Exelon Nuclear
Limerick Generating Station
P.O. Box 2300
Pottstown, PA 19464

www.exeloncorp.com

Exelon Nuclear

TS 6.9.1.7

April 20, 2004

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Limerick Generating Station, Units 1 and 2
Facility Operating License Nos. NPF-39 and NPF-85
NRC Docket Nos. 50-352 and 50-353

Subject: 2003 Annual Radiological Environmental Operating Report

Dear Sir:

In accordance with the requirements of Section 3.5 of the Limerick Generating Station (LGS), Units 1 and 2 Offsite Dose Calculation Manual (ODCM), this letter submits the 2003 Annual Radiological Environmental Operating Report No. 20. This report provides the 2003 results for the Radiological Environmental Monitoring Program (REMP) as called for in the Offsite Dose Calculation Manual.

In assessing the data collected for the REMP, we have concluded that the operation of LGS, Units 1 and 2 had no adverse impact on the environment. No plant-produced fission or activation products, with the exception of Cs-137 and I-131, were found in any pathway modeled by the REMP. Cesium-137 levels detected in sediment were similar to those found in previous years. Iodine-131 activity was found in two downstream sediment samples and was the result of medical treatments. The calculated dose to the maximum exposed individual from the sediment pathway was 1.29 E-03 mrem. This dose represented 0.006% of the 10 CFR 20, Appendix I limit of 20 mrem per year for any organ.

If you have any questions, please do not hesitate to contact us.

Sincerely,

Ron J. DeGregorio
Vice President -LGS

Attachment: 2003 Annual Radiological Environmental Operating Report No. 20

cc: H. Miller, Administrator, Region I, USNRC
A. Burritt, USNRC Senior Resident Inspector, LGS
S. Wall, Senior Project Manager-NRR, USNRC
J. Jang, Inspector, Region I, USNRC

IE25

LIMERICK GENERATING STATION
ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
DISTRIBUTION LIST

R. DeGregorio – GML 5-1 (with Attachment)
B. Hanson –GML 5-1 (with Attachment)
T. Dougherty – SSB 2-3 (with Attachment)
K. Kemper – SSB 2-4 (with Attachment)
R. Newmaster – SSB 2-1 (with Attachment)
S. Gamble – SSB 2-4 (w/o Attachment)
J. Toro- SMB 1-2 (with Attachment)
J. Benjamin – Cantara (w/o Attachment)
W. Levis - KSA 3N (w/o Attachment)
C. Lewis – KSA 3N (w/o Attachment)
R. West – KSA 3N (w/o Attachment)
J. Grimes- KSA 2N (w/o Attachment)
J. Armstrong - KSA 3N (w/o Attachment)
R. A. Kankus – KSA 3G (w/o Attachment)
D. Helker – KSA 3E (with Attachment)
R. Janati-Commonwealth of PA (with Attachment)
D. Dyckman - PA DEP BRP Inspector – SSB 2-4 (with Attachment)
S. Focht – ANI (with Attachment)
B. Aptowicz – City of Philadelphia Water Department (with Attachment)
Dr. T. Yohe – Phoenixville Water Works (with Attachment)
A. Wyda - Citizens Utility Water Co. (with Attachment)
R. Jones - Pottstown Water Authority (with Attachment)
Dr. T. Yoh - Philadelphia Suburban Water Co. (with Attachment)

Docket No: 50-352
50-353

LIMERICK GENERATING STATION
UNITS 1 and 2

Annual Radiological
Environmental Operating Report

Report No.20

1 January Through 31 December 2003

Prepared By

Teledyne Brown Engineering
Environmental Services

Exelon SM
Nuclear

Limerick Generating Station
Sanatoga, PA 19464

April 2004

Table Of Contents

I. Summary and Conclusions 1

II. Introduction 3
- A. Objectives of the REMP 3
- B. Implementation of the Objectives 3

III. Program Description 4
- A. Sample Collection 4
- B. Sample Analysis 6
- C. Data Interpretation 6
- D. Program Exceptions 8
- E. Program Changes 9

IV. Results and Discussion 9
- A. Aquatic Environment 9
  - 1. Surface Water 9
  - 2. Drinking Water 10
  - 3. Fish 10
  - 4. Sediment 11
- B. Atmospheric Environment 11
  - 1. Airborne 11
    - a. Air Particulates 11
    - b. Airborne Iodine 12
  - 2. Terrestrial 13
    - a. Milk 13
- C. Ambient Gamma Radiation 13
- D. 10 CFR 20.2002 Permit Storage Area 14
- E. Land Use Survey 14

V. References 15

Appendices

Appendix A Radiological Environmental Monitoring Report Summary

Tables

Table A-1 Radiological Environmental Monitoring Program Annual Summary for the Limerick Generating Station, 2003

Appendix B Location Designation, Distance & Direction, and Sample Collection & Analytical Methodologies

Tables

Table B-1: Location Designation and Identification System for the Limerick Generating Station

Table B-2: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Limerick Generating Station, 2003

Table B-3: Radiological Environmental Monitoring Program - Summary of Sample Collection and Analytical Methods, Limerick Generating Station, 2003

Figures

Figure B-1: Environmental Sampling Locations Within One Mile of the Limerick Generating Station, 2003

Figure B-2: Environmental Sampling Locations Between One and Five Miles from the Limerick Generating Station, 2003

Figure B-3: Environmental Sampling Locations Greater Than Five Miles from the Limerick Generating Station, 2003

Appendix C Data Tables and Figures - Primary Laboratory

Tables

Table C-I.1 Concentrations of Tritium in Surface Water Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-I.2 Concentrations of Gamma Emitters in Surface Water Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-II.1 Concentrations of Gross Beta Insoluble in Drinking Water Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-II.2 Concentrations of Gross Beta Soluble in Drinking Water Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-II.3 Concentrations of Tritium in Drinking Water Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-II.4 Concentrations of Gamma Emitters in Drinking Water Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-III.1 Concentrations of Gamma Emitters in Predator and Bottom Feeder (Fish) Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-IV.1 Concentrations of Gamma Emitters in Sediment Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-V.1 Concentrations of Gross Beta in Air Particulate Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-V.2 Monthly and Yearly Mean Values of Gross Beta Concentrations (E-3 pCi/cu. meter) in Air Particulate Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-V.3 Concentrations of Gamma Emitters in Air Particulate Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-VI.1 Concentrations of I-131 in Air Iodine Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-VII.1 Concentrations of I-131 in Milk Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-VII.2 Concentrations of Gamma Emitters in Milk Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table C-VIII.1 Quarterly TLD Results for Limerick Generating Station, 2003.

Table C-VIII.2 Mean Quarterly TLD Results for the Site Boundary, Middle and Control Locations for Limerick Generating Station, 2003.

Table C-VIII.3 Summary of the Ambient Dosimetry Program for Limerick Generating Station, 2003.

Table C-IX.1 Summary of Collection Dates for Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Figures

Figure C-1 Mean Monthly Insoluble Gross Beta Concentrations in Drinking Water Samples Collected in the Vicinity of LGS, 1982 - 2003.

Figure C-2 Mean Monthly Soluble Gross Beta Concentrations in Drinking Water Samples Collected in the Vicinity of LGS, 1982 - 2003.

Figure C-3 Mean Annual Cs-137 Concentrations in Fish Samples Collected in the Vicinity of LGS, 1982 - 2003.

Figure C-4 Concentrations of Cs-137 in Sediment Samples Collected in the Vicinity of LGS, 1982 - 2003.

Figure C-5 Mean Monthly Gross Beta Concentrations in Air Particulate Samples Collected in the Vicinity of LGS, 1982 - 2003.

Figure C-6 Mean Weekly Gross Beta Concentrations in Air Particulate Samples Collected in the Vicinity of LGS, 2003.

Figure C-7 Mean Quarterly Ambient Gamma Radiation Levels (TLD) in the Vicinity of LGS, 1985 - 2003.

Appendix D Data Tables and Figures - QC Laboratory

Tables

Table D-I.1 Concentrations of Gross Beta Insoluble in Drinking Water Samples Collected in the Vicinity Of Limerick Generating Station, 2003.

Table D-I.2 Concentration of Gross Beta Soluble in Drinking Water Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table D-I.3 Concentrations of Gamma Emitters in Drinking Water Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table D-II.1 Concentrations of Gross Beta in Air Particulate Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Table D-II.2 Concentrations of Gamma Emitters in Air Particulate Samples Collected in the Vicinity of Limerick Generating Station, 2003.

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, 2003.

Table D-IV.1 Summary of Collection Dates for Samples Collected in the Vicinity of Limerick Generating Station, 2003.

Figures

Figure D-1 Comparison of Monthly Insoluble Gross Beta Concentrations in Drinking Water Samples Split Between ENV and TBE, 2003.

Figure D-2 Comparison of Monthly Soluble Gross Beta Concentrations in Drinking Water Samples Split Between ENV and TBE, 2003.

Figure D-3 Comparison of Weekly Gross Beta Concentrations in Air Particulate Samples Collected from LGS Collocated Locations 11S1 and 11S2, 2003.

Appendix E Inter-Laboratory Comparison Program

Tables

Table E-1 Analytics Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering, 2003

Table E-2 DOE/EML Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering, 2003

Table E-3 ERA Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering, 2003

Table E-4 MAPEP Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering, 2003

Table E-5 ERA Statistical Summary Proficiency Testing Program
Environmental, Inc., 2003

Table E-6 DOE's Mixed Analyte Performance Evaluation Program (MAPEP)
Environmental, Inc., 2003

I. Summary and Conclusions

This report on the Radiological Environmental Monitoring Program conducted for the Limerick Generating Station (LGS) by Exelon covers the period 1 January 2003 through 31 December 2003. During that time period, 1,160 analyses were performed on 892 samples. In assessing all the data gathered for this report and comparing these results with preoperational data, it was concluded that the operation of LGS had no adverse radiological impact on the environment.

Surface and drinking water samples were analyzed for concentrations of tritium and gamma emitting nuclides. Drinking water samples were also analyzed for concentrations of gross beta (soluble and insoluble fractions). No fission or activation products were detected. Gross beta activities detected were consistent with those detected in previous years. No tritium activity was detected.

Fish (predator and bottom feeder) and sediment samples were analyzed for concentrations of gamma emitting nuclides. No fission or activation products were detected in fish. Sediment samples collected below the discharge had Cesium–137 concentrations consistent with levels observed during the preoperational years. In addition, positive I-131 activity was found in sediment samples at two downstream indicator locations and was the result of medical treatments. The dose to a teenager's skin through the sediment pathway was calculated as 1.29 E–3 mrem.

Air particulate samples were analyzed for concentrations of gross beta and gamma emitting nuclides. Cosmogenic Be–7 was detected at levels consistent with those detected in previous years. No fission or activation products were detected.

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

Cow milk samples were analyzed for concentrations of I–131 and gamma emitting nuclides. All I–131 results were below the minimum detectable activity. Concentrations of naturally occurring K–40 were consistent with those detected in previous years. No fission or activation products were found.

Environmental gamma radiation measurements were performed quarterly using thermoluminescent dosimeters. Levels detected were consistent with those observed in previous years.

Review of the gamma spectroscopy results from the surface water sampler (25S1) located at the Limerick's intake and downstream of the 10CFR20.2002 permitted storage area indicated no offsite radionuclide transport was evident.

Intentionally left blank

II. Introduction

The Limerick Generating Station (LGS), consisting of two 3458 MWt boiling water reactors owned and operated by Exelon Corporation, 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 that 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 to 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 Brown Engineering (TBE), Global Dosimetry, and Environmental Inc. (Midwest Labs) on samples collected during the period 1 January 2003 through 31 December 2003.

On 6 July 1996 a 10CFR20.2002 permit was issued to Limerick for storage of slightly contaminated soils, sediments and sludges obtained from the holding pond, cooling tower and spray pond systems. These materials will decay to background while in storage. Final disposition will be determined at Station decommissioning.

A. Objective of the REMP

The objectives of the REMP are to:

1. Provide data on measurable levels of radiation and radioactive materials in the site environs.
2. 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 of the Objectives

The implementation of the objectives is accomplished by:

1. Identifying significant exposure pathways.
2. Establishing baseline radiological data of media within those

pathways.

3. Continuously monitoring those media before and during Station operation to assess Station radiological effects (if any) on man and the environment.

III. Program Description

A. Sample Collection

Samples for the LGS REMP were collected for Exelon Nuclear by Normandeau Associates, RMC Environmental Services Division (RMC). This section describes the general collection methods used by RMC to obtain environmental samples for the LGS REMP in 2003. Sample locations and descriptions can be found in Tables B–1 and B–2, and Figures B–1 through B–3, Appendix B. The collection procedures used by RMC are listed in Table B-3.

Aquatic Environment

The aquatic environment was evaluated by performing radiological analyses on samples of surface water, drinking water, fish, and sediment. Two gallon water samples were collected monthly from continuous samplers located at two surface water locations (13B1 and 24S1) and four drinking water locations (15F4, 15F7, 16C2, and 28F3). One additional surface water location (10F2) was sampled only during the months when water was taken from the Perkiomen Creek for cooling. Control locations were 10F2, 24S1, and 28F3. All samples were collected in 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 two locations, 16C5 and 29C1 (control). Sediment samples composed of recently deposited substrate were collected at three locations semiannually, 16B2 and 16C4 and 33A2 (control).

Atmospheric Environment

The atmospheric environment was evaluated by performing radiological analyses on samples of air particulate, airborne iodine, and milk. Airborne iodine and particulate samples were collected and analyzed weekly at five locations (10S3, 11S1, 13C1, 14S1, and 22G1). The control location was 22G1. Airborne iodine and particulate samples were obtained at each location, using a vacuum pump with charcoal and glass fiber filters attached. The pumps were run continuously and sampled air at the rate of

approximately one cubic foot per minute. The filters were replaced weekly and sent to the laboratory for analysis.

Milk samples were collected biweekly at five locations (9G1, 10F4, 18C1, 19B1, and 21B1) from April through November, and monthly from December through March. Four additional locations (36E1, 22C1, 23F1 and 25C1) were sampled quarterly. Locations 36E1, 9G1 and 23F1 were controls. All samples were collected in new unused two gallon plastic bottles from the bulk tank at each location, preserved with sodium bisulfite, and shipped promptly to the laboratory.

Ambient Gamma Radiation

Direct radiation measurements were made using Panasonic 814 calcium sulfate ($CaSO_4$) thermoluminescent dosimeters (TLD). The TLD locations were placed on and around the LGS site as follows:

A site boundary ring consisting of 16 locations (36S2, 3S1, 5S1, 7S1, 10S3, 11S1, 13S2, 14S1, 18S2, 21S2, 23S2, 25S2, 26S3, 29S1, 31S1 and 34S2) near and within the site perimeter representing fence post doses (i.e., at locations where the doses will be potentially greater than maximum annual off–site doses) from LGS release.

An intermediate distance ring consisting of 16 locations (36D1, 2E1, 4E1, 7E1, 10E1, 10F3, 13E1, 16F1, 19D1, 20F1, 24D1, 25D1, 28D2, 29E1, 31D2, and 34E1) extending to approximately 5 miles from the site designed to measure possible exposures to close-in population.

The balance of eight locations (5H1, 6C1, 9C1, 13C1, 15D1, 17B1, 20D1 and 31D1) representing control and special interests areas such as population centers, schools, etc.

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 sixteen–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 three $CaSO_4$ thermoluminescent phosphors enclosed in plastic– were placed at each location in a PVC conduit located approximately three feet above ground level. The TLDs were exchanged quarterly and sent to ICN for analysis.

10CFR20.2002 Permit Storage Area

1. The results of the surface water sampling program were used to determine if radioactive nuclide transport from the storage area into the Schuylkill River had occurred.

B. Sample Analysis

This section describes the general analytical methodologies used by TBE and Midwest Labs to analyze the environmental samples for radioactivity for the LGS REMP in 2002. The analytical procedures used by the laboratories are listed in Table B-3.

In order to achieve the stated objectives, the current program includes the following analyses:

1. Concentrations of beta emitters in drinking water, and air particulates.

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

3. Concentrations of tritium in surface and drinking water.

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

5. Ambient gamma radiation levels at various site environs.

C. Data Interpretation

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

1. Lower Limit of Detection and Minimum Detectable Activity

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.

The minimum detectable activity (MDA) is defined above with the exception that the measurement is an after the fact estimate of the presence of activity.

2. Net Activity Calculation and Reporting of Results

Net activity for a sample was calculated by subtracting background activity from the sample activity. Since the REMP measures extremely small changes in radioactivity in the environment, background variations may result in sample activity being lower than the background activity effecting a negative number. An MDA was reported in all cases where positive activity was not detected.

Gamma spectroscopy results for each type of sample were grouped as follows:

For surface and drinking water 11 nuclides, Mn–54, Co–58, Fe-59, Co–60, Zn–65, Zr–95, Nb–95, Cs–134, Cs–137, Ba–140, and La–140 were reported.

For fish eight nuclides, K-40, Mn–54, Co–58, Fe–59, Co–60, Zn-65, Cs–134, and Cs–137 were reported.

For sediment six nuclides, K-40, Mn–54, Co–58, Co–60, Cs–134, and Cs–137 were reported.

For air particulate six nuclides, Be–7, Mn–54, Co–58, Co–60, Cs-134, and Cs–137 were reported.

For milk five nuclides, K-40 , Cs–134, Cs–137, Ba–140, and La-140 were reported.

Means and standard deviations of the results were calculated. The standard deviations represent the variability of measured results for

different samples rather than single analysis uncertainty.

D. Program Exceptions

For 2003 the LGS REMP had a sample recovery rate in excess of 99%. Exceptions are listed below:

1. Surface water composite sampler at location 13B1 (Vincent Dam) was out of service during the following periods:
   01/02/2003 – 01/06/2003 Flooding
   01/13/2003 – 02/03/2003 Line frozen
   02/10/2003 – 02/18/2003 Line frozen
   02/21/2003 – 02/25/2003 Flooding
   03/19/2003 – 03/25/2003 Flooding
   04/11/2003 – 04/14/2003 Flooding
   05/27/2003 – 05/28/2003 Electrical problem
   05/28/2003 – 06/23/2003 Flooding
   06/23/2003 – 07/08/2003 Electrical problem
   07/22/2003 – 07/28/2003 Flooding
   08/05/2003 – 08/27/2003 Flooding
   08/20/2003 – 08/27/2003 Electrical problem
   10/20/2003 – 11/30/2003 Electrical problem
   09/02/2003 – 09/05/2003 Flooding
   09/15/2003 – 09/29/2003 Flooding
   12/13/2003 – 12/30/2003 Flooding

   Grab samples were taken for the composite.

2. Surface water composite sampler at location 10F2 (Perkiomen) was out of service during the following periods:
   09/22/2003 – 10/08/2003 Pump malfunction
   January – April 2003 Source water not pumped to Limerick
   November – December 2003 Source water not pumped to Limerick

   Grab samples were taken for the composite.

3. Surface water composite sampler at location 24S1 (Limerick) was out of service during the following periods:
   01/13/2003 – 02/03/2003 Line frozen
   02/24/2003 – 03/03/2003 Line frozen
   12/09/2003 – 12/23/2003 Pump Malfunction

   Grab samples were taken for the composite.

4. Drinking water composite sampler at location 28F3 (Pottstown) was

out of service during the following periods:
11/17/2003 – 12/02/2003 Pump malfunction

Grab samples were taken for the composite

5. The QC Laboratory drinking water sample at location 16C2 was out of service during the following periods:

01/13/2003 – 01/22/2003 Line frozen

Grab samples were taken for the composite

6. Air particulate and air iodine samples were not available for the following periods and locations, due to electrical problems:
03/31/2003 – 04/07/2003 (week 14), Location 10S3
04/07/2003 – 04/14/2003 (week 15), Location 10S3
06/02/2003 – 06/09/2003 (week 23), Location 10S3

7. TLD sample at location 36D1 was vandalized in the second quarter 2003.

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.

E. Program Changes

ICN Pharmaceutical was renamed to Global Dosimetry in 2003.

IV. Results and Discussion

A. Aquatic Environment

1. Surface Water

Samples were taken from a continuous sampler at three locations (10F2, 13B1, and 24S1) on a monthly schedule. Of these locations only 13B1 located downstream, could be affected by Limerick's effluent releases. The following analyses were performed.

Tritium

Monthly samples from all locations were composited quarterly and analyzed for tritium activity (Table C–I.1, Appendix C). No tritium activity was detected. The highest MDA calculated was <200 pCi/l.

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C–I.2, Appendix C). All nuclides were less than the MDA.

2. Drinking Water

Monthly samples were collected from continuous water samplers at four locations (15F4, 15F7, 16C2, and 28F3). Three locations (15F4, 15F7, and 16C2) could be affected by Limerick's effluent releases. The following analyses were performed:

Gross Beta

Samples from all locations were analyzed for concentrations of gross beta in the insoluble and soluble fractions (Tables C–II.1 and C–II.2, Appendix C). The values ranged from <1.3 to <1.8 pCi/l for the insoluble fraction and from 1.6 to 9.0 pCi/l for the soluble fraction. Concentrations detected in both fractions were consistent with those detected in previous years (Figures C–1 and C–2, Appendix C).

Tritium

Monthly samples from all locations were composited quarterly and analyzed for tritium activity (Table C–II.3, Appendix C). No tritium activity was detected. The highest MDA calculated was <195 pCi/l.

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C–II.4, Appendix C). All nuclides were less than the MDA.

3. Fish

Fish samples comprised of catfish/bullhead (bottom feeder) and

sunfish (predator) were collected at two locations (16C5 and 29C1) semiannually. Location 16C5 could be affected by Limerick's effluent releases. The following analysis was performed:

Gamma Spectrometry

The edible portion of fish samples from both locations was analyzed for gamma emitting nuclides (Table C–III.1, Appendix C). Naturally occurring K-40 was found at all stations and ranged from 2,800 to 3,650 pCi/kg wet and was consistent with levels detected in previous years. No fission or activation products were found. Historical levels of Cs–137 are shown in Figure C–3, Appendix C.

4. Sediment

Aquatic sediment samples were collected at three locations (16B2, 16C4 and 33A2) semiannually. Of these locations two 16B2 and 16C4 located downstream, could be affected by Limerick's effluent releases. 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, and the fission products Cs–137 and I–131.

Beryllium–7 and K–40 were found at all stations and ranged from 948 to 5,280 and12,600 to 18,900 pCi/kg dry, respectively. Concentrations of the fission product Cs–137 were found in sediment samples in all samples. Location 16C4 had the highest average concentration of 180 pCi/kg dry. The activity detected was consistent with those detected in the pre–operational years (Figure C–4, Appendix C). Iodine–131 at concentrations of 256 and 443 pCi/kg dry was found at the downstream indicator stations 16B2 and 16C4, respectively, and was the result of medical treatments. The dose to a teenager's skin through the sediment pathway was calculated as 1.29 E–03 mrem. No other Limerick fission or activation products were found.

B. Atmospheric Environment

1. Airborne

a. Air Particulates

Continuous air particulate samples were collected from five locations on a weekly basis. The five locations were separated into three groups: Group I represents locations within the LGS site boundary (10S3, 11S1, and 14S1), Group II represents the location at an intermediate distance from the LGS site (13C1), and Group III represents the control location at a remote distance from LGS (22G1). The following analyses were performed:

Gross Beta

Weekly samples were analyzed for concentrations of beta emitters (Table C–V.1 and C–V.2, 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 <6 to 38 E–3 pCi/m^3 with a mean of 16 E–3 pCi/m^3. The results from the Intermediate Distance location (Group II) ranged from <5 to 35 E–3 pCi/m^3 with a mean of 15 E–3 pCi/m^3. The results from the Distant locations (Group III) ranged from <5 to 38 E–3 pCi/m^3 with a mean of 16 E–3 pCi/m^3. Comparison of the 2003 air particulate data with previous years data indicate no effects from the operation of LGS (Figure C–5, Appendix C). In addition a comparison of the weekly mean values for 2003 indicate no notable differences among the three groups (Figure C–6, Appendix C).

Gamma Spectrometry

Weekly samples were composited quarterly and analyzed for gamma emitting nuclides (Table C–V.3, Appendix C). Naturally occurring Be–7 due to cosmic ray activity was detected in all samples. These values ranged from 36 to 68 E–3 pCi/m^3. All other nuclides were less than the MDA.

b. Airborne Iodine

Continuous air samples were collected from five (10S3, 11S1, 14S1, 13C1, and 22G1) locations and analyzed weekly for I–131 (Table C–VI.1, Appendix C). All results were less than the MDA.

2. Terrestrial

a. Milk

Samples were collected from five locations (9G1, 10F4, 18C1, 19B1 and 21B1) biweekly April through November and monthly December through March. Samples from four additional locations (22C1, 23F1, 25C1 and 36E1) were taken quarterly. The following analyses were performed:

Iodine–131

Milk samples from all locations were analyzed for concentrations of I–131 (Table C–VII.1, Appendix C). All results were less than the MDA.

Gamma Spectrometry

Each milk sample was analyzed for concentrations of gamma emitting nuclides (Table C–VII.2, Appendix C).

Naturally occurring K–40 activity was found in all samples and ranged from 1,130 to 2,030 pCi/l. All other nuclides were less than the MDA.

C. Ambient Gamma Radiation

Ambient gamma radiation levels were measured utilizing Panasonic 814 ($CaSO_4$) thermoluminescent dosimeters. Forty TLD locations were established around the site. Results of TLD measurements are listed in Tables C–VIII.1 to C–VIII.3, Appendix C.

Most TLD measurements were below 10 mR/standard month, with a range of 4.7 to 11.4 mR/standard month. A comparison of the Site Boundary and Intermediate Distance data to the Control Location data, indicate that the ambient gamma radiation levels from the Control Location 5H1 were consistently higher. The historical ambient gamma radiation data from Location 5H1 were plotted along with similar data from the Site, Intermediate Distance and Outer Ring Locations (Figure C–7, Appendix C). Location 5H1 has a historical high bias, but tracked with the data from all three groups. This bias is most likely due to radon emanating from the ground.

D. 10 CFR 20.2002 Permit Storage Area

The results of the surface water aquatic monitoring program from Location 25S1 were used to determine if radioactivity from the permit storage area had made it to the Schuylkill River. The data obtained from the gamma analysis program did not detect any migration of radioactivity from the permit storage area.

E. Land Use Survey

A Land Use Survey conducted during the May to September 2003 growing season around the Limerick Generating Station (LGS) was performed by Normandeau Associates, RMC Environmental Services Division for Exelon Nuclear to comply with Sections 2.15 and 3.4.2 of the Plant's Offsite Dose Calculation Manual. The purpose of the survey was to document the nearest resident, milk producing animal and garden of greater than 500 ft^2 in each of the sixteen 22 ½ degree sectors around the site. The distance and direction of all locations from the LGS reactor buildings were positioned using Global Positioning System (GPS) technology. There were no changes required to the LGS REMP, as a result of this survey. The results of this survey are summarized below.

Distance in Miles from the LGS Reactor Buildings			
Sector	Residence Miles	Garden Miles	Milk Farm Miles
1 N	0.6	1.8	4.7
2 NNE	0.5	0.5	-
3 NE	0.7	1.6	-
4 ENE	0.4	0.7	-
5 E	0.5	0.7	-
6 ESE	0.7	1.5	-
7 SE	1.0	1.4	-
8 SSE	1.0	1.1	-
9 S	0.8	1.2	2.3
10 SSW	1.0	1.0	1.8
11 SW	0.6	0.8	2.9
12 WSW	0.7	0.7	2.7
13 W	0.7	2.1	2.8
14 WNW	0.7	0.7	-
15 NW	0.7	1.6	-
16 NNW	1.0	1.6	-

V. References

1. Environmental Report Operating License Stage, Limerick Generating Station, Units 1 and 2, Volumes 1–5 Philadelphia Electric Company.
2. Branch Technical Position Paper, Regulatory Guide 4.8, Revision 1, November 1979.
3. Pre-operational 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.

APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT SUMMARY

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LIMERICK GENERATING STATION, 2003

Name of Facility: LIMERICK GENERATING STATION — **DOCKET NUMBER:** 50-352 & 50-353
Location of Facility: MONTGOMERY COUNTY, PA — **REPORTING PERIOD:** 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATION MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (PCI/LITER)	TRITIUM	10	2000	184 (0/4) (<161/<199)	184 (0/6) (<172/<200)	187 (0/2) (<174/<200)	10F2 CONTROL PERKIOMEN PUMPING STATION 7.25 MILES E OF SITE	0
	GAMMA	30						
	MN-54		15	4 (0/12) (<2/<9)	3 (0/18) (<2/<7)	4 (0/6) (<3/<7)	10F2 CONTROL PERKIOMEN PUMPING STATION 7.25 MILES E OF SITE	0
	CO-58		15	4 (0/12) (<2/<9)	3 (0/18) (<2/<7)	4 (0/6) (<3/<7)	10F2 CONTROL PERKIOMEN PUMPING STATION 7.25 MILES E OF SITE	0
	CO-60		15	4 (0/12) (<2/<9)	4 (0/18) (<2/<9)	5 (0/6) (<3/<9)	10F2 CONTROL PERKIOMEN PUMPING STATION 7.25 MILES E OF SITE	0
	FE-59		30	9 (0/12) (<4/<19)	7 (0/18) (<4/<13)	9 (0/12) (<4/<19)	13B1 INDICATOR VINCENT DAM 1.75 MILES SE OF SITE	0
	ZN-65		30	9 (0/12) (<4/<20)	7 (0/18) (<4/<16)	9 (0/6) (<7/<16)	10F2 CONTROL PERKIOMEN PUMPING STATION 7.25 MILES E OF SITE	0
	ZR-95		30	7 (0/12) (<3/<15)	6 (0/18) (<4/<13)	8 (0/6) (<5/<13)	10F2 CONTROL PERKIOMEN PUMPING STATION 7.25 MILES E OF SITE	0
	NB-95		15	4 (0/12) (<2/<8)	4 (0/18) (<2/<7)	4 (0/6) (<3/<7)	10F2 CONTROL PERKIOMEN PUMPING STATION 7.25 MILES E OF SITE	0

FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICTED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LIMERICK GENERATING STATION, 2003

Name of Facility: LIMERICK GENERATING STATION — DOCKET NUMBER: 50-352 & 50-353
Location of Facility: MONTGOMERY COUNTY, PA — REPORTING PERIOD: 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATION MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
	CS-134		15	4 (0/12) (<2/<7)	3 (0/18) (<2/<8)	4 (0/6) (<3/<8)	10F2 CONTROL PERKIOMEN PUMPING STATION 7.25 MILES E OF SITE	0
	CS-137		18	4 (0/12) (<2/<9)	4 (0/18) (<2/<9)	4 (0/6) (<3/<9)	10F2 CONTROL PERKIOMEN PUMPING STATION 7.25 MILES E OF SITE	0
	BA-140		60	18 (0/12) (<7/<38)	17 (0/18) (<9/<32)	21 (0/6) (<12/<32)	10F2 CONTROL PERKIOMEN PUMPING STATION 7.25 MILES E OF SITE	0
	LA-140		15	6 (0/12) (<2/<11)	6 (0/18) (<3/<15)	8 (0/6) (<4/<15)	10F2 CONTROL PERKIOMEN PUMPING STATION 7.25 MILES E OF SITE	0
DRINKING WATER (PCI/LITER)	GROSS BETA SOLUBLE	48	4	3.3 (28/36) (<2.1/9.0)	2.9 (10/12) (1.6/4.2)	3.5 (11/12) (<2.3/5.7)	15F4 INDICATOR PHILA. SUB. WATER CO. 8.62 MILES SE OF SITE	0
	GROSS BETA INSOLUBLE	48	4	1.5 (0/36) (<1.3/<1.8)	1.5 (0/12) (<1.3/<1.8)	1.5 (0/12) (<1.3/<1.8)	15F7 INDICATOR PHOENIXVILLE WATER WORKS 6.33 MILES SSE OF SITE	0
	TRITIUM	16	2000	180 (0/12) (<146/<195)	188 (0/4) (<177/<195)	188 (0/4) (<177/<195)	28F3 CONTROL POTTSTOWN WATER AUTHORITY 5.84 MILES WNW OF SITE	0

FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICTED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LIMERICK GENERATING STATION, 2003

Name of Facility: LIMERICK GENERATING STATION — **DOCKET NUMBER:** 50-352 & 50-353

Location of Facility: MONTGOMERY COUNTY, PA — **REPORTING PERIOD:** 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATION MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
	GAMMA	48						
	MN-54		15	4 (0/36) (<2/<7)	4 (0/12) (<2/<7)	4 (0/12) (<2/<7)	28F3 CONTROL POTTSTOWN WATER AUTHORITY 5.84 MILES WNW OF SITE	0
	CO-58		15	4 (0/36) (<2/<7)	4 (0/12) (<2/<7)	4 (0/12) (<2/<7)	16C2 INDICATOR CITIZENS HOME WATER CO. 2.66 MILES SSE OF SITE	0
	CO-60		15	4 (0/36) (<2/<13)	4 (0/12) (<2/<11)	5 (0/12) (<2/<11)	16C2 INDICATOR CITIZENS HOME WATER CO. 2.66 MILES SSE OF SITE	0
	FE-59		30	9 (0/36) (<4/<28)	9 (0/12) (<4/<24)	9 (0/12) (<5/<16)	16C2 INDICATOR CITIZENS HOME WATER CO. 2.66 MILES SSE OF SITE	0
	ZN-65		30	9 (0/36) (<4/<29)	9 (0/12) (<4/<26)	9 (0/12) (<4/<26)	28F3 CONTROL POTTSTOWN WATER AUTHORITY 5.84 MILES WNW OF SITE	0
	ZR-95		30	6 (0/36) (<3/<12)	7 (0/12) (<3/<14)	7 (0/12) (<3/<14)	28F3 CONTROL POTTSTOWN WATER AUTHORITY 5.84 MILES WNW OF SITE	0
	NB-95		15	4 (0/36) (<2/<7)	4 (0/12) (<2/<8)	4 (0/12) (<2/<8)	28F3 CONTROL POTTSTOWN WATER AUTHORITY 5.84 MILES WNW OF SITE	0

FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICTED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LIMERICK GENERATING STATION, 2003

Name of Facility: LIMERICK GENERATING STATION — DOCKET NUMBER: 50-352 & 50-353
Location of Facility: MONTGOMERY COUNTY, PA — REPORTING PERIOD: 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATION MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
	CS-134		15	3 (0/36) (<2/<6)	4 (0/12) (<2/<7)	4 (0/12) (<2/<7)	28F3 CONTROL POTTSTOWN WATER AUTHORITY 5.84 MILES WNW OF SITE	0
	CS-137		18	4 (0/36) (<2/<6)	4 (0/12) (<2/<7)	4 (0/12) (<2/<6)	16C2 INDICATOR CITIZENS HOME WATER CO. 2.66 MILES SSE OF SITE	0
	BA-140		60	17 (0/36) (<8/<30)	19 (0/12) (<9/<33)	19 (0/12) (<9/<33)	28F3 CONTROL POTTSTOWN WATER AUTHORITY 5.84 MILES WNW OF SITE	0
	LA-140		15	6 (0/36) (<2/<12)	6 (0/12) (<3/<12)	6 (0/12) (<3/<12)	28F3 CONTROL POTTSTOWN WATER AUTHORITY 5.84 MILES WNW OF SITE	0
BOTTOM FEEDER (FISH) (PCI/KG WET)	GAMMA	4	N/A					
	K-40			3310 (2/2) (2970/3650)	3195 (2/2) (2800/3590)	3310 (2/2) (2970/3650)	16C5 INDICATOR VINCENT POOL DOWNSTREAM OF DISCHARGE	0
	MN-54		130	28 (0/2) (<14/<42)	30 (0/2) (<21/<40)	30 (0/2) (<21/<40)	29C1 CONTROL POTTSTOWN VICINITY UPSTREAM OF INTAKE	0
	CO-58		130	31 (0/2) (<14/<47)	31 (0/2) (<20/<42)	31 (0/2) (<20/<42)	29C1 CONTROL POTTSTOWN VICINITY UPSTREAM OF INTAKE	0

FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICTED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LIMERICK GENERATING STATION, 2003

Name of Facility: LIMERICK GENERATING STATION — **DOCKET NUMBER:** 50-352 & 50-353
Location of Facility: MONTGOMERY COUNTY, PA — **REPORTING PERIOD:** 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATION MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
	CO-60		130	32 (0/2) (<28/<36)	31 (0/2) (<19/<43)	32 (0/2) (<28/<36)	16C5 INDICATOR VINCENT POOL DOWNSTREAM OF DISCHARGE	0
	FE-59		260	92 (0/2) (<71/<114)	72 (0/2) (<45/<99)	92 (0/2) (<71/<114)	16C5 INDICATOR VINCENT POOL DOWNSTREAM OF DISCHARGE	0
	ZN-65		260	81 (0/2) (<70/<92)	66 (0/2) (<44/<88)	81 (0/2) (<70/<92)	16C5 INDICATOR VINCENT POOL DOWNSTREAM OF DISCHARGE	0
	CS-134		130	25 (0/2) (<13/<37)	30 (0/2) (<18/<42)	30 (0/2) (<18/<42)	29C1 CONTROL POTTSTOWN VICINITY UPSTREAM OF INTAKE	0
	CS-137		150	28 (0/2) (<15/<42)	33 (0/2) (<19/<48)	33 (0/2) (<19/<48)	29C1 CONTROL POTTSTOWN VICINITY UPSTREAM OF INTAKE	0
PREDATOR (FISH) (PCI/KG WET)	GAMMA	4						
	K-40		130	3470 (2/2) (3330/3610)	3215 (2/2) (3000/3430)	3470 (2/2) (3330/3610)	16C5 INDICATOR VINCENT POOL DOWNSTREAM OF DISCHARGE	0
	MN-54		130	23 (0/2) (<21/<25)	28 (0/2) (<19/<36)	28 (0/2) (<19/<36)	29C1 CONTROL POTTSTOWN VICINITY UPSTREAM OF INTAKE	0

FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICTED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LIMERICK GENERATING STATION, 2003

Name of Facility: LIMERICK GENERATING STATION — DOCKET NUMBER: 50-352 & 50-353
Location of Facility: MONTGOMERY COUNTY, PA — REPORTING PERIOD: 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATION MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
	CO-58		130	23 (0/2) (<22/<24)	28 (0/2) (<20/<37)	28 (0/2) (<20/<37)	29C1 CONTROL POTTSTOWN VICINITY UPSTREAM OF INTAKE	0
	CO-60		130	21 (0/2) (<20/<23)	23 (0/2) (<17/<29)	23 (0/2) (<17/<29)	29C1 CONTROL POTTSTOWN VICINITY UPSTREAM OF INTAKE	0
	FE-59		260	50 (0/2) (<48/<52)	61 (0/2) (<42/<80)	61 (0/2) (<42/<80)	29C1 CONTROL POTTSTOWN VICINITY UPSTREAM OF INTAKE	0
	ZN-65		260	52 (0/2) (<47/<58)	58 (0/2) (<39/<76)	58 (0/2) (<39/<76)	29C1 CONTROL POTTSTOWN VICINITY UPSTREAM OF INTAKE	0
	CS-134		130	22 (0/2) (<21/<23)	25 (0/2) (<14/<35)	25 (0/2) (<14/<35)	29C1 CONTROL POTTSTOWN VICINITY UPSTREAM OF INTAKE	0
	CS-137		150	27 (0/2) (<24/<30)	26 (0/2) (<19/<34)	27 (0/2) (<24/<30)	16C5 INDICATOR VINCENT POOL DOWNSTREAM OF DISCHARGE	0
SEDIMENT (PCI/KG DRY)	GAMMA	6						
	BE-7		N/A	3663 (4/4) (2800/5280)	1819 (2/2) (948/2690)	4450 (2/2) (3620/5280)	16C4 INDICATOR VINCENT DAM 2.18 MILES SSE OF SITE	0

FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICTED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LIMERICK GENERATING STATION, 2003

Name of Facility: LIMERICK GENERATING STATION
Location of Facility: MONTGOMERY COUNTY, PA
DOCKET NUMBER: 50-352 & 50-353
REPORTING PERIOD: 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATION MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
	K-40		N/A	17400 (4/4) (15700/18900)	13800 (2/2) (12600/15000)	18600 (2/2) (18300/18900)	16C4 INDICATOR VINCENT DAM 2.18 MILES SSE OF SITE	0
	MN-54		N/A	48 (0/4) (<27/<71)	48 (0/2) (<37/<60)	49 (0/2) (<27/<71)	16B2 INDICATOR LINFIELD BRIDGE 1.35 MILES SSE OF SITE	0
	CO-58		N/A	45 (0/4) (<29/<61)	46 (0/2) (<38/<54)	46 (0/2) (<38/<54)	33A2 CONTROL UPSTREAM OF INTAKE 0.84 MILES NNW OF SITE	0
	CO-60		N/A	47 (0/4) (<30/<71)	46 (0/2) (<32/<60)	50 (0/2) (<30/<71)	16B2 INDICATOR LINFIELD BRIDGE 1.35 MILES SSE OF SITE	0
	I-131		N/A	218 (2/4) (<72/443)	138 (0/2) (<85/<191)	258 (1/2) (<72/443)	16C4 INDICATOR VINCENT DAM 2.18 MILES SSE OF SITE	0
	CS-134		150	41 (0/4) (<23/<60)	43 (0/2) (<32/<54)	43 (0/2) (<32/<54)	33A2 CONTROL UPSTREAM OF INTAKE 0.84 MILES NNW OF SITE	0
	CS-137		180	167 (4/4) (132/182)	113 (2/2) (79/147)	180 (2/2) (178/182)	16C4 INDICATOR VINCENT DAM 2.18 MILES SSE OF SITE	0
AIR PARTICULATE (E-3 PCI/CU.METER)	GROSS BETA	259	10	16 (197/207) (5/38)	16 (50/52) (5/38)	16 (49/52) (5/36)	10S3 INDICATOR KEEN ROAD 0.50 MILES E OF SITE	0

FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICTED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LIMERICK GENERATING STATION, 2003

Name of Facility: LIMERICK GENERATING STATION — DOCKET NUMBER: 50-352 & 50-353

Location of Facility: MONTGOMERY COUNTY, PA — REPORTING PERIOD: 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATION MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
	GAMMA	20						
	BE-7		N/A	50 (16/16) (36/68)	47 (4/4) (37/55)	53 (4/4) (46/68)	13C1 INDICATOR KING ROAD 2.84 MILES SE OF SITE	0
	MN-54		N/A	0.6 (0/16) (<0.2/<1)	0.4 (0/4) (<0.2/<0.5)	0.7 (0/4) (<0.3/<1)	11S1 INDICATOR LGS INFORMATION CENTER 0.38 MILES ESE OF SITE	0
	CO-58		N/A	0.6 (0/16) (<0.2/<1)	0.5 (0/4) (<0.2/<0.6)	0.6 (0/4) (<0.3/<1)	11S1 INDICATOR LGS INFORMATION CENTER 0.38 MILES ESE OF SITE	0
	CO-60		N/A	0.7 (0/16) (<0.2/<2)	0.6 (0/4) (<0.2/<0.8)	0.8 (0/4) (<0.3/<2)	11S1 INDICATOR LGS INFORMATION CENTER 0.38 MILES ESE OF SITE	0
	CS-134		50	0.5 (0/16) (<0.2/<1)	0.4 (0/4) (<0.2/<0.6)	0.6 (0/4) (<0.2/<1)	11S1 INDICATOR LGS INFORMATION CENTER 0.38 MILES ESE OF SITE	0
	CS-137		60	0.6 (0/16) (<0.2/<1)	0.4 (0/4) (<0.2/<0.5)	0.6 (0/4) (<0.2/<1)	11S1 INDICATOR LGS INFORMATION CENTER 0.38 MILES ESE OF SITE	0
AIR IODINE (E-3 PCI/CU.METER)	I-131	259	70	8 (0/207) (<2/<21)	5 (0/52) (<2/<12)	8 (0/51) (<2/<21)	10S3 INDICATOR KEEN ROAD 0.50 MILES E OF SITE	0

FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICTED IN PARENTHESES (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LIMERICK GENERATING STATION, 2003

Name of Facility: LIMERICK GENERATING STATION
Location of Facility: MONTGOMERY COUNTY, PA
DOCKET NUMBER: 50-352 & 50-353
REPORTING PERIOD: 2003

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL LOCATION MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: MEAN (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN: STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
MILK (PCI/LITER)	I-131	126	1	0.6 (0/96) (<0.1/<1)	0.6 (0/30) (<0.2/<0.9)	0.6 (0/22) (<0.2/<1)	21B1 INDICATOR REGIONAL FARM 1.75 MILES SSW OF SITE	0
	GAMMA K-40	126	N/A	1317 (100/100) (1130/2030)	1290 (26/26) (1140/1430)	1343 (4/4) (1250/1440)	36E1 INDICATOR REGIONAL FARM 4.70 MILES N OF SITE	0
	CS-134		15	4 (0/100) (<1/<10)	4 (0/26) (<2/<7)	4 (0/22) (<1/<10)	10F4 INDICATOR REGIONAL FARM 6.60 MILES ESE OF SITE	0
	CS-137		18	4 (0/100) (<1/<11)	4 (0/26) (<2/<7)	4 (0/22 (<2/<11)	10F4 INDICATOR REGIONAL FARM 6.60 MILES ESE OF SITE	0
	BA-140		60	17 (0/100) (<6/<42)	17 (0/26) (<7/<27)	21 (0/4) (<15/<27)	23F1 CONTROL REGIONAL FARM 5.02 MILES SW OF SITE	0
	LA-140		15	5 (0/100) (<2/<14)	6 (0/26) (<2/<9)	7 (0/4) (<3/<10)	25C1 INDICATOR REGIONAL FARM 2.69 MILES WSW OF SITE	0
DIRECT RADIATION (MILLI-ROENTGEN/STD.MO.	TLD-QUARTERLY	160	N/A	6.9 (156/156) (4.7/11.4)	8.3 (4/4) (7.8/9.0)	11.0 (4/4) (10.6/11.4)	13S2 INDICATOR 500 KV SUBSTATION 0.41 MILES SE OF SITE	0

FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICTED IN PARENTHESES (F)

Intentionally Left Blank

APPENDIX B

LOCATION DESIGNATION, DISTANCE & DIRECTION, AND SAMPLE COLLECTION & ANALYTICAL METHODS

TABLE B-1: 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's Units 1 and 2 off-gas vents. 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-2: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Limerick Generating Station, 2002

Location	Location Description	Distance & Direction From Site
A. Surface Water		
13B1	Vincent Dam (indicator)	1.75 miles SE
24S1	Limerick Intake (control)	0.20 miles SW
10F2	Perkiomen Pumping Station (control)	7.25 miles E
B. Drinking (Potable) Water		
15F4	Philadelphia Suburban Water Company (indicator)	8.62 miles SE
15F7	Phoenixville Water Works (indicator)	6.33 miles SSE
16C2	Citizens Home Water Company (indicator)	2.66 miles SSE
28F3	Pottstown Water Authority (control)	5.84 miles WNW
C. Milk - bi-weekly / monthly		
9G1	Control	11.64 miles E
10F4		6.60 miles ESE
18C1		2.26 miles S
19B1		1.95 miles SSW
21B1		1.75 miles SSW
D. Milk - quarterly		
36E1		4.70 miles N
22C1		2.92 miles SW
23F1	Control	5.02 miles SW
25C1		2.69 miles WSW
E. Air Particulates / Air Iodine		
10S3	Keen Road	0.50 miles E
11S1	LGS Information Center	0.38 miles ESE
11S2	LGS Information Center	0.38 miles ESE
13C1	King Road	2.84 miles SE
14S1	Longview Road	0.63 miles SSE
22G1	Manor Substation (control)	17.73 miles SW
F. Fish		
16C5	Vincent Pool (indicator)	Downstream of Discharge
29C1	Pottstown Vicinity (control)	Upstream of Intake
G. Sediment		
16B2	Linfield Bridge (indicator)	1.35 miles SSE
16C4	Vincent Dam (indicator)	2.18 miles SSE
33A2	Upstream of Intake (control)	0.84 miles NNW
H. Environmental Dosimetry - TLD		
Site Boundary		
36S2	Evergreen & Sanatoga Road	0.60 miles N
3S1	Sanatoga Road	0.44 miles NNE

TABLE B-2: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Limerick Generating Station, 2002

Location	Location Description	Distance & Direction From Site
5S1	Possum Hollow Road	0.45 miles NE
7S1	LGS Training Center	0.59 miles ENE
10S3	Keen Road	0.50 miles E
11S1	LGS Information Center	0.38 miles ESE
13S2	500 KV Substation	0.41 miles SE
14S1	Longview Road	0.63 miles SSE
18S2	Rail Line along Longview Road	0.26 miles S
21S2	Near Intake Building	0.19 miles SSW
23S2	Transmission Tower	0.53 miles SW
25S2	Sector Site Boundary	0.46 miles WSW
26S3	Met. Tower #2	0.40 miles W
29S1	Sector Site Boundary	0.55 miles WNW
31S1	Sector Site Boundary	0.26 miles NW
34S2	Met. Tower #1	0.58 miles NNW
Intermediate Distance		
36D1	Siren Tower No. 147	3.51 miles N
2E1	Laughing Waters GSC	4.76 miles NNE
4E1	Neiffer Road	4.78 miles NE
7E1	Pheasant Road	4.26 miles ENE
10E1	Royersford Road	3.94 miles E
10F3	Trappe Substation	5.58 miles ESE
13E1	Vaughn Substation	4.31 miles SE
16F1	Pikeland Substation	5.04 miles SSE
19D1	Snowden Substation	3.49 miles S
20F1	Sheeder Substation	5.24 miles SSW
24D1	Porters Mill Substation	3.97 miles SW
25D1	Hoffecker & Keim Streets	3.99 miles WSW
28D2	W. Cedarville Road	3.83 miles W
29E1	Prince Street	4.95 miles WNW
31D2	Poplar Substation	3.87 miles NW
34E1	Varnell Road	4.59 miles NNW
Control and Special Interest		
5H1	Birch Substation (control)	24.76 miles NE
6C1	Pottstown Landing Field	2.14 miles NE
9C1	Reed Road	2.15 miles E
13C1	King Road	2.84 miles SE
15D1	Spring City Substation	3.20 miles SE
17B1	Linfield Substation	1.60 miles S
20D1	Ellis Woods Road	3.06 miles SSW
31D1	Lincoln Substation	3.00 miles WNW

TABLE B-3: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Limerick Generating Station, 2002

Sample Medium	Analysis	Sampling Method	Collection Procedure Number	Sample Size	Analytical Procedure Number
Surface Water	Gamma Spectroscopy	Monthly composite from a continuous water compositor.	RMC-ER5 Collection of water samples for radiological analysis (Limerick Generating Station)	2 gallon	TBE, PRO-042-5 Determination of gamma emitting radioisotopes Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Surface Water	Tritium	Quarterly composite from a continuous water compositor.	RMC-ER5 Collection of water samples for radiological analysis (Limerick Generating Station)	500 ml	TBE, PRO-052-35 Determination of tritium in water by liquid scintillation Env. Inc., T-02 Determination of tritium in water (direct method)
Drinking Water	Gross Beta	Monthly composite from a continuous water compositor.	RMC-ER5 Collection of water samples for radiological analysis (Limerick Generating Station)	2 gallon	TBE, PRO-032-41 Gross Alpha and/or gross beta activity in water samples (suspended and dissolved fractions) Env. Inc., W(DS)-01 Determination of gross alpha and/or gross beta in water (dissolved solids or total residue) Env. Inc., W(SS)-02 Determination of gross alpha and/or gross beta in water (suspended solids)
Drinking Water	Gamma Spectroscopy	Monthly composite from a continuous water compositor.	RMC-ER5 Collection of water samples for radiological analysis (Limerick Generating Station)	2 gallon	TBE, PRO-042-5 Determination of gamma emitting radioisotopes Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Drinking Water	Tritium	Quarterly composite from a continuous water compositor.	RMC-ER5 Collection of water samples for radiological analysis (Limerick Generating Station)	500 ml	TBE, PRO-052-35 Determination of tritium in water by liquid scintillation Env. Inc., T-02 Determination of tritium in water (direct method)
Fish	Gamma Spectroscopy	Semi-annual samples collected via electroshocking or other techniques	RMC-ER6 Collection of fish samples for radiological analysis (Limerick Generating Station)	1000 grams (wet)	TBE, PRO-042-5 Determination of gamma emitting radioisotopes Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Sediment	Gamma Spectroscopy	Semi-annual grab samples	RMC-ER7 Collection of sediment samples for radiological analysis (Limerick Generating Station)	500 grams (dry)	TBE, PRO-042-5 Determination of gamma emitting radioisotopes Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Air Particulates	Gross Beta	One-week composite of continuous air sampling through glass fiber filter paper	RMC-ER8 Collection of air particulate and air iodine samples for radiological analysis (Limerick Generating Station)	1 filter (approximately 280 cubic meters weekly)	TBE, PRO-032-10 Gross beta and/or alpha activity in air particulate filters (direct count method) Env. Inc., AP-02 Determination of gross alpha and/or gross beta in air particulate filters

TABLE B-3: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Limerick Generating Station, 2002

Sample Medium	Analysis	Sampling Method	Collection Procedure Number	Sample Size	Analytical Procedure Number
Air Particulates	Gamma Spectroscopy	Quarterly composite of each station	Env. Inc., AP-03 Procedure for compositing air particulate filters for gamma spectroscopic analysis	13 filters (approximately 3600 cubic meters)	TBE, PRO-042-5 Determination of gamma emitting radioisotopes Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Air Iodine	Gamma Spectroscopy	One-week composite of continuous air sampling through charcoal filter	RMC-ER8 Collection of air particulate and air iodine samples for radiological analysis (Limerick Generating Station)	1 filter (approximately 280 cubic meters weekly)	TBE, PRO-042-5 Determination of gamma emitting radioisotopes Env. Inc., I-131-02 Determination of I-131 in charcoal canisters by gamma spectroscopy (batch method)
Milk	I-131	Bi-weekly grab sample when cows are on pasture. Monthly all other times	RMC-ER10 Collection of milk samples for radiological analysis (Limerick Generating Station)	2 gallon	TBE, PRO-032-20 Radiometric determination of I-131 by the beta-gamma coincidence counting technique Env. Inc., I-131-01 Determination of I-131 in milk by anion exchange
Milk	Gamma Spectroscopy	Bi-weekly grab sample when cows are on pasture. Monthly all other times	RMC-ER10 Collection of milk samples for radiological analysis (Limerick Generating Station)	2 gallon	TBE, PRO-042-5 Determination of gamma emitting radioisotopes Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
TLD	Thermoluminescence Dosimetry	Quarterly TLDs comprised of two Panasonic 814 (containing 3 each $CaSO_4$ elements)	RMC-ER9 Collection of TLD samples for radiological analysis (Limerick Generating Station)	2 dosimeters	ICN Pharmaceutical

