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

THREE MILE ISLAND NUCLEAR STATION UNIT 1 AND UNIT 2
RENEWED OPERATING LICENSE NO. DPR-50 AND POSSESSION ONLY
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DOCKET NOS. 50-289 AND 50-320

SUBJECT: 2011 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM REPORT

In accordance with TMI-1 Technical Specification 6.9.3.1, TMI-2 Technical Specifications 6.8.1.1, enclosed is the Annual Radiological Environmental Operating Report covering the time-period of January 1 through December 31, 2011, for the Three Mile Island Nuclear Station.

Please contact Laura Weber of TMI-1 Chemistry at (717) 948-8947 if you have any questions regarding this submittal.

Sincerely,

Mark M. Newcomer
Plant Manager

MMN/lkw

Attachments/Enclosures

cc: Region 1 Administrator
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FSME20
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50-320

THREE MILE ISLAND NUCLEAR STATION
UNITS 1 and 2

Annual Radiological
Environmental Operating Report

1 January Through 31 December 2011

Prepared By
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Environmental Services

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Middletown, PA 17057

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Appendices

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I. Summary and Conclusions

This report on the Radiological Environmental Monitoring Program conducted for the Three Mile Island Nuclear Station (TMINS) by Exelon covers the period 1 January 2011 through 31 December 2011. During that time period, 1,723 analyses were performed on 1,319 samples. In assessing all the data gathered for this report and comparing these results with preoperational data and operational REMP data, it was concluded that the operation of TMINS had no adverse radiological impact on the environment.

On March 11, 2011 an earthquake off the Japanese islands produced a massive tsunami that caused a nuclear accident at four of the six Fukushima Daiichi reactors. In planning for the potential radioactive plume reaching the United States, Exelon Nuclear increased the sampling frequency and added additional analyses of select media from pathways that were expected to be the most sensitive to any increase in ambient radiation levels. Low level I-131 analyses and gamma spectroscopy analyses were performed on air particulates, air iodine, and milk, as appropriate.

The resulting radioactive plume was first detected in the environs of Three Mile Island Nuclear Station on March 16, 2011. The final date of positive detection was April 13, 2011. The radionuclide identified was Iodine-131. Maximum activity levels found by media were 87 E-3 pCi/m^3 for air iodine. Samples collected were compared to offsite control locations to verify that these positive detections were not attributable to licensed activities. All other radionuclides analyzed for were below MDL.

The radioactive half-life of I-131 is about 8 days. This short half-life allowed the affects of this radioactive plume to subside over about 4 weeks. As of April 14, 2011 no further impacts from the Fukushima Daiichi accident was evident.

Surface, drinking, and effluent water samples were analyzed for concentrations of tritium and gamma emitting nuclides. Surface, drinking, and effluent water samples were also analyzed for concentrations of I-131. Drinking and effluent water samples were also analyzed for concentrations of gross beta. Effluent water samples were also analyzed for concentrations of Sr-89 and Sr-90. All groundwater, surface water, precipitation water and storm water results are now being reported in the ARGPPR, Appendix F. No Sr-89 and Sr-90 activities were detected. Iodine-131 and gross beta concentrations detected were consistent with those detected in previous years. Tritium activity in nine surface water samples and monthly effluent water samples was due to TMINS activities or releases. No other fission or activation products potentially attributed to TMI liquid releases were detected.

Fish (predator and bottom feeder) and sediment samples were analyzed for concentrations of gamma emitting nuclides. Fish samples were also analyzed for concentrations of Sr-90. No Sr-90 activity was detected. No fission or activation products were detected in fish samples. Cesium-137 was detected in two sediment samples. Occasionally Cs-137 is detected at very low levels (just

above LLD) and is not distinguishable from background levels.

Air particulate samples were analyzed for concentrations of gross beta and gamma emitting nuclides. Gross beta activity is consistent with data from previous years. Cosmogenic Be-7 was detected at levels consistent with those detected in previous years. No other activation products were detected.

High sensitivity I-131 analyses were performed on weekly air samples. All results were less than the minimum detectable activity, with the exception of 19 samples that were positive for I-131. The positive activity is directly attributed to the Fukushima event in March of 2011.

Cow milk samples were analyzed for concentrations of I-131, gamma emitting nuclides, Sr-89 and Sr-90. No I-131 and Sr-89 activities were detected. Concentrations of naturally occurring K-40 were consistent with those detected in previous years. Sr-90 activities detected were consistent with those detected in previous years and were attributed to fallout from nuclear weapons testing. No other fission or activation products were found.

Food Product samples were analyzed for concentrations of gamma emitting nuclides (including I-131) and Sr-90. Sr-90 activities were detected in both the indicator and control samples. This was a result of plant uptake of Sr-90 in soil as a result of past nuclear weapons testing. Concentrations of naturally occurring Be-7 and K-40 were consistent with those detected in previous years. No other fission or activation products were detected.

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

In conclusion, radioactive materials related to TMINS operations were detected in environmental samples, but the measured concentrations were low and consistent with measured effluents. The environmental sample results verified that the doses received by the public from TMINS effluents in 2011 were well below applicable dose limits and only a small fraction of the doses received from natural background radiation. Additionally, the results indicated that there was no permanent buildup of radioactive materials in the environment and no increase in background radiation levels.

Therefore, based on the results of the radiological environmental monitoring program (REMP) and the doses calculated from measured effluents, TMINS operations in 2011 did not have any adverse effects on the health of the public or on the environment.

II. Introduction

The Three Mile Island Nuclear Station (TMINS), consisting of two pressurized water reactors (PWR), is located on the northern end of Three Mile Island in the Susquehanna River approximately 2.5 miles south of Middletown in Londonderry Township, Dauphin County, Pennsylvania. TMI-1 is owned and operated by Exelon and became operational in 1974. TMI-2 is operated by GPU Nuclear, Inc. and owned by Metropolitan Edison (50%), Pennsylvania Electric (25%) and Jersey Central Power & Light (25%). TMI-2 became operational in 1978 and was shut down following the 1979 accident. At the end of 1993, TMI-2 was placed in a condition called Post-Defueling Monitored Storage. TMI-2 is maintained by Exelon under contract with GPU Nuclear.

A Radiological Environmental Monitoring Program (REMP) for TMINS was initiated in 1974. This report covers those analyses performed by Teledyne Brown Engineering (TBE), Mirion Technologies, and Environmental Inc. (Midwest Labs) on samples collected during the period 1 January 2011 through 31 December 2011.

A. Objective of the REMP

The objectives of the REMP are to:

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

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

3. To verify inplant controls for the containment of radioactive materials.

4. To determine buildup of long-lived radionuclides in the environment and changes in background radiation levels.

5. To provide reassurance to the public that the program is capable of adequately assessing impacts and identifying noteworthy changes in the radiological status of the environment.

6. To fulfill the requirements of the TMI-1 and TMI-2 Technical Specifications.

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 TMINS REMP were collected for Exelon by Normandeau Associates, RMC Environmental Services Division (RMC). This section describes the general collection methods used by RMC to obtain environmental samples for the TMINS REMP in 2011. Sample locations and descriptions can be found in Tables B–1 and B–2, and Figures B–1 through B–3, Appendix B. The collection procedures used by RMC are listed in Table B–3.

Aquatic Environment

The aquatic environment was evaluated by performing radiological analyses on samples of surface water, drinking water, effluent water, fish, and sediment. Two gallon water samples were collected monthly from continuous samplers located at three surface water locations (A3-2, J1-2 and Q9-1), three drinking water locations (G15-2, G15-3 and Q9-1), and one effluent water location (K1-1). Control locations were A3-2 and Q9-1. All groundwater and storm water results are now being reported in the ARGPPR, Appendix F. All water samples were collected in unused plastic bottles, which were rinsed at least twice with source water prior to collection. Fish samples comprising the flesh of two groups, bottom feeders and predators, were collected semiannually at an upstream control (BKG) and a downstream Indicator (IND) location. Location IND could be affected by TMINS' effluent releases. Sediment samples composed of recently deposited substrate were collected semiannually at three locations (A1-3, J2-1, and K1-3). In addition, one sediment sample was collected annually at the EDCB. Location A1-3 was the control.

Atmospheric Environment

The atmospheric environment was evaluated by performing radiological analyses on samples of air particulates, airborne iodine, milk, and food product. Airborne iodine and particulate samples were collected and analyzed weekly at seven locations (A3-1, E1-2, F1-3, G2-1, H3-1, M2-1, and Q15-1). The control location was Q15-1. 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.

Terrestrial Environment

The terrestrial environment was evaluated by performing radiological analyses on samples of milk and food product. Milk samples were collected biweekly at five locations (E2-2, F4-1, G2-1, K15-3 and P4-1) from March through November, and monthly from December through February. The control location was K15-3. All samples were collected in new unused two gallon plastic bottles from the bulk tank at each location, preserved with sodium bisulfite, and shipped promptly to the laboratory.

Food products were collected monthly at two locations (B10-2 and H1-2), in lieu of milk sampling, and annually from the four food product groups at two locations (B10-2 and E1-2). B10-2 was the control location for both annual and monthly sampling. Nine different kinds of vegetation samples and seven different kinds of vegetation leaves were collected and placed in new unused plastic bags, and sent to the laboratory for analysis.

Ambient Gamma Radiation

Direct radiation measurements were made using Panasonic 814 calcium sulfate ($CaSO_4$) thermoluminescent dosimeters (TLD). The TLD locations are arranged in generally concentric rings on and around the TMINS site as follows:

A site boundary ring consisting of 19 locations (A1-4, B1-2, C1-2, D1-1, E1-4, F1-2, F1-4, G1-3, G1-5, G1-6, H1-1, J1-3, K1-4, L1-1, M1-1, N1-3, P1-2, Q1-2, and R1-1) 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 TMINS release.

An indicator ring consisting of 60 locations (A3-1, A5-1, A9-3, B1-1, B2-1, B5-1, B10-1, C1-1, C2-1, C5-1, C8-1, D1-2, D2-2, D6-1, E1-2, E2-3, E5-1,

E7-1, F1-1, F2-1, F5-1, F10-1, G1-2, G2-4, G5-1, H3-1, H5-1, H8-1, J1-1, J3-1, J5-1, J7-1 K2-1, K3-1, K5-1, K8-1, L1-2, L2-1, L5-1, L8-1, M1-2, M2-1, M5-1, M9-1, N1-1, N2-1, N5-1, N8-1, P1-1, P2-1, P5-1, P8-1, Q1-1, Q2-1, Q5-1, Q9-1, R1-2, R3-1, R5-1, and R9-1) extending to approximately 10 miles from the site designed to measure possible exposures to close-in population.

The balance of 11 locations (D15-1, F25-1, G10-1, G15-1, H15-1, J15-1, K15-1, L15-1, N15-2, Q15-1, and R15-1) represent control areas.

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 TMINS, 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.

Each TLD station consists of two primary program TLD badges, each of which has three $CaSO_4$ thermoluminescent phosphors enclosed in plastic, placed at each location in a frame located approximately three to six feet above ground level. Since each TLD responds to radiation independently, this provides six independent detectors at each station. The TLDs were exchanged quarterly and sent to Mirion Technologies for analysis.

B. Sample Analysis

This section describes the general analytical methods used by TBE and Midwest Labs to analyze the environmental samples for radioactivity for the TMINS REMP in 2011. The analytical procedures used by the laboratories are listed in Table B–3.

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

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

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

3. Concentrations of tritium in surface, drinking, and effluent water.

4. Concentrations of I-131 in surface, drinking, and effluent water, air, milk and food products.

5. Concentrations of strontium in effluent water, fish, milk, and food products.

6. Ambient gamma radiation levels at various site environs.

C. Data Interpretation

Data were compared to previous years' operational data for consistency and trending. In addition, comparison to pre-operational data is sometimes made. For the purpose of this report, TMINS was considered operational at initial criticality. Several factors were important in the interpretation of the data:

1. Lower Limit of Detection and Minimum Detectable Concentration

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 TMINS detection capabilities for environmental sample analysis.

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

2. Net Activity Calculation and Reporting of Results

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

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

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

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

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

For air particulate eight nuclides, Be-7, Mn-54, Co-58, Co-60, Nb-95, Zn-95, Cs-134 and Cs-137 were reported.

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

For food products five nuclides, Be-7, K-40, I-131, Cs-134 and Cs-137 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 2011 the TMINS REMP had a sample recovery rate in excess of 99%. Issue Reports (IR) were initiated to document significant exceptions and missing samples. All exceptions are listed below:

AIR

1. During the sampling period 01/19/11 – 01/26/11, the pump for location H3-1 was found not operating. Per procedure the sample volume was invalid and samples were not sent for analyses. The pump was replaced and the sampler was returned to service. (IR 1173549)

2. On 03/02/11, location G2-1 sample pump vacuum reading was low and pump was replaced after sample collection. Samples were valid and sent for analyses.

3. During sampling period 03/08/11 – 03/16/11, there was a low run time and air volume due to a pump malfunction at location A3-1. The

vanes were replaced and the sample was restarted satisfactorily. Samples were valid and sent for analysis.

4. The following sample periods and locations were impacted due to power supply problems at the visitor center. Newly installed GFCI's were tripping and causing the samplers to not operate. The GCFI's were replaced with a single outlet per code to prevent power interruptions:

   03/30/11 – 04/06/11, Location E1-2Q, low volume invalid not sent for analysis (IR 1199251)
   04/13/11 – 04/20/11, Locations E1-2 & E1-2Q sufficient sample volume obtained
   04/20/11 – 04/27/11, Locations E1-2 & E1-2Q sufficient sample volume obtained (IR 1207261)
   04/27/11 – 05/04/11, Location E1-2Q substituted for E1-2 which had a low volume (IR 1212173)

5. For the sampling period 07/06/11 – 07/13/11, there was low sample volume due to a tripped breaker at location A3-1. The samples were valid per procedure and were sent for analyses. The breaker was reset and sampler operated normally. Due to the low volume the LLD requirements were not met for the I-131 analyses.

6. For the sampling period 08/24/11 – 08/31/11, there was low sample volume due to a breaker trip probably due to Hurricane Irene at location A3-1. The samples were valid per procedure and were sent for analyses. The breaker was reset and sampler operated normally.

7. For the sampling period 08/24/11 – 08/31/11, there was low sample volume due to power outages probably related to Hurricane Irene at location Q15-1. The samples were valid per procedure and sent for analyses.

8. For the sampling periods 08/31/11 – 09/08/11 and 09/08/11 – 09/14/11, the samples and sampler were damaged due to being submerged during flooding at location A3-1. There were no samples available for these time periods. Access to the area and power were restored following the flood water receding and the sampler was replaced on 09/14/11. (IR 1262803)

9. For the sampling periods 08/31/11 – 09/08/11 and 09/08/11 – 09/14/11, the sampler was inaccessible and damaged due to flooding at location M2-1. The samples were not submerged, but power was lost to the sampler and it was damaged on 09/09/11. When

accessible the samples were sent to the lab for analyses with the extended sample time until power was lost. (IR 1262803)

10. For the sampling periods 08/31/11 – 09/08/11 and 09/08/11 – 09/14/11, the sampler was inaccessible due to flooding at location Q15-1. The sampler was accessed on 09/10/11 resulting in an extended run time for 08/31/11 to 09/10/11 and a four day run time for 09/10/11 to 09/14/11. All samples were considered valid and sent for analyses. (IR 1262803)

11. During 10/26/11 – 11/02/11 sampling period, there were lower than expected run times and air sample volumes probably due to power outages due to early season snow storms and downed trees for the following locations:

    Locations A3-1, E1-2, E1-2Q, and G2-1

    All samples were considered valid and sent for analyses.

12. During 11/16/11 – 11/22/11 sampling period, breaker was found tripped and reset at location E1-2 . Sample volume was lower than expected but sample was still available and sent for analyses. During 11/30/11 – 12/07/11 sampling period, breaker was found tripped and could not be reset. Enough sample volume was collected for valid samples and they were sent for analyses. Unit and pump were both replaced on 12/09/11. (IR 1326489)

<u>WATER</u>

1. During the following sampling periods, several samples were missed due to power interruptions while replacing the pole supplying power to the building (IR1170705):

   01/04/11 – 01/11/11, Location A3-2, no grab sample required
   01/11/11 – 01/18/11, Location A3-2, no grab sample required

2. During the following sampling period, hourly aliquots were missing due to frozen water in the sampling line (IR1170705):

   01/18/11 – 01/25/11, Location A3-2, sufficient volume, no grab required.

3. Due to a frozen sample line, numerous hourly aliquots were missing from the weekly composite at the downstream surface water sampler at J1-2. The following sampling periods were impacted (IR 1170705):

   12/28/10 – 01/04/11, sufficient volume, no grab sample required.
   01/04/11 – 01/11/11, sufficient volume, no grab sample required.
   01/11/11 – 01/18/11, sufficient volume, no grab sample required.
   01/18/11 – 01/25/11, sufficient volume, no grab sample required.
   01/25/11 – 02/01/11, sufficient volume, no grab sample required.
   02/01/11 – 02/08/11, sufficient volume, no grab sample required.
   02/08/11 – 02/15/11, sufficient volume, no grab sample required.
   02/15/11 – 02/22/11, sufficient volume, no grab sample required.
   02/22/11 – 03/01/11, sufficient volume, no grab sample required.
   03/01/11 – 03/08/11, sufficient volume, no grab sample required.

4. For the sampling period 09/06/11 – 09/13/11, no composite sample was available due to the sampler being damaged due to flooding at location J1-2. A grab sample was taken for the week. A replacement sampler was calibrated and installed on 09/16/11. After installation no sample could be collected due to the sample line out of water. The sampler line was weighted and relocated on 09/23/11. (IR 1262803)

5. For the sampling period 09/06/11 – 09/13/11, no composite was available due to the sampler being damaged due to flooding at location A3-2. A grab sample was taken. The compositor building was also damaged and power has not been restored by the borough. Weekly grab samples continue to be taken. (IR 1262803)

6. For the sampling period 11/08/11 – 11/15/11, sampler was found with no source water to the compositor at location G15-3. Sufficient sample volume was collected so no grab was required. The old water treatment facility was taken out of service. After piping modifications by the facility personnel, a sampler was setup in the new treatment building and calibrated on 11/18/11. (IR 1296143)

7. Accumulated debris caused the sample line to submerge and also detach from weight/anchor at location J1-2. Sufficient sample volume was collected. No grab samples were necessary. A temporary anchor/weight was attached on 12/28/11. (IR 1326489):

   12/06/11 – 12/13/11, sufficient volume, no grab sample required.
   12/20/11 – 12/27/11, insufficient volume, grab sample required.

TLD

1. Locations K2-1, L1-2, M1-2, N1-1, P1-1, Q1-1, and R1-2 were collected with a six month exposure. TLDs were not collected with other 4th quarter TLDs due to unsafe ice conditions on the river. (IR 1170705)

2. During the first quarter collection, station C8-1 was found on the ground. TLDs were sent for analyses and TLD holder was remounted satisfactorily.

3. During the second quarter collection, TLDs were missing from sample station E7-1. (IR 1255611)

4. TLDs for the third quarter were missing from the sampling station L1-2. The tree, hardware and TLD badges were all swept away by recent local area flooding. New hardware and 4th quarter badges were installed. (IR 1262803)

5. During the fourth quarter collection, badges 171 and 172 for location R1-2 were missing and no samples available. Both bags/pouches were sliced or cut and badges were taken. (IR 1326489)

6. During the fourth quarter collection, badge 20 bag/pouch for location C1-1 was sliced/cut and badge was found on the ground. Badge was sent for analysis.

7. During the fourth quarter collection, badges in mounting frame were found on the ground for location E5-1. Frame was reattached and badges were exchanged.

VEGETATION

1. There was no grain or root vegetables at location E1-2 due to extreme heat conditions and no rain.

2. For location H1-2, substitutions were obtained. Field corn was collected due to no sweet corn available and turnips were collected on 10/19/11.

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

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

E. Program Changes

There were no program changes for 2011.

IV. Results and Discussion

A. Aquatic Environment

1. Surface Water

Samples were taken weekly from a continuous sampler at three locations (A3-2, J1-2, and Q9-1) and composited on a monthly schedule. Of these locations only J1-2 located downstream, could be affected by TMINS' effluent releases. The following analyses were performed.

Tritium

Monthly samples from J1-2 and Q9-1 were analyzed for tritium activity (Table C–I.1, Appendix C). Positive tritium activity was detected in nine of 12 samples at location J1-2 which is located immediately downstream of the TMINS effluent outfall. The concentrations ranged from 324 to 8230 pCi/l. The increased tritium concentrations detected were a result of TMINS releasing radwaste treatment system effluent water under permitted discharges in accordance with NRC regulations. The indicator surface water sample is taken just downstream of the liquid discharge outfall where mixing of liquid effluents with the river water is incomplete. More complete mixing is not achieved until liquid effluents pass over the York Haven Dam. This water is normally not consumed by humans. The concentrations detected were well below any regulatory limits (Figures C–1 and C–2, Appendix C).

Iodine

Monthly samples from location A3-2 were analyzed for I-131 activity (Table C–I.2, Appendix C). This is a control or background station sampled because known medical discharges of radiopharmaceuticals occur into the surface water upstream of TMI from a nearby hospital. Iodine-131 from medical discharges was

detected in two of twelve samples. The concentration ranged from 1.0 to 2.5 pCi/l. (IR 1183397)

Gamma Spectrometry

Locations J1-2 and Q9-1 were analyzed for gamma emitting nuclides (Table C–I.3, Appendix C), all nuclides were less than the MDC.

2. Drinking Water

Monthly samples were collected from continuous water samplers at three locations (G15-2, G15-3, and Q9-1). Two locations (G15-2 and G15-3) could be affected by TMINS' effluent releases. The following analyses were performed:

Gross Beta

Monthly samples from all locations were analyzed for concentrations of gross beta (Tables C–II.1, Appendix C). Gross beta activity was detected in seven of 36 samples. The concentrations ranged from 2.0 to 6.5 pCi/l. Concentrations detected were consistent with those detected in previous years (Figure C–3, Appendix C).

Iodine

Monthly samples from all locations were analyzed for concentrations of Iodine-131 (Table C–II.2, Appendix C). Iodine-131 activity was not detected in any samples.

Tritium

Monthly samples from all locations were analyzed for tritium activity (Table C–II.3, Appendix C). Tritium was detected in two of 36 samples at concentrations just above the LLD. The concentrations ranged from 184 to 230 pCi/L (Figures C–4, Appendix C). The hypothetical dose to the maximum exposed individual from consuming this water from two locations was calculated as <0.005 mrem. (IR 1217864)

Gamma Spectrometry

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

3. Effluent Water

Monthly samples were collected from a continuous water sampler at one location (K1-1). The following analyses were performed:

Gross Beta

Monthly samples from location K1-1 were analyzed for concentrations of gross beta (Tables C–III.1, Appendix C). Gross beta was detected in 10 of 12 samples. The concentrations ranged from 3.2 to 10.7 pCi/l. Concentrations detected were consistent with those detected in previous years.

Iodine-131

Monthly samples from location K1-1 were analyzed for concentrations of I-131 (Tables C–III.1, Appendix C). Iodine-131 was detected in one sample at a concentration of 1.4 pCi/l. I-131 was detected in the upstream control sample location for the same period of time. No I-131 was identified in any tank effluent pre-release samples, and I-131 was not detected in any other downstream drinking water samples. Effluent water is not consumed by humans. The I-131detected was attributed to upstream medical discharges and not plant related activities. (IR 1183397)

Tritium

Monthly samples from location K1-1 were analyzed for tritium activity (Table C–III.1, Appendix C). Tritium activity was detected in 11 of 12 samples. The concentrations ranged from 982 to 77,200 pCi/l. The elevated results were a result of TMI releasing radwaste treatment system effluent water under permitted discharges in accordance with NRC regulations. These results were from the liquid discharge mixing basin. The concentrations detected agree with those obtained from the TMINS Effluent Monitoring Program. The concentrations were well below any regulatory limits.

Strontium

Semiannual composite samples from location K1-1 were analyzed for Sr-89 and Sr-90 (Table C–III.1, Appendix C). No strontium activity was detected. The highest MDC was calculated at 4.2 pCi/l for Sr-89 and at 0.7 pCi/l for Sr-90.

Gamma Spectrometry

Samples from location K1-1 were analyzed for gamma emitting nuclides (Table C–III.2, Appendix C). All nuclides were less than the MDC.

4. Storm Water

Storm water results are now included in the Annual Radiological Groundwater Protection Program (ARGPPR), Appendix F.

5. Ground Water

Groundwater results are now included in the Annual Radiological Groundwater Protection Program (ARGPPR), Appendix F.

6. Fish

Fish samples comprised of bottom feeders and predators were collected at two locations (IND and BKG) semiannually. Location IND could be affected by TMINS' effluent releases. The following analyses were performed:

Strontium

The edible portions of fish samples from both locations were analyzed for Sr-90. (Table C–IV.1, Appendix C). No strontium activity was detected. The highest MDC was calculated at <4 pCi/kg wet for Sr-90.

Gamma Spectrometry

The edible portions of fish samples from both locations were analyzed for gamma emitting nuclides (Table C–IV.2, Appendix C). Naturally occurring K-40 was found in all fish samples and ranged from 1,310 to 3,730 pCi/kg wet and was consistent with levels detected in previous years. No fission or activation products were detected.

7. Sediment

Aquatic sediment samples were collected at three locations (A1-3, J2-1 and K1-3) semiannually. Of these locations two (J2-1 and K1-3) could be affected by TMINS' effluent releases. The following analysis was performed:

Gamma Spectrometry

Sediment samples from all locations were analyzed for gamma emitting nuclides (Table C–V.1, Appendix C). Potassium-40 was found in all sediment samples and ranged from 8,580 to 17,600 pCi/kg dry. Cesium-137 was detected in two sediment samples. The concentrations ranged from 187 to 306 pCi/L. Cesium-137 is occasionally found in sediment at very low levels (just above LLD) and is not distinguishable from background levels. No other fission or activation products were detected (Figure C–5, Appendix C).

B. Atmospheric Environment

1. Airborne Particulates

a. Air Particulates

Continuous air particulate samples were collected from seven locations on a weekly basis. Six locations (A3-1, E1-2, F1-3, G2-1, H3-1 and M2-1) were indicator stations located in the highest D/Q sectors and the nearest communities to TMI. One sample (Q15-1) represents the control location at a remote distance from TMINS. The following analyses were performed:

Gross Beta

Weekly samples were analyzed for concentrations of beta emitters (Table C–VI.1 and C–VI.2, Appendix C).

Detectable gross beta activity was observed at all locations. Comparison of results aid in determining the effects, if any, resulting from the operation of TMINS. The results from the closest to the site boundary locations (Group I) ranged from 7 to 39 E–3 pCi/m^3 with a mean of 17 E–3 pCi/m^3. The results from the intermediate offsite locations (Group II) ranged from 7 to 88 E–3 pCi/m^3 with a mean of 19 E–3 pCi/m^3. The results from the Control location (Group III)

ranged from 9 to 43 E–3 pCi/m^3 with a mean of 20 E–3 pCi/m^3. Comparison of the 2011 air particulate data with previous years' data indicate no effects from the operation of TMINS (Figure C–6, Appendix C). In addition a comparison of the weekly mean values for 2011 indicate no notable differences between indicator and control stations (Figure C–7, Appendix C).

Gamma Spectrometry

Weekly samples were composited quarterly and analyzed for gamma emitting nuclides (Table C–VI.3, Appendix C). Naturally occurring Be-7 due to cosmic ray activity was detected in all 28 samples. These concentrations ranged from 25 to 92 E–3 pCi/m3. All other nuclides were less than the MDC. Additional sampling occurred in the weeks immediately following the Fukushima event in 2011. All nuclides were less than the MDC.

b. Airborne Iodine

Continuous air samples were collected from seven (A3-1, E1-2, F1-3, G2-1, H3-1, M2-1, and Q15-1) locations and analyzed weekly for I-131 (Table C–VII.1, Appendix C). All results were less than the MDC, with the exception of 19 samples that were positive for I-131. The positive activity is directly attributed to the Fukushima event in March of 2011.

2. Terrestrial

a. Milk

Samples were collected from five locations (K15-3, E2-2, F4-1 G2-1 and P4-1) biweekly March through November and monthly December through February. The following analyses were performed:

Iodine–131

Milk samples from all locations were analyzed for concentrations of I-131 (Table C–VIII.1, Appendix C). Additional sampling occurred in the weeks immediately following the Fukushima event in 2011. All results were less than the MDC.

Strontium

Milk samples from all locations were composited quarterly and analyzed for Sr-89 and Sr-90 (Table C–IX.2, Appendix C). No Sr-89 activity was detected. Strontium-90 activity was detected in four of 20 samples. The concentrations ranged from 0.6 to 0.7 pCi/l. The activity detected was consistent with those detected in the pre–operational years (Figure C–8, Appendix C).

Gamma Spectrometry

Milk samples from all locations were analyzed for concentrations of gamma emitting nuclides (Table C–VIII.3, Appendix C).

Naturally occurring K-40 activity was found in all samples. The concentrations ranged from 745 to 1,670 pCi/l. All other nuclides were less than the MDC.

b. Food Products

Samples were collected from two locations (B10-2, and H1-2) on a monthly basis, in lieu of milk sampling. Samples from the four food product groups were collected annually from three locations (B10-2, E1-2, and H1-2) this year due to unavailability of sweet corn and a root vegetable at E1-2. The following analyses were performed:

Strontium

Twenty-six of 32 food product samples was analyzed for concentrations of Sr-90 (Table C–IX.1, Appendix C). Strontium-90 activity was detected in 11 of 26 samples. The concentrations ranged from 3 to 17 pCi/kg wet.

