITE	0
	K-40		N/A	8 (4/16) (6-10)	5 (2/4) (4-7)	10 (1/4) (10-10)	10S3 (INDICATOR) KEEN ROAD 0.5 MILES E OF SITE	0

MEAN AND RANGE BASED UPON DETECTABLE MEASUREMENTS ONLY. FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES. (F)

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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

NAME OF FACILITY: LIMERICK GENERATING STATION — DOCKET NO.: 50-352 & 50-353

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MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATIONS MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN STATION # NAME DISTANCE & DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIR PARTICULATE (E-3 PCI/CU. METER)	GAMMA							
	CS-134		.05	< LLD	< LLD	< LLD		0
	CS-137		.06	< LLD	< LLD	< LLD		0
AIR IODINE (E-3 PCI/CU. METER)	I-131	258		< LLD	< LLD	< LLD		0
MILK (PCI/LITER)	I-131 RADIOCHEMISTY	102	1	< LLD	< LLD	< LLD		0
	GAMMA	85						
	K-40		N/A	1260 (63/63) (980-1400)	1300 (22/22) (1100-1500)	1300 (21/21) (1100-1500)	2201 (CONTROL) REGIONAL FARM 7.8 MILES SW OF SITE	0
	CS-134		15	< LLD	< LLD	< LLD		0
	CS-137		18	4 (3/63) (4-5)	4 (1/22) (4-4)	5 (2/21) (4-5)	2181 (INDICATOR) REGIONAL FARM 1.7 MILES SW OF SITE	0
	BA-140		60	< LLD	< LLD	< LLD		0
	LA-140		15	< LLD	< LLD	< LLD		0
GOAT MILK (PCI/LITER)	I-131 RADIOCHEMISTY	19		< LLD		< LLD		0

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APPENDIX A
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

NAME OF FACILITY: LIMERICK GENERATING STATION
LOCATION OF FACILITY: MONTGOMERY COUNTY, PA

DOCKET NO.: 50-352 & 50-353
REPORTING PERIOD: 1990

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATIONS MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN STATION # NAME DISTANCE & DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GOAT MILK (PCI/LITER)	GAMMA K-40	19	N/A	1420 (19/19) (320-1700)		1420 (19/19) (320-1700)	1081 (INDICATOR) REGIONAL FARM 1.1 MILES ESE OF SITE	0
	CS-134		15	< LLD		< LLD		0
	CS-137		18	5 (8/19) (3-7)		5 (8/19) (3-7)	1081 (INDICATOR) REGIONAL FARM 1.1 MILES ESE OF SITE	0
	BA-140		60	< LLD		< LLD		0
	LA-140		15	< LLD		< LLD		0
DIRECT RADIATION (MILLI-ROENTGEN / STD. MONTH)	TLD-MONTHLY	575	N/A	7.10 (515/515) (3.60-11.00)	7.01 (60/60) (3.70-10.00)	8.84 (12/12) (7.50-11.00)	3101 (INDICATOR) LINCOLN SUBSTATION 3.0 MILES NW OF SITE	0
	TLD-QUARTERLY	192	N/A	6.39 (172/172) (4.40-8.20)	5.95 (20/20) (1.90-8.10)	7.95 (4/4) (7.70-8.20)	3101 (INDICATOR) LINCOLN SUBSTATION 3.0 MILES NW OF SITE	0

SAMPLE DESIGNATION
AND LOCATIONS

APPENDIX B: SAMPLE DESIGNATION AND LOCATIONS

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FIGURE B-3: Aquatic and Terrestrial Environmental Stations at Intermediate Distances from the Limerick Generating Station

FIGURE B-4: Environmental Sampling Stations at Remote Distances from the Limerick Generating Station

TABLE B-I: Location Designation and Identification System for the Limerick Generating Station

XXYZ - General code for identification of locations, where:

XX - Angular Sector of Sampling Location.

The compass is divided into 36 sectors of 10 degrees each with center at Limerick off-gas vent. Sector 36 is centered due North, and others are numbered in a clockwise direction.

Y - Radial Zone of Sampling Location (in this report, the radial distance from the Limerick vent for all regional stations).

S	:	on-site location	E	:	4-5 miles off-site
A	:	0-1 mile off-site	F	:	5-10 miles off-site
B	:	1-2 miles off-site	G	:	10-20 miles off-site
C	:	2-3 miles off-site	H	:	20-100 miles off-site
D	:	3-4 miles off-site			

Z - Station's Numerical Designation within sector and zone, using 1, 2, 3... in each sector and zone.

TABLE B-II: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 1990

Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
A. Surface Water				
10F2	Perkiomen Pumping Station (control)	7.1 miles E	Two gallon sample collected from a continuous water sampler, monthly	G. Beta (S&I) - monthly - TI Gamma Spec - monthly - TI Tritium - quarterly comp. - TI G. Beta (S&I) - monthly - CH* Gamma Spec - monthly - CH*
13B1	Vincent Dam (indicator)	1.8 miles ESE	Same as 10F2	Same as 10F2
16B2	Linfield Bridge (indicator)	1.1 miles SSE	Same as 10F2	Same as 10F2
24S1	Limerick Intake (control)	0.3 miles SSW	Same as 10F2	Same as 10F2
B. Drinking (Potable) Water				
13H2	Belmont Water Works (indicator)	25.5 miles SE	Two gallon composite sample collected from a continuous water sampler, monthly	G. Beta (S&I) - monthly - TI Gamma Spec - monthly - TI Tritium - quarterly comp. - TI
15F4	Philadelphia Suburban Water Company (indicator)	7.8 miles SSE	Same as 13H2	Same as 13H2

TABLE B-II: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 1990

Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
15F7	Phoenixville Water Works (indicator)	5.2 miles SSE	Same as 13H2	Same as 13H2
16C2	Citizens Home Water Company (indicator)	2.4 miles SSE	Same as 13H2	Same as 13H2
28F3	Pottstown Water Authority (control)	5.9 miles WNW	Same as 13H2	Same as 13H2
C. Cow's Milk				
36E1		4.7 miles N	Two gallons processed milk purchased quarterly at farm dairy store	I-131 - quarterly - TI
9G1	Control	11.4 miles	Two gallon grab sample collected from bulk tank at farm quarterly	Same as 36E1
11E1		4.9 miles ESE	Same as 9G1	Same as 36E1
13E2		4.5 miles SE	Same as 9G1	Same as 36E1
18C1		1.9 miles S	Same as 9G1	Same as 36E1
19B1		1.9 miles SSW	Bi-weekly during grazing season (April through November; monthly otherwise	I-131 - biweekly - TI Gamma Spec - biweekly - TI I-131 - quarterly - CH* Gamma Spec - quarterly - CH*

TABLE B-II: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 1990

Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
21B1		1.7 miles SW	Same as 19B1	Same as 19B1
22C1		3.0 miles SW	Same as 9G1	Same as 36E1
22F1	Control	9.8 miles SW	Same as 19B1	Same as 19B1
25B1		1.3 miles WSW	Same as 19B1	I-131 - biweekly - TI Gamma Spec - biweekly - TI
D. Goat's Milk				
10B1		1.1 mile ESE	Two gallon grab sample purchased at goat farm, biweekly during grazing season (April through November); monthly otherwise	I-131 - biweekly - TI Gamma Spec - biweekly - TI
E. Air Particulates/Air Iodine				
2B1	Sanatoga Substation	1.5 miles NNE	Approximately 1 cfm continuous flow through glass fiber and charcoal filters (approx. 2" diameter) which are installed for one week and replaced	G. Beta - weekly - TI I-131 - if necessary
6C1	Pottstown Landing Field	2.1 miles ENE	Same as 2B1	Same as 2B1

TABLE B-II: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 1990

Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
9C1	Reed Road	2.2 miles E	Same as 2B1	Same as 2B1
10S3	Keen Road	0.5 miles E	Same as 2B1	G. Beta - weekly - TI Gamma Spec - quarterly comp. - TI I-131 - weekly - TI
11S1	LGS Information Center	0.5 miles ESE	Same as 2B1	Same as 10S3
11S2	LGS Information Center	0.5 miles ESE	Same as 2B1	G. Beta - weekly - CH* Gamma Spec - quarterly comp - CH*
13C1	King Road	2.9 miles SE	Same as 2B1	Same as 10S3
13H4	2301 Market St., Philadelphia (control)	28.8 miles SE	Same as 2B1	Same as 10S3
14S1	Longview Road	0.6 miles SE	Same as 2B1	Same as 10S3
14S2	Longview Road	0.6 miles SE	Same as 2B1	Same as 11S2
15D1	Spring City Substation	3.2 miles SE	Same as 2B1	Same as 2B1
17B1	Linfield Substation	1.6 miles S	Same as 2B1	Same as 2B1
20D1	Ellis Wood Road	3.1 miles SSW	Same as 2B1	Same as 2B1
22G1	Manor Substation (control)	17.6 miles SW	Same as 2B1	Same as 2B1

TABLE B-II: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 1990

Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
26B1	Old Schuylkill Road	1.7 miles W	Same as 2B1	Same as 2B1
29B1	Vost Road	1.8 miles NW	Same as 2B1	Same as 2B1
31D1	Lincoln Substation	3.0 miles NW	Same as 2B1	Same as 10S3
34S2	Met. Tower #1	0.6 miles NNW	Same as 2B1	Same as 2B1
35B1	Pleasantview Road	1.9 miles NNW	Same as 2B1	Same as 10S3
F. Fish				
16C5	Vincent Pool (indicator)	Downstream of Discharge	Fish flesh from two groups repre[illegible]ng predator and bottom feeder species collected by electrofisher or other appropriate fishery gear, semiannually	Gamma Spec - semiannually - TI
20S1	Discharge Area (indicator)	Downstream of Discharge	Same as 16C5	Same as 16C5
29C1	Pottstown Vicinity (control)	Upstream of Intake	Same as 16C5	Same as 16C5
G. Sediment				
16B2	Linfield Bridge (indicator)	Downstream of Discharge	Recently deposited sediment collected below the waterline, semi-annually	Gamma Spec - semiannually - TI

TABLE B-II: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 1990

Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
16C4	Vicent Dam (indicator)	Downstream of Discharge	Same as 16B2	Same as 16B2
33A2	Control	Upstream of Discharge	Same as 16B2	Same as 16B2
H. Environmental Dosimetry - TLD				
36S2	Evergreen & Sanatoga Road	0.6 miles N	Collection method and frequency is described in placement procedure Section III, A.	TLD - monthly - TI TLD - quarterly - TI
2B1	Sanatoga Substation	1.5 miles NNE	Same as 36S2	Same as 36S2
2E1	Laughing Waters GSC	5.1 miles NNE	Same as 36S2	Same as 36S2
3S1	Sanatoga Road	0.6 miles NNE	Same as 36S2	Same as 36S2
4E1	Neiffer Road	4.6 miles NE	Same as 36S2	Same as 36S2
5S1	Possum Hollow Road	0.4 miles NE	Same as 36S2	Same as 36S2
5H1	Birch Substation	25.8 miles NE	Same as 36S2	Same as 36S2
6C1	Pottstown Landing Field	2.1 miles ENE	Same as 36S2	Same as 36S2
7S1	LGS Training Center	0.5 miles ENE	Same as 36S2	Same as 36S2

TABLE B-II: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 1990

Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
7E1	Pheasant Road	4.2 miles ENE	Same as 36S2	Same as 36S2
9C1	Reed Road	2.2 miles E	Same as 36S2	Same as 36S2
10S3	Keen Road	0.5 miles E	Same as 36S2	Same as 36S2
10E1	Royersford Road	3.9 miles E	Same as 36S2	Same as 36S2
10F3	Trappe Substation	5.5 miles ESE	Same as 36S2	Same as 36S2
11S1	LGS Information Center	0.5 miles ESE	Same as 36S2	Same as 36S2
13C1	King Road	2.9 miles SE	Same as 36S2	Same as 36S2
13E1	Vaughn Substation	4.3 miles SE	Same as 36S2	Same as 36S2
13H4	2301 Market Street Philadelphia, (control)	28.8 miles SE	Same as 36S2	Same as 36S2
14S1	Longview Road	0.6 miles SE	Same as 36S2	Same as 36S2
15D1	Spring City Substation	3.2 miles SE	Same as 36S2	Same as 36S2
16S2	Longview Road	0.6 miles SSE	Same as 36S2	Same as 36S2
16F1	Pikeland Substation	4.9 miles SSE	Same as 36S2	Same as 36S2
17B1	Linfield Substation	1.6 miles S	Same as 36S2	Same as 36S2

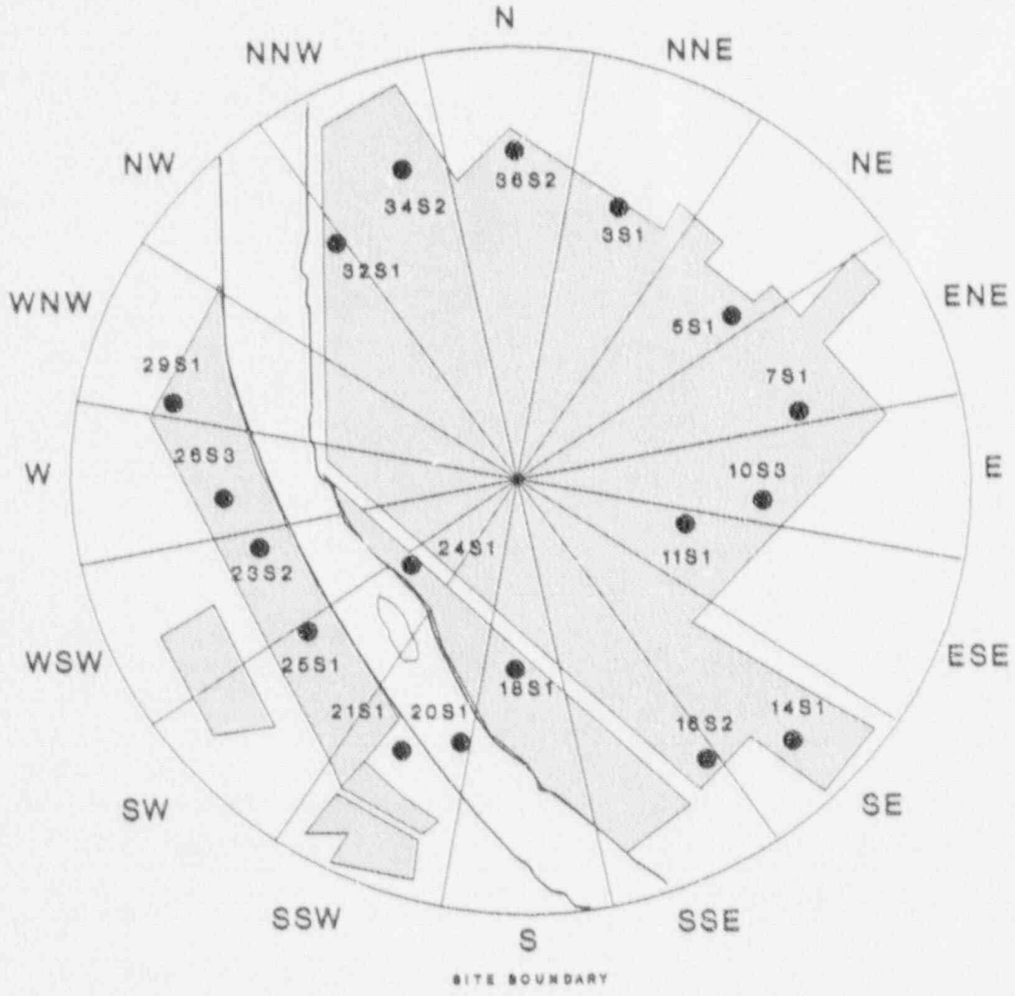
TABLE B-II: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 1990

Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
18S1	Rail Line along Longview Road	0.3 miles S	Same as 36S2	Same as 36S2
18G1	Planebrook Substation	12.9 miles S	Same as 36S2	Same as 36S2
19D1	Snowden Substation	3.6 miles S	Same as 36S2	Same as 36S2
20D1	Ellis Woods Road	3.1 miles SSW	Same as 36S2	Same as 36S2
20F1	Sheeder Substation	5.2 miles SSW	Same as 36S2	Same as 36S2
21S1	Impound Basin	0.5 miles SSW	Same as 36S2	Same as 36S2
22G1	Manor Substation	17.6 miles SW	Same as 36S2	Same as 36S2
23S2	Transmission Tower	0.5 miles WSW	Same as 36S2	Same as 36S2
24D1	Porters Mill Substation	3.9 miles SW	Same as 36S2	Same as 36S2
25S1	Sector Site Boundary	0.5 miles SW	Same as 36S2	Same as 36S2
25D1	Hoffecker & Keim Streets	4.0 miles WSW	Same as 36S2	Same as 36S2
26S3	Met. Tower #2	0.4 miles W	Same as 36S2	Same as 36S2
26B1	Old Schuylkill Road	1.7 miles W	Same as 36S2	Same as 36S2
28D2	W. Cedarville Road	3.8 miles W	Same as 36S2	Same as 36S2

TABLE B-II: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 1990

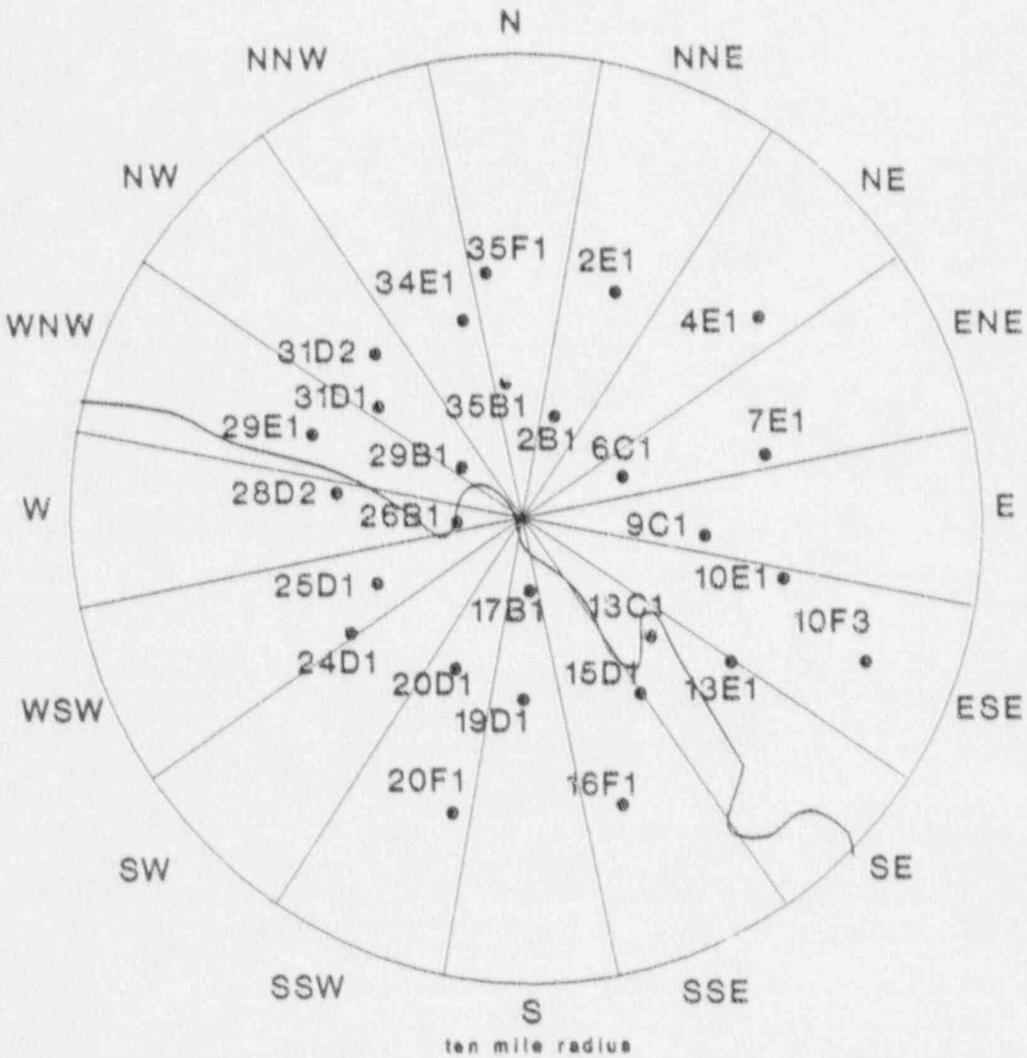
Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
29S1	Sector Site Boundary	0.5 miles WNW	Same as 36S1	Same as 36S2
29B1	Yost Road	1.8 miles NW	Same as 36S2	Same as 36S2
29E1	Prince Street	4.9 miles WNW	Same as 36S2	Same as 36S2
31D1	Lincoln Substation	3.0 miles NW	Same as 36S2	Same as 36S2
31D2	Poplar Substation	3.9 miles NW	Same as 36S2	Same as 36S2
32S1	Sector Site Boundary	0.6 miles NW	Same as 36S2	Same as 36S2
32G1	Friendensburg Substation	15.6 miles NW	Same as 36S2	Same as 36S2
34S2	Met. Tower #1	0.6 miles NNW	Same as 36S2	Same as 36S2
34E1	Varnell Road	4.6 miles NNW	Same as 36S2	Same as 36S2
35B1	Pleasantville Road	1.9 miles NNW	Same as 36S2	Same as 36S2
35F1	Ringing Rock Substation	4.2 miles N	Same as 36S2	Same as 36S2

FIGURE B-1
ENVIRONMENTAL SAMPLING LOCATIONS ON-SITE OR NEAR THE LIMERICK GENERATING STATION, 1990



36S2 EVERGREEN & SANATOGA RD.
3S1 SANATOGA RD.
5S1 POSSUM HOLLOW RD.
7S1 LGS TRAINING CENTER
10S3 KEEN RD.
11S1 LGS INFORMATION CNTR.
14S1 LONGVIEW RD.
16S2 LONGVIEW RD.
18S1 RAILROAD TRACKS
20S1 LGS DISCHARGE AREA
21S1 LGS IMPOUNDING BASIN
23S2 TRANSMISSION TOWER
24S1 LGS INTAKE
25S1 SW SECTOR
26S3 MET. TOWER #2
29S1 WNW SECTOR
32S1 NW SECTOR
34S2 MET. TOWER #1

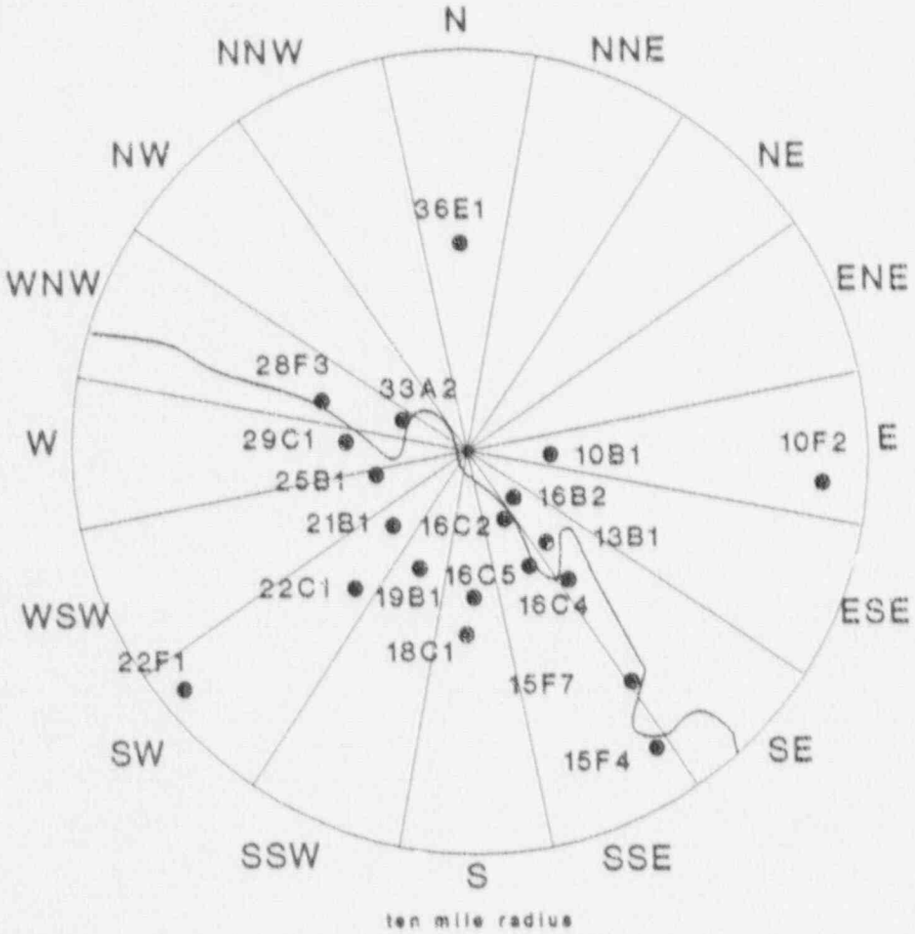
FIGURE B-2
AIRBORNE AND TLD ENVIRONMENTAL SAMPLING STATIONS AT INTERMEDIATE DISTANCES FROM LIMERICK GENERATING STATION, 1990



2B1 SANATOGA SUBSTATION	13E1 VAUGHN ROAD	26B1 OLD SCHUYLKILL RD
2E1 LAUGHING WATERS GSC	15D1 SPRING CITY SUBSTATION	28D2 W. CEDARVILLE RD
4E1 NEIFFER ROAD	16F1 PIKELAND SUBSTATION	29B1 YOST ROAD
6C1 POTTSTOWN AIRPORT	17B1 LINFIELD SUBSTATION	29E1 HIGH SUBSTATION
7E1 PHEASANT ROAD	19D1 SNOWDEN SUBSTATION	31D1 LINCOLN SUBSTATION
9C1 REED ROAD	20D1 ELLIS WOODS ROAD	31D2 POPLAR SUBSTATION
10E1 ROYERSFORD ROAD	20F1 SHEEDER SUBSTATION	34E1 YARNELL ROAD
10F3 TRAPPE SUBSTATION	24D1 PORTERS MILL SUBSTATION	35B1 PLEASANTVILLE RD
13C1 KING ROAD	25D1 HOFFECKER & KEIM ST.	35F1 RINGING ROCKS SUB

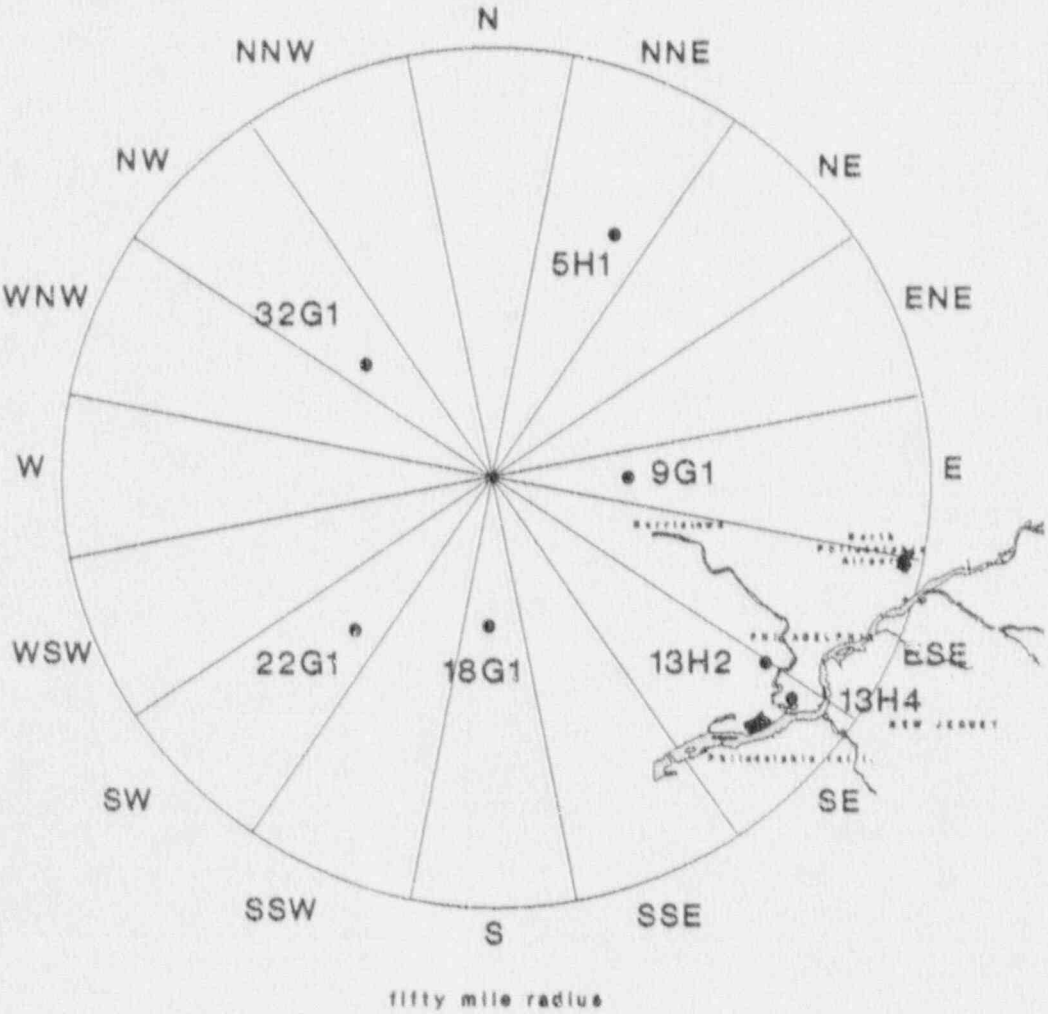
FIGURE B-3

AQUATIC AND TERRESTRIAL ENVIRONMENTAL SAMPLING STATIONS AT INTERMEDIATE DISTANCES FROM LIMERICK GENERATING STATION, 1990



10B1 FARM IN ESE SECTOR
10F2 PERKIOMEN CREEK
13B1 VINCENT DAM
15F4 PHIL. SUB. WATER CO.
15F7 PHOENIXVILLE WATER CO.
16B2 LINFIELD BRIDGE
16C2 CITIZENS HOME WATER CO.
16C4 VINCENT POOL
16C5 VINCENT POOL
18A1 ANDERSON ROAD
18C1 FARM IN S SECTOR
19B1 FARM IN SSW SECTOR
21B1 FARM IN SW SECTOR
22C1 FARM IN SW SECTOR
22F1 FARM IN SW SECTOR
25B1 FARM IN WSW SECTOR
28F3 POTTSTOWN WATER AUTH.
29C1 POTTSTOWN VICINITY
33A2 UPSTREAM OF LGS
36E1 FARM IN N SECTOR

FIGURE B-4
ENVIRONMENTAL SAMPLING STATIONS AT REMOTE
DISTANCES FROM LIMERICK GENERATING STATION, 1990



5H1 BIRCH SUBSTATION
9G1 FARM IN E SECTOR
13H2 BELMONT WATER WORKS
13H4 PECo BUILDING
18G1 PLANEBROOK SUBSTATION
22G1 MANOR SUBSTATION
32G1 FRIEDENBERG SUBSTATION

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PRIMARY LABORATORY

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TABLE C-I.1 CONCENTRATIONS OF GROSS BETA SOLUBLE IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	10F2	1381	1682	24S1
JAN 90	5 ± 1		4 ± 1	4 ± 1
FEB 90	10 ± 1		3.6 ± 0.9	3.4 ± 0.9
MAR 90	9 ± 1		4 ± 1	2.6 ± 1.0
APR 90	4 ± 1		2.8 ± 1.0	2.5 ± 1.0
MAY 90	10 ± 1		3 ± 1	2.1 ± 0.9
JUN 90	2.4 ± 0.9		3 ± 1	3 ± 1
JUL 90	4 ± 1	8 ± 1	7 ± 1	5 ± 1
AUG 90	5 ± 1	4 ± 1	4 ± 1	6 ± 1
SEP 90	4 ± 1	3 ± 1	4 ± 1	7 ± 1
OCT 90	6 ± 1	4 ± 1	12 ± 1	6 ± 1
NOV 90	5 ± 1	3 ± 1	4 ± 1	2.9 ± 1.0
DEC 90	6 ± 1	3.2 ± 1.0	3.0 ± 0.9	4 ± 1
MEAN	5.9 ± 5.0	4.2 ± 3.8	4.5 ± 5.2	4.0 ± 3.2