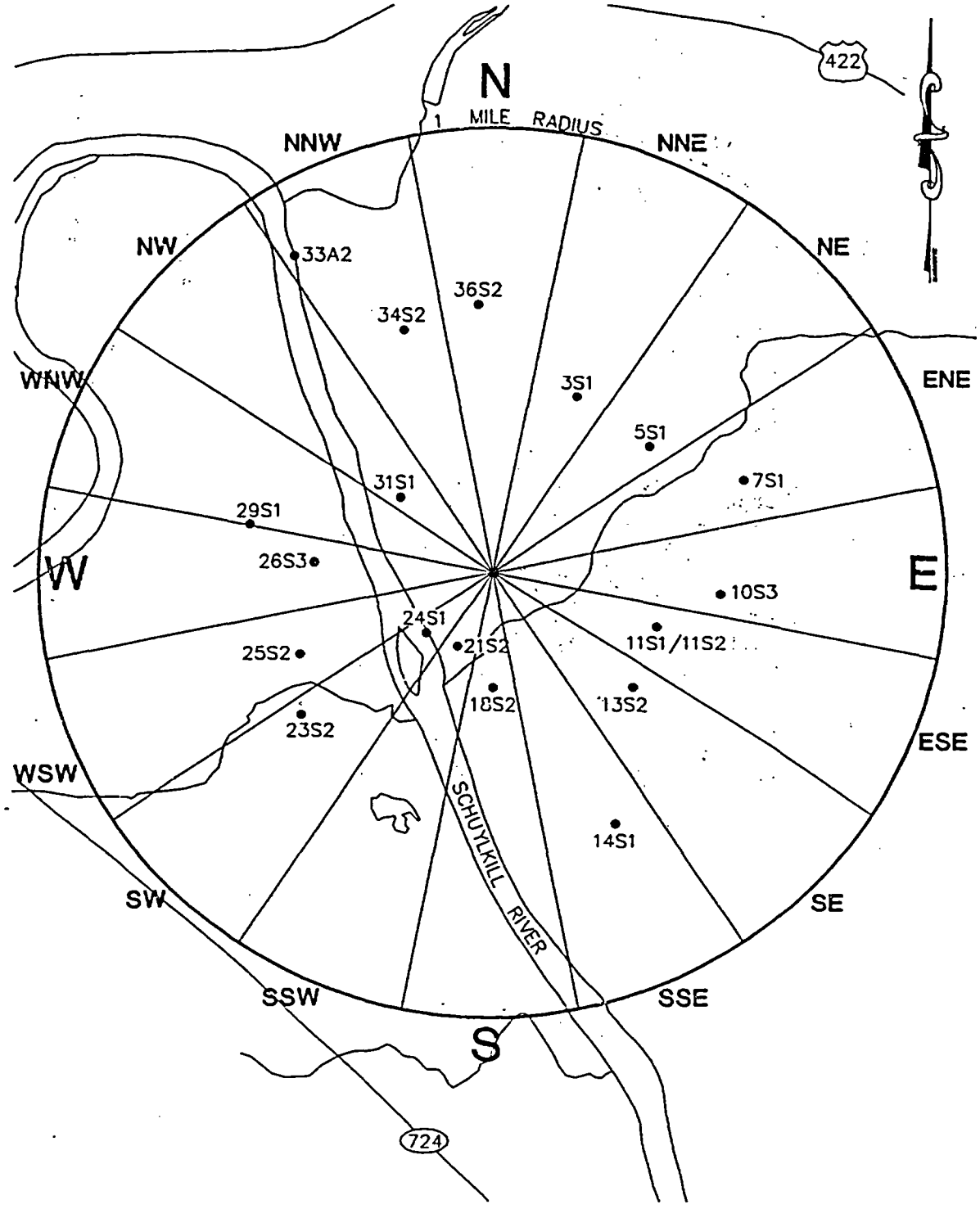


Figure B-1
Environmental Sampling Locations Within One
Mile of the Limerick Generating Station, 2002

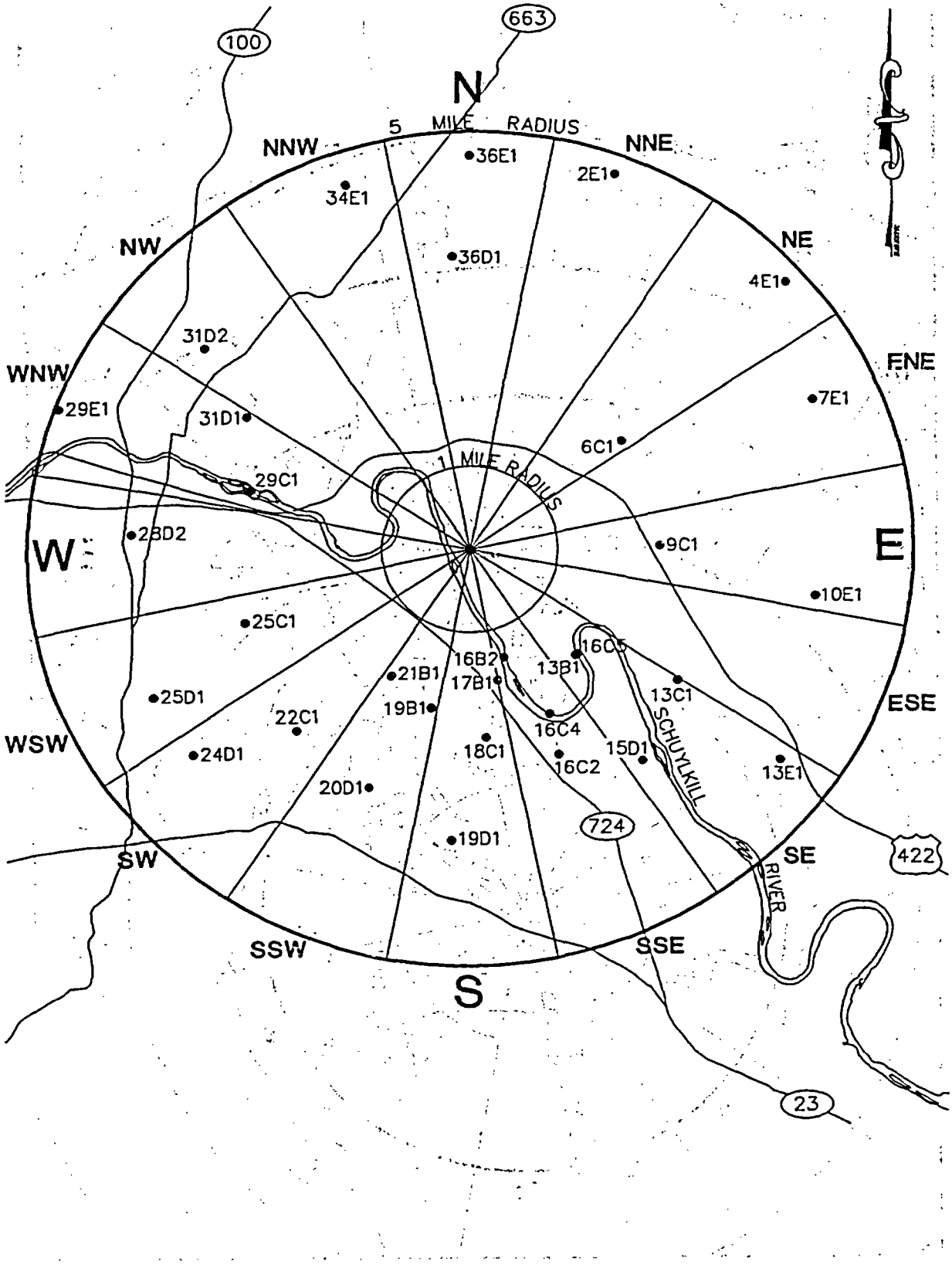


Figure B-2
Environmental Sampling Locations Between One and Five
Miles from the Limerick Generating Station, 2002

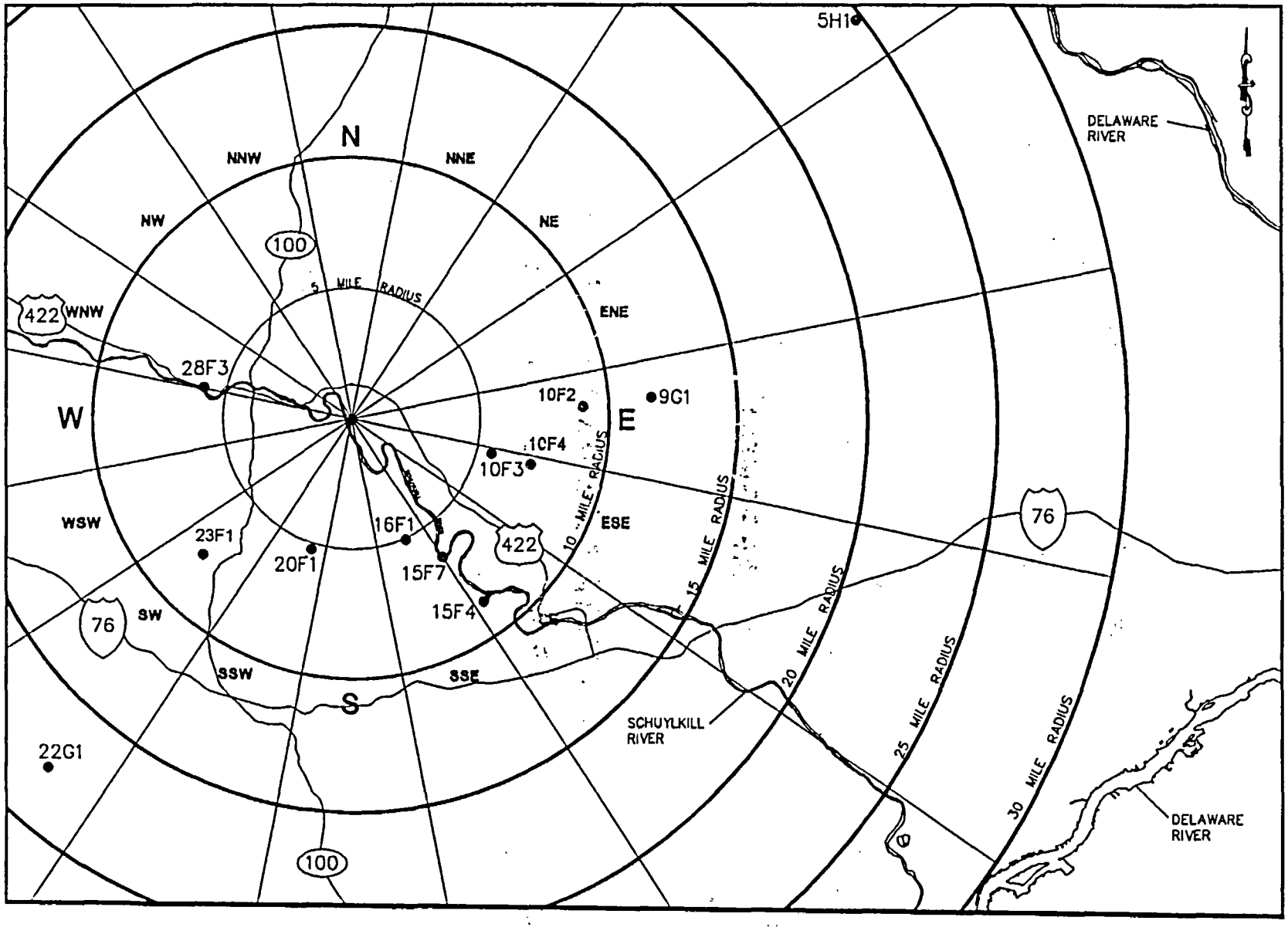


Figure B-3
Environmental Sampling Locations Greater than Five Miles from the Limerick Generating Station, 2002

APPENDIX C

DATA TABLES AND FIGURES
PRIMARY LABORATORY

TABLE C-I.1 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	10F2	13B1	24S1
JAN-MAR	(1)	< 181	< 179
APR-JUN	< 174	< 199	< 177
JUL-SEP	< 200	< 196	< 172
OCT-DEC	< (1)	< 161	< 200
MEAN	187 ± 37	184 ± 35	182 ± 25

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-I.2 CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STC	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	Nb-95	Cs-134	Cs-137	Ba-140	La-140
10F2	JAN	(1)										
	FEB	(1)										
	MAR	(1)										
	APR	(1)										
	MAY	< 7	< 7	< 13	< 9	< 16	< 13	< 7	< 8	< 9	< 32	< 15
	JUN	< 4	< 4	< 9	< 4	< 7	< 7	< 4	< 3	< 4	< 27	< 9
	JUL	< 4	< 4	< 9	< 5	< 10	< 8	< 5	< 4	< 4	< 21	< 7
	AUG	< 3	< 3	< 6	< 3	< 6	< 5	< 3	< 3	< 3	< 14	< 5
	SEP	< 4	< 4	< 8	< 4	< 9	< 7	< 4	< 4	< 4	< 20	< 8
	OCT	< 3	< 3	< 6	< 3	< 7	< 5	< 3	< 3	< 3	< 12	< 4
	NOV	(1)										
	DEC	(1)										
	MEAN	4 ± 3	4 ± 3	9 ± 5	5 ± 4	9 ± 7	8 ± 6	4 ± 3	4 ± 4	4 ± 4	21 ± 15	8 ± 7
13B1	JAN	< 2	< 2	< 4	< 2	< 4	< 4	< 2	< 2	< 3	< 11	< 3
	FEB	< 3	< 3	< 6	< 3	< 6	< 5	< 3	< 3	< 3	< 13	< 4
	MAR	< 4	< 3	< 7	< 4	< 7	< 7	< 4	< 3	< 4	< 14	< 5
	APR	< 2	< 2	< 9	< 4	< 9	< 3	< 2	< 2	< 2	< 7	< 2
	MAY	< 9	< 9	< 18	< 8	< 17	< 15	< 8	< 7	< 9	< 38	< 10
	JUN	< 3	< 3	< 6	< 3	< 5	< 5	< 3	< 3	< 3	< 21	< 7
	JUL	< 3	< 3	< 6	< 3	< 6	< 5	< 3	< 3	< 3	< 14	< 4
	AUG	< 5	< 5	< 12	< 6	< 11	< 11	< 6	< 5	< 6	< 32	< 11
	SEP	< 4	< 4	< 19	< 9	< 20	< 7	< 4	< 3	< 4	< 21	< 6
	OCT	< 6	< 6	< 11	< 6	< 12	< 11	< 6	< 6	< 6	< 27	< 9
	NOV	< 3	< 2	< 5	< 3	< 5	< 4	< 3	< 2	< 3	< 11	< 3
	DEC	< 3	< 3	< 5	< 3	< 5	< 5	< 3	< 2	< 3	< 11	< 4
	MEAN	4 ± 4	4 ± 4	9 ± 10	4 ± 4	9 ± 10	7 ± 7	4 ± 4	4 ± 3	4 ± 4	18 ± 19	6 ± 6

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-I.2 CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STC	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	Nb-95	Cs-134	Cs-137	Ba-140	La-140
24S1	JAN	< 4	< 3	< 8	< 4	< 8	< 6	< 4	< 3	< 4	< 17	< 6
	FEB	< 2	< 2	< 5	< 3	< 5	< 4	< 3	< 2	< 2	< 11	< 3
	MAR	< 4	< 4	< 8	< 4	< 9	< 7	< 4	< 4	< 4	< 17	< 6
	APR	< 3	< 3	< 6	< 3	< 6	< 5	< 3	< 3	< 3	< 12	< 4
	MAY	< 3	< 3	< 5	< 3	< 5	< 5	< 3	< 3	< 3	< 16	< 5
	JUN	< 2	< 2	< 5	< 2	< 4	< 4	< 2	< 2	< 2	< 14	< 6
	JUL	< 2	< 2	< 4	< 4	< 5	< 4	< 2	< 2	< 2	< 9	< 3
	AUG	< 4	< 4	< 7	< 4	< 7	< 6	< 4	< 3	< 4	< 18	< 6
	SEP	< 4	< 4	< 10	< 4	< 10	< 8	< 5	< 4	< 5	< 24	< 8
	OCT	< 3	< 3	< 6	< 3	< 6	< 5	< 3	< 3	< 3	< 13	< 4
	NOV	< 3	< 3	< 7	< 4	< 7	< 6	< 3	< 3	< 4	< 13	< 5
	DEC	< 3	< 4	< 7	< 4	< 8	< 6	< 4	< 3	< 4	< 16	< 6
	MEAN	3 ± 1	3 ± 1	6 ± 3	4 ± 2	7 ± 3	6 ± 3	3 ± 2	3 ± 1	3 ± 2	15 ± 8	5 ± 3

TABLE C-II.1 CONCENTRATIONS OF GROSS BETA INSOLUBLE IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	15F4	15F7	16C2	28F3
JAN	< 1.5	< 1.5	< 1.5	< 1.5
FEB	< 1.5	< 1.5	< 1.5	< 1.5
MAR	< 1.5	< 1.5	< 1.5	< 1.5
APR	< 1.5	< 1.5	< 1.5	< 1.5
MAY	< 1.4	< 1.4	< 1.4	< 1.4
JUN	< 1.8	< 1.8	< 1.8	< 1.8
JUL	< 1.5	< 1.5	< 1.5	< 1.5
AUG	< 1.5	< 1.5	< 1.5	< 1.5
SEP	< 1.4	< 1.4	< 1.4	< 1.4
OCT	< 1.6	< 1.6	< 1.6	< 1.6
NOV	< 1.3	< 1.3	< 1.3	< 1.3
DEC	< 1.6	< 1.6	< 1.6	< 1.6
MEAN	1.5 ± 0.3	1.5 ± 0.3	1.5 ± 0.3	1.5 ± 0.3

TABLE C-II.2 CONCENTRATIONS OF GROSS BETA SOLUBLE IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	15F4	15F7	16C2	28F3
JAN	3.1 ± 1.5	3.1 ± 1.6	2.5 ± 1.5	2.5 ± 1.5
FEB	2.6 ± 1.5	4.0 ± 1.7	< 2.2	2.4 ± 1.5
MAR	3.0 ± 1.4	2.1 ± 1.4	2.6 ± 1.4	1.6 ± 1.4
APR	3.7 ± 1.5	< 2.1	< 2.2	< 2.1
MAY	4.6 ± 1.6	3.8 ± 1.5	3.8 ± 1.5	3.4 ± 1.5
JUN	< 2.3	< 2.4	< 2.6	< 2.4
JUL	3.2 ± 1.5	3.6 ± 1.5	3.1 ± 1.5	3.5 ± 1.5
AUG	3.6 ± 1.5	3.5 ± 1.5	3.1 ± 1.6	2.8 ± 1.5
SEP	5.7 ± 1.6	9.0 ± 1.9	4.5 ± 1.6	4.2 ± 1.6
OCT	3.7 ± 1.6	2.3 ± 1.5	< 2.2	3.9 ± 1.6
NOV	3.7 ± 1.4	3.6 ± 1.4	3.2 ± 1.4	3.1 ± 1.4
DEC	3.3 ± 1.5	< 2.1	2.5 ± 1.5	3.3 ± 1.6
MEAN	3.5 ± 1.8	3.5 ± 3.8	2.9 ± 1.4	2.9 ± 1.5

TABLE C-II.3 CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	15F4	15F7	16C2	28F3
JAN-MAR	< 176	< 176	< 176	< 177
APR-JUN	< 146	< 176	< 166	< 190
JUL-SEP	< 195	< 195	< 190	< 195
OCT-DEC	< 189	< 191	< 186	< 188
MEAN	177 ± 44	185 ± 20	180 ± 22	188 ± 15

TABLE C-II.4 CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STC	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	Nb-95	Cs-134	Cs-137	Ba-140	La-140
15F4	JAN	< 3	< 3	< 7	< 3	< 7	< 6	< 3	< 3	< 3	< 16	< 5
	FEB	< 3	< 3	< 6	< 3	< 6	< 5	< 3	< 3	< 3	< 13	< 4
	MAR	< 4	< 4	< 8	< 4	< 8	< 7	< 4	< 4	< 5	< 16	< 5
	APR	< 6	< 6	< 13	< 6	< 12	< 10	< 6	< 5	< 6	< 26	< 9
	MAY	< 3	< 3	< 14	< 6	< 13	< 5	< 3	< 2	< 3	< 15	< 4
	JUN	< 2	< 2	< 6	< 3	< 5	< 5	< 3	< 2	< 3	< 21	< 6
	JUL	< 4	< 4	< 9	< 5	< 9	< 8	< 4	< 4	< 5	< 20	< 8
	AUG	< 5	< 4	< 18	< 9	< 19	< 8	< 4	< 3	< 4	< 22	< 6
	SEP	< 4	< 4	< 8	< 4	< 7	< 6	< 4	< 3	< 4	< 19	< 7
	OCT	< 2	< 2	< 5	< 4	< 5	< 4	< 2	< 2	< 3	< 9	< 4
	NOV	< 4	< 4	< 8	< 4	< 9	< 7	< 4	< 4	< 4	< 15	< 6
	DEC	< 2	< 3	< 5	< 3	< 5	< 5	< 2	< 2	< 3	< 12	< 3
	MEAN	4 ± 2	3 ± 2	9 ± 8	4 ± 3	9 ± 8	6 ± 3	4 ± 2	3 ± 2	4 ± 2	17 ± 9	6 ± 3
15F7	JAN	< 3	< 3	< 6	< 3	< 6	< 5	< 3	< 3	< 3	< 14	< 4
	FEB	< 3	< 3	< 6	< 4	< 7	< 6	< 3	< 3	< 3	< 13	< 5
	MAR	< 2	< 2	< 4	< 2	< 4	< 4	< 2	< 2	< 2	< 8	< 2
	APR	< 3	< 3	< 6	< 3	< 6	< 5	< 3	< 3	< 3	< 12	< 4
	MAY	< 6	< 4	< 8	< 5	< 9	< 7	< 5	< 5	< 6	< 22	< 10
	JUN	< 2	< 2	< 4	< 2	< 4	< 3	< 2	< 2	< 2	< 14	< 4
	JUL	< 3	< 3	< 6	< 3	< 6	< 5	< 3	< 3	< 3	< 14	< 5
	AUG	< 4	< 4	< 8	< 5	< 8	< 8	< 4	< 4	< 4	< 21	< 7
	SEP	< 3	< 3	< 6	< 3	< 5	< 5	< 3	< 3	< 3	< 16	< 5
	OCT	< 7	< 6	< 28	< 13	< 29	< 12	< 6	< 6	< 6	< 26	< 10
	NOV	< 3	< 2	< 5	< 3	< 5	< 4	< 3	< 3	< 3	< 11	< 3
	DEC	< 3	< 3	< 7	< 4	< 7	< 6	< 3	< 3	< 3	< 16	< 5
	MEAN	3 ± 3	3 ± 2	8 ± 13	4 ± 6	8 ± 14	6 ± 5	3 ± 2	3 ± 2	4 ± 3	16 ± 10	5 ± 5

TABLE C-II.4 CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STC	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	Nb-95	Cs-134	Cs-137	Ba-140	La-140
16C2	JAN	< 4	< 4	< 9	< 4	< 8	< 7	< 5	< 4	< 5	< 22	< 7
	FEB	< 3	< 3	< 12	< 6	< 12	< 4	< 3	< 2	< 3	< 9	< 3
	MAR	< 4	< 4	< 8	< 4	< 9	< 7	< 4	< 4	< 5	< 16	< 6
	APR	< 6	< 6	< 13	< 7	< 12	< 11	< 6	< 6	< 6	< 28	< 10
	MAY	< 4	< 4	< 17	< 8	< 18	< 6	< 4	< 3	< 4	< 17	< 5
	JUN	< 2	< 2	< 5	< 2	< 4	< 4	< 2	< 2	< 2	< 16	< 5
	JUL	< 4	< 4	< 8	< 4	< 8	< 7	< 4	< 4	< 4	< 19	< 6
	AUG	< 4	< 4	< 7	< 4	< 7	< 6	< 4	< 3	< 4	< 19	< 6
	SEP	< 3	< 3	< 7	< 4	< 7	< 6	< 4	< 3	< 3	< 18	< 6
	OCT	< 3	< 3	< 5	< 3	< 6	< 5	< 3	< 3	< 3	< 11	< 3
	NOV	< 7	< 7	< 16	< 11	< 13	< 11	< 7	< 5	< 6	< 30	< 12
	DEC	< 3	< 3	< 6	< 3	< 6	< 5	< 3	< 3	< 3	< 15	< 5
	MEAN	4 ± 3	4 ± 3	9 ± 8	5 ± 5	9 ± 8	7 ± 5	4 ± 3	3 ± 2	4 ± 3	18 ± 12	6 ± 5
28F3	JAN	< 4	< 4	< 7	< 4	< 8	< 6	< 4	< 3	< 4	< 17	< 6
	FEB	< 2	< 2	< 5	< 3	< 5	< 4	< 2	< 2	< 2	< 10	< 3
	MAR	< 3	< 3	< 6	< 3	< 7	< 6	< 3	< 3	< 3	< 14	< 4
	APR	< 2	< 2	< 4	< 2	< 4	< 3	< 2	< 2	< 2	< 9	< 3
	MAY	< 7	< 7	< 13	< 7	< 14	< 11	< 7	< 7	< 6	< 29	< 10
	JUN	< 2	< 3	< 5	< 3	< 5	< 5	< 3	< 2	< 3	< 19	< 6
	JUL	< 2	< 2	< 4	< 2	< 4	< 3	< 2	< 2	< 2	< 9	< 3
	AUG	< 2	< 2	< 5	< 2	< 4	< 4	< 2	< 2	< 3	< 12	< 4
	SEP	< 4	< 4	< 8	< 4	< 8	< 7	< 4	< 3	< 4	< 21	< 6
	OCT	< 5	< 5	< 12	< 6	< 13	< 11	< 7	< 6	< 5	< 26	< 10
	NOV	< 7	< 7	< 15	< 8	< 16	< 14	< 8	< 7	< 7	< 33	< 12
	DEC	< 6	< 4	< 24	< 11	< 26	< 9	< 4	< 5	< 6	< 24	< 7
	MEAN	4 ± 4	4 ± 3	9 ± 12	4 ± 5	9 ± 13	7 ± 7	4 ± 4	4 ± 4	4 ± 4	19 ± 16	6 ± 6

TABLE C-III.1

CONCENTRATIONS OF GAMMA EMITTERS IN PREDATOR & BOTTOM FEEDER (FISH) SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