Gamma Spectrometry

Each food product sample was analyzed for concentrations of gamma emitting nuclides (Table C–IX.1, Appendix C). Naturally occurring Be-7 due to cosmic ray activity was detected in 18 of 32 samples. These concentrations ranged from 152 to 3,650 pCi/l. Naturally occurring K-40 activity was found in all samples. The concentrations ranged from 1,900 to 8,260 pCi/l. All other nuclides were less than the

MDC.

C. Ambient Gamma Radiation

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

All of the TLD measurements were below 10 mR/standard month, with a range of 2.7 to 8.7 mR/standard month. A comparison of the Site Boundary and Indicator data to the Control Location data, indicate that the ambient gamma radiation levels from the Control Locations D15-1, F25-1, G10-1, G15-1, H15-1, J15-1, K15-1, L15-1, N15-2, Q15-1, and R15-1 averaged higher than indicator stations. The historical ambient gamma radiation data from Locations D15-1, F25-1, G10-1, G15-1, H15-1, J15-1, K15-1, L15-1, N15-2, Q15-1, and R15-1 were plotted along with similar data from the Site, Indicator and Control Ring Locations (Figure C–9, Appendix C). Locations D15-1, F25-1, G10-1, G15-1, H15-1, J15-1, K15-1, L15-1, N15-2, Q15-1, and R15-1 have a historical high bias, but tracked with the data from all three groups, this bias is most likely due to radon and other naturally occurring nuclides, e.g. K-40, emanating from the ground.

D. Land Use Survey

A Land Use Survey conducted in the July, August, September, and October 2011 growing season around the Three Mile Island Nuclear Station (TMINS) was performed by Normandeau Associates, RMC Environmental Services Division for Exelon to comply with Sections 8.2 of the Plant's Offsite Dose Calculation Manual (ODCM). The purpose of the survey was to document the nearest resident, milk-producing animal and garden of greater than 500 ft^2 in each of the sixteen 22 ½ degree sectors around the site. The results of this survey are summarized below.

Distance in Miles from the TMINS Reactor Buildings					
Sector		Residence Miles	Garden Miles	Milk Farm Miles	Meat Animal Miles
1	N	1.1	1.6	2.1	2.1
2	NNE	0.7	0.9	-	2.4
3	NE	0.5	1.5	4.1	2.4
4	ENE	0.5	0.5	4.5	1.1
5	E	0.4	0.5	1.1	1.1
6	ESE	1.1	1.2	3.2	1.1
7	SE	0.7	1.1	1.4	1.4
8	SSE	0.7	0.8	-	-
9	S	2.3	2.7	-	3.3
10	SSW	0.6	2.5	4.9, 14.4	-
11	SW	0.5	1.0		-
12	WSW	0.5	1.3	-	-
13	W	0.7	1.3	-	-
14	WNW	0.4	2.2	3.7	2.4
15	NW	0.4	1.2	-	-
16	NNW	0.7	2.4	-	-

E. Radiological Impact of TMINS Operations

An assessment of potential radiological impact indicated that radiation doses to the public from 2011 operations at TMINS were well below all applicable regulatory limits and were significantly less than doses received from natural sources of radiation. The 2011 whole body dose potentially received by an assumed maximum exposed individual from TMI-1 and TMI-2 liquid and airborne effluents was conservatively calculated to be 0.17 mrem. This dose is equivalent to 0.05% of the dose that an individual living in the TMI area receives each year from natural background radiation.

1. Determination of Radiation Doses to the Public

Dose assessments can be performed by using either effluent data and an environmental transport model or environmental sample data. To the extent possible, doses to the public are based on the direct measurement of dose rates from external sources and the measurement of radionuclide concentrations in environmental media which may contribute to an internal dose of radiation. Thermoluminescent dosimeters (TLDs) positioned in the environment around TMINS provide measurements to determine external radiation doses to humans. Samples of air, water and food products are used to determine internal doses.

The quantity of radioactive materials released during normal operations are typically too small to be measured once distributed in the offsite environment. Therefore, the potential offsite doses are more effectively calculated for TMINS operations using a computerized model that predicts concentrations of radioactive materials in the environment and subsequent radiation doses based on measured effluents.

Doses are calculated using an advanced "class A" dispersion model. This model incorporates the guidelines and methodology set forth by the USNRC in Regulatory Guide 1.109. Due to the conservative assumptions that are used in the model, the calculated doses are generally higher than the doses based on actual environmental sample concentrations.

Therefore, the model predicts doses that are higher than actual doses received by people. The type and amount of radioactivity released from TMINS is calculated using measurements from effluent sample analyses. Once released, the dispersion of radionuclides in the environment is readily determined by computer modeling.

Airborne releases are diluted and carried away from the site by atmospheric diffusion, which continuously acts to disperse radioactivity. Variables that affect atmospheric dispersion include wind speed, temperature at different elevations, terrain, and shift in wind direction. A weather station on the north end of TMI is linked to a data logger that records the meteorological data.

Computer models also are used to predict the downstream dilution and travel times for liquid releases into the Susquehanna River. Actual monthly Susquehanna River flows are obtained from the York Haven Hydroelectric Station.

The human exposure pathways also are included in the model and are depicted in Figure 1. The exposure pathways that are considered for the discharge of TMINS liquid effluents are consumption of drinking water and fish, and shoreline exposure. The exposure pathways considered for the discharge of TMINS airborne effluents are plume exposure, inhalation, cow milk consumption, goat milk consumption, fruit and vegetable consumption, meat consumption and land deposition.

Numerous data files are used in the calculations that describe the area around TMI in terms of population distribution and foodstuffs

production. Data files include such information as the distance from the plant stack to the site boundary in each sector, the population groupings, milk cows, milk goats, gardens of more than 500 square feet, meat animals, downstream drinking water users, and crop yields.

When determining the dose to humans, it is necessary to consider all applicable pathways and all exposed tissues, summing the dose from each to provide the total dose for each organ as well as the whole body from a given radionuclide. Dose calculations involve determining the energy absorbed per unit mass in the various tissues. Thus, for radionuclides taken into the body, the metabolism of the radionuclide in the body must be known along with the physical characteristics of the nuclide such as energies, types of radiations emitted and half-life. The dose assessment model also contains dose conversion factors for the radionuclides for each of four age groups (adults, teenagers, children and infants) and eight organs (total body, thyroid, liver, skin, kidney, lung, bone and GI tract).

Doses are calculated for what is termed the "maximum hypothetical individual". This individual is assumed to be affected by the combined maximum environmental concentrations wherever they occur.

For liquid releases, the maximum hypothetical individual would consume 193 gallons of Susquehanna River water per year from the first downstream drinking water supplier, eat 46 pounds of fish each year that reside in the plant discharge area and stand 67 hours per year on the shoreline influenced by the plant discharge.
For airborne releases, the maximum hypothetical individual would live at the location of highest radionuclide concentration for inhalation and direct plume exposure. Additionally, this individual each year would consume 106 gallons of cow milk, 141 pounds of leafy vegetables, 1389 pounds of non-leafy vegetables and fruits and 243 pounds of meat produced at the locations with the highest predicted radionuclide concentrations. Consumption of goat milk is not included, since this exposure pathway does not currently exist.

2. Result of Dose Calculations

The maximum hypothetical doses due to 2011 TMI-1 and TMI-2 liquid and airborne effluents are summarized in Tables 1 and 2. Table 1 compares the calculated maximum hypothetical individual doses to the USNRC 10 CFR 50 App. I guidelines. This table also

compares the calculated doses (to an individual of the public) from effluents and direct radiation to USEPA 40 CFR 190 dose limits. Table 2 presents the maximum hypothetical whole body doses to an individual.

As shown in Table 1, the doses calculated for 2011 operations at TMINS were well below the Federal dose limits (USEPA 40 CFR 190) and the guidelines of USNRC 10 CFR 50 App. I. This conclusion was supported by radionuclide concentrations detected in actual environmental samples.

Doses from natural background radiation provide a baseline for assessing the potential public health significance of radioactive effluents. Natural background radiation from cosmic, terrestrial and natural radionuclides in the human body (not including radon), averages about 81 mrem/yr (Ref. 5). Additionally, the average individual living in the United States receives an annual dose of about 2,760 mrem to the lung from natural radon gas. This lung dose is considered to be equivalent to a whole (or total) body dose of 230 mrem (Ref. 5). Therefore, the average person in the United States receives a whole body dose of about 311 mrem/yr from natural background radiation sources.

As shown on Table 2, the maximum hypothetical whole body dose received by an individual from 2011 TMI-1 and TMI-2 liquid and airborne effluents combined was conservatively calculated to be 0.17 mrem. This dose is equivalent to 0.05% percent of the dose that an individual living in the TMI area receives each year from natural background radiation (311 mrem).

The low doses calculated for 2011 TMINS operations were the result of efforts to maintain releases "as low as reasonably achievable" (ALARA).

In conclusion, radioactive materials related to 2011 TMINS operations were detected in environmental samples, but the measured concentrations were low and consistent with measured effluents. The environmental sample results verified that the doses received by the public from TMINS effluents in 2011 were well below applicable dose limits and only a small fraction of the doses received from natural background radiation. Additionally, the results indicated that there was no permanent buildup of radioactive materials in the environment and no increase in background radiation levels.
Therefore, based on the results of the radiological environmental

monitoring program (REMP) and the doses calculated from measured effluents, TMINS operations in 2011 did not have any adverse effects on the health of the public or on the environment.

TABLE 1

Calculated Maximum Hypothetical Doses to an Individual from 2011 TMI-1 and TMI-2 Liquid and Airborne Effluents

	Maximum Hypothetical Doses To An Individual		
	USNRC 10 CFR 50 APP. I Guidelines (mrem/yr)	**Calculated Dose (mrem/yr)**	
		TMI-1	**TMI-2**
From Radionuclides In Liquid Releases	3 total body, or	2.42E-2	3.63E-4
	10 any organ	2.66E-2	5.77E-4
From Radionuclides In Airborne Releases (Noble Gases)	5 total body, or	1.21E-3	0*
	15 skin	3.79E-3	0*
From Radionuclides In Airborne Releases (Iodines, Tritium and Particulates)	15 any organ	1.37E-1	1.06E-5

*No noble gases were released from TMI-2.

	USEPA 40 CFR 190 Limits (mrem/yr)	**Calculated Dose (mrem/yr) TMI-1 and TMI-2 Combined****
Total from Site	75 thyroid	0.60
	25 total body or other organs	0.71

* *This sums together TMI-1 and TMI-2 maximum doses regardless of age group for different pathways. The combined doses include those due to radioactive effluents and direct radiation from TMINS. The direct radiation dose is calculated from environmental TLD data. For this calculation, exposure is assumed to be equal to dose.

The direct radiation dose from 2011 TMINS operations was 0.54 mrem. This dose was based on a maximum net fence-line exposure rate of 8.7 mR/std month and a shoreline/fence-line occupancy factor of 67 hours (Regulatory Guide 1.109). The combination of the maximum organ dose from TMI-1 and TMI-2 effluents (0.17 mrem) and the dose from direct radiation (0.54 mrem) yielded a maximum hypothetical dose of 0.71 mrem.

TABLE 2

Calculated Whole Body Doses to the Maximum Individual From 2011 TMI-1 and TMI-2 Liquid and Airborne Effluents

	Calculated Maximum Individual Whole Body Dose (mrem/yr)	
	TMI-1	TMI-2
From Radionuclides In Liquid Releases	2.42E-2	3.63E-4
From Radionuclides in Airborne Releases (Noble Gases)	1.21E-3	0*
From Radionuclides In Airborne Releases (Iodines, Tritium and Particulates)	1.37E-1	1.06E-5

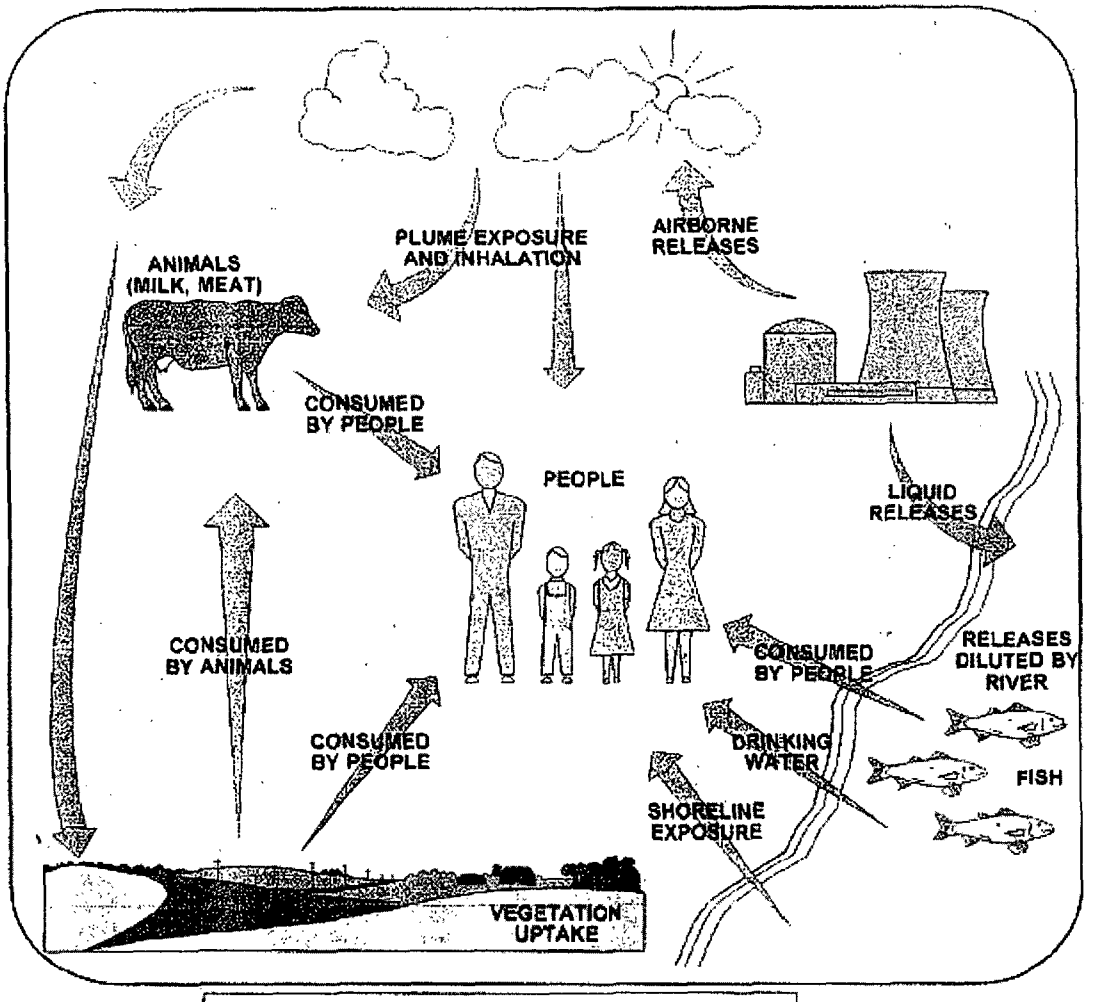
*No noble gases were released from TMI-2.

Individual Whole Body Dose Due to TMI-1 and TMI-2 Operations:	0.17 mrem/yr
Individual Whole Body Dose Due to Natural Background Radiation (1)	311 mrem/yr

(1) NCRP 160 – (2009)

Figure 1

Exposure Pathways For Radionuclides Routinely Released From TMINS



PREDOMINANT RADIONUCLIDES

NOBLE GASES (Xe,Kr)
Plume exposure

RADIOIODINES (I-131, I-133)
Inhalation and consumption of milk, water, fruits, and vegetables

RADIOSTRONTIUMS (Sr-89, Sr-90)
Consumption of milk, meat, fruits, and vegetables

ACTIVATION PRODUCTS (Co-60, Mn-54)
Shoreline exposure

RADIOCESIUMS (Cs-134, Cs-137)
Shoreline exposure and consumption of milk, meat, fish, water, fruits, and vegetables

TRITIUM (H-3)
Inhalation and consumption of water, milk, fruits, and vegetables

F. Summary of Results – Inter-Laboratory Comparison Program

The primary and secondary laboratories analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation and water matrices (Appendix E). The PE samples, supplied by Analytics Inc., Environmental Resource Associates (ERA) and DOE's MAPEP, were evaluated against the following pre-set acceptance criteria:

1. Analytics Evaluation Criteria

   Analytics' evaluation report provides a ratio of TBE's result and Analytics' known value. Since flag values are not assigned by Analytics, TBE-ES evaluates the reported ratios based on internal QC requirements, which are based on the DOE MAPEP criteria.

2. ERA Evaluation Criteria

   ERA's evaluation report provides an acceptance range for control and warning limits with associated flag values. ERA's acceptance limits are established per the USEPA, NELAC, state specific PT program requirements or ERA's SOP for the Generation of Performance Acceptance Limits, as applicable. The acceptance limits are either determined by a regression equation specific to each analyte or a fixed percentage limit promulgated under the appropriate regulatory document.

3. DOE Evaluation Criteria

   MAPEP's evaluation report provides an acceptance range with associated flag values.

   The MAPEP defines three levels of performance: Acceptable (flag = "A"), Acceptable with Warning (flag = "W"), and Not Acceptable (flag = "N"). Performance is considered acceptable when a mean result for the specified analyte is ± 20% of the reference value. Performance is acceptable with warning when a mean result falls in the range from ±20% to ±30% of the reference value (i.e., 20% < bias < 30%). If the bias is greater than 30%, the results are deemed not acceptable.

For the primary laboratory, 14 out of 18 analytes met the specified acceptance criteria. Four analytes did not meet the specified acceptance criteria for the following reason:

1. Teledyne Brown Engineering's Analytics March 2011 Cr-51 in milk result of 398 pCi/L was higher than the known value of 298 pCi/L, resulting in a found to known ratio of 1.34. NCR 11-13 was initiated to investigate this failure. There was a slightly high bias in all the gamma activities. The June gamma results in milk did not show a high bias. No further action was required.
2. Teledyne Brown Engineering's ERA May 2011 Gross Alpha in water result of 64.1 pCi/L was higher than the known value of 50.1 pCi/L, which exceeded the upper control limit of 62.9 pCi/L. NCR 11-08 was initiated to investigate this failure. The solids on the planchet exceeded 100 mg, which was beyond the range of the efficiency curve.

   Teledyne Brown Engineering's MAPEP March 2011 Gross Alpha in air particulate result of 0.101 Bq/sample was lower than the known value of 0.659 Bq/sample, which exceeded the lower control limit of 0.198 Bq/sample. NCR 11-11 was initiated to investigate this failure. The air particulate filter was counted on the wrong side.
3. Teledyne Brown Engineering's ERA November 2011 Sr-89 in water result of 81.0 pCi/L was higher than the known value of 69.7 pCi/L, which exceeded the upper control limit of 77.9 pCi/L. NCR 11-16 was initiated to investigate this failure. The TBE reported value to known ratio of 1.16 fell within the acceptable range of ± 20%, which TBE considers acceptable.
4. Teledyne Brown Engineering's MAPEP March 2011 Sr-90 in soil, air particulate and vegetation were non-reports that were evaluated as failed. NCR 11-11 was initiated to investigate these failures. MAPEP evaluated the non-reports as failed due to not reporting a previously reported analyte.

For the secondary laboratory, Environmental, Inc., 12 out of 14 analytes met the specified acceptance criteria.

1. Environmental Inc.'s ERA October 2011 Cs-134 in water result of 38.8 pCi/L was higher than the known value of 33.4 pCi/L, which exceeded the upper control limit of 36.7 pCi/L. The sample was reanalyzed. The reanalyzed result of 32.9 was acceptable.
2. Environmental Inc.'s MAPEP February 2011 Sr-90 in air particulate result of 1.89 Bq/sample was higher than the known value of 1.36 Bq/sample, which exceeded the upper control limit of 1.77 Bq/sample. No errors were found in the calculation or procedure. The reanalyzed result of 1.73 Bq/sample was acceptable.

   Environmental Inc.'s MAPEP August 2011 Sr-90 in soil result of 219.4 Bq/kg, less than the known value of 320 Bq/kg, was below the lower control limit of 224 Bq/kg. The sample was reanalyzed in

triplicate through a strontium column. The reanalyzed result of 304.2 Bq/kg was acceptable.

The Inter-Laboratory Comparison Program provides evidence of "in control" counting systems and methods, and that the laboratories are producing accurate and reliable data.

V. References

1. Three Mile Island Nuclear Station, Unit 1, Technical Specifications, DPR 50.
2. Three Mile Island Nuclear Station, Unit 2, PDMS Technical Specifications, DPR 73.
3. Radiation Management Corporation. "Three Mile Island Nuclear Station, Preoperational Radiological Environmental Monitoring Program, January 1, 1974 – June 5, 1974." RMC-TR-75-17, January 1975.
4. Exelon. "Three Mile Island Nuclear Station Offsite Dose Calculation Manual (ODCM)."
5. National Council of Radiation Protection and Measurements Report No. 160. "Ionizing Radiation Exposure of the Population of the United States." 2009.

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APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT SUMMARY

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE THREE MILE ISLAND NUCLEAR STATION, 2011

Name of Facility: THREE MILE ISLAND NUCLEAR STATION **DOCKET NUMBER: 50-289 & 50-320**

Location of Facility: MIDDLETOWN COUNTY PA **REPORTING PERIOD: 2011**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (PCI/LITER)	H-3	24	2000	2166 (9/12) (324/8230)	<LLD	2166 (9/12) (324/8230)	TM-SW-J1-2 INDICATOR WEST SHORE; TMI 0.5 MILES S OF SITE	0
	I-131	12	1	NA	1.8 (2/12) (1.0/2.5)	1.8 (2/12) (1.0/2.5)	TM-SW-A3-2 CONTROL SWATARA CREEK 2.5 MILES N OF SITE	0
	GAMMA	24						
	MN-54		15	<LLD	<LLD	-		0
	CO-58		15	<LLD	<LLD	-		0
	FE-59		30	<LLD	<LLD	-		0
	CO-60		15	<LLD	<LLD	-		0
	ZN-65		30	<LLD	<LLD	-		0

THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUE
FRACTION OF DETECTABLE MEASUREMENT AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESIS (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE THREE MILE ISLAND NUCLEAR STATION, 2011

Name of Facility: THREE MILE ISLAND NUCLEAR STATION **DOCKET NUMBER:** 50-289 & 50-320

Location of Facility: MIDDLETOWN COUNTY PA **REPORTING PERIOD:** 2011

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (PCI/LITER)	NB-95		15	<LLD	<LLD	-		0
	ZR-95		30	<LLD	<LLD	-		0
	CS-134		15	<LLD	<LLD	-		0
	CS-137		18	<LLD	<LLD	-		0
	BA-140		60	<LLD	<LLD	-		0
	LA-140		15	<LLD	<LLD	-		0
DRINKING WATER (PCI/LITER)	GR-B	36	4	3.5 (6/24) (2.5/6.5)	2 (1/12)	3.7 (5/12) (2.5/6.5)	TM-DW-G15-2 INDICATOR WRIGHTS WATER SUPPLY 13.3 MILES SE OF SITE	0
	I-131	36	1	<LLD	<LLD	-		0

THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUE
FRACTION OF DETECTABLE MEASUREMENT AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESIS (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE THREE MILE ISLAND NUCLEAR STATION, 2011

Name of Facility: THREE MILE ISLAND NUCLEAR STATION **DOCKET NUMBER: 50-289 & 50-320**

Location of Facility: MIDDLETOWN COUNTY PA **REPORTING PERIOD: 2011**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
DRINKING WATER (PCI/LITER)	H-3	36	2000	207 (2/24) (184/230)	<LLD	230 (1/12)	TM-DW-G15-3 INDICATOR LANCASTER WATER AUTHORITY 14.8 MILES SE OF SITE	0
	GAMMA	36						
	MN-54		15	<LLD	<LLD	-		0
	CO-58		15	<LLD	<LLD	-		0
	FE-59		30	<LLD	<LLD	-		0
	CO-60		15	<LLD	<LLD	-		0
	ZN-65		30	<LLD	<LLD	-		0
	NB-95		15	<LLD	<LLD	-		0

THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUE
FRACTION OF DETECTABLE MEASUREMENT AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESIS (F)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE THREE MILE ISLAND NUCLEAR STATION, 2011

Name of Facility: THREE MILE ISLAND NUCLEAR STATION **DOCKET NUMBER:** 50-289 & 50-320

Location of Facility: MIDDLETOWN COUNTY PA **REPORTING PERIOD:** 2011

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
DRINKING WATER (PCI/LITER)	ZR-95		30	<LLD	<LLD	-		0
	CS-134		15	<LLD	<LLD	-		0
	CS-137		18	<LLD	<LLD	-		0
	BA-140		60	<LLD	<LLD	-		0
	LA-140		15	<LLD	<LLD	-		0
EFFLUENT WATER (PCI/LITER)	GR-B	12	4	5.8 (10/12) (3.2/10.7)	NA	5.8 (10/12) (3.2/10.7)	TM-EW-K1-1 INDICATOR MAIN STATION LIQ. DISCHARGE ONSITE	0
	I-131	12	1	1.4 (1/12)	NA	1.4 (1/12)	TM-EW-K1-1 INDICATOR MAIN STATION LIQ. DISCHARGE ONSITE	0

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EFFLUENT WATER (PCI/LITER)	H-3	12	2000	20378 (11/12) (982/77200)	NA	20378 (11/12) (982/77200)	TM-EW-K1-1 INDICATOR MAIN STATION LIQ. DISCHARGE ONSITE	0
	SR-89	2	5	<LLD	NA	-		0
	SR-90	2	2	<LLD	NA	-		0
	GAMMA	12						
	MN-54		15	<LLD	NA	-		0
	CO-58		15	<LLD	NA	-		0
	FE-59		30	<LLD	NA	-		0
	CO-60		15	<LLD	NA	-		0

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EFFLUENT WATER (PCI/LITER)	ZN-65		30	<LLD	NA	-		0
	NB-95		15	<LLD	NA	-		0
	ZR-95		30	<LLD	NA	-		0
	CS-134		15	<LLD	NA	-		0
	CS-137		18	<LLD	NA	-		0
	BA-140		60	<LLD	NA	-		0
	LA-140		15	<LLD	NA	-		0

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BOTTOM FEEDER (PCI/KG WET)	SR-90	4	10	<LLD	<LLD	-		0
	GAMMA	4						
	K-40		NA	2270 (2/2) (1310/3230)	2700 (2/2) (2110/3290)	2700 (2/2) (2110/3290)	BKGB CONTROL CITY ISLAND UPSTREAM OF DISCHARGE	0
	MN-54		130	<LLD	<LLD	-		0
	CO-58		130	<LLD	<LLD	-		0
	FE-59		260	<LLD	<LLD	-		0
	CO-60		130	<LLD	<LLD	-		0
	ZN-65		260	<LLD	<LLD	-		0

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BOTTOM FEEDER (PCI/KG WET)	CS-134		130	<LLD	<LLD	-		0
	CS-137		150	<LLD	<LLD	-		0
PREDATOR (PCI/KG WET)	SR-90	4	10	<LLD	<LLD	-		0
	GAMMA	4						
	K-40		NA	3350 (2/2) (2970/3730)	3020 (2/2) (2920/3120)	3350 (2/2) (2970/3730)	INDP INDICATOR YORK HAVEN DAM DOWNSTREAM OF DISCHARGE	0
	MN-54		130	<LLD	<LLD	-		0
	CO-58		130	<LLD	<LLD	-		0
	FE-59		260	<LLD	<LLD	-		0

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PREDATOR (PCI/KG WET)	CO-60		130	<LLD	<LLD	-		0
	ZN-65		260	<LLD	<LLD	-		0
	CS-134		130	<LLD	<LLD	-		0
	CS-137		150	<LLD	<LLD	-		0
SEDIMENT (PCI/KG DRY)	GAMMA	7						
	K-40		NA	14700 (5/5) (12400/17600)	9790 (2/2) (8580/11000)	16000 (2/2) (14400/17600)	J2-1 INDICATOR YORK HAVEN DAM 1.5 MILES S OF SITE	0
	MN-54		NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0

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SEDIMENT (PCI/KG DRY)	CO-60		NA	<LLD	<LLD	-		0
	CS-134		150	<LLD	<LLD	-		0
	CS-137		180	247 (2/5) (187/306)	<LLD	306 (1/1)	EDCB INDICATOR STORM WATER BASIN 0.2 MILES SE OF SITE	0
AIR PARTICULATE (E-3 PCI/CU.METER)	GR-B	360	10	18 (299/308) (7/88)	20 (51/52) (9/43)	20 (49/52) (9/88)	TM-AP-G2-1 INDICATOR BECKER FARM 1.4 MILES SE OF SITE	0
	GAMMA	28						
	BE-7		NA	59 (24/24) (25/92)	61 (4/4) (38/84)	67 (4/4) (32/92)	TM-AP-F1-3 INDICATOR 500 KV SUBSTATION 0.6 MILES ESE OF SITE	0
	MN-54		NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0

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AIR PARTICULATE (E-3 PCI/CU.METER)	CO-60		NA	<LLD	<LLD	-		0
	NB-95		NA	<LLD	<LLD	-		0
	ZR-95		NA	<LLD	<LLD	-		0
	CS-134		50	<LLD	<LLD	-		0
	CS-137		60	<LLD	<LLD	-		0
AIR IODINE (E-3 PCI/CU.METER)	GAMMA I-131	360	70	54 (16/308) (37/74)	71 (3/52) (57/87)	71 (3/52) (57/87)	TM-AI-Q15-1 CONTROL WEST FAIRVIEW 13.5 MILES NW OF SITE	0
MILK (PCI/LITER)	I-131	115	1	<LLD	<LLD	-		0

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MILK (PCI/LITER)	SR-89	20	5	<LLD	<LLD	-		0
	SR-90	20	2	0.7 (3/16) (0.7/0.7)	0.6 (1/4)	0.7 (2/4) (0.7/0.7)	TM-M-E2-2 INDICATOR NISSLEY FARM 1.1 MILES E OF SITE	0
	GAMMA	115						
	K-40		NA	1259 (92/92) (745/1670)	1231 (23/23) (1100/1380)	1359 (23/23) (1110/1670)	P4-1 INDICATOR	0
	CS-134		15	<LLD	<LLD	-		0
	CS-137		18	<LLD	<LLD	-		0
	BA-140		60	<LLD	<LLD	-		0
	LA-140		15	<LLD	<LLD	-		0

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VEGETATION (PCI/KG WET)	SR-90	26	10	9 (7/13) (3/17)	5 (4/13) (3/10)	9 (7/12) (3/17)	H1-2 INDICATOR RED HILL MARKET, ALONG ROUTE 441 1.0 MILES SSE OF SITE	0
	GAMMA	32						
	BE-7		NA	1124 (13/16) (242/3650)	746 (5/16) (152/1720)	1190 (12/14) (242/3650)	H1-2 INDICATOR RED HILL MARKET, ALONG ROUTE 441 1.0 MILES SSE OF SITE	0
	K-40		NA	4486.3 (16/16) (1930/8260)	3629.4 (16/16) (1900/5800)	4526.4 (14/14) (1930/8260)	H1-2 INDICATOR RED HILL MARKET, ALONG ROUTE 441 1.0 MILES SSE OF SITE	0
	I-131		60	<LLD	<LLD	-		0
	CS-134		60	<LLD	<LLD	-		0
	CS-137		80	<LLD	<LLD	-		0
DIRECT RADIATION (MILLI-ROENTGEN/STD.MO.)	TLD-QUARTERLY	357	NA	4.6 (313/313) (2.7/8.7)	5.2 (44/44) (3.8/7.8)	7.3 (4/4) (6.6/8.6)	H8-1 INDICATOR SAGINAW ROAD, STARVIEW 7.4 MILES SSE OF SITE	0

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APPENDIX B

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

TABLE B-1: Location Designation and Identification System for the Three Mile Island Nuclear Station

XYY-Z- General code for identification of locations, where:

X - Angular Sector of Sampling Location. The compass is divided into 16 sectors of 22 1/2 degrees each with center at Three Mile Island's Units 1 and 2 off-gas vents. Sector A is centered due North, and others are alphabetical in a clockwise direction.