TABLE C-I.2 CONCENTRATIONS OF GROSS BETA INSOLUBLE IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	10F2	1381	1682	24S1
JAN 90	0.4 ± 0.4		0.6 ± 0.4	0.7 ± 0.4
FEB 90	0.7 ± 0.3		0.6 ± 0.3	0.6 ± 0.3
MAR 90	< 0.4		< 0.4	< 0.4
APR 90	2.3 ± 0.6		1.1 ± 0.5	1.9 ± 0.6
MAY 90	0.5 ± 0.5		< 0.5	< 0.4
JUN 90	0.6 ± 0.4		1.7 ± 0.5	< 0.4
JUL 90	< 0.3	< 0.3	1.7 ± 0.5	0.5 ± 0.3
AUG 90	< 0.4	< 0.4	< 0.4	< 0.4
SEP 90	< 0.4	< 0.4	< 0.4	< 0.4
OCT 90	0.6 ± 0.3	1.3 ± 0.4	0.7 ± 0.3	0.7 ± 0.3
NOV 90	< 0.4	0.6 ± 0.4	< 0.4	< 0.4
DEC 90	0.7 ± 0.5	1.2 ± 0.6	0.6 ± 0.5	0.5 ± 0.5
MEAN	0.6 ± 1.1	0.7 ± 0.9	0.8 ± 1.0	0.6 ± 0.8

TABLE C-I.3 CONCENTRATIONS OF H-3 AQUEOUS LIQ. SCINT. W/ENR II SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	10F2	1381	1682	24S1
JAN-MAR 90	< 40		210 ± 50	60 ± 40
APR-JUN 90	50 ± 30		150 ± 30	120 ± 30
JUL-SEP 90	< 30	200 ± 70	130 ± 50	70 ± 50
OCT-DEC 90	60 ± 50	60 ± 20	70 ± 40	90 ± 30
MEAN	50 ± 30	130 ± 200	140 ± 120	90 ± 50

TABLE C-1.4 CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STATION CODE	COLLECTION PERIOD	K-40	MN-54	CO-58	FE-59	CO-60	ZN-65	ZR-95	NB-95	CS-134	CS-137	BA-140	LA-140
1381	JUL 90	< 7	< 0.3	< 0.4	< 1	< 0.4	< 0.9	< 0.9	< 0.5	< 0.4	< 0.4	< 5	< 3
	AUG 90	< 5	< 0.3	< 0.3	< 0.8	< 0.3	< 0.6	< 0.7	< 0.4	< 0.3	< 0.4	< 2	< 0.9
	SEP 90	< 7	< 0.4	< 0.4	< 1.0	< 0.4	< 0.8	< 0.9	< 0.4	< 0.4	< 0.4	< 3	< 1
	OCT 90	< 9	< 0.3	< 0.4	< 0.9	< 0.4	< 0.7	< 0.8	< 0.4	< 0.3	< 0.4	< 3	< 1
	NOV 90	< 4	< 0.3	< 0.2	< 0.6	< 0.4	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 1	< 0.6
	DEC 90	7 ± 6	< 0.3	< 0.3	< 0.8	< 0.4	< 0.6	< 0.8	< 0.4	< 0.3	< 0.3	< 3	< 1
	MEAN	7 ± 4	< .3	< 0.3	< 0.9	< 0.4	< 0.7	< 0.8	< 0.4	< 0.3	< 0.4	< 3	< 1.3
10F2	JAN 90	< 20	< 0.7	< 0.8	< 2	< 1	< 2	< 1	< 0.7	< 0.7	< 0.8	< 3	< 5
	FEB 90	< 4	< 0.2	< 0.3	< 0.5	< 0.2	< 0.4	< 0.5	< 0.3	< 0.3	< 0.2	< 2	< 0.8
	MAR 90	7 ± 5	< 0.3	< 0.3	< 0.7	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.7
	APR 90	< 5	< 0.2	< 0.3	< 0.6	< 0.2	< 0.5	< 0.5	< 0.3	< 0.2	< 0.2	< 2	< 0.6
	MAY 90	< 5	< 0.2	< 0.2	< 0.5	< 0.3	< 0.5	< 0.5	< 0.3	< 0.2	< 0.3	< 1	< 0.5
	JUN 90	< 5	< 0.3	< 0.3	< 0.9	< 0.3	< 0.7	< 0.8	< 0.4	< 0.4	< 0.4	< 3	< 1
	JUL 90	< 5	< 0.3	< 0.4	< 1	< 0.4	< 0.6	< 0.7	< 0.4	< 0.4	< 0.4	< 5	< 3
	AUG 90	< 8	< 0.4	< 0.5	< 1	< 0.4	< 0.9	< 1	< 0.5	< 0.4	< 0.4	< 5	< 2
	SEP 90	< 20	< 0.6	< 0.7	< 2	< 0.7	< 2	< 2	< 0.8	< 0.7	< 0.7	< 5	< 2
	OCT 90	< 4	< 0.3	< 0.3	< 0.7	< 0.3	< 0.6	< 0.7	< 0.3	< 0.3	< 0.3	< 2	< 1
	NOV 90	9 ± 6	< 0.3	< 0.3	< 0.7	< 0.3	< 0.7	< 0.7	< 0.3	< 0.3	< 0.3	< 1	< 0.7
	DEC 90	13 ± 7	< 0.4	< 0.4	< 0.9	< 0.4	< 0.7	< 0.9	< 0.4	< 0.4	< 0.4	< 4	< 1
	MEAN	9 ± 12	< .4	< 0.4	< 1.0	< 0.4	< 0.9	< 0.8	< 0.4	< 0.4	< 0.4	< 3	< 1.5
16B2	JAN 90	17 ± 6	< 0.3	< 0.4	< 0.8	< 0.3	< 0.7	< 0.7	< 0.4	< 0.3	< 0.3	< 2	< 0.8
	FEB 90	< 4	< 0.2	< 0.3	< 0.7	< 0.3	< 0.5	< 0.5	< 0.3	< 0.3	< 0.3	< 2	< 0.9
	MAR 90	< 20	< 1	< 1	< 3	< 1	< 2	< 3	< 1	< 1	< 1	< 7	< 3
	APR 90	< 10	< 0.4	< 0.4	< 1.0	< 0.4	< 0.8	< 0.9	< 0.5	< 0.4	< 0.4	< 3	< 1
	MAY 90	< 5	< 0.3	< 0.3	< 0.7	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.6
	JUN 90	9 ± 7	< 0.4	< 0.4	< 0.9	< 0.4	< 0.8	< 0.9	< 0.4	< 0.4	< 0.4	< 3	< 1
	JUL 90	< 10	< 0.4	< 0.5	< 1	< 0.4	< 0.8	< 1.0	< 0.5	< 0.4	< 0.4	< 6	< 2
	AUG 90	8 ± 7	< 0.3	< 0.3	< 0.7	< 0.3	< 0.7	< 0.7	< 0.4	< 0.3	< 0.3	< 2	< 0.9
	SEP 90	< 10	< 0.4	< 0.4	< 1.0	< 0.5	< 0.9	< 0.9	< 0.5	< 0.4	< 0.4	< 3	< 1
	OCT 90	< 5	< 0.3	< 0.3	< 0.8	< 0.4	< 0.6	< 0.7	< 0.4	< 0.3	< 0.3	< 3	< 1
	NOV 90	8 ± 5	< 0.2	< 0.2	< 0.5	< 0.3	< 0.5	< 0.5	< 0.3	< 0.3	< 0.3	< 1	< 0.5
	DEC 90	< 4	< 0.3	< 0.3	< 0.7	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 1
	MEAN	9 ± 10	< .4	< 0.4	< 1.0	< 0.4	< 0.8	< 0.9	< 0.4	< 0.4	< 0.4	< 3	< 1.1

TABLE C-1.4 CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STATION CODE	COLLECTION PERIOD	K-40	MN-54	CO-58	FE-59	CO-60	ZN-65	ZR-95	NB-95	CS-134	CS-137	BA-140	LA-140
24S1	JAN 90	7 ± 4	< 0.2	< 0.2	< 0.5	< 0.3	< 0.5	< 0.5	< 0.2	< 0.2	< 0.2	< 2	< 0.6
	FEB 90	7 ± 5	< 0.3	< 0.3	< 0.6	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.9
	MAR 90	< 9	< 0.3	< 0.4	< 0.8	< 0.4	< 0.7	< 0.8	< 0.4	< 0.4	< 0.4	< 2	< 0.7
	APR 90	7 ± 5	< 0.3	< 0.3	< 0.7	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.9
	MAY 90	< 4	< 0.3	< 0.2	< 0.6	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 1	< 0.6
	JUN 90	< 5	< 0.2	< 0.3	< 0.6	< 0.2	< 0.5	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.6
	JUL 90	< 5	< 0.2	< 0.3	< 0.3	< 0.3	< 0.5	< 0.6	< 0.3	< 0.2	< 0.3	< 4	< 1
	AUG 90	< 7	< 0.3	< 0.4	< 0.8	< 0.4	< 0.7	< 0.8	< 0.4	< 0.4	< 0.4	< 2	< 1
	SEP 90	7 ± 5	< 0.3	< 0.3	< 0.7	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 1.0
	OCT 90	< 7	< 0.3	< 0.4	< 0.9	< 0.4	< 0.7	< 0.8	< 0.4	< 0.4	< 0.4	< 3	< 1
	NOV 90	9 ± 7	< 0.4	< 0.4	< 0.8	< 0.4	< 0.7	< 0.8	< 0.4	< 0.4	< 0.4	< 2	< 0.6
	DEC 90	< 7	< 0.3	< 0.4	< 0.9	< 0.4	< 0.7	< 0.8	< 0.4	< 0.4	< 0.4	< 3	< 2
	MEAN	7 ± 3	< .3	< 0.3	< 0.7	< 0.3	< 0.6	< 0.7	< 0.3	< 0.3	< 0.3	< 2	< 0.9
MEAN ALL STATIONS		8 ± 9	< .3	< 0.4	< 0.9	< 0.4	< 0.7	< 0.8	< 0.4	< 0.4	< 0.4	< 3	< 1.2

TABLE C-II.1 CONCENTRATIONS OF GROSS BETA SOLUBLE IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	13H2	15F4	15F7	16C2	28F3
JAN 90	4 ± 1	5 ± 1	4 ± 1	2.0 ± 1.0	4 ± 1
FEB 90	3.6 ± 0.9	4.5 ± 1.0	3.7 ± 1.0	2.7 ± 0.9	3.4 ± 0.9
MAR 90	3 ± 1	6 ± 1	5 ± 1	1.9 ± 1.0	3 ± 1
APR 90	3 ± 1	4 ± 1	3 ± 1	2 ± 1	3 ± 1
MAY 90	3 ± 1	3.0 ± 1.0	2.3 ± 1.0	2 ± 1	3 ± 1
JUN 90	3 ± 1	4 ± 1	5 ± 1	3 ± 1	4 ± 1
JUL 90	4 ± 1	6 ± 1	6 ± 1	4 ± 1	5 ± 1
AUG 90	5 ± 1	5 ± 1	5 ± 1	2.1 ± 1.0	5 ± 1
SEP 90	5 ± 1	5 ± 1	5 ± 1	2 ± 1	4 ± 1
OCT 90	7 ± 1	6 ± 1	12 ± 1	4 ± 1	4 ± 1
NOV 90	4 ± 1	5 ± 1	4 ± 1	3 ± 1	3 ± 1
DEC 90	4 ± 1	6 ± 1	3.2 ± 1.0	3 ± 1	3.0 ± 1.0
MEAN	4.1 ± 2.3	5.0 ± 1.9	4.9 ± 5.0	2.6 ± 1.5	3.7 ± 1.5

TABLE C-II.2 CONCENTRATIONS OF GROSS BETA INSOLUBLE IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	13H2	15F4	15F7	16C2	28F3
JAN 90	0.7 ± 0.4	0.6 ± 0.4	0.5 ± 0.4	0.7 ± 0.4	0.4 ± 0.4
FEB 90	0.4 ± 0.3	0.3 ± 0.3	< 0.3	0.7 ± 0.3	< 0.3
MAR 90	< 0.4	< 0.4	< 0.4	0.5 ± 0.4	< 0.4
APR 90	1.6 ± 0.6	1.6 ± 0.6	2.0 ± 0.6	2.1 ± 0.6	1.5 ± 0.6
MAY 90	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
JUN 90	< 0.4	< 0.4	< 0.4	0.6 ± 0.4	< 0.4
JUL 90	< 0.3	< 0.3	< 0.3	0.8 ± 0.4	< 0.3
AUG 90	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
SEP 90	0.8 ± 0.5	< 0.4	< 0.4	< 0.4	< 0.4
OCT 90	< 0.3	< 0.3	< 0.4	0.7 ± 0.3	< 0.2
NOV 90	< 0.4	< 0.4	< 0.4	6.4 ± 0.7	< 0.4
DEC 90	< 0.4	< 0.5	< 0.4	1.8 ± 0.6	< 0.4
MEAN	0.5 ± 0.7	0.5 ± 0.7	0.5 ± 0.9	1.3 ± 3.4	0.5 ± 0.7

TABLE C-II.3 CONCENTRATIONS OF H-3 AQUEOUS LIQ. SCINT. W/ENR IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	13H2	15F4	15F7	16C2	28F3
JAN-MAR 90	60 ± 40	< 50	< 50	60 ± 50	40 ± 40
APR-JUN 90	90 ± 30	100 ± 30	120 ± 30	80 ± 30	90 ± 30
JUL-SEP 90	170 ± 60	90 ± 50	80 ± 30	< 50	< 50
OCT-DEC 90	70 ± 60	50 ± 40	80 ± 50	< 50	50 ± 40
MEAN	100 ± 100	70 ± 50	80 ± 60	60 ± 30	60 ± 40

TABLE C-II.4 CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STATION CODE	COLLECTION PERIOD	K-40	MN-54	CO-58	FE-59	CO-60	ZN-65	ZR-95	NB-95	CS-134	CS-137	BA-140	LA-140
13H2	JAN 90	< 6	< 0.3	< 0.3	< 0.7	< 0.4	< 0.7	< 0.7	< 0.4	< 0.3	< 0.3	< 2	< 0.9
	FEB 90	< 9	< 0.3	< 0.4	< 0.8	< 0.4	< 0.7	< 0.7	< 0.4	< 0.4	< 0.4	< 2	< 0.8
	MAR 90	< 10	< 0.4	< 0.4	< 0.8	< 0.4	< 0.8	< 0.8	< 0.4	< 0.4	< 0.4	< 2	< 0.8
	APR 90	< 6	< 0.3	< 0.3	< 0.7	< 0.3	< 0.7	< 0.7	< 0.4	< 0.3	< 0.3	< 1	< 0.6
	MAY 90	9 ± 6	< 0.3	< 0.3	< 0.7	< 0.4	< 0.7	< 0.7	< 0.4	< 0.3	< 0.4	< 1	< 0.5
	JUN 90	11 ± 6	< 0.3	< 0.3	< 0.6	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.9
	JUL 90	12 ± 7	< 0.3	< 0.4	< 1	< 0.3	< 0.7	< 0.9	< 0.4	< 0.4	< 0.4	< 5	< 2
	AUG 90	13 ± 7	< 0.2	< 0.3	< 0.8	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.9
	SEP 90	< 4	< 0.3	< 0.3	< 0.6	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.6
	OCT 90	< 4	< 0.2	< 0.3	< 0.6	< 0.2	< 0.5	< 0.5	< 0.3	< 0.2	< 0.2	< 2	< 1.0
	NOV 90	< 4	< 0.2	< 0.2	< 0.5	< 0.2	< 0.4	< 0.5	< 0.2	< 0.2	< 0.2	< 1	< 0.5
	DEC 90	< 5	< 0.2	< 0.3	< 0.6	< 0.3	< 0.5	< 0.6	< 0.3	< 0.3	< 0.2	< 2	< 1
	MEAN	8 ± 7	< .3	< 0.3	< 0.7	< 0.3	< 0.6	< 0.7	< 0.3	< 0.3	< 0.3	< 2	< 0.9
15F4	JAN 90	< 5	< 0.3	< 0.3	< 0.6	< 0.3	< 0.5	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.9
	FEB 90	< 4	< 0.2	< 0.3	< 0.6	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.8
	MAR 90	< 5	< 0.2	< 0.3	< 0.5	< 0.3	< 0.5	< 0.5	< 0.2	< 0.3	< 0.2	< 2	< 0.6
	APR 90	< 20	< 0.7	< 0.7	< 2	< 1	< 2	< 1	< 0.7	< 0.6	< 0.6	< 2	< 3
	MAY 90	< 9	< 0.3	< 0.3	< 0.7	< 0.4	< 0.7	< 0.8	< 0.4	< 0.4	< 0.4	< 2	< 0.6
	JUN 90	< 6	< 0.3	< 0.3	< 0.6	< 0.3	< 0.5	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.8
	JUL 90	5 ± 5	< 0.3	< 0.4	< 1	< 0.3	< 0.7	< 0.8	< 0.4	< 0.3	< 0.3	< 4	< 2
	AUG 90	< 5	< 0.3	< 0.3	< 0.6	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.8
	SEP 90	< 10	< 0.3	< 0.4	< 0.8	< 0.4	< 0.8	< 0.8	< 0.4	< 0.4	< 0.4	< 3	< 0.9
	OCT 90	< 5	< 0.3	< 0.3	< 0.8	< 0.3	< 0.6	< 0.7	< 0.4	< 0.3	< 0.3	< 3	< 1
	NOV 90	< 10	< 0.4	< 0.4	< 0.9	< 0.5	< 0.9	< 0.9	< 0.4	< 0.4	< 0.4	< 3	< 0.9
	DEC 90	< 10	< 0.4	< 0.5	< 1	< 0.4	< 0.9	< 1	< 0.5	< 0.4	< 0.4	< 4	< 1
	MEAN	8 ± 9	< .3	< 0.4	< 0.8	< 0.4	< 0.8	< 0.7	< 0.4	< 0.4	< 0.4	< 3	< 1.1

TABLE C-II.4 CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STATION CODE	COLLECTION PERIOD	K-40	MN-54	CO-58	FE-59	CO-60	ZN-65	ZR-95	NB-95	CS-134	CS-137	BA-140	LA-140
15F7	JAN 90	< 3	< 0.3	< 0.3	< 0.6	< 0.3	< 0.5	< 0.5	< 0.3	< 0.3	< 0.2	< 2	< 0.9
	FEB 90	7 ± 5	< 0.2	< 0.2	< 0.6	< 0.2	< 0.5	< 0.5	< 0.3	< 0.3	< 0.3	< 2	< 0.6
	MAR 90	18 ± 6	< 0.3	< 0.3	< 0.7	< 0.3	< 0.7	< 0.7	< 0.4	< 0.3	< 0.3	< 2	< 0.7
	APR 90	< 4	< 0.2	< 0.3	< 0.5	< 0.3	< 0.5	< 0.5	< 0.3	< 0.3	< 0.3	< 1	< 0.5
	MAY 90	< 5	< 0.3	< 0.3	< 0.6	< 0.3	< 0.6	< 0.7	< 0.3	< 0.3	< 0.3	< 1	< 0.6
	JUN 90	< 10	< 0.4	< 0.4	< 1	< 0.4	< 0.8	< 0.9	< 0.5	< 0.4	< 0.4	< 3	< 1
	JUL 90	< 5	< 0.3	< 0.3	< 0.8	< 0.3	< 0.7	< 0.7	< 0.3	< 0.3	< 0.3	< 4	< 2
	AUG 90	< 20	< 0.7	< 0.7	< 2	< 0.6	< 2	< 2	< 0.8	< 0.7	< 0.7	< 5	< 2
	SEP 90	< 6	< 0.3	< 0.3	< 0.7	< 0.4	< 0.7	< 0.7	< 0.4	< 0.3	< 0.4	< 2	< 1.0
	OCT 90	< 4	< 0.3	< 0.3	< 0.7	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 1
	NOV 90	< 5	< 0.3	< 0.3	< 0.6	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.7
	DEC 90	< 5	< 0.3	< 0.3	< 0.7	< 0.3	< 0.5	< 0.7	< 0.3	< 0.3	< 0.3	< 3	< 1
	MEAN	8 ± 11	< .3	< 0.3	< 0.8	< 0.3	< 0.7	< 0.8	< 0.4	< 0.3	< 0.3	< 2	< 1.0
16C2	JAN 90	12 ± 6	< 0.3	< 0.3	< 0.7	< 0.4	< 0.7	< 0.8	< 0.4	< 0.4	< 0.3	< 2	< 0.8
	FEB 90	< 30	< 0.7	< 0.7	< 2	< 1	< 2	< 1	< 0.8	< 0.8	< 0.6	< 3	< 5
	MAR 90	6 ± 6	< 0.3	< 0.3	< 0.7	< 0.3	< 0.6	< 0.7	< 0.3	< 0.3	< 0.3	< 2	< 0.8
	APR 90	< 20	< 0.7	< 0.7	< 2	< 1	< 2	< 1	< 0.7	< 0.8	< 0.6	< 2	< 3
	MAY 90	< 5	< 0.3	< 0.3	< 0.6	< 0.3	< 0.6	< 0.5	< 0.3	< 0.3	< 0.3	< 1	< 0.6
	JUN 90	< 10	< 0.4	< 0.4	< 1.0	< 0.5	< 0.8	< 0.9	< 0.4	< 0.4	< 0.4	< 3	< 1
	JUL 90	< 10	< 0.4	< 0.4	< 1	< 0.4	< 0.8	< 0.9	< 0.5	< 0.4	< 0.4	< 5	< 2
	AUG 90	< 4	< 0.2	< 0.2	< 0.5	< 0.2	< 0.5	< 0.5	< 0.3	< 0.2	< 0.2	< 2	< 0.7
	SEP 90	< 5	< 0.2	< 0.2	< 0.5	< 0.3	< 0.5	< 0.5	< 0.3	< 0.3	< 0.3	< 1	< 0.6
	OCT 90	< 20	< 0.8	< 1	< 2	< 0.8	< 2	< 2	< 1	< 0.9	< 0.9	< 10	< 5
	NOV 90	12 ± 7	< 0.4	< 0.4	< 0.8	< 0.4	< 0.8	< 0.8	< 0.4	< 0.4	< 0.4	< 2	< 0.8
	DEC 90	< 10	< 0.4	< 0.4	< 1	< 0.4	< 0.8	< 1	< 0.5	< 0.4	< 0.4	< 4	< 1
	MEAN	12 ± 16	< .4	< 0.4	< 1.1	< 0.5	< 1.0	< 0.9	< 0.5	< 0.5	< 0.4	< 3	< 1.8

TABLE C-11.4 CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STATION CODE	COLLECTION PERIOD	K-40	MN-54	CO-58	FE-59	CO-60	ZN-65	ZR-95	NB-95	CS-134	CS-137	BA-140	LA-140
28F3	JAN 90	30 ± 30	< 0.7	< 0.7	< 3	< 1	< 2	< 1	< 0.7	< 0.7	< 0.6	< 3	< 4
	FEB 90	< 5	< 0.3	< 0.3	< 0.8	< 0.3	< 0.6	< 0.7	< 0.3	< 0.3	< 0.3	< 2	< 0.9
	MAR 90	< 4	< 0.3	< 0.3	< 0.6	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 2	< 0.8
	APR 90	< 6	< 0.3	< 0.3	< 0.7	< 0.3	< 0.7	< 0.7	< 0.3	< 0.3	< 0.3	< 2	< 0.6
	MAY 90	< 4	< 0.2	< 0.2	< 0.5	< 0.2	< 0.5	< 0.5	< 0.2	< 0.2	< 0.2	< 1	< 0.5
	JUN 90	< 5	< 0.4	< 0.4	< 0.8	< 0.3	< 0.7	< 0.8	< 0.4	< 0.4	< 0.4	< 3	< 1
	JUL 90	< 6	< 0.3	< 0.3	< 0.7	< 0.4	< 0.7	< 0.8	< 0.4	< 0.3	< 0.3	< 4	< 2
	AUG 90	14 ± 8	< 0.3	< 0.3	< 0.7	< 0.3	< 0.6	< 0.7	< 0.3	< 0.3	< 0.3	< 2	< 1.0
	SEP 90	< 7	< 0.4	< 0.4	< 0.8	< 0.4	< 0.7	< 0.8	< 0.4	< 0.4	< 0.4	< 2	< 1.0
	OCT 90	12 ± 6	< 0.3	< 0.4	< 0.9	< 0.4	< 0.7	< 0.8	< 0.4	< 0.3	< 0.4	< 4	< 1
	NOV 90	< 5	< 0.2	< 0.3	< 0.6	< 0.3	< 0.6	< 0.6	< 0.3	< 0.3	< 0.3	< 1	< 0.6
	DEC 90	< 5	< 0.2	< 0.3	< 0.7	< 0.3	< 0.5	< 0.6	< 0.3	< 0.3	< 0.3	< 3	< 1
	MEAN	9 ± 15	< .3	< 0.4	< 0.9	< 0.4	< 0.7	< 0.7	< 0.4	< 0.3	< 0.3	< 2	< 1.2
MEAN ALL STATIONS		9 ± 12	< .3	< 0.4	< 0.9	< 0.4	< 0.8	< 0.8	< 0.4	< 0.4	< 0.4	< 3	< 1.2

TABLE C-III.1 CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/GRAM (WET) ± 2 SIGMA

STATION CODE	MEDIA	COLLECTION PERIOD	K-40	MN-54	CO-58	FE-59	CO-60	ZN-65	CS-134	CS-137
16C5	PREDATOR	05/22-05/22	3.2 ± 0.3	< 0.009	< 0.01	< 0.02	< 0.01	< 0.02	< 0.010	< 0.01
		10/05-10/05	3.2 ± 0.3	< 0.008	< 0.01	< 0.03	< 0.009	< 0.02	< 0.008	< 0.009
		MEAN	3.2 ± 0.0	< 0.009	< 0.01	< 0.03	< 0.010	< 0.02	< 0.009	< 0.010
	BOTTOM FEEDER	05/22-05/22	3.6 ± 0.4	< 0.005	< 0.006	< 0.01	< 0.005	< 0.01	< 0.006	< 0.006
		10/05-11/09	3.4 ± 0.3	< 0.005	< 0.005	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005
		MEAN	3.5 ± 0.3	< 0.005	< 0.006	< 0.01	< 0.005	< 0.01	< 0.006	< 0.006
20S1	PREDATOR	05/21-05/21	3.0 ± 0.3	< 0.008	< 0.008	< 0.02	< 0.009	< 0.02	< 0.008	< 0.009
		09/21-09/21	2.6 ± 0.3	< 0.007	< 0.008	< 0.02	< 0.008	< 0.01	< 0.008	< 0.007
		MEAN	2.8 ± 0.6	< 0.008	< 0.008	< 0.02	< 0.009	< 0.02	< 0.008	< 0.008
	BOTTOM FEEDER	05/21-05/21	3.7 ± 0.4	< 0.005	< 0.006	< 0.02	< 0.006	< 0.01	< 0.006	< 0.007
		09/21-09/21	3.1 ± 0.3	< 0.005	< 0.006	< 0.01	< 0.005	< 0.01	< 0.005	< 0.005
		MEAN	3.4 ± 0.8	< 0.005	< 0.006	< 0.02	< 0.006	< 0.01	< 0.006	< 0.006
29C1	PREDATOR	05/24-05/24	3.4 ± 0.3	< 0.007	< 0.008	< 0.02	< 0.008	< 0.02	< 0.008	< 0.008
		11/16-11/28	3.1 ± 0.3	< 0.006	< 0.006	< 0.02	< 0.007	< 0.01	< 0.006	< 0.006
		MEAN	3.3 ± 0.4	< 0.007	< 0.007	< 0.02	< 0.008	< 0.02	< 0.007	< 0.007
	BOTTOM FEEDER	05/24-05/24	3.3 ± 0.3	< 0.006	< 0.006	< 0.02	< 0.007	< 0.01	< 0.007	< 0.006
		11/21-11/21	3.1 ± 0.3	< 0.004	< 0.005	< 0.01	< 0.004	< 0.010	< 0.005	< 0.005
		MEAN	3.2 ± 0.3	< 0.005	< 0.006	< 0.02	< 0.006	< 0.010	< 0.006	< 0.006
MEAN ALL STATIONS	PREDATOR		3.1 ± 0.5	< 0.008	< 0.008	< 0.02	< 0.009	< 0.02	< 0.008	< 0.008
	BOTTOM FEEDER		3.4 ± 0.5	< 0.005	< 0.006	< 0.01	< 0.005	< 0.010	< 0.006	< 0.006

TABLE C-IV.1 CONCENTRATIONS OF GAMMA EMITTERS IN SILT SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/GRAM (DRY) ± 2 SIGMA

STATION CODE	COLLECTION PERIOD	BE-7	K-40	CS-134	CS-137	RA-226	TH-228
16B2	05/25-05/25	2.5 ± 0.4	14 ± 1	< 0.02	0.26 ± 0.04	1.6 ± 0.7	1.3 ± 0.1
	11/27-11/27	0.7 ± 0.6	14 ± 1	< 0.03	0.12 ± 0.05	2.5 ± 0.9	1.4 ± 0.1
	MEAN	1.6 ± 2.5	14 ± 0	< 0.03	0.19 ± 0.20	2.1 ± 1.3	1.4 ± 0.1
16C4	05/25-05/25	5.5 ± 0.8	16 ± 2	< 0.03	0.31 ± 0.07	2 ± 1	1.9 ± 0.2
	11/27-11/27	1.5 ± 0.6	15 ± 2	< 0.03	0.27 ± 0.06	2.5 ± 0.8	1.2 ± 0.1
	MEAN	3.5 ± 5.7	16 ± 1	< 0.03	0.29 ± 0.06	2.3 ± 0.7	1.6 ± 1.0
33A2	05/25-05/25	2.8 ± 0.6	12 ± 1	< 0.03	0.11 ± 0.06	2.2 ± 1.0	1.4 ± 0.1
	11/27-11/27	< 0.2	10 ± 1	< 0.02	< 0.02	1.9 ± 0.6	1.0 ± 0.1
	MEAN	1.5 ± 3.7	11 ± 3	< 0.03	0.07 ± 0.13	2.1 ± 0.4	1.2 ± 0.6
MEAN ALL STATIONS		2.2 ± 3.8	14 ± 4	< 0.03	0.18 ± 0.23	2.1 ± 0.7	1.4 ± 0.6

TABLE C-V.1 CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF E-3 PCI/CU. METER ± 2 SIGMA