STC	COLLECTION PERIOD	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
16C5	PREDATOR								
	05/07 - 05/07/03	3610 ± 403	< 21	< 22	< 48	< 23	< 47	< 21	< 24
	11/04 - 11/04/03	3330 ± 668	< 25	< 24	< 52	< 20	< 58	< 23	< 30
	MEAN	3470 ± 396	23 ± 7	23 ± 3	50 ± 6	21 ± 4	52 ± 16	22 ± 4	27 ± 8
	BOTTOM FEEDER								
	05/07 - 05/07/03	3650 ± 500	< 14	< 14	< 71	< 28	< 70	< 13	< 15
	11/04 - 11/04/03	2970 ± 689	< 42	< 47	< 114	< 36	< 92	< 37	< 42
	MEAN	3310 ± 962	28 ± 41	31 ± 47	92 ± 61	32 ± 12	81 ± 31	25 ± 35	28 ± 37
29C1	PREDATOR								
	06/19 - 06/19/03	3000 ± 302	< 19	< 20	< 42	< 17	< 39	< 14	< 19
	11/05 - 11/05/03	3430 ± 639	< 36	< 37	< 80	< 29	< 76	< 35	< 34
	MEAN	3215 ± 608	28 ± 24	28 ± 24	61 ± 53	23 ± 17	58 ± 53	25 ± 30	26 ± 21
	BOTTOM FEEDER								
	06/19 - 06/19/03	2800 ± 487	< 21	< 20	< 45	< 19	< 44	< 18	< 19
	11/05 - 11/05/03	3590 ± 689	< 40	< 42	< 99	< 43	< 88	< 42	< 48
	MEAN	3195 ± 1117	30 ± 27	31 ± 31	72 ± 76	31 ± 34	66 ± 62	30 ± 34	33 ± 40

TABLE C-IV.1 CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/KG DRY ± 2 SIGMA

STC	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Co-60	I-131	Cs-134	Cs-137
16B2									
	06/18/03	2950 ± 345	15700 ± 644	< 27	< 29	< 30	256 ± 138	< 23	175 ± 26
	12/04/03	2800 ± 610	16700 ± 1490	< 71	< 61	< 71	< 101	< 60	132 ± 54
	MEAN	2875 ± 212	16200 ± 1414	49 ± 62	45 ± 46	50 ± 58	179 ± 219	42 ± 53	154 ± 61
16C4									
	06/18/03	5280 ± 559	18900 ± 974	< 48	< 47	< 45	443 ± 210	< 42	182 ± 44
	12/04/03	3620 ± 451	18300 ± 1060	< 47	< 42	< 44	< 72	< 39	178 ± 44
	MEAN	4450 ± 2348	18600 ± 849	47 ± 1	44 ± 8	44 ± 3	258 ± 525	41 ± 4	180 ± 6
33A2									
	06/18/03	2690 ± 376	15000 ± 762	< 37	< 38	< 32	< 191	< 32	147 ± 40
	12/04/03	948 ± 445	12600 ± 1130	< 60	< 54	< 60	< 85	< 54	79 ± 53
	MEAN	1819 ± 809	13800 ± 3394	48 ± 33	46 ± 22	46 ± 39	138 ± 149	43 ± 30	113 ± 97

TABLE C-V.1 CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

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

		GROUP I		GROUP II	GROUP III
WEEK	10S3	11S1	14S1	13C1	22G1
1	11 ± 4	15 ± 4	12 ± 4	16 ± 4	16 ± 4
2	19 ± 4	18 ± 4	15 ± 4	16 ± 4	16 ± 4
3	21 ± 4	23 ± 4	20 ± 4	23 ± 4	19 ± 4
4	15 ± 5	14 ± 5	14 ± 5	14 ± 5	17 ± 5
5	21 ± 4	19 ± 4	16 ± 4	21 ± 4	21 ± 4
6	21 ± 5	19 ± 5	18 ± 4	23 ± 5	21 ± 5
7	10 ± 4	8 ± 4	6 ± 4	9 ± 4	12 ± 4
8	14 ± 4	15 ± 4	14 ± 4	22 ± 5	15 ± 5
9	22 ± 5	21 ± 5	19 ± 5	17 ± 4	16 ± 4
10	21 ± 4	24 ± 4	22 ± 4	19 ± 4	23 ± 4
11	23 ± 5	24 ± 5	23 ± 5	13 ± 4	23 ± 5
12	16 ± 4	14 ± 4	11 ± 4	13 ± 4	14 ± 4
13	15 ± 4	14 ± 4	20 ± 5	13 ± 4	13 ± 4
14	(1)	13 ± 4	16 ± 4	13 ± 4	14 ± 4
15	(1)	10 ± 4	9 ± 4	8 ± 4	< 5
16	16 ± 5	15 ± 5	20 ± 5	16 ± 5	17 ± 5
17	11 ± 4	12 ± 4	11 ± 4	10 ± 4	13 ± 4
18	20 ± 4	17 ± 4	14 ± 4	16 ± 4	16 ± 4
19	11 ± 4	10 ± 4	10 ± 4	10 ± 4	7 ± 4
20	8 ± 4	8 ± 3	6 ± 3	8 ± 3	5 ± 3
21	12 ± 4	9 ± 4	6 ± 3	8 ± 3	6 ± 3
22	11 ± 5	12 ± 5	8 ± 4	12 ± 5	10 ± 5
23	(1)	8 ± 4	10 ± 4	9 ± 4	9 ± 4
24	7 ± 4	7 ± 4	9 ± 4	10 ± 4	7 ± 4
25	5 ± 4	6 ± 4	< 5	< 5	< 5
26	22 ± 4	26 ± 5	19 ± 4	26 ± 5	21 ± 4
27	12 ± 4	16 ± 4	15 ± 4	13 ± 4	16 ± 4
28	12 ± 4	10 ± 4	10 ± 4	11 ± 4	9 ± 4
29	14 ± 5	13 ± 5	12 ± 5	11 ± 4	11 ± 4
30	12 ± 5	16 ± 5	16 ± 5	18 ± 5	18 ± 5
31	14 ± 4	17 ± 5	15 ± 4	18 ± 5	16 ± 4
32	< 7	8 ± 4	< 6	< 6	6 ± 4
33	13 ± 5	10 ± 5	18 ± 5	14 ± 5	15 ± 5
34	14 ± 5	18 ± 5	21 ± 5	14 ± 5	20 ± 5
35	20 ± 5	24 ± 5	20 ± 5	15 ± 4	26 ± 5
36	13 ± 6	10 ± 5	9 ± 5	10 ± 5	11 ± 5
37	9 ± 5	< 7	< 7	12 ± 5	11 ± 5
38	18 ± 6	17 ± 5	13 ± 5	18 ± 5	20 ± 6
39	23 ± 6	22 ± 6	23 ± 6	20 ± 5	25 ± 6
40	< 7	< 7	7 ± 5	14 ± 5	12 ± 5
41	36 ± 6	34 ± 6	38 ± 6	35 ± 6	38 ± 6
42	18 ± 6	24 ± 6	17 ± 5	28 ± 6	29 ± 6
43	15 ± 5	14 ± 5	17 ± 5	14 ± 5	15 ± 5
44	21 ± 5	22 ± 5	20 ± 5	22 ± 5	20 ± 5
45	18 ± 5	21 ± 5	15 ± 5	20 ± 5	20 ± 5
46	25 ± 6	22 ± 6	23 ± 6	21 ± 6	28 ± 6
47	26 ± 6	24 ± 5	19 ± 5	24 ± 5	20 ± 5
48	20 ± 6	15 ± 5	16 ± 5	12 ± 5	13 ± 5
49	12 ± 5	19 ± 5	15 ± 5	12 ± 5	15 ± 5
50	15 ± 5	13 ± 5	11 ± 5	12 ± 5	13 ± 5
51	21 ± 5	15 ± 5	17 ± 5	20 ± 5	19 ± 5
52	26 ± 5	26 ± 5	25 ± 5	22 ± 5	19 ± 5
MEAN	16 ± 12	16 ± 13	15 ± 12	15 ± 12	16 ± 13

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-V.2 MONTHLY AND YEARLY MEAN VALUES OF GROSS BETA CONCENTRATIONS (E-3 PCI/CU METER) IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

GROUP I - ON-SITE LOCATIONS				GROUP II - INTERMEDIATE DISTANCE LOCATIONS				GROUP III - CONTROL LOCATIONS			
COLLECTION PERIOD	MIN.	MAX.	MEAN ± 2 SD	COLLECTION PERIOD	MIN.	MAX.	MEAN ± 2 SD	COLLECTION PERIOD	MIN.	MAX.	MEAN ± 2 SD
12/30/02 - 02/03/03	11	23	17 ± 7	12/30/02 - 02/03/03	14	23	18 ± 7	12/30/02 - 02/03/03	16	21	18 ± 4
02/03/03 - 03/03/03	6	22	15 ± 11	02/03/03 - 03/03/03	9	23	18 ± 13	02/03/03 - 03/03/03	12	21	16 ± 8
03/03/03 - 03/31/03	11	24	19 ± 10	03/03/03 - 03/31/03	13	19	15 ± 6	03/03/03 - 03/31/03	13	23	18 ± 11
03/31/03 - 05/05/03	9	20	14 ± 7	03/31/03 - 05/05/03	8	16	13 ± 7	03/31/03 - 05/05/03	< 5	17	13 ± 10
05/05/03 - 06/02/03	6	12	9 ± 4	05/05/03 - 06/02/03	8	12	10 ± 4	05/05/03 - 06/02/03	5	10	7 ± 4
06/02/03 - 06/30/03	5	26	11 ± 15	06/02/03 - 06/30/03	< 5	26	12 ± 18	06/02/03 - 06/30/03	< 5	21	11 ± 14
06/30/03 - 07/28/03	10	16	13 ± 4	06/30/03 - 07/28/03	11	18	13 ± 7	06/30/03 - 07/28/03	9	18	13 ± 8
07/28/03 - 09/02/03	< 6	24	15 ± 11	07/28/03 - 09/02/03	6	18	13 ± 9	07/28/03 - 09/02/03	6	26	17 ± 14
09/02/03 - 09/29/03	< 7	23	14 ± 12	09/02/03 - 09/29/03	10	20	15 ± 9	09/02/03 - 09/29/03	11	25	17 ± 14
09/29/03 - 11/03/03	< 7	38	20 ± 20	09/29/03 - 11/03/03	14	35	22 ± 18	09/29/03 - 11/03/03	12	38	23 ± 21
11/03/03 - 12/01/03	15	26	20 ± 7	11/03/03 - 12/01/03	12	24	19 ± 11	11/03/03 - 12/01/03	13	28	20 ± 12
12/01/03 - 12/29/03	11	26	18 ± 11	12/01/03 - 12/29/03	12	22	16 ± 11	12/01/03 - 12/29/03	13	19	16 ± 6
12/30/02 - 12/29/03	< 6	38	16 ± 7	12/30/02 - 12/30/02	< 5	35	15 ± 7	12/30/02 - 12/30/02	< 5	38	16 ± 8

TABLE C-V.3 CONCENTRATION OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

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

STC	COLLECTION PERIOD	Be-7	Mn-54	Co-58	Co-60	Cs-134	Cs-137
10S3	12/30 - 03/31/03	54 ± 7	< 0.5	< 0.4	< 0.9	< 0.4	< 0.4
	03/31 - 06/30/03	53 ± 6	< 0.2	< 0.3	< 0.2	< 0.2	< 0.2
	06/30 - 09/29/03	54 ± 6	< 0.4	< 0.4	< 0.4	< 0.3	< 0.4
	09/29 - 12/29/03	38 ± 11	< 1.0	< 1.1	< 1.2	< 0.8	< 1.1
	MEAN	50 ± 16	0.5 ± 0.7	0.6 ± 0.7	0.7 ± 0.9	0.4 ± 0.5	0.5 ± 0.8
11S1	12/30 - 03/31/03	56 ± 8	< 0.8	< 0.8	< 0.7	< 0.7	< 0.7
	03/31 - 06/30/03	50 ± 6	< 0.4	< 0.6	< 0.4	< 0.4	< 0.4
	06/30 - 09/30/02	51 ± 4	< 0.3	< 0.3	< 0.3	< 0.2	< 0.2
	09/30 - 12/30/02	40 ± 14	< 1.3	< 1.0	< 1.8	< 1.3	< 1.2
	MEAN	49 ± 13	0.7 ± 0.9	0.6 ± 0.6	0.8 ± 1.4	0.6 ± 0.9	0.6 ± 0.9
13C1	12/30 - 03/31/03	68 ± 8	< 0.6	< 0.7	< 0.6	< 0.6	< 0.6
	03/31 - 06/30/03	47 ± 4	< 0.3	< 0.4	< 0.3	< 0.3	< 0.3
	06/30 - 09/30/02	53 ± 3	< 0.2	< 0.2	< 0.4	< 0.2	< 0.2
	09/30 - 12/30/02	46 ± 9	< 1.0	< 1.0	< 1.2	< 0.8	< 1.2
	MEAN	53 ± 20	0.5 ± 0.7	0.6 ± 0.7	0.6 ± 0.8	0.5 ± 0.6	0.6 ± 0.9
14S1	12/30 - 03/31/03	46 ± 8	< 0.8	< 0.8	< 0.7	< 0.7	< 0.5
	03/31 - 06/30/03	49 ± 5	< 0.3	< 0.4	< 0.3	< 0.3	< 0.3
	06/30 - 09/30/02	54 ± 5	< 0.3	< 0.4	< 0.4	< 0.3	< 0.3
	09/30 - 12/30/02	36 ± 11	< 0.8	< 0.8	< 1.1	< 0.7	< 0.8
	MEAN	46 ± 15	0.6 ± 0.6	0.6 ± 0.4	0.6 ± 0.7	0.5 ± 0.4	0.5 ± 0.5
22G1	12/30 - 03/31/03	55 ± 6	< 0.4	< 0.5	< 0.7	< 0.3	< 0.4
	03/31 - 06/30/03	41 ± 10	< 0.5	< 0.6	< 0.8	< 0.4	< 0.5
	06/30 - 09/30/02	55 ± 4	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	09/30 - 12/30/02	37 ± 9	< 0.5	< 0.6	< 0.7	< 0.6	< 0.5
	MEAN	47 ± 19	0.4 ± 0.3	0.5 ± 0.4	0.6 ± 0.5	0.4 ± 0.3	0.4 ± 0.3

TABLE C-VI.1 CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

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

	GROUP I			GROUP II	GROUP III
WEEK	10S3	11S1	14S1	13C1	22G1
1	< 4	< 8	< 4	< 4	< 4
2	< 6	< 6	< 6	< 9	< 6
3	< 5	< 5	< 5	< 5	< 5
4	< 5	< 5	< 5	< 5	< 5
5	< 3	< 3	< 3	< 3	< 3
6	< 4	< 2	< 4	< 4	< 2
7	< 3	< 3	< 3	< 3	< 3
8	< 3	< 3	< 3	< 3	< 3
9	< 3	< 3	< 3	< 3	< 3
10	< 5	< 3	< 3	< 3	< 3
11	< 2	< 3	< 5	< 4	< 4
12	< 8	< 8	< 8	< 8	< 8
13	< 4	< 7	< 4	< 4	< 4
14	(1)	< 5	< 5	< 5	< 7
15	(1)	< 4	< 4	< 4	< 4
16	< 5	< 4	< 4	< 4	< 5
17	< 2	< 4	< 4	< 7	< 5
18	< 3	< 3	< 3	< 3	< 3
19	< 16	< 16	< 16	< 16	< 9
20	< 15	< 15	< 14	< 14	< 8
21	< 8	< 5	< 5	< 7	< 10
22	< 15	< 15	< 15	< 15	< 8
23	(1)	< 8	< 8	< 8	< 4
24	< 9	< 9	< 8	< 8	< 9
25	< 9	< 9	< 9	< 9	< 6
26	< 7	< 7	< 7	< 7	< 4
27	< 11	< 10	< 10	< 10	< 7
28	< 8	< 8	< 7	< 7	< 4
29	< 14	< 13	< 13	< 13	< 5
30	< 8	< 8	< 8	< 8	< 5
31	< 6	< 6	< 6	< 6	< 3
32	< 12	< 11	< 11	< 11	< 7
33	< 2	< 3	< 3	< 4	< 4
34	< 5	< 5	< 5	< 5	< 3
35	< 7	< 7	< 7	< 7	< 3
36	< 5	< 3	< 5	< 6	< 4
37	< 14	< 13	< 13	< 13	< 6
38	< 5	< 5	< 4	< 3	< 3
39	< 6	< 6	< 6	< 6	< 4
40	< 8	< 8	< 8	< 8	< 4
41	< 7	< 7	< 7	< 6	< 4
42	< 13	< 13	< 16	< 12	< 9
43	< 16	< 15	< 15	< 15	< 10
44	< 5	< 5	< 5	< 5	< 3
45	< 19	< 19	< 19	< 18	< 12
46	< 6	< 4	< 5	< 6	< 5
47	< 21	< 21	< 20	< 20	< 9
48	< 6	< 6	< 5	< 5	< 3
49	< 12	< 12	< 12	< 12	< 5
50	< 8	< 7	< 7	< 7	< 4
51	< 8	< 7	< 7	< 7	< 5
52	< 16	< 16	< 16	< 16	< 9
MEAN	8 ± 10	8 ± 9	8 ± 9	8 ± 9	5 ± 5

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-VII.1 CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

	CONTROL FARMS			INDICATOR FARMS					
COLLECTION PERIOD	36E1	9G1	23F1	18C1	19B1	21B1	22C1	25C1	10F4
01/14/03	< 0.3	< 0.2	< 0.3	< 0.3	< 0.2	< 0.3	< 0.2	< 0.4	< 0.2
02/11/03		< 0.7		< 0.4	< 0.3	< 0.3			< 0.5
03/11/03		< 0.3		< 0.3	< 0.3	< 0.2			< 0.3
04/01/03	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.5	< 0.6	< 0.7	< 0.5
04/15/03		< 0.9		< 0.8	< 0.7	< 0.6			< 0.8
04/29/03		< 0.4		< 0.4	< 0.1	< 0.4			< 0.5
05/13/03		< 0.3		< 0.4	< 0.3	< 0.4			< 0.4
05/27/03		< 0.9		< 0.4	< 0.9	< 0.8			< 0.6
06/10/03		< 0.4		< 0.4	< 0.3	< 0.5			< 0.6
06/24/03		< 0.4		< 0.3	< 0.5	< 1.0			< 0.4
07/08/03	< 0.6	< 0.6	< 0.5	< 0.7	< 0.7	< 0.8	< 0.7	< 0.6	< 0.9
07/22/03		< 0.7		< 0.9	< 0.6	< 0.6			< 0.8
08/05/03		< 0.6		< 0.6	< 0.6	< 1.0			< 0.8
08/19/03		< 0.9		< 0.8	< 0.6	< 0.8			< 0.5
09/02/03		< 0.5		< 0.7	< 0.6	< 1.0			< 0.7
09/16/03		< 0.4		< 0.5	< 0.4	< 0.5			< 0.7
09/30/03		< 0.6		< 0.6	< 0.6	< 0.6			< 0.7
10/14/03	< 0.6	< 0.7	< 0.5	< 0.6	< 0.5	< 0.6	< 0.8	< 0.6	< 0.7
10/28/03		< 0.5		< 0.6	< 0.7	< 0.7			< 0.5
11/11/03		< 0.4		< 0.4	< 0.7	< 0.6			< 0.5
11/25/03		< 0.7		< 0.5	< 0.6	< 0.6			< 0.5
12/15/03		< 0.6		< 0.7	< 0.6	< 0.6			< 0.6
MEAN	0.5 ± 0.3	0.6 ± 0.4	0.5 ± 0.3	0.5 ± 0.3	0.5 ± 0.4	0.6 ± 0.4	0.6 ± 0.5	0.6 ± 0.2	0.6 ± 0.4

TABLE C-VII.2 . CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STC	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
10F4	01/14/03	1330 ± 81	< 1	< 2	< 8	< 2
	02/11/03	1310 ± 137	< 6	< 6	< 28	< 9
	03/11/03	1420 ± 77	< 3	< 3	< 12	< 4
	04/02/03	1330 ± 72	< 3	< 3	< 14	< 5
	04/14/03	1340 ± 159	< 5	< 6	< 20	< 7
	04/28/03	1350 ± 87	< 4	< 4	< 15	< 5
	05/12/03	1220 ± 80	< 3	< 3	< 13	< 4
	05/28/03	1360 ± 85	< 2	< 3	< 12	< 4
	06/09/03	1340 ± 86	< 2	< 3	< 10	< 3
	06/23/03	1300 ± 99	< 3	< 3	< 10	< 3
	07/07/03	1320 ± 82	< 3	< 4	< 21	< 7
	07/21/03	1230 ± 158	< 5	< 5	< 22	< 7
	08/04/03	1300 ± 121	< 5	< 6	< 20	< 6
	08/18/03	1230 ± 148	< 3	< 4	< 11	< 4
	09/01/03	1180 ± 103	< 5	< 5	< 19	< 6
	09/15/03	1350 ± 103	< 4	< 5	< 19	< 7
	09/29/03	1250 ± 200	< 6	< 8	< 34	< 9
	10/13/03	1280 ± 81	< 4	< 4	< 19	< 6
	10/27/03	1260 ± 75	< 2	< 3	< 9	< 3
	11/10/03	1340 ± 81	< 3	< 4	< 14	< 5
	11/24/03	1250 ± 247	< 10	< 11	< 39	< 11
	12/16/03	1250 ± 75	< 3	< 3	< 12	< 3
	MEAN	1297 ± 116	4 ± 4	4 ± 4	17 ± 16	5 ± 5
18C1	01/14/03	1240 ± 83	< 3	< 4	< 18	< 6
	02/11/03	1300 ± 75	< 3	< 3	< 15	< 5
	03/11/03	1410 ± 73	< 2	< 3	< 8	< 2
	04/01/03	1280 ± 69	< 2	< 2	< 11	< 3
	04/15/03	1400 ± 75	< 3	< 3	< 12	< 4
	04/29/03	1320 ± 132	< 6	< 6	< 24	< 7
	05/13/03	1410 ± 90	< 3	< 4	< 16	< 5
	05/27/03	1310 ± 83	< 4	< 4	< 20	< 5
	06/10/03	2030 ± 218	< 5	< 7	< 21	< 7
	06/24/03	1220 ± 98	< 4	< 5	< 17	< 5
	07/08/03	1380 ± 82	< 3	< 4	< 18	< 5
	07/22/03	1320 ± 98	< 4	< 4	< 16	< 6
	08/05/03	1250 ± 113	< 5	< 5	< 19	< 7
	08/19/03	1340 ± 74	< 1	< 2	< 7	< 2
	09/01/03	1260 ± 84	< 4	< 5	< 17	< 5
	09/16/03	1260 ± 99	< 4	< 4	< 15	< 5
	09/30/03	1230 ± 77	< 2	< 3	< 10	< 4
	10/14/03	1130 ± 90	< 4	< 5	< 20	< 7
	10/28/03	1310 ± 143	< 3	< 6	< 17	< 5
	11/11/03	1360 ± 156	< 5	< 6	< 18	< 6
	11/25/03	1170 ± 166	< 7	< 9	< 42	< 14
	12/16/03	1450 ± 74	< 2	< 2	< 8	< 3
	MEAN	1335 ± 350	4 ± 3	4 ± 3	17 ± 14	5 ± 5

TABLE C-VII.2 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STC	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
19B1	01/14/03	1370 ± 101	< 4	< 5	< 22	< 6
	02/11/03	1370 ± 83	< 3	< 4	< 19	< 5
	03/11/03	1190 ± 117	< 5	< 6	< 20	< 5
	04/01/03	1390 ± 95	< 3	< 3	< 13	< 4
	04/15/03	1410 ± 124	< 5	< 5	< 22	< 7
	04/29/03	1310 ± 72	< 2	< 2	< 8	< 3
	05/13/03	1400 ± 70	< 2	< 3	< 11	< 3
	05/27/03	1380 ± 120	< 2	< 3	< 15	< 5
	06/10/03	1380 ± 101	< 4	< 5	< 15	< 5
	06/24/03	1250 ± 111	< 4	< 5	< 18	< 6
	07/08/03	1300 ± 71	< 3	< 3	< 16	< 5
	07/22/03	1200 ± 94	< 4	< 5	< 17	< 5
	08/05/03	1190 ± 83	< 3	< 3	< 10	< 3
	08/19/03	1310 ± 85	< 2	< 2	< 9	< 2
	09/01/03	1240 ± 97	< 4	< 5	< 16	< 5
	09/16/03	1460 ± 76	< 3	< 3	< 12	< 3
	09/30/03	1360 ± 83	< 3	< 4	< 17	< 6
	10/14/03	1340 ± 71	< 3	< 3	< 15	< 4
	10/28/03	1260 ± 103	< 4	< 4	< 15	< 5
	11/11/03	1250 ± 97	< 4	< 5	< 18	< 5
	11/25/03	1320 ± 216	< 7	< 7	< 34	< 13
	12/16/03	1310 ± 85	< 4	< 4	< 14	< 5
	MEAN	1318 ± 152	4 ± 2	4 ± 3	16 ± 11	5 ± 4
21B1	01/14/03	1460 ± 78	< 1	< 2	< 8	< 2
	02/11/03	1360 ± 83	< 3	< 3	< 16	< 4
	03/11/03	1350 ± 83	< 3	< 4	< 14	< 4
	04/01/03	1330 ± 83	< 4	< 4	< 19	< 5
	04/15/03	1380 ± 123	< 5	< 5	< 19	< 8
	04/29/03	1300 ± 81	< 3	< 4	< 13	< 4
	05/13/03	1390 ± 68	< 1	< 1	< 6	< 2
	05/27/03	1350 ± 136	< 4	< 3	< 24	< 7
	06/10/03	1380 ± 79	< 2	< 2	< 7	< 2
	06/24/03	1210 ± 84	< 3	< 3	< 13	< 3
	07/08/03	1350 ± 69	< 3	< 3	< 16	< 5
	07/22/03	1210 ± 109	< 5	< 6	< 20	< 8
	08/05/03	1310 ± 79	< 3	< 3	< 13	< 4
	08/19/03	1280 ± 72	< 3	< 3	< 13	< 5
	09/01/03	1250 ± 75	< 3	< 4	< 13	< 4
	09/16/03	1300 ± 172	< 5	< 6	< 18	< 6
	09/30/03	1230 ± 91	< 4	< 4	< 19	< 5
	10/14/03	1290 ± 70	< 3	< 3	< 14	< 5
	10/28/03	1250 ± 94	< 4	< 5	< 16	< 5
	11/11/03	1270 ± 89	< 3	< 4	< 14	< 4
	11/25/03	1280 ± 207	< 7	< 9	< 34	< 14
	12/16/03	1310 ± 87	< 3	< 3	< 11	< 4
	MEAN	1311 ± 126	3 ± 3	4 ± 3	15 ± 12	5 ± 5