YY - Radial Zone of Sampling Location in miles.

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

TABLE B-2: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Three Mile Island Nuclear Station, 2011

Sample Medium	Station Code	Map Number	Distance (miles)	Azimuth	Description
AQS	A1-3	1	0.5	359°	N of site off north tip of TMI in Susquehanna River
ID	A1-4	1	0.3	6°	N of Reactor Building on W fence adjacent to North Weather Station, TMI
AP,AI,ID	A3-1	2	2.7	357°	N of site at Mill Street Substation
SW	A3-2	2	2.7	356°	N of site at Swatara Creek, Middletown
ID	A5-1	2	4.4	3°	N of site on Vine Street Exit off Route 283
ID	A9-3	3	8.0	2°	N of site at Duke Street Pumping Station, Hummelstown
ID	B1-1	1	0.6	25°	NNE of site on light pole in middle of North Bridge, TMI
ID	B1-2	1	0.4	23°	NNE of Reactor Building on top of dike, TMI
ID	B2-1	2	1.9	17°	NNE of site on Sunset Dr. (off Hillsdale Rd.)
ID	B5-1	2	4.9	19°	NNE of site at intersection of School House and Miller Roads
ID	B10-1	3	9.2	21°	NNE of site at intersection of West Areba Avenue and Mill Street, Hershey
FP	B10-2	3	10	31°	NNE of site at Milton Hershey School, Hershey
ID	C1-1	1	0.7	37°	NE of site along Route 441 N
ID	C1-2	1	0.3	50°	NE of Reactor Building on top of dike, TMI
ID	C2-1	2	1.5	44°	NE of site at Middletown Junction
ID	C5-1	2	4.7	43°	NE of site on Kennedy Lane
ID	C8-1	3	7.1	48°	NE of site at Schenk's Church on School House Road
AQF	Control	-	-	-	All locations where finfish are collected above Dock St. Dam, Harrisburg
ID	D1-1	1	0.2	76°	ENE of Reactor Building on top of dike, TMI
ID	D1-2	1	0.5	67°	ENE of site off Route 441 along lane between garden center and residence
ID	D2-2	2	1.6	74°	ENE of site along Hillsdale Rd. (S of Zion Rd.)
ID	D6-1	3	5.2	66°	ENE of site off Beagle Road
ID	D15-1	3	10.8	64°	ENE of site along Route 241, Lawn
AP, AI, ID, FP	E1-2	1	0.4	97°	E of site at TMI Visitor's Center
ID	E1-4	1	0.2	97°	E of Reactor Building on top of dike, TMI
M	E2-2	2	1.1	96°	E of site at farm on Pecks Road
ID	E2-3	2	2.0	97°	E of site along Hillsdale Rd. (N of Creek Rd.)
ID	E5-1	2	4.7	82°	E of site at intersection of North Market Street (Route 230) and Zeager Road
ID	E7-1	3	6.7	88°	E of site along Hummelstown Street, Elizabethtown
ID	F1-1	1	0.5	117°	ESE of site near entrance to 500 kV Substation
ID	F1-2	1	0.2	112°	ESE of Reactor Building on top of dike midway within ISWSF, TMI
AP, AI	F1-3	1	0.6	112°	ESE of site in 500 kV Substation
ID	F1-4	1	0.2	122°	ESE of Reactor Building on top of dike, TMI
ID	F2-1	2	1.3	119°	ESE of site along Engle Road
M	F4-1	2	3.2	104°	ESE of site at farm on Turnpike Road
ID	F5-1	2	4.7	109°	ESE of site along Amosite Road
ID	F10-1	3	9.4	112°	ESE of site along Donegal Springs Road, Donegal Springs
ID	F25-1	3	22	106°	ESE of site at intersection of Steel Way and Loop Roads, Lancaster
ID	G1-2	1	0.7	145°	SE of site along Route 441 S
ID	G1-3	1	0.2	130°	SE of Reactor Building on top of dike, TMI
ID	G1-5	1	0.3	143°	SE of Reactor Building on top of dike, TMI
ID	G1-6	1	0.3	139°	SE of Reactor Building on top of dike, TMI
AI, AP, M	G2-1	2	1.4	126°	SE of site at farm on Becker Road
ID	G2-4	2	1.7	138°	SE of site on Becker Road
ID	G5-1	2	4.8	131°	SE of site at intersection of Bainbridge and Risser Roads
ID	G10-1	3	9.7	128°	SE of site at farm along Engles Tollgate Road, Marietta
ID	G15-1	3	14.4	126°	SE of site at Columbia Water Treatment Plant
DW	G15-2	3	13.3	129°	SE of site at Wrightsville Water Treatment Plant
DW	G15-3	3	15.7	124°	SE of site at Lancaster Water Treatment Plant

TABLE B-2: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Three Mile Island Nuclear Station, 2011

Sample Medium	Station Code	Map Number	Distance (miles)	Azimuth	Description
ID	H1-1	1	0.5	167°	SSE of site, TMI
FP	H1-2	1	1.0	151°	SSE of site along Route 441, Red Hill Market
AP, AI, ID	H3-1	2	2.2	160°	SSE of site in Falmouth-Collins Substation
ID	H5-1	2	4.1	158°	SSE of site by Guard Shack at Brunner Island Steam Electric Station
ID	H8-1	3	7.4	163°	SSE of site along Saginaw Road, Starview
ID	H15-1	3	13.2	157°	SSE of site at intersection of Orchard and Stonewood Roads, Wilshire Hills
AQF	Indicator	-	-	-	All locations where finfish are collected downstream of the TMINS liquid discharge outfall
ID	J1-1	1	0.8	176°	S of site, TMI
SW	J1-2	1	0.5	188°	S of site downstream of the TMINS liquid discharge outfall in Susquehanna River
ID	J1-3	1	0.3	189°	S of Reactor Building just S of SOB, TMI
AQS	J2-1	2	1.4	179°	S of site in Susquehanna River just upstream of the York Haven Dam
ID	J3-1	2	2.7	179°	S of site at York Haven/Cly
ID	J5-1	2	4.9	181°	S of site along Canal Road, Conewago Heights
ID	J7-1	3	6.5	176°	S of site off of Maple Street, Manchester
ID	J15-1	3	12.6	183°	S of site in Met-Ed York Load Dispatch Station
EW	K1-1	1	0.2	210°	On site at RML-7 Main Station Discharge Building
AQS	K1-3	1	0.2	212°	SSW of site downstream of the TMINS liquid discharge outfall in the Susquehanna River
ID	K1-4	1	0.2	209°	SSW of Reactor Building on top of dike behind Warehouse 2, TMI
ID	K2-1	2	1.2	200°	SSW of site on S Shelley Island
ID	K3-1	2	2.0	206°	SSW of site along Rt. 262, N of Cly
ID	K5-1	2	4.9	202°	SSW of site along Conewago Creek Road, Strinestown
ID	K8-1	3	7.5	196°	SSW of site at intersection of Coppenhaffer Road and Route 295, Zions View
ID	K15-1	3	12.8	203°	SSW of site behind McDonald's and next to child care center, Weiglestown
M	K15-3	3	14.4	205°	SSW of site at farm along S Salem Church Rd, Dover
ID	L1-1	1	0.1	236°	SW of site on top of dike W of Mech. Draft Cooling Tower, TMI
ID	L1-2	1	0.5	221°	SW of site on Beech Island
ID	L2-1	2	1.8	224°	SW of site along Route 262
ID	L5-1	2	4.1	228°	SW of site at intersection of Stevens and Wilson Roads
ID	L8-1	3	8.0	225°	SW of site along Rohlers Church Rd., Andersontown
ID	L15-1	3	11.8	226°	SW of site on W side of Route 74, rear of church, Mt. Royal
ID	M1-1	1	0.1	250°	WSW of Reactor Building on SE corner of U-2 Screenhouse fence, TMI
ID	M1-2	1	0.4	252°	WSW of site on E side of Shelley Island, Lot #157
AP, AI, ID	M2-1	2	1.3	256°	WSW of site along Route 262 and adjacent to Fishing Creek, Goldsboro
ID	M5-1	2	4.3	249°	WSW of site at intersection of Lewisberry and Roxberry Roads, Newberrytown
ID	M9-1	3	8.7	243°	WSW of site along Alpine Road, Maytown
ID	N1-1	1	0.7	274°	W of site on W side of Shelley Island, between lots #13 and #14
ID	N1-3	1	0.1	274°	W of Reactor Building on fence adjacent to Screenhouse entrance gate, TMI
ID	N2-1	2	1.2	261°	W of site at Goldsboro Marina
ID	N5-1	2	5.0	268°	W of site off of Old York Road along Robin Hood Drive
ID	N8-1	3	7.7	262°	W of site along Route 382, 1/2 mile north of Lewisberry
ID	N15-2	3	10.4	275°	W of site at intersection of Lisburn Road and Main Street, Lisburn
ID	P1-1	1	0.4	303°	WNW of site on Shelley Island

TABLE B-2: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Three Mile Island Nuclear Station, 2011

Sample Medium	Station Code	Map Number	Distance (miles)	Azimuth	Description
ID	P1-2	1	0.1	292°	WNW of Reactor Building on fence N of Unit 1 Screenhouse, TMI
ID	P2-1	2	2.0	283°	WNW of site along Route 262
M	P4-1	2	3.7	295°	WNW of site at farm on Valley Road
ID	P5-1	2	5.0	284°	WNW of site at intersection of Valley Road (Route 262) and Beinhower Road
ID	P8-1	3	8.0	292°	WNW of site along Evergreen Road, Reesers Summit
ID	Q1-1	1	0.5	317°	NW of site on E side of Shelley Island
ID	Q1-2	1	0.2	321°	NW of Reactor Building on fence W of Warehouse 1, TMI
ID	Q2-1	2	1.9	310°	NW of site along access road along river
ID	Q5-1	2	5.0	317°	NW of site along Lumber Street, Highspire
SW, DW, ID	Q9-1	3	8.5	310°	NW of site at the Steelton Water Company
AP, AI, ID	Q15-1	3	13.4	309°	NW of site behind West Fairview Fire Dept. Social Hall (abandoned)
ID	R1-1	3	0.2	335°	NNW of Reactor Building along W fence, TMI
ID	R1-2	1	0.7	334°	NNW of site on central Henry Island
ID	R3-1	2	2.6	341°	NNW of site at Crawford Station, Middletown
ID	R5-1	2	4.9	339°	NNW of site at intersection of Spring Garden Drive and Route 441
ID	R9-1	3	8.0	341°	NNW of site at intersection of Derry and 66th Streets, Rutherford Heights
ID	R15-1	3	11.2	332°	NNW of site at intersection of Route 22 and Colonial Road, Colonial Park

IDENTIFICATION KEY

ID = Immersion Dose (TLD)
SW = Surface Water
AI = Air Iodine
AP = Air Particulate
FP = Food Products (Green Leafy Vegetation, Fruits, Vegetables)
EW = Effluent Water
DW = Drinking Water
M = Milk (Cow)
AQF = Finfish
AQS = Aquatic Sediment

TABLE B-3: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Three Mile Island Nuclear Station, 2011

Sample Medium	Analysis	Sampling Method	Collection Procedure Number	Sample Size	Analytical Procedure Number
Surface Water	Gamma Spectroscopy	Monthly composite from a continuous water compositor.	ER-TMI-06 Collection of water samples for radiological analysis (Three Mile Island Nuclear Station)	2 gallon	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Surface Water	Tritium	Monthly composite from a continuous water compositor.	ER-TMI-06 Collection of water samples for radiological analysis (Three Mile Island Nuclear Station)	2 gallon	TBE, TBE-2010 Tritium and carbon-14 analysis by liquid scintillation Env. Inc., T-02 Determination of tritium in water (direct method)
Surface Water	Iodine- 131	Monthly composite from a continuous water compositor.	ER-TMI-06 Collection of water samples for radiological analysis (Three Mile Island Nuclear Station)	2 gallon	TBE, TBE-2012 Radioiodine in various matrices Env. Inc., I-131-01 Determination of I-131 in milk by anion exchange
Drinking Water	Gross Beta	Monthly composite from a continuous water compositor.	ER-TMI-06 Collection of water samples for radiological analysis (Three Mile Island Nuclear Station)	2 gallon	TBE, TBE-2008 Gross alpha and/or gross beta activity in various matrices Env. Inc., W(DS)-01 Determination of gross alpha and/or gross beta in water (dissolved solids or total residue)
Drinking Water	Gamma Spectroscopy	Monthly composite from a continuous water compositor.	ER-TMI-06 Collection of water samples for radiological analysis (Three Mile Island Nuclear Station)	2 gallon	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Drinking Water	Tritium	Monthly composite from a continuous water compositor.	ER-TMI-06 Collection of water samples for radiological analysis (Three Mile Island Nuclear Station)	2 gallon	TBE, TBE-2010 Tritium and carbon-14 analysis by liquid scintillation Env. Inc., T-02 Determination of tritium in water (direct method)
Drinking Water	Iodine-131	Monthly composite from a continuous water compositor.	ER-TMI-06 Collection of water samples for radiological analysis (Three Mile Island Nuclear Station)	2 gallon	TBE, TBE-2012 Radioiodine in various matrices Env. Inc., I-131-01 Determination of I-131 in milk by an ion exchange
Effluent Water	Iodine-131	Monthly composite from a continuous water compositor.	ER-TMI-06 Collection of water samples for radiological analysis (Three Mile Island Nuclear Station)	2 gallon	TBE, TBE-2012 Radioiodine in various matrices Env. Inc., I-131-01 Determination of I-131 in milk by an ion exchange
Effluent Water	Gross Beta	Monthly composite from a continuous water compositor.	ER-TMI-06 Collection of water samples for radiological analysis (Three Mile Island Nuclear Station)	2 gallon	TBE, TBE-2008 Gross alpha and/or gross beta activity in various matrices Env. Inc., W(DS)-01 Determination of gross alpha and/or gross beta in water (dissolved solids or total residue)

TABLE B-3: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Three Mile Island Nuclear Station, 2011

Sample Medium	Analysis	Sampling Method	Collection Procedure Number	Sample Size	Analytical Procedure Number
Effluent Water	Gamma Spectroscopy	Monthly composite from a continuous water compositor.	ER-TMI-06 Collection of water samples for radiological analysis (Three Mile Island Nuclear Station)	2 gallon	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Effluent Water	Tritium	Monthly composite from a continuous water compositor.	ER-TMI-06 Collection of water samples for radiological analysis (Three Mile Island Nuclear Station)	2 gallon	TBE, TBE-2010 Tritium and carbon-14 analysis by liquid scintillation Env. Inc., T-02 Determination of tritium in water (direct method)
Effluent Water	Strontium 89/90	Semi-annual composite from monthly samples.	TBE, TBE-2023 Compositing of samples	2 gallon	TBE, TBE-2019 Radiostrontium analysis by ion exchange
Storm Water	Gamma Spectroscopy	Quarterly composite of monthly grab samples	ER-TMI-06 Collection of water samples for radiological analysis (Three Mile Island Nuclear Station)	1 gallon	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Storm Water	Tritium	Quarterly composite of monthly grab samples	ER-TMI-06 Collection of water samples for radiological analysis (Three Mile Island Nuclear Station)	1 gallon	TBE, TBE-2010 Tritium and carbon-14 analysis by liquid scintillation Env. Inc., T-02 Determination of tritium in water (direct method)
Fish	Gamma Spectroscopy	Semi-annual samples collected via electroshocking or other techniques	ER-TMI-13 Collection of fish samples for radiological analysis (Three Mile Island Nuclear Station)	1000 grams (wet)	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Fish	Strontium 90	Semi-annual samples collected via electroshocking or other techniques	ER-TMI-13 Collection of fish samples for radiological analysis (Three Mile Island Nuclear Station)	1000 grams (wet)	TBE, TBE-2019 Radiostrontium analysis by ion exchange Env. Inc., SR-05, Determination of Sr-89 and Sr-90 in Ashed Samples

TABLE B-3: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Three Mile Island Nuclear Station, 2011

Sample Medium	Analysis	Sampling Method	Collection Procedure Number	Sample Size	Analytical Procedure Number
Sediment	Gamma Spectroscopy	Semi-annual grab samples	ER-TMI-03 Collection of sediment samples for radiological analysis (Three Mile Island Nuclear Station)	500 grams (dry)	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Air Particulates	Gross Beta	One-week composite of continuous air sampling through glass fiber filter paper	ER-TMI-14 Collection of air particulate and air iodine samples for radiological analysis (Three Mile Island Nuclear Station)	1 filter (approximately 280 cubic meters weekly)	TBE, TBE-2008 Gross alpha and/or gross beta activity in various matrices Env. Inc., AP-02 Determination of gross alpha and/or gross beta in air particulate filters
Air Particulates	Gamma Spectroscopy	Quarterly composite of each station	TBE, TBE-2023 Compositing of samples Env. Inc., AP-03 Procedure for compositing air particulate filters for gamma spectroscopic analysis	13 filters (approximately 3600 cubic meters)	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Air Iodine	Gamma Spectroscopy	One-week composite of continuous air sampling through charcoal filter	ER-TMI-14 Collection of air particulate and air iodine samples for radiological analysis (Three Mile Island Nuclear Station)	1 filter (approximately 280 cubic meters weekly)	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., I-131-02 Determination of I-131 in charcoal canisters by gamma spectroscopy (batch method)
Milk	I-131	Bi-weekly grab sample when cows are on pasture. Monthly all other times	ER-TMI-01 Collection of milk samples for radiological analysis (Three Mile Island Nuclear Station)	2 gallon	TBE, TBE-2012 Radioiodine in various matrices Env. Inc., I-131-01 Determination of I-131 in milk by anion exchange
Milk	Strontium-89/90	Quarterly composite of Bi-weekly and monthly grab samples	ER-TMI-01 Collection of milk samples for radiological analysis (Three Mile Island Nuclear Station) TBE, TBE-2023 Compositing of samples	2 gallon	TBE, TBE-2019 Radiostrontium analysis by ion exchange Enc. Inc., SR-07, Determination of Sr-89 and Sr-90 in Milk (Ion Exchange Batch Method)
Milk	Gamma Spectroscopy	Bi-weekly grab sample when cows are on pasture. Monthly all other times	ER-TMI-01 Collection of milk samples for radiological analysis (Three Mile Island Nuclear Station)	2 gallon	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Vegetation	Gamma Spectroscopy	Monthly and annual grab sample	ER-TMI-04 Collection of vegetation samples for radiological analysis (Three Mile Island Nuclear Station)	1000 grams	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy

TABLE B-3: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Three Mile Island Nuclear Station, 2011

Sample Medium	Analysis	Sampling Method	Collection Procedure Number	Sample Size	Analytical Procedure Number
Vegetation	Strontium-89/90	Monthly and annual grab sample	ER-TMI-04 Collection of vegetation samples for radiological analysis (Three Mile Island Nuclear Station)	1000 grams	TBE, TBE-2019 Radiostrontium analysis by ion exchange Env. Inc., SR-05, Determination of Sr-89 and Sr-90 in Ashed Samples
TLD	Thermoluminescence Dosimetry	Quarterly TLDs comprised of two Panasonic 814 (containing 3 each $CaSO_4$ elements)	ER-TMI-02 Collection of TLD samples for radiological analysis (Three Mile Island Nuclear Station)	2 badges with 3 dosimeters	Mirion Technologies

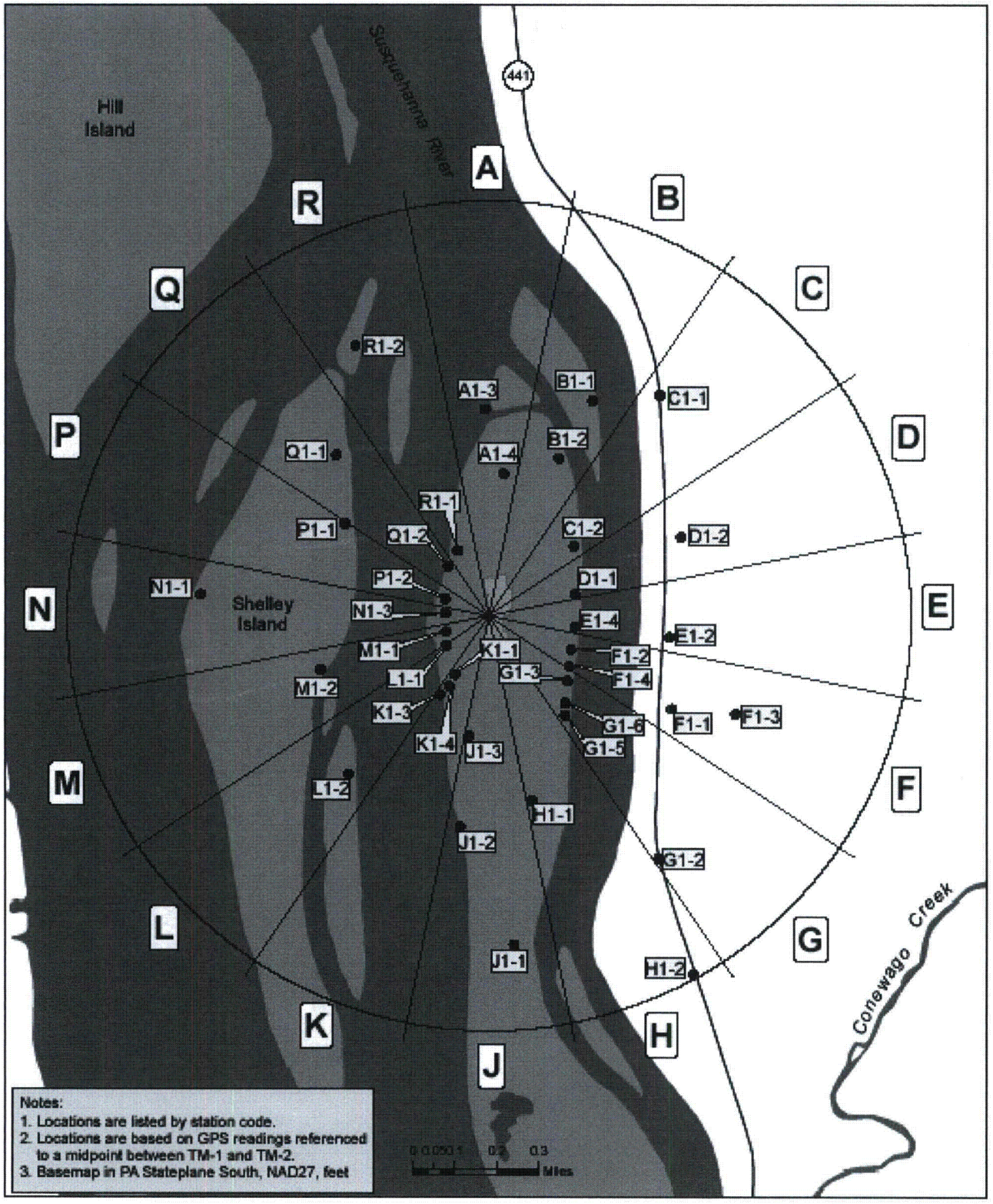

Figure B-1
Environmental Sampling Locations Within One Mile of the Three Mile Island Nuclear Station, 2011

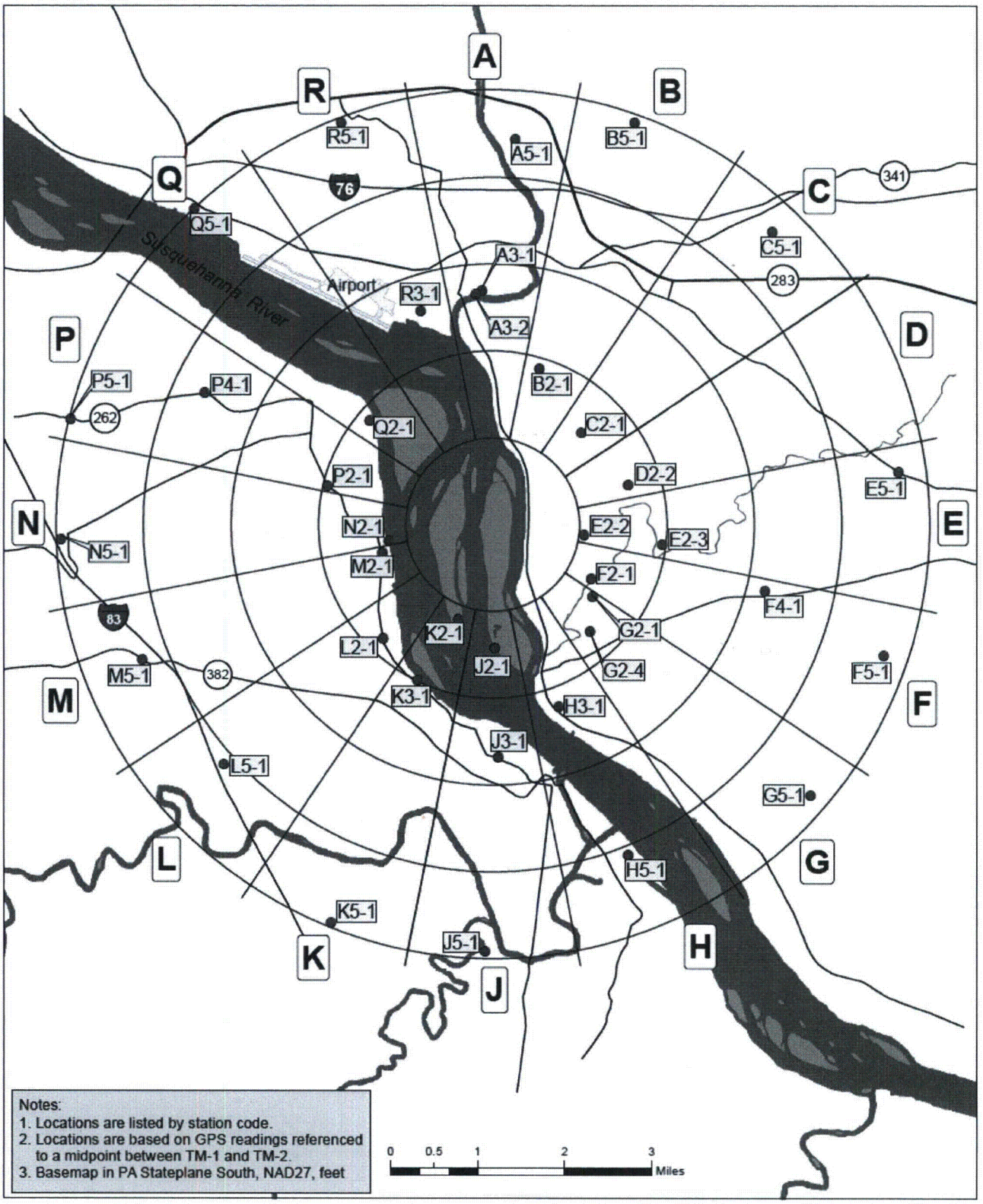

Figure B-2
Environmental Sampling Locations Between One and Five Miles of the Three Mile Island Nuclear Station, 2011