GROUP I - ON-SITE LOCATIONS

WEEK	1053		1161		1431		3452	
01	24	± 4	19	± 3	20	± 3	47	± 8
02	20	± 3	18	± 3	17	± 3	19	± 3
03	17	± 2	16	± 2	16	± 2	17	± 2
04	19	± 3	20	± 3	17	± 3	18	± 3
05	10	± 3	11	± 3	13	± 3	11	± 3
06	15	± 3	16	± 3	18	± 3	15	± 3
07	16	± 3	18	± 3	18	± 3	18	± 3
08	12	± 3	12	± 3	12	± 3	15	± 4
09	21	± 3	20	± 3	15	± 3	19	± 3
10	22	± 3	22	± 3	22	± 3	24	± 3
11	16	± 3	12	± 3	19	± 3	16	± 3
12	15	± 3	14	± 3	18	± 3	16	± 3
13	13	± 3	10	± 3	9	± 2	7	± 2
14	10	± 3	11	± 3	13	± 3	11	± 3
15	12	± 3	13	± 3	12	± 3	15	± 3
16	19	± 3	16	± 3	20	± 3	19	± 3
17	19	± 3	21	± 3	20	± 3	21	± 3
18	6	± 3	6	± 3	7	± 3	8	± 3
19	13	± 3	12	± 3	14	± 3	12	± 3
20	11	± 3	8	± 3	9	± 3	7	± 4
21	6	± 2	6	± 2	3	± 2	7	± 2
22	10	± 3	19	± 3	11	± 3	12	± 3
23	10	± 3	9	± 3	10	± 3	15	± 3
24	14	± 3	12	± 3	11	± 3	12	± 3
25	10	± 3	12	± 3	13	± 3	(1)	
26	21	± 3	20	± 3	19	± 3	19	± 3
27	12	± 3	15	± 3	12	± 3	12	± 3
28	13	± 2	17	± 3	14	± 3	13	± 2
29	22	± 4	24	± 4	25	± 4	21	± 3
30	13	± 4	11	± 2	13	± 3	11	± 2
31	17	± 3	19	± 3	16	± 3	17	± 3
32	13	± 3	14	± 3	(1)		16	± 3
33	12	± 4	12	± 4	13	± 4	13	± 4
34	13	± 3	10	± 3	10	± 3	11	± 3
35	24	± 4	22	± 3	19	± 3	20	± 3
36	15	± 3	17	± 3	15	± 3	19	± 3
37	19	± 3	24	± 4	23	± 4	23	± 4
38	11	± 3	10	± 3	10	± 3	11	± 3
39	20	± 3	24	± 3	20	± 3	20	± 3
40	19	± 3	16	± 3	16	± 4	19	± 3
41	13	± 3	12	± 3	14	± 3	14	± 3
42	17	± 3	16	± 3	14	± 3	15	± 3
43	15	± 3	17	± 3	15	± 3	16	± 3
44	30	± 4	32	± 4	35	± 4	31	± 4
45	16	± 3	21	± 3	17	± 3	17	± 3
46	21	± 3	23	± 3	24	± 3	24	± 3
47	22	± 3	22	± 3	21	± 3	20	± 3
48	29	± 3	23	± 3	26	± 3	20	± 3
49	20	± 3	20	± 3	24	± 3	20	± 3
50	21	± 3	22	± 3	20	± 3	21	± 3
51	14	± 3	15	± 3	13	± 3	13	± 3
52	19	± 3	20	± 3	18	± 3	20	± 3
MEAN	16	± 10	16	± 11	16	± 11	17	± 13

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-V.1 CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF E-3 PCI/CU. METER ± 2 SIGMA

GROUP II - INTERMEDIATE DISTANCE LOCATIONS

WEEK	2B1		6C1		9C1		13C1		15D1		17B1	
01	20	± 3	19	± 3	22	± 3	18	± 3	20	± 3	17	± 3
02	17	± 3	17	± 3	18	± 3	18	± 3	18	± 3	16	± 3
03	18	± 2	16	± 2	16	± 2	20	± 2	17	± 2	14	± 2
04	19	± 3	20	± 3	18	± 3	21	± 3	20	± 3	16	± 3
05	13	± 3	16	± 3	12	± 3	14	± 3	12	± 3	12	± 3
06	12	± 3	15	± 3	15	± 3	14	± 3	17	± 3	12	± 3
07	18	± 3	17	± 3	18	± 3	21	± 3	20	± 3	18	± 3
08	11	± 3	13	± 3	15	± 4	14	± 4	13	± 3	14	± 3
09	17	± 3	16	± 3	19	± 3	16	± 3	20	± 3	19	± 3
10	23	± 3	22	± 3	23	± 3	21	± 3	20	± 3	24	± 3
11	16	± 3	15	± 3	17	± 3	16	± 3	15	± 3	15	± 3
12	14	± 3	14	± 3	14	± 3	15	± 3	14	± 3	12	± 3
13	9	± 3	9	± 3	11	± 3	7	± 2	8	± 2	6	± 2
14	11	± 3	9	± 2	12	± 3	10	± 3	10	± 3	9	± 3
15	13	± 3	13	± 3	16	± 3	14	± 3	16	± 3	12	± 3
16	17	± 3	19	± 3		(1)	16	± 3	20	± 3	16	± 3
17	19	± 3	19	± 3	20	± 3	21	± 3	26	± 4	18	± 3
18	6	± 3	5	± 3	6	± 3	7	± 3	5	± 3	4	± 3
19	15	± 3	11	± 3	13	± 3	14	± 3	13	± 3	17	± 3
20	11	± 3	10	± 3	10	± 3	9	± 3	9	± 3	7	± 3
21	9	± 3	6	± 2	9	± 3	8	± 2	6	± 2	9	± 3
22	13	± 3	13	± 3	10	± 3	11	± 3	13	± 3	11	± 3
23	13	± 3	9	± 3	12	± 3	10	± 3	11	± 3	10	± 3
24	13	± 3	14	± 3	12	± 3	11	± 3	10	± 3	12	± 3
25	11	± 3	10	± 3	11	± 3	10	± 3	13	± 3	11	± 3
26	17	± 3	18	± 3	19	± 3	21	± 3	16	± 3	17	± 3
27	17	± 3	14	± 3	11	± 3	13	± 3	11	± 3		(1)
28	14	± 3		(1)	15	± 3	15	± 3	12	± 2	15	± 3
29	21	± 4	28	± 5	25	± 4	22	± 3	24	± 4	30	± 4
30	10	± 2	10	± 2	11	± 3	10	± 2	13	± 3	10	± 2
31	17	± 3	17	± 3	17	± 3	17	± 3	16	± 3	19	± 3
32	16	± 3	14	± 3	16	± 3	14	± 3	17	± 3	11	± 3
33	16	± 4	14	± 4	11	± 4	15	± 4	11	± 4	8	± 4
34	9	± 3	11	± 3	12	± 3	13	± 3		(1)	14	± 3
35	20	± 5	16	± 3	19	± 3	33	± 6	22	± 5	20	± 3
36	19	± 3	16	± 3	19	± 3	15	± 3	22	± 3	16	± 3
37	24	± 4	20	± 4	25	± 4	22	± 4	21	± 4	25	± 4
38	10	± 3	10	± 3	12	± 3	12	± 3	13	± 3	15	± 3
39	20	± 3	21	± 3	18	± 3	19	± 3	17	± 3	21	± 3
40	18	± 3	15	± 3	18	± 3	19	± 3	18	± 3	17	± 3
41	13	± 3	33	± 4	15	± 3	12	± 3	23	± 3	18	± 3
42	16	± 3	15	± 3	14	± 3	14	± 3	18	± 3	16	± 3
43	16	± 3	17	± 3	15	± 3	15	± 3	16	± 3	18	± 3
44	31	± 4	30	± 4	32	± 4		(1)	35	± 4	35	± 4
45	17	± 3	14	± 3	18	± 3	19	± 4	17	± 3	16	± 3
46	24	± 3		(1)	25	± 4	24	± 4	24	± 3	23	± 3
47	22	± 3	20	± 3	21	± 3	24	± 3	21	± 3	21	± 3
48	23	± 3	24	± 3	24	± 3	22	± 3	19	± 3	24	± 3
49	20	± 3	21	± 3	22	± 3	20	± 3	23	± 3	19	± 3
50	20	± 3	20	± 3	23	± 3	17	± 3	23	± 3	21	± 3
51	16	± 3	11	± 3	12	± 3	17	± 3	15	± 3	16	± 3
52	22	± 3	19	± 3	20	± 3	23	± 3	20	± 3	18	± 3
MEAN	16	± 10	16	± 11	16	± 10	16	± 10	17	± 11	16	± 12

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-V.1 CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF E-3 PCI/CU. METER ± 2 SIGMA

GROUP II - INTERMEDIATE DISTANCE LOCATIONS

WEEK	2001		2681		2981		3101		3581	
01	20	± 3	20	± 3	16	± 3	22	± 3	17	± 3
02	16	± 3	16	± 3	18	± 3	18	± 3	17	± 3
03	14	± 2	15	± 2	17	± 2	17	± 3	16	± 3
04	18	± 3	17	± 3	19	± 3	16	± 3	18	± 3
05	10	± 3	11	± 3	10	± 3	13	± 3	12	± 3
06	16	± 3	16	± 3	16	± 3	15	± 3	16	± 3
07	20	± 3	20	± 3	19	± 3	20	± 3	19	± 3
08	12	± 3	15	± 4	10	± 3	14	± 3	13	± 3
09	21	± 3	20	± 3	20	± 3	18	± 3	17	± 3
10	19	± 3	22	± 3	22	± 3	23	± 3	23	± 3
11	13	± 3	13	± 3	15	± 3	16	± 3	13	± 3
12	15	± 3	16	± 3	18	± 3	14	± 3	15	± 3
13	9	± 3	11	± 3	9	± 3	9	± 3	9	± 3
14	12	± 3	12	± 3	10	± 3	7	± 2	9	± 3
15	13	± 3	16	± 3	14	± 3	13	± 3	16	± 3
16	17	± 3	19	± 3	20	± 3	16	± 3	23	± 3
17	19	± 3	20	± 3	19	± 3	16	± 3	21	± 3
18	12	± 3	14	± 3	13	± 3	14	± 3	12	± 3
19	13	± 3	14	± 3	14	± 3	13	± 3	13	± 3
20	8	± 3	13	± 3	9	± 3	11	± 3	11	± 3
21	6	± 2	7	± 2	6	± 2	5	± 2	7	± 3
22	12	± 3	14	± 3	11	± 3	14	± 3	16	± 3
23	10	± 3	13	± 3	10	± 3	13	± 3	9	± 3
24	13	± 3	10	± 3	13	± 3	13	± 3	14	± 3
25	12	± 4	10	± 3	11	± 3	11	± 3	12	± 3
26	18	± 3	18	± 3	14	± 3	18	± 3	18	± 3
27	15	± 3	10	± 3	10	± 3	22	± 4	16	± 3
28	14	± 3	14	± 3	15	± 3	13	± 3	14	± 3
29	26	± 4	22	± 4	31	± 4	26	± 4	29	± 4
30	10	± 2	11	± 2	13	± 3	11	± 3	12	± 3
31	16	± 3	16	± 3	18	± 3	14	± 3	16	± 3
32	14	± 3	12	± 3	14	± 3	15	± 3	19	± 3
33		(1)	10	± 4	28	± 3	29	± 3	27	± 3
34	19	± 5	11	± 3	12	± 3	11	± 3	11	± 3
35	23	± 4	24	± 4	19	± 3	20	± 5	24	± 5
36	15	± 3	13	± 3	17	± 3	17	± 3	15	± 3
37	20	± 4	21	± 4	23	± 4	20	± 4	23	± 4
38	12	± 3	14	± 3	13	± 3	12	± 3	10	± 3
39	20	± 3	17	± 3	20	± 3	20	± 3	22	± 3
40	13	± 3	18	± 3	19	± 3	19	± 3	17	± 3
41	12	± 3	12	± 3	14	± 3	12	± 3	13	± 3
42	13	± 3	12	± 3	17	± 3	14	± 3	17	± 3
43	17	± 3	16	± 3	17	± 3	16	± 3	16	± 3
44	32	± 4	30	± 4	29	± 4	36	± 4	33	± 4
45	19	± 3	17	± 3	16	± 3	15	± 3	17	± 3
46	25	± 3	21	± 3	24	± 3	24	± 3	24	± 3
47	21	± 3	23	± 3	21	± 3	21	± 3	22	± 3
48	23	± 3	26	± 3	27	± 3	22	± 3	24	± 3
49	21	± 3	21	± 3	20	± 3	20	± 3	20	± 3
50	23	± 3	20	± 3	20	± 3	20	± 3	19	± 3
51	15	± 3	13	± 3	15	± 3	14	± 3	16	± 3
52	18	± 3	17	± 3	17	± 3	21	± 3	20	± 3
MEAN	16	± 10	16	± 9	17	± 11	17	± 11	17	± 11

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-V.1 CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF E-3 PCI/CU. METER ± 2 SIGMA

GROUP III - CONTROL LOACATIONS

WEEK	13H4		22G1	
01	28	± 4	21	± 4
02	22	± 3	18	± 3
03	24	± 3	21	± 3
04	20	± 3	15	± 3
05	14	± 3	14	± 3
06	17	± 3	15	± 3
07	30	± 3	17	± 3
08	11	± 3	12	± 3
09	21	± 3	18	± 3
10	21	± 3	24	± 3
11	19	± 3	14	± 3
12		(1)	16	± 3
13	12	± 3	10	± 3
14	12	± 2	10	± 3
15	19	± 3	13	± 3
16	19	± 3	20	± 3
17	22	± 3	22	± 3
18	17	± 3	14	± 3
19	5	± 3	16	± 3
20	26	± 3	11	± 3
21	21	± 3	5	± 2
22	15	± 3	10	± 3
23	14	± 3	9	± 3
24	12	± 2	10	± 3
25	21	± 3	13	± 3
26	18	± 3	20	± 3
27	18	± 3	18	± 3
28	21	± 3	11	± 2
29	22	± 3	24	± 4
30	12	± 3	11	± 2
31	16	± 3	15	± 3
32	22	± 3	13	± 3
33	22	± 3	26	± 3
34	11	± 3	< 2	
35	25	± 3	20	± 4
36	23	± 3	13	± 3
37	22	± 3	18	± 3
38	16	± 3	11	± 3
39	23	± 3	17	± 3
40	21	± 3	15	± 3
41	15	± 3	11	± 3
42	18	± 3	12	± 3
43	18	± 3	14	± 3
44	34	± 4	29	± 4
45	21	± 3	17	± 3
46	25	± 4	24	± 3
47	26	± 3	21	± 3
48	27	± 3	23	± 3
49	24	± 3	18	± 3
50	21	± 3	19	± 3
51	28	± 9	16	± 3
52	26	± 3	17	± 3
MEAN	20	± 11	16	± 11

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-V.2 CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF E-3 PCI/CU. METER ± 2 SIGMA

STATION CODE	COLLECTION PERIOD	BE-7	K-40	CS-134	CS-137
10S3	01/01-04/02/90	53 ± 7	< 4	< 0.2	< 0.2
	04/02-07/02/90	54 ± 7	< 8	< 0.3	< 0.3
	07/02-10/01/90	57 ± 7	10 ± 5	< 0.2	< 0.2
	10/01-12/31/90	64 ± 7	< 4	< 0.2	< 0.2
	MEAN	57 ± 10	7 ± 6	< 0.2	< 0.2
11S1	01/01-04/02/90	57 ± 6	< 4	< 0.2	< 0.1
	04/02-07/02/90	52 ± 7	6 ± 4	< 0.2	< 0.2
	07/02-10/01/90	59 ± 7	< 8	< 0.3	< 0.3
	10/01-12/31/90	52 ± 7	< 8	< 0.3	< 0.3
	MEAN	55 ± 7	7 ± 4	< 0.3	< 0.2
14S1	01/01-04/02/90	50 ± 8	< 10	< 0.4	< 0.3
	04/02-07/02/90	46 ± 5	6 ± 4	< 0.2	< 0.1
	07/02-10/01/90	43 ± 6	< 4	< 0.2	< 0.2
	10/01-12/31/90	46 ± 5	< 3	< 0.2	< 0.2
	MEAN	46 ± 6	6 ± 6	< 0.3	< 0.2
13C1	01/01-04/02/90	88 ± 9	< 5	< 0.2	< 0.2
	04/02-07/02/90	46 ± 7	< 4	< 0.2	< 0.2
	07/02-10/01/90	55 ± 7	9 ± 5	< 0.2	< 0.2
	10/01-12/31/90	53 ± 7	< 4	< 0.2	< 0.2
	MEAN	61 ± 37	6 ± 5	< 0.2	< 0.2
13H4	01/02-04/02/90	57 ± 8	< 9	< 0.3	< 0.3
	04/02-07/02/90	53 ± 8	4 ± 3	< 0.2	< 0.2
	07/02-10/01/90	67 ± 7	7 ± 4	< 0.2	< 0.2
	10/01-12/31/90	65 ± 7	< 4	< 0.2	< 0.2
	MEAN	61 ± 13	6 ± 5	< 0.2	< 0.2

TABLE C-VI.1 CONCENTRATIONS OF I-131 RADIOCHEMISTY IN AIR IODINE SAMPLES
COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF E-3 PCI/CU. METER ± 2 SIGMA

	GROUP I			GROUP II	GROUP III
WEEK	10S3	11S1	14S1	13C1	13H4
01	< 9	< 8	< 8	< 9	< 20
02	< 9	< 9	< 9	< 9	< 10
03	< 10	< 10	< 10	< 10	< 20
04	< 9	< 9	< 9	< 9	< 6
05	< 10	< 10	< 10	< 10	< 9
06	< 10	< 10	< 10	< 10	< 10
07	< 10	< 10	< 10	< 10	< 20
08	< 10	< 10	< 10	< 10	< 10
09	< 20	< 20	< 9	< 9	< 20
10	< 9	< 9	< 9	< 7	< 8
11	< 9	< 6	< 5	< 4	< 10
12	< 8	< 8	< 8	< 8	(1)
13	< 10	< 10	< 10	< 10	< 9
14	< 10	< 10	< 10	< 10	< 20
15	< 10	< 10	< 10	< 10	< 10
16	< 8	< 10	< 10	< 10	< 20
17	< 9	< 8	< 8	< 9	< 8
18	< 10	< 10	< 10	< 10	< 9
19	< 10	< 10	< 10	< 10	< 10
20	< 10	< 9	< 9	< 9	< 20
21	< 10	< 10	< 10	< 10	< 10
22	< 10	< 10	< 10	< 10	< 20
23	< 10	< 10	< 10	< 10	< 9
24	< 10	< 10	< 10	< 10	< 10
25	< 10	< 10	< 10	< 10	< 20
26	< 10	< 10	< 10	< 10	< 20
27	< 10	< 10	< 10	< 10	< 20
28	< 9	< 9	< 9	< 9	< 10
29	< 10	< 10	< 10	< 10	< 20
30	< 20	< 10	< 10	< 10	< 20
31	< 10	< 10	< 10	< 10	< 6
32	< 10	< 10	< 30	< 10	< 10
33	< 20	< 20	< 20	< 20	< 9
34	< 10	< 9	< 10	< 8	< 10
35	< 9	< 9	< 9	< 20	< 10
36	< 10	< 9	< 10	< 9	< 20
37	< 10	< 10	< 10	< 10	< 10
38	< 10	< 10	< 10	< 10	< 10
39	< 20	< 10	< 20	< 10	< 20
40	< 10	< 10	< 20	< 10	< 10
41	< 10	< 10	< 10	< 10	< 20
42	< 10	< 10	< 10	< 10	< 10
43	< 10	< 10	< 10	< 10	< 8
44	< 10	< 10	< 10	(1)	< 10
45	< 10	< 10	< 10	< 20	< 10
46	< 7	< 7	< 7	< 6	< 10
47	< 9	< 9	< 9	< 10	< 20
48	< 10	< 10	< 10	< 10	< 10
49	< 10	< 10	< 10	< 10	< 10
50	< 10	< 10	< 10	< 10	< 7
51	< 9	< 10	< 10	< 10	< 8
52	< 10	< 10	< 10	< 10	< 10
MEAN	< 10	< 10	< 11	< 10	< 13

(1) SEE EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-VII.1 CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

	INDICATOR FARMS								CONTROL FARMS		
COLLECTION DATE	10B1	11E1	13E2	18C1	19B1	21B1	22C1	25B1	36E1	9G1	22F1
01/09/90	< 0.2	< 0.1	< 0.07	< 0.09	< 0.1	< 0.1	< 0.1	< 0.10	< 0.07	< 0.08	< 0.3
02/13/90	(1)				< 0.05	< 0.05		< 0.05			< 0.07
03/13/90	(1)				< 0.07	< 0.1		< 0.05			< 0.10
04/10/90	< 0.06			< 0.09	< 0.3	< 0.10	< 0.1	< 0.2	< 0.07	< 0.1	< 0.10
04/24/90	< 0.1				< 0.08	< 0.1		< 0.07			< 0.07
05/08/90	< 0.08				< 0.2	< 0.08		< 0.1			< 0.07
05/22/90	< 0.06				< 0.06	< 0.1		< 0.07			< 0.08
06/05/90	< 0.05				< 0.10	< 0.07		< 0.1			< 0.07
06/19/90	< 0.04				< 0.05	< 0.07		< 0.08			< 0.05
07/03/90									< 0.08		
07/04/90	< 0.1			< 0.06	< 0.05	< 0.10	< 0.07	< 0.1		< 0.05	< 0.07
07/17/90	< 0.06				< 0.08	< 0.05		< 0.09			< 0.05
07/31/90	< 0.05				< 0.07	< 0.07		< 0.08			< 0.06
08/14/90	< 0.06				< 0.06	< 0.07		< 0.07			< 0.07
08/28/90	< 0.07				< 0.2	< 0.06		< 0.07			< 0.1
09/12/90	< 0.06				< 0.10	< 0.1		< 0.1			< 0.1
09/25/90	< 0.05				< 0.05	< 0.08		< 0.08			< 0.1
10/09/90	< 0.05			< 0.08	< 0.04	< 0.07	< 0.09	< 0.05	< 0.07	< 0.05	< 0.1
10/23/90	< 0.04				< 0.09	< 0.06		< 0.1			< 0.09
11/06/90	< 0.04				< 0.06	< 0.05		< 0.1			< 0.08
11/20/90	< 0.05				< 0.1	< 0.07		< 0.1			< 0.07
12/04/90	< 0.03				< 0.03	< 0.04		< 0.03			< 0.06
MEAN	< 0.07	< 0.1	< 0.07	< 0.08	< 0.09	< 0.08	< 0.09	< 0.09	< 0.07	< 0.07	< 0.09

NOTE: STATION 10B1 IS A GOAT MILK

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-VII.2 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STATION CODE	COLLECTION DATE	K-40	CS-134	CS-137	BA-140	LA-140
1081	01/09/90	320 ± 40	< 1	< 2	< 4	< 2
	02/13/90	(1)				
	03/13/90	(1)				
	04/10/90	1400 ± 100	< 2	< 2	< 6	< 2
	04/24/90	1400 ± 100	< 2	< 2	< 6	< 3
	05/08/90	1600 ± 200	< 2	5 ± 3	< 6	< 2
	05/22/90	1600 ± 200	< 1	< 1	< 6	< 2
	06/05/90	1500 ± 100	< 2	7 ± 3	< 6	< 2
	06/19/90	1600 ± 200	< 1	5 ± 3	< 4	< 2
	07/04/90	1500 ± 200	< 2	< 2	< 6	< 2
	07/17/90	1600 ± 200	< 2	< 2	< 6	< 2
	07/31/90	1400 ± 100	< 2	< 2	< 6	< 3
	08/14/90	1500 ± 100	< 1	4 ± 3	< 6	< 2
	08/28/90	1500 ± 200	< 1	3 ± 2	< 5	< 2
	09/12/90	1500 ± 200	< 2	< 2	< 5	< 2
	09/25/90	1300 ± 100	< 2	< 2	< 6	< 3
	10/10/90	1500 ± 100	< 2	< 2	< 6	< 3
	10/23/90	1400 ± 100	< 2	< 2	< 6	< 2
	11/06/90	1700 ± 200	< 1	4 ± 3	< 6	< 3
	11/20/90	1500 ± 100	< 2	6 ± 3	< 7	< 2
	12/04/90	1300 ± 100	< 1	4 ± 3	< 4	< 2
	MEAN	1427 ± 576	< 2	3 ± 3	< 6	< 2
1981	01/09/90	1000 ± 100	< 2	< 2	< 5	< 2
	02/13/90	1100 ± 100	< 3	< 3	< 9	< 4
	03/13/90	1200 ± 100	< 3	< 3	< 9	< 4
	04/10/90	1300 ± 100	< 2	< 2	< 6	< 3
	04/24/90	1200 ± 100	< 2	< 2	< 5	< 2
	05/08/90	1300 ± 100	< 2	< 2	< 6	< 3
	05/22/90	980 ± 100	< 1	< 1	< 5	< 2
	06/05/90	1300 ± 100	< 1	< 2	< 6	< 3
	06/19/90	1100 ± 100	< 2	< 2	< 5	< 2
	07/04/90	1100 ± 100	< 2	< 2	< 5	< 2
	07/17/90	1100 ± 100	< 2	< 2	< 6	< 3
	07/31/90	1300 ± 100	< 1	< 1	< 6	< 2
	08/14/90	1200 ± 100	< 1	< 1	< 6	< 3
	08/28/90	1200 ± 100	< 1	< 1	< 5	< 2
	09/12/90	1200 ± 100	< 2	< 2	< 5	< 2
	09/25/90	1300 ± 100	< 2	< 2	< 8	< 3
	10/09/90	1200 ± 100	< 1	4 ± 3	< 6	< 3
	10/23/90	1400 ± 100	< 2	< 2	< 5	< 3
	11/06/90	1200 ± 100	< 2	< 2	< 7	< 3
	11/20/90	1200 ± 100	< 3	< 2	< 7	< 3
	12/04/90	1300 ± 100	< 2	< 2	< 5	< 2
	MEAN	1199 ± 214	< 2	2 ± 1	< 6	< 3
2181	01/09/90	1300 ± 100	< 2	< 2	< 4	< 2
	02/13/90	1100 ± 100	< 2	< 2	< 5	< 2
	03/13/90	1400 ± 100	< 2	< 2	< 5	< 3
	04/10/90	1300 ± 100	< 2	< 2	< 6	< 2
	04/24/90	1200 ± 100	< 2	< 2	< 6	< 2
	05/08/90	1300 ± 100	< 1	< 2	< 6	< 3
	05/22/90	1300 ± 100	< 2	< 2	< 6	< 3
	06/05/90	1300 ± 100	< 2	< 2	< 6	< 2
	06/19/90	1300 ± 100	< 1	< 1	< 4	< 2
	07/04/90	1200 ± 100	< 2	< 2	< 5	< 2
	07/17/90	1200 ± 100	< 2	< 2	< 6	< 2
	07/31/90	1300 ± 100	< 2	< 2	< 6	< 2
	08/14/90	1300 ± 100	< 2	< 2	< 6	< 3
	08/28/90	1400 ± 100	< 2	< 2	< 6	< 2
	09/12/90	1400 ± 100	< 2	< 2	< 5	< 2
	09/25/90	1400 ± 100	< 2	< 2	< 6	< 3
	10/09/90	1200 ± 100	< 2	< 2	< 6	< 2
	10/23/90	1300 ± 100	< 2	5 ± 3	< 6	< 2
	11/06/90	1300 ± 100	< 1	< 1	< 6	< 2
	11/20/90	1300 ± 100	< 2	< 2	< 6	< 2
	12/04/90	1400 ± 100	< 2	4 ± 3	< 4	< 1
	MEAN	1295 ± 161	< 2	2 ± 2	< 6	< 2

TABLE C-VII.2 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STATION CODE	COLLECTION DATE	K-40	CS-134	CS-137	BA-140	LA-140
25B1	01/09/90	1300 ± 100	< 2	< 2	< 4	< 2
	02/13/90	1300 ± 100	< 2	< 2	< 5	< 2
	03/13/90	1200 ± 100	< 2	< 2	< 5	< 2
	04/10/90	1300 ± 100	< 2	< 2	< 5	< 2
	04/24/90	1300 ± 100	< 2	< 2	< 5	< 2
	05/08/90	1100 ± 100	< 3	< 3	< 10	< 4
	05/22/90	1200 ± 100	< 2	< 2	< 6	< 2
	06/05/90	1300 ± 100	< 2	< 2	< 6	< 2
	06/19/90	1300 ± 100	< 1	< 1	< 4	< 2
	07/04/90	1300 ± 100	< 2	< 2	< 5	< 2
	07/17/90	1300 ± 100	< 2	< 2	< 5	< 2
	07/31/90	1400 ± 100	< 2	< 2	< 6	< 3
	08/14/90	1300 ± 100	< 1	< 2	< 6	< 3
	08/28/90	1300 ± 100	< 2	< 2	< 6	< 3
	09/12/90	1300 ± 100	< 2	< 2	< 5	< 2
	09/25/90	1300 ± 100	< 2	< 2	< 6	< 3
	10/09/90	1300 ± 100	< 2	< 2	< 5	< 2
	10/23/90	1400 ± 100	< 2	< 2	< 6	< 3
	11/06/90	1300 ± 100	< 2	< 2	< 6	< 2
	11/20/90	1400 ± 100	< 2	< 2	< 5	< 3
	12/04/90	1200 ± 100	< 2	< 2	< 4	< 2
	MEAN	1290 ± 140	< 2	< 2	< 5	< 2
22F1	01/09/90	1300 ± 100	< 2	< 2	< 4	< 1
	02/13/90	1300 ± 100	< 2	< 2	< 5	< 2
	03/13/90	1200 ± 100	< 2	< 2	< 5	< 2
	04/10/90	1400 ± 100	< 3	< 3	< 10	< 5
	04/24/90	1300 ± 100	< 2	< 2	< 5	< 2
	05/08/90	1200 ± 100	< 2	< 2	< 6	< 2
	05/22/90	1100 ± 100	< 2	4 ± 4	< 8	< 3
	06/05/90	1300 ± 100	< 2	< 2	< 6	< 3
	06/19/90	1300 ± 100	< 1	< 1	< 4	< 2
	07/04/90	1400 ± 100	< 2	< 2	< 5	< 2
	07/17/90	1300 ± 100	< 2	< 2	< 5	< 2
	07/31/90	1300 ± 100	< 2	< 2	< 6	< 2
	08/14/90	1300 ± 100	< 2	< 2	< 6	< 2
	08/28/90	1400 ± 100	< 2	< 2	< 6	< 3
	09/12/90	1300 ± 100	< 2	< 2	< 5	< 2
	09/25/90	1500 ± 100	< 2	< 2	< 5	< 2
	10/09/90	1200 ± 100	< 2	< 2	< 5	< 2
	10/23/90	1400 ± 100	< 2	< 2	< 5	< 2
	11/06/90	1400 ± 100	< 2	< 2	< 7	< 2
	11/20/90	1300 ± 100	< 2	< 2	< 6	< 2
	12/04/90	1400 ± 100	< 2	< 2	< 4	< 2
	MEAN	1314 ± 182	< 2	2 ± 1	< 6	< 2

NOTE: 1081 IS A GOAT MILK

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-VIII.1 MONTHLY TLD RESULTS FOR LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF MILLI-ROENTGEN/STD. MO. ± 2 S.D.

