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TS 6.9.1.7

April 25, 2001

Docket Nos. 50-352
50-353

License Nos. NPF-39
NPF-85

U. S Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Limerick Generating Station, Units 1 and 2
2000 Annual Radiological Environmental Operating Report

Dear Sir/Madam:

In accordance with the requirements of Section 6.9.1.7 of the Limerick Generating Station (LGS), Units 1 and 2 Technical Specifications (TS), this letter submits the 2000 Annual Radiological Environmental Operating Report No. 17. This report provides the information delineated in TS Section 6.9.1.7, including a summary of the Radiological Environmental Monitoring Program (REMP).

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 tritium were found in any pathway modeled by the REMP. Tritium levels detected in the surface and drinking water pathway were similar to those found in previous years and were less than 1% of the reportable Offsite Dose Calculation Manual limit (ODCM).

The 2000 REMP confirmed that the LGS environmental effects from radioactive releases were well below LGS Technical Specifications, ODCM and other applicable regulatory limits.

C001

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

Sincerely,

J. A. Hutton /FOR

James A. Hutton
Director - Licensing
Mid-Atlantic Regional Operating Group

Attachment

cc: H. J. Miller, Administrator, Region I, USNRC
A. L. Burritt, USNRC Senior Resident Inspector, LGS
C. Gratton, Senior Project Manager, USNRC

Docket No: 50-352
50-353

LIMERICK GENERATING STATION
UNITS 1 and 2

Annual Radiological
Environmental Operating Report

Report No.17

1 January Through 31 December 2000

Prepared By

Nuclear

Generation Support
200 Exelon Way
Kennett Square, PA 19348

May 2001

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I. Summary and Conclusions

This report on the Radiological Environmental Monitoring Program conducted for the Limerick Generating Station by Exelon covers the period 1 January 2000 through 31 December 2000. During that time period, 1130 analyses were performed on 911 samples. In assessing all the data gathered for this report and comparing these results with preoperational data, it was evident that, the operation of LGS had no adverse radiological impact on the environment.

Surface and drinking water samples were analyzed for concentrations of tritium and gamma emitting nuclides. In addition, drinking water samples were analyzed for concentrations of gross beta (soluble and insoluble fractions). No fission or activation products were found. Gross beta activities detected were consistent with those observed in other years. Tritium activity was detected at the surface and drinking water stations located downstream of the LGS discharge during the second quarter. The levels detected were less than 1% of the reportable level and consistent with those observed in previous years.

Fish (predator and bottom feeder) and sediment samples were analyzed for concentrations of gamma emitting nuclides. No fission or activation products were found in fish. Cesium-137 levels found in sediment was consistent with levels found in previous years. No Plant produced fission or activation products were found in sediment.

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

Environmental gamma radiation measurements were made quarterly using thermoluminescent dosimeters. Levels detected were consistent with those observed in other 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 radioactive nuclide transport was evident.

II. Introduction

The Limerick Generating Station (LGS), consisting of two 3458 MWt boiling water reactors owned and operated by Exelon Corporation (formally PECO Energy), 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 AmerGen ERL, Environmental Inc., and Teledyne Brown Engineering (TBE) on samples collected during the period 1 January 2000 through 31 December 2000.

On July 6, 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 while in storage will decay to background. Final disposition will be determined at decommissioning of the Station.

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 by Normandeau Associates, RMC Environmental Services Division (RMC). This section describes the collection methods used by RMC to obtain environmental samples for the LGS REMP in 2000. Sample locations and descriptions can be found in Tables B–1 and B–2, and Figures B–1 through B–3, Appendix B.

Aquatic Environment

The aquatic environment was examined 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 examined 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) during April through November, and monthly during 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, refrigerated, and shipped promptly to the laboratory. No preservative was added.

Ambient Gamma Radiation

Direct radiation measurements were made using Panasonic 801 and 804 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 sixteen 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 sixteen 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 two $CaSO_4$ thermoluminescent phosphors (Panasonic 801) or three $CaSO_4$ thermoluminescent phosphors (Panasonic 804) 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 the laboratory for analysis.

10CFR20.2002 Permit Storage Area

1. The results of the surface water sampling program is used to determine any radioactive nuclide transport from the storage area into the Schuylkill River.

B. Sample Analysis

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 this operational data will be compared. For the purpose of this report, LGS was considered operational at initial criticality. In addition data will be compared to previous years' operational data for consistency and trending. Several factors are important in the interpretation of the data. These factors are discussed here to avoid undue repetition in the discussion of the results.

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. For a more detailed description of the result calculations, see Appendix E.

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

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

For fish seven nuclides, 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 2000 the LGS REMP had a sample recovery rate of better than 99%. The exceptions to this program are listed below:

1. Surface water composite sampler at location 24S1 (LGS Intake) was out of service for during the following periods:
   01/18/2000 – 01/20/2000 – freezing
   01/24/2000 – 01/28/2000 – freezing
   12/19/2000 – 12/24/2000 – freezing

   Grab samples were taken as necessary.

2. Surface water composite sampler at location 13B1 (Vincent Dam) was out of service for during the following periods:
   03/21/2000 – 03/29/2000 Pump clogged due to high flows
   05/29/2000 – 05/31/2000 Pump clogged due to high flows
   06/12/2000 – 06/14/2000 Pump failure
   06/29/2000 Pump clogged due to high flows
   07/14/2000 Pump clogged
   07/31/2000 – 08/04/2000 Pump failure
   08/06/2000 – 08/07/2000 Pump clogged due to high flows
   08/17/2000 Pump clogged
   09/11/2000 River level is too low. Portable sampling equipment set up across river at Citizen's Utilities intake.
   11/27/2000 – 12/04/2000 freezing
   12/12/2000 – 12/19/2000 sample lost due to high flows
   12/19/2000 – 12/26/2000 freezing

   Grab samples were taken as necessary.

3. Drinking water composite sampler at location 28F3 (Pottstown Water Co.) was out of service for during the following periods:
   05/22/2000 – 05/25/2000 Pump failure

   Grab samples were taken as necessary.

4. The air particulate and air iodine filters from sampling location 10S3 were not available for week no. 19 due to an electrical problem.

5. The air particulate and air iodine filters from sampling location 11S1 were not available for week no. 14 due to an electrical problem.

6. The air particulate and air iodine filters from sampling location 14S1 were not available for week no. 44 due to sample equipment problem.

7. TLD data from location 25S2 was not available for the third quarter due to vandalism.

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 numerous problems noted for surface water sampling location 13B1 (Vincent Dam) are the direct result of a breach in the Dam that causes the pond height to drop. We are currently investigating relocating this sampler to the other shore at the Citizen's Utilities intake.

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

E. Program Changes

The following programs changes were made in 2000:

1. Goat milk farm was removed from the REMP due to an insufficient number of lactating goats. Farm 10F4 was added to the bi-weekly sampling program beginning in April.

2. The AmerGen ERL discontinued laboratory operations beginning fourth quarter. Environmental, Inc., became the primary laboratory.

3. TLD processing was transferred from ERL to ICN located in California.

4. Teledyne Brown Engineering relocated its operations from Westwood, NJ to Knoxville, TN. As a result samples sent to them were transferred to Environmental, Inc., for processing.

5. Commencing with the fourth quarter, Environmental, Inc., reported results as a "less than" when ever positive activity was below the MDA.

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 could be affected by Station discharges. 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). Tritium activity ranged from –5.5 to <157 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 minimum detectable activity.

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 Station discharges. 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 -1.7 to <1.9 pCi/l for the insoluble fraction and from 1.0 to 5.6 pCi/l for the soluble fraction. Concentrations detected in both fractions were consistent with those observed 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). Tritium activity ranged from –2.5 to <157 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 minimum detectable activity.

3. Fish

Fish samples comprised of catfish/bullhead (bottom feeder) and redbreast/pumpkinseed (predator) were collected at two locations (16C5 and 29C1) semiannually. Location 16C5 could be affected by Station discharges. 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). No fission or activation products attributable to the Plant 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) could be affected by Station discharge. The following analysis was performed:

Gamma Spectrometry

Sediment samples from all three locations were analyzed for gamma emitting nuclides (Table C–IV.1, Appendix C). Nuclides detected were naturally occurring K–40, and the fission product Cs–137.

Potassium–40 was found at all stations and ranged from 11,133 to 15,000 pCi/kg dry for K–40. Concentrations of the fission product Cs–137 were found in sediment samples in two samples from the indicator locations 16B2 and 16C2. Location 16B2 had the highest average concentration of 110 pCi/kg dry. The activity detected was consistent with those observed in the pre–operational years (Figure C–4, Appendix C). No other Plant 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 1 to 40 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 4 to 37 E–3 pCi/m^3 with a mean of 16 E–3 pCi/m^3. The results from the Distant locations (Group III) ranged from 2 to 36 E–3 pCi/m^3 with a mean of 15 E–3 pCi/m^3. Comparison of the 2000 air particulate data with previous years data suggest no effects from the operation of LGS (Figure C–5, Appendix C). In addition a comparison of the weekly mean values for 2000 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 29 to 84 E–3 pCi/m^3. All other nuclides were less than the minimum detectable activity.

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 minimum detectable activity.

2. Terrestrial

a. Milk

Samples were taken 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 minimum detectable activity.

Gamma Spectrometry

Each milk sample from locations 18C1, 19B1, 21B1 and 22F1 were analyzed for concentrations of gamma emitting nuclides (Table C–VII.2, Appendix C).

Potassium–40 activity was found in all samples and ranged from 1,277 to 1,706 pCi/l. All other nuclides were less than the minimum detectable activity.

C. Ambient Gamma Radiation

Ambient gamma radiation levels were measured utilizing Panasonic 801 or 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 mrad/std. month, with a range of 4.6 to 11.3 mR/std. 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 was consistently higher. The historical ambient gamma radiation data from

Location 5H1 was plotted along with similar data from the Site, Intermediate Distance and Outer Ring Locations (Figure C–7, Appendix C). The data indicate that Location 5H1 had a historical high bias, but tracked with the data from all three groups.

D. 10 CFR 20.2002 Permit Storage Area

The results of the surface water aquatic monitoring program from Location 25S1 was used to determine if radioactivity from the 2002 permit area has made it to the Schuylkill River. The data obtained from the gamma analysis program did not detect any radioactivity from the 2002 permit area.

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

APPENDIX A
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

NAME OF FACILITY: LIMERICK GENERATING STATION
LOCATION OF FACILITY: MONTGOMERY COUNTY, PA
DOCKET NUMBER: 50-352 & 50-353
REPORTING PERIOD: 2000

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL 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	11	2000	108 (4/4) (52/157)	80 (7/7) (-6/157)	108 (4/4) (52/157)	13B1 (INDICATOR) VINCENT DAM 1.75 MILES SE OF SITE	0
	GAMMA	31						
	MN-54		15	0.2 (12/12) (-1.3/2.5)	0.6 (19/19) (-1.2/2.9)	0.8 (7/7) (-1.2/2.9)	10F2 (CONTROL) PERKIOMEN PUMPING STATION 7.30 MILES E OF SITE	0
	CO-58		15	0.1 (12/12) (-2/1.9)	0.5 (19/19) (-2.7/3.5)	1.1 (7/7) (-1.1/3.5)	10F2 (CONTROL) PERKIOMEN PUMPING STATION 7.30 MILES E OF SITE	0
	CO-60		15	0.3 (12/12) (-1.3/2.2)	0.7 (19/19) (-0.8/3)	0.9 (7/7) (-0.7/3)	10F2 (CONTROL) PERKIOMEN PUMPING STATION 7.30 MILES E OF SITE	0
	FE-59		30	1.9 (12/12) (-0.1/5.6)	1.8 (19/19) (-3/7.3)	2.4 (7/7) (-1.4/7.3)	10F2 (CONTROL) PERKIOMEN PUMPING STATION 7.30 MILES E OF SITE	0
	ZN-65		30	-1.6 (12/12) (-8/5.7)	-0.3 (19/19) (-7/8.2)	1.6 (7/7) (-5/8.2)	10F2 (CONTROL) PERKIOMEN PUMPING STATION 7.30 MILES E OF SITE	0
	ZR-95		30	1.0 (12/12) (-3/5.3)	1.3 (19/19) (-3/6.8)	1.7 (7/7) (-3/6.8)	10F2 (CONTROL) PERKIOMEN PUMPING STATION 7.30 MILES E OF SITE	0
	NB-95		15	0.6 (12/12) (-1.6/2.5)	1.3 (19/19) (-0.7/3.4)	1.6 (7/7) (0.1/3.4)	10F2 (CONTROL) PERKIOMEN PUMPING STATION 7.30 MILES E OF SITE	0
	CS-134		15	-2.5 (12/12) (-7/2.4)	-2.2 (19/19) (-11/4.8)	-1.0 (7/7) (-10/4.8)	10F2 (CONTROL) PERKIOMEN PUMPING STATION 7.30 MILES E OF SITE	0
	CS-137		18	0.3 (12/12) (-1.5/3.4)	0.8 (19/19) (-2/3.3)	1.1 (7/7) (-2/3.3)	10F2 (CONTROL) PERKIOMEN PUMPING STATION 7.30 MILES E OF SITE	0

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

APPENDIX A
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

NAME OF FACILITY: LIMERICK GENERATING STATION
LOCATION OF FACILITY: MONTGOMERY COUNTY, PA
DOCKET NUMBER: 50-352 & 50-353
REPORTING PERIOD: 2000

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL 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
	BA-140		60	4.5 (12/12) (-3/27)	4.0 (19/19) (-4/18)	6.3 (7/7) (-2.7/18)	10F2 (CONTROL) PERKIOMEN PUMPING STATION 7.30 MILES E OF SITE	0
	LA-140		15	1.0 (12/12) (-1.9/7.8)	1.1 (19/19) (-1/4.2)	1.4 (7/7) (-1/4.2)	10F2 (CONTROL) PERKIOMEN PUMPING STATION 7.30 MILES E OF SITE	0
DRINKING WATER (PCI/LITER)	GROSS BETA SOLUBLE	48	4	3.1 (36/36) (1.4/4.6)	3.0 (12/12) (1.0/5.6)	3.5 (12/12) (1.4/4.5)	15F4 (INDICATOR) PHILA. SUB. WATER CO. 8.62 MILES SE OF SITE	0
	GROSS BETA INSOLUBLE	48	4	0.3 (36/36) (-1.7/1.9)	0.3 (12/12) (-1/1.8)	0.3 (12/12) (-1/1.7)	15F4 (INDICATOR) PHILA. SUB. WATER CO. 8.62 MILES SE OF SITE	0
	TRITIUM	16	2000	90 (12/12) (17/157)	63 (4/4) (-2.5/152)	109 (4/4) (47/157)	15F4 (INDICATOR) PHILA. SUB. WATER CO. 8.62 MILES SE OF SITE	0
	GAMMA	48						
	MN-54		15	0.5 (36/36) (-1.7/5.8)	0.9 (12/12) (-0.7/4.1)	0.9 (12/12) (-0.7/4.1)	28F3 (CONTROL) POTTSTOWN WATER AUTHORITY 5.84 MILES WNW OF SITE	0
	CO-58		15	0.4 (36/36) (-1.8/3.5)	0.5 (12/12) (-0.9/2.7)	0.5 (12/12) (-0.7/3.5)	15F4 (INDICATOR) PHILA. SUB. WATER CO. 8.62 MILES SE OF SITE	0
	CO-60		15	0.6 (36/36) (-1.9/2.9)	0.8 (12/12) (-1/4.7)	0.8 (12/12) (-1/4.7)	28F3 (CONTROL) POTTSTOWN WATER AUTHORITY 5.84 MILES WNW OF SITE	0
	FE-59		30	1.6 (36/36) (-1.6/11)	1.2 (12/12) (-2.5/8.3)	1.7 (12/12) (-1.6/8.2)	15F4 (INDICATOR) PHILA. SUB. WATER CO. 8.62 MILES SE OF SITE	0
	ZN-65		30	-1.3 (36/36) (-8/5.9)	-0.6 (12/12) (-5/5.7)	-0.4 (12/12) (-6/5.9)	16C2 (INDICATOR) CITIZENS HOME WATER CO. 2.66 MILES SSE OF SITE	0

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

APPENDIX A
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY

NAME OF FACILITY: LIMERICK GENERATING STATION
LOCATION OF FACILITY: MONTGOMERY COUNTY, PA
DOCKET NUMBER: 50-352 & 50-353
REPORTING PERIOD: 2000

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL 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
	ZR-95		30	1.2 (36/36) (-1.4/7.4)	1.3 (12/12) (-1.0/7.3)	1.6 (12/12) (-1.4/7.4)	15F4 (INDICATOR) PHILA. SUB. WATER CO. 8.62 MILES SE OF SITE	0
	NB-95		15	0.8 (36/36) (-1.7/6.4)	0.4 (12/12) (-0.9/3.1)	1.1 (12/12) (-1.2/6.4)	15F4 (INDICATOR) PHILA. SUB. WATER CO. 8.62 MILES SE OF SITE	0
	CS-134		15	-2.5 (36/36) (-9/4.6)	-1.4 (12/12) (-5/4.4)	-1.4 (12/12) (-5/4.4)	28F3 (CONTROL) POTTSTOWN WATER AUTHORITY 5.84 MILES WNW OF SITE	0
	CS-137		18	0.7 (36/36) (-1.1/4.2)	0.5 (12/12) (-2.5/3.8)	0.7 (12/12) (-0.5/3)	16C2 (INDICATOR) CITIZENS HOME WATER CO. 2.66 MILES SSE OF SITE	0
	BA-140		60	3.0 (36/36) (-9/23)	2.7 (12/12) (-4/11)	3.4 (12/12) (-9/23)	15F4 (INDICATOR) PHILA. SUB. WATER CO. 8.62 MILES SE OF SITE	0
	LA-140		15	0.8 (36/36) (-1.1/4.4)	1.1 (12/12) (-0.9/4.7)	1.1 (12/12) (-0.9/4.7)	28F3 (CONTROL) POTTSTOWN WATER AUTHORITY 5.84 MILES WNW OF SITE	0
BOTTOM FEEDER (FISH) (PCI/KG WET)	GAMMA	4						
	MN-54		130	2.3 (2/2) (-0.9/5.5)	1.3 (2/2) (-6/8.1)	2.3 (2/2) (-0.9/5.5)	16C5 (INDICATOR) VINCENT POOL DOWNSTREAM OF DISCHARGE	0
	CO-58		130	1.0 (2/2) (-2.1/4)	3 (2/2) (-5/11)	3 (2/2) (-5/11)	29C1 (CONTROL) POTTSTOWN VICINITY UPSTREAM OF DISCHARGE	0
	CO-60		130	4.4 (2/2) (2.2/6.6)	1.7 (2/2) (-4/7.4)	4.4 (2/2) (2.2/6.6)	16C5 (INDICATOR) VINCENT POOL DOWNSTREAM OF DISCHARGE	0
	FE-59		260	5.7 (2/2) (0.1/11)	13 (2/2) (13/14)	13 (2/2) (13/14)	29C1 (CONTROL) POTTSTOWN VICINITY UPSTREAM OF DISCHARGE	0
	ZN-65		260	-0.2 (2/2) (-13/13)	1.3 (2/2) (-8/11)	1.3 (2/2) (-8/11)	29C1 (CONTROL) POTTSTOWN VICINITY UPSTREAM OF DISCHARGE	0

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MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL 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
PREDATOR (FISH) (PCI/KG WET)	CS-134	4	130	-3 (2/2) (-13/6.5)	-6 (2/2) (-22/9.3)	-3 (2/2) (-13/6.5)	16C5 (INDICATOR) VINCENT POOL DOWNSTREAM OF DISCHARGE	0
	CS-137		150	2.8 (2/2) (1.2/4.3)	4.9 (2/2) (2.5/7.3)	4.9 (2/2) (2.5/7.3)	29C1 (CONTROL) POTTSTOWN VICINITY UPSTREAM OF DISCHARGE	0
	GAMMA MN-54		130	1.0 (2/2) (-4/5.7)	6.4 (2/2) (2.8/9.9)	6.4 (2/2) (2.8/9.9)	29C1 (CONTROL) POTTSTOWN VICINITY UPSTREAM OF DISCHARGE	0
	CO-58		130	3.2 (2/2) (-1.6/7.9)	4.7 (2/2) (2/7.4)	4.7 (2/2) (2/7.4)	29C1 (CONTROL) POTTSTOWN VICINITY UPSTREAM OF DISCHARGE	0
	CO-60		130	5.7 (2/2) (4.7/6.7)	5.7 (2/2) (3.8/7.5)	5.7 (2/2) (4.7/6.7)	16C5 (INDICATOR) VINCENT POOL DOWNSTREAM OF DISCHARGE	0
	FE-59		260	7.1 (2/2) (3.7/11)	16 (2/2) (13/19)	16 (2/2) (13/19)	29C1 (CONTROL) POTTSTOWN VICINITY UPSTREAM OF DISCHARGE	0
	ZN-65		260	-0.7 (2/2) (-16/15)	-6 (2/2) (-20/8.8)	-0.7 (2/2) (-16/15)	16C5 (INDICATOR) VINCENT POOL DOWNSTREAM OF DISCHARGE	0
	CS-134		130	-4 (2/2) (-15/6.2)	-0.8 (2/2) (-13/12)	-0.8 (2/2) (-13/12)	29C1 (CONTROL) POTTSTOWN VICINITY UPSTREAM OF DISCHARGE	0
	CS-137		150	5.8 (2/2) (5.4/6.1)	5.4 (2/2) (2.3/8.4)	5.8 (2/2) (5.4/6.1)	16C5 (INDICATOR) VINCENT POOL DOWNSTREAM OF DISCHARGE	0
SILT (PCI/KG DRY)	GAMMA K-40	6	N/A	11930 (4/4) (10000/15000)	13503 (2/2) (13000/14005)	15000 (1/1) (15000/15000)	16B2 (INDICATOR) LINFIELD BRIDGE 1.35 MILES SSE OF SITE	0

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

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REPORTING PERIOD: 2000

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL 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
	MN-54		N/A	19 (4/4) (-0.6/39)	21 (2/2) (6.2/36)	39 (1/1) (39/39)	16B2 (INDICATOR) LINFIELD BRIDGE 1.35 MILES SSE OF SITE	0
	CO-58		N/A	23 (4/4) (-1.3/50)	14 (2/2) (-14/43)	50 (1/1) (50/50)	16B2 (INDICATOR) LINFIELD BRIDGE 1.35 MILES SSE OF SITE	0
	CO-60		N/A	19 (4/4) (-10/44)	16 (2/2) (8.8/23)	44 (1/1) (44/44)	16C4 (INDICATOR) VICENT DAM 2.18 MILES SSE OF SITE	0
	CS-134		N/A	25 (4/4) (-4/60)	29 (2/2) (2.3/55)	60 (1/1) (60/60)	16B2 (INDICATOR) LINFIELD BRIDGE 1.35 MILES SSE OF SITE	0
	CS-137		N/A	108 (4/4) (50/170)	59 (2/2) (37/81)	170 (1/1) (170/170)	16B2 (INDICATOR) LINFIELD BRIDGE 1.35 MILES SSE OF SITE	0
AIR PARTICULATE (E-3 PCI/CU. METER)	GROSS BETA	257	10	16 (205/205) (1.2/40)	15 (52/52) (2.2/36)	16 (51/51) (1.2/37)	10S3 (INDICATOR) KEEN ROAD 0.50 MILES E OF SITE	0
	GAMMA	20						
	BE-7		N/A	56 (16/16) (29/84)	50 (4/4) (38/60)	62 (4/4) (36/84)	13C1 (INDICATOR) KING ROAD 2.84 MILES SE OF SITE	0
	MN-54		N/A	0.1 (16/16) (-1/0.9)	0.2 (4/4) (-0.3/0.8)	0.2 (4/4) (-0.3/0.8)	22G1 (CONTROL) MANOR SUBSTATION 17.73 MILES SW OF SITE	0
	CO-58		N/A	0.1 (16/16) (-0.7/1.3)	-0.4 (4/4) (-1.3/0.8)	0.3 (4/4) (-0.2/0.8)	13C1 (INDICATOR) KING ROAD 2.84 MILES SE OF SITE	0
	CO-60		N/A	0.1 (16/16) (-1.9/1)	0.2 (4/4) (-0.4/0.8)	0.5 (4/4) (0.1/0.8)	10S3 (INDICATOR) KEEN ROAD 0.50 MILES E OF SITE	0

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

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MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (F) RANGE	CONTROL 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		50	-0.1 (16/16) (-2.3/1.1)	0.2 (4/4) (-0.9/1.1)	0.2 (4/4) (-0.2/0.6)	14S1 (INDICATOR) LONGVIEW ROAD 0.63 MILES SSE OF SITE	0
	CS-137		60	0.2 (16/16) (-0.5/1)	0.1 (4/4) (-0.4/0.4)	0.3 (4/4) (-0.4/0.9)	11S1 (INDICATOR) LGS INFORMATION CENTER 0.38 MILES ESE OF SITE	0
AIR IODINE (E-3 PCI/CU. METER)	I-131	257	70	2.7 (205/205) (-19/17)	2.6 (52/52) (-11/16)	3.2 (51/51) (-8/17)	10S3 (INDICATOR) KEEN ROAD 0.50 MILES E OF SITE	0
MILK (PCI/LITER)	I-131	118	1	0.1 (88/88) (-0.2/0.5)	0.1 (30/30) (-0.2/0.4)	0.1 (22/22) (-0.2/0.5)	21B1 (INDICATOR) REGIONAL FARM 1.75 MILES SSW OF SITE	0
	GAMMA K-40	103	N/A	1473 (80/80) (1277/1706)	1400 (23/23) (1300/1540)	1486 (14/14) (1400/1700)	10F4 (INDICATOR) REGIONAL FARM 6.60 MILES ESE OF SITE	0
	CS-134		15	-2.8 (80/80) (-15/6.7)	-1.5 (23/23) (-10/5.4)	-1.5 (23/23) (-10/5.4)	9G1 (CONTROL) REGIONAL FARM 11.64 MILES E OF SITE	0
	CS-137		18	0.7 (80/80) (-2.4/6.2)	1.2 (23/23) (-1.1/4.9)	1.2 (23/23) (-1.1/4.9)	9G1 (CONTROL) REGIONAL FARM 11.64 MILES E OF SITE	0
	BA-140		60	2.4 (80/80) (-10/24)	3.8 (23/23) (-7/20)	3.8 (23/23) (-7/20)	9G1 (CONTROL) REGIONAL FARM 11.64 MILES E OF SITE	0
	LA-140		15	0.5 (80/80) (-2.1/5.9)	0.7 (23/23) (-0.9/4.1)	0.7 (23/23) (-0.9/4.1)	9G1 (CONTROL) REGIONAL FARM 11.64 MILES E OF SITE	0
DIRECT RADIATION (MILLI-ROENTGEN/STD. MO.)	TLD-QUARTERLY	159	N/A	6.6 (155/155) (4.6/11.3)	8.2 (4/4) (7.7/8.8)	10.6 (4/4) (10.0/11.3)	13S2 (INDICATOR) 500 KV SUBSTATION 0.41 MILES SE OF SITE	0

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

APPENDIX B

SAMPLE DESIGNATION AND LOCATIONS

APPENDIX B: SAMPLE DESIGNATION AND LOCATIONS

LIST OF TABLES AND FIGURES

TABLES

FIGURES

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

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

TABLE B-2: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 2000

Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
A Surface Water				
13B1	Vincent Dam (indicator)	1.75 miles SE	Two gallon sample collected from a continuous water sampler, monthly	Gamma Spec - monthly - PL Tritium - quarterly comp. - PL
24S1	Limerick Intake (control)	0.20 miles SW	Same as 13B1	Same as 13B1
10F2	Perkiomen Pumping Station (control)	7.25 miles E	Same as 13B1 except water collected monthly only when water is withdrawn from the Perkiomen Creek for cooling	Same as 13B1
B Drinking (Potable) Water				
15F4	Philadelphia Suburban Water Company (indicator)	8.62 miles SE	Two gallon composite sample collected from a continuous water sampler, monthly	G. Beta (S&I) - monthly - PL Gamma Spec - monthly - PL Tritium - quarterly comp. - PL
15F7	Phoenixville Water Works indicator)	6.33 miles SSE	Same as 15F4	Same as 15F4
16C2	Citizens Home Water Company (indicator)	2.66 miles SSE	Same as 15F4	Same as 15F4 G. Beta (S&I) - monthly - QC* Gamma Spec - monthly - QC*
28F3	Pottstown Water Authority (control)	5.84 miles WNW	Same as 15F4	Same as 15F4
C. Milk - Bi-weekly / monthly				
9G1	Control	11.64 miles E	Two gallon grab sample collected from farm bulk tank bi-weekly during grazing season (April through November); monthly other times	I-131 - biweekly - PL Gamma Spec - biweekly - PL I-131 - quarterly - QC* Gamma Spec - quarterly - QC*

TABLE B-2: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 2000

Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
10F4		6.60 miles ESE	Same as 9G1	I-131 - biweekly - PL Gamma Spec - biweekly – PL
18C1		2.26 miles S	Same as 9G1	Same as 10F4
19B1		1.95 miles SSW	Same as 9G1	Same as 9G1
21B1		1.75 miles SSW	Same as 9G1	Same as 9G1
D. Milk - Quarterly				
36E1		4.70 miles N	Two gallons processed milk purchased at farm dairy store, quarterly	I-131 - quarterly - PL
22C1		2.92 miles SW	Two gallon grab sample collected from farm bulk tank, quarterly	Same as 36E1
23F1	Control	5.02 miles SW	Same as 22C1	Same as 36E1
25C1		2.69 miles WSW	Same as 22C1	Same as 36E1
E. Air Particulates / Air Iodine				
10S3	Keen Road	0.50 miles E	Approximately 1 cfm continuous flow through glass fiber and charcoal filters (approx. 2" diameter) which are installed for one week and replaced.	G. Beta - weekly - PL Gamma Spec - quarterly comp. - PL I-131 - weekly – PL
11S1	LGS Information Center	0.38 miles ESE	Same as 10S3	Same as 10S3
11S2	LGS Information Center	0.38 miles ESE	Same as 10S3	G. Beta - weekly - QC* Gamma Spec - quarterly comp. - QC*