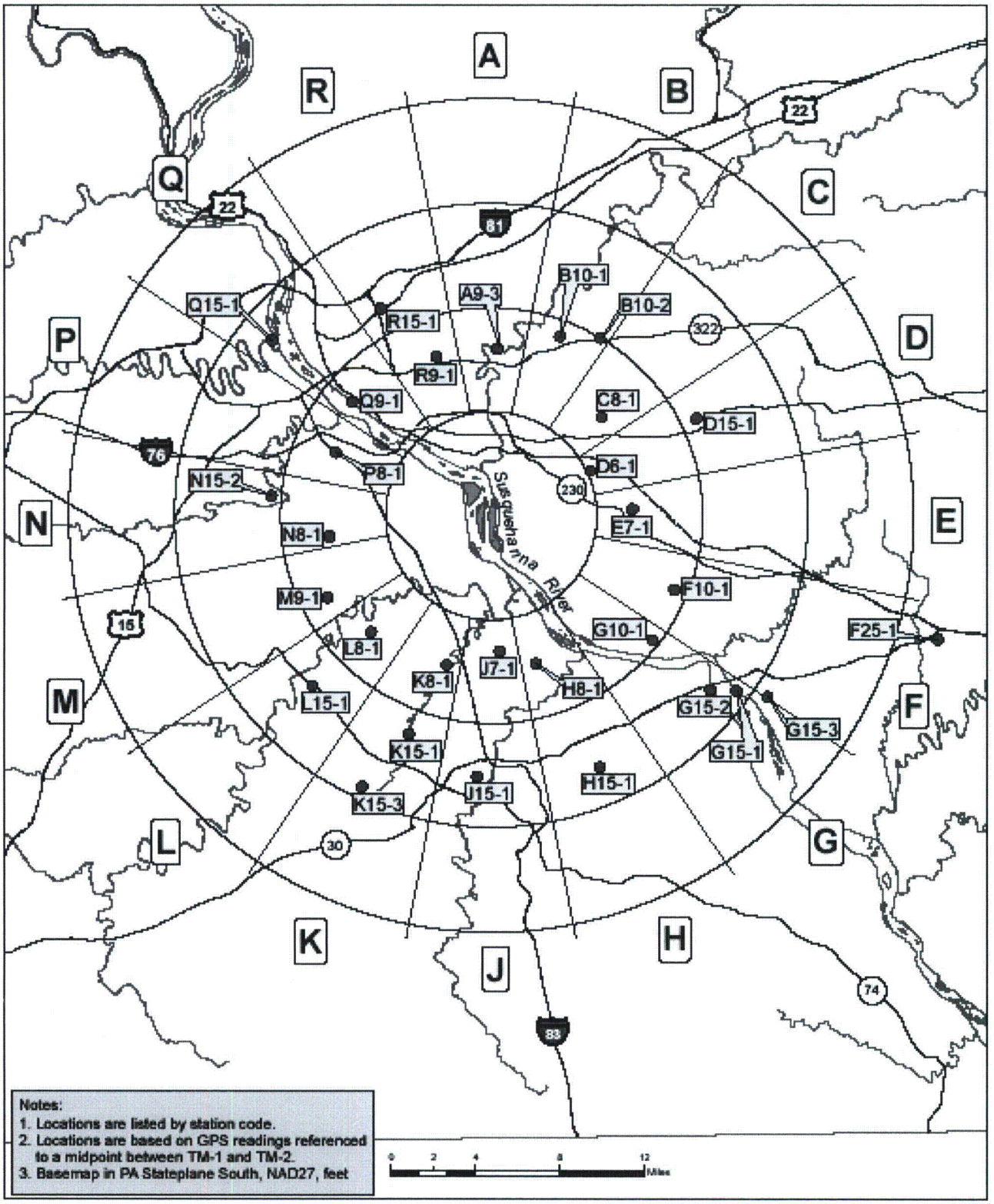

Figure B-3
Environmental Sampling Locations Greater than Five Miles of the Three Mile Island Nuclear Station, 2011

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APPENDIX C

DATA TABLES AND FIGURES - PRIMARY LABORATORY

TABLE C-I.1 **CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	J1-2		Q9-1	
12/28/10 - 02/01/11	324 ± 119	(1)	< 177	
02/01/11 - 03/01/11	8230 ± 866	(1)	< 166	
03/01/11 - 03/29/11	< 147	(1)	< 143	
03/29/11 - 05/03/11	< 192		< 189	
05/03/11 - 05/31/11	645 ± 135		< 168	
05/31/11 - 06/28/11	2190 ± 273		< 178	
06/28/11 - 08/02/11	1980 ± 250		< 177	
08/02/11 - 08/30/11	900 ± 152		< 171	
08/30/11 - 09/27/11	3660 ± 417	(1)	< 185	
09/27/11 - 11/01/11	912 ± 166		< 199	
11/01/11 - 11/29/11	< 165		< 163	
11/29/11 - 01/03/12	656 ± 154	(1)	< 163	
MEAN	2166 ± 5010		-	

TABLE C-I.2 **CONCENTRATIONS OF I-131 IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	A3-2	
12/28/10 - 02/01/11	2.5 ± 0.7	(1)
02/01/11 - 03/01/11	1.0 ± 0.6	
03/01/11 - 03/29/11	< 0.6	
03/29/11 - 05/03/11	< 0.4	
05/03/11 - 05/31/11	< 0.8	
05/31/11 - 06/28/11	< 0.6	
06/28/11 - 08/02/11	< 0.7	
08/02/11 - 08/30/11	< 0.9	
08/30/11 - 09/27/11	< 0.4	(1)
10/04/11 - 11/01/11	< 0.8	(1)
11/08/11 - 11/29/11	< 0.6	(1)
12/06/11 - 01/03/12	< 0.7	(1)
MEAN	1.8 ± 2.1	

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-I.3 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
J1-2	12/28/10 - 02/01/11 (1)	< 5	< 5	< 11	< 5	< 10	< 5	< 8	< 5	< 5	< 25	< 7
	02/01/11 - 03/01/11 (1)	< 5	< 6	< 10	< 5	< 11	< 5	< 9	< 4	< 5	< 29	< 13
	03/01/11 - 03/29/11 (1)	< 1	< 2	< 3	< 1	< 3	< 2	< 3	< 1	< 2	< 14	< 4
	03/29/11 - 05/03/11	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 1	< 1	< 17	< 6
	05/03/11 - 05/31/11	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 1	< 2	< 21	< 7
	05/31/11 - 06/28/11	< 4	< 4	< 8	< 4	< 7	< 5	< 7	< 4	< 4	< 29	< 9
	06/28/11 - 08/02/11	< 4	< 6	< 11	< 5	< 11	< 5	< 8	< 6	< 6	< 23	< 6
	08/02/11 - 08/30/11	< 6	< 6	< 9	< 6	< 11	< 6	< 9	< 5	< 5	< 27	< 7
	08/30/11 - 09/27/11 (1)	< 5	< 5	< 11	< 6	< 10	< 5	< 10	< 5	< 6	< 24	< 7
	09/27/11 - 11/01/11	< 7	< 7	< 15	< 6	< 16	< 8	< 12	< 7	< 7	< 40	< 12
	11/01/11 - 11/29/11	< 4	< 4	< 9	< 5	< 10	< 5	< 8	< 4	< 5	< 24	< 8
	11/29/11 - 01/03/12 (1)	< 5	< 6	< 12	< 5	< 14	< 7	< 10	< 6	< 6	< 32	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-
Q9-1	12/28/10 - 02/01/11	< 6	< 5	< 12	< 5	< 10	< 6	< 9	< 4	< 4	< 27	< 9
	02/01/11 - 03/01/11	< 3	< 4	< 7	< 3	< 7	< 4	< 7	< 4	< 4	< 28	< 8
	03/01/11 - 03/29/11	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 2	< 2	< 17	< 5
	03/29/11 - 05/03/11	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 12	< 3
	05/03/11 - 05/31/11	< 1	< 1	< 2	< 1	< 2	< 1	< 2	< 1	< 1	< 12	< 3
	05/31/11 - 06/28/11	< 4	< 4	< 9	< 4	< 7	< 5	< 7	< 4	< 4	< 28	< 10
	06/28/11 - 08/02/11	< 5	< 6	< 14	< 5	< 9	< 4	< 11	< 5	< 5	< 21	< 8
	08/02/11 - 08/30/11	< 5	< 6	< 9	< 6	< 10	< 6	< 9	< 5	< 4	< 29	< 10
	08/30/11 - 09/27/11	< 4	< 4	< 9	< 4	< 8	< 4	< 8	< 4	< 5	< 22	< 6
	09/27/11 - 11/01/11	< 5	< 6	< 13	< 5	< 9	< 6	< 11	< 6	< 8	< 27	< 14
	11/01/11 - 11/29/11	< 5	< 6	< 11	< 7	< 14	< 6	< 11	< 6	< 6	< 26	< 10
	11/29/11 - 01/03/12	< 7	< 6	< 13	< 6	< 12	< 9	< 13	< 6	< 7	< 31	< 10
	MEAN	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-II.1 **CONCENTRATIONS OF GROSS BETA IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	G15-2	G15-3	Q9-1
12/28/10 - 02/01/11	< 3.4	< 3.6	< 3.4
02/01/11 - 03/01/11	2.5 ± 1.6	< 2.2	< 2.1
03/01/11 - 03/29/11	< 3.3	< 3.0	< 2.9
03/29/11 - 05/03/11	< 3.4	< 3.2	< 3.0
05/03/11 - 05/31/11	3.2 ± 1.5	< 1.9	< 1.8
05/31/11 - 06/28/11	< 3.3	< 3.3	< 3.2
06/28/11 - 08/02/11	< 2.4	< 2.5	< 2.4
08/02/11 - 08/30/11	< 3.2	< 3.2	< 3.1
08/30/11 - 09/27/11	3.1 ± 0.8	2.8 ± 0.8	2.0 ± 0.7
09/27/11 - 11/01/11	< 2.3	< 2.1	< 1.6
11/01/11 - 11/29/11	6.5 ± 2.2	< 2.8 (1)	< 2.7
11/29/11 - 01/03/12	3.1 ± 1.5	< 2.0	< 2.0
MEAN	3.7 ± 3.2	-	-

TABLE C-II.2 **CONCENTRATIONS OF I-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	G15-2	G15-3	Q9-1
12/28/10 - 02/01/11	< 0.4	< 0.7	< 0.4
02/01/11 - 03/01/11	< 0.5	< 0.5	< 0.9
03/01/11 - 03/29/11	< 0.6	< 0.6	< 0.5
03/29/11 - 05/03/11	< 0.8	< 0.6	< 0.6
05/03/11 - 05/31/11	< 0.5	< 0.6	< 0.6
05/31/11 - 06/28/11	< 0.6	< 0.7	< 0.6
06/28/11 - 08/02/11	< 0.7	< 0.7	< 0.7
08/02/11 - 08/30/11	< 0.9	< 0.9	< 0.8
08/30/11 - 09/27/11	< 0.6	< 0.5	< 0.6
09/27/11 - 11/01/11	< 0.9	< 0.9	< 0.7
11/01/11 - 11/29/11	< 0.5	< 0.7 (1)	< 0.7
11/29/11 - 01/03/12	< 0.5	< 0.9	< 0.5
MEAN	-	-	-

TABLE C-II.3 **CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	G15-2	G15-3	Q9-1
12/28/10 - 02/01/11	< 167	< 168	< 170
02/01/11 - 03/01/11	< 166	230 ± 113	< 165
03/01/11 - 03/29/11	184 ± 116	< 172	< 173
03/29/11 - 05/03/11	< 187	< 189	< 189
05/03/11 - 05/31/11	< 165	< 164	< 168
05/31/11 - 06/28/11	< 175	< 178	< 175
06/28/11 - 08/02/11	< 175	< 174	< 179
08/02/11 - 08/30/11	< 169	< 173	< 171
08/30/11 - 09/27/11	< 189	< 190	< 186
09/27/11 - 11/01/11	< 195	< 195	< 196
11/01/11 - 11/29/11	< 165	< 162 (1)	< 162
11/29/11 - 01/03/12	< 200	< 198	< 195
MEAN	-	-	-

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-II.4 **CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
G15-2	12/28/10 - 02/01/11	< 4	< 4	< 9	< 4	< 7	< 4	< 7	< 3	< 4	< 19	< 5
	02/01/11 - 03/01/11	< 2	< 3	< 7	< 3	< 6	< 4	< 5	< 3	< 3	< 21	< 6
	03/01/11 - 03/29/11	< 1	< 2	< 3	< 1	< 3	< 2	< 3	< 1	< 2	< 14	< 4
	03/29/11 - 05/03/11	< 1	< 2	< 3	< 1	< 2	< 2	< 3	< 1	< 1	< 22	< 7
	05/03/11 - 05/31/11	< 3	< 3	< 7	< 2	< 5	< 3	< 5	< 2	< 2	< 24	< 9
	05/31/11 - 06/28/11	< 6	< 7	< 14	< 7	< 13	< 7	< 13	< 6	< 7	< 41	< 14
	06/28/11 - 08/02/11	< 5	< 5	< 12	< 6	< 10	< 7	< 9	< 6	< 5	< 27	< 5
	08/02/11 - 08/30/11	< 6	< 6	< 12	< 6	< 11	< 6	< 12	< 4	< 6	< 28	< 6
	08/30/11 - 09/27/11	< 7	< 9	< 16	< 8	< 15	< 9	< 12	< 7	< 8	< 41	< 12
	09/27/11 - 11/01/11	< 4	< 4	< 12	< 5	< 11	< 5	< 9	< 5	< 6	< 22	< 9
	11/01/11 - 11/29/11	< 4	< 4	< 11	< 5	< 12	< 5	< 9	< 5	< 6	< 21	< 8
	11/29/11 - 01/03/12	< 6	< 7	< 13	< 8	< 18	< 6	< 11	< 6	< 7	< 31	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-
G15-3	12/28/10 - 02/01/11	< 4	< 3	< 7	< 4	< 5	< 2	< 5	< 3	< 3	< 21	< 5
	02/01/11 - 03/01/11	< 5	< 4	< 12	< 4	< 6	< 4	< 6	< 5	< 5	< 29	< 10
	03/01/11 - 03/29/11	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 16	< 5
	03/29/11 - 05/03/11	< 1	< 2	< 3	< 1	< 2	< 1	< 2	< 1	< 1	< 20	< 6
	05/03/11 - 05/31/11	< 2	< 2	< 4	< 1	< 4	< 2	< 4	< 2	< 2	< 24	< 6
	05/31/11 - 06/28/11	< 5	< 5	< 9	< 4	< 8	< 6	< 8	< 5	< 5	< 36	< 13
	06/28/11 - 08/02/11	< 6	< 6	< 13	< 6	< 13	< 7	< 11	< 6	< 6	< 26	< 7
	08/02/11 - 08/30/11	< 5	< 6	< 13	< 6	< 10	< 5	< 12	< 6	< 6	< 26	< 6
	08/30/11 - 09/27/11	< 5	< 5	< 10	< 5	< 10	< 6	< 9	< 4	< 5	< 24	< 6
	09/27/11 - 11/01/11	< 6	< 6	< 12	< 6	< 11	< 7	< 11	< 6	< 6	< 29	< 8
	11/01/11 - 11/29/11 (1)	< 4	< 4	< 8	< 4	< 8	< 4	< 6	< 4	< 4	< 19	< 5
	11/29/11 - 01/03/12	< 8	< 9	< 20	< 11	< 21	< 10	< 17	< 8	< 9	< 42	< 14
	MEAN	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANTION

TABLE C-II.4 **CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
Q9-1	12/28/10 - 02/01/11	< 4	< 3	< 6	< 4	< 8	< 4	< 5	< 4	< 3	< 18	< 2
	02/01/11 - 03/01/11	< 3	< 4	< 9	< 5	< 8	< 3	< 6	< 4	< 5	< 29	< 10
	03/01/11 - 03/29/11	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 16	< 4
	03/29/11 - 05/03/11	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 1	< 1	< 17	< 6
	05/03/11 - 05/31/11	< 2	< 2	< 4	< 1	< 4	< 3	< 4	< 2	< 2	< 22	< 5
	05/31/11 - 06/28/11	< 6	< 5	< 8	< 4	< 10	< 7	< 9	< 5	< 6	< 40	< 15
	06/28/11 - 08/02/11	< 6	< 7	< 14	< 7	< 14	< 7	< 11	< 7	< 7	< 27	< 14
	08/02/11 - 08/30/11	< 5	< 5	< 11	< 6	< 9	< 5	< 8	< 5	< 5	< 23	< 9
	08/30/11 - 09/27/11	< 4	< 4	< 11	< 4	< 9	< 6	< 10	< 5	< 5	< 24	< 8
	09/27/11 - 11/01/11	< 5	< 5	< 13	< 7	< 13	< 6	< 11	< 5	< 6	< 25	< 9
	11/01/11 - 11/29/11	< 5	< 5	< 11	< 5	< 10	< 6	< 9	< 5	< 5	< 22	< 9
	11/29/11 - 01/03/12	< 7	< 7	< 16	< 4	< 12	< 7	< 11	< 6	< 7	< 30	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-

TABLE C-III.1 **CONCENTRATIONS OF GROSS BETA, IODINE-131, TRITIUM, AND STRONTIUM IN EFFLUENT WATER SAMPLES FOR STATION K1-1 COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	GR-B	I-131	H-3	SR-89	SR-90
12/28/10 - 02/01/11	< 3.8	1.4 ± 0.5	5810 ± 657	< 4.2	< 0.6
02/01/11 - 03/01/11	4.2 ± 1.8	< 0.4	77200 ± 7740		
03/01/11 - 03/29/11	6.7 ± 2.3	< 0.6	982 ± 149		
03/29/11 - 05/03/11	4.0 ± 2.2	< 0.5	3700 ± 426		
05/03/11 - 05/31/11	4.3 ± 1.6	< 0.9	4700 ± 513		
05/31/11 - 06/28/11	7.6 ± 2.6	< 0.9	30300 ± 3070		
06/28/11 - 08/02/11	3.6 ± 2.0	< 0.6	19400 ± 1980	< 3.7	< 0.7
08/02/11 - 08/30/11	8.5 ± 2.6	< 0.8	6540 ± 702		
08/30/11 - 09/27/11	10.7 ± 1.4	< 0.5	60500 ± 6020		
09/27/11 - 11/01/11	5.2 ± 1.3	< 0.7	12100 ± 1260		
11/01/11 - 11/29/11	< 2.7	< 0.6	< 164		
11/29/11 - 01/03/12	3.2 ± 1.4	< 0.7	2930 ± 352		
MEAN	5.8 ± 5.0	-	20378 ± 51438	-	-

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES

TABLE C-III.2 **CONCENTRATIONS OF GAMMA EMITTERS IN EFFLUENT WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
K1-1	12/28/10 - 02/01/11	< 4	< 5	< 10	< 5	< 11	< 4	< 10	< 5	< 6	< 29	< 8
	02/01/11 - 03/01/11	< 4	< 5	< 11	< 4	< 6	< 4	< 7	< 4	< 4	< 30	< 7
	03/01/11 - 03/29/11	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 17	< 5
	03/29/11 - 05/03/11	< 1	< 1	< 2	< 1	< 2	< 1	< 2	< 1	< 1	< 15	< 4
	05/03/11 - 05/31/11	< 2	< 2	< 5	< 2	< 5	< 3	< 4	< 2	< 2	< 26	< 5
	05/31/11 - 06/28/11	< 5	< 7	< 12	< 6	< 12	< 8	< 11	< 6	< 6	< 45	< 14
	06/28/11 - 08/02/11	< 6	< 6	< 13	< 6	< 12	< 5	< 11	< 6	< 6	< 21	< 7
	08/02/11 - 08/30/11	< 6	< 5	< 9	< 5	< 12	< 5	< 10	< 5	< 5	< 24	< 7
	08/30/11 - 09/27/11	< 4	< 4	< 9	< 4	< 6	< 4	< 6	< 4	< 4	< 22	< 6
	09/27/11 - 11/01/11	< 4	< 4	< 9	< 4	< 7	< 4	< 7	< 4	< 4	< 21	< 5
	11/01/11 - 11/29/11	< 7	< 7	< 16	< 5	< 10	< 6	< 11	< 6	< 8	< 37	< 8
	11/29/11 - 01/03/12	< 6	< 8	< 12	< 7	< 15	< 6	< 12	< 7	< 6	< 28	< 12
	MEAN	-	-	-	-	-	-	-	-	-	-	-

TABLE C-IV.1 **CONCENTRATIONS OF STRONTIUM IN PREDATOR AND BOTTOM FEEDER (FISH) SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Sr-90
INDP	PREDATOR	
	06/06/11	< 3
	10/04/11	< 3
	MEAN	-
INDB	BOTTOM FEEDER	
	06/06/11	< 3
	10/04/11	< 4
	MEAN	-
BKGP	PREDATOR	
	06/08/11	< 4
	10/07/11	< 3
	MEAN	-
BKGB	BOTTOM FEEDER	
	06/08/11	< 4
	10/07/11	< 3
	MEAN	-

TABLE C-IV.2 **CONCENTRATIONS OF GAMMA EMITTERS IN PREDATOR AND BOTTOM FEEDER (FISH) SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
BKGB	BOTTOM FEEDER								
	06/08/11	3290 ± 1110	< 74	< 97	< 208	< 77	< 146	< 72	< 79
	10/07/11	2110 ± 794	< 48	< 50	< 82	< 45	< 99	< 49	< 42
	MEAN	2700 ± 1669	-	-	-	-	-	-	-
BKGP	PREDATOR								
	06/08/11	2920 ± 1010	< 78	< 65	< 168	< 90	< 135	< 68	< 77
	10/07/11	3120 ± 785	< 38	< 39	< 83	< 51	< 84	< 42	< 44
	MEAN	3020 ± 283	-	-	-	-	-	-	-
INDB	BOTTOM FEEDER								
	06/06/11	3230 ± 856	< 61	< 67	< 185	< 61	< 96	< 56	< 56
	10/04/11	1310 ± 798	< 74	< 74	< 162	< 63	< 155	< 65	< 59
	MEAN	2270 ± 2715	-	-	-	-	-	-	-
INDP	PREDATOR								
	06/06/11	3730 ± 1150	< 95	< 96	< 226	< 78	< 186	< 97	< 102
	10/04/11	2970 ± 904	< 65	< 65	< 150	< 71	< 128	< 67	< 73
	MEAN	3350 ± 1075	-	-	-	-	-	-	-

TABLE C-V.1 CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/KG DRY ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Mn-54	Co-58	Co-60	Cs-134	Cs-137
A1-3	06/17/11	8580 ± 1580	< 93	< 85	< 95	< 86	< 88
	11/08/11	11000 ± 2050	< 123	< 119	< 122	< 110	< 142
	MEAN	9790 ± 3422	-	-	-	-	-
EDCB	11/08/11	15600 ± 2090	< 109	< 96	< 128	< 102	306 ± 144
	MEAN	-	-	-	-	-	-
J2-1	06/17/11	14400 ± 1860	< 83	< 96	< 74	< 66	< 105
	11/08/11	17600 ± 2530	< 116	< 108	< 117	< 98	< 133
	MEAN	16000 ± 4525	-	-	-	-	-
K1-3	06/17/11	13500 ± 1760	< 81	< 95	< 112	< 83	187 ± 75
	11/08/11	12400 ± 1430	< 31	< 20	< 30	< 21	< 36
	MEAN	12950 ± 1556	-	-	-	-	-

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES

TABLE C-VI.1 CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

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

COLLECTION PERIOD	GROUP I		GROUP II				GROUP III
	E1-2	F1-3	A3-1	G2-1	H3-1	M2-1	Q15-1
12/29/10 - 01/05/11	26 ± 4	39 ± 5	36 ± 5	38 ± 5	35 ± 5	41 ± 5	43 ± 5
01/05/11 - 01/12/11	25 ± 6	29 ± 6	28 ± 6	28 ± 6	29 ± 6	27 ± 6	24 ± 6
01/12/11 - 01/19/11	11 ± 5	14 ± 5	11 ± 5	10 ± 5	18 ± 6	14 ± 5	16 ± 5
01/19/11 - 01/26/11	17 ± 6	25 ± 6	22 ± 6	21 ± 6	(1)	23 ± 6	29 ± 6
01/26/11 - 02/02/11	17 ± 5	21 ± 6	16 ± 5	20 ± 6	14 ± 5	19 ± 5	21 ± 6
02/02/11 - 02/09/11	7 ± 5	17 ± 5	17 ± 5	9 ± 5	13 ± 5	18 ± 5	17 ± 5
02/09/11 - 02/16/11	13 ± 5	18 ± 5	15 ± 5	18 ± 5	17 ± 5	18 ± 5	23 ± 6
02/16/11 - 02/23/11	15 ± 5	16 ± 5	20 ± 5	20 ± 5	21 ± 5	22 ± 5	17 ± 5
02/23/11 - 03/02/11	9 ± 5	15 ± 5	18 ± 5	16 ± 5 (1)	18 ± 5	18 ± 5	20 ± 5
03/02/11 - 03/08/11	< 8	12 ± 6	15 ± 6 (1)	< 8	10 ± 6	11 ± 6	9 ± 6
03/08/11 - 03/16/11	9 ± 4	11 ± 4	17 ± 11	< 6	11 ± 4	10 ± 4	14 ± 5
03/16/11 - 03/23/11	15 ± 6	24 ± 6	22 ± 6	24 ± 6	23 ± 6	25 ± 6	33 ± 7
03/23/11 - 03/30/11	23 ± 6	27 ± 6	23 ± 6	88 ± 9	35 ± 7	26 ± 6	32 ± 7
03/30/11 - 04/06/11	19 ± 6 (1)	28 ± 7	31 ± 7	28 ± 7	31 ± 7	25 ± 6	26 ± 6
04/06/11 - 04/13/11	12 ± 5	20 ± 6	19 ± 6	17 ± 6	17 ± 6	17 ± 6	19 ± 6
04/13/11 - 04/20/11	12 ± 5 (1)	15 ± 5	15 ± 5	17 ± 5	17 ± 5	19 ± 5	15 ± 5
04/20/11 - 04/27/11	11 ± 6 (1)	12 ± 6	11 ± 6	13 ± 6	13 ± 6	13 ± 6	11 ± 6
04/27/11 - 05/04/11	11 ± 6 (1)	11 ± 6	12 ± 6	9 ± 6	< 8	11 ± 6	9 ± 6
05/04/11 - 05/11/11	9 ± 5	14 ± 5	18 ± 5	15 ± 5	16 ± 5	14 ± 5	13 ± 5
05/11/11 - 05/18/11	< 7	9 ± 5	< 7	< 7	7 ± 5	8 ± 5	10 ± 5
05/18/11 - 05/25/11	16 ± 5	12 ± 5	14 ± 5	14 ± 5	9 ± 5	11 ± 5	11 ± 5
05/25/11 - 06/01/11	21 ± 6	24 ± 6	21 ± 6	26 ± 7	22 ± 6	24 ± 6	22 ± 7
06/01/11 - 06/08/11	22 ± 5	20 ± 5	24 ± 5	24 ± 6	21 ± 5	23 ± 5	19 ± 5
06/08/11 - 06/15/11	10 ± 5	17 ± 5	15 ± 5	16 ± 5	17 ± 5	15 ± 5	18 ± 6
06/15/11 - 06/22/11	15 ± 5	13 ± 5	19 ± 5	18 ± 5	16 ± 5	19 ± 5	23 ± 6
06/22/11 - 06/29/11	10 ± 5	15 ± 5	15 ± 5	12 ± 5	16 ± 5	14 ± 5	16 ± 5
06/29/11 - 07/06/11	17 ± 5	22 ± 5	22 ± 5	24 ± 5	19 ± 5	18 ± 5	22 ± 6
07/06/11 - 07/13/11	17 ± 5	26 ± 6	22 ± 14 (1)	23 ± 6	24 ± 6	24 ± 6	19 ± 6
07/13/11 - 07/20/11	15 ± 5	14 ± 5	17 ± 5	16 ± 5	15 ± 5	16 ± 5	17 ± 5
07/20/11 - 07/27/11	20 ± 6	20 ± 6	26 ± 6	26 ± 6	22 ± 6	25 ± 6	16 ± 6
07/27/11 - 08/03/11	16 ± 6	25 ± 6	25 ± 6	21 ± 6	23 ± 6	22 ± 6	22 ± 6
08/03/11 - 08/10/11	16 ± 5	12 ± 5	13 ± 5	16 ± 5	16 ± 5	17 ± 5	14 ± 5
08/10/11 - 08/17/11	17 ± 5	12 ± 5	16 ± 5	16 ± 5	17 ± 5	16 ± 5	16 ± 5
08/17/11 - 08/24/11	21 ± 6	18 ± 6	14 ± 6	19 ± 6	21 ± 6	16 ± 6	24 ± 7
08/24/11 - 08/31/11	16 ± 6	11 ± 6	< 13 (1)	9 ± 5	12 ± 6	12 ± 5	11 ± 6 (1)
08/31/11 - 09/10/11	22 ± 5	20 ± 5	(1)	19 ± 5	20 ± 5	19 ± 5 (1)	17 ± 4 (1)
09/08/11 - 09/14/11	20 ± 7	11 ± 6	(1)	18 ± 7	16 ± 7	(1)	35 ± 11 (1)
09/14/11 - 09/21/11	13 ± 5	16 ± 5	17 ± 5	14 ± 5	11 ± 5	14 ± 5	16 ± 5
09/21/11 - 09/28/11	9 ± 5	11 ± 5	11 ± 5	12 ± 5	15 ± 6	17 ± 6	13 ± 6
09/28/11 - 10/05/11	10 ± 5	11 ± 5	< 7	12 ± 5	11 ± 5	10 ± 5	< 7
10/05/11 - 10/12/11	26 ± 6	22 ± 6	30 ± 6	32 ± 6	26 ± 6	29 ± 6	29 ± 6
10/12/11 - 10/19/11	13 ± 5	14 ± 5	12 ± 5	13 ± 5	14 ± 5	12 ± 5	17 ± 6
10/19/11 - 10/26/11	10 ± 6	11 ± 6	15 ± 6	11 ± 5	11 ± 6	17 ± 6	16 ± 6
10/26/11 - 11/02/11	23 ± 6 (1)	15 ± 6	17 ± 6 (1)	17 ± 6 (1)	18 ± 6	21 ± 6	18 ± 6
11/02/11 - 11/09/11	15 ± 6	16 ± 6	20 ± 6	20 ± 6	16 ± 6	21 ± 6	21 ± 6
11/09/11 - 11/16/11	15 ± 6	18 ± 6	27 ± 7	25 ± 6	26 ± 6	23 ± 6	24 ± 7
11/16/11 - 11/22/11	16 ± 5 (1)	19 ± 7	21 ± 7	17 ± 7	18 ± 7	19 ± 7	19 ± 7
11/22/11 - 11/30/11	8 ± 4	11 ± 5	13 ± 5	10 ± 4	8 ± 4	9 ± 4	11 ± 5
11/30/11 - 12/07/11	14 ± 6 (1)	12 ± 5	15 ± 5	12 ± 5	15 ± 5	14 ± 5	17 ± 5
12/07/11 - 12/14/11	25 ± 8	24 ± 6	19 ± 5	25 ± 6	21 ± 5	20 ± 5	29 ± 6
12/14/11 - 12/21/11	31 ± 6	27 ± 6	24 ± 6	28 ± 6	31 ± 6	28 ± 6	27 ± 6
12/21/11 - 12/28/11	15 ± 5	16 ± 5	24 ± 6	19 ± 5	16 ± 5	15 ± 5	19 ± 6
MEAN	16 ± 11	18 ± 13	19 ± 11	20 ± 24	18 ± 13	18 ± 12	20 ± 14