STATION CODE	MEAN ± 2 S.D. (1)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
36S2	7.6 ± 2.0	7.7 ± 0.3	7.3 ± 0.3	8.4 ± 0.8	8.1 ± 1.0	6.9 ± 0.7	6.4 ± 0.6	7.7 ± 0.4	5.7 ± 0.7	9.6 ± 0.8	7.3 ± 0.2	8.2 ± 0.5	8.1 ± 0.9
2B1	6.8 ± 2.5	7.1 ± 0.4	6.4 ± 0.4	8.5 ± 0.8	7.1 ± 0.4	6.1 ± 0.3	4.8 ± 0.3	6.7 ± 0.5	5.2 ± 0.9	9.3 ± 1.5	6.4 ± 0.2	7.3 ± 0.5	6.9 ± 0.6
2E1	7.6 ± 2.2	7.2 ± 0.5	8.2 ± 0.4	8.7 ± 1.0	7.1 ± 0.5	7.9 ± 0.5	5.2 ± 0.2	7.6 ± 0.1	6.7 ± 0.3	9.6 ± 0.7	7.0 ± 0.2	8.4 ± 0.7	7.3 ± 0.4
3S1	7.2 ± 2.3	7.4 ± 0.6	6.9 ± 0.2	7.7 ± 0.5	8.3 ± 0.4	6.6 ± 0.7	5.2 ± 0.4	7.4 ± 0.4	5.5 ± 0.2	9.5 ± 1.1	6.8 ± 0.2	7.6 ± 0.2	7.1 ± 0.8
4E1	5.9 ± 1.7	5.9 ± 0.3	5.6 ± 0.3	6.8 ± 0.4	6.0 ± 0.2	5.3 ± 0.4	5.0 ± 0.2	5.8 ± 0.1	4.4 ± 0.4	7.6 ± 0.5	5.4 ± 0.2	6.4 ± 0.4	6.6 ± 0.3
5S1	7.3 ± 2.6	7.1 ± 0.4	6.9 ± 0.4	8.3 ± 0.5	7.0 ± 0.3	6.5 ± 0.1	5.0 ± 0.2	6.9 ± 0.4	5.9 ± 1.0	9.7 ± 0.3	7.6 ± 0.1	8.8 ± 0.3	8.4 ± 0.7
5H1	8.6 ± 1.8	8.8 ± 0.3	8.3 ± 0.3	9.3 ± 0.5	8.4 ± 0.3	7.9 ± 0.3	7.5 ± 0.5	8.7 ± 0.3	7.0 ± 1.4	10.0 ± 1.2	9.7 ± 0.4	9.5 ± 0.8	8.3 ± 0.5
6C1	7.0 ± 2.1	7.0 ± 0.5	6.8 ± 0.3	7.9 ± 0.5	7.3 ± 0.3	6.2 ± 0.2	5.3 ± 0.5	7.1 ± 0.5	5.3 ± 0.9	9.1 ± 1.3	7.1 ± 0.4	7.9 ± 0.4	6.9 ± 0.4
7S1	7.7 ± 2.1	7.5 ± 0.3	7.4 ± 0.2	9.2 ± 0.7	8.7 ± 0.5	7.0 ± 0.1	6.7 ± 0.4	7.6 ± 0.9	5.7 ± 0.1	9.5 ± 0.6	7.6 ± 0.4	8.2 ± 0.6	7.5 ± 0.3
7E1	7.4 ± 2.1	7.6 ± 0.4	7.0 ± 0.3	8.4 ± 0.6	7.5 ± 0.4	6.7 ± 0.6	5.6 ± 0.8	7.8 ± 0.4	5.7 ± 0.2	9.2 ± 0.2	7.6 ± 0.3	8.3 ± 0.8	7.3 ± 0.3
9C1	7.0 ± 1.8	6.9 ± 0.3	6.7 ± 0.2	8.1 ± 0.7	7.4 ± 0.2	6.3 ± 0.3	5.9 ± 0.3	7.1 ± 0.5	5.4 ± 0.3	8.7 ± 1.0	7.2 ± 0.4	7.6 ± 0.4	6.9 ± 0.5
10S3	7.4 ± 1.8	7.5 ± 0.4	7.1 ± 0.2	8.7 ± 0.9	7.3 ± 0.3	6.8 ± 0.3	6.7 ± 0.4	7.3 ± 0.3	5.8 ± 0.9	9.3 ± 0.7	7.5 ± 0.3	8.0 ± 0.4	7.4 ± 0.4
10E1	7.3 ± 2.4	7.4 ± 0.3	6.9 ± 0.2	8.1 ± 0.2	7.6 ± 0.3	6.6 ± 0.3	5.1 ± 0.3	7.4 ± 0.3	5.6 ± 0.5	9.5 ± 0.6	7.5 ± 0.5	8.4 ± 0.3	7.4 ± 0.2
11S1	7.9 ± 1.9	8.2 ± 0.5	7.7 ± 0.3	7.9 ± 0.8	8.0 ± 0.7	7.8 ± 1.0	6.2 ± 0.2	7.9 ± 0.5	6.5 ± 0.3	9.9 ± 0.5	8.1 ± 0.3	8.9 ± 0.3	8.0 ± 0.2
10F3	7.5 ± 2.1	7.1 ± 0.4	7.0 ± 0.3	8.9 ± 0.2	8.5 ± 0.3	8.7 ± 0.3	5.4 ± 0.2	7.5 ± 0.6	7.0 ± 0.4	9.1 ± 0.7	7.5 ± 0.3	8.1 ± 0.7	7.3 ± 0.3
14S1	6.6 ± 2.1	6.7 ± 0.2	6.3 ± 0.2	7.4 ± 0.3	6.5 ± 0.2	6.3 ± 0.8	4.7 ± 0.1	7.0 ± 0.3	5.0 ± 0.2	8.7 ± 0.3	7.0 ± 1.2	7.4 ± 0.3	6.7 ± 0.2
13C1	5.6 ± 2.1	5.7 ± 0.3	6.0 ± 0.2	6.5 ± 0.5	5.9 ± 0.1	4.7 ± 0.4	3.6 ± 0.4	5.5 ± 0.4	4.1 ± 0.4	7.4 ± 0.8	6.6 ± 0.3	6.2 ± 0.2	5.6 ± 0.6
13E1	7.4 ± 2.0	7.2 ± 0.3	7.0 ± 0.3	8.2 ± 0.5	7.6 ± 0.4	6.9 ± 0.7	5.4 ± 0.3	(2)	6.6 ± 0.6	9.4 ± 0.2	7.6 ± 0.3	8.1 ± 0.3	7.8 ± 1.0
13H4	5.5 ± 3.0	5.3 ± 0.5	5.6 ± 0.5	5.2 ± 0.3	9.9 ± 2.1	4.9 ± 0.2	5.3 ± 0.2	4.8 ± 0.6	5.2 ± 0.3	5.2 ± 0.3	3.7 ± 1.0	5.5 ± 0.6	5.8 ± 0.5
15D1	7.3 ± 2.3	7.6 ± 0.4	7.2 ± 0.1	8.3 ± 0.5	7.5 ± 0.3	6.6 ± 0.4	5.4 ± 0.2	7.9 ± 0.3	5.8 ± 0.5	9.5 ± 0.3	7.7 ± 0.5	8.8 ± 0.4	7.4 ± 1.0
16S2	6.8 ± 2.3	6.5 ± 0.3	7.1 ± 0.3	7.5 ± 0.2	7.5 ± 0.6	6.0 ± 0.2	4.8 ± 0.4	6.6 ± 0.4	4.9 ± 0.4	8.7 ± 0.2	6.7 ± 0.3	7.5 ± 0.6	7.6 ± 0.6
16F1	7.5 ± 2.3	7.3 ± 0.3	7.1 ± 0.1	8.9 ± 0.4	7.5 ± 0.2	6.8 ± 0.1	5.4 ± 0.2	7.8 ± 0.4	6.0 ± 0.5	9.4 ± 0.5	7.8 ± 0.1	8.6 ± 0.6	7.8 ± 0.5
17B1	7.0 ± 2.3	7.0 ± 0.2	7.4 ± 0.3	8.7 ± 0.4	7.2 ± 0.4	6.3 ± 0.2	5.1 ± 0.3	7.2 ± 0.3	5.1 ± 0.4	8.7 ± 0.3	6.7 ± 0.5	8.0 ± 0.5	6.8 ± 0.1
18S1	6.5 ± 2.2	6.4 ± 0.4	6.2 ± 0.1	7.4 ± 0.5	6.3 ± 0.2	6.0 ± 0.4	4.6 ± 0.4	6.4 ± 0.3	4.7 ± 0.3	8.3 ± 0.4	7.2 ± 0.4	7.6 ± 0.6	7.1 ± 0.5

1. MEAN AND TWO TIMES THE STANDARD DEVIATION OF THE MONTHLY RESULTS.
2. SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION.

TABLE C-VIII.1 MONTHLY TLD RESULTS FOR LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF MILLI-ROENTGEN/STD. MO. ± 2 S.D.

STATION CODE	MEAN ± 2 S.D. (1)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
18G1	6.4 ± 2.5	6.8 ± 0.3	5.9 ± 0.3	8.0 ± 0.9	6.1 ± 0.2	5.5 ± 0.2	4.1 ± 0.4	6.1 ± 0.2	4.6 ± 0.3	8.2 ± 0.5	7.1 ± 0.4	7.2 ± 0.6	7.2 ± 0.7
19D1	7.3 ± 2.4	7.2 ± 0.2	6.9 ± 0.5	8.6 ± 0.7	8.6 ± 0.6	6.1 ± 0.2	5.2 ± 0.3	7.1 ± 0.4	6.1 ± 0.4	9.1 ± 0.5	8.3 ± 1.2	8.3 ± 0.5	6.7 ± 0.6
20D1	6.9 ± 2.4	6.6 ± 0.6	7.7 ± 0.5	9.0 ± 0.8	7.1 ± 0.3	5.8 ± 0.1	4.7 ± 0.5	6.8 ± 0.2	5.9 ± 0.4	8.5 ± 0.4	6.4 ± 0.2	7.9 ± 0.3	6.5 ± 0.4
20F1	7.4 ± 2.4	7.2 ± 0.3	8.1 ± 0.6	9.1 ± 0.2	8.4 ± 0.6	6.2 ± 0.4	5.0 ± 0.5	7.5 ± 0.4	6.1 ± 0.2	8.9 ± 0.4	6.9 ± 0.2	8.1 ± 0.5	7.1 ± 1.0
21S1	6.5 ± 1.9	6.2 ± 0.4	7.2 ± 0.4	7.5 ± 0.3	6.6 ± 0.4	5.9 ± 0.2	4.3 ± 0.5	6.8 ± 0.5	5.6 ± 0.2	7.9 ± 0.1	6.6 ± 0.2	7.1 ± 0.7	6.1 ± 0.3
22G1	6.9 ± 2.1	6.7 ± 0.1	7.4 ± 0.3	8.7 ± 1.1	7.3 ± 0.2	5.8 ± 0.5	5.0 ± 0.9	7.0 ± 0.4	5.9 ± 0.4	8.4 ± 0.5	6.5 ± 0.1	7.6 ± 0.3	6.6 ± 0.4
23S2	6.9 ± 2.1	6.7 ± 0.2	7.7 ± 0.4	8.3 ± 0.4	6.9 ± 0.5	6.3 ± 0.5	5.0 ± 0.9	6.8 ± 0.5	5.6 ± 0.4	8.8 ± 1.4	6.6 ± 0.3	7.4 ± 0.3	6.6 ± 0.3
24D1	6.5 ± 2.3	6.0 ± 0.3	6.9 ± 0.3	8.5 ± 0.5	6.8 ± 0.5	5.4 ± 0.3	4.5 ± 0.8	6.8 ± 0.3	5.4 ± 0.2	8.3 ± 1.4	6.2 ± 0.3	7.3 ± 0.3	6.1 ± 0.7
25S1	6.8 ± 2.1	6.4 ± 0.2	8.3 ± 0.3	7.9 ± 0.5	6.6 ± 0.4	6.0 ± 1.0	4.6 ± 0.4	6.9 ± 0.6	5.9 ± 0.5	8.2 ± 0.2	6.6 ± 0.3	7.3 ± 0.4	7.1 ± 0.3
25D1	6.3 ± 2.2	6.0 ± 0.3	6.9 ± 0.4	8.1 ± 0.4	6.2 ± 0.3	5.3 ± 0.2	4.3 ± 0.3	6.5 ± 0.4	5.3 ± 0.2	8.1 ± 1.0	6.0 ± 0.2	6.8 ± 0.3	5.9 ± 0.2
26S3	6.5 ± 2.3	6.1 ± 0.3	7.9 ± 0.4	7.6 ± 0.5	6.3 ± 0.2	5.6 ± 0.5	4.3 ± 0.3	6.9 ± 0.2	5.5 ± 0.1	8.0 ± 0.6	6.5 ± 0.2	7.4 ± 0.2	5.8 ± 0.3
26B1	6.9 ± 2.0	6.6 ± 0.3	7.3 ± 0.5	8.3 ± 0.8	7.0 ± 0.4	6.1 ± 0.5	4.9 ± 0.5	7.0 ± 0.3	6.0 ± 0.1	8.5 ± 0.3	6.7 ± 0.4	7.4 ± 0.1	6.7 ± 0.6
28D2	7.2 ± 2.1	6.6 ± 0.3	7.3 ± 0.1	8.1 ± 0.3	7.9 ± 0.4	5.9 ± 0.3	4.8 ± 0.6	7.1 ± 0.4	7.1 ± 0.5	8.6 ± 1.0	6.7 ± 0.2	7.8 ± 0.2	8.0 ± 1.3
29S1	6.7 ± 2.3	6.3 ± 0.3	8.1 ± 0.2	7.9 ± 0.3	6.4 ± 0.3	5.7 ± 0.3	4.3 ± 0.4	6.9 ± 0.5	5.6 ± 0.4	7.9 ± 0.3	7.5 ± 0.4	7.4 ± 0.2	6.3 ± 0.3
29B1	7.0 ± 1.7	6.6 ± 0.3	7.3 ± 0.3	8.3 ± 0.4	7.1 ± 0.3	6.1 ± 0.6	6.1 ± 0.4	7.0 ± 0.4	5.9 ± 0.4	8.7 ± 0.5	6.6 ± 0.3	7.5 ± 0.3	6.6 ± 0.2
29E1	7.0 ± 2.1	6.8 ± 0.1	7.5 ± 0.3	8.4 ± 0.6	6.9 ± 0.2	6.1 ± 0.3	5.0 ± 0.3	7.2 ± 0.4	6.0 ± 0.4	8.8 ± 0.3	7.0 ± 0.2	7.8 ± 0.3	7.0 ± 0.9
31D1	8.8 ± 2.2	8.0 ± 0.3	9.8 ± 0.2	11.0 ± 0.4	8.7 ± 0.3	7.7 ± 0.4	7.5 ± 0.5	8.8 ± 0.6	7.9 ± 0.5	10.2 ± 0.5	9.2 ± 1.6	9.3 ± 0.3	8.2 ± 0.3
31D2	7.6 ± 2.6	7.0 ± 0.5	8.7 ± 0.4	9.6 ± 0.1	7.8 ± 0.3	6.6 ± 0.4	5.8 ± 0.7	7.5 ± 0.4	6.3 ± 0.3	9.2 ± 0.4	7.5 ± 0.4	8.6 ± 0.3	7.3 ± 0.2
32S1	5.7 ± 2.2	5.3 ± 0.8	6.3 ± 0.3	7.1 ± 0.2	5.6 ± 0.3	4.8 ± 0.1	3.7 ± 0.2	5.7 ± 0.4	4.7 ± 0.3	7.5 ± 0.4	5.3 ± 0.2	6.8 ± 0.4	5.4 ± 0.1
32G1	7.6 ± 1.8	7.2 ± 0.3	7.9 ± 0.4	8.9 ± 0.2	7.6 ± 0.4	6.6 ± 0.5	5.3 ± 0.2	7.9 ± 0.4	6.6 ± 0.4	9.2 ± 0.3	7.4 ± 0.6	8.5 ± 0.4	7.2 ± 0.4
34S2	8.0 ± 2.5	7.7 ± 0.4	8.1 ± 0.4	9.1 ± 0.2	9.2 ± 0.1	7.4 ± 1.4	5.6 ± 0.3	7.8 ± 0.2	6.8 ± 0.5	10.6 ± 0.7	7.8 ± 0.4	8.7 ± 0.4	7.6 ± 0.3
34E1	7.2 ± 2.4	6.9 ± 0.2	7.5 ± 0.3	9.4 ± 0.8	7.2 ± 0.4	6.2 ± 0.6	4.9 ± 0.4	7.3 ± 0.3	6.2 ± 0.2	8.9 ± 0.6	7.0 ± 0.8	8.1 ± 0.2	7.0 ± 0.4
35B1	7.5 ± 2.5	6.8 ± 0.2	7.5 ± 0.3	9.3 ± 0.4	7.5 ± 0.1	6.3 ± 0.7	5.0 ± 0.3	7.6 ± 0.3	6.4 ± 0.1	8.8 ± 0.5	7.5 ± 0.2	9.2 ± 0.4	7.9 ± 0.4
35F1	8.0 ± 2.5	7.5 ± 0.6	8.1 ± 0.2	10.3 ± 0.4	8.1 ± 0.5	7.0 ± 0.3	5.7 ± 0.4	8.0 ± 0.4	7.1 ± 0.4	10.0 ± 0.7	7.6 ± 0.3	8.8 ± 0.3	7.8 ± 0.5

1. MEAN AND TWO TIMES THE STANDARD DEVIATION OF THE MONTHLY RESULTS.

TABLE C-VIII.2 QUARTERLY TLD RESULTS FOR LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF MILLI-ROENTGEN/STD. MO. ± 2 S.D.

STATION CODE	MEAN ± 2 S.D. (1)	JAN-MAR	APR-JUN	JUL-SEP	OCT-DEC
36S2	6.8 ± 0.4	6.9 ± 0.2	7.0 ± 0.3	6.5 ± 0.1	6.9 ± 0.2
2B1	6.0 ± 0.2	5.9 ± 0.3	6.1 ± 0.3	6.0 ± 0.4	6.1 ± 0.2
2E1	6.8 ± 0.9	6.6 ± 0.3	6.3 ± 0.3	6.9 ± 0.5	7.3 ± 0.1
3S1	6.5 ± 0.6	6.3 ± 0.3	6.4 ± 0.1	6.5 ± 0.2	7.0 ± 0.3
4E1	5.1 ± 0.6	5.0 ± 0.3	5.0 ± 0.2	4.9 ± 0.1	5.6 ± 0.2
5S1	6.8 ± 1.5	6.3 ± 0.1	6.4 ± 0.6	6.5 ± 0.2	7.9 ± 0.4
5H1	7.8 ± 0.8	7.8 ± 0.1	7.9 ± 0.3	7.2 ± 0.2	8.1 ± 0.2
6C1	6.3 ± 0.4	6.2 ± 0.3	6.5 ± 0.4	6.4 ± 0.4	6.0 ± 0.3
7S1	6.9 ± 0.8	6.8 ± 0.4	6.8 ± 0.3	6.5 ± 0.2	7.4 ± 0.2
7E1	6.8 ± 0.8	7.3 ± 0.2	6.7 ± 0.4	6.4 ± 0.4	6.9 ± 0.1
9C1	6.2 ± 0.3	6.2 ± 0.3	6.4 ± 0.2	6.0 ± 0.3	6.2 ± 0.2
10S3	6.7 ± 0.6	6.6 ± 0.2	6.5 ± 0.4	6.6 ± 0.4	7.2 ± 0.3
10E1	6.6 ± 0.7	6.4 ± 0.3	6.7 ± 0.3	6.2 ± 0.4	7.0 ± 0.3
11S1	7.2 ± 0.3	7.2 ± 0.3	7.3 ± 0.3	7.2 ± 0.2	7.0 ± 0.3
10F3	6.8 ± 0.9	6.6 ± 0.1	6.9 ± 0.3	6.3 ± 0.2	7.3 ± 0.3
14S1	5.9 ± 0.8	5.6 ± 0.3	5.7 ± 0.2	5.8 ± 0.2	6.5 ± 0.1
13C1	4.8 ± 0.7	4.6 ± 0.1	5.0 ± 0.4	4.5 ± 0.2	5.2 ± 0.1
13E1	6.5 ± 0.6	6.4 ± 0.2	6.4 ± 0.2	6.3 ± 0.3	7.0 ± 0.1
13H4	3.7 ± 2.9	5.0 ± 0.3	3.2 ± 1.0	4.7 ± 0.3	1.9 ± 0.1
15D1	6.7 ± 0.6	6.3 ± 0.1	6.8 ± 0.2	6.6 ± 0.4	7.0 ± 0.3
16S2	5.9 ± 0.5	5.6 ± 0.1	5.9 ± 0.4	5.8 ± 0.2	6.2 ± 0.5
16F1	6.9 ± 1.1	6.5 ± 0.4	6.5 ± 0.4	6.8 ± 0.3	7.7 ± 0.7
17B1	6.1 ± 0.4	6.1 ± 0.2	6.4 ± 0.1	6.0 ± 0.1	5.9 ± 0.2
18S1	5.7 ± 0.8	5.5 ± 0.4	5.9 ± 0.3	5.3 ± 0.3	6.2 ± 0.0
18G1	5.6 ± 0.7	5.7 ± 0.4	5.3 ± 0.2	5.3 ± 0.2	6.0 ± 0.2
19D1	6.3 ± 0.4	6.4 ± 0.4	6.3 ± 0.2	6.0 ± 0.6	6.5 ± 0.2
20D1	6.1 ± 0.6	6.0 ± 0.3	6.4 ± 0.2	5.8 ± 0.2	6.4 ± 0.1
20F1	6.5 ± 0.3	6.6 ± 0.5	6.4 ± 0.3	6.4 ± 0.2	6.7 ± 0.2
21S1	5.9 ± 0.4	5.8 ± 0.1	6.0 ± 0.4	5.8 ± 0.3	6.2 ± 0.2
22G1	6.1 ± 0.5	6.3 ± 0.1	6.3 ± 0.5	6.0 ± 0.1	5.8 ± 0.3
23S2	6.1 ± 0.8	6.4 ± 0.2	5.5 ± 0.4	6.3 ± 0.2	6.3 ± 0.2
24D1	5.9 ± 1.0	6.6 ± 0.1	5.4 ± 0.9	5.7 ± 0.4	6.0 ± 0.1
25S1	5.9 ± 0.6	6.1 ± 0.2	5.5 ± 0.2	5.8 ± 0.2	6.2 ± 0.2
25D1	5.5 ± 1.2	5.8 ± 0.1	4.6 ± 0.2	5.6 ± 0.3	6.0 ± 0.2
26S3	5.5 ± 1.4	5.8 ± 0.2	4.5 ± 0.3	5.7 ± 0.2	6.1 ± 0.6
26B1	6.1 ± 1.1	6.3 ± 0.2	5.5 ± 0.2	6.0 ± 0.3	6.8 ± 0.4
28D2	6.1 ± 0.8	6.2 ± 0.2	5.7 ± 0.1	6.0 ± 0.2	6.7 ± 0.5
29S1	5.9 ± 1.5	6.3 ± 0.2	4.9 ± 0.2	5.7 ± 0.2	6.6 ± 0.1
29B1	6.1 ± 0.5	6.2 ± 0.2	6.0 ± 0.2	5.8 ± 0.3	6.4 ± 1.0
29E1	6.2 ± 0.5	6.4 ± 0.2	5.8 ± 0.3	6.3 ± 0.4	6.2 ± 0.2
31D1	7.9 ± 0.4	8.0 ± 0.2	7.7 ± 0.4	7.9 ± 0.2	8.2 ± 0.2
31D2	6.7 ± 0.5	6.7 ± 0.2	6.7 ± 0.2	6.4 ± 0.2	7.0 ± 0.1
32S1	4.9 ± 0.8	4.8 ± 0.1	4.4 ± 0.1	5.1 ± 0.5	5.3 ± 0.0
32G1	6.6 ± 1.1	6.8 ± 0.4	5.8 ± 0.2	6.8 ± 0.3	7.1 ± 0.1
34S2	6.9 ± 1.3	7.1 ± 0.2	6.9 ± 0.2	6.4 ± 0.3	7.8 ± 0.4
34E1	6.3 ± 0.5	6.3 ± 0.2	6.1 ± 1.0	6.2 ± 0.2	6.7 ± 0.2
35B1	6.5 ± 0.7	6.5 ± 0.3	6.1 ± 0.3	6.8 ± 0.5	6.8 ± 0.2
35F1	7.3 ± 0.7	7.3 ± 0.2	6.9 ± 0.2	7.2 ± 0.3	7.7 ± 0.2

1. MEAN AND TWO TIMES THE STANDARD DEVIATION OF THE QUARTERLY RESULTS.

TABLE C-VIII.3 1990 MEAN TLD RESULTS FROM LIMERICK GENERATING STATION FOR THE SITE BOUNDARY, MIDDLE, AND OUTER RINGS

RESULTS IN UNITS OF MILLI-ROENTGEN/STD. MO. ± 2 STANDARD DEVIATIONS OF THE STATION DATA

SAMPLE TYPE	EXPOSURE PERIOD	SITE	MIDDLE RING	OUTER RING
MONTHLY	JAN 1990	6.9 ± 1.5	6.9 ± 1.1	6.9 ± 2.6
	FEB 1990	7.3 ± 1.3	7.3 ± 1.5	7.0 ± 2.4
	MAR 1990	8.0 ± 1.2	8.6 ± 1.8	8.0 ± 3.3
	APR 1990	7.2 ± 2.0	7.4 ± 1.4	7.9 ± 2.8
	MAY 1990	6.3 ± 1.5	6.3 ± 1.4	6.1 ± 2.3
	JUN 1990	5.1 ± 1.9	5.2 ± 1.4	5.6 ± 2.6
	JUL 1990	7.0 ± 1.1	7.2 ± 1.3	6.9 ± 3.0
	AUG 1990	5.6 ± 1.2	5.9 ± 1.7	5.9 ± 2.0
	SEP 1990	8.9 ± 1.8	8.9 ± 1.3	8.2 ± 3.6
	OCT 1990	7.0 ± 1.4	7.1 ± 1.5	6.9 ± 4.3
	NOV 1990	7.8 ± 1.3	8.0 ± 1.6	7.7 ± 3.0
	DEC 1990	7.0 ± 1.7	7.1 ± 1.3	7.0 ± 1.8
QUARTERLY	JAN-MAR 1990	6.2 ± 1.3	6.3 ± 1.3	6.3 ± 2.1
	APR-JUN 1990	5.9 ± 1.7	6.2 ± 1.3	5.7 ± 3.4
	JUL-SEP 1990	6.1 ± 1.1	6.2 ± 1.3	6.0 ± 2.1
	OCT-DEC 1990	6.7 ± 1.4	6.6 ± 1.4	5.8 ± 4.7

TABLE C-VIII.4 SUMMARY OF THE 1990 AMBIENT DOSIMETRY PROGRAM FOR LIMERICK GENERATING STATION

RESULTS IN UNITS OF MILLI-ROENTGEN/STD. MO.

SAMPLE TYPE	LOCATION	NO. OF SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN ± 2 S.D.	PRE-OP MEAN ± 2 S.D. (1)
MONTHLY	SITE	192	3.7	10.6	7.0 ± 2.4	7.6 ± 2.4
	MIDDLE RING	323	3.6	11.0	7.2 ± 2.5	7.8 ± 2.2
	OUTER RING	60	3.7	10.0	7.0 ± 3.1	7.8 ± 3.0
QUARTERLY	SITE	64	4.4	7.9	6.2 ± 1.5	
	MIDDLE RING	108	4.5	8.2	6.3 ± 1.4	
	OUTER RING	20	1.9	8.1	5.9 ± 3.0	

(1) THE PRE-OPERATIONAL MEAN WAS CALCULATED FROM TLD READINGS 1-15-82 TO 12-02-84.

SITE BOUNDARY RING STATIONS - 3S1, 5S1, 7S1, 10S3, 11S1, 14S1, 16S2, 18S1, 21S1, 23S2, 25S1, 26S3, 29S1, 32S1, 34S2, 36S2.

MIDDLE RING STATIONS - 2B1, 2E1, 4E1, 6C1, 7E1, 9C1, 10B1, 10F3, 13C1, 13E1, 15D1, 16F1, 17B1, 19D1, 20D1, 20F1, 24D1, 25D1, 26B1, 28D2, 29B1, 29E1, 31D1, 31D2, 34E1, 35B1, 35F1

OUTER RING STATIONS - 5N1, 13H4, [illegible]

TABLE C-IX.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

SURFACE WATER (GROSS BETA AND GAMMA)

COLLECTION PERIOD	10F2	13B1	16B2	24B1
JAN 90	12/27-01/29		12/26-01/29	12/26-01/29
FEB 90	01/29-02/26		01/29-02/26	01/29-02/26
MAR 90	02/26-03/26		02/26-03/26	02/26-03/26
APR 90	03/26-04/30		03/26-04/30	03/26-04/30
MAY 90	04/30-05/29		04/30-05/28	04/30-05/28
JUN 90	05/29-06/25		05/28-06/25	05/28-06/25
JUL 90	06/25-07/30	07/25-07/30	06/25-07/30	06/25-07/30
AUG 90	07/30-08/27	07/30-08/27	07/30-08/27	07/30-08/27
SEP 90	08/27-09/24	08/27-09/24	08/27-09/24	08/27-09/24
OCT 90	09/24-10/29	09/24-10/29	09/24-10/29	09/24-10/29
NOV 90	10/29-11/26	10/29-11/26	10/29-11/26	10/29-11/26
DEC 90	11/26-12/27	11/26-12/27	11/26-12/27	11/26-12/27

SURFACE WATER (TRITIUM)

COLLECTION PERIOD	10F2	13B1	16B2	24B1
JAN-MAR 90	12/27-03/26		12/26-03/26	12/26-03/26
APR-JUN 90	03/26-06/25		03/26-06/25	03/26-06/25
JUL-SEP 90	06/25-09/24	07/25-09/24	06/25-09/24	06/25-09/24
OCT-DEC 90	09/24-12/27	09/24-12/27	09/24-12/27	09/24-12/27

DRINKING WATER (GROSS BETA AND GAMMA)

COLLECTION PERIOD	13H2	15F4	15F7	16C2	28F3
JAN 90	12/26-01/29	12/26-01/29	12/26-01/29	12/26-01/29	12/26-01/29
FEB 90	01/29-02/26	01/29-02/26	01/29-02/26	01/29-02/26	01/29-02/26
MAR 90	02/26-03/26	02/26-03/26	02/26-03/26	02/26-03/26	02/26-03/26
APR 90	03/26-04/30	03/26-04/30	03/26-04/30	03/26-04/30	03/26-04/30
MAY 90	04/30-05/29	04/30-05/28	04/30-05/29	04/30-05/28	04/30-05/28
JUN 90	05/29-06/25	05/28-06/25	05/29-06/25	05/28-06/25	05/28-06/25
JUL 90	06/25-07/30	06/25-07/30	06/25-07/30	06/25-07/30	06/25-07/30
AUG 90	07/30-08/27	07/30-08/27	07/30-08/27	07/30-08/27	07/30-08/27
SEP 90	08/27-09/24	08/27-09/24	08/27-09/24	08/27-09/24	08/27-09/24
OCT 90	09/24-10/29	09/24-10/29	09/24-10/29	09/24-10/29	09/24-10/29
NOV 90	10/29-11/26	10/29-11/26	10/29-11/26	10/29-11/26	10/29-11/26
DEC 90	11/26-12/27	11/26-12/27	11/26-12/27	11/26-12/27	11/26-12/27

DRINKING WATER (TRITIUM)

COLLECTION PERIOD	13H2	15F4	15F7	16C2	28F3
JAN-MAR 90	12/26-03/26	12/26-03/26	12/26-03/26	12/26-03/26	12/26-03/26
APR-JUN 90	03/26-06/25	03/26-06/25	03/26-06/25	03/26-06/25	03/26-06/25
JUL-SEP 90	06/25-09/24	06/25-09/24	06/25-09/24	06/25-09/24	06/25-09/24
OCT-DEC 90	09/24-12/27	09/24-12/27	09/24-12/27	09/24-12/27	09/24-12/27