TABLE B-2: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 2000

Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
13C1	King Road	2.84 miles SE	Same as 10S3	Same as 10S3
14S1	Longview Road	0.63 miles SSE	Same as 10S3	Same as 10S3
22G1	Manor Substation (control)	17.73 miles SW	Same as 10S3	Same as 10S3
E. Fish				
16C5	Vincent Pool (indicator)	Downstream of Discharge	Fish flesh from two groups representing predator and bottom feeder species collected by electrofishing or other appropriate fishery gear, semiannually	Gamma Spec - semiannually - PL
29C1	Pottstown Vicinity (control)	Upstream of Intake	Same as 16C5	Same as 16C5
G. Sediment				
16B2	Linfield Bridge (indicator)	1.35 miles SSE	Recently deposited sediment collected below the waterline, semi-annually	Gamma Spec - semiannually - PL
16C4	Vincent Dam (indicator)	2.18 miles SSE	Same as 16B2	Same as 16B2
33A2	Control	0.84 miles NNW	Same as 16B2	Same as 16B2
H. Environmental Dosimetry - TLD				
Site Boundary				
36S2	Evergreen & Sanatoga Road	0.60 miles N	Collection method and frequency is described in placement procedure Section III, A.	TLD - quarterly - PL
3S1	Sanatoga Road	0.44 miles NNE	Same as 36S2	Same as 36S2

TABLE B-2: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 2000

Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
5S1	Possum Hollow Road	0.45 miles NE	Same as 36S2	Same as 36S2
7S1	LGS Training Center	0.59 miles ENE	Same as 36S2	Same as 36S2
10S3	Keen Road	0.50 miles E	Same as 36S2	Same as 36S2
11S1	LGS Information Center	0.38 miles ESE	Same as 36S2	Same as 36S2
13S2	500 KV Substation	0.41 miles SE	Same as 36S2	Same as 36S2
14S1	Longview Road	0.63 miles SSE	Same as 36S2	Same as 36S2
18S2	Rail Line along Longview Road	0.26 miles S	Same as 36S2	Same as 36S2
21S2	Near Intake Building	0.19 miles SSW	Same as 36S2	Same as 36S2
23S2	Transmission Tower	0.53 miles SW	Same as 36S2	Same as 36S2
25S2	Sector Site Boundary	0.46 miles WSW	Same as 36S2	Same as 36S2
26S3	Met. Tower #2	0.40 miles W	Same as 36S2	Same as 36S2
29S1	Sector Site Boundary	0.55 miles WNW	Same as 36S2	Same as 36S2
31S1	Sector Site Boundary	0.26 miles NW	Same as 36S2	Same as 36S2
34S2	Met. Tower #1	0.58 miles NNW	Same as 36S2	Same as 36S2
Intermediate Distance				
36D1	Siren Tower No. 147	3.51 miles N	Same as 36S2	Same as 36S2
2E1	Laughing Waters GSC	4.76 miles NNE	Same as 36S2	Same as 36S2
4E1	Neiffer Road	4.78 miles NE	Same as 36S2	Same as 36S2
7E1	Pheasant Road	4.26 miles ENE	Same as 36S2	Same as 36S2
10E1	Royersford Road	3.94 miles E	Same as 36S2	Same as 36S2
10F3	Trappe Substation	5.58 miles ESE	Same as 36S2	Same as 36S2
13E1	Vaughn Substation	4.31 miles SE	Same as 36S2	Same as 36S2
16F1	Pikeland Substation	5.04 miles SSE	Same as 36S2	Same as 36S2
19D1	Snowden Substation	3.49 miles S	Same as 36S2	Same as 36S2
20F1	Sheeder Substation	5.24 miles SSW	Same as 36S2	Same as 36S2
24D1	Porters Mill Substation	3.97 miles SW	Same as 36S2	Same as 36S2
25D1	Hoffecker & Keim Streets	3.99 miles WSW	Same as 36S2	Same as 36S2
28D2	W. Cedarville Road	3.83 miles W	Same as 36S2	Same as 36S2
29E1	Prince Street	4.95 miles WNW	Same as 36S2	Same as 36S2
31D2	Poplar Substation	3.87 miles NW	Same as 36S2	Same as 36S2
34E1	Varnell Road	4.59 miles NNW	Same as 36S2	Same as 36S2

TABLE B-2: Sample Collection and Analysis Program for the Radiological Environmental Monitoring Program for Limerick Generating Station, 2000

Location	Location Description	Distance & Direction	Collection Method and Frequency	Analysis & Frequency Performed--Consultant
Control and Special Interest				
5H1 - C	Birch Substation (Control)	24.76 miles NE	Same as 36S2	Same as 36S2
6C1	Pottstown Landing Field	2.14 miles NE	Same as 36S2	Same as 36S2
9C1	Reed Road	2.15 miles E	Same as 36S2	Same as 36S2
13C1	King Road	2.84 miles SE	Same as 36S2	Same as 36S2
15D1	Spring City Substation	3.20 miles SE	Same as 36S2	Same as 36S2
17B1	Linfield Substation	1.60 miles S	Same as 36S2	Same as 36S2
20D1	Ellis Woods Road	3.06 miles SSW	Same as 36S2	Same as 36S2
31D1	Lincoln Substation	3.00 miles WNW	Same as 36S2	Same as 36S2

* QC Laboratory

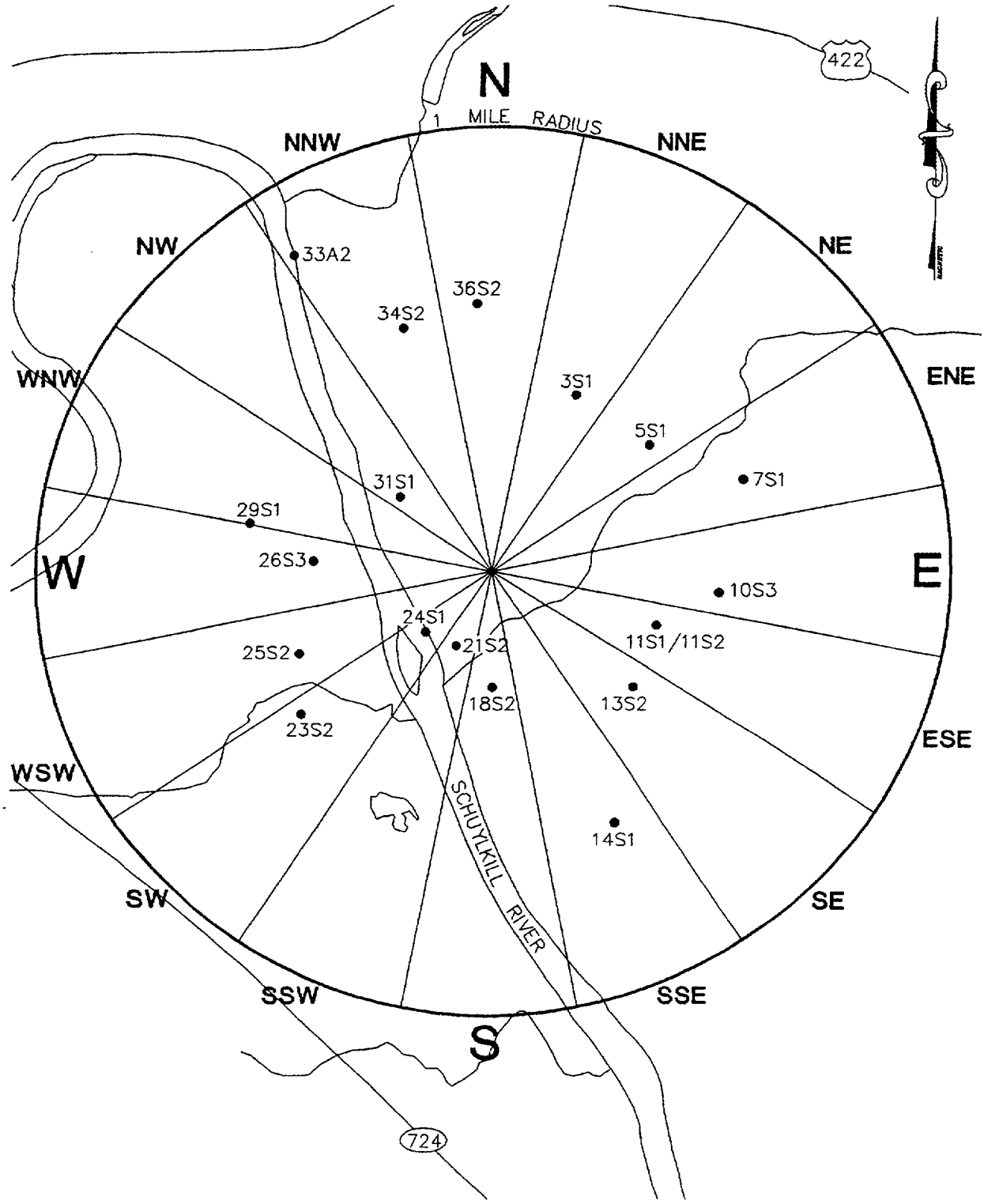

Figure B-1
Environmental Sampling Locations Within One
Mile of the Limerick Generating Station, 2000

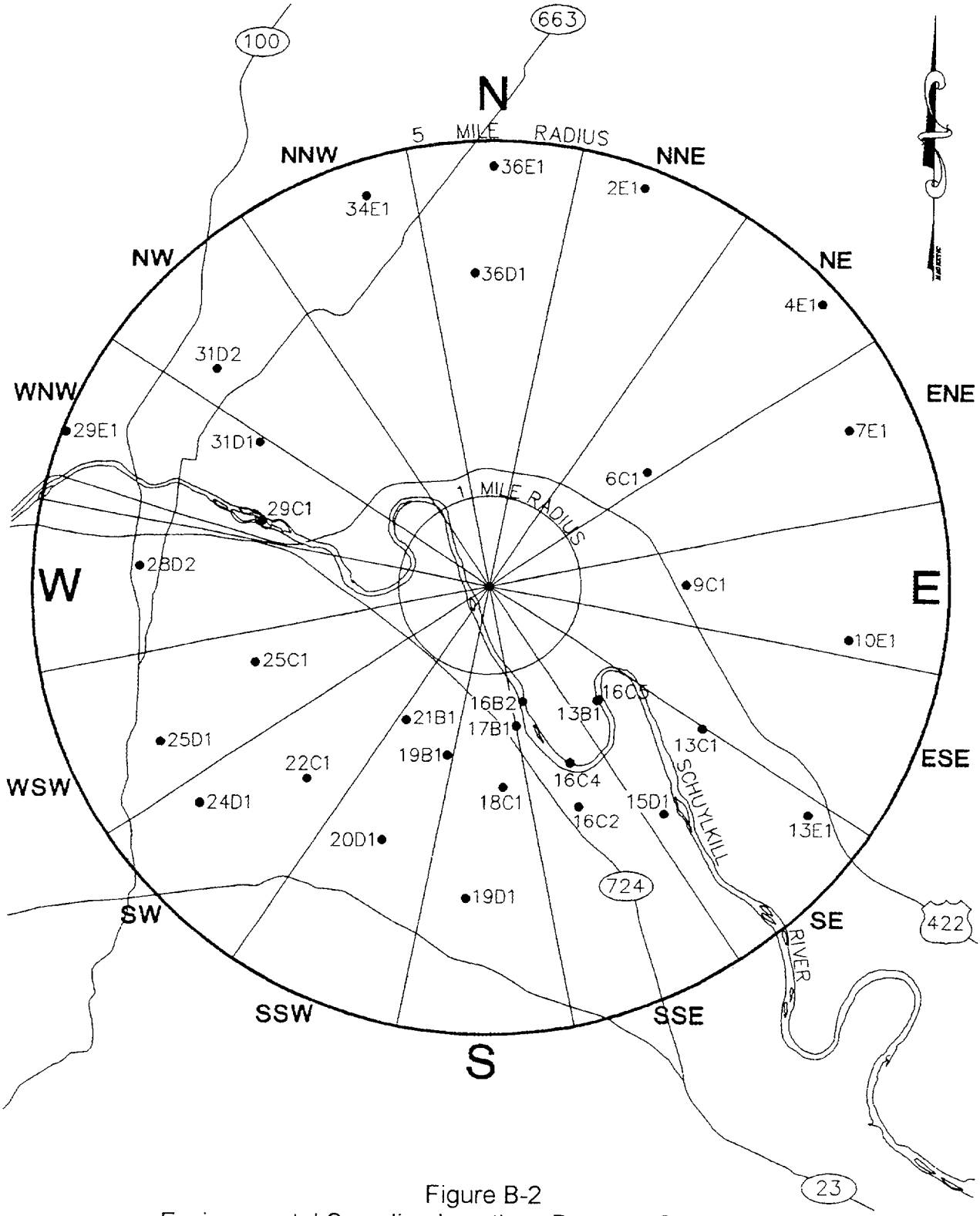

Figure B-2
Environmental Sampling Locations Between One and Five Miles of the Limerick Generating Station, 2000

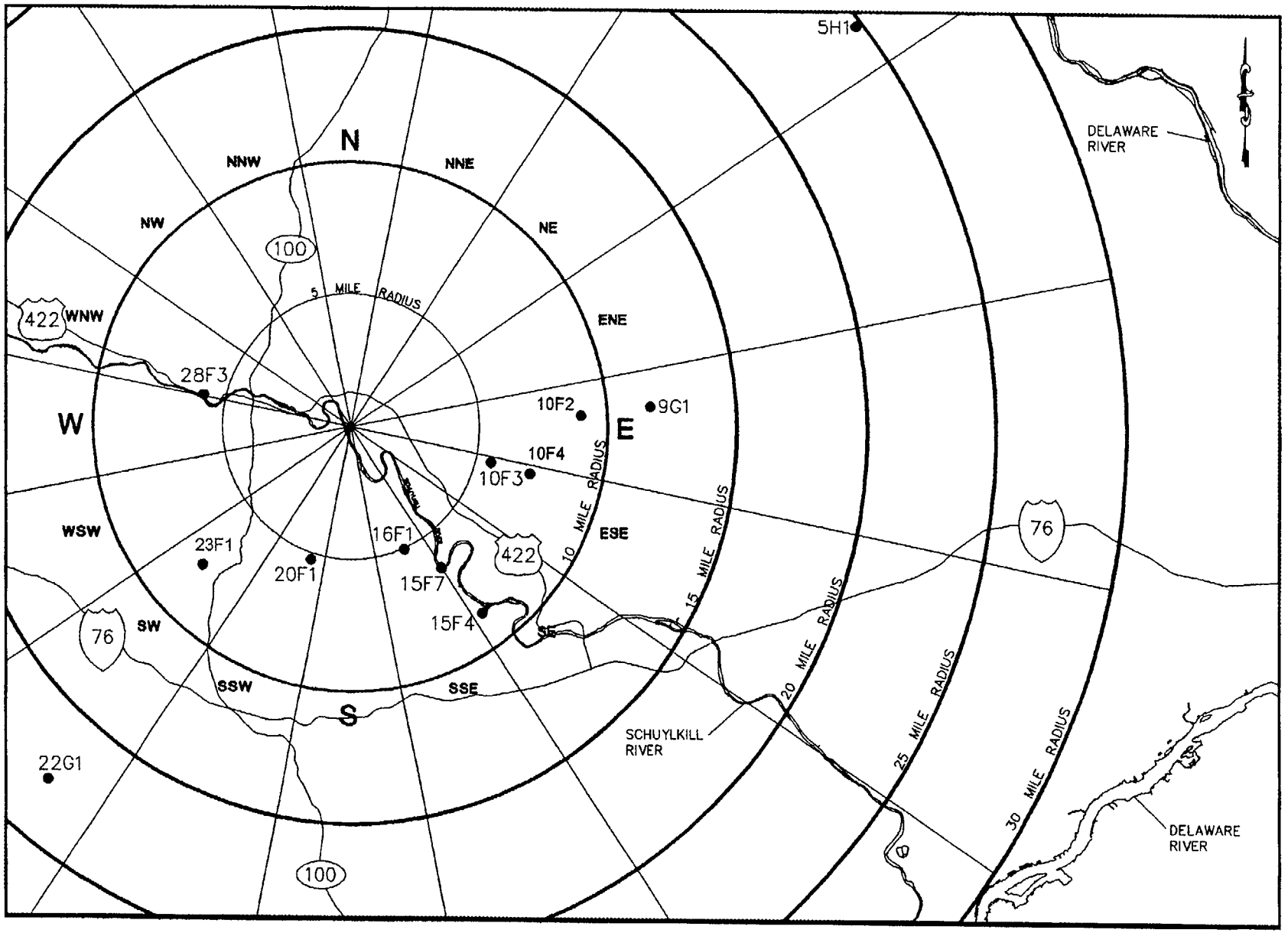

Figure B-3
Environmental Sampling Locations Greater than Five Miles from the Limerick Generating Station, 2000

APPENDIX C

DATA TABLES AND FIGURES
PRIMARY LABORATORY

APPENDIX C: DATA TABLES AND FIGURES - PRIMARY LABORATORY

TABLES

FIGURES

TABLE C-I.1 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

RESULTS IN UNITS OF PCI/LITER +/- 2 SIGMA

COLLECTION PERIOD	10F2	13B1	24S1
JAN-MAR	(1)	130 ± 50	88 ± 51
APR-JUN	2.5 ± 54	52 ± 56	-5.5 ± 54
JUL-SEP	99 ± 52	94 ± 51	59 ± 50
OCT-DEC	< 157	< 157	< 157
MEAN	86.2 ± 156.1	108.3 ± 91.0	74.6 ± 134.8

(1) NO SAMPLES COLLECTE DURING THIS PERIOD

TABLE C-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000**

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	JUN	-1 ± 2	-1 ± 2	2 ± 4	-1 ± 2	1 ± 4	-1 ± 3	0 ± 2	-3 ± 2	1 ± 2	2 ± 5	0.4 ± 3
	JUL	0 ± 1	0 ± 1	0 ± 1	0 ± 1	0 ± 2	1 ± 1	1 ± 1	-1 ± 1	0 ± 1	0 ± 3	0.4 ± 1
	AUG	-1 ± 2	0 ± 2	1 ± 4	1 ± 2	0 ± 4	-3 ± 3	0 ± 2	-5 ± 2	-2 ± 2	-3 ± 6	-0 ± 3
	SEP	0 ± 2	-1 ± 2	-1 ± 5	0 ± 2	-5 ± 5	-1 ± 4	2 ± 2	-10 ± 2	1 ± 2	6 ± 9	-1 ± 4
	OCT	< 2.7	< 2.6	< 3	< 3	< 3.5	< 5	< 3	< 3.4	< 2.9	< 9.6	< 2.6
	NOV	< 2.9	< 3.5	< 7	< 1.4	< 8.2	< 7	< 2.4	< 4.8	< 3.3	< 11	< 4.2
	DEC	< 2.2	< 2.8	< 5	< 1.7	< 4.3	< 4	< 3.4	< 3.8	< 1.6	< 18	< 3.3
	MEAN	0.8 ± 3.4	1.0 ± 3.8	2.5 ± 5.8	0.9 ± 2.7	1.7 ± 8.3	1.7 ± 7.3	1.7 ± 2.8	-1.0 ± 10.9	1.1 ± 3.6	6.3 ± 14.5	1.4 ± 3.9
13B1	JAN	0 ± 1	0 ± 1	1 ± 2	0 ± 1	-5 ± 2	1 ± 1	0 ± 1	-7 ± 1	-1 ± 1	1 ± 3	0.6 ± 1
	FEB	1 ± 2	-2 ± 2	2 ± 3	-1 ± 2	-2 ± 4	0 ± 3	0 ± 2	-6 ± 2	1 ± 2	-3 ± 5	2.3 ± 3
	MAR	0 ± 2	0 ± 2	0 ± 4	-1 ± 2	-7 ± 5	1 ± 3	0 ± 2	-5 ± 2	0 ± 2	-2 ± 8	-0 ± 3
	APR	-1 ± 2	1 ± 2	1 ± 4	1 ± 2	-8 ± 5	-3 ± 3	1 ± 2	-7 ± 2	-2 ± 2	5 ± 7	1.8 ± 3
	MAY	-1 ± 2	-2 ± 2	2 ± 4	-1 ± 2	-3 ± 4	0 ± 3	1 ± 2	-1 ± 2	1 ± 2	2 ± 7	-2 ± 2
	JUN	0 ± 1	-1 ± 1	1 ± 2	1 ± 1	-1 ± 2	0 ± 2	-1 ± 1	-2 ± 1	0 ± 1	-2 ± 3	-1 ± 1
	JUL	-1 ± 1	0 ± 1	1 ± 3	0 ± 2	-3 ± 4	-1 ± 3	-2 ± 2	1 ± 2	-1 ± 2	-1 ± 5	-1 ± 2
	AUG	0 ± 1	0 ± 1	1 ± 3	0 ± 2	-3 ± 3	-1 ± 3	1 ± 2	-2 ± 2	-1 ± 2	0 ± 6	-1 ± 2
	SEP	0 ± 2	-1 ± 2	3 ± 4	0 ± 2	-1 ± 4	1 ± 3	0 ± 2	-7 ± 2	-1 ± 2	0 ± 8	-2 ± 4
	OCT	< 1.5	< 1.5	< 6	< 2.1	< 5.7	< 5	< 1.9	< 2.4	< 1.7	< 13	< 3.6
	NOV	< 1.7	< 1.9	< 5	< 1.6	< 4.6	< 5	< 2.5	< 2.3	< 1.9	< 27	< 7.8
	DEC	< 2.5	< 1.5	< 2	< 2.2	< 2.5	< 5	< 2	< 2	< 3.4	< 14	< 3.2
	MEAN	0.7 ± 2.3	0.4 ± 2.6	2.5 ± 3.3	1.0 ± 2.3	0.7 ± 8.5	2.0 ± 5.3	0.6 ± 2.6	-0.5 ± 7.7	0.6 ± 3.2	7.2 ± 17.9	1.4 ± 5.8
24S1	JAN	0 ± 2	-1 ± 2	-1 ± 4	1 ± 2	-7 ± 4	1 ± 3	2 ± 2	-11 ± 2	-1 ± 2	-2 ± 6	2.1 ± 2
	FEB	-1 ± 1	0 ± 1	1 ± 2	0 ± 1	-2 ± 2	1 ± 2	1 ± 1	-4 ± 1	0 ± 1	-2 ± 3	0.1 ± 1
	MAR	-1 ± 2	0 ± 2	4 ± 4	2 ± 2	-1 ± 4	-3 ± 3	1 ± 2	-5 ± 2	0 ± 2	3 ± 7	1.7 ± 3
	APR	-1 ± 1	0 ± 1	-1 ± 2	0 ± 1	-4 ± 2	0 ± 1	0 ± 1	-6 ± 1	0 ± 1	0 ± 4	-1 ± 1
	MAY	1 ± 2	-3 ± 2	2 ± 4	0 ± 2	-5 ± 4	-1 ± 3	0 ± 2	0 ± 2	0 ± 2	0 ± 6	1.7 ± 3
	JUN	0 ± 1	0 ± 1	1 ± 2	-1 ± 1	-2 ± 2	-1 ± 2	-1 ± 1	-2 ± 1	-1 ± 1	1 ± 3	0.7 ± 1
	JUL	0 ± 1	-1 ± 1	2 ± 2	0 ± 1	-4 ± 2	1 ± 1	0 ± 1	0 ± 1	0 ± 1	0 ± 3	-0 ± 1
	AUG	0 ± 2	-1 ± 2	-3 ± 4	0 ± 2	2 ± 4	0 ± 3	2 ± 2	-5 ± 2	0 ± 2	1 ± 7	-0 ± 3
	SEP	0 ± 1	0 ± 1	2 ± 2	0 ± 1	-6 ± 3	0 ± 2	0 ± 1	-9 ± 1	1 ± 1	-4 ± 5	-0 ± 2
	OCT	< 1.7	< 1.7	< 5	< 2.8	< 3.8	< 4	< 2.8	< 1.8	< 2	< 10	< 1.4
	NOV	< 1.8	< 2.6	< 2	< 1.5	< 3.9	< 6	< 2.5	< 2.8	< 2.1	< 11	< 2.2
	DEC	< 2.8	< 3.1	< 5	< 1.4	< 3.8	< 6	< 3.2	< 1.8	< 2.8	< 15	< 2.1
	MEAN	0.9 ± 2.4	0.8 ± 3.4	2.0 ± 4.8	0.7 ± 2.2	0.2 ± 7.9	2.2 ± 5.4	1.4 ± 2.7	-1.4 ± 8.9	1.0 ± 2.4	4.8 ± 11.8	0.8 ± 2.1

TABLE C-II.1 CONCENTRATIONS OF GROSS BETA INSOLUBLE IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

RESULTS IN UNITS OF PCI/LITER +/- 2 SIGMA

COLLECTION PERIOD	15F4	15F7	16C2	28F3
JAN	-1.0± 0.7	-1.2± 0.7	-1.7± 0.7	-1.0± 0.7
FEB	-0.3± 0.6	-0.4± 0.6	0.1± 0.7	-0.2± 0.6
MAR	0.4± 0.7	0.0± 0.6	0.0± 0.6	0.1± 0.7
APR	0.5± 0.6	0.1± 0.6	-0.2± 0.6	-0.1± 0.6
MAY	0.3± 0.5	0.4± 0.6	0.5± 0.6	0.2± 0.5
JUN	-0.1± 0.7	-0.8± 0.6	-0.8± 0.6	-0.9± 0.6
JUL	-0.1± 0.6	-0.2± 0.6	-0.1± 0.6	0.2± 0.6
AUG	-0.3± 0.6	-0.2± 0.6	0.1± 0.6	-0.4± 0.6
SEP	-0.2± 0.6	-0.3± 0.6	-0.1± 0.7	0.2± 0.7
OCT	< 1.6	< 1.6	< 1.7	< 1.7
NOV	< 1.4	< 1.5	< 1.5	< 1.6
DEC	< 1.7	< 1.9	< 1.9	< 1.8
MEAN	0.3± 1.7	0.2± 2.0	0.2± 2.1	0.3± 1.9

TABLE C-II.2 CONCENTRATIONS OF GROSS BETA SOLUBLE IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

RESULTS IN UNITS OF PCI/LITER +/- 2 SIGMA

COLLECTION PERIOD	15F4	15F7	16C2	28F3
JAN	3.6± 1.1	3.4± 1.1	3.4± 1.1	3.3± 1.1
FEB	3.2± 1.2	3.8± 1.2	1.9± 1.1	2.8± 1.2
MAR	4.4± 0.9	2.5± 0.8	2.1± 0.7	3.0± 0.9
APR	2.8± 0.8	2.3± 0.8	1.9± 0.8	2.1± 0.8
MAY	4.2± 1.1	2.9± 1.0	2.6± 1.0	3.2± 1.1
JUN	2.7± 1.0	1.9± 0.9	2.6± 1.0	1.0± 0.9
JUL	3.3± 0.9	4.6± 1.0	2.0± 0.9	2.6± 0.9
AUG	3.7± 1.1	4.5± 1.1	2.5± 1.0	4.3± 1.1
SEP	4.5± 1.2	4.4± 1.2	3.4± 1.2	5.6± 1.3
OCT	< 1.4	< 1.5	< 1.5	< 1.6
NOV	4.3± 0.7	4.1± 0.7	3.4± 0.6	3.6± 0.7
DEC	3.6± 1.1	3.3± 1.1	2.4± 1.0	2.9± 1.1
MEAN	3.5± 1.8	3.3± 2.1	2.5± 1.3	3.0± 2.4

TABLE C-II.3 CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

RESULTS IN UNITS OF PCI/LITER +/- 2 SIGMA

COLLECTION PERIOD	15F4	15F7	16C2	28F3
JAN-MAR	110 ± 50	110 ± 50	34 ± 50	71 ± 50
APR-JUN	47 ± 56	17 ± 55	41 ± 56	-2.5 ± 54
JUL-SEP	120 ± 50	69 ± 50	64 ± 50	30 ± 50
OCT-DEC	< 157	< 157	< 152	< 152
	108.5 ± 91.4	88.3 ± 119.1	72.8 ± 108.7	62.6 ± 133.5