TABLE C-VII.2 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STC	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
9G1	01/14/03	1300 ± 91	< 4	< 4	< 18	< 7
	02/11/03	1380 ± 73	< 3	< 3	< 13	< 4
	03/11/03	1330 ± 98	< 4	< 5	< 16	< 5
	04/01/03	1290 ± 86	< 4	< 4	< 17	< 6
	04/15/03	1370 ± 74	< 3	< 3	< 11	< 3
	04/29/03	1430 ± 94	< 4	< 4	< 15	< 5
	05/13/03	1420 ± 84	< 3	< 4	< 14	< 5
	05/27/03	1300 ± 71	< 2	< 2	< 7	< 2
	06/10/03	1430 ± 92	< 4	< 4	< 15	< 5
	06/24/03	1300 ± 97	< 4	< 5	< 15	< 5
	07/08/03	1260 ± 88	< 4	< 5	< 23	< 7
	07/22/03	1260 ± 106	< 4	< 5	< 17	< 6
	08/05/03	1150 ± 105	< 5	< 5	< 19	< 6
	08/19/03	1290 ± 82	< 4	< 4	< 17	< 6
	09/02/03	1150 ± 97	< 4	< 4	< 16	< 6
	09/16/03	1400 ± 165	< 6	< 6	< 24	< 8
	09/30/03	1180 ± 84	< 4	< 4	< 17	< 6
	10/14/03	1150 ± 85	< 3	< 3	< 15	< 5
	10/28/03	1270 ± 87	< 4	< 4	< 14	< 5
	11/11/03	1320 ± 87	< 3	< 3	< 11	< 3
	11/25/03	1200 ± 79	< 3	< 4	< 18	< 6
	12/15/03	1140 ± 179	< 7	< 7	< 20	< 9
	MEAN	1287 ± 190	4 ± 2	4 ± 2	16 ± 8	5 ± 3
22C1	01/14/03	1350 ± 89	< 4	< 4	< 19	< 5
	04/01/03	1380 ± 78	< 3	< 4	< 17	< 5
	07/08/03	1380 ± 78	< 2	< 3	< 15	< 5
	10/14/03	1190 ± 93	< 3	< 3	< 14	< 5
	MEAN	1325 ± 182	3 ± 1	4 ± 1	16 ± 5	5 ± 0.3
23F1	01/14/03	1340 ± 81	< 3	< 4	< 17	< 5
	04/01/03	1290 ± 122	< 5	< 5	< 27	< 9
	07/08/03	1320 ± 80	< 4	< 4	< 26	< 8
	10/15/03	1270 ± 77	< 3	< 3	< 15	< 4
	MEAN	1305 ± 62	4 ± 2	4 ± 2	21 ± 12	7 ± 4
25C1	01/14/03	1280 ± 90	< 2	< 2	< 10	< 3
	04/01/03	1420 ± 75	< 3	< 3	< 14	< 4
	07/08/03	1250 ± 89	< 4	< 5	< 30	< 10
	10/14/03	1310 ± 153	< 4	< 5	< 24	< 9
	MEAN	1315 ± 148	3 ± 2	4 ± 3	19 ± 18	7 ± 7
36E1	01/14/03	1370 ± 86	< 2	< 2	< 10	< 3
	04/01/03	1440 ± 118	< 5	< 6	< 25	< 7
	07/08/03	1250 ± 83	< 3	< 4	< 25	< 7
	10/14/03	1310 ± 75	< 3	< 3	< 15	< 5
	MEAN	1343 ± 163	3 ± 3	4 ± 3	19 ± 15	6 ± 4

TABLE C-VIII.1 QUARTERLY TLD RESULTS FOR LIMERICK GENERATION STATION, 2003

RESULTS IN UNITS OF MILLI-ROENTGEN/STD. MONTH ± 2 STANDARD DEVIATIONS

STATION CODE	MEAN ± 2 S. D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
36S2	7.0 ± 0.5	6.8 ± 0.6	7.1 ± 8.0	7.4 ± 0.6	6.9 ± 0.3
36D1	6.1 ± 1.9	4.7 ± 1.6	6.5 ± 0.3	6.9 ± 0.8	6.3 ± 0.7
2E1	6.9 ± 1.6	6.0 ± 0.2	7.4 ± 0.3	7.7 ± 0.5	6.6 ± 0.2
3S1	7.0 ± 0.3	6.9 ± 0.6	6.9 ± 0.6	7.1 ± 0.5	7.2 ± 0.6
4E1	5.4 ± 0.7	5.0 ± 0.5	5.4 ± 0.7	5.6 ± 0.1	5.4 ± 0.5
5S1	7.7 ± 0.7	7.2 ± 0.7	7.9 ± 0.6	7.9 ± 0.8	7.7 ± 0.5
5H1	8.3 ± 1.0	7.8 ± 1.0	8.5 ± 1.4	9.0 ± 1.3	8.1 ± 1.3
6C1	7.5 ± 1.6	6.6 ± 0.8	8.4 ± 2.2	7.8 ± 0.6	7.1 ± 0.8
7S1	7.1 ± 1.1	6.7 ± 0.6	7.6 ± 0.3	7.5 ± 0.4	6.5 ± 0.4
7E1	7.0 ± 1.4	6.6 ± 0.4	7.4 ± 0.5	7.8 ± 0.8	6.3 ± 0.6
9C1	6.8 ± 0.5	6.6 ± 0.9	7.1 ± 0.8	6.9 ± 0.4	6.5 ± 0.8
10S3	7.1 ± 0.9	6.8 ± 0.4	7.2 ± 0.9	7.7 ± 1.2	6.6 ± 0.5
10E1	7.2 ± 0.4	6.9 ± 0.5	7.1 ± 1.2	7.4 ± 1.2	7.2 ± 0.6
10F3	7.1 ± 1.0	6.4 ± 0.2	7.5 ± 0.4	7.4 ± 0.9	7.1 ± 0.2
11S1	8.1 ± 0.7	8.1 ± 0.4	8.2 ± 1.1	8.5 ± 0.4	7.7 ± 0.9
13S2	11.0 ± 0.8	10.6 ± 0.6	11.3 ± 0.6	11.4 ± 0.6	10.8 ± 1.1
13C1	5.5 ± 0.7	5.0 ± 1.2	5.8 ± 0.5	5.6 ± 1.0	5.4 ± 1.5
13E1	7.3 ± 1.3	6.9 ± 0.4	7.2 ± 0.5	8.2 ± 0.6	6.8 ± 0.5
14S1	6.2 ± 1.2	5.9 ± 0.5	6.6 ± 0.5	6.8 ± 0.4	5.6 ± 0.7
15D1	7.1 ± 0.9	6.9 ± 0.7	7.4 ± 0.4	7.5 ± 0.5	6.6 ± 0.3
16F1	7.0 ± 1.1	6.2 ± 0.4	7.2 ± 0.5	7.5 ± 0.7	7.2 ± 1.2
17B1	6.4 ± 0.7	6.0 ± 0.6	6.8 ± 0.3	6.3 ± 0.3	6.3 ± 0.6
18S2	7.4 ± 1.0	6.8 ± 0.8	7.4 ± 1.0	8.0 ± 0.5	7.4 ± 0.7
19D1	6.8 ± 1.1	6.0 ± 1.7	7.0 ± 0.4	7.0 ± 0.5	7.2 ± 0.8
20D1	6.5 ± 1.7	5.8 ± 0.2	6.8 ± 0.4	7.5 ± 1.7	5.8 ± 0.2
20F1	6.8 ± 1.2	6.2 ± 1.1	7.1 ± 0.3	7.5 ± 0.5	6.5 ± 0.3
21S2	6.2 ± 0.3	6.1 ± 0.4	6.0 ± 0.5	6.4 ± 0.7	6.2 ± 0.6
23S2	6.1 ± 1.4	5.2 ± 0.9	6.8 ± 0.4	6.4 ± 0.4	5.9 ± 0.2
24D1	6.0 ± 0.9	5.9 ± 0.6	6.5 ± 0.5	6.3 ± 0.3	5.5 ± 0.5
25S2	6.4 ± 0.9	6.1 ± 0.4	6.7 ± 0.5	6.8 ± 1.0	5.9 ± 0.5
25D1	5.7 ± 0.7	5.4 ± 0.4	5.8 ± 1.0	6.2 ± 1.0	5.6 ± 0.4
26S3	6.2 ± 0.9	5.5 ± 0.4	6.3 ± 0.5	6.6 ± 0.6	6.3 ± 1.8
28D2	6.5 ± 1.3	5.9 ± 0.4	7.3 ± 1.4	6.8 ± 0.6	6.1 ± 0.2
29S1	6.0 ± 1.0	6.1 ± 0.6	6.3 ± 0.4	6.4 ± 0.8	5.3 ± 0.3
29E1	6.7 ± 0.8	6.4 ± 0.4	7.3 ± 1.3	6.7 ± 0.5	6.4 ± 1.0
31S1	7.1 ± 0.6	6.8 ± 0.5	7.4 ± 0.6	7.2 ± 0.5	6.8 ± 0.4
31D1	8.3 ± 0.9	8.0 ± 0.8	8.4 ± 0.2	8.9 ± 0.5	7.9 ± 0.8
31D2	7.0 ± 0.3	6.8 ± 0.5	7.0 ± 0.3	7.1 ± 0.6	7.0 ± 0.9
34S2	7.4 ± 0.7	7.1 ± 0.3	7.4 ± 0.7	7.9 ± 1.3	7.4 ± 0.3
34E1	6.8 ± 0.9	6.2 ± 1.0	6.8 ± 0.3	7.2 ± 1.1	7.0 ± 0.7

TABLE C-VIII.2 MEAN QUARTERLY TLD RESULTS FOR THE SITE BOUNDARY, MIDDLE AND CONTROL LOCATIONS FOR LIMERICK GENERATING STATION, 2003

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

STATION CODE	SITE BOUNDARY ±2 S. D.	MIDDLE	CONTROL
JAN-MAR	6.8 ± 2.5	6.2 ± 1.5	7.8 ± 1.0
APR-JUN	7.3 ± 2.4	7.0 ± 1.4	8.5 ± 1.4
JUL-SEP	7.5 ± 2.4	7.1 ± 1.5	9.0 ± 1.3
OCT-DEC	6.9 ± 2.5	6.5 ± 1.3	8.1 ± 1.3

TABLE C-VIII.3 SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF MILLI-ROENTGEN/STD. MONTH

LOCATION	SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN ±2 S. D.	PRE-OP MEAN ±2 S. D.
SITE BOUNDARY	64	5.2	11.4	7.1 ± 2.4	7.6 ± 2.4
MIDDLE DISTANCE	92	4.7	8.9	6.7 ± 1.4	7.8 ± 2.2
CONTROL	4	7.8	9.0	8.3 ± 1.0	7.8 ± 3.0

THE PRE-OPERATIONAL MEAN WAS CALCULATED FROM MONTHLY TLD READINGS 01/15/52 TO 12/02/94.

SITE BOUNDARY STATIONS - 36S2, 3S1, 5S1, 7S1, 10S3, 11S1, 13S2, 14S1, 18S2, 21S2, 23S2, 25S2, 26S3, 29S1, 31S1, 34S2

MIDDLE DISTANCE STATIONS - 36D1, 2E1, 4E1, 6C1, 7E1, 9C1, 10E1, 10F3, 13C1, 13E1, 15D1, 16F1, 17B1, 19D1, 20D1, 20F1, 24D1, 25D1, 28D2, 29E1, 31D1, 31D2, 34E1

CONTROL STATIONS - 5H1

TABLE C-IX.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

SURFACE WATER (TRITIUM LIQUID SCINTILLATION)

COLLECTION PERIOD	10F2	13B1	24S1
JAN-MAR	(1)	12/30/02 - 03/31/03	12/30/02 - 03/31/03
APR-JUN	05/05/03 - 07/01/03	03/31/03 - 07/01/03	03/31/03 - 07/01/03
JUL-SEP	07/01/03 - 09/29/03	07/01/03 - 09/29/03	07/01/03 - 09/29/03
OCT-DEC		09/29/03 - 12/30/03	09/29/03 - 12/30/03

SURFACE WATER (GAMMA SPECTROSCOPY)

COLLECTION PERIOD	10F2	13B1	24S1
JAN	(1)	12/30/02 - 01/27/03	12/30/02 - 01/27/03
FEB	(1)	01/27/03 - 03/03/03	01/27/03 - 03/03/03
MAR	(1)	03/03/03 - 03/31/03	03/03/03 - 03/31/03
APR	(1)	03/31/03 - 04/28/03	03/31/03 - 04/28/03
MAY	05/05/03 - 05/30/03	04/28/03 - 05/30/03	04/28/03 - 05/30/03
JUN	05/30/03 - 07/01/03	05/30/03 - 07/01/03	05/30/03 - 07/01/03
JUL	07/01/03 - 07/28/03	07/01/03 - 07/29/02	07/01/03 - 07/29/02
AUG	07/28/03 - 09/02/03	07/28/03 - 09/02/03	07/28/03 - 09/02/03
SEP	09/02/03 - 09/29/03	09/02/03 - 09/29/03	09/02/03 - 09/29/03
OCT	09/29/03 - 10/27/03	09/29/03 - 10/27/03	09/29/03 - 10/27/03
NOV	(1)	10/27/03 - 12/01/03	10/27/03 - 12/01/03
DEC	(1)	12/01/03 - 12/30/03	12/01/03 - 12/30/03

DRINKING WATER (TRITIUM)

COLLECTION PERIOD	15F4	15F7	16C2	28F3
JAN-MAR	12/30/02 - 03/31/03	12/30/02 - 03/31/03	12/30/02 - 03/31/03	12/30/02 - 03/31/03
APR-JUN	03/31/03 - 07/01/03	03/31/03 - 07/01/03	03/31/03 - 07/01/03	03/31/03 - 07/01/03
JUL-SEP	07/01/03 - 09/29/03	07/01/03 - 09/29/03	07/01/03 - 09/29/03	07/01/03 - 09/29/03
OCT-DEC	09/29/03 - 12/30/03	09/29/03 - 12/30/03	09/29/03 - 12/30/03	09/29/03 - 12/30/03

DRINKING WATER (GROSS BETA & GAMMA SPECTROSCOPY)

COLLECTION PERIOD	15F4	15F7	16C2	28F3
JAN	12/30/02 - 01/27/03	12/30/02 - 01/27/03	12/30/02 - 01/27/03	12/30/02 - 01/27/03
FEB	01/27/03 - 03/03/03	01/27/03 - 03/03/03	01/27/03 - 03/03/03	01/27/03 - 03/03/03
MAR	03/03/03 - 03/31/03	03/03/03 - 03/31/03	03/03/03 - 03/31/03	03/03/03 - 03/31/03
APR	03/31/03 - 04/28/03	03/31/03 - 04/28/03	03/31/03 - 04/28/03	03/31/03 - 04/28/03
MAY	04/28/03 - 05/30/03	04/28/03 - 05/30/03	04/28/03 - 05/30/03	04/28/03 - 05/30/03
JUN	05/30/03 - 07/01/03	05/30/03 - 07/01/03	05/30/03 - 07/01/03	05/30/03 - 07/01/03
JUL	07/01/03 - 07/28/03	07/01/03 - 07/28/03	07/01/03 - 07/28/03	07/01/03 - 07/28/03
AUG	07/28/03 - 09/02/03	07/28/03 - 09/02/03	07/28/03 - 09/02/03	07/28/03 - 09/02/03
SEP	09/02/03 - 09/29/03	09/02/03 - 09/29/03	09/02/03 - 09/29/03	09/02/03 - 09/29/03
OCT	09/29/03 - 10/27/03	09/29/03 - 10/27/03	09/29/03 - 10/27/03	09/29/03 - 10/27/03
NOV	10/27/03 - 12/01/03	10/27/03 - 12/01/03	10/27/03 - 12/01/03	10/27/03 - 12/01/03
DEC	12/01/03 - 12/30/03	12/01/03 - 12/30/03	12/01/03 - 12/30/03	12/01/03 - 12/30/03

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-IX.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

AIR PARTICULATE (GAMMA SPECTROSCOPY)

COLLECTION PERIOD	10S3	11S1	14S1	13CS	22G1
JAN-MAR	12/30/02 - 03/31/03	12/30/02 - 03/31/03	12/30/02 - 03/31/03	12/30/02 - 03/31/03	12/30/02 - 03/31/03
APR-JUN	03/31/03 - 06/30/03	03/31/03 - 06/30/03	03/31/03 - 06/30/03	03/31/03 - 06/30/03	03/31/03 - 06/30/03
JUL-SEP	06/30/03 - 09/29/03	06/30/03 - 09/29/03	05/30/03 - 09/29/03	06/30/03 - 09/29/03	06/30/03 - 09/29/03
OCT-DEC	09/29/03 - 12/29/03	09/29/03 - 12/29/03	09/29/03 - 12/29/03	09/29/03 - 12/29/03	09/29/03 - 12/29/03

AIR PARTICULATE (GROSS BETA & I-131)

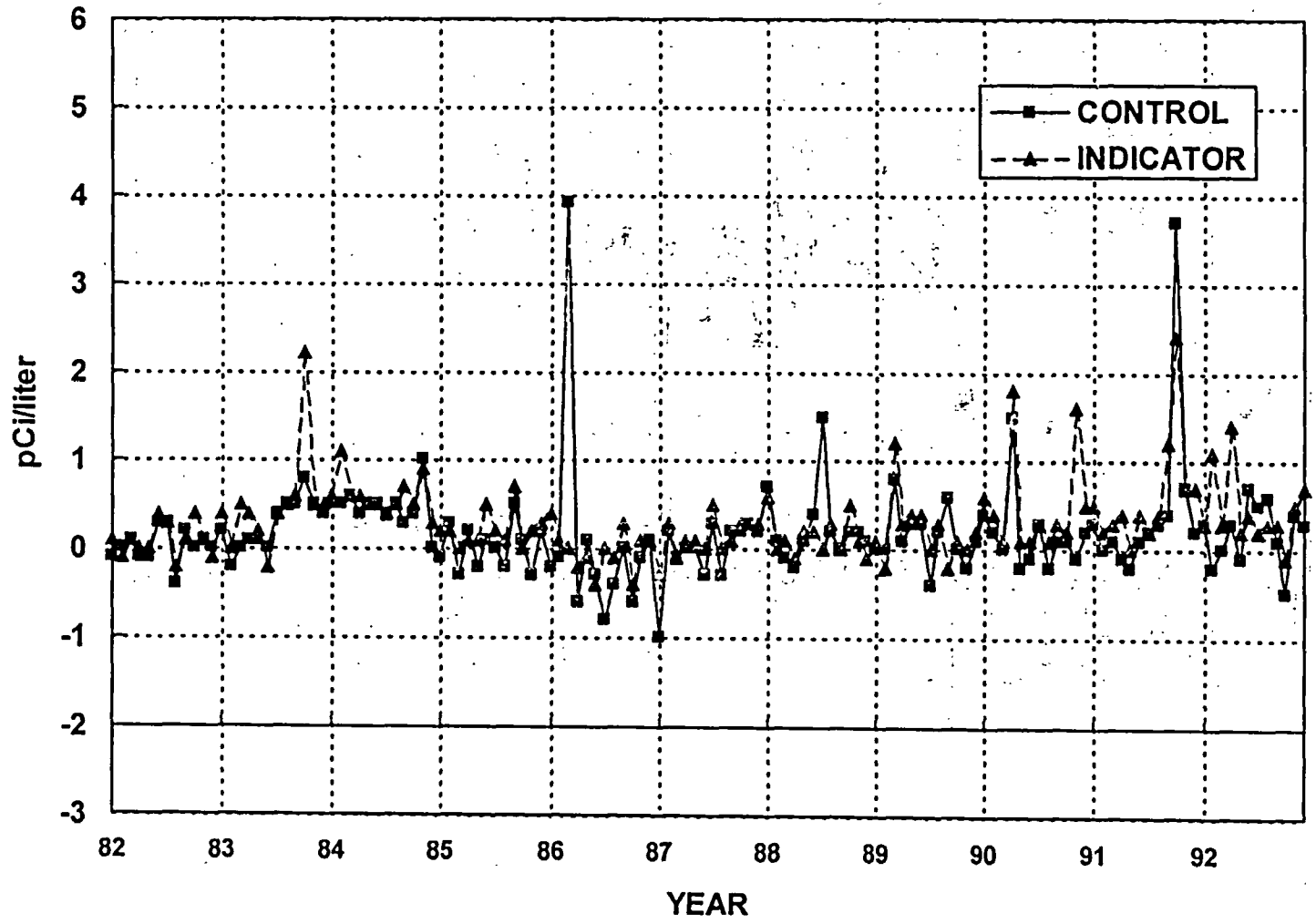
COLLECTION PERIOD	10S3	11S1	14S1	13CS	22G1
1	12/30/02 - 01/06/03	12/30/02 - 01/06/03	12/30/02 - 01/06/03	12/30/02 - 01/06/03	12/30/02 - 01/06/03
2	01/06/03 - 01/13/03	01/06/03 - 01/13/03	01/06/03 - 01/13/03	01/06/03 - 01/13/03	01/06/03 - 01/13/03
3	01/13/03 - 01/21/03	01/13/03 - 01/21/03	01/13/03 - 01/21/03	01/13/03 - 01/21/03	01/13/03 - 01/21/03
4	01/21/03 - 01/27/03	01/21/03 - 01/27/03	01/21/03 - 01/27/03	01/21/03 - 01/27/03	01/21/03 - 01/27/03
5	01/27/03 - 02/03/03	01/27/03 - 02/03/03	01/27/03 - 02/03/03	01/27/03 - 02/03/03	01/27/03 - 02/03/03
6	02/03/03 - 02/10/03	02/03/03 - 02/10/03	02/03/03 - 02/10/03	02/03/03 - 02/10/03	02/03/03 - 02/10/03
7	02/10/03 - 02/18/03	02/10/03 - 02/18/03	02/10/03 - 02/18/03	02/10/03 - 02/18/03	02/10/03 - 02/18/03
8	02/18/03 - 02/24/03	02/18/03 - 02/24/03	02/18/03 - 02/24/03	02/18/03 - 02/24/03	02/18/03 - 02/24/03
9	02/24/03 - 03/03/03	02/24/03 - 03/03/03	02/24/03 - 03/03/03	02/24/03 - 03/03/03	02/24/03 - 03/03/03
10	03/03/03 - 03/10/03	03/03/03 - 03/10/03	03/03/03 - 03/10/03	03/03/03 - 03/10/03	03/03/03 - 03/10/03
11	03/10/03 - 03/17/03	03/10/03 - 03/17/03	03/10/03 - 03/17/03	03/10/03 - 03/17/03	03/10/03 - 03/17/03
12	03/17/03 - 03/24/03	03/17/03 - 03/24/03	03/17/03 - 03/24/03	03/17/03 - 03/24/03	03/17/03 - 03/24/03
13	03/24/03 - 03/31/03	03/24/03 - 03/31/03	03/24/03 - 03/31/03	03/24/03 - 03/31/03	03/24/03 - 03/31/03
14	03/31/03 - 04/07/03	03/31/03 - 04/07/03	03/31/03 - 04/07/03	03/31/03 - 04/07/03	03/31/03 - 04/07/03
15	04/07/03 - 04/14/03	04/07/03 - 04/14/03	04/07/03 - 04/14/03	04/07/03 - 04/14/03	04/07/03 - 04/14/03
16	04/14/03 - 04/21/03	04/14/03 - 04/21/03	04/14/03 - 04/21/03	04/14/03 - 04/21/03	04/14/03 - 04/21/03
17	04/21/03 - 04/28/03	04/21/03 - 04/28/03	04/21/03 - 04/28/03	04/21/03 - 04/28/03	04/21/03 - 04/28/03
18	04/28/03 - 05/05/03	04/28/03 - 05/05/03	04/28/03 - 05/05/03	04/28/03 - 05/05/03	04/28/03 - 05/05/03
19	05/05/03 - 05/12/03	05/05/03 - 05/12/03	05/05/03 - 05/12/03	05/05/03 - 05/12/03	05/05/03 - 05/12/03
20	05/12/03 - 05/19/03	05/12/03 - 05/19/03	05/12/03 - 05/19/03	05/12/03 - 05/19/03	05/12/03 - 05/19/03
21	05/19/03 - 05/27/03	05/19/03 - 05/27/03	05/19/03 - 05/27/03	05/19/03 - 05/27/03	05/19/03 - 05/27/03
22	05/27/03 - 06/02/03	05/27/03 - 06/02/03	05/27/03 - 06/02/03	05/27/03 - 06/02/03	05/27/03 - 06/02/03
23	06/02/03 - 06/09/03	06/02/03 - 06/09/03	06/02/03 - 06/09/03	06/02/03 - 06/09/03	06/02/03 - 06/09/03
24	06/09/03 - 06/16/03	06/09/03 - 06/16/03	06/09/03 - 06/16/03	06/09/03 - 06/16/03	06/09/03 - 06/16/03
25	06/16/03 - 06/23/03	06/16/03 - 06/23/03	06/16/03 - 06/23/03	06/16/03 - 06/23/03	06/16/03 - 06/23/03
26	06/23/03 - 06/30/03	06/23/03 - 06/30/03	06/23/03 - 06/30/03	06/23/03 - 06/30/03	06/23/03 - 06/30/03
27	06/30/03 - 07/07/03	06/30/03 - 07/07/03	06/30/03 - 07/07/03	06/30/03 - 07/07/03	06/30/03 - 07/07/03
28	07/07/03 - 07/14/03	07/07/03 - 07/14/03	07/07/03 - 07/14/03	07/07/03 - 07/14/03	07/07/03 - 07/14/03
29	07/14/03 - 07/21/03	07/14/03 - 07/21/03	07/14/03 - 07/21/03	07/14/03 - 07/21/03	07/14/03 - 07/21/03
30	07/21/03 - 07/28/03	07/21/03 - 07/28/03	07/21/03 - 07/28/03	07/21/03 - 07/28/03	07/21/03 - 07/28/03
31	07/28/03 - 08/04/03	07/28/03 - 08/04/03	07/28/03 - 08/04/03	07/28/03 - 08/04/03	07/28/03 - 08/04/03
32	08/04/03 - 08/11/03	08/04/03 - 08/11/03	08/04/03 - 08/11/03	08/04/03 - 08/11/03	08/04/03 - 08/11/03
33	08/11/03 - 08/18/03	08/11/03 - 08/18/03	08/11/03 - 08/18/03	08/11/03 - 08/18/03	08/11/03 - 08/18/03
34	08/18/03 - 08/25/03	08/18/03 - 08/25/03	08/18/03 - 08/25/03	08/18/03 - 08/25/03	08/18/03 - 08/25/03
35	08/25/03 - 09/02/03	08/25/03 - 09/02/03	08/25/03 - 09/02/03	08/25/03 - 09/02/03	08/25/03 - 09/02/03
36	09/02/03 - 09/08/03	09/02/03 - 09/08/03	09/02/03 - 09/08/03	09/02/03 - 09/08/03	09/02/03 - 09/08/03
37	09/08/03 - 09/15/03	09/08/03 - 09/15/03	09/08/03 - 09/15/03	09/08/03 - 09/15/03	09/08/03 - 09/15/03
38	09/15/03 - 09/22/03	09/15/03 - 09/22/03	09/15/03 - 09/22/03	09/15/03 - 09/22/03	09/15/03 - 09/22/03
39	09/22/03 - 09/29/03	09/22/03 - 09/29/03	09/22/03 - 09/29/03	09/22/03 - 09/29/03	09/22/03 - 09/29/03
40	09/29/03 - 10/06/03	09/29/03 - 10/06/03	09/29/03 - 10/06/03	09/29/03 - 10/06/03	09/29/03 - 10/06/03
41	10/06/03 - 10/13/03	10/06/03 - 10/13/03	10/06/03 - 10/13/03	10/06/03 - 10/13/03	10/06/03 - 10/13/03
42	10/13/03 - 10/20/03	10/13/03 - 10/20/03	10/13/03 - 10/20/03	10/13/03 - 10/20/03	10/13/03 - 10/20/03
43	10/20/03 - 10/27/03	10/20/03 - 10/27/03	10/20/03 - 10/27/03	10/20/03 - 10/27/03	10/20/03 - 10/27/03
44	10/27/03 - 11/03/03	10/27/03 - 11/03/03	10/27/03 - 11/03/03	10/27/03 - 11/03/03	10/27/03 - 11/03/03
45	11/03/03 - 11/10/03	11/03/03 - 11/10/03	11/03/03 - 11/10/03	11/03/03 - 11/10/03	11/03/03 - 11/10/03
46	11/10/03 - 11/17/03	11/10/03 - 11/17/03	11/10/03 - 11/17/03	11/10/03 - 11/17/03	11/10/03 - 11/17/03
47	11/17/03 - 11/24/03	11/17/03 - 11/24/03	11/17/03 - 11/24/03	11/17/03 - 11/24/03	11/17/03 - 11/24/03
48	11/24/03 - 12/01/03	11/24/03 - 12/01/03	11/24/03 - 12/01/03	11/24/03 - 12/01/03	11/24/03 - 12/01/03
49	12/01/03 - 12/08/03	12/01/03 - 12/08/03	12/01/03 - 12/08/03	12/01/03 - 12/08/03	12/01/03 - 12/08/03
50	12/08/03 - 12/15/03	12/08/03 - 12/15/03	12/08/03 - 12/15/03	12/08/03 - 12/15/03	12/08/03 - 12/15/03
51	12/15/03 - 12/22/03	12/15/03 - 12/22/03	12/15/03 - 12/22/03	12/15/03 - 12/22/03	12/15/03 - 12/22/03
52	12/22/03 - 12/29/03	12/22/03 - 12/29/03	12/22/03 - 12/29/03	12/22/03 - 12/29/03	12/22/03 - 12/29/03

TABLE C-IX.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

TLD

STATION CODE	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
36S2	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
36D1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
2E1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
3S1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
4E1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
5S1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
5H1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
6C1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
7S1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
7E1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
9C1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
10S3	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
10E1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
10F3	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
11S1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
13S2	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
13C1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
13E1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
14S1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
15D1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
16F1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
17B1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
18S2	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
19D1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
20D1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
20F1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
21S2	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
23S2	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
24D1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
25S2	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
25D1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
26S3	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
28D2	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
29S1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
29E1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
31S1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
31D1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
31D2	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
34S2	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04
34E1	01/07/03 - 04/08/03	04/08/03 - 07/08/03	07/08/03 - 10/01/03	10/01/03 - 01/06/04

FIGURE C-1
MEAN MONTHLY INSOLUBLE GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LGS, 1982 - 2003



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

FIGURE C-1 (cont.)