TABLE C-IX.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

AIR PARTICULATE AND AIR IODINE

GROUP I - ON-SITE LOCATIONS

WEEK	1083	1181	1481	3482
01	01/01-01/08	01/01-01/08	01/01-01/08	01/01-01/08
02	01/08-01/15	01/08-01/15	01/08-01/15	01/08-01/15
03	01/15-01/22	01/15-01/22	01/15-01/22	01/15-01/22
04	01/22-01/29	01/22-01/29	01/22-01/29	01/22-01/29
05	01/29-02/05	01/29-02/05	01/29-02/05	01/29-02/05
06	02/05-02/12	02/05-02/12	02/05-02/12	02/05-02/12
07	02/12-02/19	02/12-02/19	02/12-02/19	02/12-02/19
08	02/19-02/26	02/19-02/26	02/19-02/26	02/19-02/26
09	02/26-03/05	02/26-03/05	02/26-03/05	02/26-03/05
10	03/05-03/12	03/05-03/12	03/05-03/12	03/05-03/12
11	03/12-03/19	03/12-03/19	03/12-03/19	03/12-03/19
12	03/19-03/26	03/19-03/26	03/19-03/26	03/19-03/26
13	03/26-04/02	03/26-04/02	03/26-04/02	03/26-04/02
14	04/02-04/09	04/02-04/09	04/02-04/09	04/02-04/09
15	04/09-04/16	04/09-04/16	04/09-04/16	04/09-04/16
16	04/16-04/23	04/16-04/23	04/16-04/23	04/16-04/23
17	04/23-04/30	04/23-04/30	04/23-04/30	04/23-04/30
18	04/30-05/07	04/30-05/07	04/30-05/07	04/30-05/07
19	05/07-05/14	05/07-05/14	05/07-05/14	05/07-05/14
20	05/14-05/21	05/14-05/21	05/14-05/21	05/14-05/21
21	05/21-05/28	05/21-05/28	05/21-05/28	05/21-05/28
22	05/28-06/04	05/28-06/04	05/28-06/04	05/28-06/04
23	06/04-06/11	06/04-06/11	06/04-06/11	06/04-06/11
24	06/11-06/18	06/11-06/18	06/11-06/18	06/11-06/18
25	06/18-06/25	06/18-06/25	06/18-06/25	06/18-06/25
26	06/25-07/02	06/25-07/02	06/25-07/02	06/25-07/02
27	07/02-07/08	07/02-07/08	07/02-07/08	07/02-07/08
28	07/08-07/16	07/08-07/16	07/08-07/16	07/08-07/16
29	07/16-07/22	07/16-07/22	07/16-07/22	07/16-07/22
30	07/22-07/30	07/22-07/30	07/22-07/30	07/22-07/30
31	07/30-08/06	07/30-08/06	07/30-08/06	07/30-08/06
32	08/06-08/13	08/06-08/13	08/09-08/13	08/06-08/13
33	08/13-08/20	08/13-08/20	08/13-08/20	08/13-08/20
34	08/20-08/27	08/20-08/27	08/20-08/27	08/20-08/27
35	08/27-09/03	08/27-09/03	08/27-09/03	08/27-09/03
36	09/03-09/11	09/03-09/11	09/03-09/11	09/03-09/11
37	09/11-09/17	09/11-09/17	09/11-09/17	09/11-09/17
38	09/17-09/24	09/17-09/24	09/17-09/24	09/17-09/24
39	09/24-10/01	09/24-10/01	09/24-10/01	09/24-10/01
40	10/01-10/08	10/01-10/08	10/01-10/08	10/01-10/08
41	10/08-10/15	10/08-10/15	10/08-10/15	10/08-10/15
42	10/15-10/22	10/15-10/22	10/15-10/22	10/15-10/22
43	10/22-10/29	10/22-10/29	10/22-10/29	10/22-10/29
44	10/29-11/05	10/29-11/05	10/29-11/05	10/29-11/05
45	11/05-11/12	11/05-11/12	11/05-11/12	11/05-11/12
46	11/12-11/19	11/12-11/19	11/12-11/19	11/12-11/19
47	11/19-11/26	11/19-11/26	11/19-11/26	11/19-11/26
48	11/26-12/03	11/26-12/03	11/26-12/03	11/26-12/03
49	12/03-12/10	12/03-12/10	12/03-12/10	12/03-12/10
50	12/10-12/17	12/10-12/17	12/10-12/17	12/10-12/17
51	12/17-12/23	12/17-12/23	12/17-12/23	12/17-12/23
52	12/23-12/31	12/23-12/31	12/23-12/31	12/23-12/31

TABLE C-IX.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

AIR PARTICULATE AND AIR IODINE

GROUP II - INTERMEDIATE DISTANCE LOACATIONS

WEEK	2B1	6C1	9C1	13C1	15D1	17B1
01	01/01-01/08	01/01-01/08	01/01-01/08	01/01-01/08	01/01-01/08	01/01-01/08
02	01/08-01/15	01/08-01/15	01/08-01/15	01/08-01/15	01/08-01/15	01/08-01/15
03	01/15-01/22	01/15-01/22	01/15-01/22	01/15-01/22	01/15-01/22	01/15-01/22
04	01/22-01/29	01/22-01/29	01/22-01/29	01/22-01/29	01/22-01/29	01/22-01/29
05	01/29-02/05	01/29-02/05	01/29-02/05	01/29-02/05	01/29-02/05	01/29-02/05
06	02/05-02/12	02/05-02/12	02/05-02/12	02/05-02/12	02/05-02/12	02/05-02/12
07	02/12-02/19	02/12-02/19	02/12-02/19	02/12-02/19	02/12-02/19	02/12-02/19
08	02/19-02/26	02/19-02/26	02/19-02/26	02/19-02/26	02/19-02/26	02/19-02/26
09	02/26-03/05	02/26-03/05	02/26-03/05	02/26-03/05	02/26-03/05	02/26-03/05
10	03/05-03/12	03/05-03/12	03/05-03/12	03/05-03/12	03/05-03/12	03/05-03/12
11	03/12-03/19	03/12-03/19	03/12-03/19	03/12-03/19	03/12-03/19	03/12-03/19
12	03/19-03/26	03/19-03/26	03/19-03/26	03/19-03/26	03/19-03/26	03/19-03/26
13	03/26-04/02	03/26-04/02	03/26-04/02	03/26-04/02	03/26-04/02	03/26-04/02
14	04/02-04/09	04/02-04/09	04/02-04/09	04/02-04/09	04/02-04/09	04/02-04/09
15	04/09-04/16	04/09-04/16	04/09-04/16	04/09-04/16	04/09-04/16	04/09-04/16
16	04/16-04/23	04/16-04/23	04/16-04/23	04/16-04/23	04/16-04/23	04/16-04/23
17	04/23-04/30	04/23-04/30	04/23-04/30	04/23-04/30	04/23-04/30	04/23-04/30
18	04/30-05/07	04/30-05/07	04/30-05/07	04/30-05/07	04/30-05/07	04/30-05/07
19	05/07-05/14	05/07-05/14	05/07-05/14	05/07-05/14	05/07-05/14	05/07-05/14
20	05/14-05/21	05/14-05/21	05/14-05/21	05/14-05/21	05/14-05/21	05/14-05/21
21	05/21-05/28	05/21-05/28	05/21-05/28	05/21-05/28	05/21-05/28	05/21-05/28
22	05/28-06/04	05/28-06/04	05/28-06/04	05/28-06/04	05/28-06/04	05/28-06/04
23	06/04-06/11	06/04-06/11	06/04-06/11	06/04-06/11	06/04-06/11	06/04-06/11
24	06/11-06/18	06/11-06/18	06/11-06/18	06/11-06/18	06/11-06/18	06/11-06/18
25	06/18-06/25	06/18-06/25	06/18-06/25	06/18-06/25	06/18-06/25	06/18-06/25
26	06/25-07/02	06/25-07/02	06/25-07/02	06/25-07/02	06/25-07/02	06/25-07/02
27	07/02-07/08	07/02-07/08	07/02-07/08	07/02-07/08	07/02-07/08	07/04-07/08
28	07/08-07/16	07/08-07/16	07/08-07/16	07/08-07/16	07/08-07/16	07/08-07/16
29	07/16-07/22	07/18-07/22	07/16-07/22	07/16-07/22	07/16-07/22	07/16-07/22
30	07/22-07/30	C7/22-07/30	07/22-07/30	07/22-07/30	07/22-07/30	07/22-07/30
31	07/30-08/06	07/30-08/06	07/30-08/06	07/30-08/06	07/30-08/06	07/30-08/06
32	08/06-08/13	08/06-08/13	08/06-08/13	08/06-08/13	08/06-08/13	08/06-08/13
33	08/13-08/20	08/13-08/20	08/13-08/20	08/13-08/20	08/13-08/20	08/13-08/20
34	08/20-08/27	08/20-08/27	08/20-08/27	08/20-08/27	08/20-08/27	08/20-08/27
35	08/29-09/03	08/27-09/03	08/27-09/03	08/30-09/03	08/29-09/03	08/27-09/03
36	09/03-09/11	09/03-09/11	09/03-09/11	09/03-09/11	09/03-09/11	09/03-09/11
37	09/11-09/17	09/11-09/17	09/11-09/17	09/11-09/17	09/11-09/17	09/11-09/17
38	09/17-09/24	09/17-09/24	09/17-09/24	09/17-09/24	09/17-09/24	09/17-09/24
39	09/24-10/01	09/24-10/01	09/24-10/01	09/24-10/01	09/24-10/01	09/24-10/01
40	10/01-10/08	10/01-10/08	10/01-10/08	10/01-10/08	10/01-10/08	10/01-10/08
41	10/08-10/15	10/08-10/15	10/08-10/15	10/08-10/15	10/08-10/15	10/08-10/15
42	10/15-10/22	10/15-10/22	10/15-10/22	10/15-10/22	10/15-10/22	10/15-10/22
43	10/22-10/29	10/22-10/29	10/22-10/29	10/22-10/29	10/22-10/29	10/22-10/29
44	10/29-11/05	10/29-11/05	10/29-11/05	10/29-11/05	10/29-11/05	10/29-11/05
45	11/05-11/12	11/05-11/12	11/05-11/12	11/07-11/12	11/05-11/12	11/05-11/12
46	11/12-11/19	11/12-11/19	11/12-11/19	11/12-11/19	11/12-11/19	11/12-11/19
47	11/19-11/26	11/19-11/26	11/19-11/26	11/19-11/26	11/19-11/26	11/19-11/26
48	11/26-12/03	11/26-12/03	11/26-12/03	11/26-12/03	11/26-12/03	11/26-12/03
49	12/03-12/10	12/03-12/10	12/03-12/10	12/03-12/10	12/03-12/10	12/03-12/10
50	12/10-12/17	12/10-12/17	12/10-12/17	12/10-12/17	12/10-12/17	12/10-12/17
51	12/17-12/23	12/17-12/23	12/17-12/23	12/17-12/23	12/17-12/23	12/17-12/23
52	12/23-12/31	12/23-12/31	12/23-12/31	12/23-12/31	12/23-12/31	12/23-12/31

TABLE C-IX.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

AIR PARTICULATE AND AIR IODINE

GROUP II - INTERMEDIATE DISTANCE LOACATIONS

WEEK	2001	2581	2981	3101	3581
01	01/01-01/08	01/01-01/08	01/01-01/08	01/01-01/08	01/01-01/08
02	01/08-01/15	01/08-01/15	01/08-01/15	01/08-01/15	01/08-01/15
03	01/15-01/22	01/15-01/22	01/15-01/22	01/15-01/22	01/15-01/22
04	01/22-01/29	01/22-01/29	01/22-01/29	01/22-01/29	01/22-01/29
05	01/29-02/05	01/29-02/05	01/29-02/05	01/29-02/05	01/29-02/05
06	02/05-02/12	02/05-02/12	02/05-02/12	02/05-02/12	02/05-02/12
07	02/12-02/19	02/12-02/19	02/12-02/19	02/12-02/19	02/12-02/19
08	02/19-02/26	02/19-02/26	02/19-02/26	02/19-02/26	02/19-02/26
09	02/26-03/05	02/26-03/05	02/26-03/05	02/26-03/05	02/26-03/05
10	03/05-03/12	03/05-03/12	03/05-03/12	03/05-03/12	03/05-03/12
11	03/12-03/19	03/12-03/19	03/12-03/19	03/12-03/19	03/12-03/19
12	03/19-03/26	03/19-03/26	03/19-03/26	03/19-03/26	03/19-03/26
13	03/26-04/02	03/26-04/02	03/26-04/02	03/26-04/02	03/26-04/02
14	04/02-04/09	04/02-04/09	04/02-04/09	04/02-04/09	04/02-04/09
15	04/09-04/16	04/09-04/16	04/09-04/16	04/09-04/16	04/09-04/16
16	04/16-04/23	04/16-04/23	04/16-04/23	04/16-04/23	04/16-04/23
17	04/23-04/30	04/23-04/30	04/23-04/30	04/23-04/30	04/23-04/30
18	04/30-05/07	04/30-05/07	04/30-05/07	04/30-05/07	04/30-05/07
19	05/07-05/14	05/07-05/14	05/07-05/14	05/07-05/14	05/07-05/14
20	05/14-05/21	05/14-05/21	05/14-05/21	05/14-05/21	05/14-05/21
21	05/21-05/28	05/21-05/28	05/21-05/28	05/21-05/28	05/21-05/28
22	05/28-06/04	05/28-06/04	05/28-06/04	05/28-06/04	05/28-06/04
23	06/04-06/11	06/04-06/11	06/04-06/11	06/04-06/11	06/04-06/11
24	06/11-06/18	06/11-06/18	06/11-06/18	06/11-06/18	06/11-06/18
25	06/20-06/25	06/18-06/25	06/18-06/25	06/18-06/25	06/18-06/25
26	06/25-07/02	06/25-07/02	06/25-07/02	06/25-07/02	06/25-07/02
27	07/02-07/08	07/02-07/08	07/02-07/08	07/02-07/08	07/02-07/08
28	07/08-07/16	07/08-07/16	07/08-07/16	07/08-07/16	07/08-07/16
29	07/16-07/22	07/16-07/22	07/16-07/22	07/16-07/22	07/16-07/22
30	07/22-07/30	07/22-07/30	07/22-07/30	07/22-07/30	07/22-07/30
31	07/30-08/06	07/30-08/06	07/30-08/06	07/30-08/06	07/30-08/06
32	08/06-08/13	08/06-08/13	08/06-08/13	08/06-08/13	08/06-08/13
33	08/13-08/20	08/13-08/20	08/13-08/20	08/13-08/20	08/13-08/20
34	08/23-08/27	08/20-08/27	08/20-08/27	08/20-08/27	08/20-08/27
35	08/27-09/03	08/27-09/03	08/27-09/03	08/29-09/03	08/29-09/03
36	09/03-09/11	09/03-09/11	09/03-09/11	09/03-09/11	09/03-09/11
37	09/11-09/17	09/11-09/17	09/11-09/17	09/11-09/17	09/11-09/17
38	09/17-09/24	09/17-09/24	09/17-09/24	09/17-09/24	09/17-09/24
39	09/24-10/01	09/24-10/01	09/24-10/01	09/24-10/01	09/24-10/01
40	10/01-10/08	10/01-10/08	10/01-10/08	10/01-10/08	10/01-10/08
41	10/08-10/15	10/08-10/15	10/08-10/15	10/08-10/15	10/08-10/15
42	10/15-10/22	10/15-10/22	10/15-10/22	10/15-10/22	10/15-10/22
43	10/22-10/29	10/22-10/29	10/22-10/29	10/22-10/29	10/22-10/29
44	10/29-11/05	10/29-11/05	10/29-11/05	10/29-11/05	10/29-11/05
45	11/05-11/12	11/05-11/12	11/05-11/12	11/05-11/12	11/05-11/12
46	11/12-11/19	11/12-11/19	11/12-11/19	11/12-11/19	11/12-11/19
47	11/19-11/26	11/19-11/26	11/19-11/26	11/19-11/26	11/19-11/26
48	11/26-12/03	11/26-12/03	11/26-12/03	11/26-12/03	11/26-12/03
49	12/03-12/10	12/03-12/10	12/03-12/10	12/03-12/10	12/03-12/10
50	12/10-12/17	12/10-12/17	12/10-12/17	12/10-12/17	12/10-12/17
51	12/17-12/23	12/17-12/23	12/17-12/23	12/17-12/23	12/17-12/23
52	12/23-12/31	12/23-12/31	12/23-12/31	12/23-12/31	12/23-12/31

TABLE C-IX.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

AIR PARTICULATE AND AIR IODINE

GROUP III - CONTROL LOACATIONS

WEEK	1304	2201
01	01/02-01/08	01/01-01/08
02	01/08-01/16	01/08-01/15
03	01/16-01/22	01/15-01/22
04	01/22-01/29	01/22-01/29
05	01/29-02/05	01/29-02/05
06	02/05-02/12	02/05-02/12
07	02/12-02/20	02/12-02/19
08	02/20-02/26	02/19-02/26
09	02/26-03/05	02/26-03/05
10	03/05-03/12	03/05-03/12
11	03/12-03/19	03/12-03/19
12	03/19-03/26	03/19-03/26
13	03/26-04/02	03/26-04/02
14	04/02-04/09	04/02-04/09
15	04/09-04/16	04/09-04/16
16	04/16-04/23	04/16-04/23
17	04/23-04/30	04/23-04/30
18	04/30-05/07	04/30-05/07
19	05/07-05/14	05/07-05/14
20	05/14-05/21	05/14-05/21
21	05/21-05/29	05/21-05/28
22	05/29-06/04	05/28-06/04
23	06/04-06/11	06/04-06/11
24	06/11-06/19	06/11-06/18
25	06/19-06/25	06/18-06/25
26	06/25-07/02	06/25-07/02
27	07/02-07/09	07/02-07/08
28	07/09-07/16	07/08-07/16
29	07/16-07/23	07/16-07/22
30	07/23-07/30	07/22-07/30
31	07/30-08/06	07/30-08/06
32	08/06-08/13	08/06-08/13
33	08/13-08/20	08/13-08/20
34	08/20-08/27	08/20-08/27
35	08/27-09/04	08/27-09/03
36	09/04-09/10	09/03-09/11
37	09/10-09/17	09/11-09/17
38	09/17-09/24	09/17-09/24
39	09/24-10/01	09/24-10/01
40	10/01-10/09	10/01-10/08
41	10/09-10/15	10/08-10/15
42	10/15-10/22	10/15-10/22
43	10/22-10/29	10/22-10/29
44	10/29-11/05	10/29-11/05
45	11/05-11/13	11/05-11/12
46	11/13-11/19	11/12-11/19
47	11/19-11/26	11/19-11/26
48	11/26-12/03	11/26-12/03
49	12/03-12/10	12/03-12/10
50	12/10-12/17	12/10-12/17
51	12/17-12/24	12/17-12/23
52	12/24-12/31	12/23-12/31

TABLE C-IX.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

TLD - MONTHLY

STATION CODE	JAN 1990	FEB 1990	MAR 1990	APR 1990	MAY 1990	JUN 1990	JUL 1990	AUG 1990	SEP 1990	OCT 1990	NOV 1990	DEC 1990
36S2	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
2B1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
2E1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
3S1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
4E1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
5S1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
5H1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
6C1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
7S1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
7E1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
9C1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
10S3	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
10E1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
11S1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
10F3	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
14S1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
13C1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
13E1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03		08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/	12/05-01/02
13H4	01/08-02/05	02/05-03/05	03/05-04/09	04/09-05/07	05/07-06/04	06/04-07/02	07/02-08/06	08/06-09/04	09/04-10/01	10/01-11/05	11/05-12/10	12/10-01/07
15D1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
16S2	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
16F1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
17B1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
18S1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
18G1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
19D1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
20D1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
20F1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
21S1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
22G1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
23S2	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
24D1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
25S1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
25D1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
26S3	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
26B1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
26D2	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
29S1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
29B1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
29E1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
31D1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
31D2	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
32S1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
32G1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
34S2	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/02	05/02-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
34E1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
35B1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02
35F1	01/03-02/06	02/06-03/06	03/06-04/03	04/03-05/01	05/01-06/06	06/06-07/03	07/03-08/07	08/07-09/04	09/04-10/02	10/02-11/07	11/07-12/05	12/05-01/02

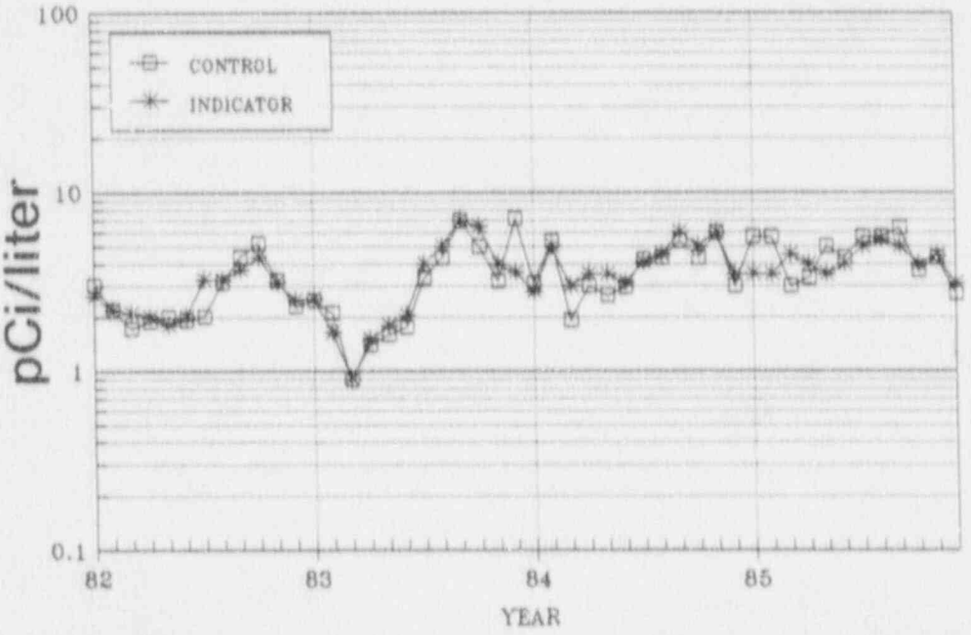
TABLE C-IX.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

TLD - QUARTERLY

STATION CODE	JAN-MAR 1990	APR-JUN 1990	JUL-SEP 1990	OCT-DEC 1990
36S2	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
2B1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
2E1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
3S1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
4E1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
5S1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
5H1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
6C1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
7S1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
7E1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
9C1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
10S3	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
10E1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
11S1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
10F3	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
14S1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
13C1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
13E1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
13H4	01/08-04/09	04/09-07/02	07/02-10/01	10/01-01/07
15D1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
16S2	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
16F1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
17B1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
18S1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
18G1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
19D1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
20D1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
20F1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
21S1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
22G1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
23S2	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
24D1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
25S1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
25D1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
26S3	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
26B1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
28D2	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
29S1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
29B1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
29E1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
31D1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
31D2	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
32S1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
32G1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
34S2	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
34E1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
35B1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02
35F1	01/03-04/03	04/03-07/03	07/03-10/02	10/02-01/02

FIGURE C-1

MEAN MONTHLY SOLUBLE GROSS BETA CONCENTRATIONS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LGS, 1982 - 1990



LGS CRITICALITY:

UNIT NO. 1 12/22/84

UNIT NO. 2 08/11/89

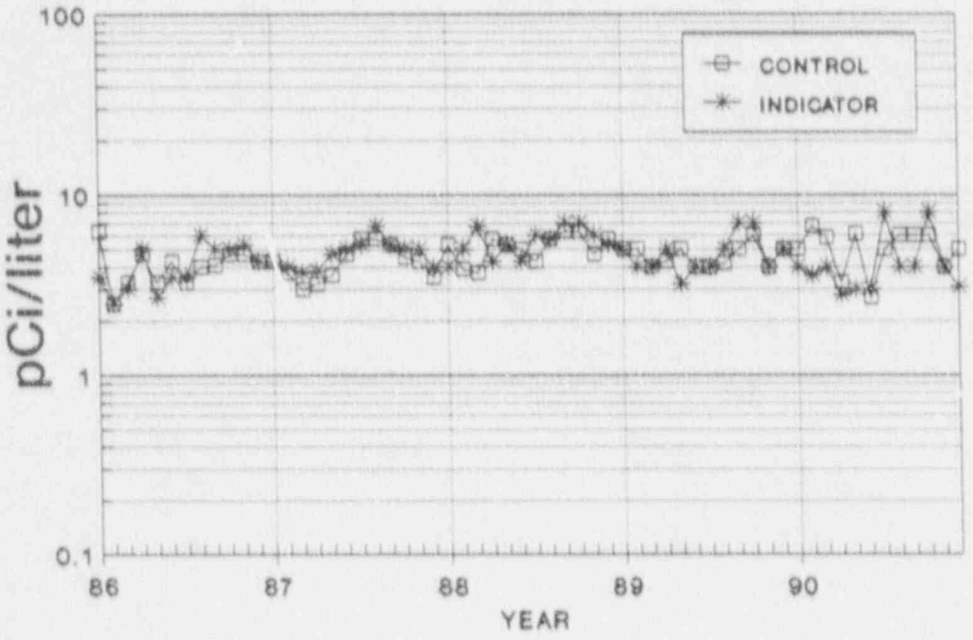
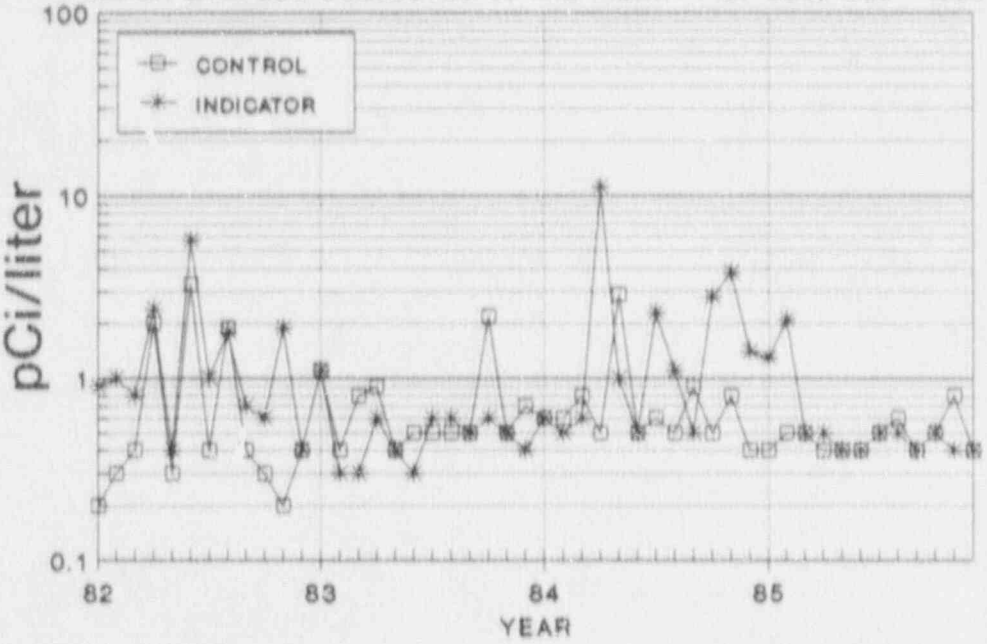


FIGURE C-2
MEAN MONTHLY INSOLUBLE GROSS BETA CONCENTRATIONS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LGS, 1982 - 1990



LGS CRITICALITY:

UNIT NO. 1 12/22/84
UNIT NO. 2 08/11/89

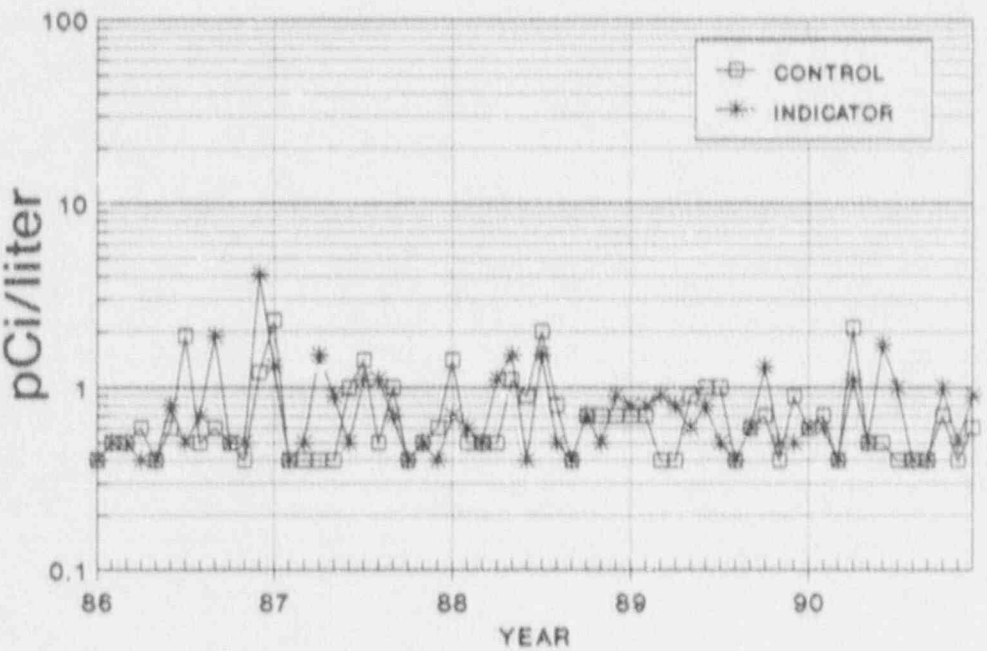
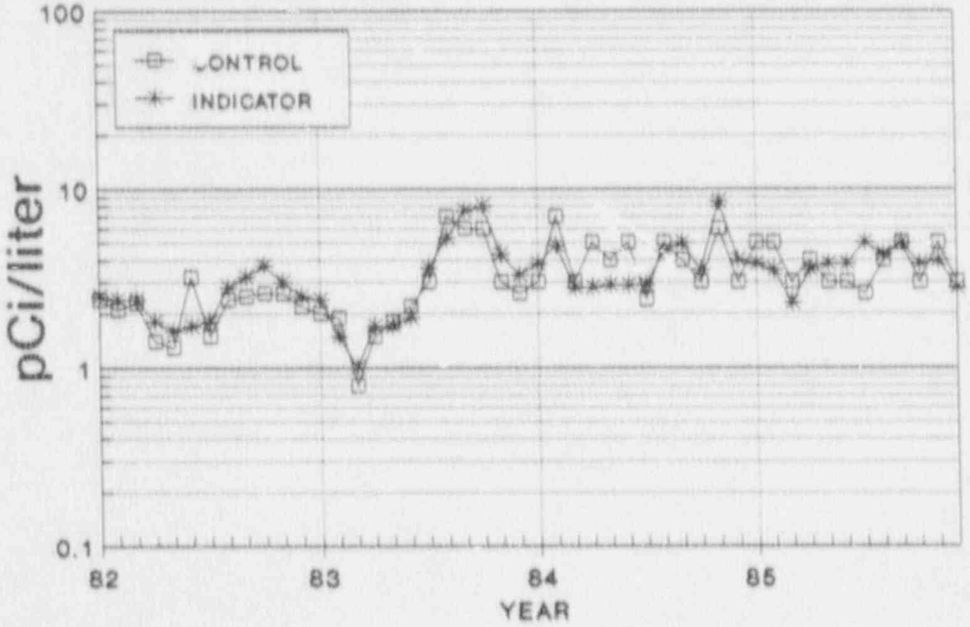


FIGURE C-3

MEAN MONTHLY SOLUBLE GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINTY OF LGS, 1982 - 1990



LGS CRITICALITY:

UNIT NO. 1 12/22/84

UNIT NO. 2 08/11/89

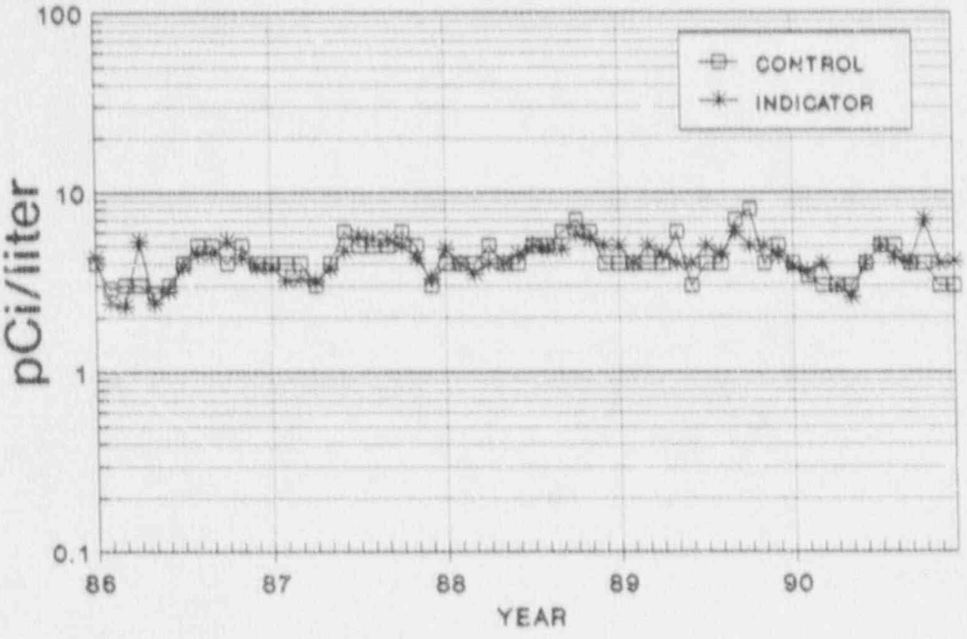
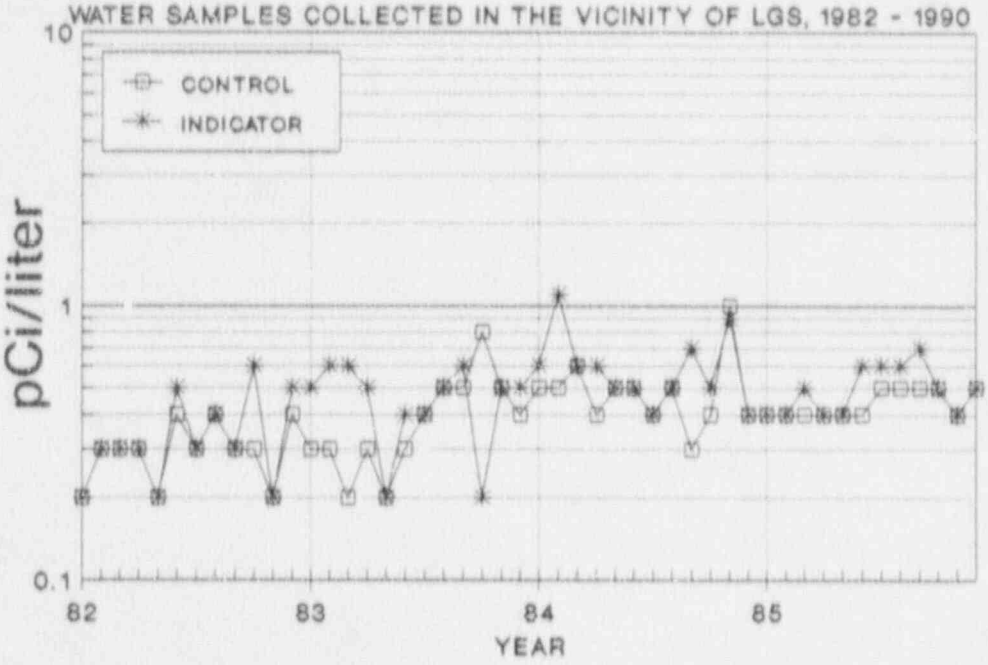


FIGURE C-4

MEAN MONTHLY INSOLUBLE GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LGS, 1982 - 1990



LGS CRITICALITY:

UNIT NO. 1 12/22/84

UNIT NO. 2 08/11/89

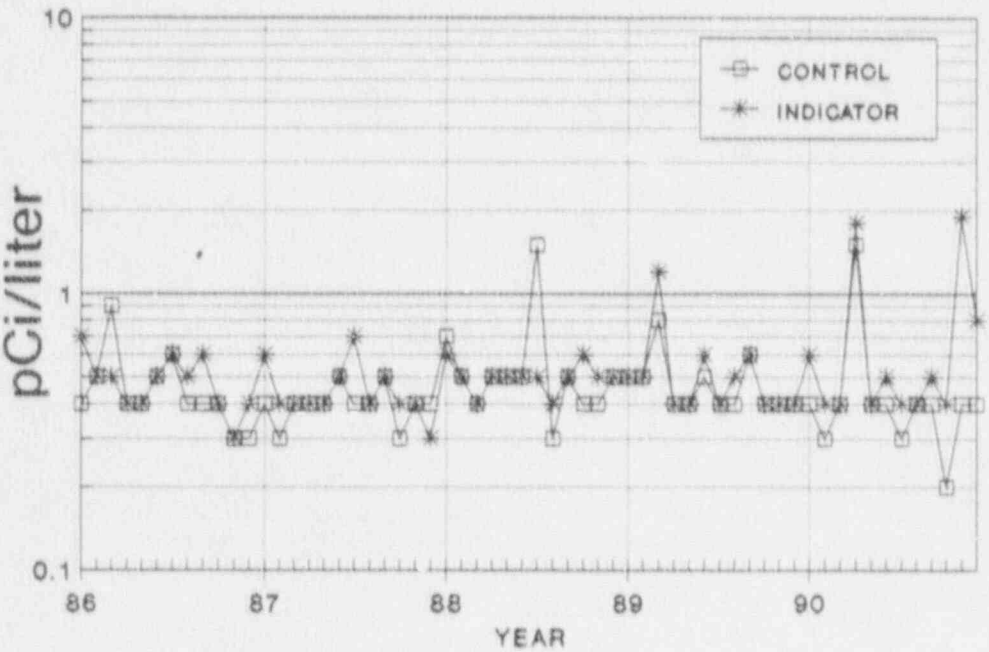


FIGURE C-5

MEAN ANNUAL CS-137 CONCENTRATIONS IN FISH SAMPLES
COLLECTED IN THE VICINITY OF LGS, 1982 - 1990

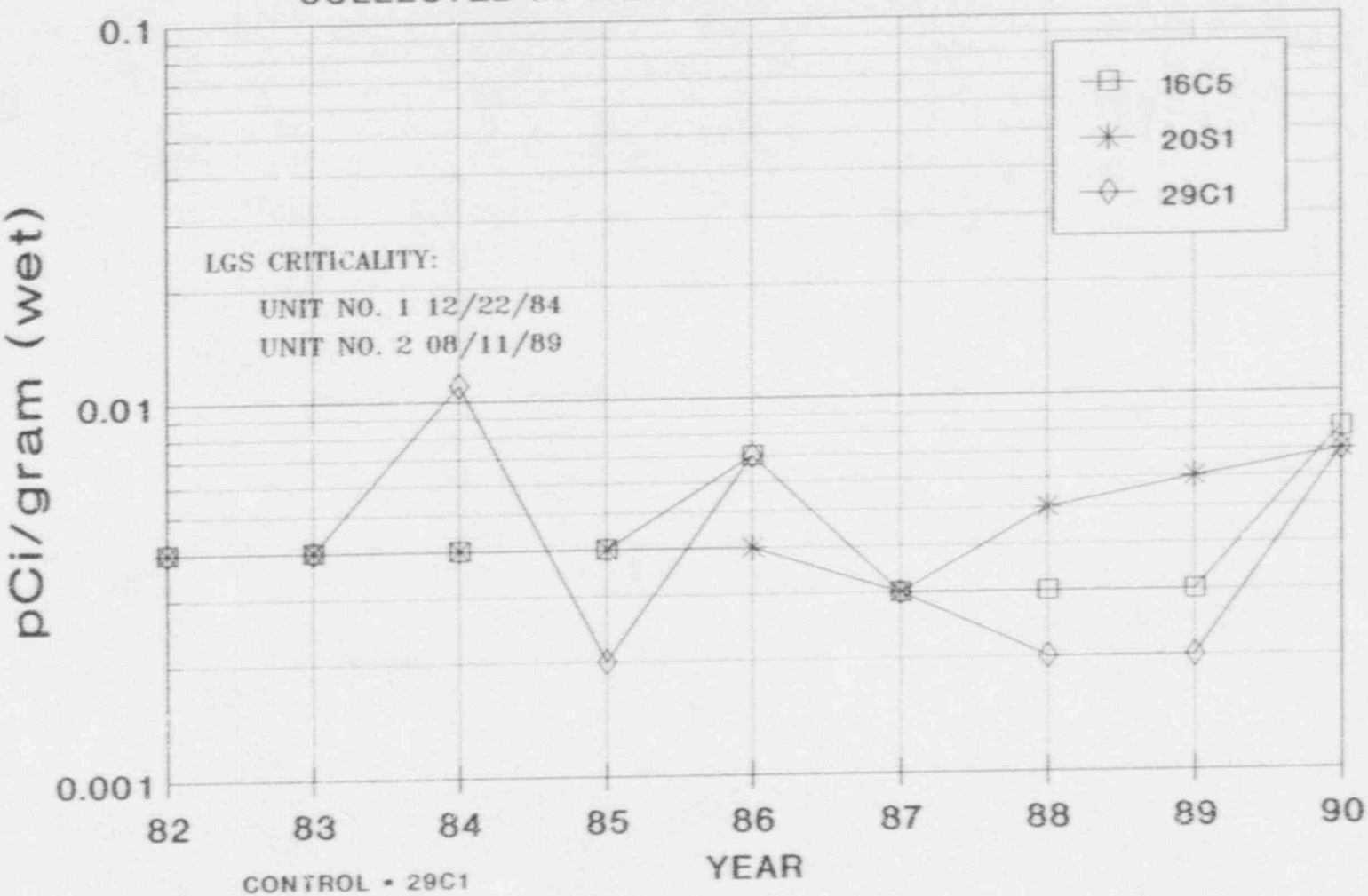


FIGURE C-6

MEAN ANNUAL CS-137 CONCENTRATIONS IN SE[illegible] PLES
COLLECTED IN THE VICINITY OF LGS, [illegible]

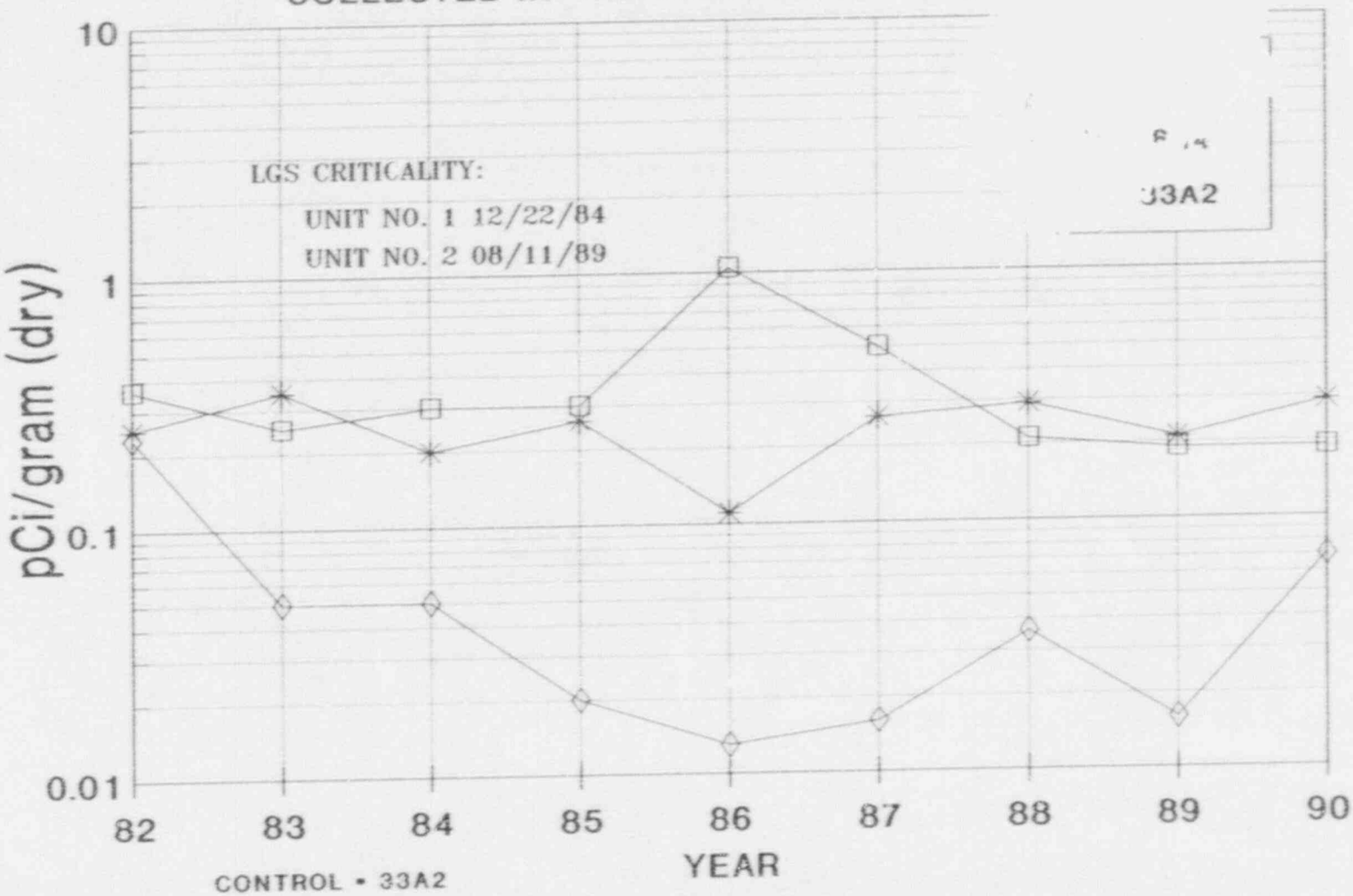


FIGURE C-7

MEAN WEEKLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE

SAMPLES COLLECTED IN THE VICINITY OF LGS, 1990

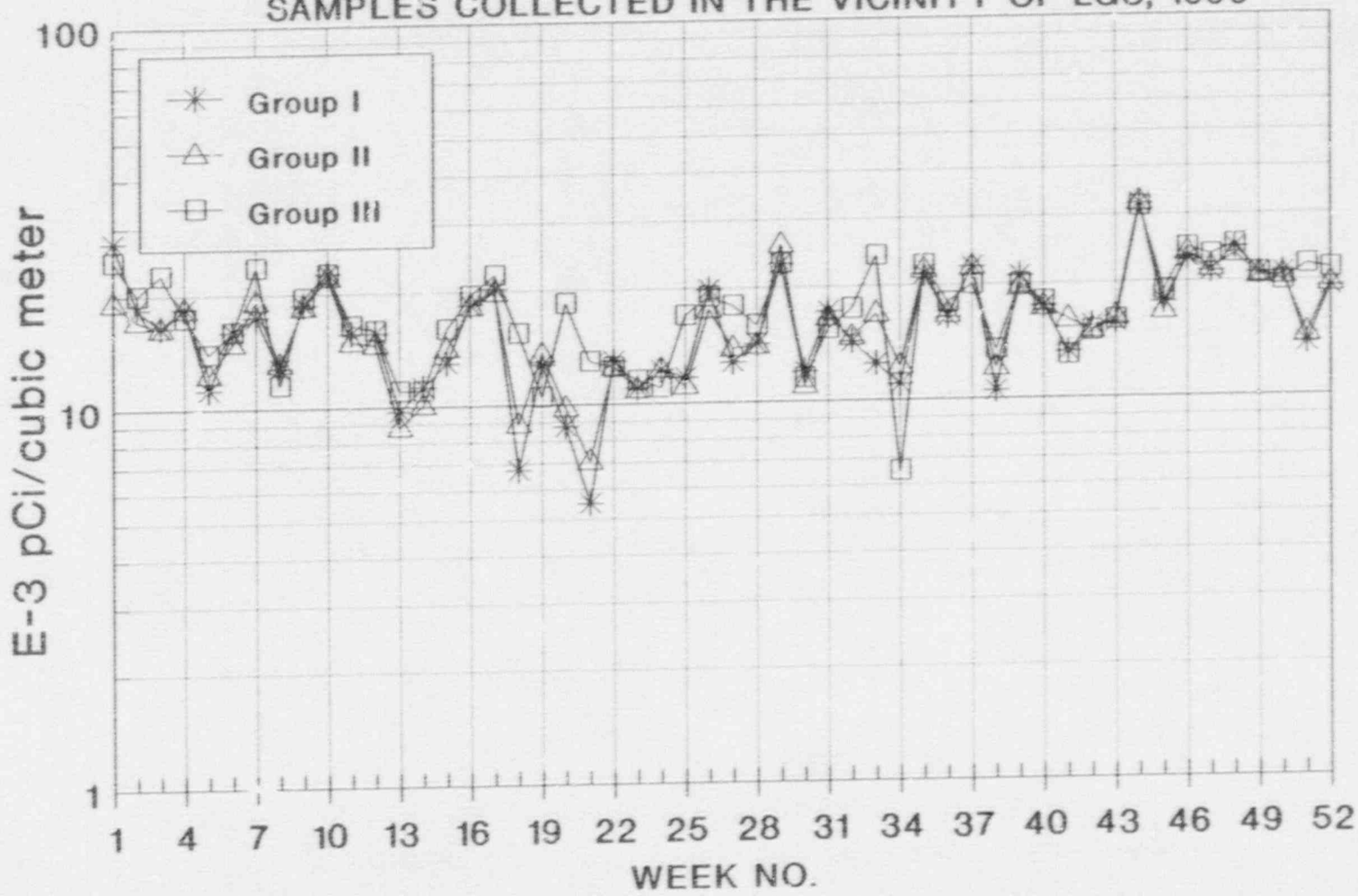
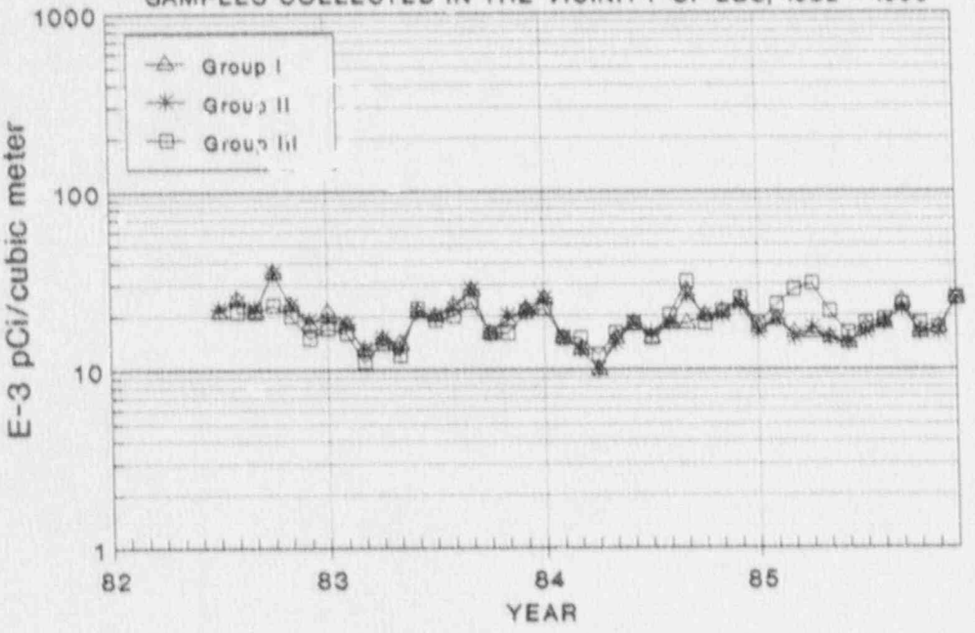


FIGURE C-8

MEAN MONTHLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LGS, 1982 - 1990



LGS CRITICALITY:

UNIT NO. 1 12/22/84

UNIT NO. 2 08/11/89

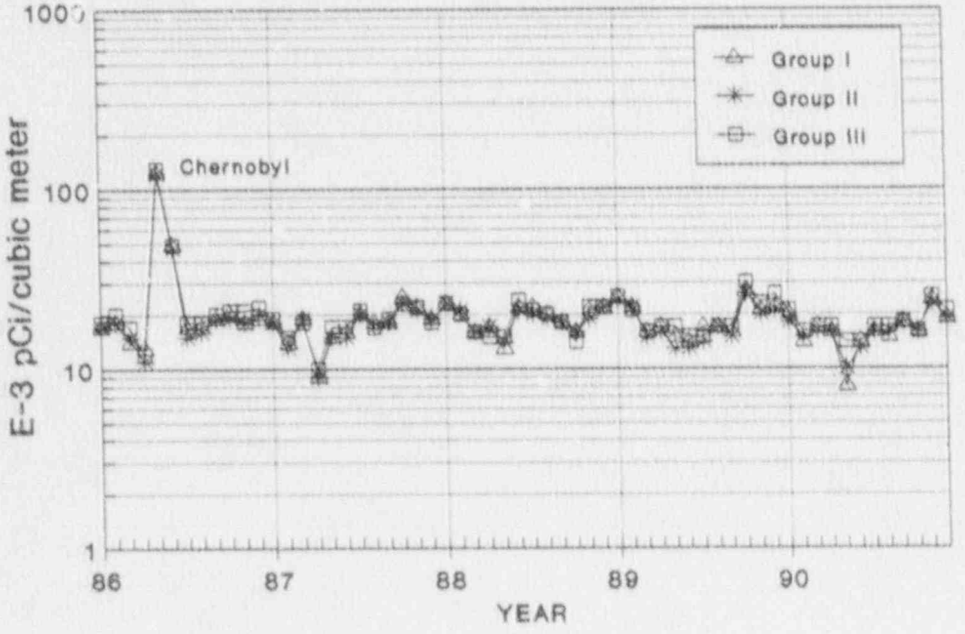
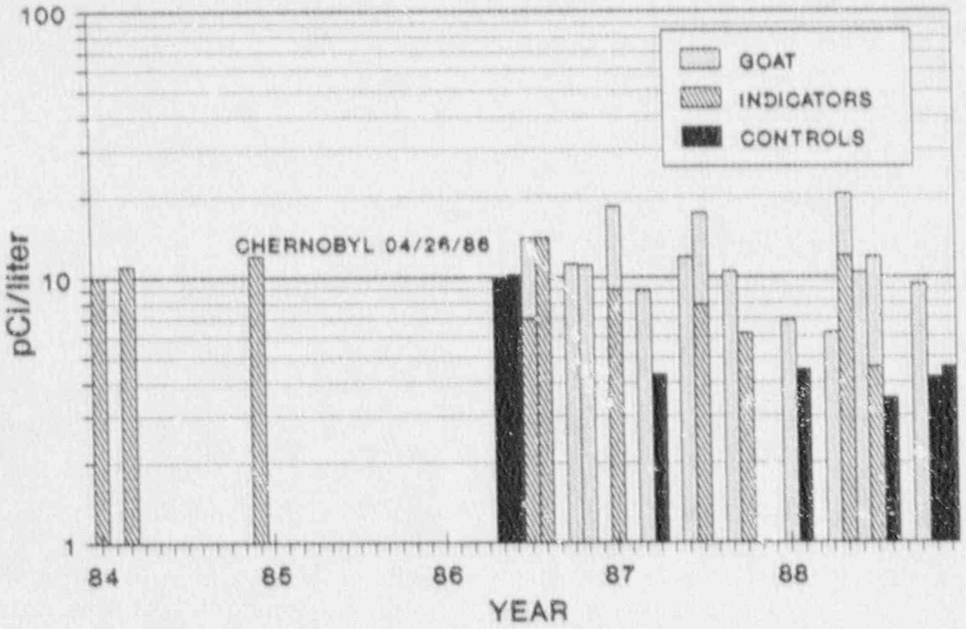


FIGURE C-9
COMPARISON OF POSITIVE MEAN MONTHLY CS-137 VALUES IN MILK SAMPLES COLLECTED IN THE VICINITY OF LGS, 1984 - 1990



LGS CRITICALITY:

UNIT NO. 1 12/22/84
UNIT NO. 2 08/11/89

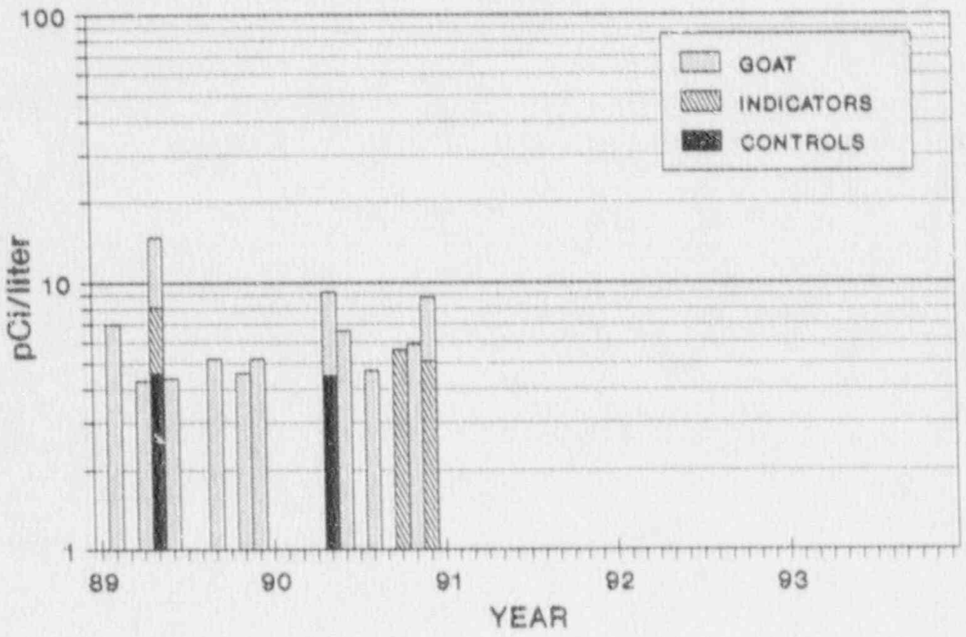
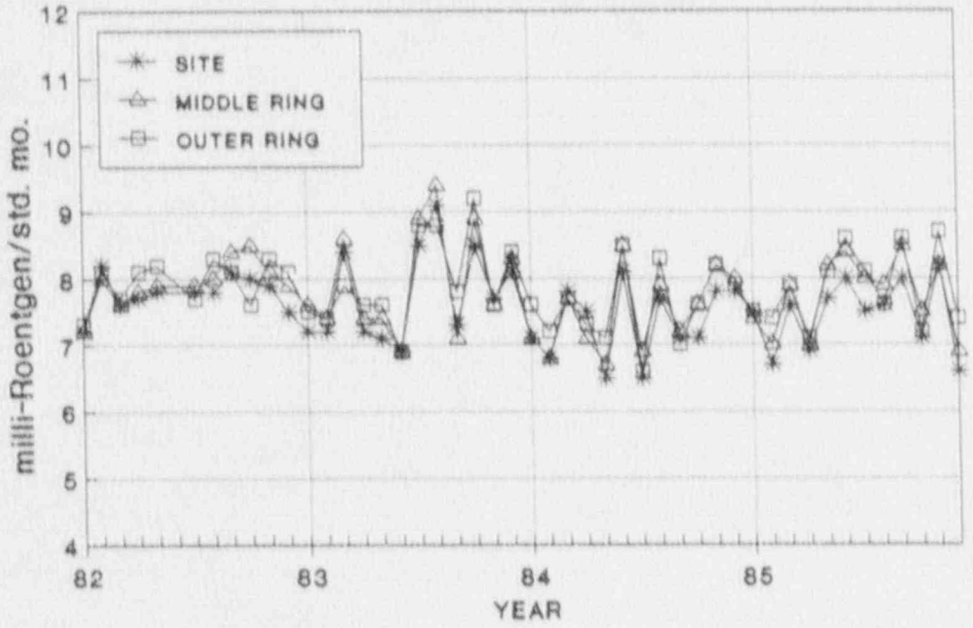


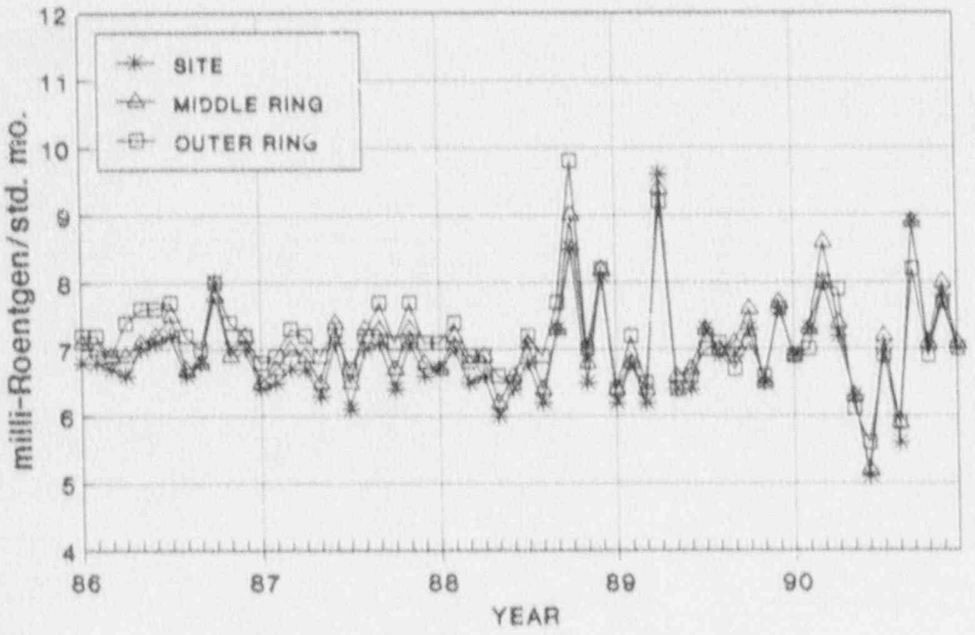
FIGURE C-10

MEAN MONTHLY AMBIENT GAMMA RADIATION LEVELS (TLD)
IN THE VICINITY OF LGS, 1982 - 1990



LGS CRITICALITY:

UNIT NO. 1 12/22/84
UNIT NO. 2 08/11/89



DATA TABLES
QC LABORATORY

APPENDIX D: DATA TABLES AND FIGURES - COMPARISON LABORATORY

TABLES

Table D-I.1	Concentration of Gross Beta Soluble in Surface and Drinking Water Samples Collected in the Vicinity of Limerick Generating Station, 1990.
Table D-I.2	Concentrations of Gross Beta Insoluble in Surface and Drinking Water Samples Collected in the Vicinity of Limerick Generating Station, 1990.
Table D-I.3	Concentrations of Gamma Emitters in Surface and Drinking Water Samples Collected in the Vicinity of Limerick Generating Station, 1990.
Table D-II.1	Concentrations of Gross Beta in Air Particulate Samples Collected in the Vicinity of Limerick Generating Station, 1990.
Table D-II.2	Concentrations of Gamma Emitters in Air Particulate Samples Collected in the Vicinity of Limerick Generating Station, 1990.
Table D-III.1	Concentrations of I-131 by Chemical Separation and Gamma Emitters in Milk Samples Collected in the Vicinity of Limerick Generating Station, 1990.
Table D-IV.1	Summary of Collected Dates for Samples Collected in the Vicinity of Limerick Generating Station, 1990.

FIGURES

Figure D-1	Weekly Gross Beta Concentrations in Air Particulate Samples Collected from LGS Locations 11S1 and 11S2, 1990.
Figure D-2	Weekly Gross Beta Concentrations in Air Particulate Samples Collected from LGS Locations 14S1 and 14S2, 1990.

The following section contains data and figures illustrating the analyses performed by the quality control laboratory. Duplicate samples were obtained from several locations and media and split between the primary laboratory, Teledyne Isotopes (TI) and the quality control laboratory, Clean Harbors (CH). Comparison of the results for most media were within expected ranges, though occasional differences were seen:

Clean Harbors results of gross beta insoluble in surface and drinking water samples (Table D-I.2) were generally lower than the results from Teledyne Isotopes (Table C-I.2, Appendix C). The differences were probably due to differences in the laboratory's respective analytical procedures. CH ashes the sample prior to counting whereas TI does no ashing prior to counting.

CH had some difficulty meeting the MDL values required for La-140 in water samples.

Gross beta results for air particulate samples were similar for both laboratories (Figures D-1 and D-2).