TABLE C-II.4 **CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000**

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	0 ± 1	-1 ± 1	1 ± 2	0 ± 1	-5 ± 2	0 ± 2	-1 ± 1	-8 ± 1	0 ± 1	0 ± 3	0 ± 1
	FEB	-1 ± 2	0 ± 2	3 ± 4	-2 ± 2	-2 ± 4	0 ± 3	2 ± 2	-6 ± 2	0 ± 2	-9 ± 6	0 ± 3
	MAR	0 ± 1	0 ± 1	0 ± 2	0 ± 1	-5 ± 2	1 ± 2	0 ± 1	-8 ± 1	0 ± 1	1 ± 4	0 ± 2
	APR	-1 ± 1	0 ± 1	-2 ± 2	0 ± 1	-2 ± 2	1 ± 1	0 ± 1	-2 ± 1	0 ± 1	1 ± 3	0 ± 1
	MAY	0 ± 1	-1 ± 1	0 ± 2	0 ± 1	-5 ± 2	-1 ± 1	1 ± 1	-5 ± 1	0 ± 1	0 ± 4	0 ± 1
	JUN	1 ± 2	0 ± 2	1 ± 4	-1 ± 2	-3 ± 4	0 ± 3	0 ± 2	-2 ± 2	1 ± 2	-1 ± 7	1 ± 3
	JUL	0 ± 1	0 ± 1	1 ± 2	0 ± 1	-3 ± 3	-1 ± 2	-1 ± 1	-5 ± 1	0 ± 1	2 ± 3	1 ± 1
	AUG	1 ± 2	2 ± 2	2 ± 4	0 ± 2	-8 ± 4	0 ± 3	1 ± 2	-7 ± 2	-1 ± 2	1 ± 7	-1 ± 3
	SEP	0 ± 1	0 ± 1	0 ± 2	0 ± 1	0 ± 2	1 ± 1	-1 ± 1	-8 ± 1	0 ± 1	-1 ± 4	-1 ± 1
	OCT	< 2	< 1	< 3	< 2	< 3.5	< 5	< 2	< 3.3	< 2	< 12	< 3
	NOV	< 1	< 2	< 1.6	< 2	< 3.9	< 3	< 2	< 2	< 2	< 4.8	< 2
	DEC	< 6	< 4	< 8.2	< 3	< 5.5	< 7	< 6	< 4.6	< 4	< 23	< 4
	MEAN	0.8 ± 3.7	0.5 ± 2.6	1.6 ± 5.0	0.3 ± 2.5	-1.7 ± 8.3	1.3 ± 5.0	1.0 ± 4.2	-3.4 ± 9.2	0.7 ± 2.8	2.8 ± 15.7	0.8 ± 3.1
15F7	JAN	-1 ± 1	0 ± 1	1 ± 1	1 ± 1	-4 ± 2	0 ± 1	0 ± 1	-4 ± 1	1 ± 1	3 ± 3	0 ± 1
	FEB	0 ± 1	0 ± 1	1 ± 2	0 ± 1	-4 ± 2	0 ± 1	-2 ± 1	-4 ± 1	0 ± 1	0 ± 3	1 ± 1
	MAR	0 ± 1	0 ± 1	-2 ± 2	0 ± 1	-2 ± 2	1 ± 1	0 ± 1	-3 ± 1	0 ± 1	1 ± 3	0 ± 1
	APR	0 ± 1	1 ± 1	2 ± 3	1 ± 2	-3 ± 4	1 ± 3	0 ± 2	-3 ± 2	1 ± 2	-1 ± 6	-1 ± 3
	MAY	-1 ± 1	-1 ± 1	0 ± 2	0 ± 1	-4 ± 2	0 ± 2	0 ± 1	-6 ± 1	-1 ± 1	-1 ± 4	0 ± 2
	JUN	0 ± 1	0 ± 1	0 ± 2	0 ± 1	-2 ± 2	-1 ± 1	0 ± 1	-3 ± 1	0 ± 1	1 ± 3	1 ± 1
	JUL	-1 ± 1	0 ± 1	0 ± 2	1 ± 1	-7 ± 2	0 ± 2	0 ± 1	1 ± 1	0 ± 1	2 ± 3	-1 ± 1
	AUG	0 ± 1	0 ± 1	0 ± 1	0 ± 1	1 ± 2	0 ± 1	1 ± 1	-4 ± 1	1 ± 1	0 ± 3	0 ± 1
	SEP	0 ± 1	0 ± 1	0 ± 2	0 ± 1	-5 ± 2	0 ± 2	1 ± 1	-9 ± 1	-1 ± 1	0 ± 5	0 ± 2
	OCT	< 2	< 2	< 5.1	< 3	< 4.2	< 4	< 3	< 2.5	< 3	< 8.7	< 2
	NOV	< 1	< 2	< 1.6	< 2	< 3.9	< 3	< 2	< 2	< 2	< 4.8	< 2
	DEC	< 4	< 2	< 11	< 2	< 3.5	< 4	< 4	< 2.2	< 3	< 12	< 4
	MEAN	0.3 ± 2.8	0.4 ± 1.6	1.7 ± 6.9	0.8 ± 2.0	-1.5 ± 7.6	1.0 ± 3.5	0.8 ± 3.3	-2.4 ± 7.2	0.7 ± 2.6	2.5 ± 8.1	0.8 ± 3.2

TABLE C-II.4 CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

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	-2 ± 2	-2 ± 2	-1 ± 3	1 ± 2	-6 ± 4	0 ± 3	-1 ± 2	-5 ± 2	0 ± 2	3 ± 5	0 ± 2
	FEB	-1 ± 1	0 ± 1	0 ± 2	0 ± 1	1 ± 2	0 ± 1	0 ± 1	-9 ± 1	-1 ± 1	3 ± 3	0 ± 1
	MAR	0 ± 1	0 ± 1	2 ± 2	0 ± 1	1 ± 2	0 ± 1	1 ± 1	-1 ± 1	1 ± 1	-3 ± 4	-1 ± 1
	APR	0 ± 1	0 ± 1	1 ± 2	0 ± 1	-3 ± 2	0 ± 1	-1 ± 1	-3 ± 1	0 ± 1	-3 ± 3	0 ± 1
	MAY	0 ± 1	0 ± 1	0 ± 1	0 ± 1	-2 ± 2	0 ± 1	0 ± 1	-2 ± 1	0 ± 1	-1 ± 4	0 ± 1
	JUN	0 ± 1	0 ± 1	0 ± 2	0 ± 1	-2 ± 2	0 ± 2	0 ± 1	-4 ± 1	0 ± 1	0 ± 3	0 ± 1
	JUL	0 ± 1	0 ± 1	0 ± 2	0 ± 1	-1 ± 2	-1 ± 1	-1 ± 1	0 ± 1	0 ± 1	-2 ± 3	0 ± 1
	AUG	0 ± 1	-1 ± 1	1 ± 2	0 ± 1	-5 ± 2	-1 ± 2	0 ± 1	-5 ± 1	0 ± 1	-1 ± 4	0 ± 1
	SEP	0 ± 1	0 ± 1	-1 ± 2	0 ± 1	-2 ± 2	1 ± 1	0 ± 1	-3 ± 1	0 ± 1	1 ± 4	0 ± 1
	OCT	< 2	< 2	< 4.6	< 3	< 4.3	< 3	< 3	< 2.7	< 3	< 11	< 2
	NOV	< 1	< 2	< 5.6	< 2	< 4.6	< 4	< 2	< 2.5	< 3	< 13	< 4
	DEC	< 2	< 2	< 3.8	< 2	< 5.9	< 5	< 4	< 2.1	< 3	< 19	< 2
	MEAN	0.2 ± 2.2	0.3 ± 2.4	1.3 ± 4.4	0.7 ± 2.1	-0.4 ± 7.6	1.0 ± 4.0	0.5 ± 3.1	-2.1 ± 7.1	0.7 ± 2.7	3.3 ± 14.3	0.6 ± 2.8
28F3	JAN	2 ± 2	-1 ± 2	-3 ± 4	0 ± 2	-1 ± 5	0 ± 3	0 ± 2	-2 ± 2	-3 ± 2	-4 ± 7	3 ± 2
	FEB	-1 ± 1	0 ± 1	-1 ± 1	0 ± 1	-3 ± 2	0 ± 1	0 ± 1	-2 ± 1	0 ± 1	0 ± 3	0 ± 1
	MAR	0 ± 1	0 ± 1	2 ± 3	-1 ± 2	-1 ± 4	-1 ± 3	1 ± 1	-3 ± 2	0 ± 2	5 ± 7	0 ± 3
	APR	1 ± 2	0 ± 2	2 ± 4	1 ± 2	-1 ± 4	-1 ± 3	-1 ± 2	-5 ± 2	0 ± 2	1 ± 7	1 ± 3
	MAY	0 ± 1	-1 ± 1	1 ± 2	0 ± 1	-2 ± 2	0 ± 1	0 ± 1	-4 ± 1	0 ± 1	-2 ± 4	-1 ± 1
	JUN	0 ± 1	0 ± 1	-1 ± 1	0 ± 1	0 ± 2	0 ± 1	-1 ± 1	-1 ± 1	0 ± 1	0 ± 3	0 ± 1
	JUL	-1 ± 1	0 ± 1	-1 ± 1	0 ± 1	-4 ± 2	1 ± 1	0 ± 1	-3 ± 1	0 ± 1	0 ± 3	0 ± 1
	AUG	0 ± 1	0 ± 1	-1 ± 1	0 ± 1	-2 ± 2	1 ± 1	0 ± 1	-2 ± 1	-1 ± 1	3 ± 3	0 ± 1
	SEP	0 ± 1	-1 ± 1	-1 ± 2	0 ± 1	-5 ± 2	0 ± 1	-1 ± 1	-5 ± 1	0 ± 1	0 ± 4	-1 ± 1
	OCT	< 4	< 3	< 8.3	< 5	< 5.7	< 5	< 3	< 4.4	< 4	< 7.3	< 5
	NOV	< 4	< 2	< 6.8	< 3	< 3.8	< 7	< 2	< 2.6	< 2	< 10	< 3
	DEC	< 2	< 2	< 2.3	< 1	< 2.6	< 4	< 2	< 2.1	< 2	< 11	< 2
	MEAN	0.9 ± 3.4	0.4 ± 2.7	1.2 ± 6.8	0.8 ± 3.3	-0.6 ± 6.3	1.3 ± 5.2	0.4 ± 2.6	-1.5 ± 6.1	0.4 ± 3.5	2.6 ± 9.4	1.0 ± 3.7

TABLE C-III.1 **CONCENTRATIONS OF GAMMA EMITTERS IN PREDATOR & BOTTOM FEEDER (FISH) SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000**

RESULTS IN UNITS OF PCI/KG WET +/- 2 SIGMA

STC	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
16C5	PREDATOR							
	05/05/2000	-4 ± 5	-2.0 ± 5	4.0 ± 10	5.0 ± 6	-16.0 ± 20	-15.0 ± 6	5.0 ± 5
	10/11/2000	< 5.7	< 10.5	< 7.9	< 6.7	< 14.6	< 6.2	< 6.1
	Mean	0.85 ± 13.7	4.25 ± 17.7	5.95 ± 5.5	5.85 ± 2.4	-0.7 ± 43.3	-4.4 ± 30.0	5.55 ± 1.6
	BOTTOM FEEDER							
	05/05/2000	-1 ± 6	-2.0 ± 6	0.0 ± 10	2.0 ± 7	-13.0 ± 10	-13.0 ± 6	1.0 ± 6
	10/11/2000	< 5.5	< 11.3	< 4.0	< 6.6	< 12.7	< 6.5	< 4.3
	Mean	2.25 ± 9.2	4.65 ± 18.8	2 ± 5.7	4.3 ± 6.5	-0.15 ± 36.3	-3.25 ± 27.6	2.65 ± 4.7
29C1	PREDATOR							
	05/04/2000	3 ± 9	2.0 ± 9	13.0 ± 30	4.0 ± 10	-20.0 ± 30	-13.0 ± 9	2.0 ± 9
	10/10/2000	< 9.9	< 18.5	< 7.4	< 7.5	< 8.8	< 11.5	< 8.4
	Mean	6.45 ± 9.8	10.25 ± 23.3	10.2 ± 7.9	5.75 ± 4.9	-5.6 ± 40.7	-0.75 ± 34.6	5.2 ± 9.1
	BOTTOM FEEDER							
	05/04/2000	-6 ± 10	-5.0 ± 10	13.0 ± 30	-4.0 ± 10	-8.0 ± 30	-22.0 ± 10	3.0 ± 10
	10/10/2000	< 8.1	< 13.6	< 10.5	< 7.4	< 10.7	< 9.3	< 7.3
	Mean	1.05 ± 19.9	4.3 ± 26.3	11.75 ± 3.5	1.7 ± 16.1	1.35 ± 26.4	-6.35 ± 44.3	5.15 ± 6.1

TABLE C-IV-1 **CONCENTRATIONS OF GAMMA EMITTERS IN SILT SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000**

RESULTS IN UNITS OF PCI/KG DRY +/- 2 SIGMA

	K-40		Mn-54		Co-58		Co-60		Cs-134		Cs-137
16B2											
05/26/2000	15000 ± 1000		-1 ± 20		12 ± 20		2 ± 30		-3 ± 20		170 ± 50
10/31/2000	11133 ± 1039	<	39.1	<	50	<	40	<	59.6	<	50.1
Mean	13067 ± 5468.8		19.1 ± 56.7		31 ± 53.7		21 ± 53.5		28.3 ± 88.5		110.1 ± 169.6
16C4											
05/26/2000	10000 ± 1000		5 ± 20		-1 ± 20		-10 ± 20		-4 ± 20		82 ± 24
10/31/2000	11587 ± 915	<	33.8	<	29.7	<	44	<	47.6		129.4 ± 48.8
Mean	10794 ± 2244.4		19.4 ± 40.7		14.4 ± 43.4		17 ± 76.7		21.8 ± 73.0		105.7 ± 67.0
33A2											
05/26/2000	13000 ± 1000		6 ± 20		-14 ± 20		9 ± 20		2 ± 10		81 ± 30
10/31/2000	14005 ± 1137	<	35.5	<	42.6	<	23	<	55.3	<	36.9
Mean	13503 ± 1421.3		20.8 ± 41.7		14.3 ± 80.0		16 ± 20.4		28.7 ± 75.4		58.95 ± 62.4

TABLE C-V.1 CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

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

	GROUP I			GROUP II	GROUP III
WEEK	10S3	11S1	14S1	13C1	22G1
1	20 ± 4	21 ± 4	23 ± 4	23 ± 4	24 ± 4
2	17 ± 3	12 ± 3	12 ± 3	7 ± 3	10 ± 3
3	22 ± 4	23 ± 4	20 ± 4	22 ± 4	19 ± 3
4	22 ± 4	24 ± 4	20 ± 4	32 ± 5	26 ± 4
5	19 ± 4	17 ± 4	16 ± 4	18 ± 4	19 ± 4
6	22 ± 3	17 ± 3	22 ± 3	25 ± 3	22 ± 3
7	16 ± 3	15 ± 3	14 ± 3	16 ± 3	12 ± 2
8	19 ± 3	20 ± 3	21 ± 3	23 ± 3	19 ± 3
9	11 ± 3	6 ± 2	10 ± 3	9 ± 3	11 ± 3
10	11 ± 3	13 ± 3	10 ± 2	12 ± 3	14 ± 3
11	14 ± 3	15 ± 3	14 ± 3	12 ± 3	13 ± 3
12	10 ± 2	9 ± 2	9 ± 2	10 ± 2	11 ± 2
13	13 ± 3	13 ± 3	13 ± 3	10 ± 2	11 ± 3
14	11 ± 3	(1)	11 ± 3	9 ± 2	12 ± 3
15	10 ± 3	12 ± 3	10 ± 3	14 ± 3	9 ± 2
16	1 ± 2	4 ± 2	5 ± 2	4 ± 2	2 ± 2
17	12 ± 3	10 ± 3	8 ± 2	10 ± 3	11 ± 3
18	16 ± 3	14 ± 3	19 ± 3	18 ± 3	17 ± 3
19	(1)	15 ± 3	17 ± 3	16 ± 3	14 ± 3
20	10 ± 2	9 ± 2	6 ± 2	8 ± 2	13 ± 3
21	6 ± 2	6 ± 2	5 ± 2	7 ± 2	8 ± 2
22	10 ± 3	10 ± 3	9 ± 3	13 ± 3	12 ± 3
23	15 ± 3	14 ± 3	12 ± 3	14 ± 3	14 ± 3
24	7 ± 2	4 ± 2	5 ± 2	6 ± 2	7 ± 2
25	13 ± 4	12 ± 3	15 ± 4	14 ± 4	10 ± 3
26	13 ± 3	9 ± 2	15 ± 3	15 ± 3	15 ± 3
27	12 ± 3	10 ± 3	9 ± 5	12 ± 3	10 ± 3
28	12 ± 4	9 ± 2	10 ± 2	8 ± 2	11 ± 2
29	10 ± 3	11 ± 3	9 ± 3	10 ± 3	10 ± 2
30	14 ± 4	8 ± 3	7 ± 3	7 ± 3	6 ± 3
31	8 ± 4	14 ± 3	10 ± 2	10 ± 2	14 ± 3
32	16 ± 3	15 ± 3	14 ± 3	11 ± 2	16 ± 3
33	11 ± 3	10 ± 2	10 ± 2	11 ± 2	13 ± 3
34	19 ± 4	18 ± 4	19 ± 4	15 ± 3	16 ± 3
35	17 ± 4	10 ± 3	13 ± 3	13 ± 3	15 ± 3
36	9 ± 4	13 ± 3	15 ± 3	12 ± 3	13 ± 3
37	12 ± 3	11 ± 3	12 ± 3	14 ± 3	11 ± 2
38	13 ± 3	12 ± 3	13 ± 3	13 ± 3	10 ± 2
39	13 ± 3	12 ± 3	11 ± 3	10 ± 2	13 ± 3
40	24 ± 4	24 ± 4	20 ± 4	21 ± 4	20 ± 4
41	37 ± 4	40 ± 4	39 ± 4	37 ± 4	35 ± 4
42	30 ± 4	27 ± 3	24 ± 3	31 ± 4	26 ± 3
43	28 ± 4	26 ± 4	25 ± 4	27 ± 4	25 ± 3
44	17 ± 3	14 ± 3	(1)	17 ± 3	18 ± 3
45	18 ± 4	16 ± 3	17 ± 4	17 ± 3	15 ± 3
46	27 ± 4	28 ± 4	31 ± 4	29 ± 4	26 ± 4
47	14 ± 3	19 ± 4	18 ± 4	17 ± 3	15 ± 3
48	21 ± 3	15 ± 3	20 ± 3	18 ± 3	17 ± 3
49	21 ± 3	21 ± 3	22 ± 3	24 ± 3	22 ± 3
50	17 ± 3	18 ± 3	20 ± 3	20 ± 3	19 ± 3
51	36 ± 4	38 ± 4	38 ± 4	35 ± 4	36 ± 4
52	17 ± 4	18 ± 4	16 ± 3	13 ± 3	18 ± 3
MEAN	16 ± 14	15 ± 15	15 ± 15	16 ± 15	15 ± 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, 2000**

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
01/03/2000 - 01/31/2000	12	24	20 ± 8	01/03/2000 - 01/31/2000	7	32	21 ± 21	01/03/2000 - 01/31/2000	10	26	20 ± 15
01/31/2000 - 02/28/2000	14	22	18 ± 5	01/31/2000 - 02/28/2000	16	25	20 ± 8	01/31/2000 - 02/28/2000	12	22	18 ± 8
02/28/2000 - 04/03/2000	6	15	11 ± 5	02/28/2000 - 04/03/2000	9	12	11 ± 3	02/28/2000 - 04/03/2000	11	14	12 ± 3
04/03/2000 - 05/01/2000	1	12	8 ± 7	04/03/2000 - 05/01/2000	4	14	9 ± 8	04/03/2000 - 05/01/2000	2	12	9 ± 9
05/01/2000 - 05/30/2000	5	19	11 ± 10	05/01/2000 - 05/30/2000	7	18	12 ± 11	05/01/2000 - 05/30/2000	8	17	13 ± 8
05/30/2000 - 07/03/2000	4	15	11 ± 7	05/30/2000 - 07/03/2000	6	15	12 ± 7	05/30/2000 - 07/03/2000	7	15	12 ± 6
07/03/2000 - 07/31/2000	7	14	10 ± 4	07/03/2000 - 07/31/2000	7	12	9 ± 4	07/03/2000 - 07/31/2000	6	11	9 ± 5
07/31/2000 - 08/28/2000	8	19	14 ± 8	07/31/2000 - 08/28/2000	10	15	12 ± 5	07/31/2000 - 08/28/2000	13	16	15 ± 3
08/28/2000 - 10/02/2000	9	17	12 ± 4	08/28/2000 - 10/02/2000	10	14	12 ± 3	08/28/2000 - 10/02/2000	10	15	12 ± 4
10/02/2000 - 10/30/2000	20	40	29 ± 13	10/02/2000 - 10/30/2000	21	37	29 ± 13	10/02/2000 - 10/30/2000	20	35	27 ± 12
10/30/2000 - 12/04/2000	14	31	20 ± 11	10/30/2000 - 12/04/2000	17	29	20 ± 11	10/30/2000 - 12/04/2000	15	26	18 ± 9
12/04/2000 - 01/02/2001	16	38	23 ± 17	12/04/2000 - 01/02/2001	13	35	23 ± 18	12/04/2000 - 01/02/2001	18	36	24 ± 17
01/03/2000 - 01/02/2001	1	40	16 ± 15	01/03/2000 - 01/02/2001	4	37	16 ± 15	01/03/2000 - 01/02/2001	2	36	15 ± 13

TABLE C-V.3 CONCENTRATION OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

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	01/03 - 04/03/2000	52 ± 15	0.2 ± 1	-0.5 ± 1	0 ± 1	0.4 ± 1	0.4 ± 1
	04/03 - 07/03/2000	61 ± 15	-0.3 ± 1	-0.1 ± 1	0 ± 1	-1.7 ± 1	0.1 ± 1
	07/03 - 10/02/2000	40 ± 14	-0.5 ± 1	0 ± 1	1 ± 1	0 ± 1	0.1 ± 1
	10/02 - 01/02/2001	68 ± 21	< 0.7	< 1.2	< 0.7	< 0.7	< 0.5
	MEAN	55.3 ± 24.2	0.0 ± 1.1	0.2 ± 1.5	0.4 ± 1.0	-0.2 ± 2.1	0.3 ± 0.4
11S1	01/03 - 04/03/2000	72 ± 23	0.5 ± 1	-0.1 ± 1	0 ± 1	-0.1 ± 0	0.2 ± 1
	04/03 - 07/03/2000	62 ± 18	-1 ± 1	-0.7 ± 1	0 ± 0	-2.3 ± 2	-0.4 ± 1
	07/03 - 10/02/2000	52 ± 15	0.1 ± 1	0.4 ± 1	-1 ± 1	0.7 ± 1	0.5 ± 1
	10/02 - 01/02/2001	41 ± 14	< 0.9	< 1.3	< 0.7	< 1.1	< 0.9
	MEAN	56.8 ± 26.6	0.1 ± 1.6	0.2 ± 1.7	-0.1 ± 1.4	-0.2 ± 3.0	0.3 ± 1.1
13C1	01/03 - 04/03/2000	84 ± 20	-0.2 ± 1	0.2 ± 1	1 ± 1	-1.9 ± 2	0.3 ± 1
	04/03 - 07/03/2000	76 ± 19	0.3 ± 1	-0.2 ± 1	0 ± 1	-0.1 ± 1	-0.5 ± 1
	07/03 - 10/02/2000	36 ± 16	-0.1 ± 1	0.4 ± 1	-1 ± 1	-0.5 ± 1	-0.2 ± 1
	10/02 - 01/02/2001	53 ± 17	< 0.8	< 0.8	< 1	< 0.8	< 0.7
	MEAN	62.3 ± 43.8	0.2 ± 0.9	0.3 ± 0.8	0.3 ± 1.9	-0.4 ± 2.2	0.1 ± 1.1
14S1	01/03 - 04/03/2000	72 ± 22	-0.1 ± 1	-0.4 ± 1	-2 ± 2	0.3 ± 1	0.3 ± 1
	04/03 - 07/03/2000	60 ± 16	-0.1 ± 1	-0.4 ± 1	0 ± 0	-0.2 ± 1	-0.1 ± 1
	07/03 - 10/02/2000	29 ± 18	-0.7 ± 1	-0.6 ± 1	0 ± 1	0.1 ± 1	-0.1 ± 1
	10/02 - 01/02/2001	39 ± 20	< 0.6	< 0.6	< 0.7	< 0.6	< 1
	MEAN	50.0 ± 39.1	-0.1 ± 1.1	-0.2 ± 1.1	-0.3 ± 2.3	0.2 ± 0.7	0.3 ± 1.0
22G1	01/03 - 04/03/2000	60 ± 21	0.6 ± 1	-0.1 ± 1	0 ± 1	0 ± 1	-0.4 ± 1
	04/03 - 07/03/2000	59 ± 20	-0.1 ± 1	-0.9 ± 1	1 ± 1	1.1 ± 1	0.3 ± 1
	07/03 - 10/02/2000	38 ± 14	-0.3 ± 1	-1.3 ± 1	0 ± 1	-0.9 ± 1	0 ± 1
	10/02 - 01/02/2001	44 ± 13	< 0.8	< 0.8	< 0.6	< 0.5	< 0.4
	MEAN	50.3 ± 21.9	0.3 ± 1.1	-0.4 ± 1.9	0.4 ± 1.0	0.2 ± 1.7	0.1 ± 0.7

TABLE C-VI.1 CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

RESULTS IN UNITS OF PCI/CU METER +/- 2 SIGMA

	GROUP I			GROUP II	GROUP III
WEEK	10S3	11S1	14S1	13C1	22G1
1	-3 ± 13	-19 ± 17	-2 ± 12	0 ± 14	11 ± 11
2	5 ± 10	5 ± 12	4 ± 9	2 ± 10	4 ± 10
3	9 ± 19	-7 ± 12	-15 ± 16	-13 ± 20	0 ± 12
4	-4 ± 10	8 ± 9	5 ± 12	5 ± 9	1 ± 10
5	-7 ± 10	0 ± 15	0 ± 11	10 ± 11	-2 ± 10
6	-3 ± 11	-6 ± 10	6 ± 14	10 ± 9	3 ± 13
7	6 ± 10	-1 ± 12	4 ± 14	1 ± 9	-4 ± 11
8	6 ± 9	5 ± 11	-1 ± 10	-4 ± 12	-1 ± 11
9	-2 ± 10	4 ± 15	-5 ± 8	-3 ± 11	1 ± 10
10	-5 ± 10	9 ± 12	9 ± 12	0 ± 10	-1 ± 8
11	-6 ± 18	-2 ± 11	-3 ± 11	-2 ± 12	5 ± 13
12	-3 ± 15	-4 ± 12	-1 ± 11	2 ± 9	-11 ± 18
13	8 ± 11	-11 ± 12	6 ± 13	-10 ± 13	0 ± 10
14	7 ± 9	(1)	-5 ± 11	-15 ± 15	5 ± 12
15	5 ± 12	-5 ± 14	-3 ± 15	-9 ± 12	2 ± 12
16	3 ± 10	9 ± 14	5 ± 13	7 ± 13	-3 ± 12
17	-3 ± 12	10 ± 8	-7 ± 14	2 ± 9	11 ± 13
18	5 ± 11	-2 ± 10	12 ± 11	-3 ± 13	3 ± 10
19	(1)	1 ± 12	9 ± 10	4 ± 9	-1 ± 8
20	7 ± 13	6 ± 11	4 ± 10	0 ± 10	-2 ± 13
21	1 ± 13	-2 ± 8	-6 ± 10	-3 ± 8	5 ± 9
22	-6 ± 9	-6 ± 13	-1 ± 13	-8 ± 15	-1 ± 13
23	-1 ± 10	0 ± 14	2 ± 13	-3 ± 12	0 ± 12
24	7 ± 12	-8 ± 13	-7 ± 14	-6 ± 9	-1 ± 8
25	0 ± 12	3 ± 11	3 ± 10	-2 ± 12	0 ± 9
26	-1 ± 9	8 ± 10	1 ± 12	2 ± 12	-2 ± 9
27	-4 ± 13	-1 ± 13	3 ± 22	3 ± 9	-3 ± 9
28	4 ± 14	9 ± 10	-2 ± 9	4 ± 9	5 ± 16
29	5 ± 8	-5 ± 11	3 ± 7	8 ± 11	-5 ± 11
30	6 ± 15	-4 ± 9	-3 ± 10	-4 ± 10	4 ± 10
31	16 ± 15	5 ± 13	1 ± 11	-1 ± 9	2 ± 9
32	-8 ± 9	-2 ± 11	-1 ± 9	8 ± 12	4 ± 12
33	0 ± 9	4 ± 10	1 ± 9	-4 ± 8	1 ± 8
34	-8 ± 11	2 ± 12	2 ± 10	5 ± 9	-6 ± 12
35	-4 ± 11	-1 ± 12	-3 ± 8	2 ± 12	-3 ± 12
36	0 ± 12	9 ± 12	-4 ± 14	0 ± 9	1 ± 12
37	2 ± 9	8 ± 8	-2 ± 9	4 ± 13	-2 ± 17
38	0 ± 8	1 ± 12	-9 ± 10	2 ± 12	-10 ± 12
39	6 ± 11	-4 ± 17	2 ± 13	2 ± 11	6 ± 13
40	< 7	< 7	< 7	< 6	< 6
41	< 9	< 9	< 9	< 9	< 9
42	< 10	< 10	< 10	< 10	< 10
43	< 10	< 9	< 9	< 9	< 9
44	< 8	< 8	(1)	< 8	< 8
45	< 10	< 10	< 10	< 10	< 10
46	< 7	< 7	< 8	< 7	< 7
47	< 11	< 11	< 11	< 11	< 10
48	< 10	< 10	< 10	< 10	< 9
49	< 7	< 7	< 7	< 7	< 6
50	< 12	< 12	< 12	< 12	< 12
51	< 17	< 16	< 17	< 16	< 16
52	< 10	< 10	< 10	< 10	< 10
MEAN	3 ± 13	3 ± 14	2 ± 13	2 ± 13	3 ± 11

(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, 2000**

RESULTS IN UNITS OF PCI/LITER +/- 2 SIGMA

	CONTROL FARMS			INDICATOR FARMS					
COLLECTION DATE	36E1	9G1	23F1	18C1	19B1	21B1	22C1	25C1	10F4
01/10/2000	0 ± 0.2	0 ± 0.2	0.1 ± 0.3			-0.2 ± 0.2	0 ± 0.2		(1)
01/11/2000				0.1 ± 0.2	0 ± 0.2			-0.1 ± 0.2	
02/08/2000		-0.1 ± 0.2		0 ± 0.2	0.1 ± 0.3	0.2 ± 0.2			
03/07/2000		-0.1 ± 0.2		0.2 ± 0.2	0.1 ± 0.2	0 ± 0.2			
04/04/2000	0.1 ± 0.2	0.1 ± 0.2	-0.1 ± 0.2	0.1 ± 0.2	0 ± 0.2	-0.1 ± 0.3	0.1 ± 0.2	0.1 ± 0.2	-0.1 ± 0.2
04/18/2000		0.1 ± 0.3		0.2 ± 0.2	0 ± 0.2	0.1 ± 0.2			0 ± 0.2
05/02/2000		0.1 ± 0.2		0 ± 0.2	-0.1 ± 0.2	0.1 ± 0.2			0.1 ± 0.2
05/16/2000		0 ± 0.2		0.1 ± 0.2	0.1 ± 0.2	0 ± 0.2			0.1 ± 0.2
05/30/2000		-0.2 ± 0.2		-0.2 ± 0.3	0.1 ± 0.2	0 ± 0.2			-0.1 ± 0.3
06/13/2000		0.1 ± 0.2		0 ± 0.2	0 ± 0.2	0.1 ± 0.2			0.1 ± 0.2
06/27/2000		0.1 ± 0.2		0 ± 0.2	-0.1 ± 0.2	0.2 ± 0.2			0.1 ± 0.2
07/11/2000	0 ± 0.2	0 ± 0.2	0 ± 0.2	-0.1 ± 0.3	-0.1 ± 0.2	0 ± 0.2	0 ± 0.2	0.2 ± 0.2	0.1 ± 0.2
07/25/2000		-0.1 ± 0.2		0.1 ± 0.2	0 ± 0.2	0.1 ± 0.2			0 ± 0.2
08/08/2000		-0.1 ± 0.2		0 ± 0.2	0.1 ± 0.2	0 ± 0.2			0.1 ± 0.2
08/22/2000		-0.2 ± 0.2		0 ± 0.2	0 ± 0.2	0.1 ± 0.2			-0.1 ± 0.2
09/05/2000		0.1 ± 0.2		-0.1 ± 0.2	0 ± 0.2	-0.1 ± 0.2			0.2 ± 0.2
09/19/2000		0 ± 0.2		-0.1 ± 0.2	0.1 ± 0.2	0 ± 0.2			-0.1 ± 0.2
10/03/2000	0.1 ± 0.2	0.1 ± 0.3	0 ± 0.2	0 ± 0.2	-0.1 ± 0.2	0 ± 0.2	0 ± 0.3	0 ± 0.2	0 ± 0.2
10/17/2000		< 0.3		< 0.3	< 0.3	< 0.2			< 0.3
10/31/2000		< 0.3		< 0.3	< 0.2	< 0.2			< 0.3
11/14/2000		< 0.4		< 0.4	< 0.4	< 0.5			< 0.5
11/29/2000		< 0.3		< 0.4	< 0.5	< 0.4			< 0.4
12/12/2000		< 0.3		< 0.4	< 0.5	< 0.4			< 0.4
	0.1 ± 0.1	0.1 ± 0.3	0.0 ± 0.2	0.1 ± 0.4	0.1 ± 0.4	0.1 ± 0.3	0.0 ± 0.1	0.1 ± 0.3	0.1 ± 0.4