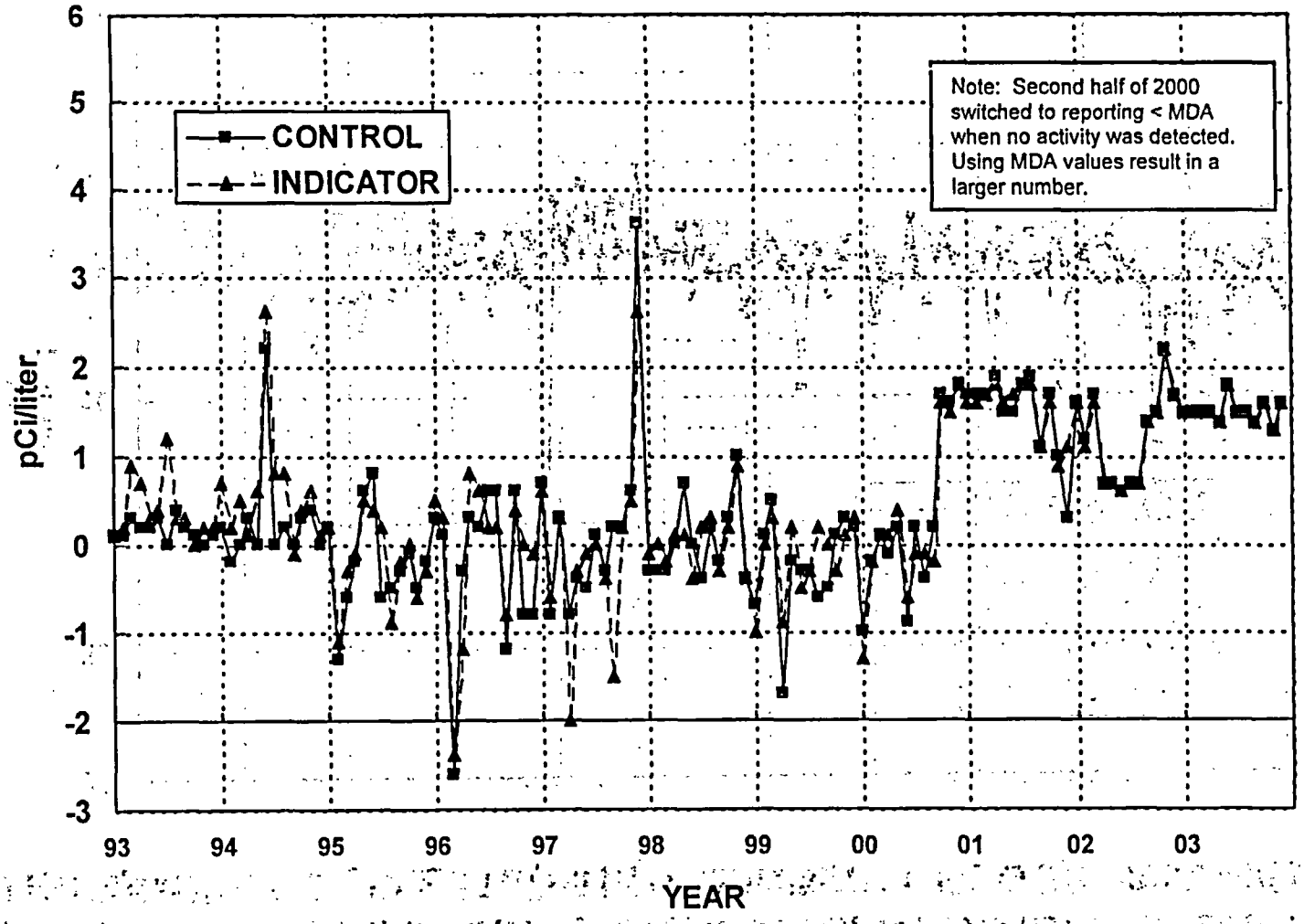
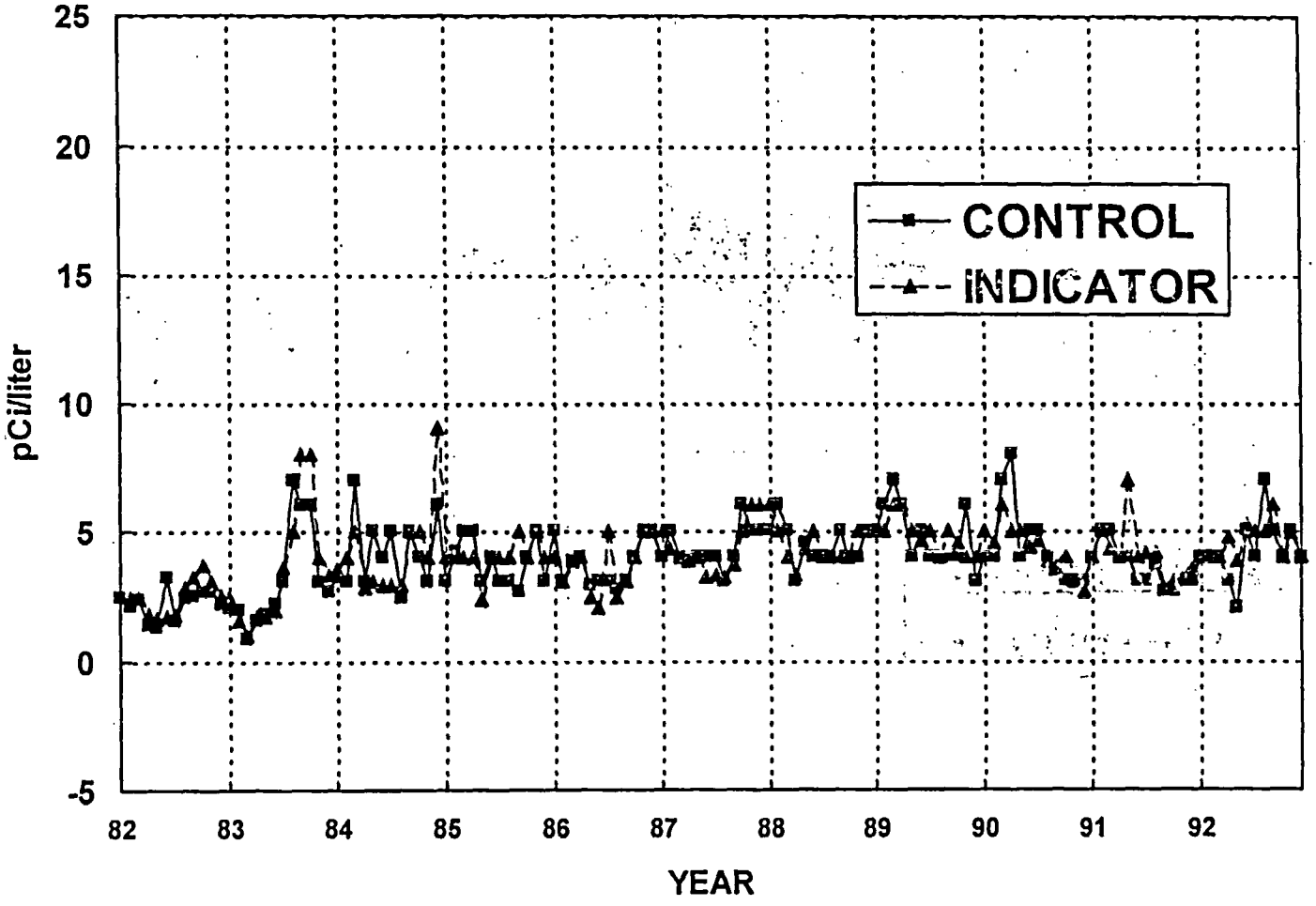


FIGURE C-2
MEAN MONTHLY SOLUBLE GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LGS, 1982 - 2003



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

FIGURE C-2 (cont.)

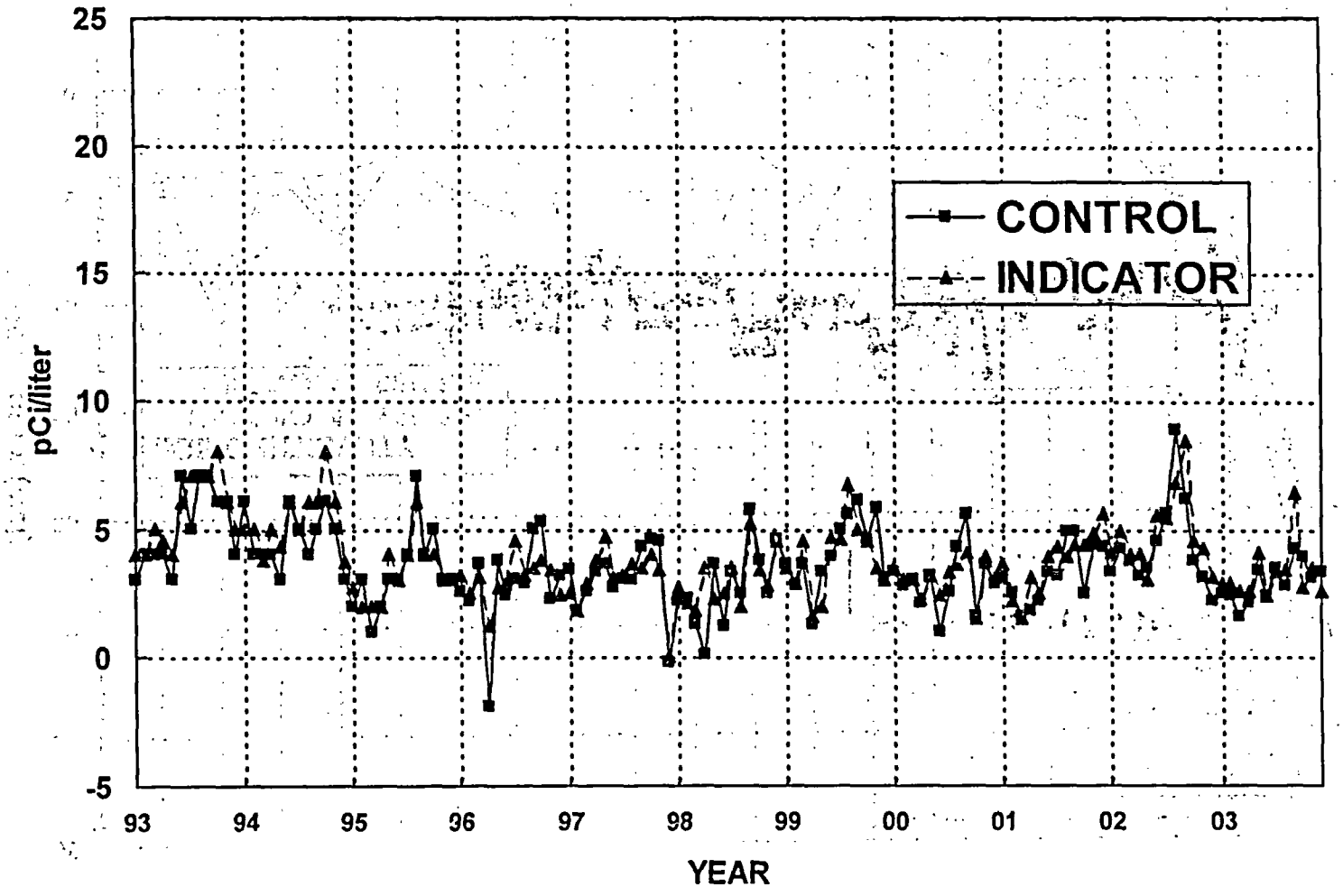
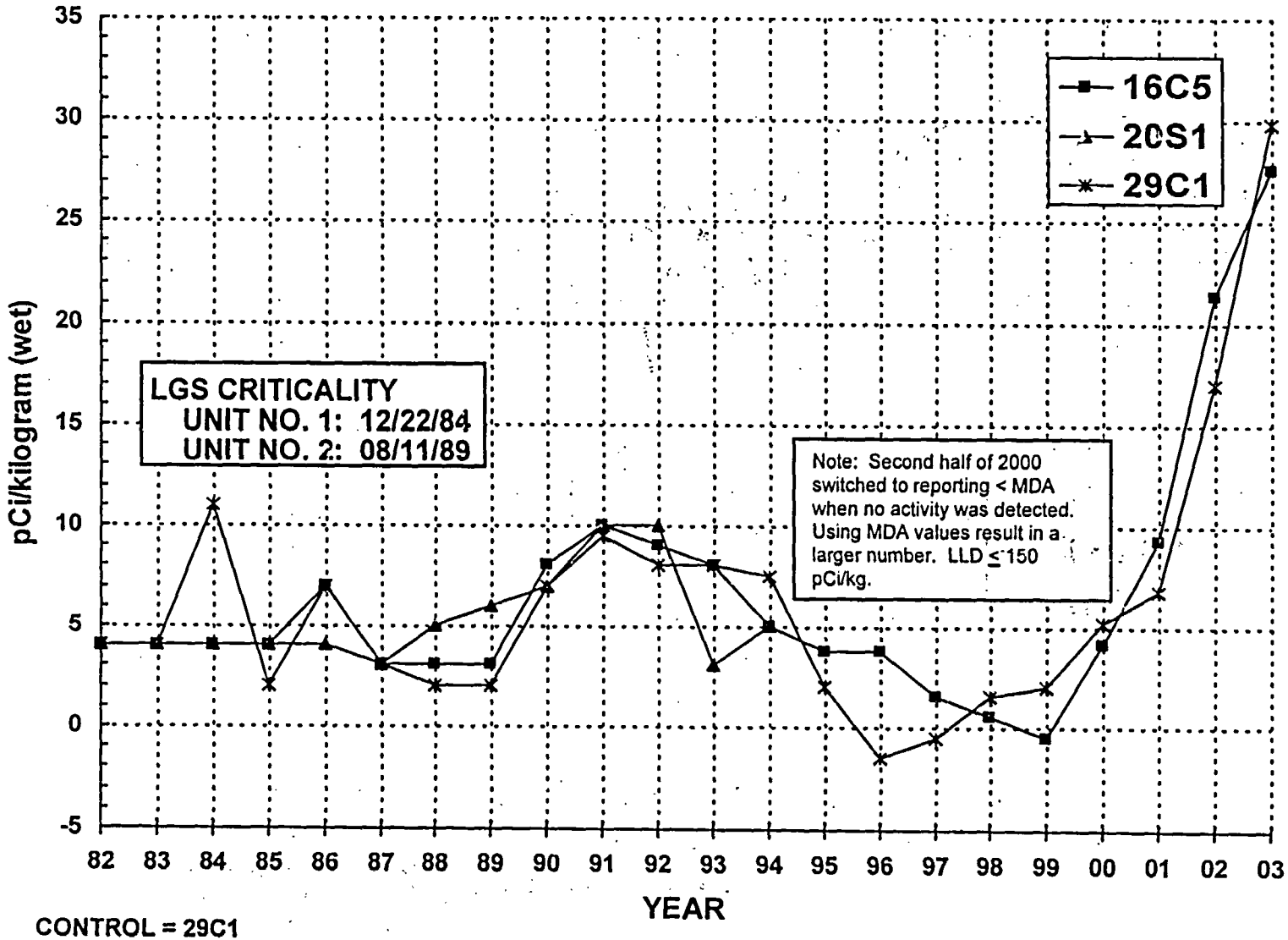


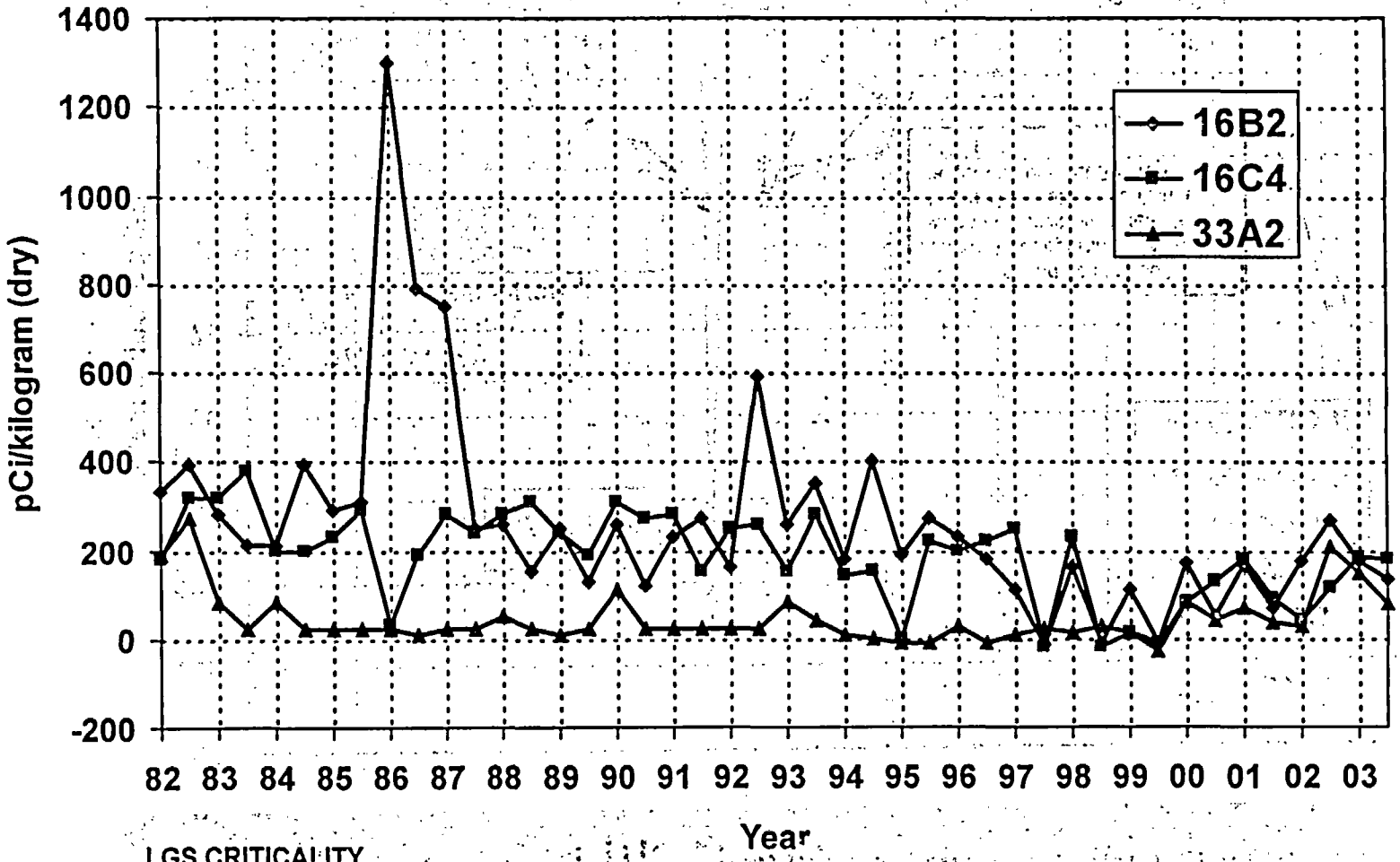
FIGURE C-3
MEAN ANNUAL CS-137 CONCENTRATIONS IN FISH SAMPLES COLLECTED IN THE VICINITY OF LGS, 1982 - 2003



CONTROL = 29C1

Station 20S1 discontinued in 1995

FIGURE C-4
CONCENTRATIONS OF CS-137 IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF LGS, 1982 - 2003



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

CONTROL = 33A2

FIGURE C-5
MEAN MONTHLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LGS, 1982 – 2003

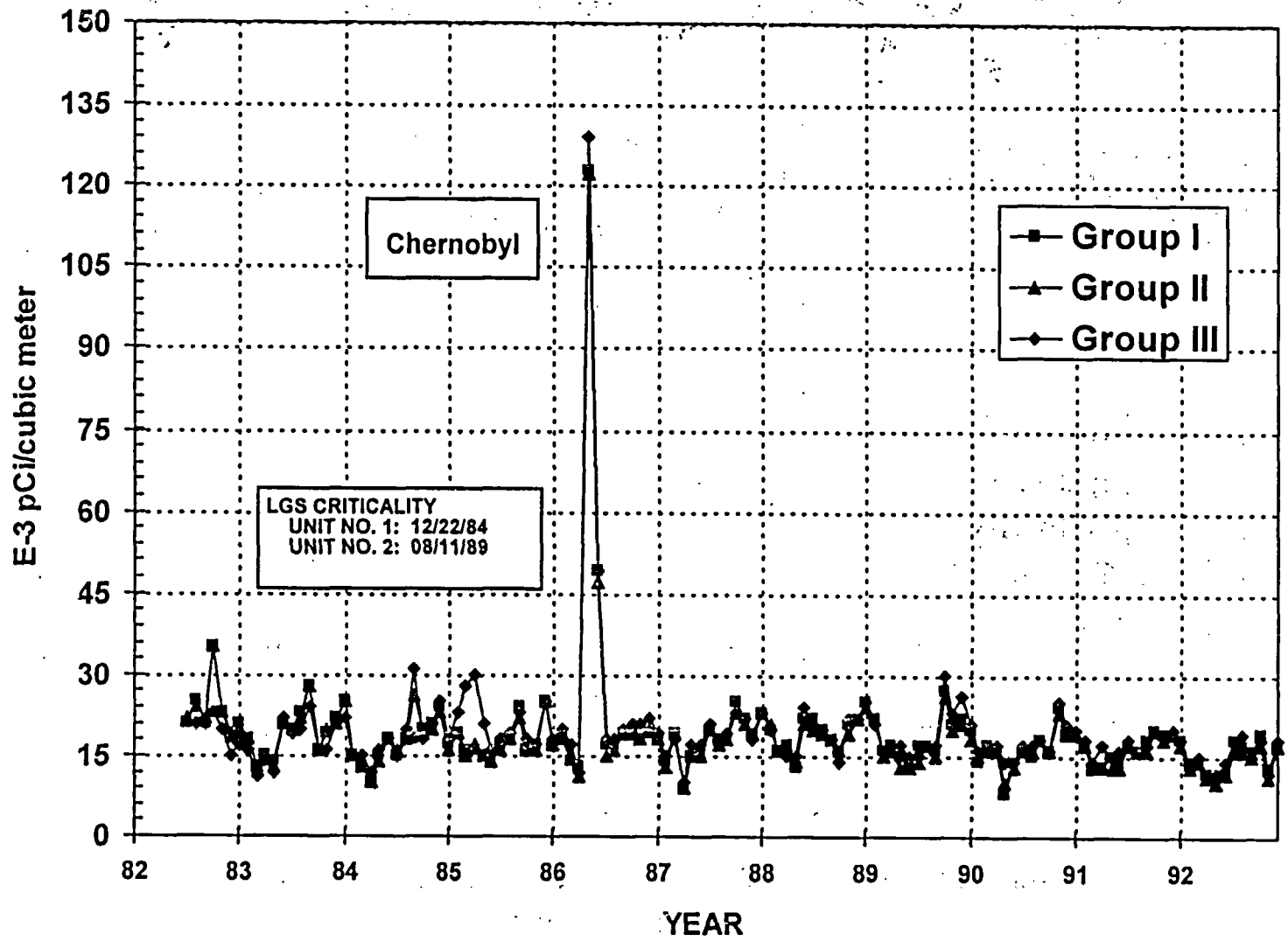


FIGURE C-5 (cont.)