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-VI.2 MONTHLY AND YEARLY MEAN VALUES OF GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

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

GROUP I - CLOSEST TO THE SITE BOUNDARY				GROUP II - INTERMEDIATE OFFSITE				GROUP III - CONTROL LOCATIONS			
COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD
12/29/10 - 02/02/11	11	39	22 ± 16	12/29/10 - 02/02/11	10	41	24 ± 18	12/29/10 - 02/02/11	16	43	27 ± 21
02/02/11 - 03/02/11	7	18	14 ± 8	02/02/11 - 03/02/11	9	22	17 ± 6	02/02/11 - 03/02/11	17	23	19 ± 6
03/02/11 - 03/30/11	9	27	17 ± 15	03/02/11 - 03/30/11	10	88	24 ± 39	03/02/11 - 03/30/11	9	33	22 ± 24
03/30/11 - 04/27/11	11	28	16 ± 12	03/30/11 - 04/27/11	11	31	19 ± 13	03/30/11 - 04/27/11	11	26	18 ± 13
04/27/11 - 06/01/11	9	24	14 ± 11	04/27/11 - 06/01/11	7	26	15 ± 11	04/27/11 - 06/01/11	9	22	13 ± 10
06/01/11 - 06/29/11	10	22	15 ± 9	06/01/11 - 06/29/11	12	24	18 ± 7	06/01/11 - 06/29/11	16	23	19 ± 6
06/29/11 - 08/03/11	14	26	19 ± 8	06/29/11 - 08/03/11	15	26	22 ± 7	06/29/11 - 08/03/11	16	22	19 ± 6
08/03/11 - 08/31/11	11	21	15 ± 7	08/03/11 - 08/31/11	9	21	15 ± 6	08/03/11 - 08/31/11	11	24	16 ± 11
08/31/11 - 09/28/11	9	22	15 ± 10	08/31/11 - 09/28/11	11	20	16 ± 6	08/31/11 - 09/28/11	13	35	20 ± 21
09/28/11 - 11/02/11	10	26	16 ± 12	09/28/11 - 11/02/11	10	32	17 ± 14	10/05/11 - 11/02/11	16	29	20 ± 12
11/02/11 - 11/30/11	8	19	15 ± 7	11/02/11 - 11/30/11	8	27	18 ± 12	11/02/11 - 11/30/11	11	24	19 ± 11
11/30/11 - 12/28/11	12	31	21 ± 14	11/30/11 - 12/28/11	12	31	20 ± 11	11/30/11 - 12/28/11	17	29	23 ± 12
12/29/10 - 12/28/11	7	39	17 ± 12	12/29/10 - 12/28/11	7	88	19 ± 16	12/29/10 - 12/28/11	9	43	20 ± 14

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES

TABLE C-VI.3 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

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

SITE	COLLECTION PERIOD	Be-7	Mn-54	Co-58	Co-60	Nb-95	Zr-95	Cs-134	Cs-137
A3-1	12/29/10 - 03/30/11	81 ± 32	< 3	< 5	< 3	< 4	< 7	< 3	< 3
	03/30/11 - 06/29/11	66 ± 40	< 4	< 5	< 3	< 6	< 9	< 4	< 3
	06/29/11 - 09/28/11	66 ± 47	< 3	< 5	< 3	< 4	< 9	< 4	< 4
	09/28/11 - 12/28/11	25 ± 8	< 1	< 1	< 1	< 1	< 2	< 1	< 1
	MEAN	60 ± 48	-	-	-	-	-	-	-
E1-2	12/29/10 - 03/30/11	78 ± 36	< 3	< 5	< 3	< 5	< 10	< 3	< 3
	03/30/11 - 06/29/11	71 ± 30	< 3	< 4	< 3	< 4	< 8	< 4	< 2
	06/29/11 - 09/28/11	74 ± 26	< 3	< 3	< 3	< 3	< 5	< 3	< 3
	09/28/11 - 12/28/11	33 ± 9	< 1	< 2	< 1	< 2	< 3	< 1	< 1
	MEAN	64 ± 42	-	-	-	-	-	-	-
F1-3	12/29/10 - 03/30/11	90 ± 40	< 3	< 4	< 4	< 5	< 9	< 3	< 4
	03/30/11 - 06/29/11	92 ± 36	< 3	< 4	< 4	< 5	< 10	< 5	< 4
	06/29/11 - 09/28/11	55 ± 28	< 3	< 3	< 3	< 3	< 8	< 4	< 3
	09/28/11 - 12/28/11	32 ± 7	< 1	< 1	< 1	< 1	< 2	< 1	< 1
	MEAN	67 ± 58	-	-	-	-	-	-	-
G2-1	12/29/10 - 03/30/11	65 ± 38	< 3	< 5	< 3	< 5	< 8	< 4	< 4
	03/30/11 - 06/29/11	60 ± 36	< 4	< 5	< 4	< 6	< 10	< 5	< 4
	06/29/11 - 09/28/11	65 ± 25	< 3	< 4	< 3	< 4	< 7	< 3	< 3
	09/28/11 - 12/28/11	30 ± 8	< 1	< 1	< 1	< 1	< 2	< 1	< 1
	MEAN	55 ± 33	-	-	-	-	-	-	-
H3-1	12/29/10 - 03/30/11	64 ± 42	< 3	< 5	< 3	< 6	< 8	< 3	< 3
	03/30/11 - 06/29/11	44 ± 26	< 2	< 3	< 2	< 3	< 4	< 2	< 2
	06/29/11 - 09/28/11	52 ± 23	< 2	< 4	< 3	< 4	< 7	< 3	< 3
	09/28/11 - 12/28/11	33 ± 11	< 1	< 1	< 1	< 1	< 2	< 1	< 2
	MEAN	49 ± 26	-	-	-	-	-	-	-
M2-1	12/29/10 - 03/30/11	65 ± 30	< 2	< 4	< 2	< 4	< 5	< 3	< 3
	03/30/11 - 06/29/11	82 ± 33	< 3	< 4	< 3	< 5	< 7	< 4	< 3
	06/29/11 - 09/28/11	56 ± 32	< 3	< 4	< 4	< 5	< 7	< 4	< 3
	09/28/11 - 12/28/11	42 ± 13	< 2	< 1	< 1	< 1	< 3	< 1	< 1
	MEAN	61 ± 33	-	-	-	-	-	-	-
Q15-1	**03/08/11 - 03/16/11**	**< 249**	**< 28**	**< 28**	**< 23**	**< 23**	**< 49**	**< 32**	**< 28**
	03/16/11 - 03/23/11	**< 317**	**< 35**	**< 32**	**< 37**	**< 39**	**< 67**	**< 36**	**< 36**
	03/23/11 - 03/30/11	**< 268**	**< 41**	**< 33**	**< 40**	**< 28**	**< 57**	**< 32**	**< 33**
	03/30/11 - 04/06/11	**< 280**	**< 41**	**< 38**	**< 46**	**< 31**	**< 53**	**< 40**	**< 47**
	04/06/11 - 04/13/11	**< 250**	**< 35**	**< 25**	**< 41**	**< 30**	**< 51**	**< 28**	**< 32**
	12/29/10 - 03/30/11	84 ± 35	< 4	< 5	< 4	< 6	< 10	< 3	< 3
	03/30/11 - 06/29/11	62 ± 23	< 3	< 3	< 3	< 4	< 5	< 3	< 3
	06/29/11 - 09/28/11	60 ± 23	< 3	< 3	< 3	< 4	< 6	< 3	< 3
	09/28/11 - 12/28/11	38 ± 11	< 1	< 2	< 2	< 2	< 3	< 1	< 1
	MEAN	61 ± 38	-	-	-	-	-	-	-

* THE MEAN AND 2 STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

BOLDED VALUES INDICATE ADDITIONAL SAMPLING DUE TO THE FUKUSHIMA EVENT

TABLE C-VII.1 CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

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

COLLECTION	GROUP I		GROUP II				GROUP III
PERIOD	E1-2	F1-3	A3-1	G2-1	H3-1	M2-1	Q15-1
12/29/10 - 01/05/11	< 53	< 54	< 67	< 55	< 54	< 66	< 67
01/05/11 - 01/12/11	< 39	< 40	< 55	< 22	< 40	< 52	< 56
01/12/11 - 01/19/11	< 30	< 31	< 30	< 31	< 31	< 29	< 30
01/19/11 - 01/26/11	< 29	< 30	< 34	< 30	(1)	< 16	< 34
01/26/11 - 02/02/11	< 22	< 23	< 32	< 23	< 23	< 32	< 33
02/02/11 - 02/09/11	< 40	< 41	< 38	< 41	< 38	< 38	< 29
02/09/11 - 02/16/11	< 47	< 48	< 65	< 48	< 48	< 63	< 65
02/16/11 - 02/23/11	< 34	< 35	< 18	< 35	< 41	< 40	< 41
02/23/11 - 03/02/11	< 53	< 54	< 64	< 55 (1)	< 55	< 63	< 65
03/02/11 - 03/08/11	< 65	< 28	< 61 (1)	< 67	< 66	< 60	< 61
03/08/11 - 03/16/11	< 26	< 27	< 32	< 27	< 27	< 12	< 13
03/16/11 - 03/23/11	< 26	55 ± 36	< 52	44 ± 33	45 ± 30	69 ± 41	57 ± 27
03/23/11 - 03/30/11	60 ± 30	42 ± 26	51 ± 29	< 56	64 ± 18	37 ± 26	87 ± 41
03/30/11 - 04/06/11	< 47 (1)	74 ± 30	60 ± 24	48 ± 24	65 ± 35	67 ± 28	71 ± 44
04/06/11 - 04/13/11	38 ± 21	< 37	39 ± 20	< 48	< 31	< 31	< 42
04/13/11 - 04/20/11	< 51 (1)	< 52	< 54	< 53	< 23	< 53	< 55
04/20/11 - 04/27/11	< 58 (1)	< 55	< 68	< 55	< 69	< 36	< 68
04/27/11 - 05/04/11	< 69 (1)	< 63	< 58	< 64	< 63	< 58	< 60
05/04/11 - 05/11/11	< 52	< 52	< 39	< 53	< 39	< 38	< 39
05/11/11 - 05/18/11	< 42	< 43	< 57	< 43	< 42	< 56	< 57
05/18/11 - 05/25/11	< 21	< 21	< 22	< 21	< 20	< 22	< 23
05/25/11 - 06/01/11	< 53	< 55	< 59	< 55	< 60	< 57	< 62
06/01/11 - 06/08/11	< 63	< 65	< 64	< 65	< 64	< 63	< 65
06/08/11 - 06/15/11	< 42	< 57	< 56	< 43	< 43	< 55	< 57
06/15/11 - 06/22/11	< 50	< 52	< 69	< 52	< 52	< 67	< 69
06/22/11 - 06/29/11	< 28	< 59	< 67	< 60	< 59	< 66	< 67
06/29/11 - 07/06/11	< 46	< 47	< 65	< 45	< 46	< 62	< 66
07/06/11 - 07/13/11	< 58	< 59	< 112 (1)	< 34	< 59	< 56	< 41
07/13/11 - 07/20/11	< 54	< 55	< 50	< 53	< 55	< 48	< 51
07/20/11 - 07/27/11	< 28	< 29	< 36	< 28	< 16	< 35	< 36
07/27/11 - 08/03/11	< 29	< 29	< 30	< 28	< 29	< 29	< 31
08/03/11 - 08/10/11	< 41	< 42	< 60	< 40	< 60	< 25	< 60
08/10/11 - 08/17/11	< 27	< 28	< 23	< 27	< 28	< 22	< 23
08/17/11 - 08/24/11	< 50	< 51	< 51	< 48	< 51	< 49	< 28
08/24/11 - 08/31/11	< 43	< 44	< 64 (1)	< 42	< 44	< 38	< 43 (1)
08/31/11 - 09/10/11	< 38	< 16	(1)	< 37	< 38	< 45 (1)	< 26 (1)
09/08/11 - 09/14/11	< 40	< 41	(1)	< 39	< 41	(1)	< 62 (1)
09/14/11 - 09/21/11	< 19	< 36	< 49	< 35	< 36	< 45	< 47
09/21/11 - 09/28/11	< 47	< 48	< 51	< 46	< 48	< 49	< 51
09/28/11 - 10/05/11	< 57	< 58	< 63	< 30	< 57	< 61	< 63
10/05/11 - 10/12/11	< 50	< 51	< 61	< 49	< 51	< 58	< 61
10/12/11 - 10/19/11	< 68	< 70	< 66	< 66	< 29	< 64	< 66
10/19/11 - 10/26/11	< 25	< 25	< 35	< 24	< 25	< 34	< 36
10/26/11 - 11/02/11	< 68 (1)	< 66	< 57 (1)	< 66 (1)	< 56	< 23	< 56
11/02/11 - 11/09/11	< 53	< 54	< 52	< 52	< 54	< 49	< 52
11/09/11 - 11/16/11	< 65	< 66	< 55	< 63	< 55	< 53	< 31
11/16/11 - 11/22/11	< 69 (1)	< 42	< 67	< 41	< 43	< 64	< 67
11/22/11 - 11/30/11	< 49	< 50	< 45	< 47	< 43	< 43	< 44
11/30/11 - 12/07/11	< 52 (1)	< 39	< 51	< 37	< 40	< 49	< 52
12/07/11 - 12/14/11	< 69	< 27	< 57	< 47	< 49	< 55	< 57
12/14/11 - 12/21/11	< 33	< 33	< 41	< 32	< 33	< 39	< 41
12/21/11 - 12/28/11	< 22	< 53	< 49	< 51	< 53	< 47	< 49
MEAN	49 ± 30	57 ± 32	50 ± 21	46 ± 6	58 ± 23	58 ± 36	71 ± 30

* THE MEAN AND 2 STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-VIII.1 CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

	CONTROL FARM	INDICATOR FARM			
COLLECTION PERIOD	K15-3	E2-2	F4-1	G2-1	P4-1
01/05/11	< 0.6	< 0.6	< 0.5	< 0.6	< 0.5
02/02/11	< 0.3	< 0.5	< 0.3	< 0.4	< 0.4
03/02/11	< 0.6	< 0.6	< 0.4	< 0.7	< 0.4
03/16/11	< 0.5	< 0.5	< 0.6	< 0.5	< 0.7
03/23/11	**< 0.7**				
03/30/11	< 0.6	< 0.6	< 0.5	< 0.8	< 0.7
04/06/11	**< 0.4**				
04/13/11	< 0.4	< 0.5	< 0.3	< 0.4	< 0.3
04/20/11	**< 0.4**				
04/27/11	< 0.5	< 0.4	< 0.4	< 0.5	< 0.5
05/11/11	< 0.6	< 0.7	< 0.4	< 0.6	< 0.4
05/25/11	< 0.3	< 0.3	< 0.2	< 0.3	< 0.6
06/08/11	< 0.6	< 0.9	< 0.6	< 0.8	< 0.7
06/22/11	< 0.8	< 0.7	< 0.7	< 0.7	< 0.7
07/06/11	< 0.9	< 0.9	< 1.0	< 0.9	< 0.8
07/20/11	< 0.6	< 0.7	< 0.8	< 0.7	< 0.6
08/03/11	< 0.5	< 0.5	< 0.4	< 0.5	< 0.5
08/17/11	< 0.5	< 0.6	< 0.4	< 0.5	< 0.6
08/31/11	< 0.6	< 0.7	< 0.6	< 0.7	< 0.8
09/14/11	< 0.6	< 0.6	< 0.5	< 0.7	< 0.8
09/28/11	< 0.6	< 0.6	< 0.5	< 0.6	< 0.5
10/12/11	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
10/26/11	< 0.6	< 0.8	< 0.9	< 0.7	< 0.7
11/09/11	< 0.8	< 0.8	< 0.7	< 0.9	< 0.7
11/22/11	< 0.6	< 0.7	< 0.6	< 0.7	< 0.7
12/07/11	< 0.8	< 0.8	< 0.5	< 0.7	< 0.7
MEAN	-	-	-	-	-

BOLDED VALUES INDICATE ADDITIONAL SAMPLING DUE TO THE FUKUSHIMA EVENT

TABLE C-VIII.2 CONCENTRATIONS OF STRONTIUM IN MILK SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION	CONTROL FARM		INDICATOR FARM							
	K15-3		P4-1		E2-2		F4-1		G2-1	
PERIOD	SR-89	SR-90	SR-89	SR-90	SR-89	SR-90	SR-89	SR-90	SR-89	SR-90
01/05/11 - 03/30/11	< 1.7	< 0.9	< 1.5	< 0.6	< 1.7	< 0.7	< 1.7	< 0.7	< 2.1	< 1.0
03/30/11 - 06/22/11	< 4.5	0.6 ± 0.4	< 4.4	0.7 ± 0.4	< 4.9	0.7 ± 0.5	< 4.9	< 0.8	< 4.8	< 0.6
07/06/11 - 09/28/11	< 1.7	< 0.4	< 1.8	< 0.5	< 1.7	0.7 ± 0.4	< 1.7	< 0.4	< 1.9	< 0.5
09/28/11 - 12/07/11	< 3.1	< 0.6	< 2.9	< 0.6	< 2.9	< 0.6	< 3.6	< 0.7	< 3.3	< 0.9
MEAN	-	-	-	-	-	-	-	-	-	-

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES

TABLE C-VIII.3 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
E2-2	01/05/11	1250 ± 143	< 6	< 5	< 27	< 11
	02/02/11	1340 ± 112	< 5	< 5	< 31	< 8
	03/02/11	1320 ± 108	< 4	< 5	< 38	< 11
	03/16/11	1140 ± 102	< 4	< 4	< 38	< 13
	03/30/11	1290 ± 175	< 6	< 7	< 25	< 6
	04/13/11	1380 ± 158	< 6	< 7	< 47	< 14
	04/27/11	1270 ± 121	< 4	< 5	< 47	< 15
	05/11/11	1190 ± 150	< 5	< 7	< 28	< 9
	05/25/11	1230 ± 123	< 5	< 6	< 44	< 13
	06/08/11	1450 ± 162	< 4	< 7	< 49	< 11
	06/22/11	1300 ± 150	< 5	< 6	< 48	< 14
	07/06/11	1360 ± 149	< 6	< 6	< 32	< 8
	07/20/11	1530 ± 159	< 6	< 6	< 39	< 9
	08/03/11	1260 ± 118	< 4	< 5	< 20	< 7
	08/17/11	1410 ± 121	< 5	< 6	< 27	< 7
	08/31/11	1260 ± 141	< 5	< 5	< 21	< 8
	09/14/11	1340 ± 52	< 2	< 2	< 13	< 4
	09/28/11	1160 ± 161	< 11	< 10	< 48	< 11
	10/12/11	1150 ± 148	< 5	< 6	< 45	< 12
	10/26/11	1310 ± 138	< 6	< 6	< 26	< 8
	11/09/11	943 ± 173	< 7	< 8	< 31	< 11
	11/22/11	1250 ± 174	< 6	< 7	< 37	< 8
	12/07/11	1200 ± 162	< 7	< 8	< 32	< 7
	MEAN	1275 ± 241	-	-	-	-
F4-1	01/05/11	1430 ± 153	< 4	< 6	< 35	< 10
	02/02/11	1460 ± 114	< 5	< 5	< 36	< 12
	03/02/11	1530 ± 126	< 5	< 6	< 42	< 12
	03/16/11	1280 ± 143	< 5	< 6	< 53	< 12
	03/30/11	1210 ± 150	< 6	< 7	< 22	< 9
	04/13/11	1470 ± 158	< 6	< 7	< 46	< 15
	04/27/11	1240 ± 106	< 4	< 4	< 44	< 13
	05/11/11	1310 ± 127	< 6	< 6	< 27	< 9
	05/25/11	1280 ± 117	< 5	< 6	< 49	< 15
	06/08/11	1430 ± 150	< 5	< 6	< 41	< 13
	06/22/11	1330 ± 122	< 4	< 5	< 31	< 10
	07/06/11	1390 ± 167	< 7	< 7	< 29	< 9
	07/20/11	1360 ± 143	< 7	< 6	< 39	< 11
	08/03/11	1460 ± 160	< 7	< 7	< 29	< 9
	08/17/11	1410 ± 134	< 5	< 6	< 25	< 10
	08/31/11	1370 ± 126	< 5	< 5	< 23	< 8
	09/14/11	1400 ± 50	< 2	< 2	< 15	< 4
	09/28/11	1170 ± 114	< 5	< 5	< 27	< 9
	10/12/11	1380 ± 118	< 5	< 5	< 32	< 10
	10/26/11	1250 ± 168	< 7	< 7	< 37	< 11
	11/09/11	1310 ± 184	< 8	< 9	< 30	< 9
	11/22/11	1260 ± 207	< 7	< 8	< 49	< 15
	12/07/11	1380 ± 180	< 7	< 7	< 38	< 9
	MEAN	1353 ± 185	-	-	-	-

TABLE C-VIII.3 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
G2-1	01/05/11	1110 ± 129	< 5	< 5	< 33	< 9
	02/02/11	1320 ± 116	< 4	< 5	< 31	< 9
	03/02/11	919 ± 117	< 4	< 6	< 41	< 14
	03/16/11	1380 ± 136	< 5	< 6	< 52	< 13
	03/30/11	781 ± 161	< 7	< 10	< 36	< 13
	04/13/11	1020 ± 137	< 7	< 6	< 49	< 13
	04/27/11	1090 ± 128	< 5	< 6	< 59	< 15
	05/11/11	1030 ± 132	< 7	< 7	< 38	< 11
	05/25/11	1080 ± 114	< 6	< 6	< 59	< 14
	06/08/11	781 ± 109	< 5	< 6	< 42	< 12
	06/22/11	1300 ± 141	< 3	< 3	< 21	< 6
	07/06/11	841 ± 153	< 7	< 9	< 31	< 10
	07/20/11	793 ± 151	< 7	< 6	< 50	< 12
	08/03/11	1190 ± 132	< 5	< 6	< 30	< 9
	08/17/11	822 ± 124	< 6	< 6	< 30	< 10
	08/31/11	966 ± 105	< 5	< 5	< 26	< 7
	09/14/11	1200 ± 43	< 2	< 2	< 12	< 3
	09/28/11	1350 ± 124	< 5	< 6	< 28	< 7
	10/12/11	978 ± 187	< 8	< 8	< 47	< 14
	10/26/11	1190 ± 184	< 6	< 7	< 33	< 9
	11/09/11	1380 ± 169	< 6	< 7	< 37	< 8
	11/22/11	910 ± 136	< 6	< 7	< 35	< 10
	12/07/11	745 ± 156	< 6	< 8	< 31	< 12
	MEAN	1051 ± 418	-	-	-	-
P4-1	01/05/11	1380 ± 149	< 6	< 6	< 36	< 9
	02/02/11	1420 ± 92	< 3	< 4	< 23	< 6
	03/02/11	1460 ± 124	< 4	< 5	< 33	< 10
	03/16/11	1330 ± 142	< 6	< 7	< 56	< 11
	03/30/11	1670 ± 198	< 8	< 8	< 21	< 5
	04/13/11	1410 ± 150	< 6	< 6	< 48	< 15
	04/27/11	1390 ± 122	< 4	< 5	< 41	< 13
	05/11/11	1280 ± 153	< 6	< 7	< 30	< 11
	05/25/11	1460 ± 161	< 6	< 6	< 42	< 12
	06/08/11	1300 ± 130	< 5	< 5	< 37	< 12
	06/22/11	1230 ± 115	< 4	< 5	< 32	< 12
	07/06/11	1520 ± 221	< 8	< 7	< 45	< 7
	07/20/11	1340 ± 164	< 6	< 7	< 42	< 12
	08/03/11	1380 ± 169	< 7	< 6	< 36	< 11
	08/17/11	1110 ± 147	< 5	< 6	< 30	< 8
	08/31/11	1210 ± 121	< 3	< 5	< 21	< 6
	09/14/11	1340 ± 55	< 2	< 2	< 13	< 4
	09/28/11	1180 ± 159	< 7	< 8	< 37	< 12
	10/12/11	1260 ± 152	< 5	< 7	< 42	< 8
	10/26/11	1380 ± 150	< 7	< 8	< 29	< 8
	11/09/11	1320 ± 180	< 6	< 8	< 31	< 7
	11/22/11	1400 ± 144	< 6	< 6	< 26	< 7
	12/07/11	1480 ± 226	< 7	< 8	< 34	< 12
	MEAN	1359 ± 243	-	-	-	-

TABLE C-VIII.3 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
K15-3	01/05/11	1100 ± 115	< 4	< 5	< 27	< 7
	02/02/11	1260 ± 102	< 4	< 4	< 26	< 8
	03/02/11	1280 ± 112	< 5	< 6	< 45	< 14
	03/16/11	1320 ± 136	< 5	< 6	< 52	< 13
	03/23/11	**1330 ± 126**	**< 6**	**< 6**	**< 25**	**< 7**
	03/30/11	1290 ± 180	< 7	< 9	< 29	< 8
	04/06/11	**1240 ± 114**	**< 4**	**< 6**	**< 44**	**< 15**
	04/13/11	1190 ± 132	< 6	< 7	< 42	< 15
	04/20/11	**1240 ± 149**	**< 5**	**< 5**	**< 53**	**< 11**
	04/27/11	1110 ± 95	< 3	< 4	< 42	< 13
	05/11/11	1140 ± 123	< 5	< 5	< 23	< 7
	05/25/11	1380 ± 96	< 3	< 4	< 38	< 13
	06/08/11	1220 ± 137	< 6	< 6	< 45	< 14
	06/22/11	1360 ± 158	< 6	< 8	< 50	< 15
	07/06/11	1240 ± 145	< 6	< 8	< 24	< 10
	07/20/11	1230 ± 162	< 6	< 7	< 36	< 6
	08/03/11	1270 ± 113	< 5	< 5	< 22	< 7
	08/17/11	1200 ± 114	< 2	< 3	< 15	< 3
	08/31/11	1230 ± 142	< 6	< 6	< 28	< 8
	09/14/11	1160 ± 41	< 2	< 2	< 13	< 3
	09/28/11	1280 ± 161	< 5	< 6	< 28	< 8
	10/12/11	1120 ± 153	< 7	< 7	< 50	< 12
	10/26/11	1190 ± 162	< 6	< 8	< 33	< 13
	11/09/11	1290 ± 194	< 6	< 8	< 34	< 8
	11/22/11	1110 ± 141	< 6	< 6	< 32	< 8
	12/07/11	1350 ± 173	< 6	< 7	< 35	< 11
	MEAN	1236 ± 161	-	-	-	-