(1) SEE PROGRAM CHANGES SECTION FOR EXPLANATION

TABLE C-VII.2 **CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000**

RESULTS IN UNITS OF PCI/LITER +/- 2

STC	SAMPLING PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
10F4		(1)				
	04/04/2000	1400± 100	-6± 1	0± 1	2± 6	1± 2
	04/18/2000	1500± 100	0± 1	1± 1	-2± 6	0± 2
	05/02/2000	1500± 100	-2± 1	0± 1	0± 6	0± 2
	05/16/2000	1600± 100	0± 1	0± 1	-2± 6	-1± 2
	05/30/2000	1500± 100	-3± 1	2± 1	-6± 6	1± 2
	06/13/2000	1500± 100	-5± 1	1± 1	-3± 6	-1± 2
	06/27/2000	1400± 100	-8± 1	0± 1	-4± 6	0± 2
	07/11/2000	1400± 100	-3± 1	0± 1	-2± 6	-1± 2
	07/25/2000	1500± 100	-2± 1	1± 1	2± 6	0± 2
	08/08/2000	1500± 100	-5± 1	0± 1	2± 6	1± 2
	08/22/2000	1700± 100	-9± 1	-1± 1	4± 6	-2± 2
	09/05/2000	1400± 100	-9± 1	1± 1	-4± 6	0± 2
	09/19/2000	1500± 100	-6± 1	1± 1	0± 6	0± 2
	10/03/2000	1400± 100	-7± 1	0± 1	4± 6	1± 2
	10/17/2000	1388± 124	< 4.5	< 1.9	< 16.5	< 2.5
	10/31/2000	1418± 115	< 4.0	< 3.2	< 9.1	< 1.4
	11/14/2000	1344± 108	< 4.6	< 3.4	< 17.5	< 2.3
	11/29/2000	1476± 122	< 3.9	< 4.0	< 11.2	< 2.3
	12/12/2000	1384± 53	< 1.5	<1.6	< 38.8	< 8.4
	MEAN	1464± 171	-2.4± 9.2	1.1± 2.7	4.4± 21.4	0.8± 4.4
18C1	01/11/2000	1400± 100	-3± 2	-2± 3	-2± 7	1± 2
	02/08/2000	1500± 100	-1± 2	-1± 3	0± 7	0± 2
	03/07/2000	1500± 100	-2± 2	0± 3	-10± 7	2± 2
	04/04/2000	1300± 100	-4± 2	-1± 3	1± 7	-1± 2
	04/18/2000	1400± 100	0± 2	0± 3	0± 7	0± 2
	05/02/2000	1400± 100	-8± 2	0± 3	4± 7	0± 2
	05/16/2000	1500± 100	0± 2	-1± 3	-2± 7	-1± 2
	05/30/2000	1400± 100	-5± 2	0± 3	1± 7	0± 2
	06/13/2000	1400± 100	-6± 2	0± 3	-2± 7	0± 2
	06/27/2000	1500± 100	-6± 2	-1± 3	-3± 7	1± 2
	07/11/2000	1400± 100	-4± 2	0± 3	5± 7	0± 2
	07/25/2000	1500± 100	-7± 2	1± 3	-1± 7	2± 2
	08/08/2000	1500± 100	-7± 2	1± 3	0± 7	0± 2
	08/22/2000	1500± 100	1± 2	-2± 3	-3± 7	1± 2
	09/05/2000	1500± 100	-9± 2	1± 3	2± 7	-2± 2
	09/19/2000	1600± 100	-10± 2	0± 3	0± 7	-2± 2
	10/03/2000	1600± 100	-1± 2	0± 3	-4± 7	0± 2
	10/17/2000	1373± 155	< 5.5	< 4.1	< 15.9	< 2.3
	10/31/2000	1432± 114	< 2.3	< 3.5	< 14.1	< 2.9
	11/14/2000	1372± 70	< 2.2	< 2.8	< 5.2	< 1.8
	11/29/2000	1536± 128	< 2.7	< 3.6	< 13.6	< 1.9
	12/12/2000	1692± 187	< 6.6	< 5.1	< 24.0	< 3.8
	MEAN	1469± 192	-2.5± 10.0	0.9± 4.0	3.7± 15.4	0.6± 3.2

(1) SEE PROGRAM CHANGES SECTION FOR EXPLANATION

TABLE C-VII.2 **CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000**

RESULTS IN UNITS OF PCI/LITER +/- 2 SIGMA

STC	SAMPLING PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
19B1	01/11/2000	1500 ± 100	-5 ± 2	1 ± 2	1 ± 9	0 ± 3
	02/08/2000	1400 ± 100	-1 ± 2	-1 ± 2	1 ± 9	0 ± 3
	03/07/2000	1500 ± 100	-5 ± 2	-1 ± 2	-1 ± 9	-1 ± 3
	04/04/2000	1500 ± 100	-7 ± 2	1 ± 2	1 ± 9	1 ± 3
	04/18/2000	1500 ± 100	-6 ± 2	0 ± 2	0 ± 9	0 ± 3
	05/02/2000	1500 ± 100	-6 ± 2	0 ± 2	0 ± 9	1 ± 3
	05/16/2000	1500 ± 100	-2 ± 2	-1 ± 2	-3 ± 9	0 ± 3
	05/30/2000	1400 ± 100	-2 ± 2	1 ± 2	5 ± 9	-2 ± 3
	06/13/2000	1500 ± 100	-1 ± 2	0 ± 2	1 ± 9	-1 ± 3
	06/27/2000	1400 ± 100	-7 ± 2	-1 ± 2	2 ± 9	-1 ± 3
	07/11/2000	1500 ± 100	-6 ± 2	-1 ± 2	0 ± 9	1 ± 3
	07/25/2000	1500 ± 100	-6 ± 2	2 ± 2	2 ± 9	0 ± 3
	08/08/2000	1500 ± 100	-6 ± 2	0 ± 2	1 ± 9	1 ± 3
	08/22/2000	1400 ± 100	0 ± 2	-1 ± 2	-2 ± 9	1 ± 3
	09/05/2000	1300 ± 100	-3 ± 2	0 ± 2	2 ± 9	-1 ± 3
	09/19/2000	1600 ± 100	-6 ± 2	0 ± 2	1 ± 9	0 ± 3
	10/03/2000	1500 ± 100	0 ± 2	0 ± 2	-1 ± 9	1 ± 3
	10/17/2000	1277 ± 95	< 3.7	< 3.2	< 14.0	< 2.7
	10/31/2000	1321 ± 95	< 2.5	< 2.5	< 13.5	< 1.5
	11/14/2000	1447 ± 92	< 2.0	< 2.5	< 8.9	< 1.8
	11/29/2000	1494 ± 128	< 4.4	< 2.6	< 8.3	< 1.5
	12/12/2000	1648 ± 185	< 6.7	< 6.2	< 13.6	< 3.5
	MEAN	1462 ± 188	-2.0 ± 8.7	0.9 ± 3.7	3.5 ± 10.8	0.6 ± 2.7
21B1	01/10/2000	1500 ± 200	-7 ± 2	0 ± 1	2 ± 6	0 ± 2
	02/08/2000	1500 ± 200	-1 ± 2	1 ± 1	0 ± 6	-1 ± 2
	03/07/2000	1600 ± 200	-1 ± 2	0 ± 1	-2 ± 6	-1 ± 2
	04/04/2000	1500 ± 200	-5 ± 2	0 ± 1	0 ± 6	1 ± 2
	04/18/2000	1400 ± 200	-11 ± 2	-1 ± 1	2 ± 6	-1 ± 2
	05/02/2000	1400 ± 200	-4 ± 2	-1 ± 1	-1 ± 6	1 ± 2
	05/16/2000	1400 ± 200	0 ± 2	-2 ± 1	-8 ± 6	0 ± 2
	05/30/2000	1500 ± 200	-7 ± 2	0 ± 1	1 ± 6	1 ± 2
	06/13/2000	1500 ± 200	-2 ± 2	1 ± 1	-2 ± 6	0 ± 2
	06/27/2000	1400 ± 200	-6 ± 2	-1 ± 1	-8 ± 6	-1 ± 2
	07/11/2000	1500 ± 200	-4 ± 2	0 ± 1	8 ± 6	1 ± 2
	07/25/2000	1500 ± 200	-5 ± 2	1 ± 1	-2 ± 6	-1 ± 2
	08/08/2000	1500 ± 200	-8 ± 2	0 ± 1	0 ± 6	-2 ± 2
	08/22/2000	1400 ± 200	1 ± 2	-1 ± 1	-3 ± 6	-2 ± 2
	09/05/2000	1500 ± 200	-15 ± 2	-1 ± 1	-3 ± 6	0 ± 2
	09/19/2000	1400 ± 200	-5 ± 2	0 ± 1	2 ± 6	0 ± 2
	10/03/2000	1500 ± 200	1 ± 2	0 ± 1	6 ± 6	0 ± 2
	10/17/2000	1364 ± 106	< 3.1	< 3.3	< 11.0	< 2.4
	10/31/2000	1466 ± 125	< 3.3	< 3.7	< 17.1	< 3.1
	11/14/2000	1398 ± 121	< 2.4	< 4.1	< 12.4	< 2.9
	11/29/2000	1597 ± 186	< 5.6	< 5.7	< 15.6	< 2.9
	12/12/2000	1706 ± 183	< 3.8	< 2.9	< 24.2	< 5.9
	MEAN	1470 ± 167	-2.7 ± 10.9	0.8 ± 4.3	3.8 ± 17.5	0.7 ± 4.0

TABLE C-VII.2 **CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000**

RESULTS IN UNITS OF PCI/LITER +/- 2 SIGMA

STC	SAMPLING PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
9G1	01/10/2000	1400± 100	-6± 1	0± 1	0± 5	-1± 1
	02/08/2000	1400± 100	0± 1	0± 1	0± 5	0± 1
	03/07/2000	1400± 100	0± 1	-1± 1	2± 5	1± 1
	04/04/2000	1500± 100	-10± 1	0± 1	-4± 5	0± 1
	04/18/2000	1400± 100	0± 1	0± 1	-3± 5	1± 1
	05/02/2000	1500± 100	-4± 1	1± 1	1± 5	1± 1
	05/16/2000	1400± 100	0± 1	0± 1	3± 5	0± 1
	05/30/2000	1400± 100	-10± 1	0± 1	0± 5	0± 1
	06/13/2000	1400± 100	-5± 1	0± 1	1± 5	0± 1
	06/27/2000	1400± 100	0± 1	0± 1	2± 5	1± 1
	07/11/2000	1400± 100	-2± 1	1± 1	-7± 5	1± 1
	07/25/2000	1500± 100	-5± 1	1± 1	3± 5	0± 1
	08/08/2000	1300± 100	-4± 1	4± 1	-3± 5	0± 1
	08/22/2000	1300± 100	-5± 1	-1± 1	4± 5	1± 1
	09/05/2000	1400± 100	-4± 1	0± 1	-2± 5	0± 1
	09/19/2000	1300± 100	-4± 1	2± 1	1± 5	0± 1
	10/03/2000	1300± 100	1± 1	1± 1	-2± 5	-1± 1
	10/17/2000	1318± 70	< 3.7	< 1.9	< 13.3	< 1.4
	10/31/2000	1397± 175	< 5.4	< 4.9	< 18.5	< 4.1
	11/14/2000	1314± 99	< 2.2	< 2.7	< 13.6	< 1.8
	11/29/2000	1385± 95	< 2.8	< 2.2	< 7.9	< 1.1
	12/12/2000	1540± 132	< 4.3	< 4.6	< 20.1	< 2.1
	MEAN	1392± 151	-1.8± 8.9	1.3± 3.4	3.5± 15.4	0.8± 2.2

TABLE VIII.1 QUARTERLY TLD RESULTS FOR LIMERICK GENERATING STATION, 2000

RESULTS IN UNITS OF MILLI-ROENTGEN/STD. +/- 2 SIGMA

STATION CODE	MEAN +/- 2 S.D.	JAN-MAR	APR-JUN	JUL-SEP	OCT-DEC
36S2	7.1 ± 1.1	6.7 ± 0.3	7.5 ± 0.3	7.5 ± 0.6	6.6 ± 0.8
36D1	5.6 ± 0.7	5.4 ± 0.4	5.9 ± 0.7	5.9 ± 0.2	5.2 ± 0.4
2E1	6.8 ± 1.4	6.1 ± 0.3	7.2 ± 0.4	7.7 ± 0.4	6.4 ± 0.4
3S1	6.7 ± 1.1	6.2 ± 0.2	6.9 ± 0.6	7.3 ± 0.6	6.2 ± 0.7
4E1	5.0 ± 0.5	4.8 ± 0.3	5.0 ± 0.3	5.4 ± 0.3	4.9 ± 0.4
5S1	7.6 ± 1.0	7.2 ± 0.3	7.9 ± 0.4	8.1 ± 0.5	7.2 ± 0.6
5H1	8.2 ± 1.0	7.8 ± 0.3	8.3 ± 0.7	8.8 ± 0.6	7.7 ± 0.5
6C1	6.8 ± 0.8	6.6 ± 0.3	7.0 ± 0.5	7.3 ± 0.5	6.4 ± 1.0
7S1	6.9 ± 0.9	6.6 ± 0.3	7.0 ± 0.4	7.5 ± 0.8	6.5 ± 0.7
7E1	7.0 ± 1.0	6.6 ± 0.1	7.1 ± 0.3	7.7 ± 1.0	6.6 ± 0.6
9C1	6.3 ± 1.1	6.2 ± 0.3	6.6 ± 0.3	6.8 ± 0.7	5.5 ± 0.3
10S3	6.8 ± 0.6	6.6 ± 0.2	7.2 ± 0.5	7.0 ± 0.3	6.6 ± 0.3
10E1	6.8 ± 0.9	6.5 ± 0.3	6.9 ± 0.6	7.4 ± 0.5	6.3 ± 0.4
10F3	6.7 ± 0.9	6.6 ± 0.4	7.0 ± 0.7	7.1 ± 0.4	6.1 ± 0.6
11S1	8.1 ± 1.5	7.5 ± 0.2	8.7 ± 0.4	8.7 ± 0.6	7.4 ± 0.6
13S2	10.6 ± 1.2	10.0 ± 0.3	11.3 ± 0.6	10.9 ± 0.1	10.2 ± 0.9
13C1	4.9 ± 0.4	4.6 ± 0.3	5.1 ± 0.4	5.0 ± 0.5	4.8 ± 0.4
13E1	6.9 ± 1.3	6.5 ± 0.2	6.9 ± 0.5	7.9 ± 0.1	6.4 ± 0.6
14S1	6.1 ± 0.7	5.8 ± 0.1	6.1 ± 0.5	6.6 ± 0.3	5.8 ± 0.3
15D1	6.8 ± 0.4	6.6 ± 0.3	6.9 ± 0.5	7.0 ± 0.6	6.6 ± 0.7
16F1	6.9 ± 1.5	6.1 ± 0.3	7.3 ± 0.3	7.7 ± 0.3	6.5 ± 0.7
17B1	6.4 ± 0.5	6.2 ± 0.1	6.6 ± 1.0	6.6 ± 0.7	6.1 ± 0.3
18S2	7.4 ± 0.9	6.9 ± 0.5	7.8 ± 0.9	7.7 ± 0.2	7.1 ± 0.4
19D1	6.2 ± 0.5	6.0 ± 0.4	6.4 ± 0.7	6.5 ± 0.3	6.0 ± 0.4
20D1	5.9 ± 0.9	5.7 ± 0.1	6.3 ± 0.6	6.1 ± 0.3	5.3 ± 0.4
20F1	6.4 ± 1.1	5.9 ± 0.7	6.7 ± 0.5	7.1 ± 0.5	6.1 ± 0.6
21S2	5.9 ± 1.0	5.3 ± 0.1	6.1 ± 0.7	6.5 ± 0.6	5.8 ± 0.6
23S2	6.1 ± 0.8	5.7 ± 0.4	6.2 ± 0.5	6.6 ± 0.5	5.8 ± 0.5
24D1	5.9 ± 0.6	5.8 ± 0.3	6.0 ± 0.2	6.2 ± 0.8	5.5 ± 0.3
25S2	5.9 ± 0.7	6.0 ± 0.6	6.2 ± 0.5	(2)	5.5 ± 0.5
25D1	5.5 ± 1.0	5.3 ± 0.3	5.5 ± 0.6	6.2 ± 0.3	5.2 ± 0.6
26S3	5.9 ± 1.3	5.4 ± 0.3	6.1 ± 0.6	6.7 ± 1.0	5.5 ± 0.0
28D2	6.2 ± 1.0	5.7 ± 0.5	6.4 ± 0.5	6.8 ± 0.6	5.8 ± 0.7
29S1	5.8 ± 0.6	5.5 ± 0.5	6.1 ± 0.6	6.0 ± 0.6	5.5 ± 0.6
29E1	6.3 ± 1.1	6.0 ± 0.3	6.4 ± 0.5	7.0 ± 0.7	5.7 ± 0.6
31S1	6.8 ± 1.3	6.5 ± 0.5	7.0 ± 0.4	7.6 ± 0.5	6.2 ± 0.7
31D1	8.2 ± 1.3	7.8 ± 0.1	8.5 ± 0.8	9.0 ± 0.9	7.6 ± 0.4
31D2	7.0 ± 1.3	6.6 ± 0.9	7.2 ± 0.4	7.8 ± 0.4	6.4 ± 0.8
34S2	7.2 ± 0.7	7.1 ± 0.4	7.3 ± 0.4	7.5 ± 0.6	6.8 ± 0.4
34E1	6.6 ± 1.1	6.2 ± 0.3	6.7 ± 0.5	7.2 ± 0.5	6.1 ± 0.6

(1) MEAN AND TWO TIMES THE STANDARD DEVIATION OF THE QUARTERLY RESULTS
(2) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-VIII.2 2000 MEAN TLD RESULTS FROM LIMERICK GENERATING STATION FOR THE SITE BOUNDARY, MIDDLE AND CONTROL LOCATIONS

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

EXPOSURE PERIOD	SITE BOUNDARY	MIDDLE	CONTROL
JAN - MAR	6.6 ± 2.3	6.1 ± 1.3	7.8 ± 0.0
APR - JUN	7.2 ± 2.7	6.6 ± 1.5	8.3 ± 0.0
JUL - SEP	7.5 ± 2.4	6.9 ± 1.8	8.8 ± 0.0
OCT - DEC	6.5 ± 2.3	6.0 ± 1.3	7.7 ± 0.0

TABLE C-VIII.3 SUMMARY OF THE 2000 AMBIENT DOSIMETRY PROGRAM FOR LIMERICK GENERATING STATION

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

LOCATION	SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN +/- 2 S.D.	PRE-OP MEAN +/- 2 S.D.
SITE BOUNDARY	64	5.3	11.3	6.9 ± 2.5	7.6 ± 2.4
MIDDLE DISTANTANCE	92	4.6	9.0	6.4 ± 1.7	7.8 ± 2.2
CONTROL	4	7.7	8.8	8.2 ± 1.0	7.8 ± 3

THE PRE-OPERATIONAL MEAN WAS CALCULATED FROM MONTHLY TLD READINGS 01/15/82 TO 12/02/94.

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

MIDDLE DISTANTANCE 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, 33H4, 18G1, 22G1, 32G1.

TABLE C-IX.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

SURFACE WATER (TRITIUM LIQUID SCINTILLATION)

SAMPLING PERIOD	10F2	13B1	24S1
JAN-MAR		12/27 - 04/04/2000	12/27 - 04/04/2000
APR-JUN	05/30 - 07/03/2000	04/04 - 07/03/2000	04/04 - 07/03/2000
JUL-SEP	07/03 - 10/02/2000	07/03 - 10/02/2000	07/03 - 10/02/2000
OCT-DEC	09/27 - 01/02/2001	09/27 - 01/02/2001	09/27 - 01/02/2001

SURFACE WATER (GAMMA SPECTROSCOPY)

SAMPLING PERIOD	10F2	13B1	24S1
JAN		12/27 - 02/01/2000	12/27 - 02/01/2000
FEB		02/01 - 02/28/2000	02/01 - 02/28/2000
MAR		02/28 - 04/04/2000	02/28 - 04/04/2000
APR		04/04 - 05/01/2000	04/04 - 05/01/2000
MAY		05/01 - 05/30/2000	05/01 - 05/30/2000
JUN	05/30 - 07/03/2000	05/30 - 07/03/2000	05/30 - 07/03/2000
JUL	07/03 - 07/31/2000	07/03 - 07/31/2000	07/03 - 07/31/2000
AUG	07/31 - 08/28/2000	07/31 - 08/28/2000	07/31 - 08/28/2000
SEP	08/28 - 10/02/2000	08/28 - 10/02/2000	08/28 - 10/02/2000
OCT	09/27 - 10/30/2000	09/27 - 10/30/2000	09/27 - 10/30/2000
NOV	10/30 - 11/27/2000	10/30 - 11/27/2000	10/30 - 11/27/2000
DEC	11/27 - 01/02/2001	11/27 - 01/02/2001	11/27 - 01/02/2001

DRINKING WATER (TRITIUM)

SAMPLING PERIOD	15F4	15F7	16C2	28F3
JAN-MAR	12/27 - 04/04/2000	12/27 - 04/04/2000	12/27 - 04/04/2000	12/27 - 04/04/2000
APR-JUN	04/04 - 07/03/2000	04/04 - 07/03/2000	04/04 - 07/03/2000	04/04 - 07/03/2000
JUL-SEP	07/03 - 10/02/2000	07/03 - 10/02/2000	07/03 - 10/02/2000	07/03 - 10/02/2000
OCT-DEC	09/27 - 01/02/2001	09/27 - 01/02/2001	09/27 - 01/02/2001	09/27 - 01/02/2001

DRINKING WATER (GROSS BETA & GAMMA SPECTROSCOPY)

SAMPLING PERIOD	15F4	15F7	16C2	28F3
JAN	12/27 - 02/01/2000	12/27 - 02/01/2000	12/27 - 02/01/2000	12/27 - 02/01/2000
FEB	02/01 - 02/28/2000	02/01 - 02/28/2000	02/01 - 02/28/2000	02/01 - 02/28/2000
MAR	02/28 - 04/04/2000	02/28 - 04/04/2000	02/28 - 04/04/2000	02/28 - 04/04/2000
APR	04/04 - 05/01/2000	04/04 - 05/01/2000	04/04 - 05/01/2000	04/04 - 05/01/2000
MAY	05/01 - 05/30/2000	05/01 - 05/30/2000	05/01 - 05/30/2000	05/01 - 05/30/2000
JUN	05/30 - 07/03/2000	05/30 - 07/03/2000	05/30 - 07/03/2000	05/30 - 07/03/2000
JUL	07/03 - 07/31/2000	07/03 - 07/31/2000	07/03 - 07/31/2000	07/03 - 07/31/2000
AUG	07/31 - 08/28/2000	07/31 - 08/28/2000	07/31 - 08/28/2000	07/31 - 08/28/2000
SEP	08/28 - 10/02/2000	08/28 - 10/02/2000	08/28 - 10/02/2000	08/28 - 10/02/2000
OCT	09/27 - 10/30/2000	09/27 - 10/30/2000	09/27 - 10/30/2000	09/27 - 10/30/2000
NOV	10/30 - 11/27/2000	10/30 - 11/27/2000	10/30 - 11/27/2000	10/30 - 11/27/2000
DEC	11/27 - 01/02/2001	11/27 - 01/02/2001	11/27 - 01/02/2001	11/27 - 01/02/2001

TABLE C-IX.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

AIR PARTICULATE (GAMMA SPECTROSCOPY)

SAMPLING PERIOD	10S3	11S1	14S1	13C1	22G1
JAN-MAR	01/03 - 04/03/2000	01/03 - 04/03/2000	01/03 - 04/03/2000	01/03 - 04/03/2000	01/03 - 04/03/2000
APR-JUN	04/03 - 07/03/2000	04/03 - 07/03/2000	04/03 - 07/03/2000	04/03 - 07/03/2000	04/03 - 07/03/2000
JUL-SEP	07/03 - 10/02/2000	07/03 - 10/02/2000	07/03 - 10/02/2000	07/03 - 10/02/2000	07/03 - 10/02/2000
OCT- DEC	10/02 - 01/02/2001	10/02 - 01/02/2001	10/02 - 01/02/2001	10/02 - 01/02/2001	10/02 - 01/02/2001

AIR PARTICULATE (GROSS BETA AND I-131)