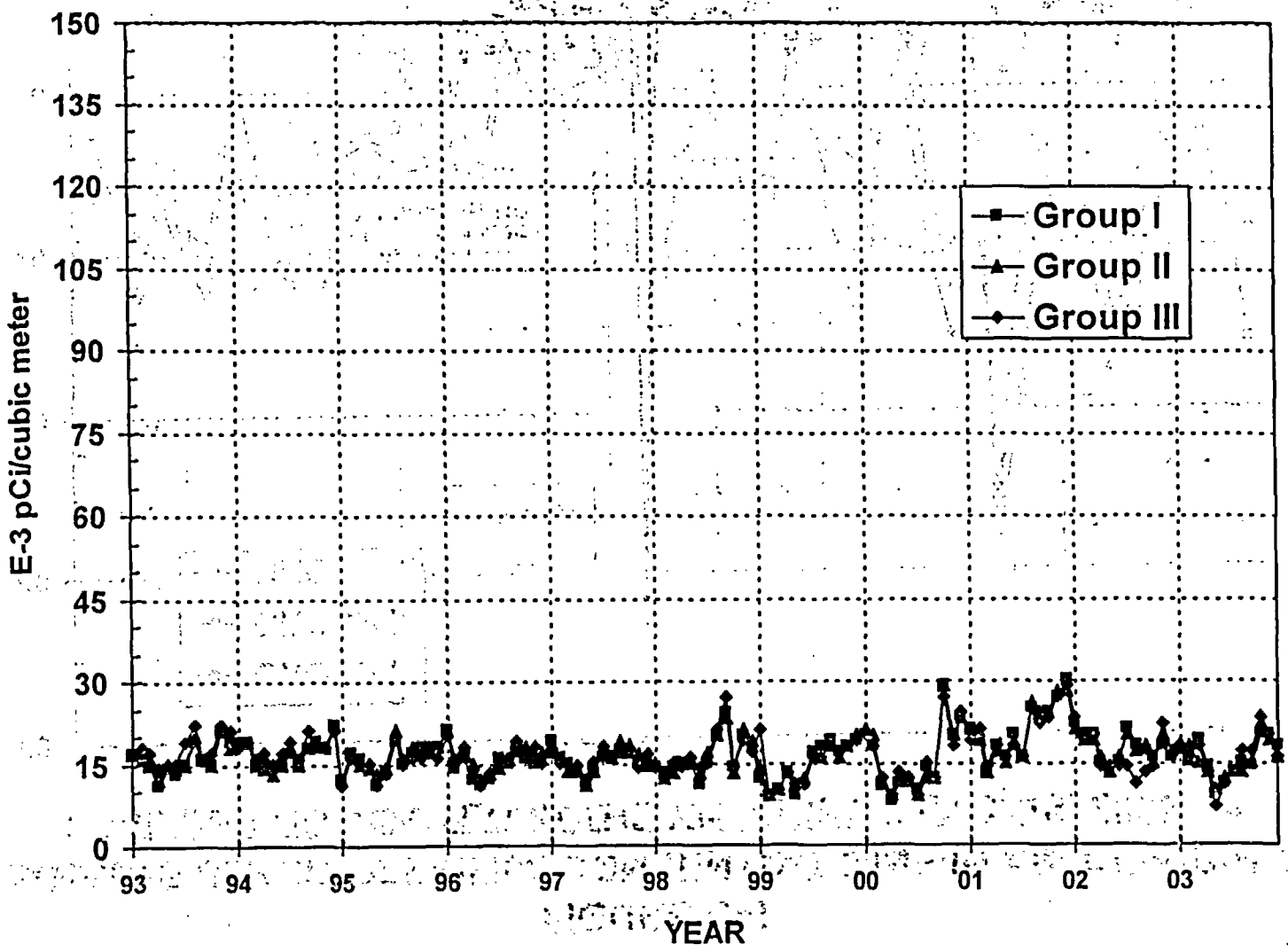


FIGURE C-6
MEAN WEEKLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LGS, 2003

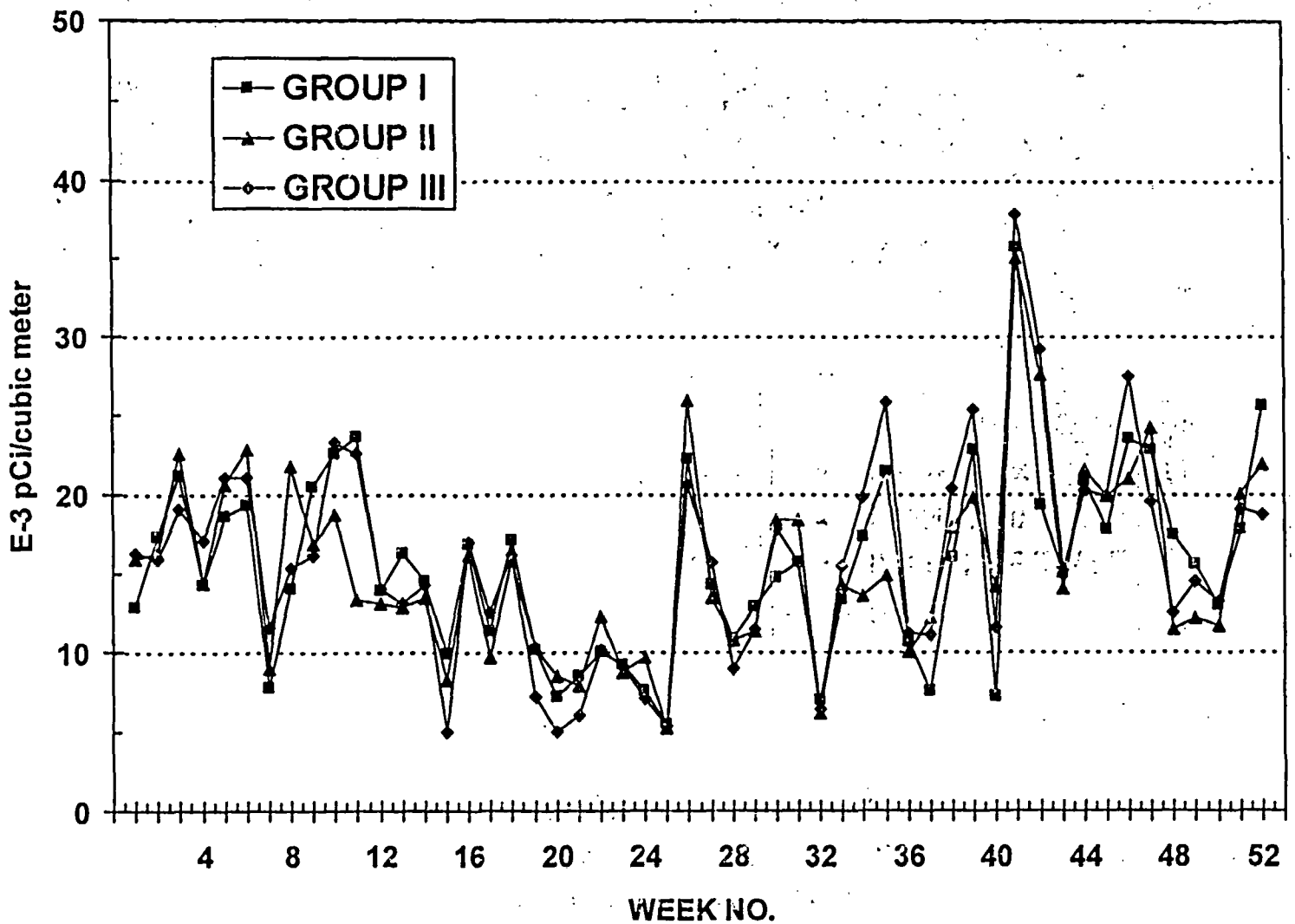
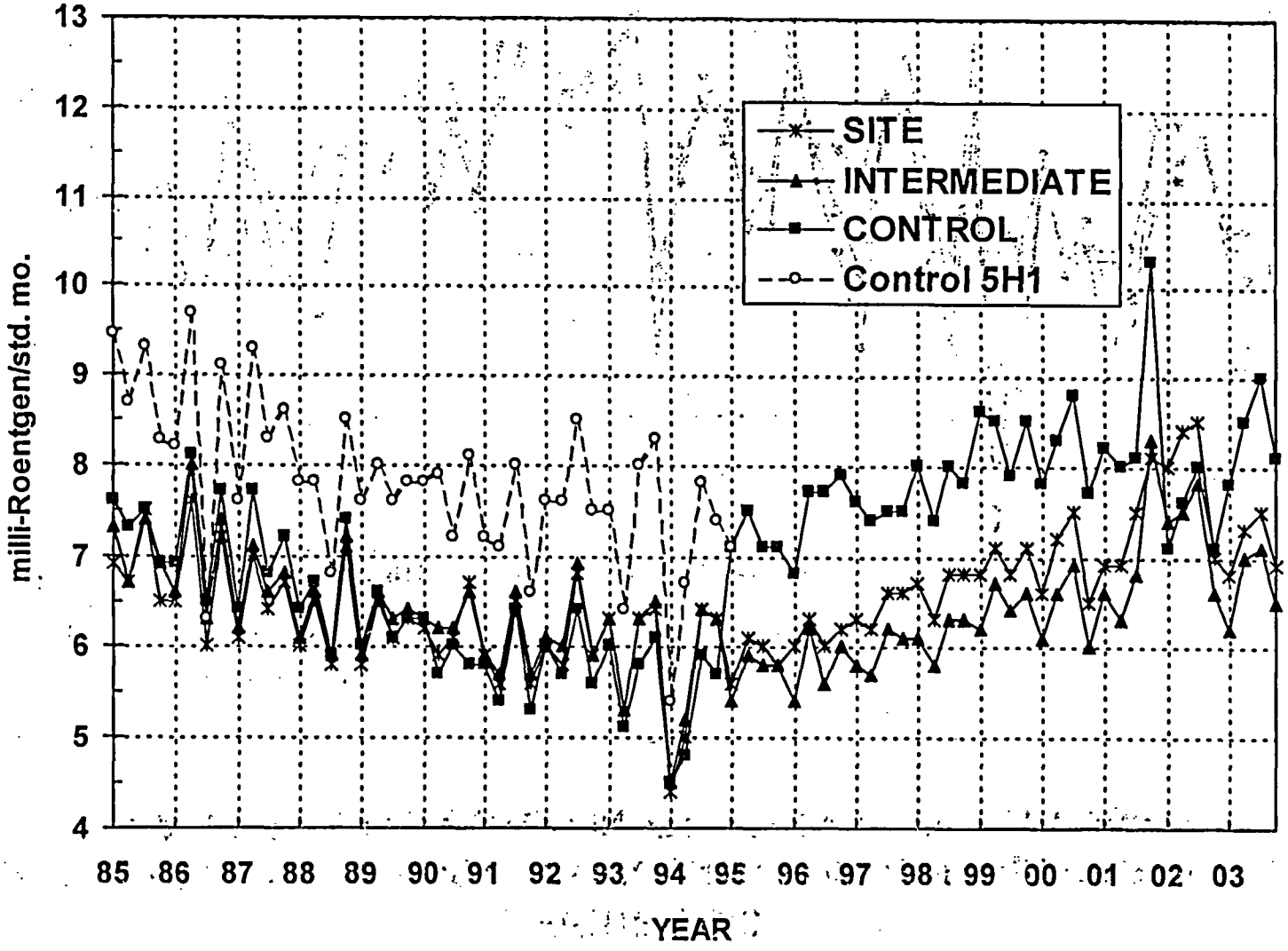


FIGURE C-7
MEAN QUARTERLY AMBIENT GAMMA RADIATION LEVELS (TLD) IN THE VICINITY OF LGS, 1985 – 2003



NOTE: Control Station 5H1 became the only distant location beginning in 1995

APPENDIX D

DATA TABLES AND FIGURES
COMPARISON LABORATORY

The following section contains data and figures illustrating the analyses performed by the quality control laboratory, Environmental Inc. (Env). Duplicate samples were obtained from several locations and media and split between the primary laboratory, Teledyne Brown Engineering (TBE) and Env. Comparison of the results for most media were within expected ranges.

Intentionally left blank

TABLE D-I.1 CONCENTRATIONS OF GROSS BETA INSOLUBLE IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	16C2
JAN	< 1.4
FEB	< 1.9
MAR	< 1.9
APR	< 1.5
MAY	< 1.9
JUN	< 1.8
JUL	< 1.6
AUG	< 1.5
SEP	< 1.7
OCT	< 1.6
NOV	< 2.0
DEC	< 1.7
MEAN	1.7 ± 0.4

TABLE D-I.2 CONCENTRATIONS OF GROSS BETA SOLUBLE IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	16C2
JAN	1.9 ± 0.9
FEB	2.7 ± 1.1
MAR	1.8 ± 1.0
APR	1.4 ± 1.1
MAY	2.4 ± 1.0
JUN	0.9 ± 0.9
JUL	1.8 ± 0.9
AUG	2.2 ± 1.0
SEP	2.2 ± 1.1
OCT	1.8 ± 0.9
NOV	2.9 ± 1.9
DEC	1.9 ± 0.9
MEAN	2.0 ± 1.1

TABLE D-I.3 CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STC	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	Nb-95	Cs-134	Cs-137	Ba-140	La-140
16C2	JAN	< 3	< 2	< 4	< 3	< 6	< 4	< 3	< 2	< 4	< 12	< 3
	FEB	< 4	< 3	< 13	< 4	< 11	< 10	< 7	< 4	< 5	< 19	< 4
	MAR	< 2	< 3	< 6	< 2	< 4	< 5	< 3	< 2	< 2	< 14	< 2
	APR	< 2	< 2	< 3	< 2	< 4	< 6	< 3	< 2	< 3	< 10	< 3
	MAY	< 3	< 4	< 6	< 2	< 6	< 7	< 4	< 4	< 3	< 17	< 4
	JUN	< 4	< 3	< 12	< 6	< 7	< 9	< 5	< 4	< 4	< 16	< 8
	JUL	< 5	< 4	< 7	< 7	< 9	< 7	< 4	< 4	< 3	< 21	< 6
	AUG	< 3	< 4	< 9	< 4	< 8	< 5	< 4	< 4	< 5	< 20	< 5
	SEP	< 3	< 3	< 4	< 2	< 4	< 5	< 5	< 2	< 3	< 15	< 3
	OCT	< 3	< 3	< 4	< 2	< 3	< 5	< 5	< 2	< 2	< 11	< 2
	NOV	< 5	< 4	< 11	< 4	< 6	< 8	< 4	< 4	< 6	< 13	< 7
	DEC	< 2	< 2	< 5	< 2	< 4	< 6	< 4	< 5	< 3	< 13	< 2
	MEAN	3.2 ± 1.9	3.1 ± 1.5	7.0 ± 6.8	3.2 ± 3.5	6.0 ± 4.8	6.4 ± 4.0	4.2 ± 2.1	3.3 ± 2.1	3.5 ± 2.2	15 ± 7	4.1 ± 4.1

TABLE D-II.1 CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

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

COLLECTION PERIOD	11S2
1	16 ± 3
2	21 ± 3
3	23 ± 3
4	18 ± 3
5	25 ± 4
6	18 ± 4
7	20 ± 3
8	40 ± 4
9	32 ± 4
10	25 ± 4
11	18 ± 4
12	13 ± 3
13	15 ± 4
14	15 ± 4
15	15 ± 3
16	26 ± 4
17	12 ± 3
18	23 ± 3
19	12 ± 3
20	11 ± 4
21	8 ± 2
22	11 ± 3
23	9 ± 3
24	14 ± 3
25	12 ± 3
26	28 ± 4
27	17 ± 3
28	15 ± 3
29	22 ± 4
30	25 ± 4
31	21 ± 3
32	10 ± 3
33	19 ± 4
34	14 ± 4
35	30 ± 4
36	16 ± 5
37	12 ± 4
38	18 ± 4
39	31 ± 4
40	12 ± 4
41	44 ± 4
42	19 ± 4
43	22 ± 4
44	33 ± 4
45	24 ± 4
46	15 ± 4
47	32 ± 5
48	18 ± 4
49	14 ± 4
50	18 ± 4
51	22 ± 4
52	21 ± 4
MEAN	20 ± 16

TABLE D-II.2 CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

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

STC	COLLECTION PERIOD	Be-7	Mn-54	Co-58	Co-60	Cs-134	Cs-137
11S2	12/31 - 04/01/02	61 ± 13	< 0.3	< 0.6	< 0.8	< 0.7	< 0.6
	04/01 - 07/01/02	68 ± 13	< 1.0	< 0.6	< 1.1	< 0.6	< 0.8
	07/01 - 09/30/02	60 ± 14	< 0.6	< 0.7	< 0.7	< 1.1	< 0.7
	09/30 - 12/30/02	52 ± 12	< 0.8	< 0.5	< 0.6	< 0.9	< 0.8
	MEAN	60 ± 13	0.7 ± 0.6	0.6 ± 0.2	0.8 ± 0.4	0.8 ± 0.4	0.7 ± 0.2

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, 2003

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

STC	COLLECTION PERIOD	I-131	K-40	Cs-134	Cs-137	Ba-140	La-140
19B1	01/14/03	< 0.3	1351 ± 117	< 4	< 3	< 31	< 5
	04/01/03	< 0.2	1394 ± 179	< 4	< 6	< 13	< 4
	07/08/03	< 0.3	1205 ± 169	< 5	< 6	< 42	< 6
	10/14/03	< 0.5	1447 ± 121	< 4	< 4	< 11	< 5
	MEAN	0.33 ± 0.25	1349 ± 208	4 ± 2	5 ± 3	25 ± 30	5 ± 2
21B1	01/14/03	< 0.3	1453 ± 119	< 3	< 2	< 29	< 4
	04/01/03	< 0.2	1429 ± 165	< 5	< 4	< 17	< 3
	07/08/03	< 0.3	1279 ± 185	< 5	< 5	< 39	< 12
	10/14/03	< 0.4	1387 ± 124	< 4	< 4	< 13	< 2
	MEAN	0.30 ± 0.16	1387 ± 154	4 ± 2	4 ± 2	25 ± 24	5 ± 9
9G1	01/14/03	< 0.4	1427 ± 111	< 3	< 2	< 22	< 5
	04/01/03	< 0.2	1320 ± 117	< 3	< 4	< 11	< 3
	07/08/03	< 0.4	1334 ± 164	< 5	< 4	< 37	< 8
	10/14/03	< 0.4	1229 ± 119	< 3	< 4	< 19	< 3
	MEAN	0.35 ± 0.20	1328 ± 162	3 ± 2	4 ± 2	22 ± 21	5 ± 5

TABLE D-IV.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2003

DRINKING WATER (GROSS BETA & GAMMA SPECTROSCOPY)

COLLECTION PERIOD	16C2
JAN	12/30/02 - 01/27/03
FEB	01/27/03 - 03/03/03
MAR	03/03/03 - 03/31/03
APR	03/31/03 - 04/28/03
MAY	04/28/03 - 05/30/03
JUN	05/30/03 - 07/01/03
JUL	07/01/03 - 07/28/03
AUG	07/28/03 - 09/02/03
SEP	09/02/03 - 09/29/03
OCT	09/29/03 - 10/27/03
NOV	10/27/03 - 12/01/03
DEC	12/01/03 - 12/30/03

AIR PARTICULATE (GAMMA SPECTROSCOPY)

COLLECTION PERIOD	11S2
JAN-MAR	12/30/02 - 03/31/03
APR-JUN	03/31/03 - 06/30/03
JUL-SEP	06/30/03 - 09/29/03
OCT-DEC	09/29/03 - 12/29/03

AIR PARTICULATE (GROSS BETA)

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

FIGURE D-1
COMPARISON OF MONTHLY INSOLUBLE GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES SPLIT BETWEEN ENV AND TBE, 2003

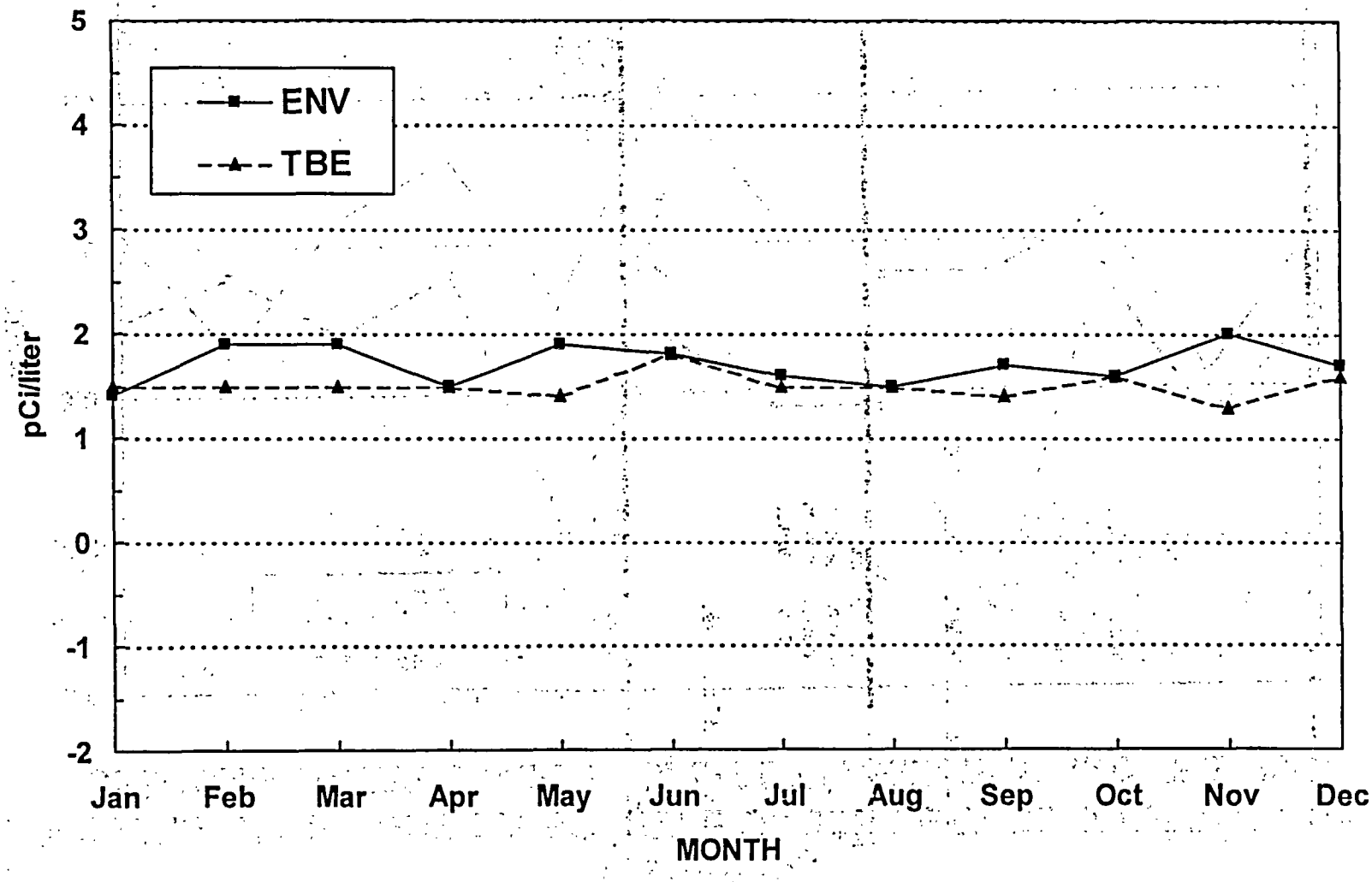


FIGURE D-2
COMPARISON OF MONTHLY SOLUBLE GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES SPLIT BETWEEN ENV AND TBE, 2003

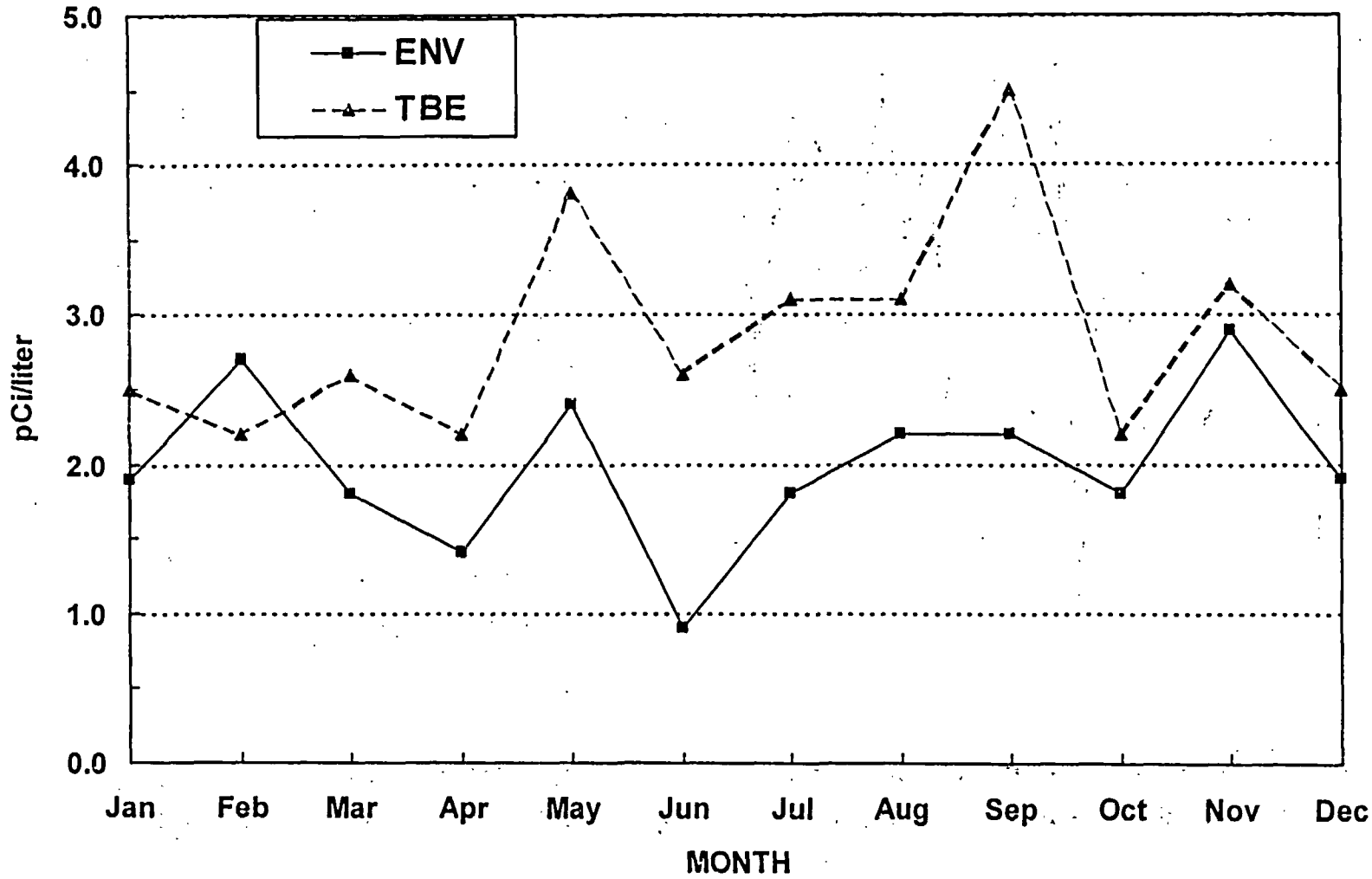
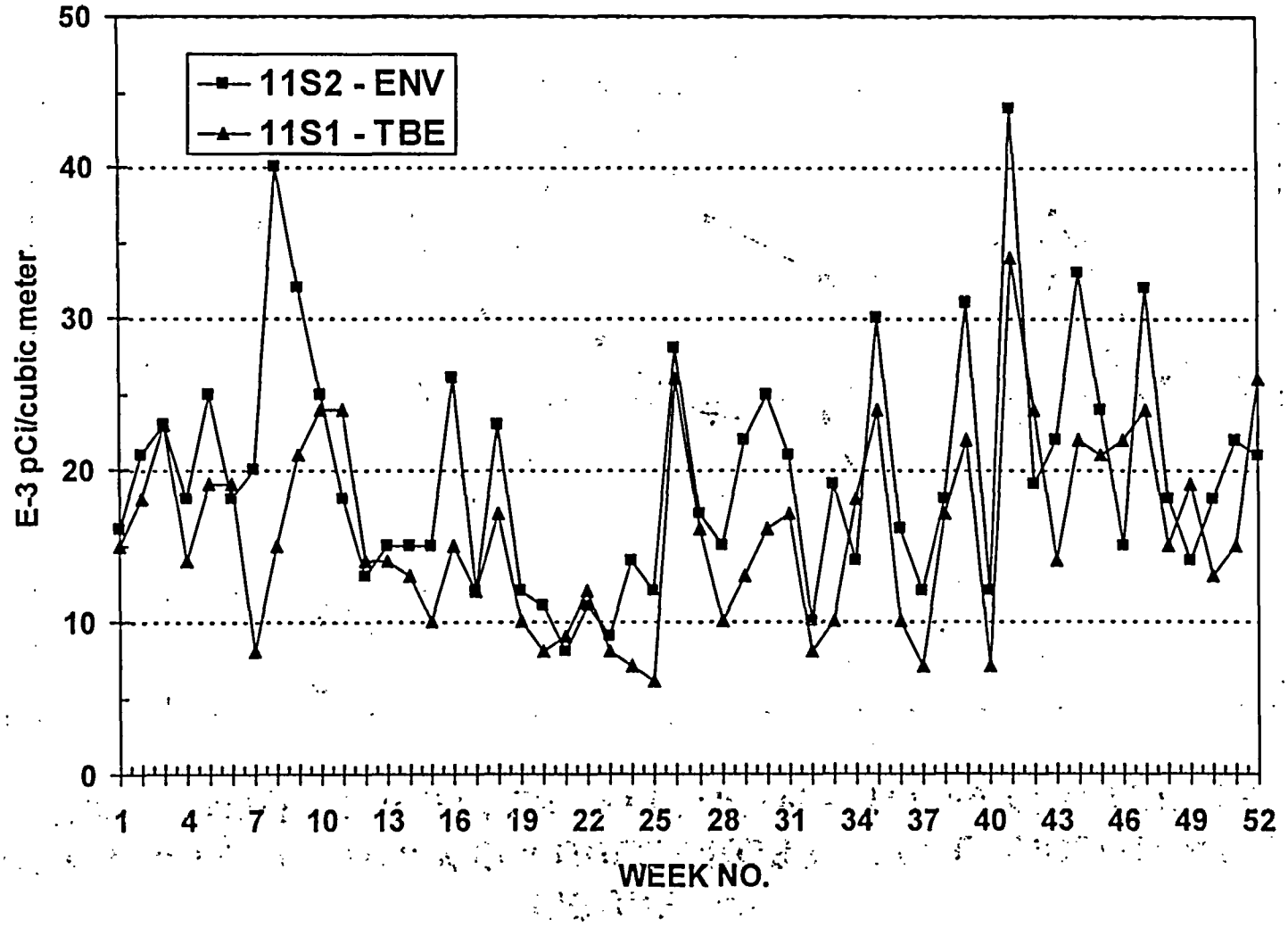