BOLDED VALUES INDICATE ADDITIONAL SAMPLING DUE TO THE FUKUSHIMA EVENT

TABLE C-IX.1 **CONCENTRATIONS OF STRONTIUM AND GAMMA EMITTERS IN FOOD PRODUCT SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD		SR-90	Be-7	K-40	I-131	Cs-134	Cs-137
B10-2	06/29/11	(Green) Cabbage	< 4	152 ± 54	4340 ± 170	< 41	< 6	< 7
	06/29/11	Cauliflower Leaves	5 ± 3	< 98	3600 ± 196	< 51	< 9	< 9
	06/29/11	Red Cabbage	< 4	< 74	4520 ± 197	< 44	< 6	< 7
	07/27/11	(Green) Cabbage	3 ± 2	< 156	2790 ± 365	< 30	< 17	< 16
	07/27/11	Pak Choi	3 ± 2	< 332	5800 ± 721	< 52	< 24	< 31
	07/27/11	Red Cabbage	< 2	< 253	4150 ± 594	< 46	< 25	< 28
	08/01/11	Cabbage	< 3	< 181	2110 ± 321	< 39	< 17	< 19
	08/01/11	Tomatoes	-	< 230	3470 ± 450	< 51	< 26	< 25
	08/15/11	Red Beets	-	< 53	3680 ± 144	< 13	< 6	< 6
	08/15/11	Sweet Corn	-	< 42	2530 ± 128	< 12	< 5	< 6
	08/26/11	(Green) Cabbage	< 3	< 175	1900 ± 302	< 23	< 17	< 20
	08/26/11	Pumpkin Leaves	< 4	1080 ± 192	3660 ± 445	< 26	< 16	< 21
	08/26/11	Squash Leaves	10 ± 2	1720 ± 237	4840 ± 451	< 24	< 16	< 15
	09/21/11	(Green) Cabbage	< 3	< 151	2410 ± 299	< 33	< 15	< 17
	09/21/11	Cauliflower Leaves	< 3	337 ± 168	4300 ± 361	< 33	< 16	< 16
	09/21/11	Chinese Cabbage	< 3	443 ± 157	3970 ± 389	< 34	< 17	< 19
	MEAN		5 ± 6	746 ± 1293	3629 ± 2132	-	-	-
E1-2	08/01/11	Cabbage	< 3	336 ± 171	5530 ± 559	< 50	< 23	< 26
	08/01/11	Tomatoes	-	< 267	2880 ± 464	< 51	< 24	< 25
	08/01/11	Grain or root vegetable	(1) -	-	-	-	-	-
	MEAN		-	-	4205 ± 3748	-	-	-
H1-2	06/29/11	Eggplant Leaves	8 ± 3	242 ± 171	6510 ± 558	< 58	< 18	< 19
	06/29/11	Summer Squash Leaves	< 4	502 ± 176	3800 ± 338	< 56	< 15	< 13
	06/29/11	Zucchini Leaves	17 ± 4	322 ± 94	5560 ± 211	< 44	< 7	< 7
	07/27/11	Eggplant Leaves	< 3	326 ± 164	8260 ± 707	< 41	< 22	< 27
	07/27/11	Squash Leaves	< 3	627 ± 177	3770 ± 422	< 32	< 18	< 19
	07/27/11	Zucchini Leaves	< 3	379 ± 183	5110 ± 501	< 35	< 17	< 21
	08/26/11	Eggplant Leaves	11 ± 2	2680 ± 298	4700 ± 550	< 29	< 18	< 21
	08/26/11	Field Corn	(1) -	< 41	1930 ± 98	< 17	< 4	< 5
	08/26/11	Neck Pumpkin Leaves	11 ± 3	1320 ± 228	4210 ± 387	< 27	< 18	< 19
	08/26/11	Zucchini Leaves	4 ± 2	520 ± 192	3550 ± 373	< 34	< 20	< 22
	09/21/11	Eggplant Leaves	6 ± 2	3650 ± 450	5100 ± 646	< 54	< 27	< 27
	09/21/11	Squash Leaves	< 3	2950 ± 215	4330 ± 315	< 24	< 12	< 13
	09/21/11	Zucchini Leaves	3 ± 2	761 ± 311	3710 ± 551	< 54	< 29	< 32
	10/19/11	Turnips	(1) -	< 45	2830 ± 119	< 25	< 4	< 5
	MEAN		9 ± 9	1190 ± 2402	4526 ± 3144	-	-	-

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES

(1) SEE PROGRAM EXCEPTIONS SECTION FOR FURTHER EXPLANATION

TABLE C-X.1 QUARTERLY TLD RESULTS FOR THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF MILLI-ROENTGEN/STD. MONTH

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
A1-4	4.1 ± 1.5	4.2 ± 0.4	3.1 ± 0.3	4.9 ± 0.8	4.2 ± 0.2
A3-1	4.2 ± 0.6	4.0 ± 0.4	4.1 ± 1.4	4.6 ± 0.5	4.0 ± 0.2
A5-1	5.2 ± 0.9	4.9 ± 0.4	5.2 ± 3.7	5.9 ± 0.6	4.9 ± 0.7
A9-3	4.2 ± 1.0	4.3 ± 0.3	3.5 ± 0.3	4.6 ± 0.7	4.4 ± 0.3
B1-1	4.1 ± 1.4	4.4 ± 0.4	3.2 ± 0.3	4.8 ± 0.8	4.1 ± 0.2
B1-2	4.2 ± 1.3	4.2 ± 0.2	3.3 ± 0.5	4.9 ± 0.6	4.3 ± 0.6
B2-1	4.3 ± 1.3	4.4 ± 0.4	3.5 ± 0.4	5.1 ± 1.0	4.1 ± 0.8
B5-1	4.7 ± 1.1	4.8 ± 0.3	3.9 ± 0.5	5.2 ± 0.7	4.8 ± 0.4
C1-1	4.8 ± 1.2	4.7 ± 0.5	3.9 ± 0.3	5.2 ± 0.4	5.2 ± 0.9 (1)
C1-2	4.1 ± 1.6	4.7 ± 1.2	3.0 ± 0.4	4.7 ± 0.6	4.1 ± 0.9
C2-1	4.5 ± 1.0	4.7 ± 0.6	3.8 ± 0.4	5.0 ± 0.5	4.6 ± 0.5
C5-1	5.0 ± 1.6	5.1 ± 0.4	4.0 ± 0.5	5.9 ± 0.9	4.9 ± 0.3
C8-1	5.3 ± 1.1	5.6 ± 0.5 (1)	4.7 ± 1.1	5.9 ± 0.8	4.9 ± 0.8
D1-1	4.3 ± 1.5	4.9 ± 0.7	3.2 ± 0.3	4.6 ± 0.3	4.5 ± 0.4
D1-2	4.2 ± 0.9	4.1 ± 0.1	3.6 ± 0.3	4.7 ± 0.8	4.4 ± 0.6
D2-2	5.5 ± 1.2	5.1 ± 0.3	5.2 ± 1.3	6.4 ± 0.6	5.4 ± 1.0
D6-1	5.3 ± 0.9	5.1 ± 0.4	4.8 ± 0.4	5.8 ± 0.4	5.6 ± 0.6
E1-2	4.3 ± 1.7	4.2 ± 0.5	3.2 ± 0.3	5.3 ± 1.0	4.4 ± 0.7
E1-4	4.7 ± 2.8	4.3 ± 0.6	3.2 ± 0.3	4.8 ± 0.9	6.6 ± 1.0
E2-3	5.1 ± 1.4	4.8 ± 0.3	4.3 ± 0.5	5.9 ± 0.6	5.2 ± 0.5
E5-1	4.9 ± 1.4	4.8 ± 0.4	4.2 ± 0.5	5.9 ± 0.6	4.8 ± 0.4 (1)
E7-1	5.0 ± 0.9	4.5 ± 0.2	(1)	5.4 ± 0.4	5.0 ± 1.2
F1-1	4.4 ± 1.2	4.3 ± 0.3	3.7 ± 0.2	5.2 ± 0.4	4.5 ± 0.4
F1-2	5.7 ± 4.3	4.5 ± 0.3	3.8 ± 0.6	5.9 ± 0.7	8.7 ± 0.8
F1-4	5.3 ± 3.8	4.4 ± 0.4	3.5 ± 0.4	5.2 ± 0.3	7.9 ± 1.0
F2-1	5.2 ± 1.5	5.0 ± 0.8	4.2 ± 0.1	5.8 ± 0.9	5.8 ± 0.6
F5-1	5.5 ± 1.8	5.3 ± 0.2	4.4 ± 0.2	6.4 ± 0.6	6.0 ± 0.4
G1-2	4.8 ± 1.1	4.4 ± 0.3	4.2 ± 0.3	5.4 ± 0.5	5.0 ± 0.5
G1-3	4.8 ± 3.1	4.3 ± 0.3	3.2 ± 0.4	4.8 ± 0.3	6.9 ± 0.8
G1-5	4.4 ± 1.9	4.2 ± 0.5	3.2 ± 0.4	4.7 ± 0.6	5.4 ± 0.6
G1-6	4.7 ± 2.0	4.1 ± 0.3	3.7 ± 0.8	5.0 ± 0.2	6.0 ± 0.5
G2-4	5.8 ± 1.6	5.5 ± 0.4	4.8 ± 0.4	6.4 ± 0.4	6.5 ± 0.3
G5-1	4.8 ± 1.4	4.6 ± 0.2	3.9 ± 0.7	4.9 ± 0.3	5.6 ± 0.6
H1-1	4.5 ± 1.3	4.5 ± 0.4	3.6 ± 0.2	5.2 ± 1.0	4.7 ± 0.6
H3-1	3.8 ± 1.1	3.9 ± 0.4	3.1 ± 0.5	4.5 ± 0.7	3.8 ± 0.3
H5-1	3.7 ± 1.3	3.7 ± 0.4	2.8 ± 0.3	4.3 ± 0.7	4.0 ± 0.9
H8-1	7.3 ± 1.8	6.7 ± 0.5	6.6 ± 0.8	8.6 ± 0.6	7.3 ± 0.4
J1-1	4.1 ± 1.4	4.0 ± 0.2	3.3 ± 0.5	5.0 ± 0.6	4.0 ± 0.6
J1-3	3.7 ± 1.5	4.0 ± 0.9	2.7 ± 0.2	4.4 ± 0.4	3.6 ± 0.8
J3-1	4.3 ± 1.4	4.2 ± 0.9	3.5 ± 0.2	5.2 ± 0.5	4.2 ± 0.3
J5-1	5.0 ± 1.1	4.7 ± 0.7	4.4 ± 0.5	5.7 ± 0.5	5.2 ± 0.2
J7-1	5.4 ± 1.3	5.0 ± 0.6	4.9 ± 0.5	6.3 ± 0.7	5.4 ± 0.8
K1-4	4.1 ± 1.5	4.1 ± 0.6	3.1 ± 0.4	4.9 ± 0.6	4.3 ± 0.4
K2-1	4.9 ± 1.7	4.2 ± 0.3 (1)	4.1 ± 0.5	5.8 ± 0.5	5.4 ± 1.0
K3-1	3.9 ± 1.0	3.7 ± 0.3	3.3 ± 0.3	4.4 ± 0.3	4.2 ± 0.3
K5-1	5.1 ± 1.3	4.8 ± 0.3	4.5 ± 0.5	6.0 ± 0.3	5.2 ± 0.3

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-X.1 QUARTERLY TLD RESULTS FOR THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF MILLI-ROENTGEN/STD. MONTH

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
K8-1	4.9 ± 1.5	4.6 ± 0.5	4.2 ± 0.3	5.9 ± 0.4	4.9 ± 1.1
L1-1	4.2 ± 1.5	4.3 ± 0.6	3.2 ± 0.5	5.0 ± 0.7	4.4 ± 0.3
L1-2	3.5 ± 1.4	3.1 ± 0.2 (1)	3.1 ± 0.2	(1)	4.3 ± 0.5
L2-1	4.8 ± 1.3	4.8 ± 0.5	3.9 ± 0.5	5.5 ± 0.4	4.8 ± 0.6
L5-1	4.2 ± 1.0	4.1 ± 0.2	3.5 ± 0.4	4.7 ± 0.6	4.4 ± 0.4
L8-1	4.7 ± 1.1	4.4 ± 0.2	4.1 ± 0.8	5.4 ± 0.6	4.7 ± 0.3
M1-1	4.1 ± 1.2	4.2 ± 0.2	3.3 ± 1.0	4.7 ± 0.5	4.1 ± 0.3
M1-2	4.2 ± 1.5	3.6 ± 0.2 (1)	3.5 ± 0.6	4.9 ± 0.5	4.7 ± 0.4
M2-1	3.9 ± 1.0	3.8 ± 0.3	3.2 ± 0.4	4.4 ± 0.4	4.1 ± 0.5
M5-1	4.6 ± 1.0	4.6 ± 0.5	3.9 ± 0.3	5.1 ± 0.5	4.6 ± 0.5
M9-1	5.7 ± 1.4	5.6 ± 0.3	4.9 ± 0.4	6.6 ± 0.8	5.5 ± 0.5
N1-1	4.2 ± 1.5	3.5 ± 0.3 (1)	3.7 ± 0.5	5.1 ± 0.5	4.4 ± 0.6
N1-3	4.2 ± 1.4	4.1 ± 0.2	3.2 ± 0.4	4.7 ± 0.3	4.6 ± 0.5
N2-1	4.7 ± 1.3	4.6 ± 0.6	3.9 ± 0.6	5.5 ± 0.4	4.7 ± 0.5
N5-1	4.0 ± 1.3	4.1 ± 0.3	3.3 ± 0.2	4.8 ± 1.2	3.8 ± 0.4
N8-1	5.1 ± 1.2	4.9 ± 0.6	4.3 ± 0.7	5.8 ± 0.5	5.2 ± 0.4
P1-1	4.1 ± 1.2	3.6 ± 0.3 (1)	3.6 ± 0.6	4.8 ± 0.8	4.4 ± 0.5
P1-2	4.3 ± 1.8	3.9 ± 0.3	3.2 ± 0.7	5.0 ± 0.6	5.0 ± 0.5
P2-1	5.4 ± 1.2	5.1 ± 0.4	4.7 ± 0.6	6.1 ± 0.7	5.5 ± 0.7
P5-1	4.7 ± 1.1	4.4 ± 0.3	4.3 ± 0.7	5.5 ± 0.5	4.4 ± 0.5
P8-1	4.0 ± 1.0	3.9 ± 0.6	3.3 ± 0.3	4.5 ± 0.7	4.2 ± 0.3
Q1-1	4.3 ± 1.7	3.5 ± 0.2 (1)	3.6 ± 0.6	5.2 ± 0.6	4.7 ± 0.3
Q1-2	3.6 ± 1.3	3.5 ± 0.4	2.7 ± 0.3	4.3 ± 1.0	3.7 ± 0.3
Q2-1	4.0 ± 1.1	3.6 ± 0.3	3.5 ± 0.6	4.6 ± 0.4	4.3 ± 0.6
Q5-1	4.4 ± 1.6	4.3 ± 0.2	3.5 ± 0.5	5.4 ± 0.7	4.5 ± 0.6
Q9-1	4.5 ± 1.2	4.7 ± 0.6	3.7 ± 0.5	5.1 ± 0.7	4.6 ± 0.6
R1-1	4.1 ± 1.4	4.0 ± 0.2	3.2 ± 0.4	4.8 ± 0.7	4.4 ± 0.6
R1-2	3.8 ± 1.4	3.4 ± 0.3 (1)	3.4 ± 0.3	4.6 ± 0.4	(1)
R3-1	5.3 ± 1.8	4.7 ± 0.5	4.4 ± 0.3	6.3 ± 0.3	5.7 ± 0.4
R5-1	5.2 ± 1.2	5.0 ± 0.6	4.4 ± 0.3	5.7 ± 0.7	5.5 ± 0.6
R9-1	5.1 ± 1.5	5.2 ± 0.8	4.1 ± 0.6	5.8 ± 0.4	5.4 ± 0.7
B10-1	4.8 ± 1.5	5.0 ± 0.3	3.7 ± 0.4	5.5 ± 0.9	4.8 ± 0.4
D15-1	4.8 ± 1.3	4.7 ± 0.3	4.0 ± 0.3	5.6 ± 0.3	4.7 ± 0.4
F10-1	5.9 ± 1.7	5.4 ± 0.8	5.0 ± 0.6	6.7 ± 0.6	6.6 ± 1.1
F25-1	5.1 ± 1.7	4.9 ± 0.2	4.0 ± 0.3	5.9 ± 0.7	5.7 ± 0.5
G10-1	6.8 ± 1.9	6.2 ± 0.3	5.8 ± 0.5	7.5 ± 0.5	7.8 ± 0.5
G15-1	5.9 ± 1.2	5.9 ± 0.6	5.1 ± 0.5	6.6 ± 0.6	6.1 ± 0.3
H15-1	5.2 ± 1.0	4.8 ± 0.3	4.8 ± 1.1	5.9 ± 0.8	5.2 ± 1.4
J15-1	5.4 ± 1.3	5.2 ± 0.5	4.6 ± 0.4	6.2 ± 0.3	5.4 ± 0.5
K15-1	4.6 ± 1.4	4.3 ± 0.4	3.8 ± 0.4	5.4 ± 0.3	4.8 ± 0.9
L15-1	4.7 ± 1.2	4.6 ± 0.7	4.0 ± 0.5	5.5 ± 0.3	4.7 ± 0.3
N15-2	5.0 ± 1.0	4.8 ± 0.3	4.6 ± 0.3	5.7 ± 0.4	4.8 ± 0.3
Q15-1	5.4 ± 1.7	5.1 ± 0.6	4.4 ± 0.3	5.7 ± 0.3	6.4 ± 1.4
R15-1	4.7 ± 1.5	4.4 ± 0.6	3.8 ± 0.4	5.2 ± 0.5	5.4 ± 0.8

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-X.2 MEAN QUARTERLY TLD RESULTS FOR THE SITE BOUNDARY, INDICATOR AND CONTROL LOCATIONS FOR THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF MILLI-ROENTGEN/MONTH
STANDARD DEVIATIONS OF THE STATION DATA

COLLECTION PERIOD	SITE BOUNDARY ± 2 S.D.	INDICATOR	CONTROL
JAN-MAR	4.2 ± 0.6	4.5 ± 1.3	5.0 ± 1.2
APR-JUN	3.2 ± 0.6	4.0 ± 1.3	4.4 ± 1.2
JUL-SEP	4.9 ± 0.7	5.4 ± 1.5	5.9 ± 1.3
OCT-DEC	5.1 ± 2.9	4.9 ± 1.4	5.5 ± 1.9

TABLE C-X.3 SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF MILLI-ROENTGEN/STD. MONTH

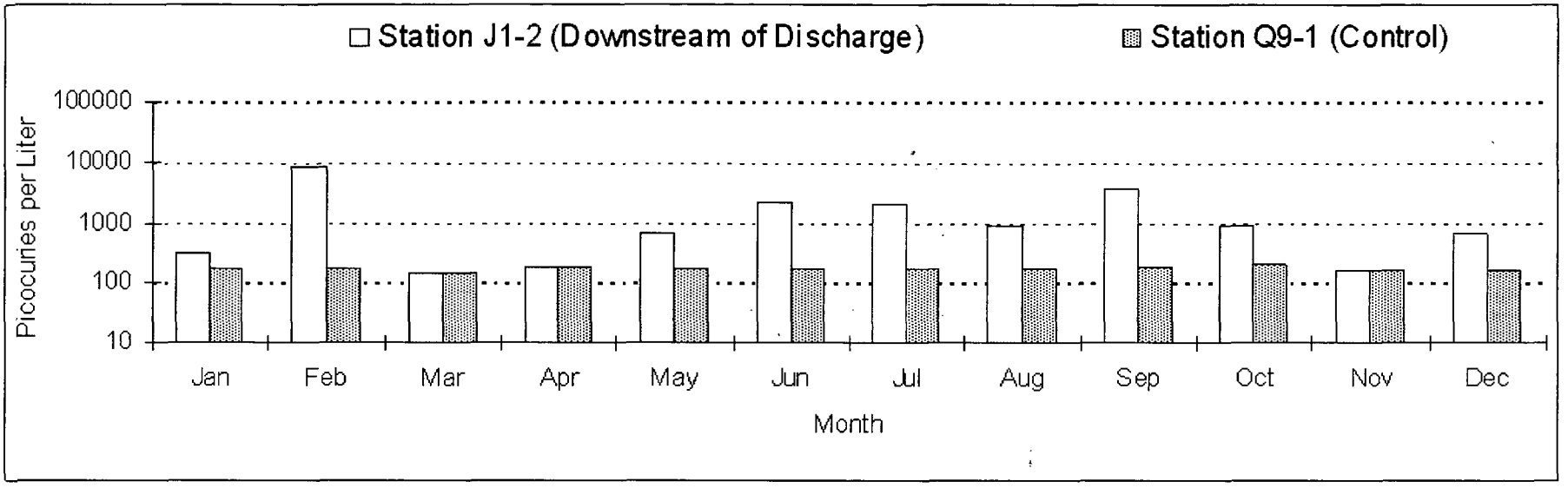
LOCATION	SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN ± 2 S.D.	PRE-OP MEAN ± 2 S.D.
SITE BOUNDARY	76	2.7	8.7	4.4 ± 2.1	4.8 ± 1.5
INDICATOR	237	2.8	8.6	4.7 ± 1.7	5.2 ± 1.5
CONTROL	44	3.8	7.8	5.2 ± 1.8	5.8 ± 1.7

SITE BOUNDARY STATIONS - A1-4, B1-2, C1-2, D1-1, E1-4, F1-2, F1-4, G1-3, G1-5, G1-6, H1-1, J1-3, K1-4, L1-1, M1-1, N1-3, P1-2, Q1-2, R1-1

INDICATOR STATIONS - A3-1, A5-1, A9-3, B1-1, B10-1, B2-1, B5-1, C1-1, C2-1, C5-1, C8-1, D1-2, D2-2, D6-1, E1-2, E2-3, E5-1, E7-1, F1-1, F10-1, F2-1, F5-1, G1-2, G2-4, G5-1, H3-1, H5-1, H8-1, J1-1, J3-1, J5-1, J7-1, K2-1, K3-1, K5-1, K8-1, L1-2, L2-1, L5-1, L8-1, M1-2, M2-1, M5-1, M9-1, N1-1, N2-1, N5-1, N8-1, P1-1, P2-1, P5-1, P8-1, Q1-1, Q2-1, Q5-1, Q9-1, R1-2, R3-1, R5-1, R9-1

CONTROL STATIONS - D15-1, F25-1, G10-1, G15-1, H15-1, J15-1, K15-1, L15-1, N15-2, Q15-1, R15-1

FIGURE C-1
Monthly Tritium Concentrations in Surface Water and Effluent Water
Three Mile Island Nuclear Station, 2011



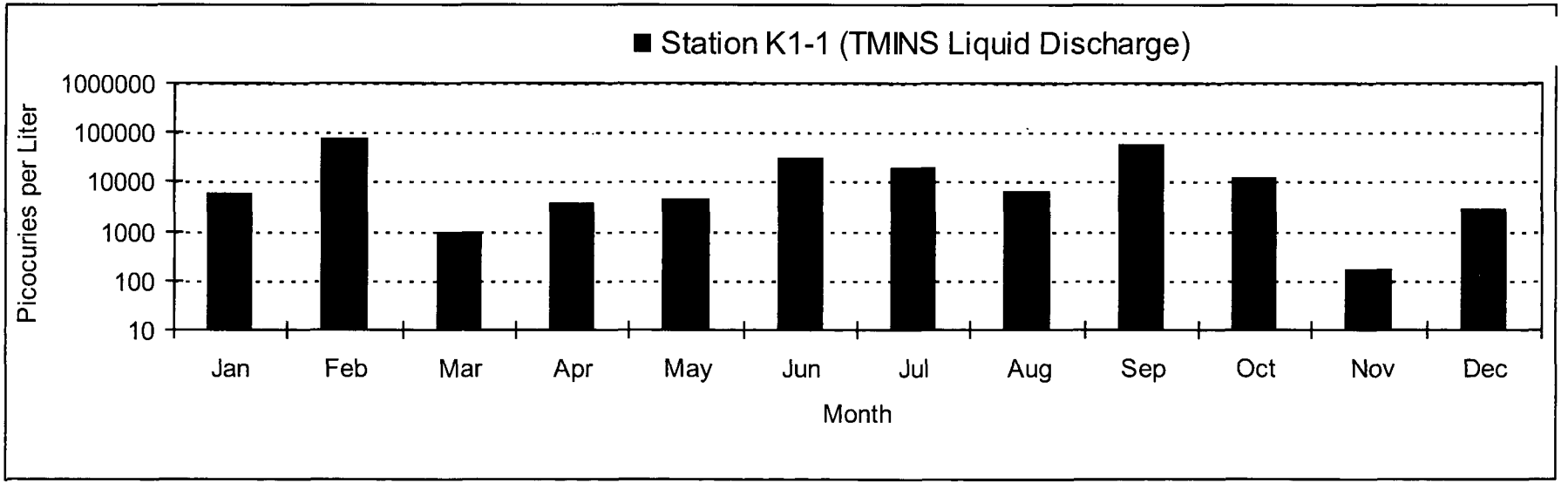


FIGURE C-2
Mean Quarterly Tritium Concentrations in Surface Water
Three Mile Island Nuclear Station, 1974 - 2011

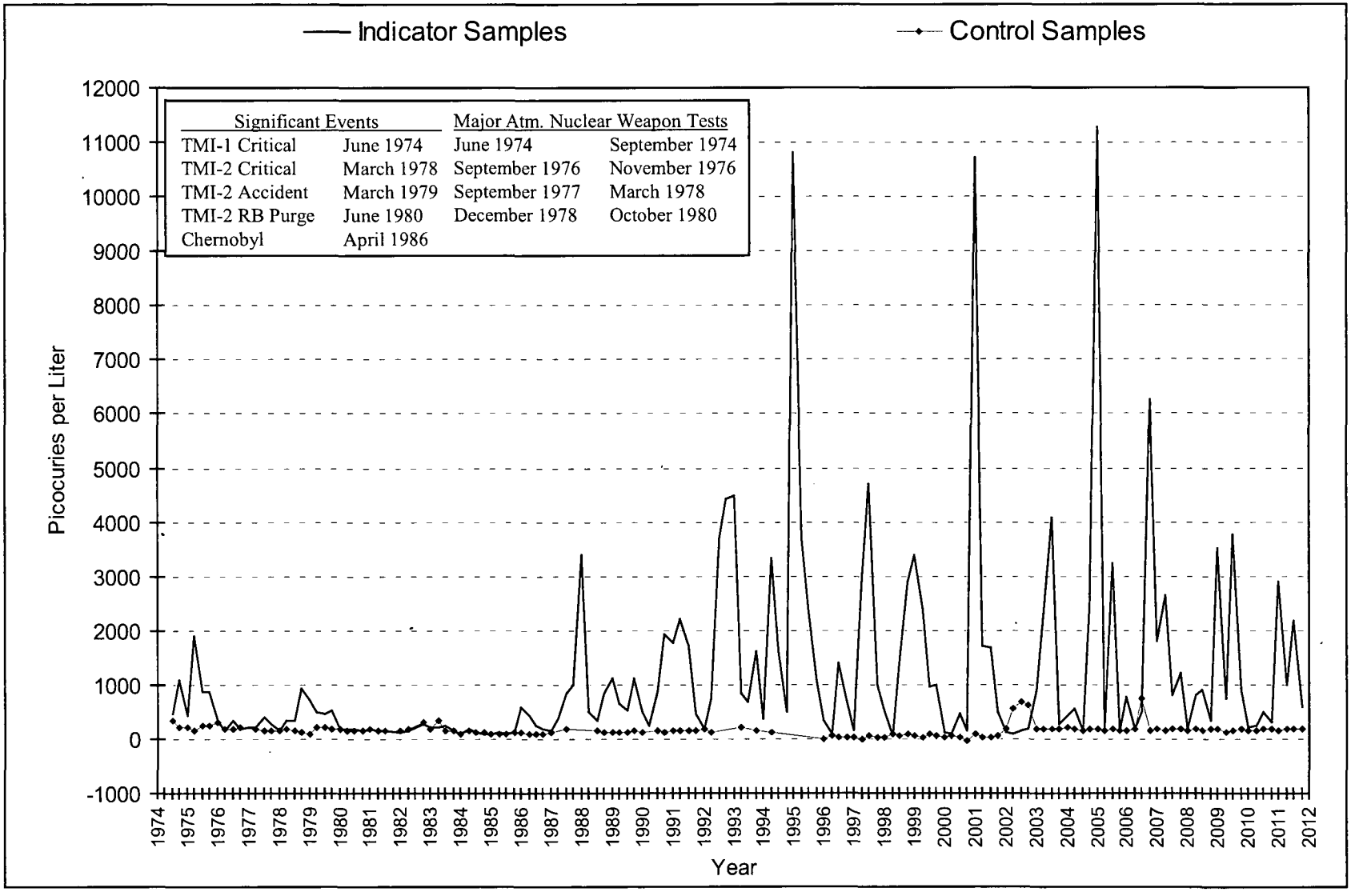


FIGURE C-3
Mean Monthly Gross Beta Concentrations in Drinking Water
Three Mile Island Nuclear Station, 2011