SAMPLING PERIOD	10S3	11S1	14S1	13C1	22G1
1	01/03 - 01/10/2000	01/03 - 01/10/2000	01/03 - 01/10/2000	01/03 - 01/10/2000	01/03 - 01/10/2000
2	01/10 - 01/18/2000	01/10 - 01/18/2000	01/10 - 01/18/2000	01/10 - 01/18/2000	01/10 - 01/18/2000
3	01/18 - 01/24/2000	01/18 - 01/24/2000	01/18 - 01/24/2000	01/18 - 01/24/2000	01/18 - 01/24/2000
4	01/24 - 01/31/2000	01/24 - 01/31/2000	01/24 - 01/31/2000	01/24 - 01/31/2000	01/24 - 01/31/2000
5	01/31 - 02/07/2000	01/31 - 02/07/2000	01/31 - 02/07/2000	01/31 - 02/07/2000	01/31 - 02/07/2000
6	02/07 - 02/14/2000	02/07 - 02/14/2000	02/07 - 02/14/2000	02/07 - 02/14/2000	02/07 - 02/14/2000
7	02/14 - 02/21/2000	02/14 - 02/21/2000	02/14 - 02/21/2000	02/14 - 02/21/2000	02/14 - 02/21/2000
8	02/21 - 02/28/2000	02/21 - 02/28/2000	02/21 - 02/28/2000	02/21 - 02/28/2000	02/21 - 02/28/2000
9	02/28 - 03/06/2000	02/28 - 03/06/2000	02/28 - 03/06/2000	02/28 - 03/06/2000	02/28 - 03/06/2000
10	03/06 - 03/13/2000	03/06 - 03/13/2000	03/06 - 03/13/2000	03/06 - 03/13/2000	03/06 - 03/13/2000
11	03/13 - 03/20/2000	03/13 - 03/20/2000	03/13 - 03/20/2000	03/13 - 03/20/2000	03/13 - 03/20/2000
12	03/20 - 03/27/2000	03/20 - 03/27/2000	03/20 - 03/27/2000	03/20 - 03/27/2000	03/20 - 03/27/2000
13	03/27 - 04/03/2000	03/27 - 04/03/2000	03/27 - 04/03/2000	03/27 - 04/03/2000	03/27 - 04/03/2000
14	04/03 - 04/10/2000	-	04/03 - 04/10/2000	04/03 - 04/10/2000	04/03 - 04/10/2000
15	04/10 - 04/17/2000	04/10 - 04/17/2000	04/10 - 04/17/2000	04/10 - 04/17/2000	04/10 - 04/17/2000
16	04/17 - 04/24/2000	04/17 - 04/24/2000	04/17 - 04/24/2000	04/17 - 04/24/2000	04/17 - 04/24/2000
17	04/24 - 05/01/2000	04/24 - 05/01/2000	04/24 - 05/01/2000	04/24 - 05/01/2000	04/24 - 05/01/2000
18	05/01 - 05/08/2000	05/01 - 05/08/2000	05/01 - 05/08/2000	05/01 - 05/08/2000	05/01 - 05/08/2000
19	-	05/08 - 05/15/2000	05/08 - 05/15/2000	05/08 - 05/15/2000	05/08 - 05/15/2000
20	05/15 - 05/22/2000	05/15 - 05/22/2000	05/15 - 05/22/2000	05/15 - 05/22/2000	05/15 - 05/22/2000
21	05/22 - 05/30/2000	05/22 - 05/30/2000	05/22 - 05/30/2000	05/22 - 05/30/2000	05/22 - 05/30/2000
22	05/30 - 06/05/2000	05/30 - 06/05/2000	05/30 - 06/05/2000	05/30 - 06/05/2000	05/30 - 06/05/2000
23	06/05 - 06/12/2000	06/05 - 06/12/2000	06/05 - 06/12/2000	06/05 - 06/12/2000	06/05 - 06/12/2000
24	06/12 - 06/19/2000	06/12 - 06/19/2000	06/12 - 06/19/2000	06/12 - 06/19/2000	06/12 - 06/19/2000
25	06/19 - 06/26/2000	06/19 - 06/26/2000	06/19 - 06/26/2000	06/19 - 06/26/2000	06/19 - 06/26/2000
26	06/26 - 07/03/2000	06/26 - 07/03/2000	06/26 - 07/03/2000	06/26 - 07/03/2000	06/26 - 07/03/2000
27	07/03 - 07/10/2000	07/03 - 07/10/2000	07/03 - 07/10/2000	07/03 - 07/10/2000	07/03 - 07/10/2000
28	07/10 - 07/17/2000	07/10 - 07/17/2000	07/10 - 07/17/2000	07/10 - 07/17/2000	07/10 - 07/17/2000
29	07/17 - 07/24/2000	07/17 - 07/24/2000	07/17 - 07/24/2000	07/17 - 07/24/2000	07/17 - 07/24/2000
30	07/24 - 07/31/2000	07/24 - 07/31/2000	07/24 - 07/31/2000	07/24 - 07/31/2000	07/24 - 07/31/2000
31	07/31 - 08/07/2000	07/31 - 08/07/2000	07/31 - 08/07/2000	07/31 - 08/07/2000	07/31 - 08/07/2000
32	08/07 - 08/14/2000	08/07 - 08/14/2000	08/07 - 08/14/2000	08/07 - 08/14/2000	08/07 - 08/14/2000
33	08/14 - 08/21/2000	08/14 - 08/21/2000	08/14 - 08/21/2000	08/14 - 08/21/2000	08/14 - 08/21/2000
34	08/21 - 08/28/2000	08/21 - 08/28/2000	08/21 - 08/28/2000	08/21 - 08/28/2000	08/21 - 08/28/2000
35	08/28 - 09/05/2000	08/28 - 09/05/2000	08/28 - 09/05/2000	08/28 - 09/05/2000	08/28 - 09/05/2000
36	09/05 - 09/11/2000	09/05 - 09/11/2000	09/05 - 09/11/2000	09/05 - 09/11/2000	09/05 - 09/11/2000
37	09/12 - 09/18/2000	09/11 - 09/18/2000	09/11 - 09/18/2000	09/11 - 09/18/2000	09/11 - 09/18/2000
38	09/18 - 09/25/2000	09/18 - 09/25/2000	09/18 - 09/25/2000	09/18 - 09/25/2000	09/18 - 09/25/2000
39	09/25 - 10/02/2000	09/25 - 10/02/2000	09/25 - 10/02/2000	09/25 - 10/02/2000	09/25 - 10/02/2000
40	10/02 - 10/09/2000	10/02 - 10/09/2000	10/02 - 10/09/2000	10/02 - 10/09/2000	10/02 - 10/09/2000
41	10/09 - 10/16/2000	10/09 - 10/16/2000	10/09 - 10/16/2000	10/09 - 10/16/2000	10/09 - 10/16/2000
42	10/16 - 10/23/2000	10/16 - 10/23/2000	10/16 - 10/23/2000	10/16 - 10/23/2000	10/16 - 10/23/2000
43	10/23 - 10/30/2000	10/23 - 10/30/2000	10/23 - 10/30/2000	10/23 - 10/30/2000	10/23 - 10/30/2000
44	10/30 - 11/06/2000	10/30 - 11/06/2000	-	10/30 - 11/06/2000	10/30 - 11/06/2000
45	11/06 - 11/13/2000	11/06 - 11/13/2000	11/06 - 11/13/2000	11/06 - 11/13/2000	11/06 - 11/13/2000
46	11/13 - 11/20/2000	11/13 - 11/20/2000	11/13 - 11/20/2000	11/13 - 11/20/2000	11/13 - 11/20/2000
47	11/20 - 11/27/2000	11/20 - 11/27/2000	11/20 - 11/27/2000	11/20 - 11/27/2000	11/20 - 11/27/2000
48	11/27 - 12/04/2000	11/27 - 12/04/2000	11/27 - 12/04/2000	11/27 - 12/04/2000	11/27 - 12/04/2000
49	12/04 - 12/12/2000	12/04 - 12/12/2000	12/04 - 12/12/2000	12/04 - 12/12/2000	12/04 - 12/12/2000
50	12/12 - 12/18/2000	12/12 - 12/18/2000	12/12 - 12/18/2000	12/12 - 12/18/2000	12/12 - 12/18/2000
51	12/18 - 12/26/2000	12/18 - 12/26/2000	12/18 - 12/26/2000	12/18 - 12/26/2000	12/18 - 12/26/2000
52	12/26 - 01/02/2001	12/26 - 01/02/2001	12/26 - 01/02/2001	12/26 - 01/02/2001	12/26 - 01/02/2001

TABLE C-IX.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

STATION CODE	JAN-MAR	APR-JUN	JUL-SEP	OCT-DEC
36S2	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
36D1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
2E1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/04/2000	10/03/2000 - 01/02/2001
3S1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
4E1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/04/2000	10/03/2000 - 01/02/2001
5S1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
5H1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/04/2000	10/03/2000 - 01/02/2001
6C1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
7S1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
7E1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/04/2000	10/03/2000 - 01/02/2001
9C1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
10S3	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
10E1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
10F3	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
11S1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
13S2	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
13C1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
13E1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
14S1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
15D1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
16F1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
17B1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
18S2	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
19D1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
20D1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
20F1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
21S2	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
23S2	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
24D1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
25S2	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
25D1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
26S3	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
28D2	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
29S1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
29E1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
31S1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
31D1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
31D2	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
34S2	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001
34E1	01/04/2000 - 04/05/2000	04/05/2000 - 07/05/2000	07/05/2000 - 10/03/2000	10/03/2000 - 01/02/2001

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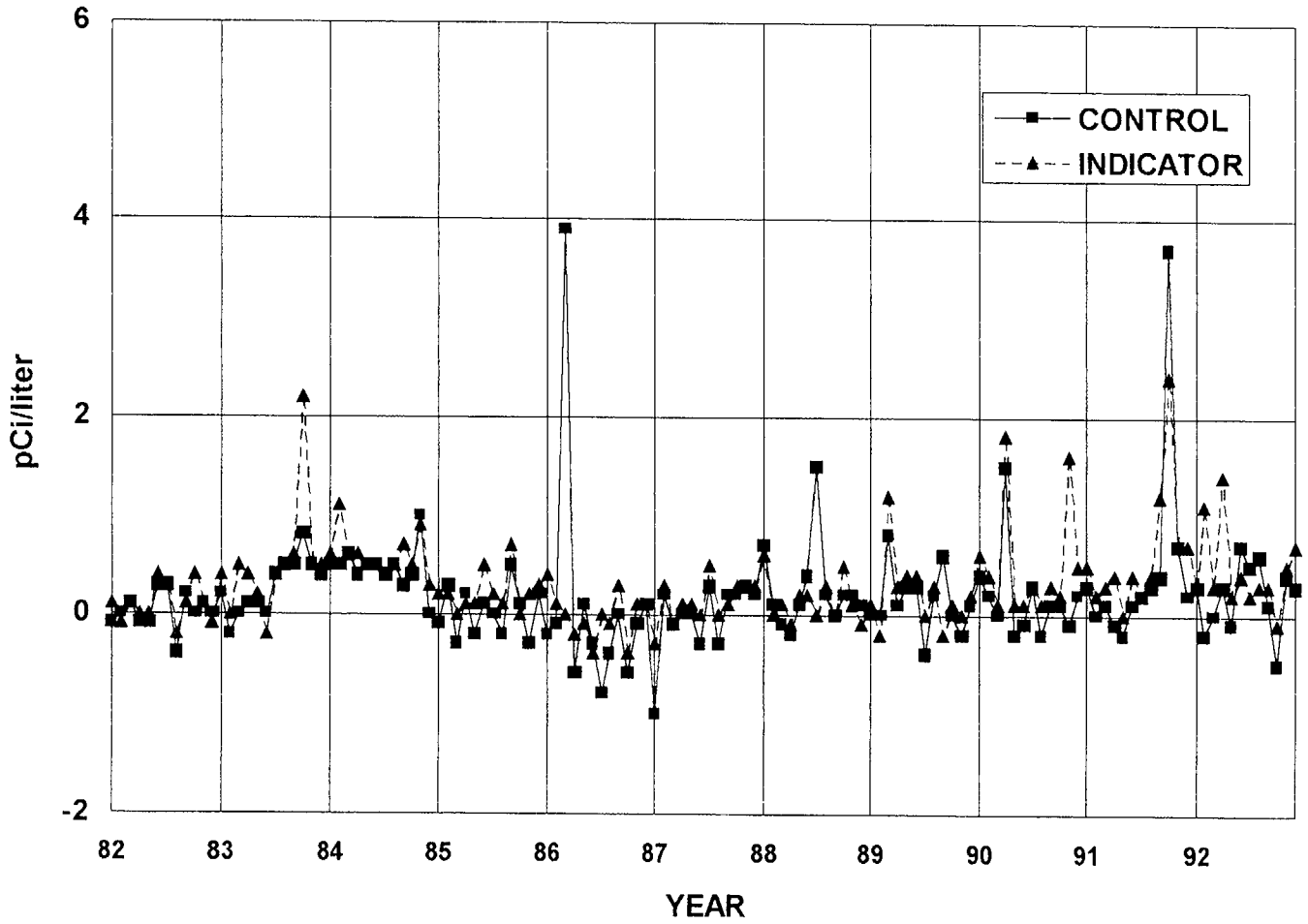
FIGURE C-1
MEAN MONTHLY INSOLUBLE GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LGS, 1982 - 2000



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

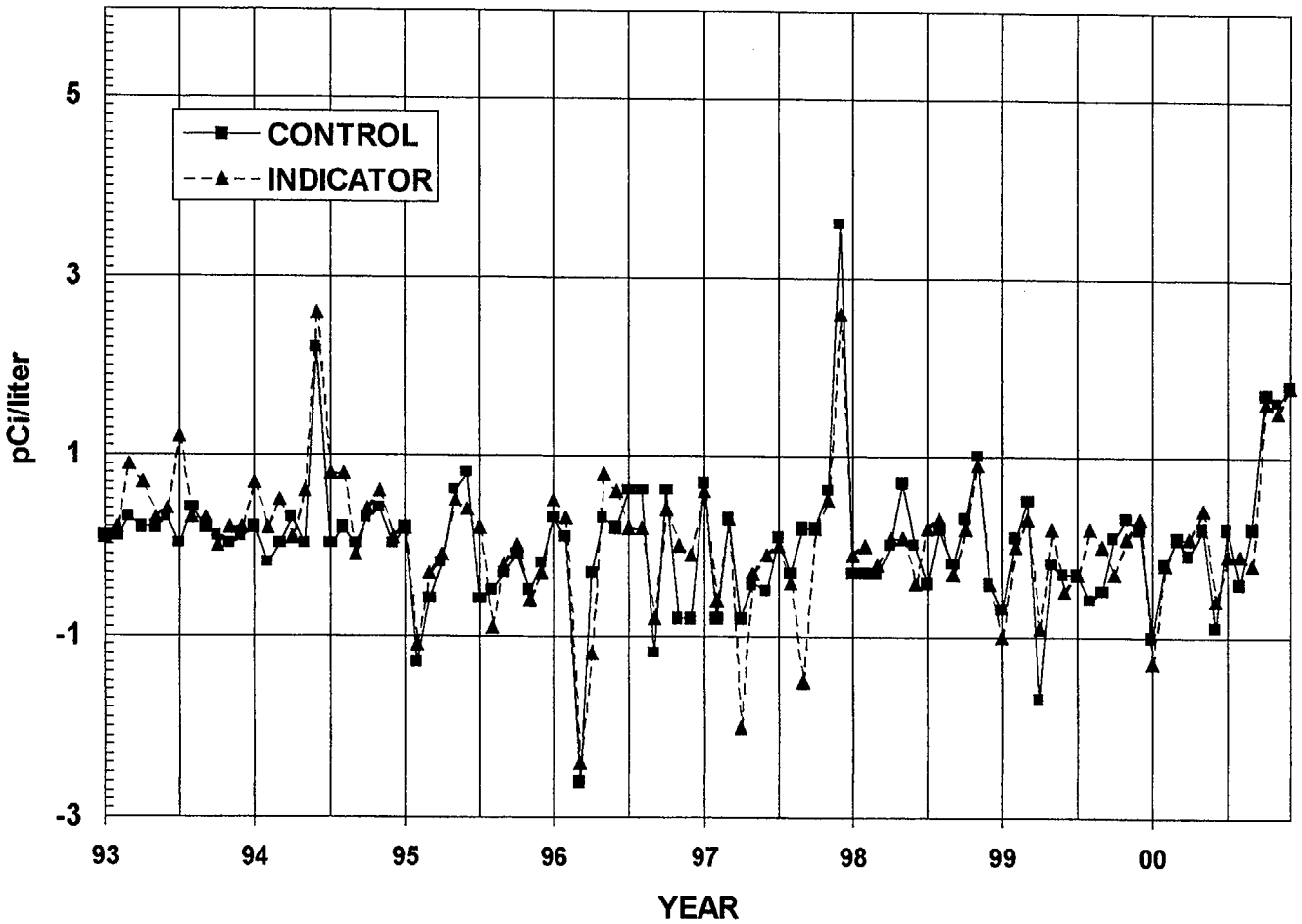
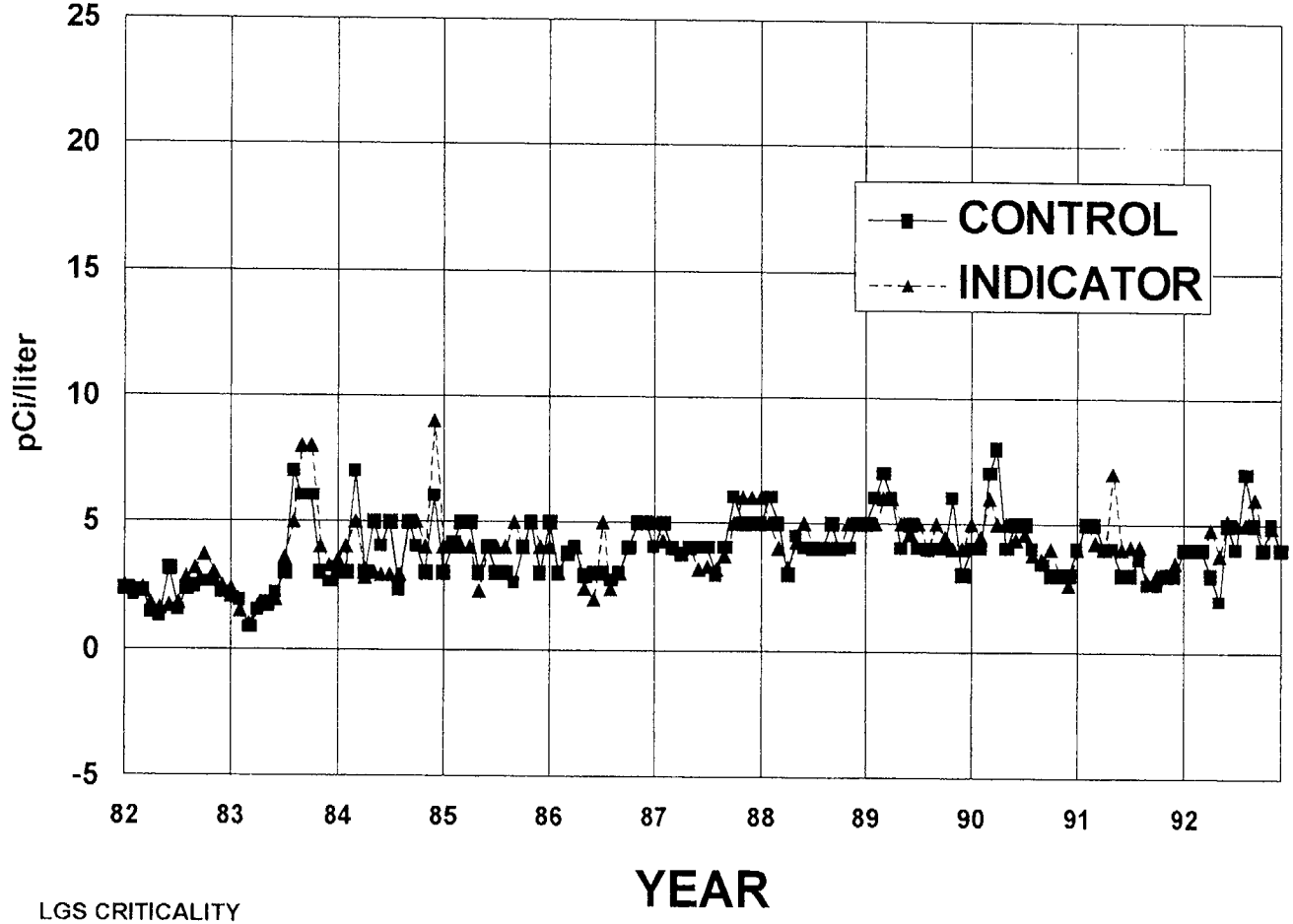

CONTROL
INDICATOR
5
3
1
-1
-3
pCi/liter
93
94
95
96
97
98
99
00
YEAR

FIGURE C-2
MEAN MONTHLY SOLUBLE GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LGS, 1982 - 2000



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

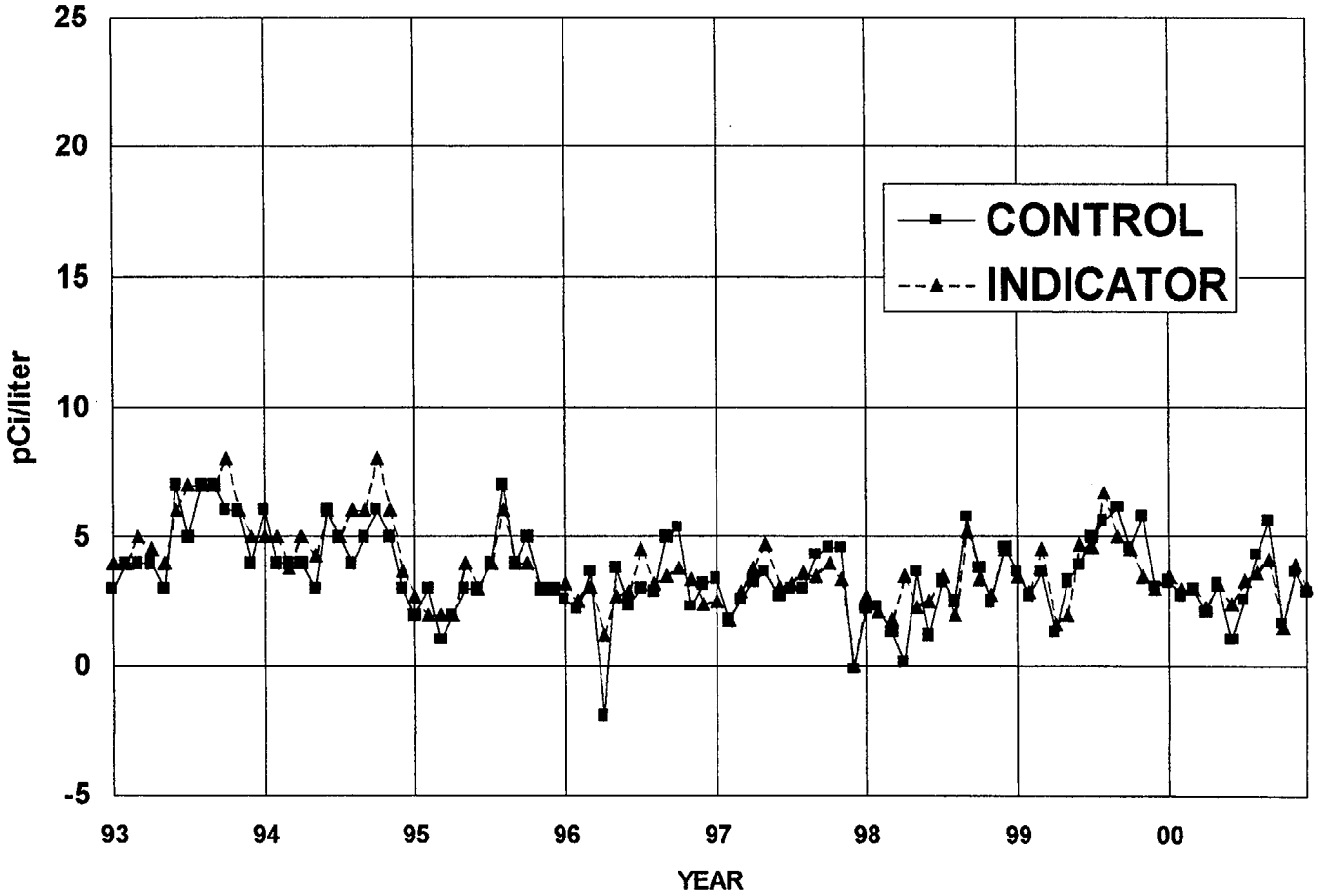
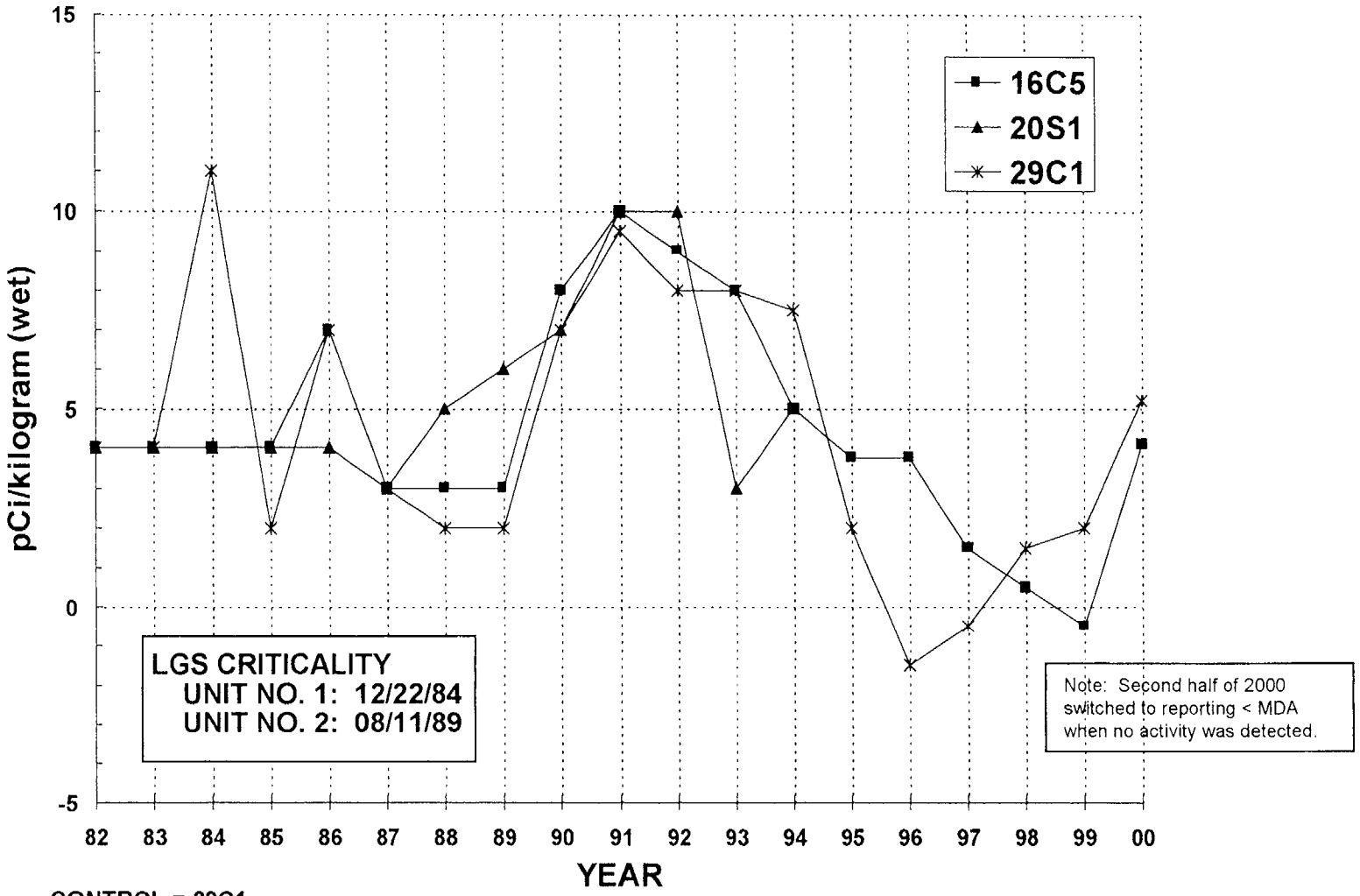

25
20
15
10
5
0
-5
pCi/liter
93
94
95
96
97
98
99
00
YEAR
CONTROL
INDICATOR

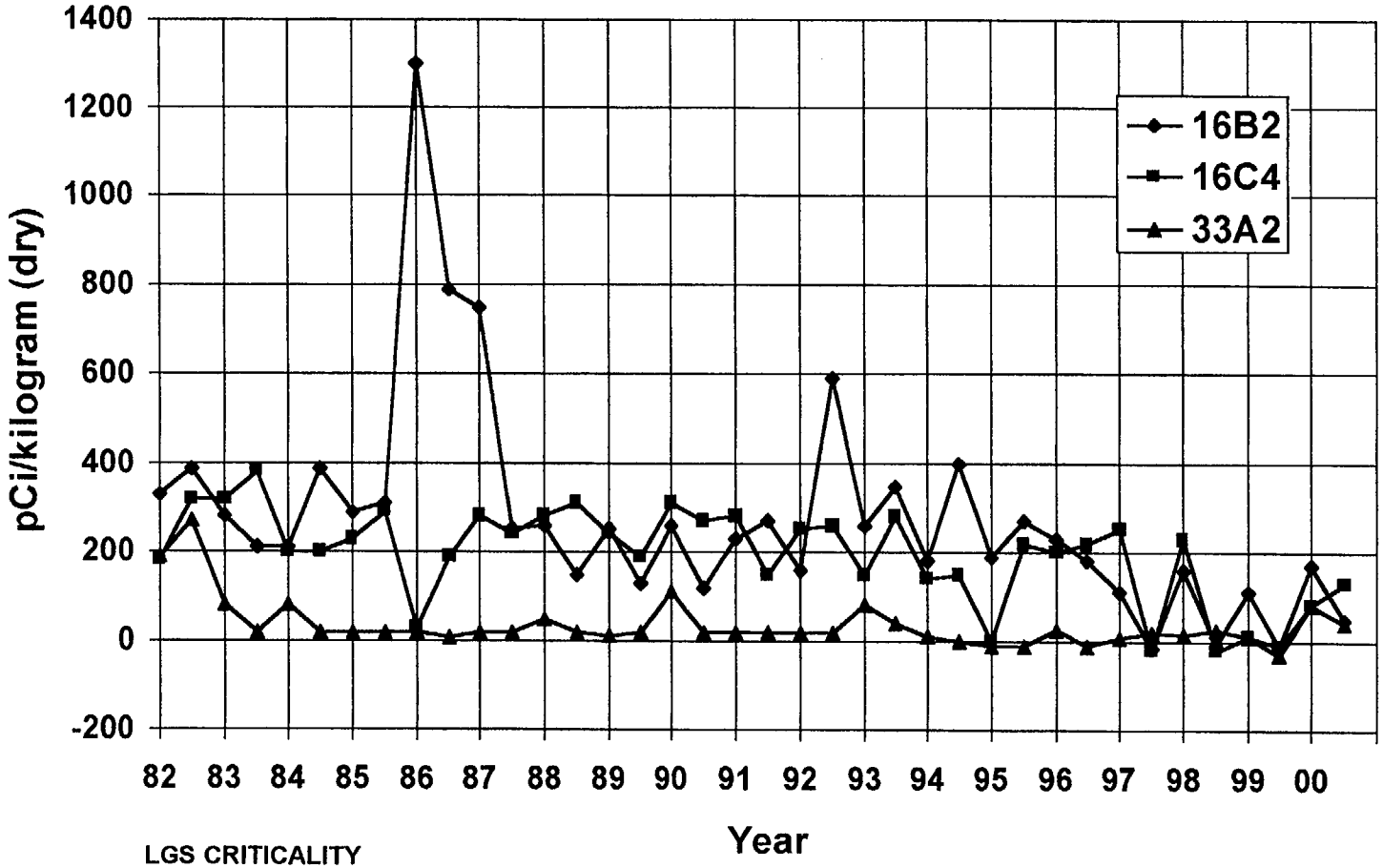
FIGURE C-3
MEAN ANNUAL CS-137 CONCENTRATIONS IN FISH SAMPLES COLLECTED IN THE VICINITY OF LGS, 1982 - 2000