FIGURE D-3
COMPARISON OF WEEKLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED FROM LGS COLLOCATED LOCATIONS 11S1 AND 11S2, 2003



APPENDIX E

INTER-LABORATORY COMPARISON PROGRAM

TABLE E-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2003
(PAGE 1 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March, 2003	E3585-396	Milk	Sr-89	pCi/L	80	133	0.60	N (1)
			Sr-90	pCi/L	11.2	11.8	0.95	A
	E3586-396	Milk	I-131	pCi/L	75	74	1.01	A
			Ce-141	pCi/L	168	173	0.97	A
			Cr-51	pCi/L	243	246	0.99	A
			Cs-134	pCi/L	83	90	0.92	A
			Cs-137	pCi/L	207	200	1.04	A
			Co-58	pCi/L	49	47	1.04	A
			Mn-54	pCi/L	65	64	1.02	A
			Fe-59	pCi/L	53	47	1.13	A
			Zn-65	pCi/L	114	93	1.23	W
			Co-60	pCi/L	169	162	1.04	A
	E3588-396	AP	Ce-141	pCi	239	224	1.07	A
			Cr-51	pCi	348	318	1.09	A
			Cs-134	pCi	101	117	0.86	A
			Cs-137	pCi	277	259	1.07	A
			Co-58	pCi	66	60	1.10	A
			Mn-54	pCi	97	83	1.17	A
			Fe-59	pCi	80	61	1.31	N (2)
			Zn-65	pCi	152	120	1.27	W
			Co-60	pCi	223	209	1.07	A
	E3587-396	Charcoal	I-131	pCi	68	74	0.92	A
June, 2003	E3747-396	Milk	Sr-89	pCi/L	89	85	1.05	A
			Sr-90	pCi/L	20	23	0.87	A
	E3748-396	Milk	I-131	pCi/L	115	103	1.12	A
			Ce-141	pCi/L	285	283	1.01	A
			Cr-51	pCi/L	266	239	1.11	A
			Cs-134	pCi/L	99	103	0.96	A
			Cs-137	pCi/L	236	230	1.03	A
			Co-58	pCi/L	106	93	1.14	A
			Mn-54	pCi/L	190	186	1.02	A
			Fe-59	pCi/L	108	99	1.09	A
			Zn-65	pCi/L	208	181	1.15	A
			Co-60	pCi/L	142	132	1.08	A
	E3750-396	AP	Ce-141	pCi	238	248	0.96	A
			Cr-51	pCi	239	209	1.14	A
			Cs-134	pCi	79	91	0.87	A
			Cs-137	pCi	189	202	0.94	A
			Co-58	pCi	71	81	0.88	A
			Mn-54	pCi	164	163	1.01	A
			Fe-59	pCi	91	87	1.05	A
			Zn-65	pCi	155	159	0.97	A
			Co-60	pCi	109	116	0.94	A

TABLE E-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2003
(PAGE 2 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
June, 2003	E3749-396	Charcoal	I-131	pCi	78	62	1.26	W
September, 2003	E3898-396	Milk	Sr-89	pCi/L	45	100	0.45	N (1)
			Sr-90	pCi/L	13	14	0.93	A
	E3899-396	Milk	I-131	pCi/L	73	74	0.99	A
			Ce-141	pCi/L	85	86	0.99	A
			Cr-51	pCi/L	220	233	0.94	A
			Cs-134	pCi/L	106	119	0.89	A
			Cs-137	pCi/L	90	88	1.02	A
			Co-58	pCi/L	96	99	0.97	A
			Mn-54	pCi/L	95	93	1.02	A
			Fe-59	pCi/L	84	79	1.06	A
			Zn-65	pCi/L	187	176	1.06	A
			Co-60	pCi/L	132	123	1.07	A
	E3901-396	AP	Ce-141	pCi	79	77	1.03	A
			Cr-51	pCi	227	210	1.08	A
			Cs-134	pCi	93	108	0.86	A
			Cs-137	pCi	70	79	0.89	A
			Co-58	pCi	80	89	0.90	A
			Mn-54	pCi	73	84	0.87	A
			Fe-59	pCi	74	71	1.04	A
			Zn-65	pCi	143	158	0.91	A
			Co-60	pCi	93	111	0.84	A
	E3900-396	Charcoal	I-131	pCi	74	86	0.86	A
November, 2003	E3790-396	Milk	Sr-89	pCi/L	185	168	1.10	A
			Sr-90	pCi/L	19	17	1.12	A
	E3971-396	Milk	I-131	pCi/L	87	90	0.97	A
			Ce-141	pCi/L	186	202	0.92	A
			Cr-51	pCi/L	287	280	1.03	A
			Cs-134	pCi/L	119	135	0.88	A
			Cs-137	pCi/L	116	129	0.90	A
			Co-58	pCi/L	111	111	1.00	A
			Mn-54	pCi/L	176	173	1.02	A
			Fe-59	pCi/L	94	102	0.92	A
			Zn-65	pCi/L	190	197	0.96	A
			Co-60	pCi/L	140	155	0.90	A

TABLE E-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2003
(PAGE 3 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
November, 2003	E3973-396	AP	Ce-141	pCi	144	142	1.01	A
			Cr-51	pCi	203	198	1.03	A
			Cs-134	pCi	90	96	0.94	A
			Cs-137	pCi	85	91	0.93	A
			Co-58	pCi	80	78	1.03	A
			Mn-54	pCi	115	122	0.94	A
			Fe-59	pCi	72	72	1.00	A
			Zn-65	pCi	121	139	0.87	A
			Co-60	pCi	102	109	0.94	A
	E3972-396	Charcoal	I-131	pCi	67	77	0.87	A

(1) Incorrectly calculated. The recalculated March & September Sr-89 results of 138 & 95.8 pCi/L, respectively, are acceptable. The efficiency required for these samples is different than the efficiency for regular samples. NCR 04-02

(2) Using only the results from the 1099.2 keV photon, the Fe-59 would be 71 pCi, which is acceptable. Coincidental summing occurs only with significant Fe-59 activity levels. Therefore, there is no impact on environmental samples. NCR 04-02

(a) Teledyne Brown Engineering reported result.

(b) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) Ratio of Teledyne Brown Engineering to Analytics results.

(d) Analytics evaluation based on TBE internal QC limits: A= Acceptable. Reported result falls within ratio limits of 0.80-1.20. W-Acceptable with warning. Reported result falls within 0.70-0.80 or 1.20-1.30. N = Not Acceptable. Reported result falls outside the ratio limits of < 0.70 and > 1.30.

TABLE E-2 DOE/EML ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2003
(PAGE 1 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/EML	Evaluation (d)
March, 2003	QAP 58 (QAP 0303)	AP	Co-60	Bq/filter	35.9	33.5	1.07	A
			Cs-137	Bq/filter	113.7	99.7	1.14	A
			Gr-Beta	Bq/filter	1.6	1.5	1.07	A
			Mn-54	Bq/filter	49.4	43.8	1.13	A
			Sr-90	Bq/filter	2.4	2.8	0.86	A
		Soil	Ac-228	Bq/kg	70.2	57.06	1.23	W
			Bi-212	Bq/kg	72.5	60.6	1.20	W
			Bi-214	Bq/kg	76.2	67.0	1.14	A
			Cs-137	Bq/kg	1883	1450	1.30	N (1)
			K-40	Bq/kg	805.7	636	1.27	W
			Pb-212	Bq/kg	74.8	57.9	1.29	W
			Pb-214	Bq/kg	79.2	71.1	1.11	A
			Sr-90	Bq/kg	53.5	64.4	0.83	A
			Th-234	Bq/kg	169.1	127	1.33	A
		Vegetation	Co-60	Bq/kg	14.4	12.1	1.19	A
			Cs-137	Bq/kg	522	444	1.18	A
			K-40	Bq/kg	1360	1120	1.21	A
			Sr-90	Bq/kg	498.3	650	0.77	A
		Water	Co-60	Bq/L	252.3	234	1.08	A
			Cs-134	Bq/L	31.1	30.5	1.02	A
			Cs-137	Bq/L	71.5	63.8	1.12	W
			Gr-Beta	Bq/L	821.3	627.5	1.31	W
			H-3	Bq/L	418.3	390	1.07	A
			Sr-90	Bq/L	3.63	4.34	0.84	W
September, 2003	QAP 59 (QAP 0309)	AP	Mn-54	Bq/filter	54.0	58.0	0.93	A
			Co-60	Bq/filter	53.3	55.1	0.97	A
			Sr-90	Bq/filter	1.7	2.058	0.83	A
			Cs-137	Bq/filter	51.2	54.8	0.93	A
			Gr-Beta	Bq/filter	3.4	3.89	0.87	W
		Soil	K-40	Bq/kg	517.0	488.0	1.06	A
			Sr-90	Bq/kg	70.0	80.3	0.87	A
			Cs-137	Bq/kg	2127.0	1973.0	1.08	A
			Bi-212	Bq/kg	56.1	53.9	1.04	A
			Pb-212	Bq/kg	52.7	50.7	1.04	A
			Bi-214	Bq/kg	36.4	34.4	1.06	A
			Pb-214	Bq/kg	41.5	35.2	1.18	A
			Ac-228	Bq/kg	56.2	50.8	1.11	A
			Th-234	Bq/kg	145.4	116.0	1.25	A

TABLE E-2 DOE/EML ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2003
(PAGE 2 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/EML	Evaluation (d)
September, 2003	QAP 59 (QAP 0309)	Water	H-3	Bq/L	511.0	446.3	1.14	A
			Co-60	Bq/L	491.0	513.0	0.96	A
			Sr-90	Bq/L	5.9	7.04	0.84	W
			Cs-134	Bq/L	62.4	63.0	0.99	A
			Cs-137	Bq/L	74.9	80.3	0.93	A
			Gr-Beta	Bq/L	1663.0	1948.0	0.85	A

(1) Incorrect bottle size used. Sample was placed into a smaller container and recounted. All recount results were acceptable except Bi-212 which was acceptable with warning. Previously analyzed samples were examined and no other incorrect container sizes were noted. NCR 03-07

(a) Teledyne Brown Engineering reported result.

(b) The DOE/EML known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) Ratio of Teledyne Brown Engineering to DOE/EML results.

(d) DOE/EML evaluation: A=acceptable, W=acceptable with warning, N=not acceptable.

TABLE E-3 ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2003
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Control Limits	Evaluation (c)
May, 2003	Rad 53	Water	I-131	pCi/L	13.6	20.8	15.6 - 26.0	N (1)
			H-3	pCi/L	1200	1250	678 - 1820	A
			Co-60	pCi/L	69.9	63.8	55.1 - 72.5	A
			Cs-134	pCi/L	73.5	75.7	67.0 - 84.4	A
			Cs-137	pCi/L	165	150	141 - 159	N (2)
			Sr-89	pCi/L	37.0	31.3	22.6 - 40.0	A
			Sr-90	pCi/L	23.5	27.4	18.7 - 36.1	A
November, 2003	Rad 55	Water	I-131	pCi/L	22.2	28.2	23.0 - 33.4	N (3)
			H-3	pCi/L	1630	14300	11800 - 16800	N (3)
			Co-60	pCi/L	28.4	27.7	19.0 - 36.4	A
			Cs-134	pCi/L	21.7	23.4	14.7 - 32.1	A
			Cs-137	pCi/L	63.6	64.2	55.5 - 72.9	A
			Sr-89	pCi/L	47.9	50.4	41.7 - 59.1	A
			Sr-90	pCi/L	9.23	10.2	1.54 - 18.9	A
			Gr-Beta	pCi/L	161	168	124 - 212	A

(1) The stable iodine carrier in the sample was unaccounted for in the calculation. When recalculated, the correct result of 20.0 pCi/L was within acceptance criteria. NCR 03-11

(2) Although Cs-137 is evaluated as N, the TBE/ERA ratio of 1.10 falls within limits of 0.80 - 1.20 and is considered by TBE as acceptable.

(3) The decay correction did not take into account the extended count time. When recalculated, the correct result of 23.2 was within acceptance criteria. NCR 04-06

Due to recalculating H-3 to required reporting units, a decimal place was dropped. The correct result of 16300 is within acceptance criteria. NCR 04-06

(a) Teledyne Brown Engineering reported result.

(b) The ERA known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) ERA evaluation: A=acceptable. Reported result falls within the Warning Limits. NA=not acceptable. Reported result falls outside of the Control Limits. CE=check for Error. Reported result falls within the Control Limits and outside of the Warning Limit.

TABLE E-4 MAPEP ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2003
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Control Limits	Evaluation (c)
February, 2003	02-W10	Water	Cs-134	Bq/L	382.7	421	294.70 - 547.30	A
			Cs-137	Bq/L	329.3	329	230.30 - 427.70	A
			Co-57	Bq/L	58.17	57	39.90 - 74.10	A
			Co-60	Bq/L	41.2	38.2	26.74 - 49.66	A
			Mn-54	Bq/L	35.07	32.9	23.03 - 42.77	A
			Sr-90	Bq/L	11.70	12.31	8.62 - 16.00	A
			Zn-65	Bq/L	566	516	361.20 - 670.80	A
July, 2003	03-S10	Soil	Cs-134	Bq/Kg	204	238	166.60 - 309.40	A
			Cs-137	Bq/Kg	803	832	582.40 - 1081.60	A
			Co-57	Bq/Kg	499	530	371.00 -689.00	A
			Co-60	Bq/Kg	427	420	294.00 - 546.00	A
			Mn-54	Bq/Kg	136	137	95.90 - 178.10	A
			K-40	Bq/Kg	686	652	456.40 - 847.60	A
			Sr-90	Bq/Kg	651	714	499.80 - 928.20	A
			Zn-65	Bq/Kg	528	490	343.00 - 637.00	A

(a) Teledyne Brown Engineering reported result.

(b) The MAPEP known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(c) DOE/MAPEP evaluation: A=acceptable, W=acceptable with warning, N=not acceptable.

TABLE E-5 ERA STATISTICAL SUMMARY PROFICIENCY TESTING PROGRAM
ENVIRONMENTAL, INC., 2003
(Page 1 of 2)

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result[b]	ERA Result[c]	Control Limits
STW-973	02/17/03	Sr-89	17.0 ± 0.5	15.9 ± 5.0	7.2 - 24.6
STW-973	02/17/03	Sr-90	8.9 ± 0.3	9.0 ± 5.0	0.4 - 17.7
STW-974	02/17/03	Ba-133	14.5 ± 0.9	19.5 ± 5.0	10.8 - 28.2
STW-974	02/17/03	Co-60	37.5 ± 0.9	37.4 ± 5.0	28.7 - 46.1
STW-974	02/17/03	Cs-134	18.2 ± 0.6	17.8 ± 5.0	9.1 - 26.5
STW-974	02/17/03	Cs-137	42.7 ± 1.0	44.2 ± 5.0	35.5 - 52.9
STW-974	02/17/03	Zn-65	56.8 ± 2.2	60.3 ± 6.0	49.9 - 70.7
STW-975[d]	02/17/03	Gr. Alpha	18.4 ± 0.3	37.6 ± 9.4	21.3 - 53.9
STW-975	02/17/03	Gr. Beta	11.7 ± 0.5	8.6 ± 5.0	0.0 - 17.2
STW-976	02/17/03	Ra-226	4.1 ± 0.1	4.7 ± 0.7	3.5 - 6.0
STW-976	02/17/03	Ra-228	7.6 ± 0.5	6.5 ± 1.6	3.7 - 9.3
STW-976	02/17/03	Uranium	52.9 ± 1.9	53.7 ± 5.4	44.4 - 63.0
STW-983	05/19/03	H-3	1290.0 ± 25.0	1250.0 ± 331.0	678.0 - 1820.0
STW-984	05/19/03	I-131	19.7 ± 1.3	20.8 ± 3.0	15.6 - 26.0
STW-985	05/19/03	Gr. Alpha	54.4 ± 3.0	70.3 ± 17.6	39.9 - 101.0
STW-985	05/19/03	Ra-226	14.9 ± 0.2	16.5 ± 2.5	12.2 - 20.8
STW-985	05/19/03	Ra-228	13.1 ± 0.6	10.3 ± 2.6	5.8 - 14.8
STW-985	05/19/03	Uranium	14.5 ± 0.4	15.1 ± 3.0	9.9 - 20.3
STW-986	05/19/03	Co-60	56.9 ± 8.6	63.8 ± 5.0	55.1 - 72.5
STW-986[e]	05/19/03	Cs-134	61.6 ± 6.6	75.7 ± 5.0	67.0 - 84.4
STW-986	05/19/03	Cs-137	143.0 ± 1.2	150.0 ± 7.5	137.0 - 163.0
STW-986	05/19/03	Gr. Beta	309.0 ± 2.7	363.0 ± 54.5	269.0 - 457.0
STW-986	05/19/03	Sr-89	33.1 ± 0.2	31.3 ± 5.0	22.6 - 40.0
STW-986	05/19/03	Sr-90	28.8 ± 1.3	27.4 ± 5.0	18.7 - 36.1
STW-988	08/18/03	Ra-226	13.3 ± 1.1	13.4 ± 2.0	9.9 - 16.9
STW-988	08/18/03	Ra-228	11.5 ± 1.0	12.5 ± 3.1	7.1 - 17.9
STW-988	08/18/03	Uranium	12.3 ± 0.4	11.4 ± 3.0	6.2 - 16.6
STW-989	08/18/03	Ba-133	18.1 ± 1.9	20.7 ± 5.0	12.0 - 29.4
STW-989	08/18/03	Co-60	35.9 ± 1.3	37.4 ± 5.0	28.7 - 46.1
STW-989	08/18/03	Cs-134	32.6 ± 1.8	32.6 ± 5.0	23.9 - 41.3
STW-989	08/18/03	Cs-137	48.3 ± 0.6	44.3 ± 5.0	35.6 - 53.0
STW-989	08/18/03	Zn-65	58.9 ± 2.1	60.2 ± 6.0	49.8 - 70.6
STW-990	08/18/03	Gr. Alpha	41.8 ± 3.4	56.2 ± 16.3	36.9 - 93.3
STW-990[f]	08/18/03	Gr. Beta	51.3 ± 3.0	31.6 ± 5.0	22.9 - 40.3
STW-991	08/18/03	Sr-89	57.2 ± 4.3	58.8 ± 5.0	50.1 - 67.5
STW-991	08/18/03	Sr-90	21.2 ± 0.9	20.6 ± 5.0	11.9 - 29.3

TABLE E-5 ERA STATISTICAL SUMMARY PROFICIENCY TESTING PROGRAM
ENVIRONMENTAL, INC., 2003
(Page 2 of 2)

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result[b]	ERA Result[c]	Control Limits
STW-997	11/18/03	Gr. Alpha	37.0 ± 2.0	29.5 ± 7.4	16.7 - 42.3
STW-997	11/18/03	Gr. Beta	26.5 ± 0.8	26.3 ± 5.0	17.6 - 35.0
STW-998	11/18/03	I-131	14.8 ± 0.3	16.5 ± 3.0	11.3 - 21.7
STW-999	11/18/03	Ra-226	17.2 ± 1.1	17.8 ± 2.7	13.2 - 22.4
STW-999	11/18/03	Ra-228	6.6 ± 0.3	6.8 ± 1.7	3.8 - 9.7
STW-999	11/18/03	Uranium	11.7 ± 0.3	11.7 ± 3.0	6.5 - 16.9
STW-1000	11/18/03	H-3	15900.0 ± 174.0	14300.0 ± 1430.0	11800.0 - 16800.0
STW-1001	11/18/03	Gr. Alpha	32.9 ± 0.3	54.2 ± 3.0	30.7 - 77.7
STW-1001	11/18/03	Ra-226	16.5 ± 0.9	16.1 ± 2.4	11.9 - 20.3
STW-1001	11/18/03	Ra-228	6.2 ± 0.5	5.5 ± 1.4	3.1 - 7.9
STW-1001	11/18/03	Uranium	9.7 ± 1.5	9.3 ± 13.6	4.1 - 14.5
STW-1002	11/18/03	Co-60	27.7 ± 1.9	27.7 ± 5.0	19.0 - 36.4
STW-1002	11/18/03	Cs-134	21.5 ± 1.1	23.4 ± 5.0	17.6 - 29.2
STW-1002	11/18/03	Cs-137	66.3 ± 2.8	64.2 ± 5.0	55.5 - 72.9
STW-1002	11/18/03	Gr. Beta	159.0 ± 2.5	168.0 ± 5.0	124.0 - 212.0
STW-1002	11/18/03	Sr-89	48.5 ± 0.4	50.4 ± 5.0	41.7 - 59.1
STW-1002	11/18/03	Sr-90	10.1 ± 3.0	10.2 ± 25.2	1.5 - 18.9

Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the environmental samples crosscheck program operated by Environmental Resources Associates (ERA).

[b] Unless otherwise indicated, the laboratory result is given as the mean ± standard deviation for three determinations.

[c] Results are presented as the known values, expected laboratory precision (1 sigma, 1 determination) and control limits as provided by ERA.

[d] Recount of the original sample still low. The ERA blank was spiked in the lab; known value of 20.1 pCi/L, measured 21.5 ± 1.1 pCi/L. No explanation for ERA test failure.

[e] Lower bias observed for gamma spectroscopic analysis. The undiluted sample was reanalyzed; Results of reanalysis, Co-60: 62.3 pCi/L., Cs-134: 69.2 pCi/L., Cs-137: 152.3 pCi/L.

[f] Reason for deviation unknown. A recount of the original planchets averaged 43.4 pCi/L. Cs-137activity by gamma spectroscopy; 28.3 pCi/L. Result of reanalysis; 29.3 pCi/L.

TABLE E-6 DOE's MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
ENVIRONMENTAL, INC., 2003
(Page 1 of 1)

			Concentration[b]			
Lab Code	Type	Date	Analysis	Laboratory result	Known Activity	Control Limits[c]
STW-972	water	12/01/02	Am-241	0.56 ± 0.06	0.58 ± 0.09	0.40 - 0.75
STW-972	water	12/01/02	Co-57	57.10 ± 1.90	57.00 ± 5.70	39.90 - 74.10
STW-972	water	12/01/02	Co-60	38.30 ± 0.60	38.20 ± 3.82	26.74 - 49.66
STW-972	water	12/01/02	Cs-134	395.30 ± 10.10	421.00 ± 42.10	294.70 - 547.30
STW-972	water	12/01/02	Cs-137	316.40 ± 5.30	329.00 ± 32.90	230.30 - 427.70
STW-972	water	12/01/02	Fe-55	94.90 ± 24.50	96.00 ± 9.60	67.20 - 124.80
STW-972	water	12/01/02	Mn-54	33.40 ± 0.10	32.90 ± 3.29	23.03 - 42.77
STW-972	water	12/01/02	Ni-63	123.80 ± 5.50	136.50 ± 13.70	95.55 - 177.45
STW-972	water	12/01/02	Pu-238	0.66 ± 0.06	0.83 ± 0.08	0.58 - 1.08
STW-972	water	12/01/02	Pu-239/40	0.001 ± 0.001	0.000 ± 0.000	0.000 - 0.005
STW-972	water	12/01/02	Sr-90	13.80 ± 1.00	12.31 ± 1.23	8.62 - 16.00
STW-972	water	12/01/02	Tc-99	128.10 ± 3.80	132.00 ± 13.20	92.40 - 171.60
STW-972	water	12/01/02	U-233/4	1.60 ± 0.09	1.54 ± 0.15	1.08 - 2.00
STW-972	water	12/01/02	U-238	1.64 ± 0.09	1.60 ± 0.16	1.12 - 2.08
STW-972	water	12/01/02	Zn-65	540.40 ± 9.90	516.00 ± 51.60	361.20 - 670.80
STSO-987	soil	01/01/03	Co-57	534.36 ± 2.61	530.00 ± 53.00	371.00 - 689.00
STSO-987	soil	01/01/03	Co-60	442.16 ± 2.31	420.00 ± 42.00	294.00 - 546.00
STSO-987	soil	01/01/03	Cs-134	211.00 ± 2.30	238.00 ± 23.80	166.60 - 309.40
STSO-987	soil	01/01/03	Cs-137	849.50 ± 3.30	832.00 ± 83.20	582.40 - 1081.60
STSO-987	soil	01/01/03	K-40	716.50 ± 12.80	652.00 ± 65.20	456.40 - 847.60
STSO-987	soil	01/01/03	Mn-54	148.76 ± 2.84	137.00 ± 13.70	95.90 - 178.10
STSO-987	soil	01/01/03	Ni-63	597.10 ± 23.50	770.00 ± 77.00	539.00 - 1001.00
STSO-987	soil	01/01/03	Pu-238	67.05 ± 3.10	66.90 ± 6.70	46.83 - 86.97
STSO-987	soil	01/01/03	Pu-239/40	52.80 ± 3.60	52.70 ± 5.30	36.90 - 68.50
STSO-987	soil	01/01/03	Sr-90	609.50 ± 9.80	714.00 ± 71.40	499.80 - 928.20
STSO-987	soil	01/01/03	U-233/4	99.50 ± 7.60	89.00 ± 8.90	62.30 - 115.70
STSO-987	soil	01/01/03	U-238	508.60 ± 42.20	421.00 ± 42.10	294.70 - 547.30
STSO-987	soil	01/01/03	Zn-65	492.70 ± 28.10	490.00 ± 49.00	343.00 - 637.00

Results obtained by Environmental, Inc. ,Midwest Laboratory as a participant in the Department of Energy's Mixed Analyte Performance Evaluation Program, Idaho Operations office, Idaho Falls, Idaho

[b] All results are in Bq/kg or Bq/L as requested by the Department of Energy.

[c] MAPEP results are presented as the known values and expected laboratory precision (1 sigma, 1 determination) and control limits as defined by the MAPEP.