TABLE D-I.1 CONCENTRATIONS OF GROSS BETA SOLUBLE IN SURFACE AND DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	10F2	16C2
JAN 90	3.7 ± 0.6	1.9 ± 0.5
FEB 90	2.8 ± 0.5	1.8 ± 0.5
MAR 90	7.0 ± 0.8	1.6 ± 0.5
APR 90	5.3 ± 0.7	4 ± 1
MAY 90	1.7 ± 0.5	2.0 ± 1.0
JUN 90	3.7 ± 0.8	2 ± 1
JUL 90	5 ± 1	3 ± 2
AUG 90	7 ± 1	3 ± 2
SEP 90	6.0 ± 1.0	5 ± 2
OCT 90	5.6 ± 1.0	5 ± 2
NOV 90	6 ± 1	3 ± 2
DEC 90	5 ± 1	< 1
MEAN	4.9 ± 3.3	2.8 ± 2.6

TABLE D-I.2 CONCENTRATIONS OF GROSS BETA INSOLUBLE IN SURFACE AND DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	10F2	16C2
JAN 90	0.14 ± 0.08	0.19 ± 0.07
FEB 90	0.40 ± 0.10	0.32 ± 0.09
MAR 90	0.19 ± 0.08	0.35 ± 0.09
APR 90	0.4 ± 0.1	0.13 ± 0.08
MAY 90	0.4 ± 0.1	0.22 ± 0.08
JUN 90	0.5 ± 0.2	0.5 ± 0.1
JUL 90	0.5 ± 0.2	0.7 ± 0.1
AUG 90	0.3 ± 0.1	0.5 ± 0.1
SEP 90	0.2 ± 0.1	0.5 ± 0.1
OCT 90	0.7 ± 0.2	0.6 ± 0.1
NOV 90	< 0.10	1.2 ± 0.2
DEC 90	0.6 ± 0.2	1.4 ± 0.2
MEAN	0.37 ± 0.38	0.55 ± 0.78

TABLE D-I.5 CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE AND DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STATION CODE	COLLECTION PERIOD	MN-54	CO-58	FE-59	CO-60	ZN-65	ZR-95	NB-95	CS-134	CS-137	BA-140	LA-140	RA-226
10F2	JAN 90	< 3	< 3	< 8	< 3	< 6	< 5	< 4	< 3	< 3	< 20	< 7	< 5
	FEB 90	< 3	< 3	< 8	< 3	< 6	< 5	< 4	< 3	< 3	< 30	< 8	< 5
	MAR 90	< 3	< 3	< 8	< 3	< 6	< 5	< 4	< 3	< 3	< 20	< 7	< 5
	APR 90	< 3	< 3	< 8	< 3	< 7	< 6	< 4	< 3	< 3	< 30	< 8	< 5
	MAY 90	< 3	< 3	< 7	< 3	< 6	< 5	< 4	< 3	< 3	< 20	< 6	7 ± 5
	JUN 90	3 ± 3	< 3	< 8	< 3	< 6	< 6	< 4	< 3	< 3	< 35	< 9	< 5
	JUL 90	< 3	< 3	< 9	< 3	< 7	< 6	< 4	< 3	< 3	< 40	< 10	< 5
	AUG 90	< 3	< 3	< 8	< 3	< 6	< 5	< 4	< 3	< 3	< 20	< 7	< 5
	SEP 90	< 3	< 3	< 8	< 3	< 6	< 6	< 4	< 3	< 3	< 20	< 8	< 5
	OCT 90	< 3	< 3	< 10	< 3	< 7	< 6	< 5	< 3	< 3	< 60	< 20	5 ± 5
	NOV 90	< 3	< 3	< 9	< 3	< 6	< 6	< 4	< 3	< 3	< 30	< 10	< 5
	DEC 90	< 3	< 3	< 9	< 3	< 6	< 6	< 4	< 3	< 3	< 30	< 10	< 5
	MEAN	3 ± 0	< 3	< 8	< 3	< 6	< 6	< 4	< 3	< 3	< 29	< 9	5 ± 1
16C2	JAN 90	< 3	< 3	< 8	< 3	< 6	< 5	< 4	< 3	< 3	< 20	< 8	9 ± 5
	FEB 90	< 3	< 3	< 10	< 3	< 6	< 6	< 5	< 3	< 3	< 50	< 10	< 5
	MAR 90	< 3	< 3	< 8	< 3	< 6	< 5	< 4	< 3	< 3	< 20	< 8	< 5
	APR 90	< 3	< 3	< 8	< 3	< 6	< 6	< 4	< 3	< 3	< 30	< 9	15 ± 6
	MAY 90	< 3	< 3	< 7	< 3	< 6	< 5	< 4	< 3	< 3	< 20	< 6	11 ± 5
	JUN 90	< 3	< 3	< 8	< 3	< 6	< 5	< 3	3 ± 3	< 2	< 20	< 6	12 ± 6
	JUL 90	< 3	< 3	< 9	< 3	< 6	< 6	< 4	< 3	< 3	< 30	< 10	< 5
	AUG 90	< 3	< 3	< 8	< 3	< 6	< 6	< 4	< 3	< 3	< 30	< 8	< 5
	SEP 90	< 3	< 3	< 8	< 3	< 6	< 6	< 4	< 3	< 3	< 30	< 9	8 ± 5
	OCT 90	< 3	< 3	< 10	< 3	< 7	< 7	< 5	< 3	< 3	< 60	< 20	< 5
	NOV 90	< 3	< 3	< 9	< 3	7 ± 7	< 6	< 4	< 3	< 3	< 40	< 10	8 ± 5
	DEC 90	< 3	< 3	< 9	< 3	< 6	< 6	< 4	< 3	< 3	< 40	< 10	< 5
	MEAN	< 3	< 3	< 9	< 3	6 ± 1	< 6	< 4	3 ± 0	< 3	< 33	< 10	8 ± 7

TABLE D-II.1 CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF E-3 PCI/CU. METER ± 2 SIGMA

WEEK	11S2		14S2	
01	18	± 2	16	± 2
02	15	± 2	15	± 2
03	9	± 2	10	± 2
04	15	± 2	14	± 2
05	11	± 2	11	± 2
06	14	± 2	15	± 2
07	14	± 2	14	± 2
08	13	± 3	10	± 2
09	17	± 2	15	± 2
10	19	± 2	13	± 2
11	9	± 2	9	± 2
12	23	± 2	11	± 2
13	6	± 2	7	± 2
14	7	± 2	7	± 2
15	12	± 2	9	± 2
16	16	± 2	14	± 2
17	16	± 2	15	± 2
18	9	± 2	9	± 2
19	10	± 2	10	± 2
20	7	± 2	8	± 2
21	5	± 2	4	± 2
22	9	± 2	10	± 2
23	10	± 2	10	± 2
24	9	± 2	9	± 2
25	8	± 2	10	± 2
26	15	± 2	15	± 2
27	12	± 2	13	± 2
28	(1)		8	± 2
29	15	± 4	17	± 3
30	7	± 2	8	± 2
31	13	± 2	15	± 2
32	18	± 2	16	± 2
33	16	± 2	17	± 2
34	8	± 2	6	± 2
35	20	± 2	18	± 3
36	16	± 2	15	± 2
37	17	± 3	21	± 3
38	10	± 2	11	± 2
39	16	± 2	19	± 2
40	13	± 2	15	± 2
41	11	± 2	10	± 2
42	13	± 2	14	± 2
43	17	± 2	16	± 2
44	28	± 3	30	± 3
45	14	± 2	16	± 2
46	14	± 2	19	± 2
47	19	± 2	19	± 2
48	18	± 2	17	± 2
49	17	± 2	18	± 2
50	19	± 2	17	± 2
51	10	± 2	14	± 2
52	15	± 2	16	± 2
MEAN	14	± 9	13	± 9

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE D-II.2 CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF E-3 PCI/CU. METER ± 2 SIGMA

STATION CODE	COLLECTION PERIOD	BE-7	FE-59	CS-134	CS-137
1182	01/01-04/02	120 ± 60	10 ± 10	< 2	< 2
	04/02-07/02	140 ± 40	< 10	< 2	< 2
	07/02-10/01	120 ± 50	< 10	< 2	< 2
	10/01-12/31	90 ± 40	< 10	< 2	< 2
	MEAN	118 ± 41	10 ± 0	< 2	< 2
1452	01/01-04/02	140 ± 40	< 10	< 2	< 2
	04/02-07/02	120 ± 40	< 10	< 2	2 ± 2
	07/02-10/01	100 ± 50	< 10	< 2	< 2
	10/01-12/31	120 ± 40	< 10	< 2	< 2
	MEAN	120 ± 33	< 10	< 2	2 ± 0

TABLE D-I.1.1 CONCENTRATIONS OF I-131 BY CHEMICAL SEPARATION AND GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STATION CODE	COLLECTION DATE	I-131	K-40	CS-134	CS-137	BA-140	LA-140	CE-141
19B1	01/09/90	< 0.1	1010 ± 80	< 3	< 3	< 10	< 4	< 4
	04/10/90	< 0.1	1430 ± 90	< 3	< 3	< 20	< 5	< 4
	07/04/90	< 0.2	860 ± 80	< 3	< 3	< 20	< 5	< 4
	10/09/90	0.2 ± 0.1	1280 ± 90	< 3	< 3	< 20	< 4	< 4
	MEAN	0.2 ± 0.1	1145 ± 515	< 3	< 3	< 18	< 5	< 4
21B1	01/09/90	< 0.09	1100 ± 90	< 3	< 3	< 10	< 4	< 4
	04/10/90	< 0.1	1530 ± 90	< 3	< 3	< 20	< 4	< 4
	07/04/90	< 0.1	1240 ± 90	< 3	< 3	< 20	< 4	< 4
	10/09/90	< 0.1	1200 ± 90	< 3	< 3	< 20	5 ± 5	< 4
	MEAN	< 0.10	1268 ± 369	< 3	< 3	< 18	4 ± 1	< 4
22F1	01/09/90	< 0.08	1090 ± 90	< 3	< 3	< 10	< 3	< 4
	04/10/90	< 0.1	1800 ± 100	< 3	4 ± 3	< 20	< 4	< 4
	07/04/90	< 0.1	1180 ± 90	< 3	< 3	< 10	< 4	4 ± 4
	10/09/90	< 0.1	1180 ± 90	< 3	3 ± 3	< 10	< 4	< 4
	MEAN	< 0.10	1313 ± 656	< 3	3 ± 1	< 13	< 4	4 ± 0

TABLE D-IV.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

SURFACE AND DRINKING WATER

COLLECTION PERIOD	10F2	16C2
JAN 90	12/27-01/29	12/26-01/29
FEB 90	01/29-02/26	01/29-02/26
MAR 90	02/26-03/26	02/26-03/26
APR 90	03/26-04/30	03/26-04/30
MAY 90	04/30-05/29	04/30-05/28
JUN 90	05/29-06/25	05/28-06/25
JUL 90	06/25-07/30	06/25-07/30
AUG 90	07/30-08/27	07/30-08/27
SEP 90	08/27-09/24	08/27-09/24
OCT 90	09/24-10/29	09/24-10/29
NOV 90	10/29-11/26	10/29-11/26
DEC 90	11/26-12/27	11/26-12/27

TABLE D-IV.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 1990

AIR PARTICULATE

WEEK	1152	1452
01	01/01-01/08	01/01-01/08
02	01/08-01/15	01/08-01/15
03	01/15-01/22	01/15-01/22
04	01/22-01/29	01/22-01/29
05	01/29-02/05	01/29-02/05
06	02/05-02/12	02/05-02/12
07	02/12-02/19	02/12-02/19
08	02/19-02/26	02/19-02/26
09	02/26-03/05	02/26-03/05
10	03/05-03/12	03/05-03/12
11	03/12-03/19	03/12-03/19
12	03/19-03/26	03/19-03/26
13	03/26-04/02	03/26-04/02
14	04/02-04/09	04/02-04/09
15	04/09-04/16	04/09-04/16
16	04/16-04/23	04/16-04/23
17	04/23-04/30	04/23-04/30
18	04/30-05/07	04/30-05/07
19	05/07-05/14	05/07-05/14
20	05/14-05/21	05/14-05/21
21	05/21-05/28	05/21-05/28
22	05/28-06/04	05/28-06/04
23	06/04-06/11	06/04-06/11
24	06/11-06/18	06/11-06/18
25	06/18-06/25	06/18-06/25
26	06/25-07/02	06/25-07/02
27	07/02-07/08	07/02-07/08
28	07/08-07/16	07/08-07/16
29	07/18-07/22	07/16-07/22
30	07/22-07/30	07/22-07/30
31	07/30-08/06	07/30-08/06
32	08/06-08/13	08/06-08/13
33	08/13-08/20	08/13-08/20
34	08/20-08/27	08/20-08/27
35	08/27-09/03	08/30-09/03
36	09/03-09/11	09/03-09/11
37	09/11-09/17	09/11-09/17
38	09/17-09/24	09/17-09/24
39	09/24-10/01	09/24-10/01
40	10/01-10/08	10/01-10/08
41	10/08-10/15	10/08-10/15
42	10/15-10/22	10/15-10/22
43	10/22-10/29	10/22-10/29
44	10/29-11/05	10/29-11/05
45	11/05-11/12	11/05-11/12
46	11/12-11/19	11/12-11/19
47	11/19-11/26	11/19-11/26
48	11/26-12/03	11/26-12/03
49	12/03-12/10	12/03-12/10
50	12/10-12/17	12/10-12/17
51	12/17-12/23	12/17-12/23
52	12/23-12/31	12/23-12/31

FIGURE D-1

MEAN WEEKLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED FROM LGS LOCATIONS 11S1 AND 11S2, 1990

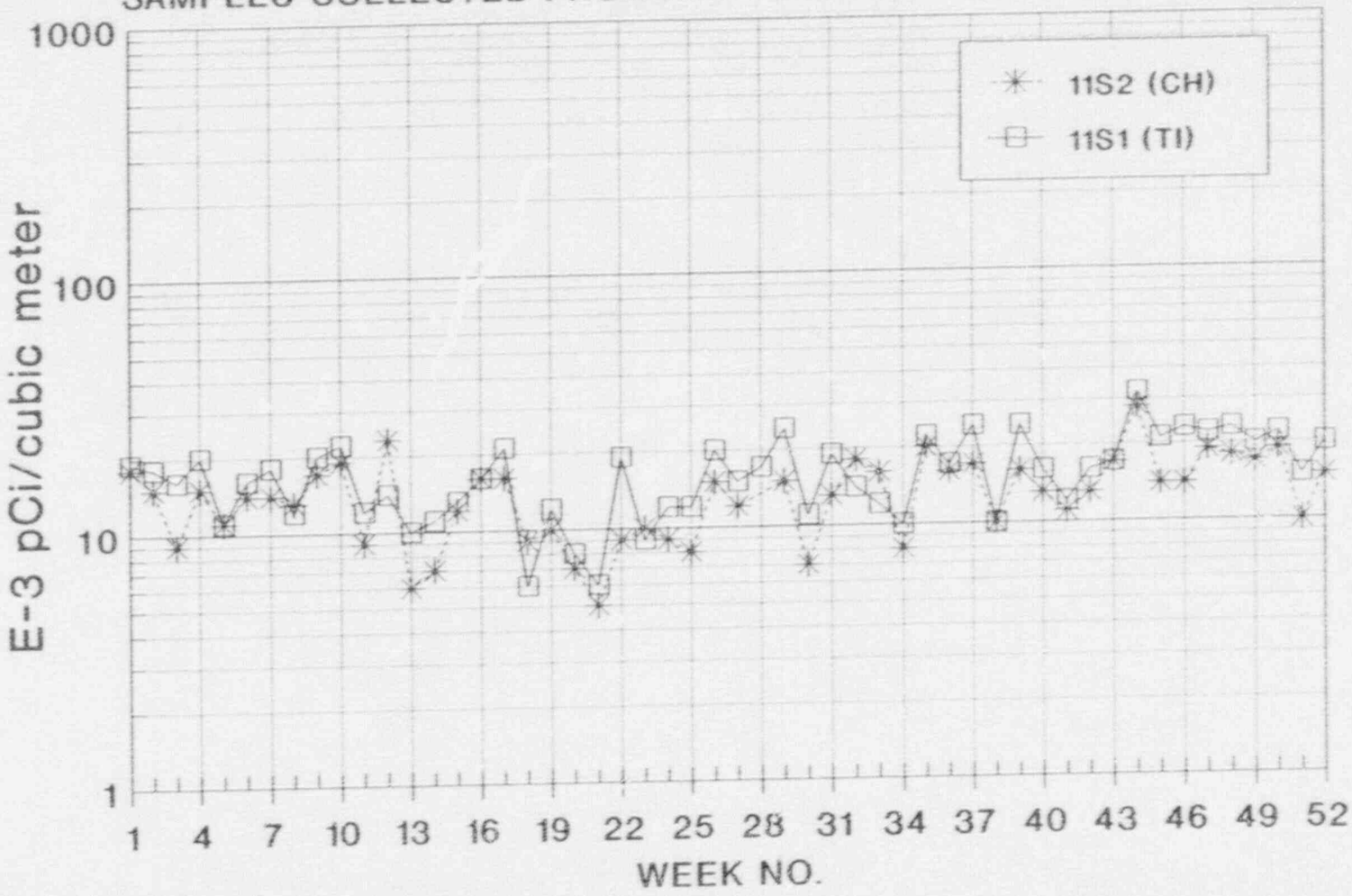
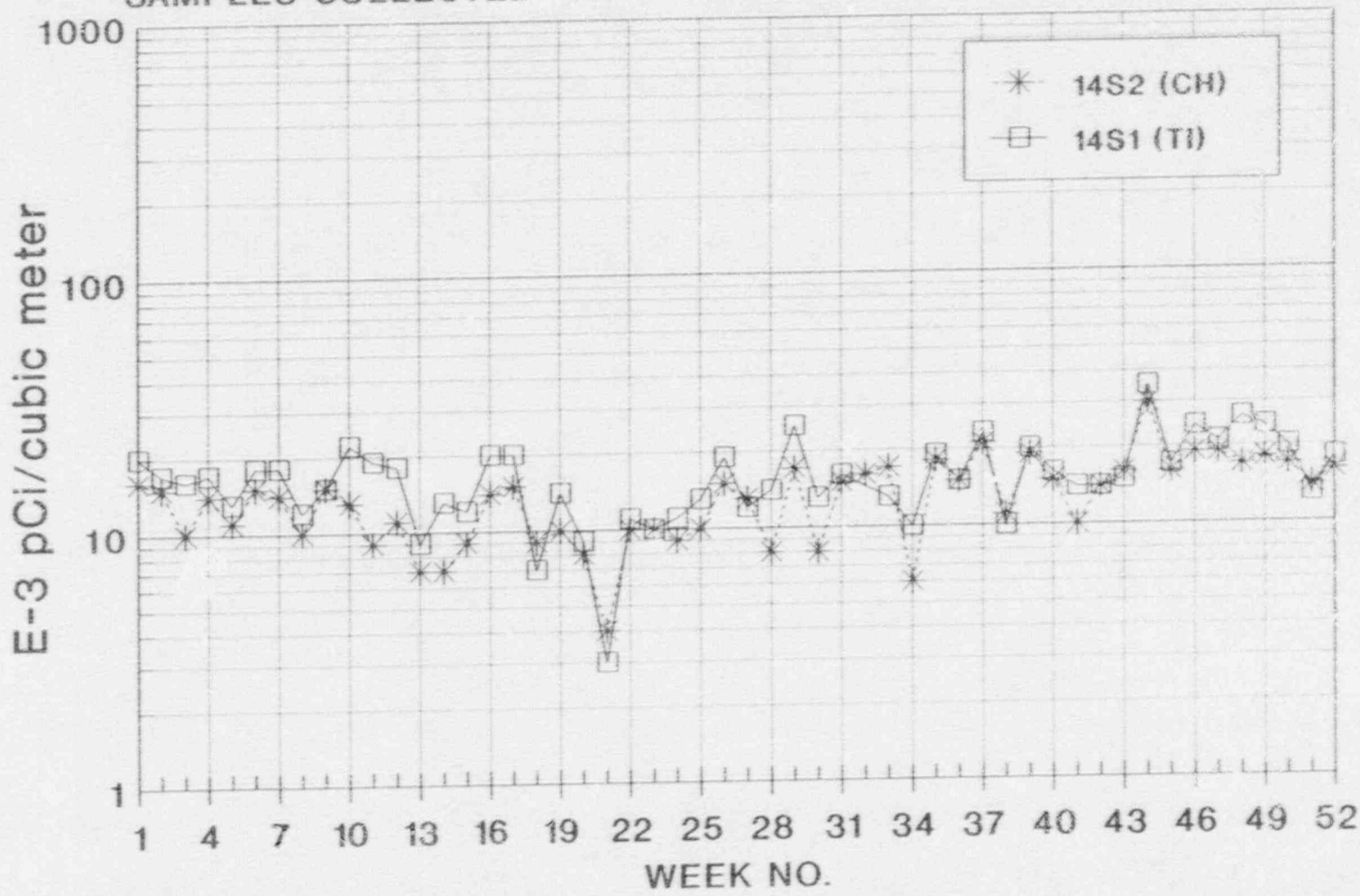


FIGURE D-2

MEAN WEEKLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED FROM LGS LOCATIONS 14S1 AND 14S2, 1990



SYNOPSIS OF ANALYTICAL PROCEDURES

APPENDIX E: SYNOPSIS OF ANALYTICAL PROCEDURES

The following section contains a description of the analytical laboratory procedures along with an explanation of the analytical calculation methods used by Teledyne Isotopes and Clean Harbors to obtain the sample activities.

DETERMINATION OF GROSS BETA ACTIVITY IN WATER SAMPLES
(TOTAL SUSPENDED AND DISSOLVED FRACTIONS)

Teledyne Isotopes

This describes the process used to measure the radioactivity of water samples without identifying the radioactive species present. No chemical separation techniques are involved.

For surface and drinking water samples, one liter of the sample is filtered under vacuum through a 0.45 micron Millipore filter. This filter represents the insoluble portion of the sample. The filter is dried and mounted on a planchet. The filter which represents the soluble portion of the sample is evaporated on a hotplate, and the residue is tranferred and dried on another planchet.

The planchets are counted for 50 minutes in a low-background gas flow proportional counter. Calculation of activity includes a self-absorption correction for counter efficiency based on the weight of residue on each planchet.

Calculation of Sample Activity or of the MDL:

$$\frac{Result}{(pCi/l)} = \underbrace{\frac{\frac{N}{t} - \beta}{(2.22)(v)(E)}}_{\text{Net Activity}} \pm \underbrace{\frac{2\sqrt{\frac{N}{t^2} + \frac{\beta}{t}}}{(2.22)(v)(E)}}_{\text{Counting Error}}$$

where:

N	=	total counts from sample (counts)
t	=	counting time for sample (min)
B	=	background rate of counter (cpm)
2.22	=	dpm/pCi
v	=	volume in liters
E	=	efficiency of the counter
2	=	multiple of counting error

The MDL is defined as that value equal to the two sigma counting error of the result. Less than MDL is reported as the result when this value is greater than the measured result defined above.

DETERMINATION OF GROSS BETA ACTIVITY IN WATER SAMPLES
(TOTAL SUSPENDED AND DISSOLVED FRACTIONS)

Clean Harbors

This describes the process used to measure the overall radioactivity of water samples without identifying the radioactive species present. No chemical separation techniques are involved.

For surface and drinking water samples, the samples are first filtered through membrane filters of 0.45 micron mean pore size. The filtrate is treated as above. The filter papers are transferred to a pre-weighed planchet, ignited using acetone and a flame, and then put into a muffle furnace for final ashing. The ash is then counted using a gas flow proportional counter.

Calculation of Sample Activity or of the MDL:

$$\frac{Result}{(pCi/l)} = \frac{\frac{C_s}{T_s} - \frac{C_b}{T_b}}{2.22\,(v)\,(E)} \pm \frac{2\sqrt{\frac{C_s}{T_s^2} + \frac{C_b}{T_b^2}}}{2.22\,(v)\,(E)}$$

Net Activity Counting Error

where:

C_s	=	total gross sample counts (counts)
T_s	=	sample count time (min)
C_b	=	total background count (counts)
T_b	=	background count time (min)
E	=	counting efficiency based on CS-137 or uranium for the weight of planchetted sample
v	=	aliquot size in liters
2.22	=	dpm per pCi
2	=	multiple of counting error

The MDL is defined as that value equal to the two sigma counting error of the result. Less than MDL is reported as the result when this value is greater than the net activity.

DETERMINATION OF TRITIUM IN WATER BY ELECTROLYTIC ENRICHMENT AND LIQUID SCINTILLATION COUNTING

Teledyne Isotopes

A 60 ml aliquot is distilled and collected in an Erlenmeyer flask. Approximately 55 g of the distillate is transferred into an electrolytic enrichment cell. One ml of 30% sodium hydroxide solution is added to the cell. The sample is electrolyzed in a 10 C cooling water bath until the volume is 3-4 mls. CO_2 is bubbled through the solution to neutralize the sodium hydroxide. The sample is transferred to a collecting bottle at 80 C and weighed. It is then transferred into a liquid scintillation vial and 20 mls of cocktail is added. The sample is counted for 100 minutes in a liquid scintillation counter.

Determination of the Enrichment Factor:

$$EnrichmentFactor = \frac{(final\ volume)(observed\ dpm/ml)}{(initial\ volume)(standard\ dpm/ml)}$$

Aliquots of a tritium standard solution have been enriched to different final volumes to provide a graph of the enrichment factor versus the final volume.

Calculation of Sample Activity or of the MDL:

$$\frac{Result}{(pCi/l)} = \underbrace{\frac{\frac{N}{t} - \beta}{2.22(v)(EF)(E)}}_{\text{Net Activity}} \pm \underbrace{\frac{2\sqrt{\frac{N}{t^2} + \frac{\beta}{t}}}{2.22(v)(EF)(E)}}_{\text{Counting Error}}$$

where:

N	=	total counts from sample (counts)
t	=	counting time for sample (min)
β	=	background rate of counter (cpm)
2.22	=	dpm/pCi
v	=	initial volume (in liters) before enrichment
EF	=	enrichment factor = .039 x VF + .603 where VF = Final Volume
E	=	efficiency of the counter tritium
2	=	multiples of counting error

The MDL is defined as that value equal to the two sigma counting error of the result. Less than MDL is reported as the result when this value is greater than the net activity.

DETERMINATION OF TRITIUM BY GAS COUNTING

Teledyne Isotopes

A 2 ml aliquot is oxidized and the hydrogen gas is collected in an activated charcoal trap. The hydrogen is then transferred into a previously evacuated one liter proportional counter. Non-tritiated hydrogen and ultra-high purity methane is added and then counted. Backgrounds and standards are counted in the same gas mixture as the samples.

Calculation of Sample Activity or of the MDL:

$$\frac{Result}{(pCi/l)} = \frac{(3.234)(TU_n)(V_n)}{(CPM_g)(V_s)}(CPM_g - BKG)$$

Net Activity

$$\pm \frac{(3.234)(TU_n)(V_n)}{(CPM_n)(V_s)} 2\sqrt{\sigma G^2 + \sigma B^2}$$

Counting Error

where:

TU_n	=	the tritium units of the standard
V_n	=	volume of the standard used to calibrate the efficiency of the detector (psia)
V_s	=	volume of the sample loaded into the detector (psia)
CPM_n	=	the cpm activity of the standard of volume V
CPM_g	=	the gross activity of the sample of volume V and the detector background
BKG	=	the background rate of the detector (cpm)
3.234	=	conversion factor changing TU to pCi/l
2	=	multiple of the counting error
σG	=	standard deviation of the gross activity of the sample and the detector background, in cpm
σB	=	standard deviation of the background, in cpm

The MDL is defined as that value equal to the two sigma counting error of the result. Less than MDL is reported as the result when this value is greater than the net activity.

DETERMINATION OF GROSS BETA ACTIVITY IN AIR PARTICULATE SAMPLES

Teledyne Isotopes

This describes the process used to measure the overall beta activity of air particulate filters without identifying the radioactive species present. No chemical separation techniques are involved. Each air particulate filter is placed directly on a 2-inch stainless steel planchet. The planchets are then counted for beta activity in a low-background gas flow proportional counter. Calculation of activity includes an empirical self-absorption correction curve which allows for the change in effective counting efficiency caused by the residue mass. Self-absorption is not considered in the case of air pariculate filters because of the impracticality of accurately weighing the deposit and because the penetration depth of the deposit into the filter is unknown.

Calculation of Sample Activity or of the MDL:

$$\frac{Result}{(pCi/m^3)} = \underbrace{\frac{(\frac{N}{t}) - \beta}{2.22(v)(E)(.02832)}}_{\text{Net Activity}} \pm \underbrace{\frac{2\sqrt{(\frac{N}{t^2}) + (\frac{\beta}{t})}}{2.22(v)(E)(.02832)}}_{\text{Counting Error}}$$

where:

N	=	total counts from sample (counts)
t	=	counting time for sample (min)
β	=	background rate of counter (cpm)
2.22	=	dpm/pCi
v	=	volume of sample analyzed in cubic feet calculated from the elapsed time meter
E	=	efficiency of the counter
2	=	multiple of counting error
.02832	=	conversion to cubic meters

The MDL is defined as that value equal to the two sigma counting error of the result. Less than MDL is reported as the result when this value is greater than the net activity.

DETERMINATION OF GROSS BETA ACTIVITY IN AIR PARTICULATE SAMPLES

Clean Harbors

Each filter paper is placed in a 2-inch diameter planchet and counted using a gas flow proportional counter.

Calculation of Sample Activity and 2 Sigma Error:

$$\frac{Result}{(pCi/m^3)} = \frac{\frac{C_s}{T_s} - \frac{C_b}{T_b}}{2.22(v)(E)(.02832)} \pm \frac{2\sqrt{\frac{C_s}{T_s^2} + \frac{C_b}{T_b^2}}}{2.22(v)(E)(.02832)}$$

Net Activity Counting Error

where:

C_s	=	total gross sample counts (counts)
T_s	=	sample count time (min)
C_b	=	total background count (counts)
T_b	=	background count time (min)
E	=	counting efficiency based on CS-137
v	=	sample volume in cubic feet calculated from the elapsed time meter readings and the flow rate
.02832	=	conversion to cubic meters
2.22	=	dpm/pCi
2	=	multiple of the counting error

The MDL is defined as that value equal to the two sigma counting error of the result. Less than MDL is reported as the result when this value is greater than the net activity.

DETERMINATION OF I-131 IN MILK AND WATER SAMPLES

Teledyne Isotopes

Two liters of sample are first equilibrated with stable iodide carrier. A batch treatment with anion exchange resin is used to remove iodide from the sample. The iodine is then stripped from the resin with sodium hypochloride, reduced with hydroxylamine hydrochloride, and extracted into carbon tetrachloride as free iodine. It is then back-extracted as iodide into sodium bisulfite solution and is precipitated as palladium iodide. The precipitate is weighed for chemical yield and is mounted on a nylon planchet for low level beta counting. The chemical yield is corrected by measuring the stable iodide content of the milk or water with a specific ion electrode.

Calculation of the Sample Activity and 2 Sigma Error:

$$\frac{Result}{(pCi/l)} = \underbrace{\frac{\frac{N}{t} - \beta}{(2.22)(v)(E)(y)(\exp^{-\lambda\Delta t})}}_{\text{Net Activity}} \pm \underbrace{\frac{2\sqrt{\frac{N}{t^2} + \frac{\beta}{t}}}{(2.22)(v)(E)(y)(\exp^{-\lambda\Delta t})}}_{\text{Counting Error}}$$

where:

N	=	total counts from sample (counts)
t	=	counting time for sample (min)
β	=	background rate of counter (cpm)
2.22	=	dpm/pCi
v	=	volume of sample analyzed (liters)
y	=	chemical yield of the amount of sample counted
λ	=	is the radioactive decay constant for I-131
Δt	=	is the elaspsed time between sample collection (or end of the sample collection) to the midcount time
2	=	multiple of the counting error
E	=	efficiency of the counter for I-131, corrected for self absorption effects by the formula:

$$E = E_s \frac{(\exp^{-0.0061M})}{(\exp^{-0.0061M_s})}$$

where:

E_s	=	efficiency of the counter determined from an I-131 standard mount
M	=	mass of PdI_2 on the sample mount (mg)
M_s	=	mass of PdI_2 on the standard mount (mg)

The MDL is defined as that value equal to the two sigma counting error of the result. Less than MDL is reported as the result when this value is greater than the net activity.