CONTROL = 29C1

Station 20S1 discontinued in 1995

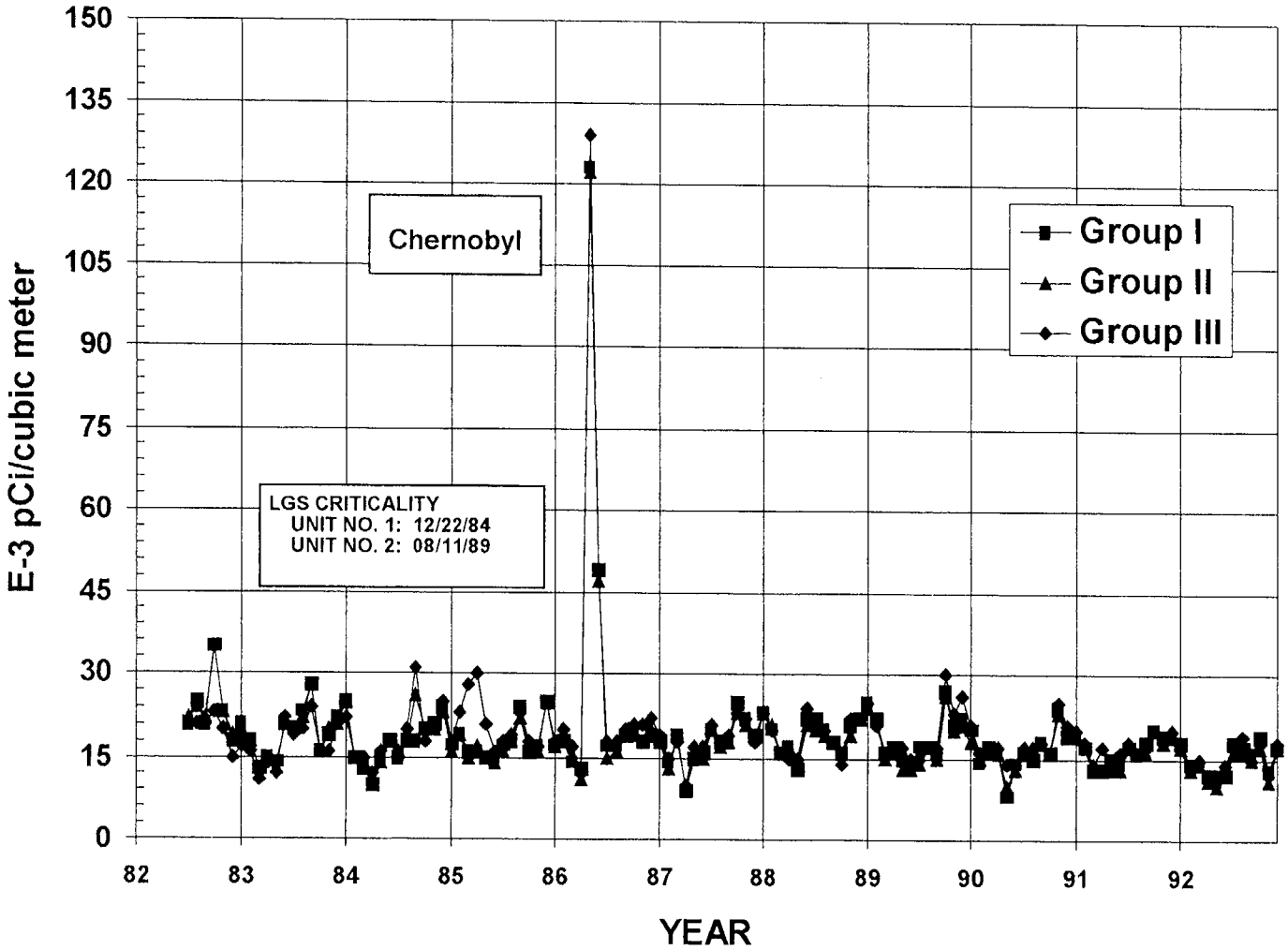
FIGURE C-4
CONCENTRATIONS OF CS-137 IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF LGS, 1982 - 2000



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 - 2000



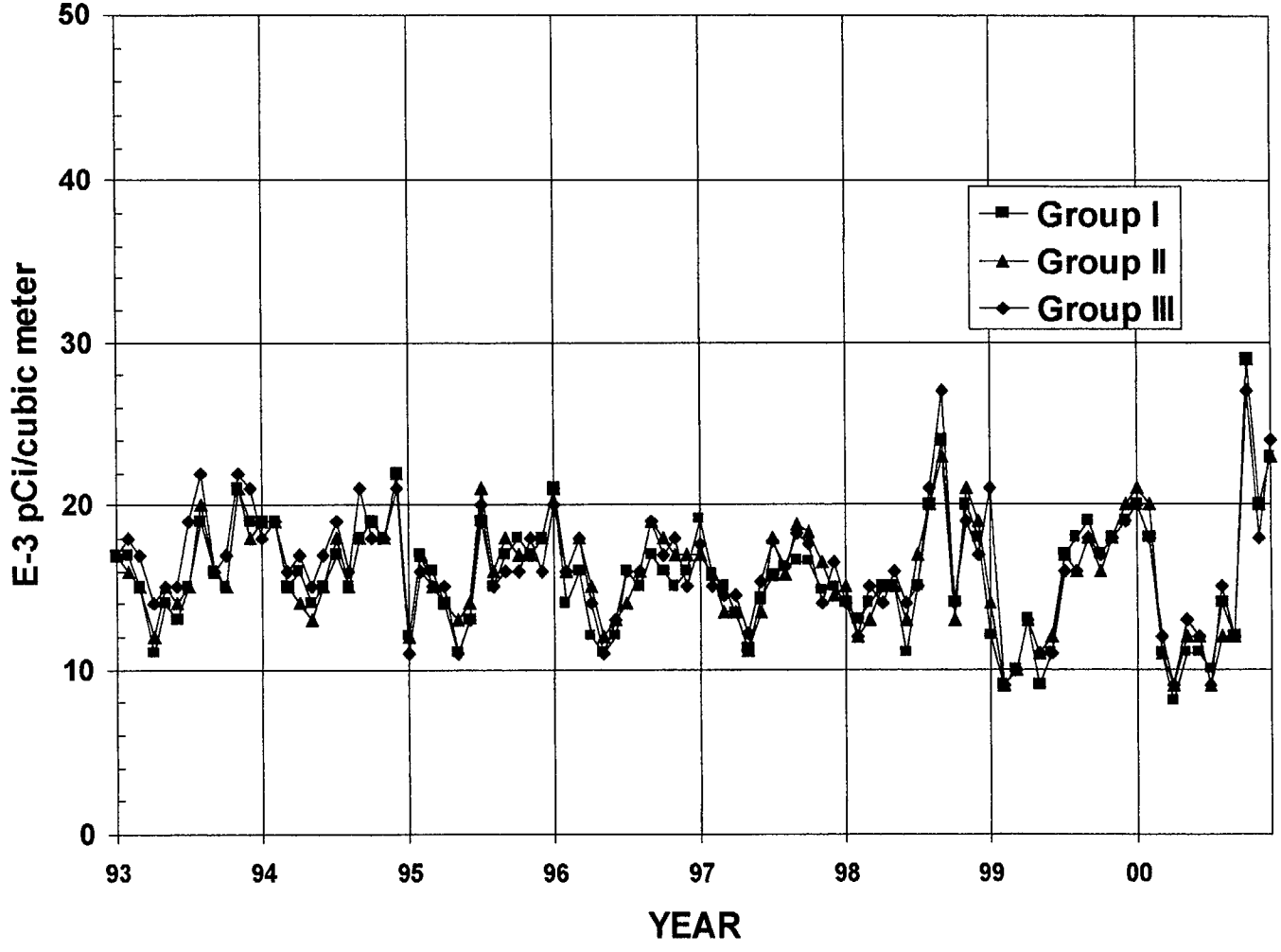

50
40
30
20
10
0
E-3 pCi/cubic meter
93
94
95
96
97
98
99
00
YEAR
Group I
Group II
Group III

FIGURE C-6
MEAN WEEKLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LGS, 2000

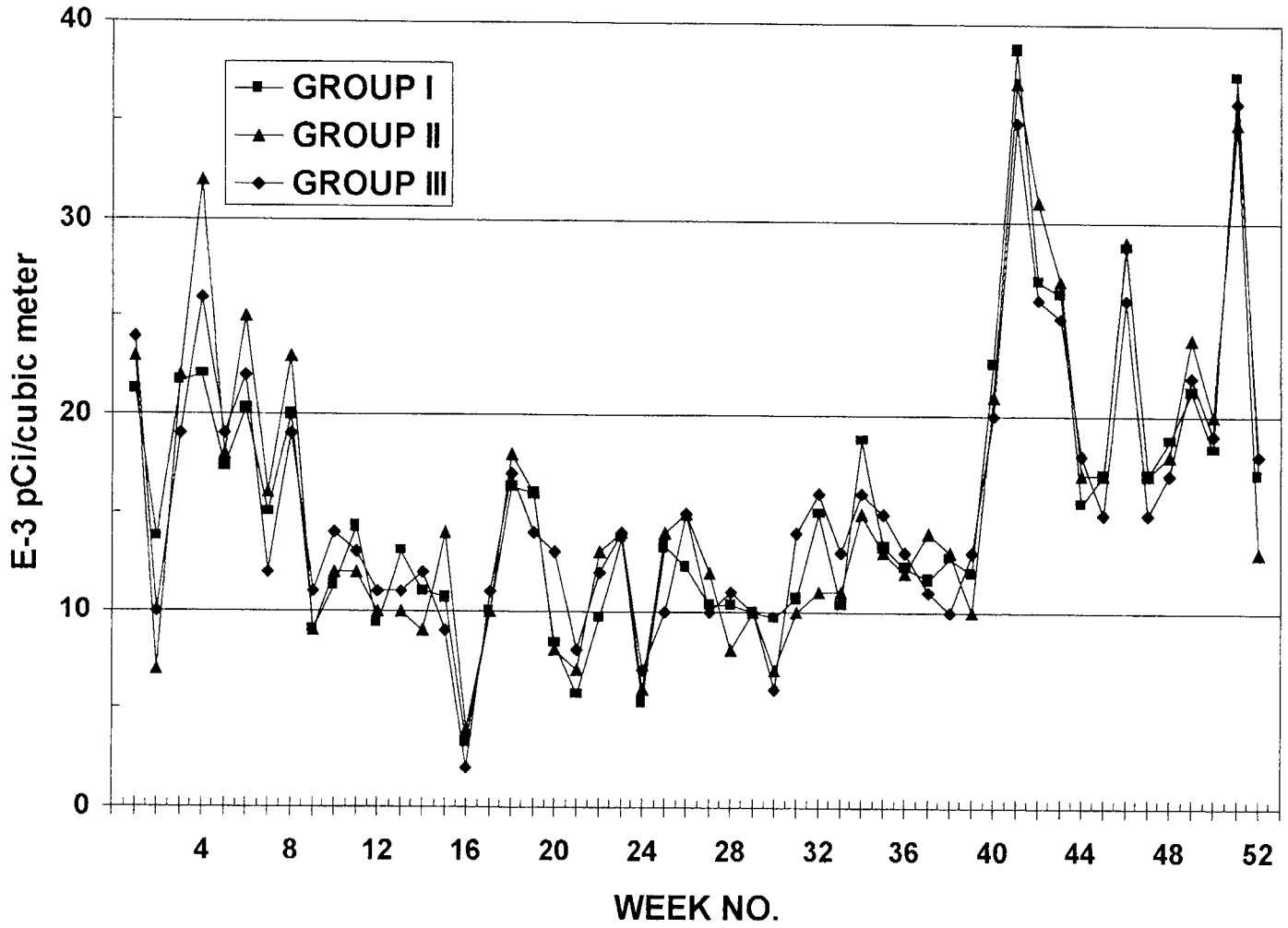
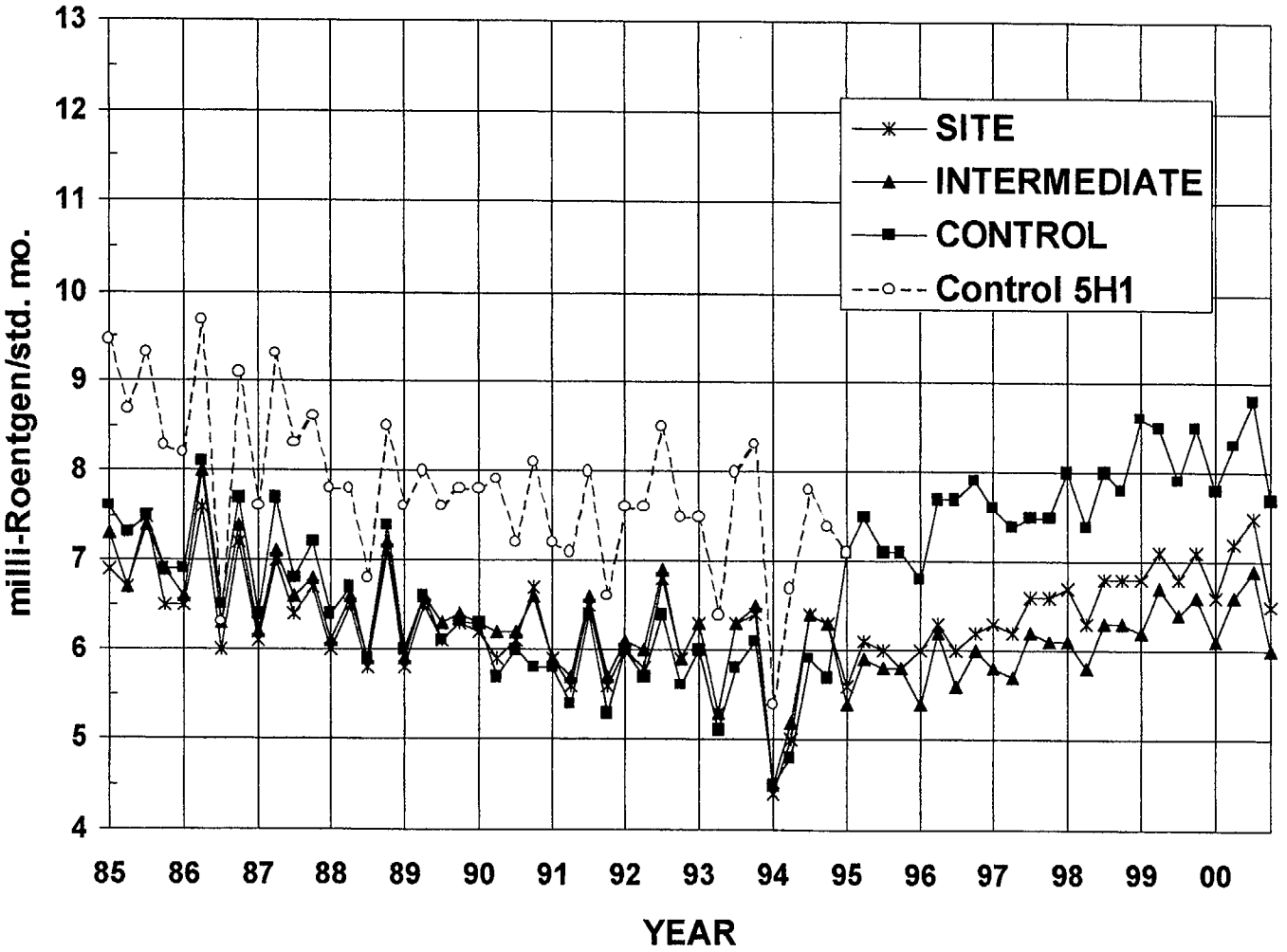


FIGURE C-7
MEAN QUARTERLY AMBIENT GAMMA RADIATION LEVELS (TLD) IN THE VICINITY OF LGS, 1985 - 2000



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

APPENDIX D

DATA TABLES AND FIGURES
COMPARISON LABORATORY

APPENDIX D: DATA TABLES AND FIGURES - COMPARISON LABORATORY

TABLES

FIGURES

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

TABLE D-I.1 CONCENTRATIONS OF GROSS BETA INSOLUBLE IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

RESULTS IN UNITS OF PCI/LITER +/- 2 SIGMA

COLLECTION PERIOD	16C2
JAN	-0.7 ± 0.8
FEB	0.6 ± 1.2
MAR	-0.1 ± 0.9
APR	0.4 ± 0.5
MAY	0.5 ± 0.4
JUN	1.0 ± 0.6
JUL	0.1 ± 0.6
AUG	(1)
SEP	0.0 ± 0.5
OCT	(1)
NOV	0.5 ± 0.5
DEC	-0.2 ± 0.8
MEAN	0.2 ± 0.9

TABLE D-I.2 CONCENTRATIONS OF GROSS BETA SOLUBLE IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

RESULTS IN UNITS OF PCI/LITER +/- SIGMA

COLLECTION PERIOD	16C2
JAN	2.8 ±1.8
FEB	4.5 ±1.4
MAR	4.0 ±1.6
APR	2.0 ±0.8
MAY	2.8 ±0.8
JUN	2.5 ±0.9
JUL	3.0 ±1.0
AUG	(1)
SEP	3.3 ±0.5
OCT	(1)
NOV	3.1 ±0.5
DEC	3.2 ±1.0
MEAN	3.1 ±1.4

(1) DATA NOT AVAILABLE AT REPORT TIME

TABLE D-I.3 **CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000**

RESULTS IN UNITS OF PCI/LITER +/- 2 SIGMA

SAMPLING PERIOD	MN-54	CO-58	FE-59	CO-60	ZN-65	ZR-95	NB-95	CS-134	CS-137	BA-140	LA-140
JAN	0.2 ± 0.5	0.05 ± 0.5	1 ± 1	-0.1 ± 0.5	-0.7 ± 1	1 ± 1.0	0.7 ± 0.5	0.1 ± 0.5	-0.4 ± 0.6	-2 ± 4	0.3 ± 1.5
FEB	0.2 ± 0.4	0.3 ± 0.4	0.07 ± 1	0.05 ± 0.4	0.5 ± 1	0.8 ± 0.9	0.3 ± 0.5	-0.3 ± 0.4	-0.2 ± 0.4	0.08 ± 2	-0.3 ± 0.9
MAR	0.07 ± 0.4	-0.3 ± 0.5	0.9 ± 2	0.4 ± 0.4	0.04 ± 1	0.7 ± 1.2	0.9 ± 0.6	0 ± 0.4	0.6 ± 0.4	5 ± 9	-3 ± 4.0
APR	0.5 ± 0.5	-0 ± 0.6	1 ± 2	0.4 ± 0.5	0.3 ± 1	0.8 ± 1.3	0.2 ± 0.7	0.1 ± 0.5	0.2 ± 0.5	-0.6 ± 11	0.9 ± 5.4
MAY	0.3 ± 0.4	-0.1 ± 0.4	0.8 ± 1	0.4 ± 0.4	-0.7 ± 1	-0.8 ± 0.8	0.3 ± 0.4	0.3 ± 0.4	0.5 ± 0.4	-1 ± 2	-1 ± 0.8
JUN	(1)										
JUL	0.2 ± 0.6	0.3 ± 0.6	-2 ± 2	0.4 ± 0.6	2 ± 1	2 ± 1.0	0.4 ± 0.7	0.3 ± 0.6	-0.2 ± 0.7	-2 ± 3	0.5 ± 1.1
AUG	(2)										
SEP	< 1	< 2	< 8	< 1.2	< 2.6	< 5.4	(3)	< 1.4	< 1	(1)	(1)
OCT	(2)										
NOV	< 2.3	< 2.8	< 2.7	< 1.7	< 3	< 3.6	(3)	< 1.4	< 1.5	< 15.4	< 5.2
DEC	< 5.8	< 4.2	< 11.8	< 2.4	< 8.6	< 8.3	(3)	< 4.6	< 4.9	< 37.2	< 5
MEAN	1.17 ± 3.7	1.03 ± 3.2	2.7 ± 8.7	0.76 ± 1.7	1.74 ± 5.8	2.42 ± 5.7	0.47 ± 0.5	0.88 ± 3.0	0.88 ± 3.3	6.51 ± 27.4	0.95 ± 5.7

(1) RESULTS NOT INCLUDED BECAUSE LLDS NOT MET DUE TO LONG DECAY TIME BETWEEN COLLECTION AND COUNTING.
(2) DATA NOT AVAILABLE AT REPORT TIME
(3) RESULTS NOT PROVIDED BY LABORATORY

TABLE **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000**

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

WEEK NO.	11S2
1	26 ± 3
2	15 ± 3
3	21 ± 4
4	22 ± 3
5	18 ± 3
6	23 ± 3
7	23 ± 3
8	16 ± 3
9	22 ± 3
10	13 ± 3
11	17 ± 3
12	14 ± 3
13	9 ± 3
14	12 ± 3
15	11 ± 3
16	14 ± 3
17	5 ± 2
18	12 ± 3
19	19 ± 3
20	14 ± 3
21	11 ± 3
22	6 ± 2
23	8 ± 3
24	18 ± 3
25	6 ± 3
26	14 ± 3
27	15 ± 3
28	17 ± 3
29	11 ± 3
30	13 ± 3
31	16 ± 5
32	16 ± 3
33	16 ± 3
34	14 ± 3
35	18 ± 3
36	13 ± 3
37	17 ± 3
38	13 ± 3
39	13 ± 3
40	25 ± 4
41	44 ± 4
42	37 ± 4
43	29 ± 4
44	19 ± 3
45	18 ± 3
46	28 ± 4
47	18 ± 3
48	20 ± 3
49	(1)
50	16 ± 4
51	34 ± 4
52	(1)
MEAN	17 ±15

(1) DATA NOT AVAILABLE AT REPORT TIME

TABLE D-II.2 CONCENTRATION OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

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

STC	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Co-60	Fe-59	Zn-65	Zr-95	Nb-95	Cs-134	Cs-137	Ba-140	La-140	Ra-226	Th-232
11S2																
	12/27 - 03/27/2000	63 ± 7	-12 ± 4	0.2 ± 0.3	-0.1 ± 0.4	-1 ± 1.0	0 ± 0.3	-0.1 ± 1	0.5 ± 1.0	-0.2 ± 0.5	0 ± 0.3	0.1 ± 0.3	3 ± 11	-4 ± 5	0 ± 4	0 ± 0
	03/27 - 06/26/2000	43 ± 9	-30 ± 10	0 ± 0.4	0.4 ± 0.6	1 ± 3.0	0.1 ± 0.4	0 ± 1	-2 ± 1.0	-0.8 ± 0.7	0.1 ± 0.4	0.1 ± 0.4	7 ± 31	-1 ± 13	2 ± 7	0 ± 1
	06/26 - 09/29/2000	(1)														
	09/29 - 12/29/2000	(1)														
	MEAN	53 ± 28	-21 ± 25	0.1 ± 0.3	0.2 ± 0.7	0.1 ± 0.1	0 ± 2.8	0 ± 0	-0.8 ± 3.5	-0.5 ± 0.8	0 ± 0.1	0.1 ± 0.0	5 ± 6	-2 ± 5	1 ±3	0 ± 1

(1) DATA NOT AVAILABLE AT REPORT TIME

TABLE D.III.1 CONCENTRATION OF I-131 BY CHEMICAL SEPARATION AND GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

RESULTS IN UNITS OF PCI/LITER +/- 2 SIGMA

STC	SAMPLING PERIOD	I-131	K-40	Cs-134	Cs-137	Ba-140	La-140
19B1	01/11/2000	0 ± 0.12	1300 ± 100	0 ± 2	2 ± 2	1 ± 8	-2 ± 3
	04/04/2000	0 05 ± 0.07	1600 ± 200	0 ± 3	1 ± 3	1 ± 10	-2 ± 4
	07/11/2000	-0.16 ± 0.09	1600 ± 160	0 ± 3	1 ± 3	10 ± 10	3 ± 4
	10/03/2000	(1)					
	MEAN	-0.08 ± 0 22	1500 350	0 ± 0	1 ± 1	4 ± 10	0 ± 6
21B1	01/10/2000	0 ± 0 13	1300 ± 100	-1 ± 3	1 ± 3	-4 ± 7	-2 ± 3
	04/04/2000	0.01 ± 0 04	1400 ± 100	0 ± 2	2 ± 2	-1 ± 8	2 ± 3
	07/11/2000	-0 04 ± 0 10	1200 ± 120	0 ± 2	-4 ± 2	2 ± 8	-2 ± 3
	10/03/2000	0.04 ± 0.14	1300 ± 100	0 ± 2	2 ± 2	0 ± 8	1 ± 3
	MEAN	-0.04 ± 0.08	1300 ± 114	0 ± 2	0 ± 4	0 ± 5	0 ± 5
9G1	01/10/2000	0 ± 0 16	1300 ± 100	0 ± 2	2 ± 2	-1 ± 7	-3 ± 3
	04/04/2000	0.05 ± 0.05	1300 ± 100	0 ± 2	1 ± 2	0 ± 7	1 ± 3
	07/11/2000	-0.04 ± 0.10	1400 ± 140	< 3	< 4	< 5	< 5
	10/03/2000	0.07 ± 0.15	1300 ± 100	0 ± 3	2 ± 3	0 ± 8	0 ± 3
	MEAN	-0.02 ± 0.09	1325 ± 87	1 ± 3	2 ± 2	1 ± 5	0 ± 6

(1) SAMPLE LOST IN TRANSIT BETWEEN LABORATORIES

TABLE D-IV.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF LIMERICK GENERATING STATION, 2000

DRINKING WATER (GROSS BETA & GAMMA SPECTROSCOPY)

COLLECTION PERIOD	16C2
JAN	12/27/1999 - 02/01/2000
FEB	02/01/2000 - 02/28/2000
MAR	02/28/2000 - 04/04/2000
APR	04/04/2000 - 05/01/2000
MAY	05/01/2000 - 05/30/2000
JUN	05/30/2000 - 07/03/2000
JUL	07/03/2000 - 07/31/2000
AUG	
SEP	08/28/2000 - 10/02/2000
OCT	
NOV	10/30/2000 - 11/27/2000
DEC	11/27/2000 - 01/02/2001

AIR PARTICULATE (GAMMA SPECTROSCOPY)

COLLECTION PERIOD	11S2
JAN-MAR	12/29/1998 - 03/29/1999
APR-JUN	03/29/1999 - 06/28/1999
JUL-SEP	06/28/1999 - 09/27/1999
OCT-DEC	09/27/1999 - 12/27/1999

AIR PARTICULATE (GROSS BETA)

COLLECTION PERIOD	11S2	COLLECTION PERIOD	11S2
1	01/03/2000 - 01/10/2000	27	07/03/2000 - 07/10/2000
2	01/10/2000 - 01/18/2000	28	07/10/2000 - 07/17/2000
3	01/18/2000 - 01/24/2000	29	07/17/2000 - 07/24/2000
4	01/24/2000 - 01/31/2000	30	07/24/2000 - 07/31/2000
5	01/31/2000 - 02/07/2000	31	07/31/2000 - 08/07/2000
6	02/07/2000 - 02/14/2000	32	08/07/2000 - 08/14/2000
7	02/14/2000 - 02/21/2000	33	08/14/2000 - 08/21/2000
8	02/21/2000 - 02/28/2000	34	08/21/2000 - 08/28/2000
9	02/28/2000 - 03/06/2000	35	08/28/2000 - 09/05/2000
10	03/06/2000 - 03/13/2000	36	09/05/2000 - 09/11/2000
11	03/13/2000 - 03/20/2000	37	09/11/2000 - 09/18/2000
12	03/20/2000 - 03/27/2000	38	09/18/2000 - 09/25/2000
13	03/27/2000 - 04/03/2000	39	09/25/2000 - 10/02/2000
14	04/03/2000 - 04/10/2000	40	10/02/2000 - 10/09/2000
15	04/10/2000 - 04/17/2000	41	10/09/2000 - 10/16/2000
16	04/17/2000 - 04/24/2000	42	10/16/2000 - 10/23/2000
17	04/24/2000 - 05/01/2000	43	10/23/2000 - 10/30/2000
18	05/01/2000 - 05/08/2000	44	10/30/2000 - 11/06/2000
19	05/08/2000 - 05/15/2000	45	11/06/2000 - 11/13/2000
20	05/15/2000 - 05/22/2000	46	11/13/2000 - 11/20/2000
21	05/22/2000 - 05/30/2000	47	11/20/2000 - 11/27/2000
22	05/30/2000 - 06/05/2000	48	11/27/2000 - 12/04/2000
23	06/05/2000 - 06/12/2000	49	
24	06/12/2000 - 06/19/2000	50	12/12/2000 - 12/18/2000
25	06/19/2000 - 06/26/2000	51	12/20/1999 - 12/27/1999
26	06/26/2000 - 07/03/2000	52	

FIGURE D-1
COMPARISON OF MONTHLY INSOLUBLE GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES SPLIT BETWEEN ERL AND TBE, 2000

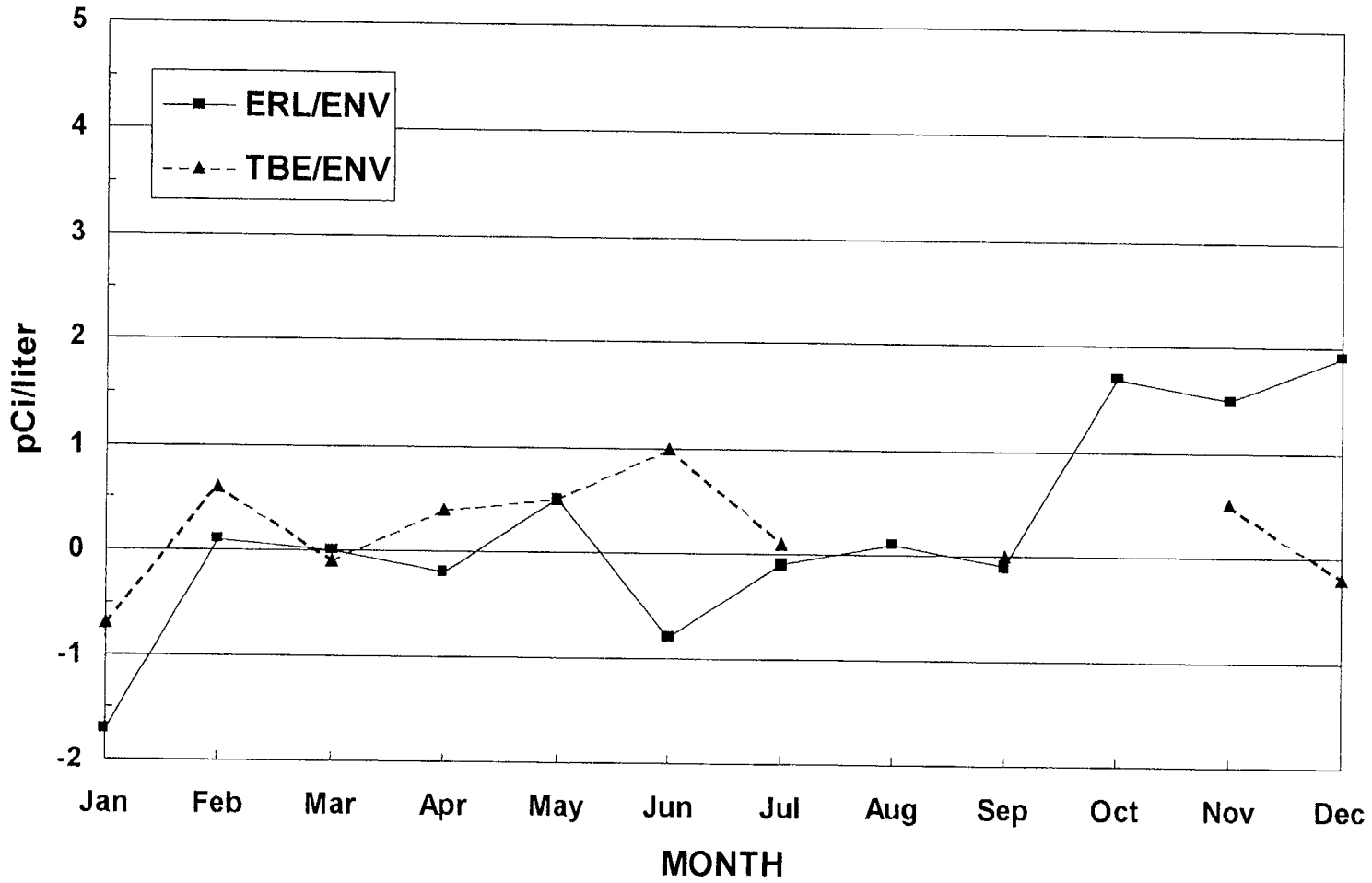


FIGURE D-2
COMPARISON OF MONTHLY SOLUBLE GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES SPLIT BETWEEN ERL AND TBE, 2000