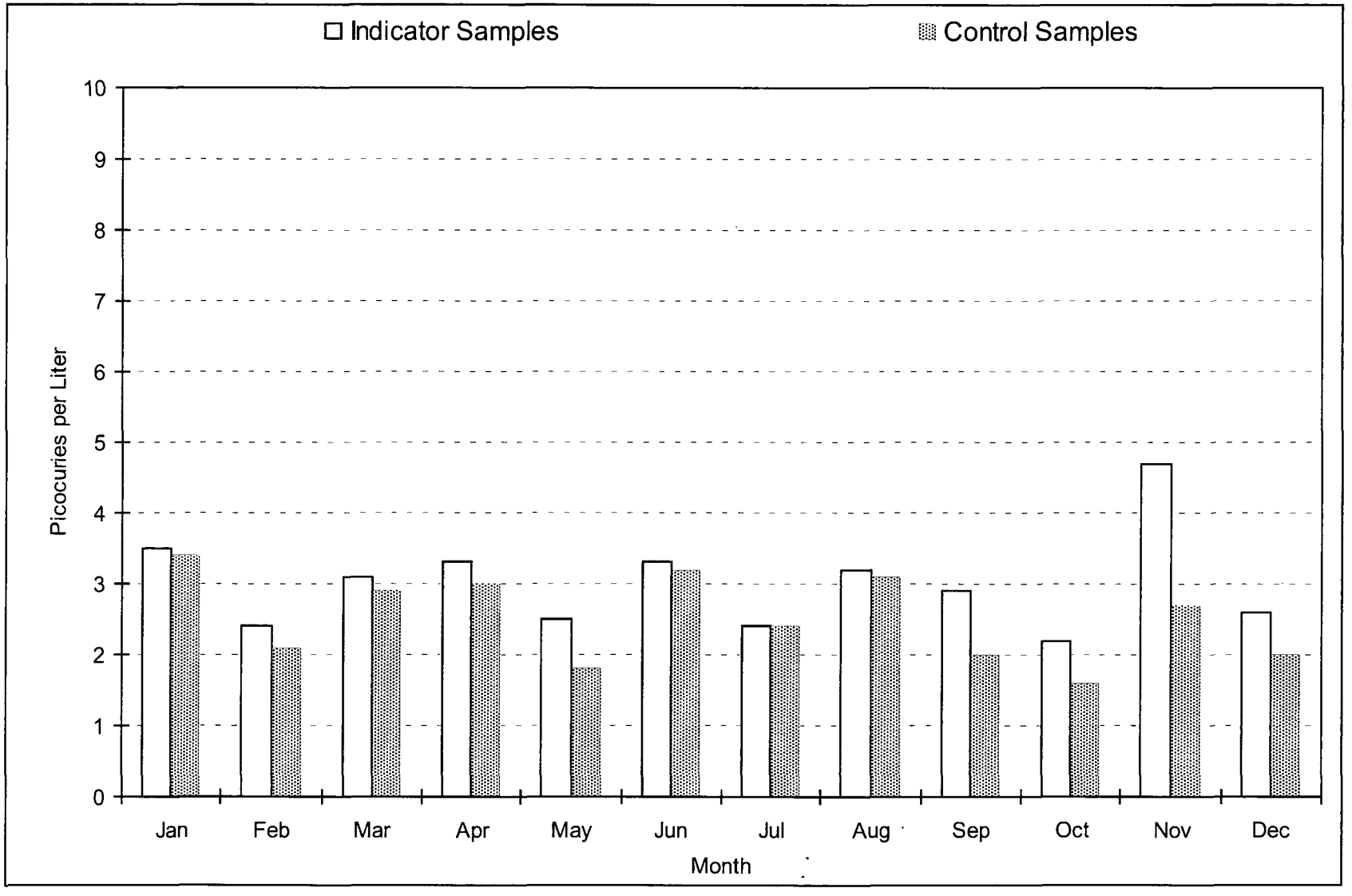
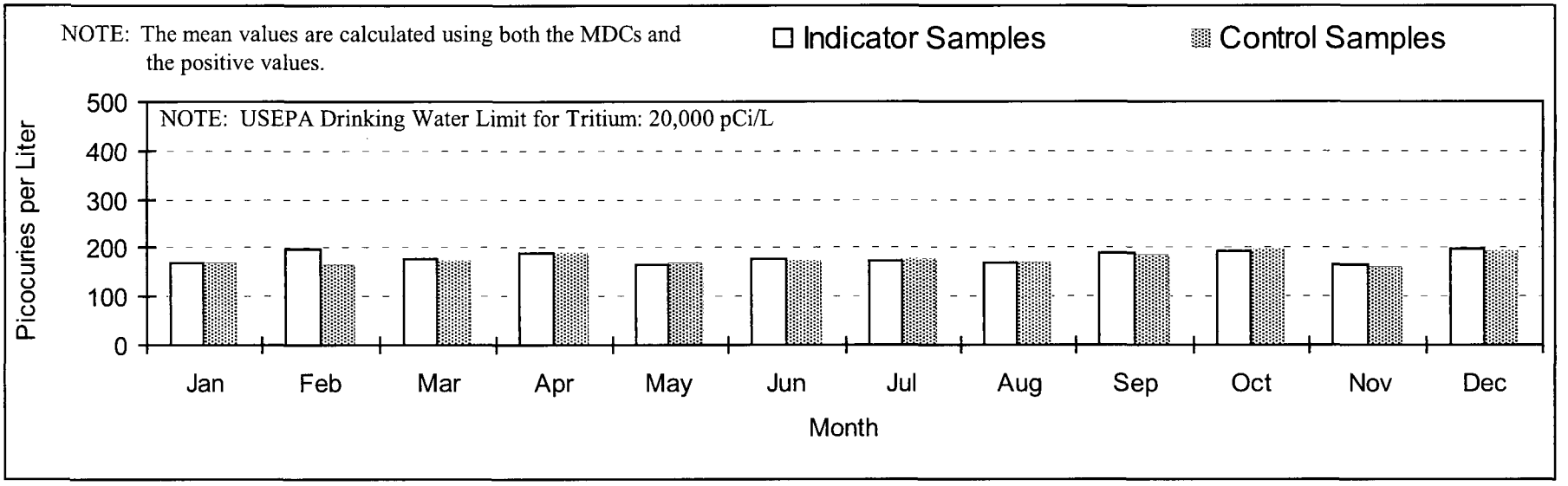


FIGURE C-4
Mean Monthly Tritium Concentrations in Drinking Water and Effluent Water
Three Mile Island Nuclear Station, 2011



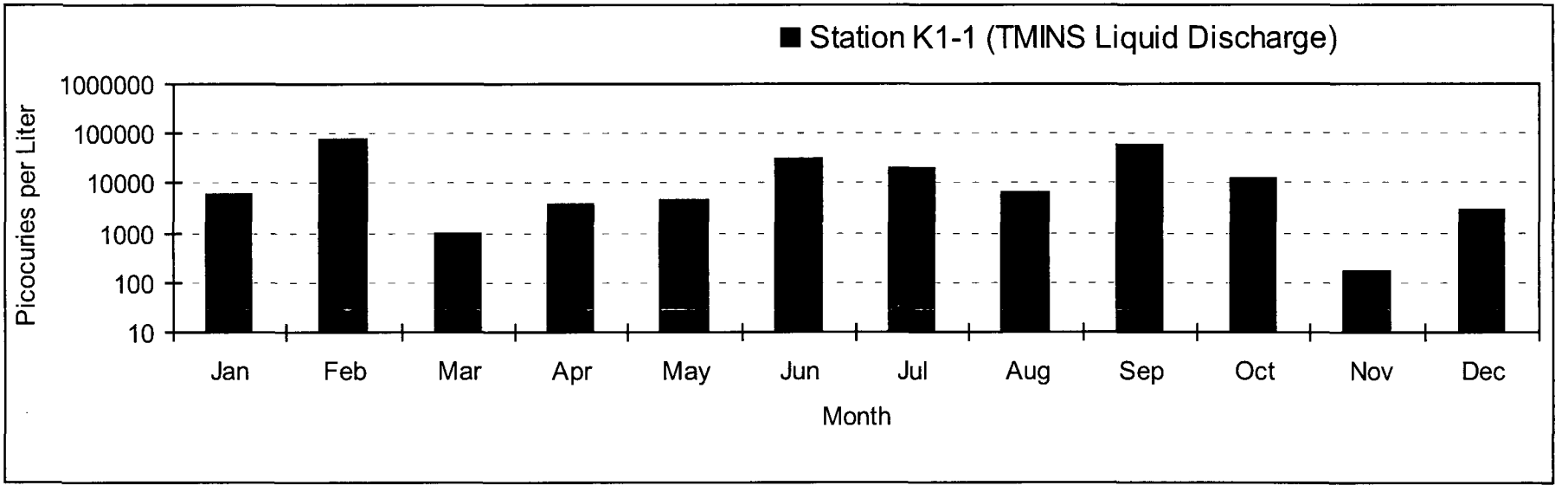


FIGURE C-5
Mean Cesium-137 Concentrations in Aquatic Sediments
Three Mile Island Nuclear Station, 1984 – 2011

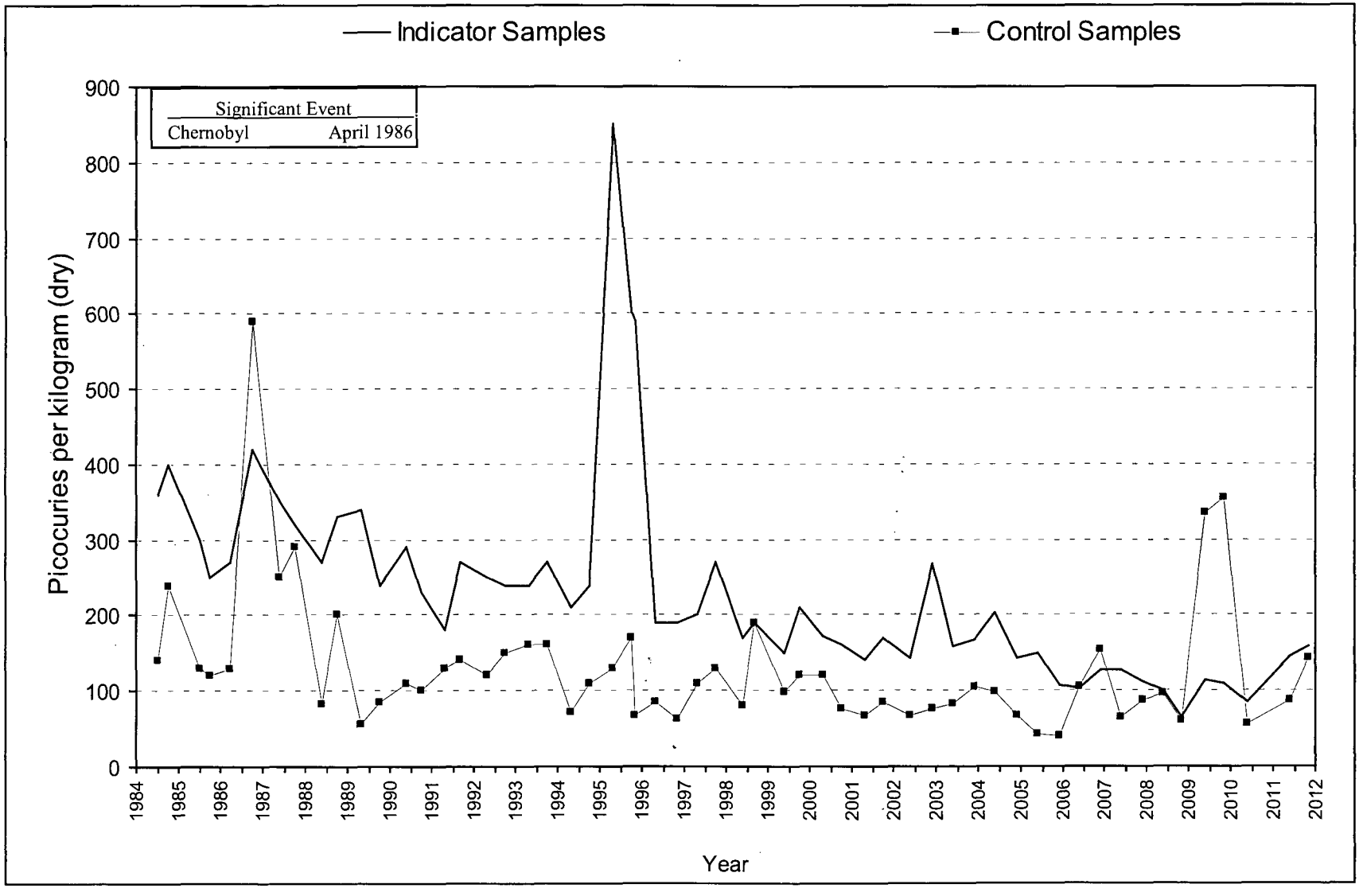


FIGURE C-6
Mean Quarterly Gross Beta Concentrations in Air Particulates
Three Mile Island Nuclear Station, 1972 - 2011

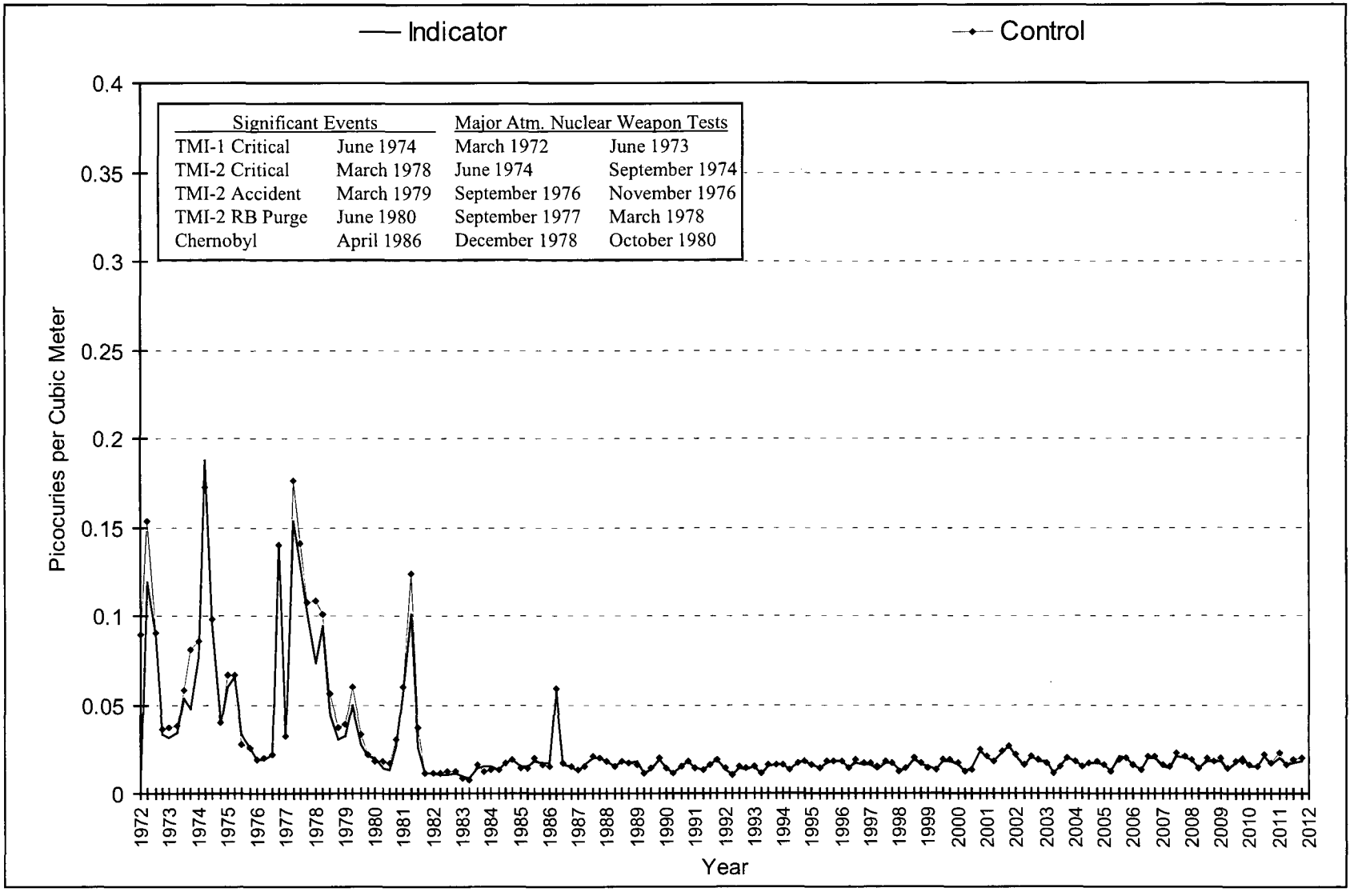
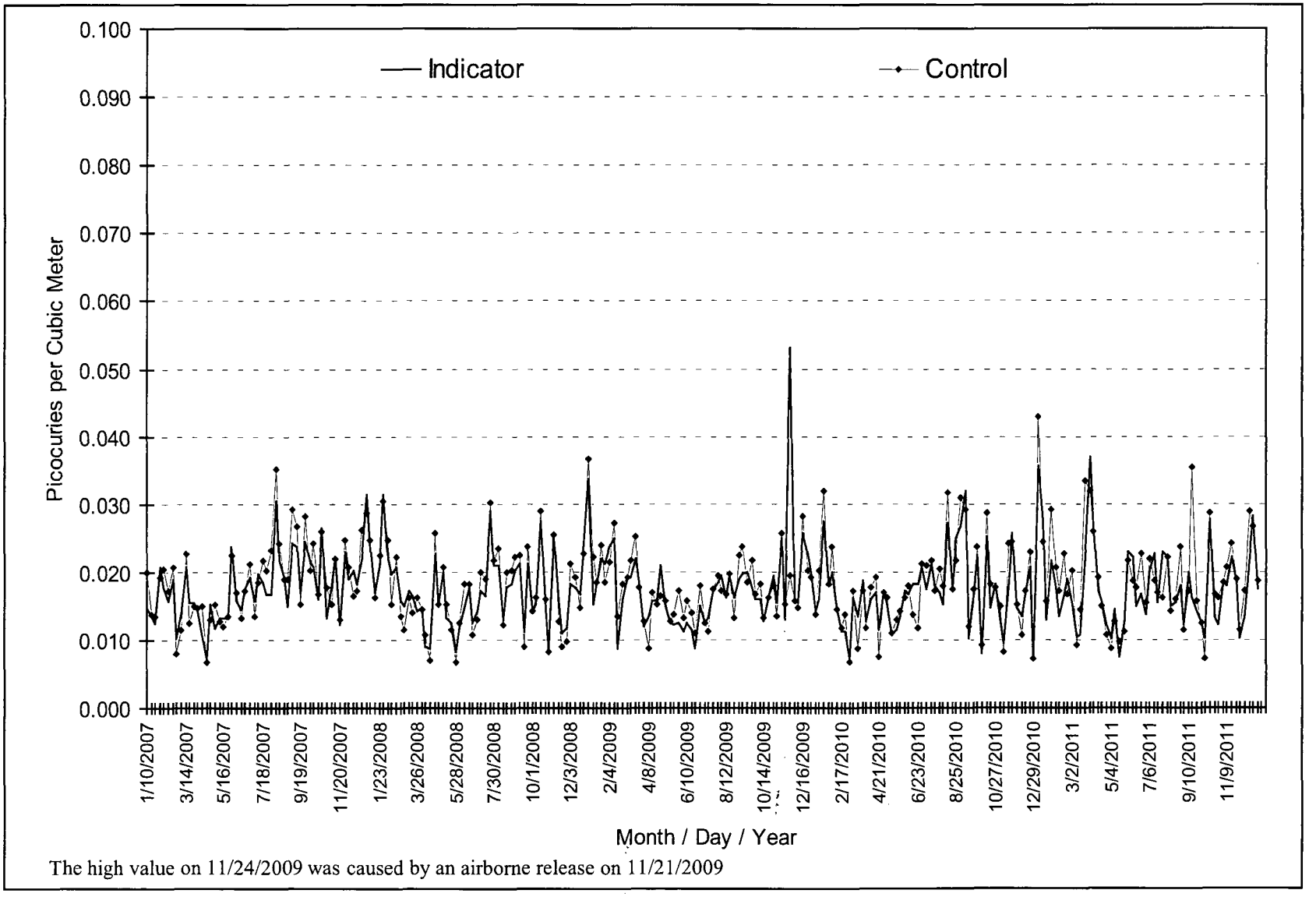


FIGURE C-7

Mean Weekly Gross Beta Concentrations in Air Particulates

Three Mile Island Nuclear Station, 2007 - 2011



The high value on 11/24/2009 was caused by an airborne release on 11/21/2009

FIGURE C-8
Mean Quarterly Strontium-90 Concentrations in Cow Milk
Three Mile Island Nuclear Station, 1979 - 2011

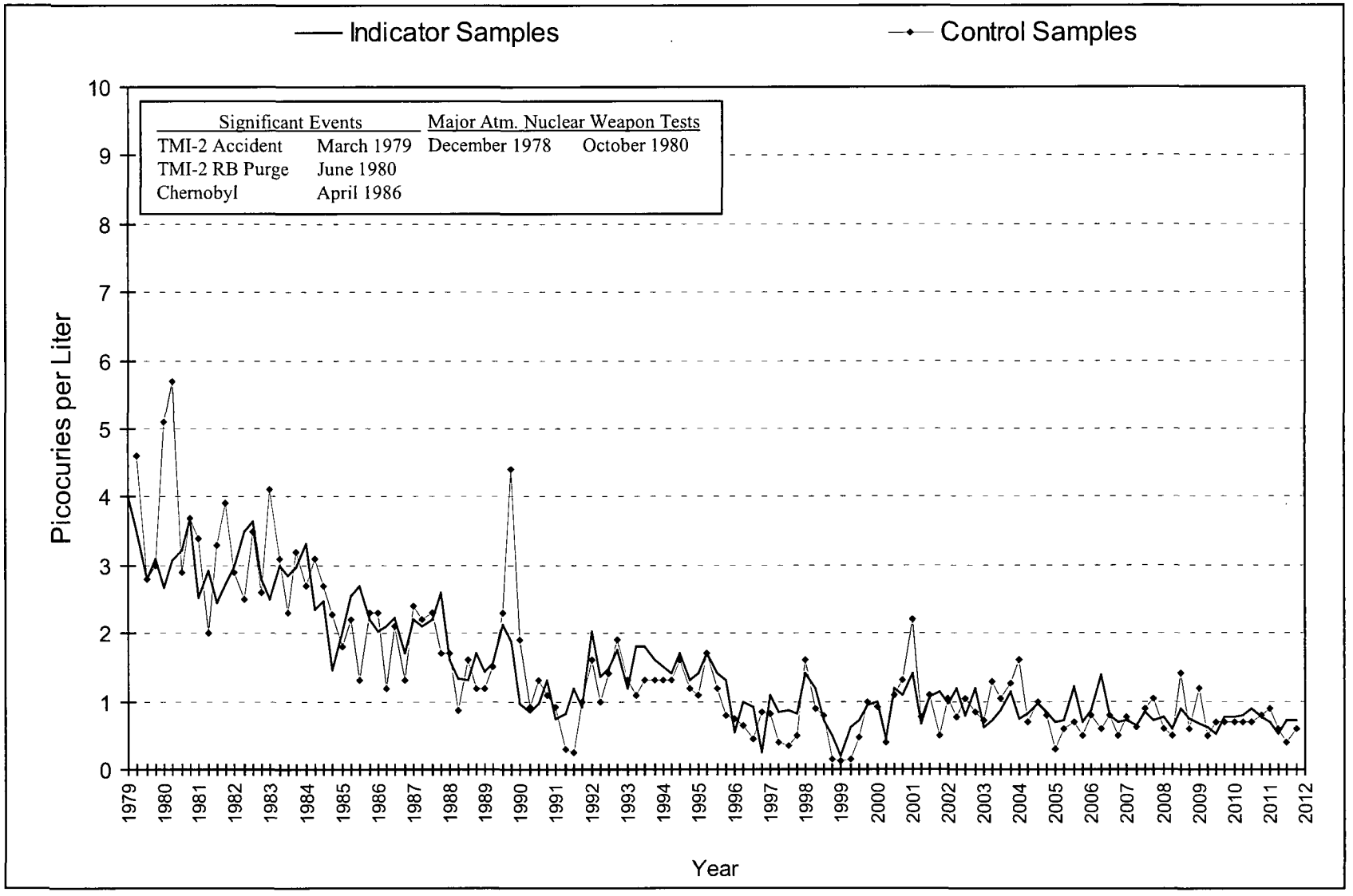
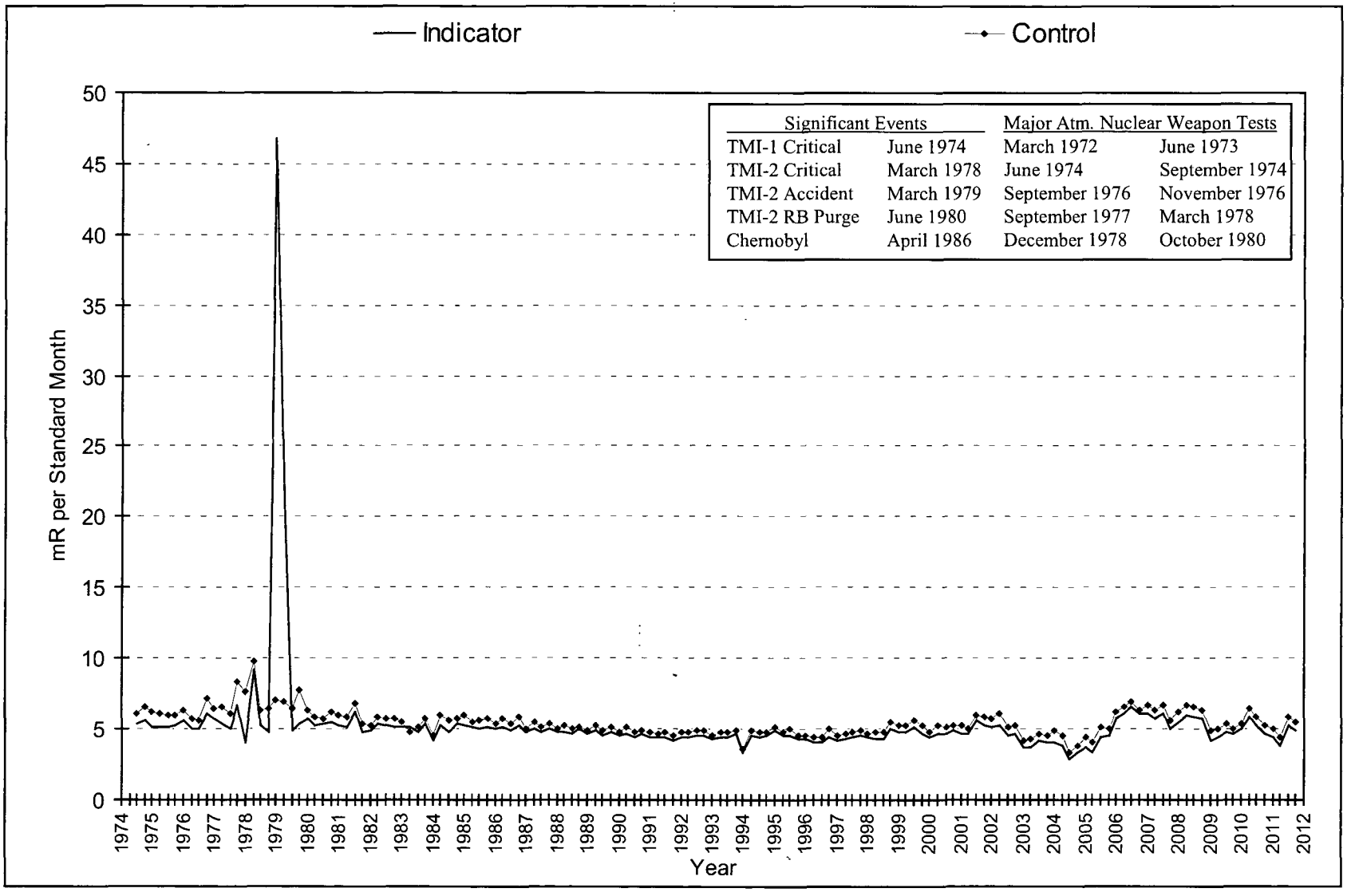


FIGURE C-9
Mean Quarterly Gamma Exposure Rates
Three Mile Island Nuclear Station, 1974 - 2011



Significant Events		Major Atm. Nuclear Weapon Tests	
TMI-1 Critical	June 1974	March 1972	June 1973
TMI-2 Critical	March 1978	June 1974	September 1974
TMI-2 Accident	March 1979	September 1976	November 1976
TMI-2 RB Purge	June 1980	September 1977	March 1978
Chernobyl	April 1986	December 1978	October 1980

APPENDIX D

DATA TABLES AND FIGURES
COMPARISON LABORATORY

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

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TABLE D-I.1 **CONCENTRATIONS OF GROSS BETA IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	Q9-1Q
12/28/10 - 02/01/11	1.0 ± 0.4
02/01/11 - 03/01/11	0.7 ± 0.4
03/01/11 - 03/29/11	< 3.6
03/29/11 - 05/03/11	< 3.5
05/03/11 - 05/31/11	< 0.9
05/31/11 - 06/28/11	1.4 ± 0.8
06/28/11 - 08/02/11	1.3 ± 0.6
08/02/11 - 08/30/11	1.0 ± 0.6
08/30/11 - 09/27/11	< 0.9
09/27/11 - 11/01/11	< 0.8
11/01/11 - 11/29/11	2.0 ± 1.0
11/29/11 - 01/03/12	1.0 ± 0.5
MEAN	1.2 ± 0.8

TABLE D-I.2 **CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	Q9-1Q
12/28/10 - 02/01/11	< 155
02/01/11 - 03/01/11	< 159
03/01/11 - 03/29/11	< 165
03/29/11 - 05/03/11	< 143
05/03/11 - 05/31/11	< 144
05/31/11 - 06/28/11	< 150
06/28/11 - 08/02/11	< 149
08/02/11 - 08/30/11	< 150
08/30/11 - 09/27/11	< 144
09/27/11 - 11/01/11	< 143
11/01/11 - 11/29/11	< 166
11/29/11 - 01/03/12	< 143
MEAN	-