DETERMINATION OF I-131 IN MILK AND WATER SAMPLES

Clean Harbors

Analysis for determination of I-131 activity is performed by initially adding iodide carrier to an aliquot of sample. The iodide is concentrated by stirring with ion exchange resin, and then purified by extraction into chloroform and back extraction. The iodide is precipitated as palladium iodide for counting in a low-background beta counter or a beta-gamma coincidence counter.

Calculation of the Sample Activity and 2 Sigma Error:

$$\frac{Result}{(pCi/l)} = \underbrace{\frac{\frac{C_s}{T_s} - \frac{C_b}{T_b}}{(2.22)(v)(E)(y)(\exp^{-\lambda\Delta t})}}_{\text{Net Activity}} \pm \underbrace{\frac{2\sqrt{\frac{C_s}{T_s^2} + \frac{C_b}{T_b^2}}}{(2.22)(v)(E)(y)(\exp^{-\lambda\Delta t})}}_{\text{Counting Error}}$$

where:

C_s	=	total gross sample counts (counts)
T_s	=	sample count time (min)
C_b	=	total background count time (counts)
T_b	=	background count time (min)
E	=	counting efficiency for I-131
v	=	aliquot analyzed (liters)
y	=	iodine yield
λ	=	is the radioactive decay constant for I-131
Δt	=	is the elaspsed time between sample collection (or end of the sample collection) to the midcount time
2.22	=	dpm/pCi
2	=	multiple of counting error

The MDL is defined as that value equal to the two sigma counting error of the result. Less than MDL is reported as the result when this value is greater than the net activity.

DETERMINATION OF GAMMA EMITTING RADIOISOTOPES

Teledyne Isotopes

Gamma emitting radioisotopes are determined with the use of a lithium drifted germanium (GeLi) and high purity germanium detectors with high resolution spectrometry in specific media; such as, air particulate filters, charcoal filters, milk and water. Each sample to be assayed is prepared and counted in standard geometries such as one liter wrap-around Marinelli containers, 300 ml or 150 ml bottles, or 2-inch filter paper source geometries.

Samples are counted on large (>55 cc volume) GeLi detectors connected to Nuclear Data 6620 data acquisition and computation systems. All resultant spectra are stored on magnetic tape.

The analysis of each sample consists of calculating the specific activities of all detected radionuclides or the detection limits from a standard list of nuclides. The GeLi systems are calibrated for each standard geometry using certified radionuclide standards traceable to the National Bureau of Standards.

Calculation of the Sample Activity and 2 Sigma Error:

$$\frac{Result}{\left(\frac{pCi}{vol - mass}\right)} = \frac{N_{(j)} - B_{(j)}}{(2.22)(v)(t)(E_{(j)})(BI_{(j)})(\exp^{-\lambda_{(j)}\Delta t})}$$

Net Activity

$$\pm \frac{2\sqrt{N_{(j)} + B_{(j)}}}{(2.22)(v)(t)(E_{(j)})(BI_{(j)})(\exp^{-\lambda_{(j)}\Delta t})}$$

Counting Error

where:

$N_{(j)}$ = area, in counts, of a special region containing a gamma emission of the nuclide of interest

NOTE: If the detector exhibits a peak in this region when counting a blank (i.e., from natural background (B)(t) is subtracted from N before using the above equation. B is the count rate of the blank, cpm, in the background peak.

$B_{(j)}$ = background counts in the region of interest, calculated by

fitting a straight line across the region connecting the two adjacent region.

2	=	multiple of counting error
2.22	=	dpm/pCi
v	=	volume or mass of sample analyzed
t	=	counting interval of sample, minutes
$E_{(j)}$	=	efficiency of counter at the energy region of interest
$BI_{(j)}$	=	branching intensity of the nuclide at the gamma emission energy under consideration
$\lambda_{(j)}$	=	is the radioactive decay constant for nuclide (j)
Δt	=	is the elaspsed time between sample collection (or end of the sample collection) to the midcount time

The MDL is defined as that value equal to the two sigma counting error of the result. Less than MDL is reported as the result when this value is greater than the measured result defined above.

DETERMINATION OF GAMMA EMITTING RADIOISOTOPES

Clean Harbors

The procedure for detection of gamma emitting radioisotopes generates high resolution gamma spectra which are used for quantitative determination and identification. Standard geometries have been established to maximize efficiency, for all sample types; primarily air particulate filters, water, vegetation, soil, sediment, and fish.

A description of the analytical methods, beginning with air particulates used for each sample type is presented, followed by the general formula used for calculation of the sample activities.

Air particulate samples from each location are placed in a petri dish and counted on GeLi detectors connected to a multichannel analyzer and micro-computer. Spectra are stored first on floppy disk, then on magnetic tape.

Water and milk samples are placed into the appropriate sized container, depending on the volume of sample available. The preferred volume is 3.5 liters. The samples are counted and spectra are stored as with air particulate samples.

Calculation of the Sample Activity and 2 Sigma Error:

$$\frac{Result}{\left(\frac{pCi}{vol - mass}\right)} = \frac{(P_{(j)} - B_{(j)})(M)(E_{(j)})(G)(.06)}{(v)(t)(\exp^{-\lambda_{(j)}\Delta t})}$$

Net Activity

$$\pm \frac{2\sqrt{(P_{(j)} + B_{(j)})(M)(E_{(j)})(G)(.06)}}{(v)(t)(\exp^{-\lambda_{(j)}\Delta t})}$$

Counting Error

where:

$P_{(j)}$	=	number of gross counts in peak channels for nuclide (j)
$B_{(j)}$	=	number of background counts in peak channels for nuclide (j)
M	=	relative GeLi efficiency (GeLi 1=1)
$E_{(j)}$	=	efficiency of counter at the energy region of interest
G	=	geometry factor for deviation from 1 liter in volume
.06	=	conversion to minutes
2	=	multiple of counting error

V = volume or mass of sample analyzed
t = counting interval of sample (kiloseconds)
$\lambda_{(j)}$ = is the radioactive decay constant for nuclide (j)
Δt = is the elaspsed time between sample collection (or end of the sample collection) to the midcount time

The MDL is defined as that value equal to the two sigma counting error of the result. Less than MDL is reported as the result when this value is greater than the measured result defined above.

Teledyne Isotopes

Teledyne Isotopes dosimeters are rectangular teflon wafers impregnated with 25% CaSO4:Dy phosphor. They are annealed in a hot air oven prior to use and are inserted into black polyethylene pouches. The filled pouches are labelled and placed in rectangular holders which contain copper shielding to filter out low energy radiation. After exposure in the environment, four separate areas of the dosimeter are read in a Teledyne Isotopes model 8300 TLD reader. The dosimeter is then re-irradiated by a standardized Cs-137 source and the four areas are read again. Calculation of the environmental exposure is performed by computer, using the re-irradiation readings to determine the sensitivity of each area of the dosimeter. The reading of control dosimeters are subtracted to allow for transit dose and system background.

A. For any given area of the dosimeter, the dose mR is calculated by the formula:

$$Dose = (R)\left(\frac{redose}{RR}\right)(avcontrol)$$

where:

R	=	initial reading of the area
RR	=	second reading of the area (after re-irradiation)
redose	=	re-irradiation dose in mR
avcontrol	=	average of control values calculated as explained below. If no controls are used, avcontrol = 0 and gross exposures result

B. Each area of each control is calculated by the formula:

$$cdose = (cr)\left(\frac{credose}{crr}\right)$$

where:

cdose	=	control area dose in mR
cr	=	initial reading of the control area
crr	=	second reading of the control area (after re-irradation)
credose	=	re-irradiation dose of the control dosimeter in mR

The average of control values is then calculated from all four areas of all controls by the formula:

$$avcontrol = \frac{\sum_{1}^{4N} cdose}{4N}$$

where:

N = total number of control dosimeters

C. The average and standard deviation of the area readings for each dosimeter are calculated by standard methods.

D. Using the criteria that if one standard deviation is greater than 10% of the average of the four readings and that if the value of one area is outside the range of 3 standard deviations of the average of the other three areas, then that area will be eliminated and the results will be based on the remaining areas.

QUALITY CONTROL
EPA CROSSCHECK PROGRAM

APPENDIX F: QUALITY CONTROL PROGRAM

TI and CH participates in the EPA Radiological Inter-laboratory Comparison (cross check) Program. This participation includes a number of analyses on various sample media as found in the Limerick Generating Station REMP. As a result of this participation, an objective measurement of analytical precision and accuracy as well as, a bias estimation of the results are obtained.

Examination of the data shows that the vast majority were within the EPA control limits. Each case of exceeding the control limits was investigated. There was no evidence to suggest systematic errors. For CH the results from participation in the EPA program are the basis for continued certification by the Commonwealth of Massachusetts in radiological analysis.

The results of TI's and CH's participation in the EPA cross check program can be found in Tables F-1 and F-2, respectively.

TABLE F-1
INTER-LABORATORY COMPARISONS - 1990
TELEDYNE ISOTOPES

Collection Date	Sequence No.	Media	Nuclide	EPA Results(a)		Teledyne Isotopes Results(b)			Normalized Deviation Grand Avg.	Normalized Deviation Known	All Participants Mean ± 2 s.d.	
01/12/90	535	Water	Sr-89	25.00 ±	8.66	24.00 ±	5.19		-0.46	-0.35	25.14 ±	14.44
			Sr-90	20.00 ±	2.60	19.67 ±	7.5		60.51	-0.38	19.66 ±	7.38
02/23/90	536	Water	H-3	4976.00 ±	862.56	4900.00 ±	300.00		-0.05	-0.26	4839.04 ±	1858.46
02/09/90	537	Water	Co-60	15.00 ±	8.66	15.00 ±	10.38		-0.11	0.00	15.31 ±	4.56
			Zn-65	139.00 ±	24.25	131.33 ±	27.21		-0.94	-0.95	138.93 ±	19.20
			Ru-106	139.00 ±	24.25	113.67 ±	12.12	(c)	-2.47	-3.13	133.60 ±	42066
			Cs-134	18.00 ±	8.66	15.33 ±	6.93		-6.58	-0.92	17.00 ±	4.28
			Cs-137	18.00 ±	8.66	19.33 ±	9.63		0.20	0.46	18.76 ±	4.80
			Ba-133	74.00 ±	12.12	66.00 ±	10.38		-1.61	-1.98	72.49 ±	12.42
03/30/90	540	Air Filter	Gross Alpha	5.0 ±	8.66	6.33 ±	1.74		0.03	0.46	6.25 ±	2.62
			Gross Beta	31.0 ±	8.66	31.67 ±	1.74		-0.18	0.23	32.19 ±	7.36
			Sr-90	10.0 ±	2.60	9.33 ±	1.74		-0.41	-0.77	9.69 ±	2.72
			Cs-137	10.0 ±	8.66	10.67 ±	3.45		-0.31	0.23	11.56 ±	4.05
04/17/90	542	Water	Gross Alpha	90.0 ±	39.83	79.33 ±	8.67		-0.14	-0.80	81.18 ±	42.6
			Gross Beta	52.0 ±	8.66	53.33 ±	4.59		1.48	0.46	49.06 ±	12.78
			Sr-89	10.0 ±	8.66	10.67 ±	3.45		-0.71	0.23	12.71 ±	50.18
			Sr-90	10.0 ±	2.60	9.67 ±	1.74		0.20	-0.38	9.50 ±	1.98
			Cs-134	15.0 ±	8.66	12.67 ±	4.59		-0.61	-0.81	14.44 ±	3.54
			Cs-137	15.0 ±	8.66	16.33 ±	3.45		0.19	0.46	15.80 ±	3.76
04/27/90	543	Milk	Sr-89	23.0 ±	8.66	24.67 ±	4.59		0.53	0.58	23.14 ±	10.20
			Sr-90	23.0 ±	8.66	24.00 ±	0.00		0.58	0.35	22.33 ±	6.76
			I-131	99.0 ±	17.32	89.67 ±	9.63		-1.53	-1.62	98.49 ±	16.26
			Cs-137	24.0 ±	8.66	27.33 ±	7.56		0.93	1.15	24.65 ±	6.06
			K	1550.0 ±	135.10	1483.33 ±	225.18		-1.44	-1.48	1548.38 ±	234.66
05/04/90	544	Water	Sr-89	7.0 ±	8.66	6.67 ±	1.74		-0.34	-0.12	7.64 ±	4.52
			Sr-90	7.0 ±	8.66	6.67 ±	1.74		-0.12	-0.12	7.02 ±	3.42

TABLE F-1
INTER-LABORATORY COMPARISONS - 1990
TELEDYNE ISOTOPES

Collection Date	Sequence No.	Media	Nuclide	EPA Results(a)		Teledyne Isotopes Results(b)			Normalized Deviation Grand Avg.	Normalized Deviation Known	All Participants Mean ± 2 s.d.	
06/08/90	545	Water	Co-60	24.0 ±	8.66	25.33 ±	7.56		0.07	0.46	25.12 ±	5.38
			Zn-65	148.0 ±	25.98	148.67 ±	9.18		-0.06	0.081	49.18 ±	24.60
			Ru-106	210.0 ±	36.37	196.00 ±	61.98		-0.41	-1.15	201.0 ±	34.02
			Cs-134	24.0 ±	8.66	23.67 ±	8.67		0.14	-0.12	23.26 ±	4.20
			Cs-137	25.0 ±	8.66	24.67 ±	6.24		-0.54	-0.12	26.21 ±	5.22
			Ba-133	99.0 ±	17.32	93.00 ±	18.24		-0.58	-1.04	96.37 ±	16.32
06/22/90	546	Water	H-3	2933.0 ±	620.07	2900. ±	300.00		-0.32	-0.16	2966.81 ±	571.28
08/10/90	548	Water	I-131	39.0 ±	10.39	36.00 ±	9.00		-1.23	-0.87	40.26 ±	8.20
09/21/90	551	Water	Gross Alpha	10.0 ±	8.66	11.00 ±	3.00		0.34	0.35	10.01 ±	6.24
			Gross Beta	10.0 ±	8.66	11.00 ±	3.00		0.03	0.35	10.91 ±	4.50
08/31/90	552	Air Filter	Gross Alpha	10.0 ±	8.66	16.00 ±	3.00	(d)	1.31	2.08	12.21 ±	5.14
			Gross Beta	62.0 ±	8.66	63.33 ±	4.59		-0.46	0.46	64.66 ±	13.54
			Sr-90	20.0 ±	8.66	18.00 ±	3.00		-0.50	-0.69	19.45 ±	5.07
			Cs-137	20.0 ±	8.66	18.33 ±	9.63		-1.51	-0.58	22.70 ±	7.82
10/15/90	553	Water	Co-60	20.0 ±	8.66	21.00 ±	3.00		0.16	0.35	20.53 ±	5.06
			Zn-65	115.0 ±	20.78	115.00 ±	34.59		-0.18	0.00	116.25 ±	19.78
			Ru-106	151.0 ±	25.98	142.00 ±	25.98		0.19	-1.04	140.39 ±	30.66
			Cs-134	12.0 ±	8.66	11.00 ±	0.00		-0.31	-0.35	11.89 ±	4.18
			Cs-137	12.0 ±	8.66	16.33 ±	7.56		1.12	1.50	13.11 ±	4.34
			Ba-133	110.0 ±	19.05	94.67 ±	15.34	(d)	-2.06	-2.41	107.73 ±	18.44
10/19/90	554	Water	H-3	7203.0 ±	1247.08	7133.33 ±	754.98		0.02	-0.17	7125.08 ±	1343.86
09/1[illegible]/90	555	Water	Sr-89	10.0 ±	8.66	8.67 ±	1.74		-0.43	-0.46	9.89 ±	5.44
			Sr-90	9.0 ±	8.66	9.0 ±	3.00		-0.11	0.00	9.30 ±	3.96
09/28/90	556	Milk	Sr-89	16.0 ±	8.66	9.0 ±	7.95	(d)	-1.57	-2.42	13.53 ±	8.56
			Sr-90	20.0 ±	8.66	15.33 ±	1.74		-0.78	-1.62	17.57 ±	6.50
			I-131	58.0 ±	10.39	54.67 ±	4.59		-1.21	-0.96	58.88 ±	9.34

TABLE F-1
INTER-LABORATORY COMPARISONS - 1990
TELEDYNE ISOTOPES

Collection Date	Sequence No.	Media	Nuclide	EPA Results(a)	Teledyne Isotopes Results(b)	Normalized Deviation Grand Avg.	Normalized Deviation Known	All Participants Mean ± 2 s.d.
09/28/90	556	Milk	Sr-89	16.0 ± 8.66	9.0 ± 7.95 (d)	-1.57	-2.42	13.53 ± 8.56
			Sr-90	20.0 ± 8.66	15.33 ± 1.74	-0.78	-1.62	17.57 ± 6.50
			I-131	58.0 ± 10.39	54.67 ± 4.59	-1.21	-0.96	58.88 ± 9.34
			Cs-137	20.0 ± 8.66	23.00 ± 5.19	0.53	1.04	21.47 ± 4.70
			K	1790.0 ± 147.22	1710.00 ± 196.53	-0.07	0.20	1713.52 ± 249.38
10/30/90	559	Water	Gross Alpha	62.00 ± 27.80	57.00 ± 3.00	-0.39	-0.54	60.64 ± 32.10
			Gross Beta	53.0 ± 8.66	51.00 ± 6.93	0.65	-0.12	50.78 ± 12.64
			Sr-89	20.0 ± 8.66	19.00 ± 10.83	0.06	-0.35	18.84 ± 10.24
			Sr-90	15.0 ± 8.66	14.33 ± 1.74	-0.04	-0.23	14.44 ± 4.04
			Cs-134	7.0 ± 8.66	9.00 ± 0.00	0.52	0.69	7.49 ± 2.88
			Cs-137	5.0 ± 8.66	7.67 ± 3.45	0.60	0.92	5.94 ± 3.10
01/25/91	560	Water	Gross Alpha	5.00 ± 8.66	9.00 ± 3.00	1.15	1.39	5.69 ± 3.58
			Gross Beta	5.00 ± 8.66	7.00 ± 0.00	0.24	0.69	6.30 ± 3.02

Footnotes:

(a) EPA Results - Expected laboratory precision (3 sigma). Units are pCi/l for water and milk except K is in mg/l.

(b) Teledyne Results - Average ± 3 sigma. Units are pCi/l for water and milk except K is in mg/l. Units are total pCi for air particulate filters.

(c) No apparent cause for the low results were found. Three aliquots of the sample were counted on three separate detectors. The results of all three were similar. The calibration curve fit is good (0.997). Ruthenium-106 will be obtained from the EPA to further investigate the matter and future mixed gamma in water EPA intercomparisons will be monitored to identify continuing trends.

(d) An investigation is being conducted and the results will be available shortly.

Table F-2
EPA Intercomparison Samples
Clean Harbors Analytical Services
1991

The EPA section of the quarterly QC report is cumulative for the year. The table submitted with the last report of the year should be complete for results received and will be updated finally for results received later.

Results are presented as follows:

	Sr-90
	17 (xx)
	16
	18
CHAS Avg.	17 (1.0)
EPA Known	17 (1.5, 2.6, 3)
EPA Gr. Avg.	16 (yy, zz)

(xx) - This value will be given when the precision (1 SD) of the CHAS measurement due to counting statistics is significantly different from the expected EPA precision. This should cause different spread in our results.

(1.0) - Next to CHAS Avg. - This is the actual SD of the CHAS data (i.e., 1 SD, 1 determination). This means that an additional single measurement should yield a result within 1 SD of the mean 66% of the time.

(1.5, 2.6, 3) - Next to EPA Known - The first number is the anticipated 1 SD as decreed by the EPA. This value can be compared to the figure above to see that the CHAS precision is as expected.

The second number is 3 SD of the mean which is the EPA Control Limit. If the observed mean (i.e. CHAS Avg.) differs from the known by more than this value the result is unacceptable according to the EPA criteria.

The third number is the deviation from the EPA's known value.

(yy, zz) - The first number is the observed 1 SD, 1 determination for all labs whose results were not deemed outliers. A significant difference between this value and the one above it indicates that the anticipated precision is not being attained by the majority of the laboratories.

The second number is the normalized value for the grand average.

Table F-2
EPA Intercomparison Samples
Clean Harbors Analytical Services
1991

Gross Alpha and Beta

Sample No.	Sample Date	Sample Type	Gross Alpha	Gross Beta
9001271	01/26/90	Water (a)	14	13
			13	14
			14	14
		Lab Avg.	14(1)	14(1)
		EPA Known	12(5,9,1)	12(5,9,1)
		EPA Gr. Avg.	12(3,1)	13(2,0)
9004010 (Note 1)	03/30/90	Air Filter (b)		26
				26
				26
		Lab Avg.		26(0)
		EPA Known		31(5,9,-2)
		EPA Gr. Avg.		32(4,-2)
9004222	04/17/90	Water (a)	92	
			86	
			87	
		Lab Avg.	88(3)	
		EPA Known	90(23,40,0)	
		EPA Gr. Avg.	81(21,1)	
9004223 (Note 2)	04/17/90	Water (a)		42
				44
				43
		Lab Avg.		43(1)
		EPA Known		52(5,9,-3)
		EPA Gr. Avg.		49(6,-2)

Note: (a) pCi/l
(b) pCi/filter

Table F-2
EPA Intercomparison Samples
Clean Harbors Analytical Services
1991

Gross Alpha and Beta

Sample No.	Sample Date	Sample Type	Gross Alpha	Gross Beta
9005157	05/11/90	Water (a)	14	16
			14	15
			18	15
		Lab Avg.	15(2)	15(1)
		EPA Known	22(6,10,-2)	15(5,9,0)
		EPA Gr. Avg.	17(6,0)	16(4,0)
9009022 (Note 1) (Note 3)	08/31/90	Air Filter (b)		1710
				1790
				1880
		Lab Avg.		1793(85)
		EPA Known		62(5,9,600)
		EPA Gr. Avg.		65(7,599)
9009210	09/21/90	Water (a)	11	15
			11	14
			8	15
		Lab Avg.	10(2)	15(1)
		EPA Known	10(5,9,0)	10(5,9,2)
		EPA Gr. Avg.	10(3,0)	11(2,1)
9011004 (Note 4)	10/30/90	Water (a)	58	42
			59	43
			64	40
		Lab Avg.	60(3)	42(2)
		EPA Known	62(16,28,0)	53(5,9,-4)
		EPA Gr. Avg.	61(16,0)	51(6,-3)

Note: (a) pCi/l
(b) pCi/filter

Table F-2
EPA Intercomparison Samples
Clean Harbors Analytical Services
1991

Gamma

Sample No.	Sample Date	Type
9002103 (Note 5)	02/09/90	Water

Nuclide (pCi/l)		Nuclide (pCi/l)	
Cs-134	15	Cs-137	8
	15		13
	17		12
Lab Avg.	16(1)	Lab Avg.	11(3)
EPA Known	18(5,9,-1)	EPA Known	18(5,9,-2)
EPA Gr. Avg.	17(2,0)	EPA Gr. Avg.	19(2,-3)
Nuclide (pCi/l)		Nuclide (pCi/l)	
Ba-133	52	Co-60	15
	54		15
	52		13
Lab Avg.	53(1)	Lab Avg.	14(1)
EPA Known	74(7,12,-5)	EPA Known	15(5,9,0)
EPA Gr. Avg.	72(6,-5)	EPA Gr. Avg.	15(2,0)
Nuclide (pCi/l)		Nuclide (pCi/l)	
Zn-65	129	Ru-106	98
	129		165
	137		128
Lab Avg.	132(5)	Lab Avg.	130(34)
EPA Known	139(14,24,-1)	EPA Known	139(14,24,-1)
EPA Gr. Avg.	139(10,-1)	EPA Gr. Avg.	134(14,0)

9004010	03/30/90	Air Filter

Nuclide (pCi/filter)	
Cs-137	8
	12
	11
Lab Avg.	10(2)
EPA Known	10(5,9,0)
EPA Gr. Avg.	12(2,0)

Table F-2
EPA Intercomparison Samples
Clean Harbors Analytical Services
1991

Gamma

Sample No.	Sample Date	Type
9004223	04/17/90	Water

Nuclide (pCi/l)			Nuclide (pCi/l)	
Cs-134	17		Cs-137	8
	17			13
	15			12
Lab Avg.	16(1)		Lab Avg.	11(1)
EPA Known	15(5,9,1)		EPA Known	15(5,9,-1)
EPA Gr. Avg.	14(2,1)		EPA Gr. Avg.	16(2,-2)

9004287	04/27/90	Milk

Nuclide (pCi/l)			Nuclide (mg/l)	
Cs-137	14		K	1440
	18			1610
	19			1540
Lab Avg.	17(3)		Lab Avg.	1530(85)
EPA Known	24(5,9,-2)		EPA Known	1550(80,140,0)
EPA Gr. Avg.	25(3,-3)		EPA Gr. Avg.	1550(120,0)

9006089	06/08/90	Water

Nuclide (pCi/l)			Nuclide (pCi/l)	
Cs-134	23		Cs-137	23
	23			22
	25			25
Lab Avg.	24(1)		Lab Avg.	23(2)
EPA Known	24(5,9,0)		EPA Known	25(5,9,-1)
EPA Gr. Avg.	23(2,0)		EPA Gr. Avg.	26(3,-1)

Nuclide (pCi/l)			Nuclide (pCi/l)	
Ba-133	90		Co-60	23
	90			26
	96			23
Lab Avg.	92(3)		Lab Avg.	24(2)
EPA Known	99(10,17,-1)		EPA Known	24(5,9,0)
EPA Gr. Avg.	96(8,-1)		EPA Gr. Avg.	25(3,0)

Table F-2
EPA Intercomparison Samples
Clean Harbors Analytical Services
1991

Gamma

Sample No.	Sample Date	Type		
Nuclide (pCi/l)	145	Nuclide (pCi/l)		184
Zn-65	173	Ru-106		219
	156			231
Lab Avg.	158(14)		Lab Avg.	211(24)
EPA Known	148(15,26,1)		EPA Known	210(21,36,0)
EPA Gr. Avg.	149(12,1)		EPA Gr. Avg.	201(17,1)
9009022 (Note 6)	08/31/90	Air Filter		
Nuclide (pCi/filter)	36			
Cs-137	43			
	42			
Lab Avg.	40(4)			
EPA Known	20(5,9,7)			
EPA Gr. Avg.	23(4,6)			
9010003	09/28/90	Milk		
Nuclide (pCi/l)	20	Nuclide (mg/l)		1691
Cs-134	23	K		1730
	17			1672
Lab Avg.	20(3)		Lab Avg.	1698(30)
EPA Known	20(5,9,0)		EPA Known	1700(85,147 0)
EPA Gr. Avg.	21(2,-1)		EPA Gr. Avg	1714'125,0)
9010094 (Note 7)	10/05/90	Water		
Nuclide (pCi/l)	11	Nuclide (pCi/l)		12
Cs-134	13	Cs-137		10
	8			7
Lab Avg.	11(3)	Lab Avg.		10(1)
EPA Known	12(5,9,0)	EPA Known		12(5,9,-1)
EPA Gr. Avg.	12(2,0)	EPA Gr. Avg.		13(2,-1)

Table F-2
EPA Intercomparison Samples
Clean Harbors Analytical Services
1991

Gamma

Sample No.	Sample Date	Type			
Nuclide (pCi/l)	90	Nuclide (pCi/l)	19
Ba-133	84	Co-60	16
	92		21
Lab Avg.	87(4)	Lab Avg.	19(3)
EPA Known	110(11,19,-3)	EPA Known	20(5,9,0)
EPA Gr. Avg.	108(9,-3)	EPA Gr. Avg.	21(3,-1)
Nuclide (pCi/l)	102	Nuclide (pCi/l)	115
Zn-65	103	Ru-106	159
	103		112
Lab Avg.	103(1)	Lab Avg.	129(26)
EPA Known	115(15,21,-2)	EPA Known	151(15,26,-3)
EPA Gr. Avg.	116(10,-2)	EPA Gr. Avg.	140(15,-1)
9011003	10/30/90	Water	
Nuclide (pCi/l)	9	Nuclide (pCi/l)	8
Cs-134	7	Cs-137	7
	9		6
Lab Avg.	8(1)	Lab Avg.	7(1)
EPA Known	7(5,9,0)	EPA Known	5(5,9,1)
EPA Gr. Avg.	7(1,0)	EPA Gr. Avg	6(2,0)

Table F-2
EPA Intercomparison Samples
Clean Harbors Analytical Services
1991

Tritium

Sample No.	Sample date	Sample Type	Tritium (pCi/l)
9002221 (Note 8)	02/23/90	Water	6559 6646 6542
		Lab Avg.	6582(56)
		EPA Known	4976(498,863,6)
		EPA Gr. Avg.	4916(641,6)
9006215	06/22/90	Water	2579 2647 2541
		Lab Avg.	2589(54)
		EPA Known	2933(358,620,-2)
		EPA Gr. Avg.	2967(286,-2)
9010237	10/19/90	Water	7362 7245 7308
		Lab Avg.	7305(59)
		EPA Known	7203(720,1247,0)
		EPA Gr. Avg.	7125(672,0)

Table F-2
EPA Intercomparison Samples
Clean Harbors Analytical Services
1991

Iodine-131

Sample No.	Sample date	Sample Type	Iodine-131(pCi/l)
9004287 (Note 9)	04/27/90	Milk	81 81 73
		Lab Avg.	78(5)
		EPA Known	99(10,17,-4)
		EPA Gr. Avg.	99(8,-4)
9008112	08/10/90	Water	36 38 34
		Lab Avg.	36(2)
		EPA Known	39(6,10,-1)
		EPA Gr. Avg.	40(4,-1)
9010003	09/28/90	Milk	53 52 46
		Lab Avg.	50(4)
		EPA Known	58(6,10,-2)
		EPA Gr. Avg.	59(5,-2)

Table F-2
EPA Intercomparison Samples
Clean Harbors Analytical Services
1991

NOTES

1. CHAS did not analyze for gross alpha because it is not an analysis performed at this time.

2. Beta was outside acceptable limits for 9004223. The sample was rerun and recalculated. The new results fell within acceptance limits.

3. Beta was outside acceptable limits for 9009022. Incorrect units were used when calculating the results. When recalculated with the proper units, an overall average of 50.3 pCi/filter was obtained. This result is slightly outside acceptable limits for no known reason.

4. Beta was out side acceptable limits for 9011004. Raw data and calculations were checked and no errors were found.

5. Ba-133 was outside acceptable limits for 9002103.

6. Cs-137 was outside acceptable limits for 9009022.

7. Ba-133 was outside acceptable limits for 9010094.

8. Tritium was outside acceptable limits for 9002221. Calculations were verified and no discrepancies were found. New standards were made and the sample was recalculated with new efficiencies. The new results fell within acceptable limits.

9. Iodine-131 was outside acceptable limits for 9004287. Raw data and calculations were checked and no problems were detected. The results obtained for Iodine-131 by GeLi analysis were in agreement with the results obtained by Iodine analysis.

LGS SURVEY

APPENDIX G: LGS SURVEYS

A Land Use Census around the Limerick Generating Station (LGS) was conducted by RMC Environmental Services for Philadelphia Electric Company (PECo) to comply with section 3/4.12.2 of the Plant's Technical Specifications. The survey was conducted during the May to September 1990 growing season. The results of this survey are summarized in Table G-1.

There were no changes required to the LGS REMP as a result of this survey.

3913062000

Table G-1 Location of Nearest Residence, Garden and Milk Farm within a Five Mile Radius of Limerick Generating Station, 1990

(Distance in Miles)

Sector	Residence	Garden[1]	Milk Farm
N	0.5	1.5	4.7
NNE	0.5	1.0	-
NE	0.6	1.6	-
ENE	0.6	1.5	-
E	0.5	1.1	-
ESE	0.6	0.6	1.1[2]
SE	1.0	1.2	4.6
SSE	1.0	1.1	4.5
S	0.8	1.2	2.3
SSW	1.0	1.1	1.8
SW	0.6	0.9	3.0
WSW	0.8	0.8	1.4
W	0.6	1.7	-
WNW	0.7	0.7	-
NW	0.7	1.6	4.7[2]
NNW	0.9	1.5	-

(1) Garden greater than 500 square feet

(2) Goat Milk