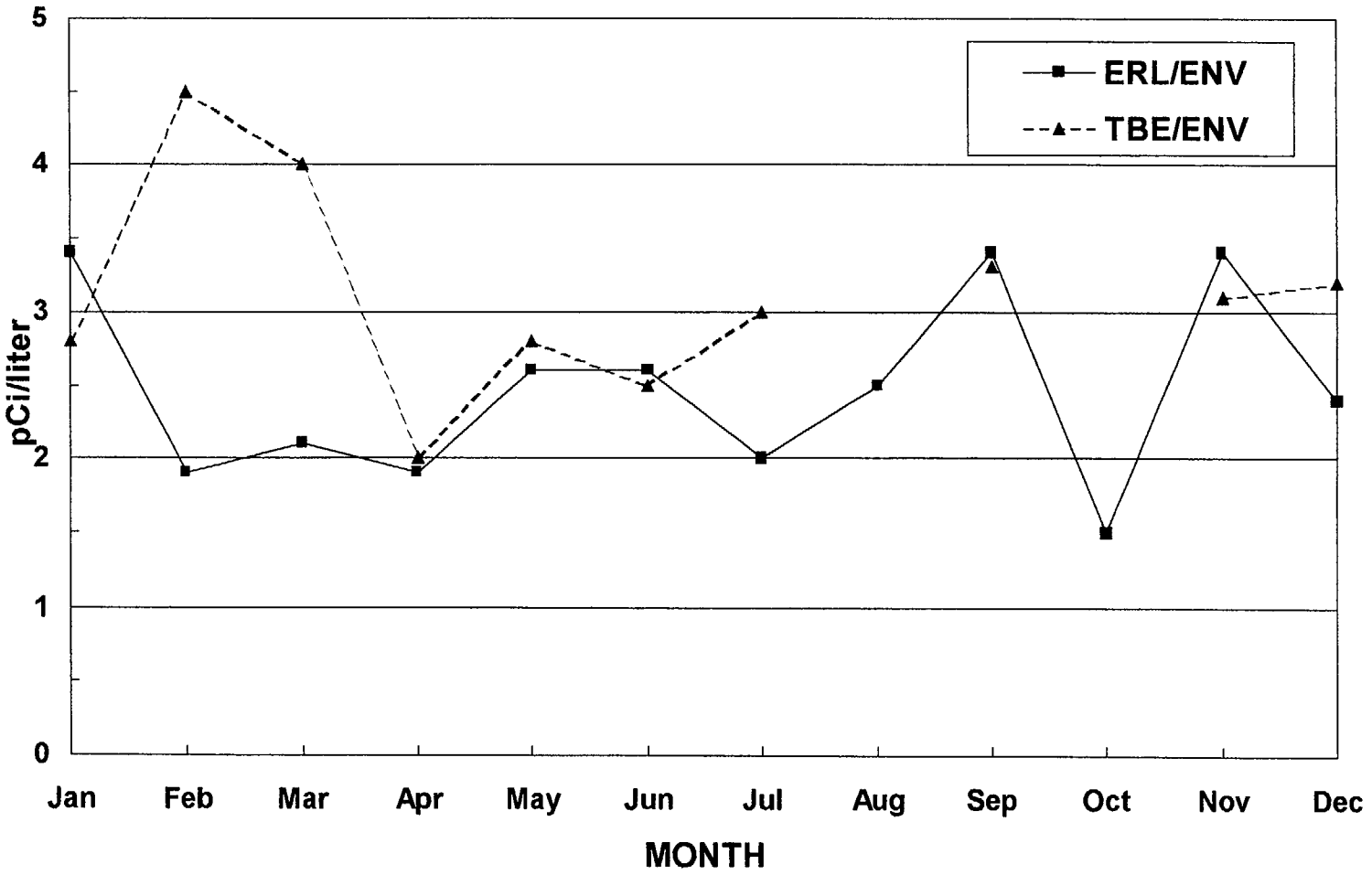
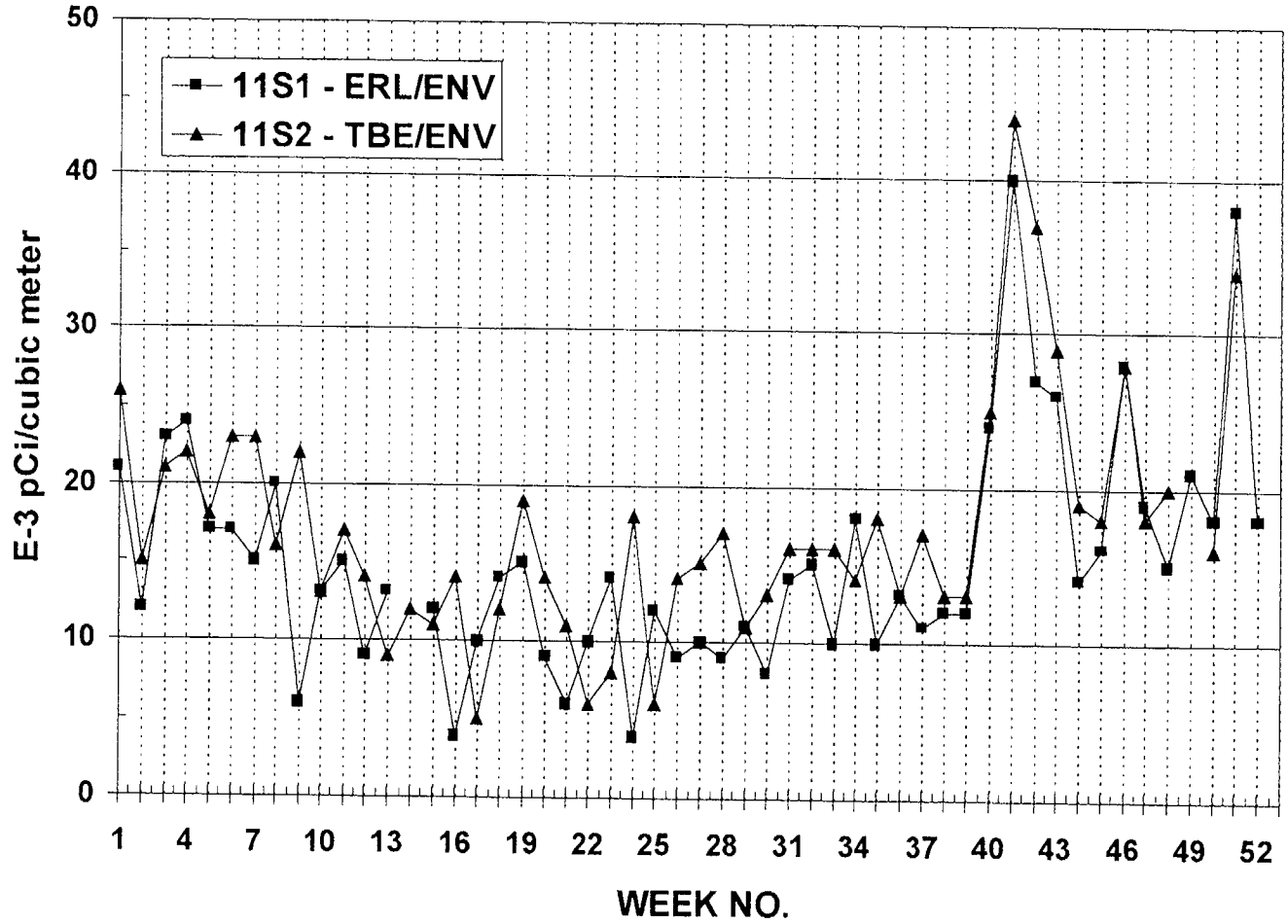


FIGURE D-3
COMPARISON OF WEEKLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED FROM LGS CO-LOCATED LOCATIONS 11S1 AND 11S2, 2000



APPENDIX E

SYNOPSIS OF ANALYTICAL PROCEDURES

APPENDIX E: SYNOPSIS OF ANALYTICAL PROCEDURES

The following section contains a description of the analytical laboratory procedures along with an explanation of the analytical calculation methods used by AmerGen ERL and Teledyne Brown Engineering to obtain the sample activities.

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

AmerGen Environmental Radioactivity Laboratory

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

For surface and drinking water samples, 400 ml of the sample is filtered under vacuum through a 0.45 micron filter. This filter represents the insoluble portion of the sample. The filter is dried and mounted on a planchet. The filtrate which represents the soluble portion of the sample is evaporated on a hot plate, and the residue is transferred and dried on another planchet.

The planchets are counted for 100 minutes in a low-background gas flow proportional counter. Calculation of activity includes a self-absorption correction for counter efficiency based on the weight of residue on each planchet.

Calculation of Sample Activity and 2 Sigma Uncertainty:

$$R = \frac{C - B}{2.22x\,E_0\,xTFxVxT}$$

$$2s = \frac{2x\sqrt{C + B}}{2.22x\,E_0\,xTFxVxT}$$

$$LLD = \frac{4.66x\sqrt{B}}{2.22x\,E_0\,xTFxVxT}$$

Where:

R	=	Activity of sample in picocuries per unit volume or weight. Volume or weight units are those used for V.
2s	=	2 Sigma Counting Uncertainty
LLD	=	Lower Limit of Detection
C	=	Sample Counts
B	=	Blank Counts
E_0	=	Efficiency of the counter
TF	=	Transmission Factor
T	=	Acquisition time in minutes
V	=	Volume or weight of aliquot analyzed.

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

Teledyne Brown Engineering

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

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

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

Calculation of Sample Activity and 2 Sigma Error:

$$\frac{Result}{(pCi/l)} = \frac{\frac{N}{t_s} - \beta}{(2.22)(v)(E)} \pm \frac{2\sqrt{\frac{N}{t_s^2} + \frac{\beta}{t_b}}}{(2.22)(v)(E)}$$

Net Activity Counting Error

where:

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

The MDA is defined as that value equal to the two sigma counting error of the result.

DETERMINATION OF TRITIUM IN WATER BY LIQUID SCINTILLATION COUNTING

AmerGen Environmental Radioactivity Laboratory

Seven (7) milliliters of sample is filtered through a 0.45 micron filter into a vial and mixed with 15 ml of liquid scintillation material and counted for a minimum of 480 minutes to determine its activity. The tritium activity is determined by measuring the count rate in the beta activity energy spectrum in Region A. 20.0 to 2000 represents Region C. If the sample Region C cpm is within ± 25% of the average background Region C cpm and the sample Quench Indicating Parameter (QIP) is within 20 of the H-3 source QIP the sample has no contamination and the tritium activity may be calculated directly. If not the sample must be purified before recounting.

Calculation of Sample Activity and 2 Sigma Uncertainty:

$$R = \frac{C - B}{2.22x\,E_0\,xVxDF}$$

$$2s = \frac{2x\sqrt{\frac{C}{T_a} + \frac{\beta}{T_b}}}{2.22x\,E_0\,xVxDF}$$

$$LLD = \frac{3.29x\sqrt{\frac{\beta}{T_a} + \frac{\beta}{T_b}}}{2.22x\,E_0\,xVxDF}$$

Where:

T_a	=	Total count time of sample in minutes
T_b	=	Total count time of background in minutes
R	=	Tritium activity in picoCurie per unit volume (Volume units are those used in V)
2s	=	2 sigma Uncertainty in the same units as above
LLD	=	Lower limit of detection in same units as above
C	=	Average count rate of sample
ß	=	Average count rate of background
E_0	=	Tritium detection efficiency of counter, calculated as shown below
V	=	Volume of aliquot

DF = Decay factor, calculated as shown below

$$DF = e^{\frac{-\ln 2 x DT}{12.43}} \quad 8$$

DT = time difference in years from collection stop date to counting date of sample

The efficiency is calculated as follows:

$$E_0 = \frac{S - B}{AsxVsxDFs} \quad 9$$

Where:

S = Average count rate for the "efficiency determination" standard
B = Average count rate of background
As = Activity of standard in dpm per unit volume
Vs = Volume of standard used
DFs = Decay factor of standard, calculated as follows:

$$DFs = e^{\frac{-\ln 2 x DTs}{12.43}} \quad 10$$

DTs = time difference (in years) between calibration date and counting date

DETERMINATION OF GROSS BETA ACTIVITY IN AIR PARTICULATE SAMPLES

AmerGen Environmental Radioactivity Laboratory

After allowing at least a three-day (extending from the sample stop date to the sample count time) period for the short-lived radionuclides to decay out, each air particulate filter paper is placed in a 2-inch diameter stainless steel planchet and counted using a gas flow proportional counter.

Calculation of Sample Activity and 2 Sigma Uncertainty:

$$R = \frac{C - B}{2.22x\,E_0\,xTFxVxT} \quad 11$$

$$2s = \frac{2x\sqrt{C + B}}{2.22x\,E_0\,xTFxVxT} \quad 12$$

$$LLD = \frac{4.66x\sqrt{B}}{2.22x\,E_0\,xTFxVxT} \quad 13$$

Where

R	=	Activity of sample in picoCuries per unit volume or weight. Volume or weight units are those used for V.
2s	=	2 Sigma Counting Uncertainty
LLD	=	Lower Limit of Detection
C	=	Sample Counts
B	=	Blank Counts
E_0	=	Efficiency of the counter
TF	=	Transmission Factor of filter (i.e. 1.00 for gross beta, 0.80 for gross alpha)
T	=	Acquisition time in minutes
V	=	Volume analyzed.

DETERMINATION OF GROSS BETA ACTIVITY IN AIR PARTICULATE SAMPLES

Teledyne Brown Engineering

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

Calculation of Sample Activity and 2 Sigma Error:

$$\frac{Result}{(pCi/m^3)} = \frac{\frac{N}{t_s} - \beta}{2.22(v)(E)(.02832)} \pm \frac{2\sqrt{\frac{N}{t_s^2} + \frac{\beta}{t_b}}}{2.22(v)(E)(.02832)}$$

Net Activity Counting Error

where:

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

The MDA is defined as that value equal to the two sigma counting error of the result.

DETERMINATION OF I-131 IN MILK SAMPLES

AmerGen Environmental Radioactivity Laboratory

Stable iodine carrier is equilibrated in a 3.5-liter volume of raw milk before pumping through 25cc of anion exchange resin to extract iodine. The system is washed with de-ionized water until clear and the washed resin is transferred to a gamma counting container and analyzed by gamma spectroscopy.

Calculation of Sample Activity and 2 Sigma Uncertainty:

The same calculations are used as in DETERMINATION OF GAMMA EMITTING RADIOISOTOPES below.

DETERMINATION OF I-131 IN MILK SAMPLES

Teledyne Brown Engineering

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

Calculation of the Sample Activity and 2 Sigma Error:

$$\frac{Result}{(pCi/l)} = \frac{\frac{N}{t_s} - \beta}{(2.22)(v)(E)(y)(\exp^{-\lambda\Delta t})} \pm \frac{2\sqrt{\frac{N}{t_s^2} + \frac{\beta}{t_b}}}{(2.22)(v)(E)(y)(\exp^{-\lambda\Delta t})}$$

Net Activity Counting Error

where:

N	=	total counts from sample (counts)
t_s	=	counting time for sample (min)
ß	=	background rate of counter (cpm)
t_b	=	counting time for background (min)
2.22	=	dpm/pCi
v	=	volume of sample analyzed (liters)
y	=	chemical yield of the amount of sample counted
λ 16	=	is the radioactive decay constant for I-131 (0.693/8.05)
Δt 17	=	is the elapsed time between sample collection (or end of the sample collection) to the midcount time
2	=	multiple of the counting error
E	=	efficiency of the counter for I-131, corrected for self absorption effects by the formula:

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

where:

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

The MDA is defined as that value equal to the two sigma counting error of the result.

DETERMINATION OF GAMMA EMITTING RADIOISOTOPES

AmerGen Environmental Radioactivity Laboratory

The procedure for detection of gamma emitting radioisotopes generates high resolution gamma spectra which are used for quantitative determination and identification. Standard geometries have been established to maximize efficiency for sample types: air particulate filters, water, milk, soil/sediment and food products.

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

Air particulate: At the end of each calendar quarter, 13 (or 14) weekly air filters from the given location are stacked in a two inch diameter Petri dish in chronological order, with the oldest filter at the bottom, nearest the detector, and the newest one on top. The Petri dish is closed and the sample counted.

Water and Milk: A well-mixed 3.5-liter sample is poured into a Marinelli beaker. The samples are brought to ambient temperature and counted.

Soil and Sediment: The sample is dried, sieved and put into a counting container and counted.

Food products: The sample is chopped up and put into a counting container and counted.

Calculation of Sample Activity and 2 Sigma Uncertainty:

$$A = \frac{P}{2.22xqx\varepsilon xbx\,E_L} x\, e^{\lambda T_s} x \frac{\lambda E_R}{(1 - e^{-\lambda E_R})}$$

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where:

A	=	the computed specific activity
P	=	peak area
2.22	=	dpm/picoCurie
q	=	sample quantity
ε 20	=	detection efficiency
b	=	gamma-ray abundance
E_L	=	elapsed live time
λ 21	=	decay constant
T_S	=	acquisition start time
E_R	=	elapsed real time

$$\Delta A = A\sqrt{\left(\frac{\Delta P}{P}\right)^2 + \left(\frac{\Delta b}{b}\right)^2 \left(\frac{\Delta \varepsilon}{\varepsilon}\right)^2 \left(\frac{sys}{100}\right)^2 (\Delta Decay)^2} \quad 22$$

where: ΔA 23 = uncertainty in the activity

$$\Delta Decay = \frac{\Delta T_{1/2}}{T_{1/2}} x \left(\frac{\lambda E_R}{1 - e^{-\lambda E_R}} - \lambda (T_S + E_R) - 1\right) \quad 24$$

ΔP 25 = uncertainty in the peak area P
Δb 26 = uncertainty in the **S**-ray abundance
$\Delta \varepsilon$ 27 = uncertainty in the efficiency
sys = systematic Uncertainty estimate (in %)
ΔT 28½ = uncertainty in the half-life

DETERMINATION OF GAMMA EMITTING RADIOISOTOPES

Teledyne Brown Engineering

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

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

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

Gamma Spectroscopy Statistically Significant Activity and 2 Sigma Error Calculation for the ND6620 and ND6700 Systems:

$$\frac{Activity}{\left(\frac{pCi}{unit\ mass}\right)} = \frac{AREA * DECAY}{LIVETIME(\text{sec.}) * ABN * EFF * 0.037 * (unit\ mass)}$$

Statistically Significant Activity

$$\pm\ 200 * \frac{\sqrt{2 * BKGND + AREA}}{AREA} * Activity$$

2 Sigma Counting Error

Where:

AREA	=	Net Peak Area (from Nuclide Line Activity Report)
BKGND	=	Compton Background (from Nuclide Line Activity Report
DECAY	=	Decay Correction Factor (from Minimum Detectable Activity Report) (Nuclide Half Life - Collection time to Mid Count time)
LIVE TIME	=	Elapsed Live Time (from Header Information)

ABN	=	Nuclide Abundance (from Nuclide Line Activity Report)
EFF	=	Detector Efficiency (from Nuclide Line Activity Report)
0.037	=	Conversion Factor (dps to picoCurie)
unit mass	=	Sample weight or volume (from Header Information)

Gamma Spectroscopy Statistically Non Significant Activity and 2 Sigma Error Calculation for the ND6620 and ND6700 Systems:

$$\frac{Activity}{\left(\frac{pCi}{unit\ mass}\right)} = \frac{AREA * DECAY}{LIVETIME(\text{sec.}) * ABN * EFF * 0.037 * (unit\ mass)}$$

Statistically Non Significant Activity

$$\pm\ 200 * \frac{\sqrt{2 * BKGND + NET}}{NET} * Net\ Activity$$

2 Sigma Counting Error

where:

NET	=	Net Peak Area (from Minimum Detectable Activity Report)
BKGND	=	Compton Background (from Nuclide Line Activity Report)
DECAY	=	Decay Correction Factor (from Minimum Detectable Activity Report) (Nuclide Half Life - Collection time to Mid Count time)
LIVE TIME	=	Elapsed Live Time (from Header Information)
(EFF*B.I)	=	Efficiency * Abundance (from Minimum Detectable Activity Report)
0.037	=	Conversion Factor (dps to picoCurie)
unit mass	=	Sample weight or volume (from Header Information)

Gamma Spectroscopy Minimum Detectable Activity Calculation for the ND6620 and ND6700 Systems:

$$\frac{MDA}{\left(\frac{pCi}{unit\ mass}\right)} = \frac{2.83\sqrt{BKGN} * DECAY}{LIVETIME(\text{sec.}) * (EFF * B.I.) * 0.037 * (unit\ mass)}$$

where:

BKGN	=	Total Peak Background Area (from Minimum Detectable Activity Report)
DECAY	=	Decay Correction Factor (from Minimum Detectable Activity Report) (Nuclide Half Life - Collection time to Mid Count time)
LIVE TIME	=	Elapsed Live Time (from Header Information)
(EFF*B.I)	=	Efficiency * Abundance (from Minimum Detectable Activity Report)
0.037	=	Conversion Factor (dps to picoCurie)
unit mass	=	Sample weight or volume (from Header Information)

ENVIRONMENTAL DOSIMETRY

AmerGen Environmental Radioactivity Laboratory

AmerGen ERL thermoluminescent dosimeters (TLDS) are Panasonic Type 801 AS badges, two of which are deployed at each station. Each badge contains two calcium sulfate and two lithium borate elements. Since each element responds to radiation independently, this provides eight independent detectors at each station. The calcium sulfate elements are shielded with a thin layer of lead, which makes the response to different energies of gamma radiation more linear. The lead also shields the calcium sulfate elements from beta radiation, so that they respond to gamma radiation only. The two lithium borate elements are shielded differently to permit the detection of beta radiation. Only the calcium sulfate elements normally are used for environmental monitoring; however, the lithium borate elements can be used to evaluate beta exposures or as a backup to the calcium sulfate elements should more data be required.

TLDs are annealed and read using a Panasonic UD701 A TLD Reader equipped with glow curve capture capability. A reader alignment is performed monthly using TLDs irradiated to a known exposure. Run Correction Factors (RCF) are inserted in each read batch to correct for small drifts in reader calibration. An Element Correction Factor (ECF) is generated for each element before a new TLD badge is placed into service to standardize each element to a known exposure. The ECF for each element is updated every two years. Each calcium sulfate element is annealed to a total residual exposure of less than 0.5 mR prior to being issued each time that a badge is used.

Control (transit) badges are issued with every batch of field TLDs and accompany the badges into the field to quantify transit exposure. After the field badges are deployed, the control badges are kept in a lead shield with minimum 2" thick lead during the period of field exposure. Additional control badges are kept in a lead shield for the entire quarter, and receive essentially no transit exposure. All control and field badges are read together at the end of each quarter, and the average field control badge exposure is subtracted from the average shield control badge exposure to generate the transit exposure. The transit exposure (generally less than 1 mR total) is subtracted from the gross exposures on the field badges to yield the net exposures. Net exposures are then converted to mR per standard month. This method of calculating transit exposure conforms to guidance contained in ANSI N545.

Each station comprises two TLD badges, each of which has two calcium sulfate elements. Outliers are identified using predefined algorithms. If all four elements are available, a given exposure value is judged an outlier if the standard deviation exceeds 5% of the mean exposure based on all four elements, and the exposure for one element is outside three standard deviations of the mean exposure based on the

other three elements. If only two elements are available, the relative standard deviation based on the two exposure values must be 12% or less, or else both exposure values are considered outliers and no valid data are reported for that station for that Quarter.

APPENDIX F

QUALITY CONTROL
INTER-LABORATORY COMPARISON PROGRAM

APPENDIX F: QUALITY CONTROL PROGRAM

AmerGen's ERL , Environmental, Inc. (EI) and Teledyne Brown Engineering (TBE) participated in an Inter-laboratory Radiological Comparison (cross check) Programs provided by Analytics, DOE Radiological Comparison Program (MAPEP) and Environmental Resources Associates (ERA). The results of these inter-laboratory programs represent the various media as found in the Limerick Generating Station REMP. As a result of this participation, an objective measurement of analytical precision and accuracy as well as, a bias estimation of the results are obtained.

Examination of the data shows that the vast majority were within the Analytics's, DOE's, or ERA's control limits. Each case of exceeding the control limits was investigated. There was no evidence to suggest systematic errors.

The results of ERL's , EI's, and TBE's participation in the DOE, Analytics and ERA cross check programs can be found in Tables F-1 through F-7.

TABLE F-1
DOE EML Cross Check Program Results
AmerGen ERL

Collection Date	Media	Nuclide	ERL VALUE (A & D)	ERL UNCERTAINTY (A)	DOE EML VALUE (B &D)	DOE EML UNCERTAINTY (C)	RATIO	Min. RATIO	Max. RATIO	AGREEMENT
3/1/2000	Air Filter	Am-241	0.15	0.02	0.088	0.005	1.705	0.73	2.58	YES
		Co-57	5.9	0.6	5.31	0.22	1.111	0.65	1.39	YES
		Co-60	6.4	0.6	5.32	0.26	1.203	0.75	1.32	YES
		Cs-137	7.1	0.7	6.1	0.3	1.164	0.73	1.37	YES
		Mn-54	31	3	27.2	0.8	1.140	0.73	2.58	YES
		Pu-238	0.079	0.013	0.08	0.001	0.988	0.74	1.4	YES
		Pu-239	0.1	0.01	0.089	0.003	1.124	0.76	1.44	YES
		Ru-106	3.3	1.7	2.01	1.94	1.642	0.59	1.3	NO
		U-234	0.055	0.009	0.062	0.001	0.887	0.83	1.92	YES
		U-238	0.051	0.009	0.062	0.001	0.823	0.84	2.61	NO
		U-NAT	0.11		0.126	0.001	0.873	0.8	2.61	YES
3/1/2000	Air Filter	ALPHA	2.7	0.3	3.02	0.3	0.894	0.5	1.55	YES
		BETA	2.8	0.3	2.42	0.2	1.157	0.72	1.67	YES
3/1/2000	Soil	Am-241	13	3	3.36	0.51	3.869	0.63	2.31	NO
		Cs-137	393	40	339	9.3	1.159	0.83	1.32	YES
		K-40	943	97	811	29	1.163	0.78	1.53	YES
		Pu-238	20	2	18.6	0.5	1.075	0.52	2.84	YES
		Pu-239	7.7	1.3	7	0.34	1.100	0.69	1.74	YES
		Sr-90	18	5	20.2	0.2	0.891	0.6	3.66	YES
		U-234	105	10	111	11	0.946	0.47	1.3	YES
		U-238	105	10	114	12	0.921	0.44	1.42	YES
		U-NAT	214		229	23	0.934	0.42	1.3	YES
3/1/2000	Vegetation	Am-241	16	2	10.4	1.4	1.538	0.68	2.7	YES
		Cm-244	10	1	5	1.8	2.000	0.47	1.74	NO
		Co-60	55	6	52.8	1	1.042	0.69	1.46	YES
		Cs-137	1400	100	1380	20	1.014	0.8	1.4	YES
		K-40	550	60	521	20	1.056	0.79	1.42	YES
		Pu-238	1.7	0.2	1.09	0.1	1.560	0.66	7.94	YES
		Pu-239	16	2	15.5	2.1	1.032	0.68	1.59	YES
		Sr-90	2200	200	1780	17.8	1.236	0.5	1.33	YES
3/1/2000	Water	Am-241	3.8	0.4	1.95	0.18	1.949	0.75	1.49	NO
		Co-60	53	5	48.9	1.8	1.084	0.8	1.2	YES
		Cs-137	110	10	103	4	1.068	0.8	1.26	YES
		Fe-55	31	5	33.1	0.7	0.937	0.44	1.53	YES
		H-3	81	7	79.4	2.5	1.020	0.71	1.79	YES
		Pu-238	1.2	0.1	0.944	0.04	1.271	0.78	1.25	NO
		Pu-239	1.2	0.1	0.918	0.03	1.307	0.8	1.39	YES
		Sr-90	3.1	0.8	3.39	0.12	0.914	0.75	1.5	YES
		U-234	0.53	0.06	0.482	0.04	1.100	0.8	1.4	YES
		U-238	0.51	0.05	0.492	0.04	1.037	0.8	1.26	YES
		U-NAT	1.1		0.995	0.087	1.106	0.67	1.42	YES
	Water	Alpha	1600	100	1700	170	0.941	0.61	1.32	YES
		Beta	940	100	690	70	1.362	0.55	1.54	YES

Notes:

A. The ERL Value is an average of 1 to 4 determinations.
B. The DOE EML value is the mean of replicate determinations for each nuclide.
C. The DOE EML uncertainty is the standard error of the mean.
D. Units are Bq/L for Water, Bq/kg (dry) for Soil, Bq/kg (wet) for Vegetation and total Bq for Air Filter.
E. This sample was analyzed three times for Ru-106 and the average (3.3 +/- 1.7 Bq/un) was reported. The individual results were as follows:

   3.5 +/- 2.0 Bq/un
   3.0 +/- 1.4
   3.4 +/- 1.7

   The EML value was 2.01 +/- 1.94. The ERL/EML ratio was 1.642 and was not acceptable. The acceptance range was between 0.59 and 1.3. No follow-up actions were requested because the concentrations were not statistically different (i.e. the results with their counting uncertainties overlapped.).
F. An investigation was conducted to determine why five out of twenty-two TRU radionuclides failed to achieve acceptable results from various media submitted by the EML crosscheck program. When processing EML crosscheck samples, separate glassware is used in order to avoid cross contaminating other client's samples. This glassware has become etched throughout the years due to acid digestions and flouric acid precipitations. What used to be very good test results from the various crosscheck programs has progressively depreciated. It has been determined that the etching causes fluctuations in radionuclide recoveries. This is true not only with TRU radionuclides but also other fission and activation product nuclides. The ERL is now disposing glassware that shows deterioration to prevent this problem from reoccurring. Also, when it is appropriate, plastic beakers are being substituted for glass. Both corrective actions should eliminate the problems that result from etched glassware.

The control limit concept was established from percentiles of historic data distributions (1982 - 1992). The evaluation of this historic data and the development of the control limits are presented in DOE report EML-564. The control limits for QAP-XLVIII were developed from percentiles of data distributions for the years 1993 - 1999.

TABLE F-2
2000 Analytics Environmental Cross Check Program Results
AmerGen ERL

Collection Date	Media	Nuclide	ERL VALUE (B)	ANALYTICS VALUE (A)	ANALYTICS UNCERTAINTY (3 SIGMA)	ANALYTICS UNCERTAINTY (1 SIGMA)	RESOLUTION	RATIO	Min. RATIO	Max. RATIO	AGREEMENT
6/22/2000	Milk	I-131 (Resin)	92	84	4	1.3	63.0	1.10	0.8	1.25	YES
	Milk	I-131	89	84	4	1.3	63.0	1.06	0.8	1.25	YES
6/22/2000	Cartridge	I-131	66	72	4	1.3	54.0	0.92	0.8	1.25	YES

Notes:

A. The Analytics Value is the known concentration. Units are pCi/L for Milk, pCi/g (dry) for Soil and total pCi for Filter and Cartridge.

B. The ERL Value is an average of three or more determinations. Units are pCi/L for Milk, pCi/g (dry) for Soil and total pCi for Filter and Cartridge.

To determine agreement or possible agreement:

1. Divide each Analytics value by its associated one sigma uncertainty to obtain the resolution.
2. Divide each ERL value by the corresponding Analytics value to obtain the ratio.
3. The ERL measurement is in agreement if the value of the ratio falls within the limits shown in the following table for the corresponding resolution.

Resolution	Agreement
< 4	0.4 - 2.5
= 4 - < 8	0.5 - 2.0
= 8 - < 16	0.6 - 1.66
= 16 - < 51	0.75 - 1.33
= 51 - < 200	0.80 - 1.25
= 200	0.85 - 1.18

Criteria are similar to those listed in USNRC Inspection Procedure 84750 "Radioactive Waste Treatment, and Effluent and Environmental Monitoring" with minor adjustments to account for activity concentrations with large uncertainties.

Table F-3
Environmental Resource Associates Cross Check Program[a]
Environmental, Inc.

				Concentration in pCi/L[b]		
Lab Code	Sample Type	Date Collected	Analysis	Laboratory results[c] ±2 Sigma	ERA Result[d] ls, N=1	Control Limits
STW-863	WATER	Jan, 2000	Gr. Alpha	39.3 ± 5.2	25.4 ± 6.4	14.5 - 36.3
			Gr. Beta	40.7 ± 1.2	42.1 ± 4.2	33.4 - 50.8
The analysis was repeated and recalculated with Am-241 efficiency; result of reanalysis 29.32 ± 5.79 pCi/L. Internal spike program results do not indicate a problem.						
STW-866	WATER	Jan, 2000	Sr-89	17.1 ± 2.2	22.5 ± 5.0	13.8 - 31.2
			Sr-90	8.1 ± 0.6	9.6 ± 5.0	0.9 - 18.3
STW-868	WATER	Feb, 2000	Ra-226	7.6 ± 0.5	8.3 ± 1.2	6.1 - 10.4
			Ra-228	5.6 ± 1.0	2.3 ± 0.6	1.3 - 3.2
			Uranium	5.4 ± 0.2	6.1 ± 3.0	0.9 - 11.3
Result of reanalysis: 6.34 ± 0.94. Activity confirmed by gamma spectroscopy (6.00 ± 1.42 pCi/L).						
STW-869	WATER	Mar, 2000	H-3	23,500.0 ± 306.0	23,800.0 ± 2,380.0	19,800.0 - 27,800.0
STW-867	WATER	Mar, 2000	Gr. Alpha	83.6 ± 5.8	58.4 ± 5.8	33.3 - 83.5
			Gr. Beta	15.4 ± 0.9	16.8 ± 1.7	8.1 - 25.5
			1-131	18.7 ± 0.6	19.9 ± 2.0	18.1 - 28.5
Results were recalculated with Am-241 efficiency; 57.80 ± 5.73 pCi/L. Refer to STW-863.						
STW-877	WATER	Apr, 2000	Gr. Alpha	52.3 ± 2.3	54.0 ± 13.5	30.8 - 77.2
			Ra-226	17.5 ± 1.1	18.6 ± 2.8	13.8 - 23.4
			Ra-228	3.7 ± 0.4	3.6 ± 0.9	2.0 - 5.1
STW-878	WATER	Apr, 2000	Co-60	19.2 ± 0.6	16.9 ± 5.0	8.2 - 25.6
			Cs-134	81.0 ± 1.3	86.4 ± 5.0	77.7 - 95.1
			Cs-137	119.0 ± 2.6	123.0 ± 6.2	112.0 - 134.0
			Gr. Beta	276.0 ± 9.6	289.0 ± 43.4	214.0 - 364.0
			Sr-89	32.3 ± 3.3	50.7 ± 5.0	42.0 - 59.4
			Sr-90	11.3 ± 1.0	32.8 ± 5.0	24.1- 41.5
An error was found in calculation. Result of recalculation: Sr-89, 55.5± 7.2 pCi/L / Sr-90, 30.7 ± 3.0 pCi/L Results of reanalysis: Sr-89, 47.4 ± 14.5 pCi/L / Sr-90, 33.0 ± 1.35 pCi/L. Both results are within limits..						
STW-879	WATER	Jun, 2000	Ba-133	22.4 ± 2.1	25.5 ± 5.0	16.8 - 34.2
			Co-60	69.9 ± 3.7	65.6 ± 5.0	56.9 - 74.3
			Cs-134	13.5 ± 0.8	13.8 ± 5.0	5.1 - 22.5
			Cs-137	232.0 ± 7.8	238.0 ± 11.9	217.0 - 259.0
			Zn-65	50.9 ± 3.8	54.6 ± 5.5	45.3 - 63.9
STW-880	WATER	Jun, 2000	Ra-226	2.8 ± 0.2	3.0 ± 0.5	2.2 - 3.8
			Ra-228	10.0 ± 0.9	13.0 ± 3.3	7.4 - 18.6
			Uranium	57.0 ± 4.4	63.4 ± 6.3	52.6 - 74.2
STW-883	WATER	Jul, 2000	Gr. Alpha	6.9 ± 1.1	7.2 ± 5.0	0.0 - 15.9
			Gr. Beta	88.8 ± 9.8	87.5 ± 10.0	70.2 - 105.0
STW-884	WATER	Aug, 2000	H-3	8,740.0 ± 174.0	8,320.0 ± 832.0	6,910.0 - 9,730.0

Table F-3
Environmental Resource Associates Cross Check Program[a]
Environmental, Inc.

				Concentration in pCi/L[b]		
Lab Code	Sample Type	Date Collected	Analysis	Laboratory results[c] ±2 Sigma	ERA Result[d] ls, N=1	Control Limits
STW-891	WATER	Sep, 2000	Ra-226	17.9 ± 1.3	18.9 ± 2.8	14.0 - 23.8
			Ra-228	5.7 ± 0.5	6.2 ± 1.6	3.5 - 8.8
			Uranium	10.3 ± 0.1	11.9 ± 3.0	6.7 - 17.1
STW-892	WATER	Oct, 2000	1-131	16.9 ± 0.3	15.9 ± 1.6	10.7 - 21.1
			I-131(g)	17.1 ± 5.4	15.9 ± 1.6	10.7 - 21.1
STW-893	WATER	Oct, 2000	Gr. Alpha	66.3 ± 5.3	74.4 ± 18.6	42.2 - 107.0
			Ra-226	10.1 ± 1.0	10.5 ± 1.6	7.8 - 13.2
			Ra-228	21.2 ± 0.5	19.4 ± 4.9	11.0 - 27.8
			Uranium	41.4 ± 1.9	44.5 ± 4.5	36.8 - 52.2
STW-894	WATER	Oct, 2000	Co-60	93.4 ± 1.6	91.1 ± 5.0	82.4 - 99.8
			Cs-134	54.8 ± 0.3	59.8 ± 5.0	51.1 - 68.5
			Cs-137	45.5 ± 2.3	45.0 ± 5.0	36.3 - 53.7
			Cs-137	45.5 ± 2.3	45.0 ± 5.0	36.3 - 53.7
			Gr. Beta	209.0 ± 7.9	256.0 ± 38.4	189.0 - 323.0
			Sr-89	32.8 ± 3.0	41.3 ± 5.0	32.6 - 50.0
			Sr-90	16.0 ± 2.4	18.0 ± 5.0	9.3 - 26.7
STW-895	WATER	Nov, 2000	Gr. Alpha	50.3 ± 2.6	60.3 ± 15.1	34.4 - 86.2
			Gr. Beta	28.6 ± 1.3	25.5 ± 5.0	16.8 - 34.2
STW-896	WATER	Nov, 2000	Ba-133	78.0 ± 2.0	82.2 ± 8.2	68.0 - 96.4
			Co-60	30.8 ± 1.7	27.8 ± 5.0	19.1 - 36.5
			Cs-134	67.2 ± 3.3	76.0 ± 5.0	67.3 - 84.7
STW-896	WATER	Nov, 2000	Cs-137	109.0 ± 1.0	106.0 ± 5.3	96.8 - 115.0
STW-896	WATER	Nov, 2000	Zn-65	81.5 ± 7.4	79.0 ± 7.9	65.3 - 92.7

The mean value for Cs-134 of all participating laboratories was 70.7 pCi/L. Other gamma emitters are within limits, the counting efficiency is not suspect. Library values were reviewed and found to be correct.

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

b All results are in pCi/L, except for elemental potassium (K) data in milk, which are in mg/L; air filter samples, which are in pCi/Filter.

c Unless otherwise indicated, the laboratory results are given as the mean ± 2 standard deviations for three determinations.

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

Table F-4
Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP)[a]
Environmental, Inc.

				Concentration[b]		
Lab Code	Sample Type	Date Collected	Analysis	Laboratory results[c]	MAPEP Result[d] Is, N=1	Control Limits
STSO-882	SOIL	Jan, 2000	Am-241	64.90 ± 6.49	61.10	42.77 - 79.43
			Co-57	721.10 ± 83.80	949.00	664.30 - 1,233.70
			Co-60	1,264.40 ± 78.60	1,180.00	826.00 - 1,534.00
			Cs-134	969.30 ± 76.90	1,047.00	732.90 - 1,361.10
			Cs-137	944.00 ± 92.00	930.00	651.00 - 1,209.00
			K-40	811.70 ± 79.90	652.00	456.40 - 847.60
			Mn-54	1,103.30 ± 64.20	1,023.00	716.10 - 1,329.90
			Ni-63	711.00 ± 71.10	960.00	672.00 - 1,248.00
			Pu-239/40	67.90 ± 6.79	74.40	52.08 - 96.72
			Sr-90	345.00 ± 34.50	304.00	212.80 - 395.20
			U-233/4	62.90 ± 6.29	90.00	63.00 - 117.00
			U-238	63.20 ± 6.32	93.00	65.10 - 120.90
			Zn-65	1,544.30 ± 61.50	1,540.00	1,078.00 - 2,002.00
The MAPEP soil sample (STSO-882), as received, did not closely match a standard gamma geometry. The results for gamma-emitting isotopes are reanalyses, with a reduced sample size.						
Incomplete dissolution of the sample is suspected. Results of reanalysis: U-233/234 67.3 ± 3.3 pCi/g, U-238 68.1 ± 8.9 pCi/g.						

a 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 Unless otherwise indicated, laboratory results are given as the mean ± 1 standard deviations for three determinations.

d Results are presented as the known values, expected laboratory precision (1 sigma, 1 determination), and control limits as defined by the MAPEP.

Table F-5
DOE EML Quality Assessment Program[a]
Environmental, Inc.

				Concentration[b]		
Lab Code	Sample Type	Date Collected	Analysis	Laboratory results[c]	EML Result[d]	Control Limits
STSO-870	SOIL	Mar, 2000	Ac-228	98.30 ± 7.10	97.60	0.79 – 1.75
			Bi-212	98.50 ± 15.10	106.00	0.42 – 1.22
			Bi-214	88.00 ± 3.80	86.70	0.75 – 1.42
			Cs-137	324.00 ± 5.00	339.00	0.83 – 1.32
			K-40	872.00 ± 34.00	811.00	0.78 – 1.53
			Pb-212	93.70 ±2.70	97.30	0.74 – 1.33
			Pb-214	100.10 ± 3.70	86.50	0.65 – 1.45
			Pu-238	19.80 ± 3.00	18.60	0.52 – 2.84
			Pu-239/40	8.10 ± 1.70	7.00	0.69 – 1.74
			Sr-90	13.60 t 3.10	20.20	0.60 – 3.66
STVE-871	VEGETATION	Mar, 2000	Am-241	9.80 ± 0.90	10.40	0.68 – 2.70
			Co-60	46.50 ± 2.10	52.80	0.69 – 1.46
			Cs-137	1,872.00±46.00	1,380.00	0.80 – 1.40
			K-40	506.40 ± 28.00	521.00	0.79 – 1.42
			Pu-239/40	14.30 ± 1.50	15.50	0.68 – 1.59
			Sr-90	1,198.00±85.00	1,780.00	0.50 – 1.33
STAP-872	AIR FILTER	Mar, 2000	Co-57	5.90 ± 0.10	5.31	0.65 – 1.39
			Co-60	5.90 ± 0.10	5.32	0.75 – 1.32
			Cs-137	7.50 ± 0.10	6.10	0.73 – 1.37
			Gr. Alpha	3.30 ± 0.10	3.02	0.50 – 1.55
			Gr. Beta	2.70 ± 0.10	2.42	0.72 – 1.67
			Mn-54	31.80 ± 0.30	27.20	0.76 – 1.33
			Pu-238	0.06 ± 0.03	0.08	0.74 – 1.40
			Pu-239/40	0.09 ± 0.01	0.09	0.76 – 1.44
			Ru-106	3.50 ± 1.00	2.01	0.59 – 1.30
Result within activity ± error margin.						
			Sr-90	0.31 ± 0.16	0.24	0.61 – 21.93
			Uranium	0.12 ± 0.01	0.13	0.80 – 3.35
STW-874	WATER	Mar, 2000	Am-241	1.70 ± 0.22	1.95	0.75 – 1.49
			Co-60	51.00 ± 1.20	48.90	0.80 – 1.20
			Cs-137	108.60 ± 1.80	103.00	0.80 - 1.26
			Fe-55	33.00 ± 1.20	33.10	0.44 - 1.53
			Gr. Alpha	1,217.00 ± 35.00	1,700.00	0.61 - 1.32
			Gr. Beta	792.00 ± 25.00	690.00	0.55 - 1.54
			H-3	147.00 ± 26.00	79.40	0.71 - 1.79
Analysis Was repeated; result of reanalysis 97.5 ± 11.6 Bq/l						
			Ni-63	101.00 ± 6.00	112.00	0.25 - 1.75
			Pu-238	0.75 ± 0.17	0.94	0.78 - 1.25
			Pu-239/40	0.99 ± 0.09	0.92	0.80 - 1.39
			Sr-90	4.46 ± 0.99	3.39	0.75 - 1.50
			Uranium	0.27 ± 0.02	0.995	0.67 - 1.42
Result reported was for U-234. Result for U (total); 0.58 ± 0.02 pCi/L.						

Table F-5
DOE EML Quality Assessment Program[a]
Environmental, Inc.

				Concentration in pCi/L[b]		
Lab Code	Sample Type	Date Collected	Analysis	Laboratory results[c] ±2 Sigma	ERA Result[d] ls, N=1	Control Limits
STSO-885	SOIL	Sep, 2000	Ac-228	78.00 ± 1.50	80.20	0.80 - 1.50
			Bi-212	73.00 ± 3.30	80.50	0.45 - 1.23
			Bi-214	91.00 ± 4.00	83.30	0.78 - 1.50
			Cs-137	925.70 t 14.20	1,020.00	0.80 - 1.29
			K-40	713.60 ± 7.10	713.00	0.80 - 1.37
			Pb-212	66.10 ± 4.30	79.30	0.74 - 1.36
			Pb-214	100.10 ± 3.70	86.30	0.76 - 1.53
			Pu-239/40	18.40 ± 0.40	16.80	0.71 - 1.33
			Sr-90	39.90 ± 5.30	50.40	0.61 – 3.91
			Th-234	154.70 ± 9.30	148.00	0.68 – 2.36
			Uranium	254.30 ± 13.00	327.00	0.62 - 1.35
STW-886	WATER	Sep, 2000	Am-241	1.30 ± 0.20	1.19	0.76 - 1.48
			Co-60	71.90 ± 7.20	73.70	0.80 - 1.20
			Cs-137	62.70 ± 6.30	67.00	0.80 - 1.24
			H-3	92.30 ± 8.90	91.30	0.74 – 2.29
			Pu-238	0.70 ± 0.10	0.79	0.74 - 1.22
			Pu-239/40	0.60 ± 0.10	0.59	0.75 - 1.26
			Sr-90	4.60 ± 0.40	4.53	0.64 - 1.50
			Uranium	0.80 ± 0.10	0.92	0.73 - 1.37
STW-887	WATER	Sep, 2000	Gr. Alpha	1,113.70 ± 17.90	1,070.00	0.58 - 1.26
			Gr. Beta	1,129.40 ± 16.70	950.00	0.56 - 1.50
STAP-888	AIR FILTER	Sep, 2000	Am-241	0.06 ± 0.01	0.03	0.69 – 2.40
		Sep, 2000	Co-57	16.50 ± 0.60	14.50	0.69 - 1.37
		Sep, 2000	Co-60	9.20 ± 0.40	8.43	0.79 - 1.30
		Sep, 2000	Cs-137	8.80 ± 0.50	7.41	0.78 - 1.35
		Sep, 2000	Mn-54	50.20 ± 2.30	43.20	0.80 - 1.36
		Sep, 2000	Pu-238	0.03 ± 0.01	0.05	0.66 - 1.35
		Sep, 2000	Pu-239/40	0.08 ± 0.01	0.07	0.69 - 1.29
		Sep, 2000	Sr-90	3.30 ± 0.10	1.64	0.55 - 2.05
		Sep, 2000	U-233/4	0.03 ± 0.00	0.04	0.80 - 1.92
		Sep, 2000	U-238	0.03 ± 0.01	0.04	0.80 – 1.59
Result within activity ± error margin.						
		Sep, 2000	Uranium	0.07 ± 0.01	0.08	0.80 - 2.54
STAP-889	AIR FILTER	Sep, 2000	Gr. Alpha	2.84 ± 0.01	2.35	0.57 - 1.47
		Sep, 2000	Gr. Beta	2.08 ± 0.02	1.52	0.76 - 1.52
STVE-890	VEGETATION	Sep, 2000	Am-241	5.90 ± 1.20	5.60	0.72 - 2.34
		Sep, 2000	Cm-244	3.20 ± 0.10	3.60	0.61 - 1.61
		Sep, 2000	Co-60	29.40±0.40	32.80	0.75 - 1.51
		Sep, 2000	Cs-137	739.30 ± 23.00	867.00	0.80 - 1.37
		Sep, 2000	K-40	597.50±49.30	639.00	0.78 - 1.43
		Sep, 2000	Pu-239/40	4.50 ± 0.20	9.60	0.67- 1.49
No reason for deviation was found with original result. The result of reanalysis; 12.1 ±1.1 pCi/g.						
		Sep, 2000	Sr-90	1,201.50 ± 117.30	1,150.00	0.52 - 1.23

a The Environmental Measurements Laboratory provides the following nuclear species : Air Filters, Soil, Vegetation and Water.
b Results are reported in Bq/L with the following exceptions: Air Filter results are reported in Bq/Filter, Soil results are reported in Bq/Kg, Vegetation results are reported in Bq/Kg.
c Laboratory results are reported as the mean of three determinations ± standard deviation.
d The EML result listed is the mean of replicate determinations for each nuclide ± the standard error of the mean.
e 'The control limits are reported by EML as the ratio of Reported Value / EML value.

Table F-6
Analytics Cross Check Comparison Program
Teledyne Brown Engineering

Sample Date	Media	Nuclide	Teledyne Brown Engineering Result (a)	Analytics Result	Ratio (b)	
03/20/00	Milk	I-131	18 ± 1	20 ± 1	0.90	
		Cr-51	381 ± 38	387 ± 19	0.98	
		Cs-134	132 ± 13	143 ± 7	0.92	
		Cs-137	128 ± 13	114 ± 6	1.12	
		Co-58	89 ± 9	79 ± 4	1.13	
		Mn-54	195 ± 20	176 ± 9	1.11	
		Fe-59	161 ± 16	144 ± 7	1.12	
		Zn-65	171 ± 17	165 ± 8	1.04	
		Co-60	179 ± 18	176 ± 9	1.02	
03/20/00	Milk	Sr-89	13 ± 3	25 ± 1	0.52	(c)
06/19/00	Air Filter	Ce-141	143 ± 8	132 ± 7	1.08	
		Cr-51	229 ± 17	198 ± 10	1.16	
		Cs-134	74 ± 4	81 ± 4	0.91	
		Cs-137	143 ± 8	115 ± 6	1.24	
		Co-58	89 ± 5	77 ± 4	1.16	
		Mn-54	102 ± 6	84 ± 4	1.21	
		Fe-59	98 ± 6	75 ± 4	1.31	
		Zn-65	188 ± 11	139 ± 7	1.35	
		Co-60	113 ± 7	104 ± 5	1.09	
06/19/00	Cartridge	I-131	106 ± 6	88 ± 4	1.20	
06/19/00	Air Filter	Sr-90	88 ± 5	96 ± 5	0.92	
06/19/00	Air Filter	Gross Alpha	103 ± 6	93 ± 5	1.11	
		Gross Beta	210 ± 6	193 ± 10	1.09	
09/18/00	Milk	I-131	97 ± 10	87 ± 4	1.11	
		Ce-141	83 ± 8	77 ± 4	1.08	
		Cr-51	323 ± 40	304 ± 15	1.06	
		Cs-134	98 ± 10	102 ± 5	0.96	
		Cs-137	117 ± 12	107 ± 5	1.09	
		Co-58	64 ± 6	60 ± 3	1.07	
		Mn-54	99 ± 10	88 ± 4	1.13	
		Fe-59	132 ± 13	119 ± 6	1.11	
		Zn-65	218 ± 22	196 ± 10	1.11	
		Co-60	209 ± 21	197 ± 10	1.06	
09/18/00	Milk	Sr-89	14 ± 1	15 ± 1	0.93	
		Sr-90	18 ± 1	14 ± 1	1.29	

Footnotes:

(a) Teledyne Results - counting error is two standard deviations. Units are pCi/liter for water and milk. For gamma results, if two standard deviations are less than 10%, then a 10% error is reported. Units are total pCi for air particulate filters.

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

(c) Caused by incorrect rinsing of the strontium extraction column. Additional training was conducted and was documented in the analyst's training file. Subsequent tests on two milk samples spiked with Sr-89 produced correct results.

To determine agreement or possible agreement:

1. Divide each Analytics value by its associated one sigma uncertainty to obtain the resolution.
2. Divide each TBE value by the corresponding Analytics value to obtain the ratio.
3. The measurement is in agreement if the value of the ratio falls within the limits shown in the following table for the corresponding resolution.

Resolution	Agreement
< 4	0.4 - 2.5
= 4 - < 8	0.5 - 2.0
= 8 - < 16	0.6 - 1.66
= 16 - < 51	0.75 - 1.33
= 51 - < 200	0.80 - 1.25
= 200	0.85 - 1.18

Criteria are similar to those listed in USNRC Inspection Procedure 84750 "Radioactive Waste Treatment, and Effluent and Environmental Monitoring" with minor adjustments to account for activity concentrations with large uncertainties.

Table F-7
ERA Proficiency Testing Program
Teledyne Brown Engineering

ERA RAD No	Media	Nuclide	ERA Known Value (a)	Teledyne Brown Engineering (b)	Expected Dev Known (c)	Control Limits (d)	Warning Limits (e)	Performance Evaluation (f)
RAD 12	Water	I-131	To be reported to ERA					
RAD 13	Water	U-Nat	53.0	61.3	5.3	44.0 – 62.0	46.9 – 59.1	CE
		Ra-226	4.05	3.67	0.608	3.00 – 5.10	3.35 – 4.75	A
		Ra-228	2.29	1.33	0.573	1.31 – 3.27	1.63 – 2.95	CE
		Gr-A	71.8	14.0	18.0	40.9 – 103	51.1 – 92.5	NA
		Gr-B	194	34.0	29.1	144 - 244	160 – 228	NA
		Sr-89	16.4	15.7	5.00	7.70 – 25.1	10.6 – 22.2	A
		Sr-90	28.9	29.0	5.00	20.2 – 37.6	23.1 – 34.7	A
		Co-60	64.4	68.3	5.00	55.7 – 73.1	58.6 – 70.2	A
		Cs-134	12.3	12.0	5.00	3.60 – 21.0	6.53 – 18.1	A
		Cs-137	72.2	76.3	5.00	63.5 – 80.9	66.4 – 78.0	A
RAD 14	Water	Gr-A	25.4	14.0	6.35	14.5 – 36.3	66.4 – 78.0	A
		Gr-B	42.1	34.0	5.00	33.4 – 50.8	36.3 – 47.9	CE
RAD 15	Water	Ba-133	98.2	91.7	9.82	81.5 - 115	86.9 - 110	A
		Co-60	99.6	101	5.00	90.9 - 108	93.8 - 105	A
		Cs-134	49.2	48.0	5.00	40.5 – 57.9	43.4 – 55.0	A
		Cs-137	209	76.3	10.4	191 - 227	197 - 221	NA
		Zn-65	313	< 1.0	31.3	260 - 367	277 - 379	NA
RAD 16	Water	Sr-89	22.5	18.3	5.00	13.8 – 31.2	197 - 221	A
		Sr-90	9.60	8.33	5.00	0.9 – 18.3	16.7 – 28.3	A
RAD 17	Water	Gr-A	58.4	83.6	5.00	33.3 – 83.5	41.5 –75.30	A
		Gr-B	16.8	15.4	5.00	8.1 – 25.5	11.0 – 22.6	CE
RAD 18	Water	I-131	19.9	2.03	3.00	14.7 – 25.1	16.4 – 23.4	NA
RAD 19	Water	U-Nat	6.07	5.77	3.00	0.87 – 11.3	2.61 – 23.4	A
		Ra-226	8.26	7.20	1.24	6.11 – 10.4	6.83 – 9.69	A
		Ra-228	2.25	2.37	0.56	1.28 – 3.22	1.60 – 2.90	A
RAD 20		H-3	23800	22300	12380	21100 - 26500	21100 - 26500	A
RAD 23	Water	Ra-226	13.0	9.70	1.15	7.41 – 18.6	9.25-16.8	A
		U-Nat	63.4	57.0	4.44	52.6 – 74.2	56.1 – 70.7	A
		Ra-228	2.83	2.99	6.34	2.21 – 3.77	2.47 – 3.51	A
		Ra-228	13.0	10.0	3.25	7.41 – 16.8	9.25 – 16.8	A
RAD 24	Water	Sr90	26.2	28.6	1.40	17.5 – 34.9	20.4 – 32.0	A
RAD 25	Water	Gr-A	7.17	6.90	1.11	DL – 15.9	1.40 – 12.9	A
		Gr-B	87.5	88.8	9.76	70.2 – 105	76.0 – 99.0	A
RAD 26	Water	H-3	8320	8740	174	6910 – 9730	7360 – 9280	A

Footnotes:

(a) 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.
(b) Average ± 1 sigma.
(c) Established per the guidelines contained in the EPA's National Standards for Water Proficiency Testing Criteria Document, December 1998, as applicable.
(d) Established per the guidelines contained in the EPA's National Standards for Water Proficiency Testing Criteria Document, December 1998, as applicable.
(e) A= Acceptable. Reported Result falls within the Warning Limits.
(f) NA = Not Acceptable. Reported Result falls outside of the Control Limits.
(g) CE = Check for Error. Reported Result falls within the Control Limits and outside of the Warning Limits.
(h) A calculation error was made by not correcting for Ra-226 content. If this correction is made, an average result of 5.7 pCi/l is obtained which is in the acceptance region.

RAD 23 through RAD 26 were received and analyzed in the Westwood, New Jersey laboratory in September 2000.

APPENDIX G

LGS SURVEY

APPENDIX G: LGS SURVEYS

A Land Use Census around the Limerick Generating Station (LGS) was conducted 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 survey was conducted during the May to September 2000 growing season. The distance and direction of all locations were positioned from the barn to the LGS vents using Global Positioning System (GPS) technology. The results of this survey are summarized in Table G-1 .

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

Table G-1 Location of Nearest Residence, Garden and Milk Farm within a Five Mile Radius of Limerick Generating Station, 1999

(Distance in Miles)

Sector	Residence	Garden(1)	Milk Farm
1 N	0.6	1.6	4.7
2 NNE	0.5	0.5	-
3 NE	0.8	1.5	-
4 ENE	0.6	2.5	-
5 E	0.6	1.6	-
6 ESE	0.5	0.7	-
7 SE	1.0	1.5	-
8 SSE	1.0	1.2	-
9 S	0.8	1.2	2.3
10 SSW	1.0	1.1	1.8
11 SW	0.6	0.9	3.0
12 WSW	0.8	1.4	2.8
13 W	0.6	2.2	2.7
14 WNW	0.7	0.8	-
15 NW	0.6	1.6	-
16 NNW	0.8	2.7	-

(1) Garden greater than 500 square feet