TABLE D-I.3 **CONCENTRATIONS OF IODINE-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	Q9-1Q
12/28/10 - 02/01/11	< 0.2
02/01/11 - 03/01/11	< 0.4
03/01/11 - 03/29/11	< 0.4
03/29/11 - 05/03/11	< 0.4
05/03/11 - 05/31/11	< 0.3
05/31/11 - 06/28/11	< 0.4
06/28/11 - 08/02/11	< 0.3
08/02/11 - 08/30/11	< 0.3
08/30/11 - 09/27/11	< 0.2
09/27/11 - 11/01/11	< 0.3
11/01/11 - 11/29/11	< 0.3
11/29/11 - 01/03/12	< 0.5
MEAN	-

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES

TABLE D-I.4 CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95	Nb-95	Cs-134	Cs-137	Ba-140	La-140
Q9-1Q	12/28/10 - 02/01/11	< 3	< 5	< 2	< 3	< 3	< 3	< 2	< 2	< 3	< 12	< 1
	02/01/11 - 03/01/11	< 3	< 6	< 3	< 2	< 3	< 4	< 3	< 3	< 4	< 18	< 2
	03/01/11 - 03/29/11	< 3	< 4	< 2	< 2	< 5	< 5	< 2	< 3	< 3	< 9	< 2
	03/29/11 - 05/03/11	< 6	< 9	< 4	< 4	< 7	< 6	< 5	< 7	< 4	< 25	< 7
	05/03/11 - 05/31/11	< 3	< 2	< 2	< 2	< 7	< 4	< 3	< 2	< 2	< 13	< 3
	05/31/11 - 06/28/11	< 2	< 6	< 2	< 2	< 3	< 5	< 3	< 4	< 2	< 15	< 3
	06/28/11 - 08/02/11	< 2	< 4	< 2	< 1	< 2	< 3	< 2	< 2	< 2	< 14	< 5
	08/02/11 - 08/30/11	< 2	< 4	< 2	< 2	< 6	< 4	< 3	< 3	< 2	< 10	< 2
	08/30/11 - 09/27/11	< 3	< 7	< 3	< 2	< 3	< 3	< 3	< 3	< 2	< 16	< 4
	09/27/11 - 11/01/11	< 3	< 4	< 1	< 2	< 4	< 4	< 2	< 2	< 2	< 17	< 2
	11/01/11 - 11/29/11	< 5	< 13	< 4	< 5	< 3	< 9	< 4	< 6	< 3	< 27	< 3
	11/29/11 - 01/03/12	< 2	< 4	< 3	< 2	< 6	< 4	< 2	< 2	< 4	< 11	< 2

TABLE D-II.1 **CONCENTRATIONS OF STRONTIUM AND GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Sr-89	Sr-90	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
INDP	10/04/11	< 5	< 4	2780 ± 440	< 13	< 14	< 15	< 11	< 24	< 5	< 11

TABLE D-III.1 CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137
J2-1	11/08/11	12002 ± 682	< 41	66 ± 22

TABLE D-IV.1 CONCENTRATIONS OF GAMMA EMITTERS AND STRONTIUM IN FOOD PRODUCT SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	I-131	Cs-134	Cs-137	Sr-89	Sr-90
H1-2Q	07/27/11	4950 ± 430	< 16	< 15	< 15	< 11	33 ± 6
B10-2Q	08/01/11	2410 ± 240	< 12	< 4	< 7	< 3	< 2
MEAN		3680 ± 3592	-	-	-	-	-

TABLE D-V.1 CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE AND I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

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

COLLECTION PERIOD	E1-2Q GROSS BETA		E1-2Q I-131	
12/29/10 - 01/05/11	51 ± 5		< 18	
01/05/11 - 01/12/11	37 ± 5		< 9	
01/12/11 - 01/19/11	22 ± 4		< 22	
01/19/11 - 01/26/11	35 ± 4		< 12	
01/26/11 - 02/02/11	23 ± 4		< 13	
02/02/11 - 02/09/11	20 ± 4		< 13	
02/09/11 - 02/16/11	25 ± 4		< 24	
02/16/11 - 02/23/11	38 ± 5		< 7	
02/23/11 - 03/02/11	28 ± 4		< 16	
03/02/11 - 03/08/11	16 ± 4		< 12	
03/08/11 - 03/16/11	12 ± 3		< 16	
03/16/11 - 03/23/11	30 ± 5		95 ± 25	
03/23/11 - 03/30/11	52 ± 5		92 ± 28	
03/30/11 - 04/06/11	(1)		(1)	
04/06/11 - 04/13/11	18 ± 4		26 ± 12	
04/13/11 - 04/20/11	20 ± 4	(1)	< 17	(1)
04/20/11 - 04/27/11	17 ± 4	(1)	< 14	(1)
04/27/11 - 05/04/11	(1)		(1)	
05/04/11 - 05/11/11	18 ± 4		< 21	
05/11/11 - 05/18/11	12 ± 4		< 10	
05/18/11 - 05/25/11	20 ± 4		< 10	
05/25/11 - 06/01/11	29 ± 4		< 8	
06/01/11 - 06/08/11	31 ± 5		< 17	
06/08/11 - 06/15/11	24 ± 4		< 18	
06/15/11 - 06/22/11	27 ± 4		< 11	
06/22/11 - 06/29/11	15 ± 4		< 17	
06/29/11 - 07/06/11	26 ± 4		< 15	
07/06/11 - 07/13/11	32 ± 4		< 16	
07/13/11 - 07/20/11	27 ± 4		< 15	
07/20/11 - 07/27/11	36 ± 5		< 23	
07/27/11 - 08/03/11	27 ± 4		< 17	
08/03/11 - 08/10/11	27 ± 4		< 16	
08/10/11 - 08/17/11	22 ± 4		< 20	
08/17/11 - 08/24/11	26 ± 4		< 13	
08/24/11 - 08/31/11	22 ± 4		< 8	
08/31/11 - 09/10/11	23 ± 4		< 15	
09/08/11 - 09/14/11	23 ± 5		< 17	
09/14/11 - 09/21/11	16 ± 4		< 14	
09/21/11 - 09/28/11	10 ± 4		< 10	
09/28/11 - 10/05/11	10 ± 4		< 13	
10/05/11 - 10/12/11	39 ± 5		< 30	
10/12/11 - 10/19/11	22 ± 4		< 23	
10/19/11 - 10/26/11	18 ± 4		< 18	
10/26/11 - 11/02/11	26 ± 4	(1)	< 22	(1)
11/02/11 - 11/09/11	31 ± 4		< 15	
11/09/11 - 11/16/11	28 ± 4		< 25	
11/16/11 - 11/22/11	27 ± 5		< 23	
11/22/11 - 11/30/11	21 ± 3		< 15	
11/30/11 - 12/07/11	14 ± 4		< 29	
12/07/11 - 12/14/11	39 ± 5		< 18	
12/14/11 - 12/21/11	39 ± 5		< 10	
12/21/11 - 12/28/11	20 ± 4		< 17	
MEAN	25 ± 19		71 ± 39	

* THE MEAN AND 2 STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE D-V.2 CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

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

SITE	COLLECTION PERIOD	Be-7	Cs-134	Cs-137
E1-2Q	**03/16/11 - 03/23/11**	**130 ± 65**	**< 6.2**	**< 7.2**
	12/29/10 - 03/30/11	86 ± 15	< 0.9	< 0.5
	03/30/11 - 06/29/11	92 ± 20	< 0.8	< 0.7
	06/29/11 - 09/28/11	75 ± 14	< 0.5	< 0.5
	09/28/11 - 12/28/11	76 ± 16	< 1.2	< 0.6
	MEAN	82 ± 16	-	-

BOLDED VALUES INDICATE ADDITIONAL SAMPLING DUE TO THE FUKUSHIMA EVENT

TABLE D-VI.1 CONCENTRATIONS OF I-131 BY CHEMICAL SEPARATION, GAMMA EMITTERS, AND STRONTIUM IN MILK SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	I-131	K-40	Cs-134	Cs-137	Ba-140	La-140	Sr-89	Sr-90
G2-1Q	01/05/11	< 0.3	1211 ± 97	< 4	< 4	< 11	< 4		
	02/02/11	< 0.3	1399 ± 106	< 3	< 3	< 12	< 2		
	03/02/11	< 0.2	944 ± 103	< 5	< 4	< 21	< 4		
	03/16/11	< 0.3	1510 ± 119	< 4	< 5	< 16	< 2		
	03/30/11	0.4 ± 0.2	1123 ± 105	< 4	< 5	< 18	< 3	< 0.6	< 0.7
	04/13/11	< 0.3	549 ± 80	< 4	< 4	< 27	< 5		
	04/27/11	< 0.4	912 ± 92	< 4	< 3	< 24	< 6		
	05/11/11	< 0.3	661 ± 80	< 4	< 3	< 23	< 3		
	05/25/11	< 0.3	1066 ± 105	< 4	< 4	< 16	< 3		
	06/08/11	< 0.2	1190 ± 88	< 3	< 4	< 13	< 3		
	06/22/11	< 0.4	1397 ± 108	< 3	< 4	< 14	< 2	< 0.6	< 0.5
	07/06/11	< 0.3	924 ± 77	< 3	< 3	< 13	< 4		
	07/20/11	< 0.2	838 ± 88	< 4	< 3	< 22	< 5		
	08/03/11	< 0.3	1039 ± 92	< 3	< 3	< 28	< 6		
	08/17/11	< 0.2	1136 ± 91	< 4	< 4	< 19	< 5		
	08/31/11	< 0.4	946 ± 111	< 6	< 6	< 18	< 4		
	09/14/11	< 0.3	1426 ± 120	< 3	< 4	< 22	< 5		
	09/28/11	< 0.3	1397 ± 97	< 4	< 2	< 12	< 4	< 0.7	< 0.6
	10/12/11	< 0.3	1026 ± 88	< 4	< 3	< 20	< 3		
	10/26/11	< 0.4	1510 ± 92	< 4	< 3	< 11	< 3		
	11/09/11	< 0.2	1110 ± 94	< 2	< 4	< 30	< 4		
	11/22/11	< 0.3	1308 ± 97	< 3	< 3	< 25	< 4		
	12/07/11	< 0.3	1060 ± 128	< 3	< 5	< 20	< 5	< 0.8	0.9 ± 0.3
	MEAN		1117 ± 515	-	-	-	-	-	-

* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES

FIGURE D-1
MONTHLY GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES COLLECTED FROM TMINS LOCATION Q9-1Q, 2011

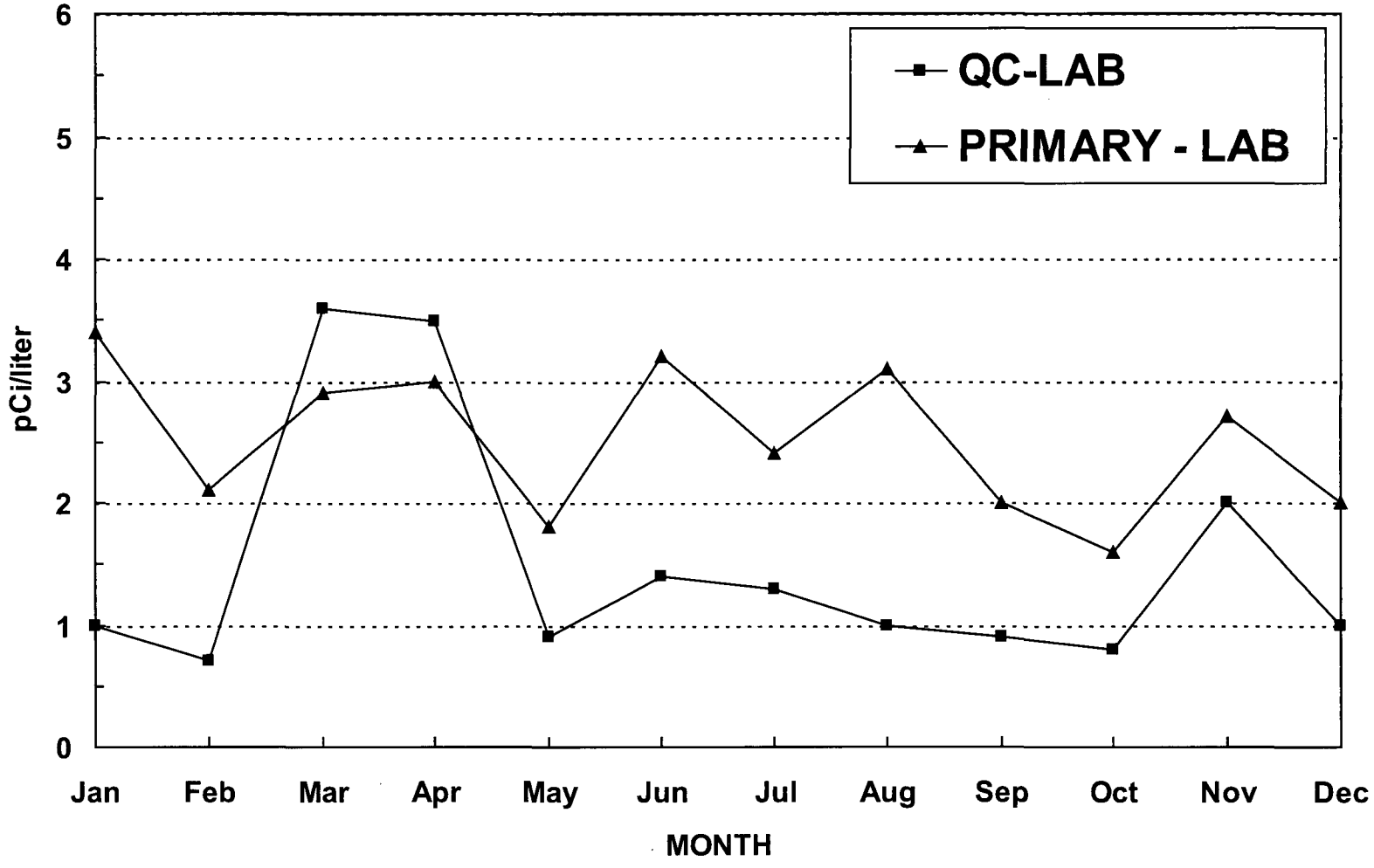
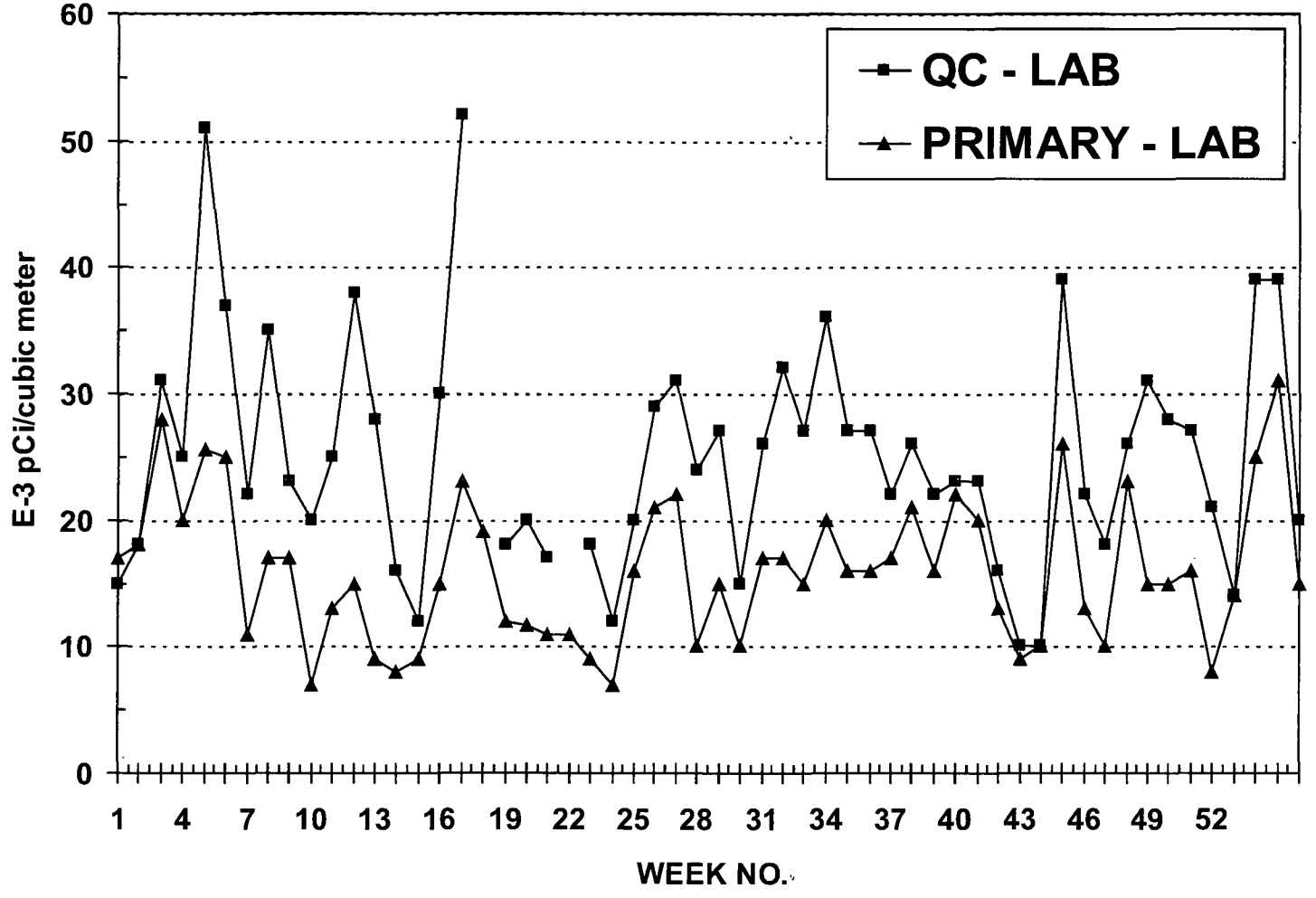


FIGURE D-2
WEEKLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED FROM TMINS LOCATION E1-2Q, 2011



APPENDIX E

INTER-LABORATORY COMPARISON PROGRAM

TABLE E-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 1 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2011	E7460-396	Milk	Sr-89	pCi/L	98.8	97.4	1.01	A
			Sr-90	pCi/L	15.2	15.8	0.96	A
	E7461-396	Milk	I-131	pCi/L	92.9	96.9	0.96	A
			Ce-141	pCi/L	not provided by Analytics for this study			
			Cr-51	pCi/L	398	298	1.34	N (1)
			Cs-134	pCi/L	130	130	1.00	A
			Cs-137	pCi/L	232	205	1.13	A
			Co-58	pCi/L	121	113	1.07	A
			Mn-54	pCi/L	289	266	1.09	A
			Fe-59	pCi/L	201	175	1.15	A
			Zn-65	pCi/L	287	261	1.10	A
			Co-60	pCi/L	186	172	1.08	A
	E7463-396	AP	Ce-141	pCi	not provided by Analytics for this study			
			Cr-51	pCi	243	215	1.13	A
			Cs-134	pCi	85.0	94.2	0.90	A
			Cs-137	pCi	168	148	1.14	A
			Co-58	pCi	89.2	81.8	1.09	A
			Mn-54	pCi	171	192	0.89	A
			Fe-59	pCi	129	126	1.02	A
			Zn-65	pCi	159	189	0.84	A
			Co-60	pCi	132	124	1.06	A
	E7462-396	Charcoal	I-131	pCi	96.5	96.3	1.00	A
June 2011	E7851-396	Milk	Sr-89	pCi/L	96.7	103	0.94	A
			Sr-90	pCi/L	13.8	15.6	0.88	A
	E7852-396	Milk	I-131	pCi/L	110	103.0	1.07	A
			Ce-141	pCi/L	68.1	79.9	0.85	A
			Cr-51	pCi/L	186	206	0.90	A
			Cs-134	pCi/L	164	190	0.86	A
			Cs-137	pCi/L	140	138	1.01	A
			Co-58	pCi/L	141	152	0.93	A
			Mn-54	pCi/L	136	138	0.99	A
			Fe-59	pCi/L	128	123	1.04	A
			Zn-65	pCi/L	263	261	1.01	A
			Co-60	pCi/L	189	195	0.97	A
	E7854-396	AP	Ce-141	pCi	49.9	42.9	1.16	A
			Cr-51	pCi	95.6	110	0.87	A
			Cs-134	pCi	104	102	1.02	A
			Cs-137	pCi	83.8	74.0	1.13	A
			Co-58	pCi	90.7	81.3	1.12	A
			Mn-54	pCi	74.5	73.9	1.01	A
			Fe-59	pCi	62.0	66.1	0.94	A
			Zn-65	pCi	140	140	1.00	A
			Co-60	pCi	119	104	1.14	A
	E7853-396	Charcoal	I-131	pCi	76.2	86.1	0.89	A

TABLE E-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 2 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
September 2011	E8070-396	Milk	Sr-89	pCi/L	102	90.8	1.12	A
			Sr-90	pCi/L	13.2	14.7	0.90	A
	E8071-396	Milk	I-131	pCi/L	74.2	89.2	0.83	A
			Ce-141	pCi/L	66.9	66.7	1.00	A
			Cr-51	pCi/L	249	226	1.10	A
			Cs-134	pCi/L	116	128	0.91	A
			Cs-137	pCi/L	106	114	0.93	A
			Co-58	pCi/L	95.4	97.5	0.98	A
			Mn-54	pCi/L	147	151	0.97	A
			Fe-59	pCi/L	53.1	54.8	0.97	A
			Zn-65	pCi/L	175	180	0.97	A
			Co-60	pCi/L	150	157	0.96	A
	E8073-396	AP	Ce-141	pCi	66.6	67.5	0.99	A
			Cr-51	pCi	263	229	1.15	A
			Cs-134	pCi	139	130	1.07	A
			Cs-137	pCi	110	115	0.96	A
			Co-58	pCi	108	98.6	1.10	A
			Mn-54	pCi	152	153	0.99	A
			Fe-59	pCi	57.5	55.5	1.04	A
			Zn-65	pCi	190	183	1.04	A
			Co-60	pCi	156	159	0.98	A
	E8072-396	Charcoal	I-131	pCi	77.6	80.6	0.96	A
December, 2011	E8230-396	Milk	Sr-89	pCi/L	93.3	93.1	1.00	A
			Sr-90	pCi/L	12.7	15.4	0.82	A
	E8231-396	Milk	I-131	pCi/L	82.5	90.2	0.91	A
			Ce-141	pCi/L	not provided by Analytics for this study			
			Cr-51	pCi/L	465	566	0.82	A
			Cs-134	pCi/L	142	171	0.83	A
			Cs-137	pCi/L	185	210	0.88	A
			Co-58	pCi/L	177	221	0.80	A
			Mn-54	pCi/L	208	241	0.86	A
			Fe-59	pCi/L	164	183	0.90	A
			Zn-65	pCi/L	259	291	0.89	A
			Co-60	pCi/L	224	270	0.83	A
	E8233-396	AP	Ce-141	pCi	not provided by Analytics for this study			
			Cr-51	pCi	344	368	0.93	A
			Cs-134	pCi	105	111	0.95	A
			Cs-137	pCi	129	137	0.94	A
			Co-58	pCi	145	144	1.01	A
			Mn-54	pCi	137	157	0.87	A
			Fe-59	pCi	119	119	1.00	A
			Zn-65	pCi	145	190	0.76	W
			Co-60	pCi	168	176	0.95	A

TABLE E-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 3 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2011	E8232-396	Charcoal	I-131	pCi	100	89.5	1.12	A

(1) Sample appears to be biased high. Corrective Action evaluated after the 2nd Quarter Analytics PE sample; no action required. NCR 11-13

(a) Teledyne Brown Engineering reported result.

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

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

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

TABLE E-2 ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Control Limits	Evaluation (c)
May 2011	RAD-85	Water	Sr-89	pCi/L	59.8	63.2	51.1 - 71.2	A
			Sr-90	pCi/L	42.5	42.5	31.3 - 48.8	A
			Ba-133	pCi/L	73.3	75.3	63.0 - 82.8	A
			Cs-134	pCi/L	64.9	72.9	59.5 - 80.2	A
			Cs-137	pCi/L	74.6	77.0	69.3 - 87.4	A
			Co-60	pCi/L	87.8	88.8	79.9 - 100	A
			Zn-65	pCi/L	103	98.9	89.0 - 118	A
			Gr-A	pCi/L	64.1	50.1	26.1 - 62.9	N (1)
			Gr-B	pCi/L	51.8	49.8	33.8 - 56.9	A
			I-131	pCi/L	27.4	27.5	22.9 - 32.3	A
			U-Nat	pCi/L	38.5	39.8	32.2 - 44.4	A
			H-3	pCi/L	10057	10200	8870 - 11200	A
	MRAD-14	Filter	Gr-A	pCi/filter	79.7	74.3	38.5 - 112	A
November 2011	RAD-87	Water	Sr-89	pCi/L	81.0	69.7	56.9 - 77.9	N (2)
			Sr-90	pCi/L	35.5	41.4	30.2 - 47.2	A
			Ba-133	pCi/L	90.7	96.9	81.8 - 106	A
			Cs-134	pCi/L	36.6	33.4	26.3 - 36.7	A
			Cs-137	pCi/L	44.7	44.3	39.4 - 51.7	A
			Co-60	pCi/L	118.7	119	107 - 133	A
			Zn-65	pCi/L	80.2	76.8	68.9 - 92.5	A
			Gr-A	pCi/L	34.2	53.2	27.8 - 66.6	A
			Gr-B	pCi/L	39.3	45.9	30.9 - 53.1	A
			I-131	pCi/L	22.9	27.5	22.9 - 32.3	A
			U-Nat	pCi/L	46.8	48.6	39.4 - 54.0	A
			H-3	pCi/L	15733	17400	15200 - 19100	A
	MRAD-15	Filter	Gr-A	pCi/filter	44.6	58.4	30.3 - 87.8	A

(1) The solids on the planchet exceeded 100 mg, which was beyond the range of the efficiency curve. NCR 11-08

(2) Sr-89 TBE to known ratio of 1.16 fell within acceptable range of ± 20%. No action required. NCR 11-16

(a) Teledyne Brown Engineering reported result.

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

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

TABLE E-3 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 1 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2011	11-MaW24	Water	Cs-134	Bq/L	19.1	21.5	15.1 - 28.0	A
			Cs-137	Bq/L	29.0	29.4	20.6 - 38.2	A
			Co-57	Bq/L	0.139		(1)	A
			Co-60	Bq/L	23.9	24.6	17.2 - 32.0	A
			H-3	Bq/L	265	243	170 - 316	A
			Mn-54	Bq/L	31.8	31.6	22.1 - 41.1	A
			K-40	Bq/L	94.8	91	64 - 118	A
			Sr-90	Bq/L	9.64	8.72	6.10 - 11.34	A
			Zn-65	Bq/L	-0.142		(1)	A
	11-GrW24	Water	Gr-A	Bq/L	0.767	1.136	0.341 - 1.931	A
			Gr-B	Bq/L	3.43	2.96	1.48 - 4.44	A
	11-MaS24	Soil	Cs-134	Bq/kg	612	680	476 - 884	A
			Cs-137	Bq/kg	772	758	531 - 985	A
			Co-57	Bq/kg	910	927	649 - 1205	A
			Co-60	Bq/kg	500	482	337 - 627	A
			Mn-54	Bq/kg	0.607		(1)	A
			K-40	Bq/kg	569	540	378 - 702	A
			Sr-90	Bq/kg	NR	160	112 - 208	N (2)
			Zn-65	Bq/kg	1497	1359	951 - 1767	A
	11-RdF24	AP	Cs-134	Bq/sample	3.26	3.49	2.44 - 4.54	A
			Cs-137	Bq/sample	2.36	2.28	1.60 - 2.96	A
			Co-57	Bq/sample	3.30	3.33	2.33 - 4.33	A
			Co-60	Bq/sample	0.0765		(1)	A
			Mn-54	Bq/sample	2.84	2.64	1.85 - 3.43	A
			Sr-90	Bq/sample	NR	1.36	0.95 - 1.77	N (2)
			Zn-65	Bq/sample	3.30	3.18	2.23 - 4.13	A
	11-GrF24	AP	Gr-A	Bq/sample	0.101	0.659	0.198 - 1.120	N (3)
			Gr-B	Bq/sample	1.23	1.323	0.662 - 1.985	A
	11-RdV24	Vegetation	Cs-134	Bq/sample	4.97	5.50	3.85 - 7.15	A
			Cs-137	Bq/sample	0.0356		(1)	A
			Co-57	Bq/sample	10.8	9.94	6.96 - 12.92	A
			Co-60	Bq/sample	4.89	4.91	3.44 - 6.38	A
			Mn-54	Bq/sample	6.42	6.40	4.48 - 8.32	A
			Sr-90	Bq/sample	NR	2.46	1.72 - 3.20	N (2)
			Zn-65	Bq/sample	3.07	2.99	2.09 - 3.89	A
September 2011	11-MaW25	Water	Cs-134	Bq/L	16.0	19.1	13.4 - 24.8	A
			Cs-137	Bq/L	0.0043		(1)	A
			Co-57	Bq/L	33.1	36.6	25.6 - 47.6	A
			Co-60	Bq/L	26.9	29.3	20.5 - 38.1	A
			H-3	Bq/L	1011	1014	710 - 1318	A
			Mn-54	Bq/L	23.2	25.0	17.5 - 32.5	A
			K-40	Bq/L	147	156	109 - 203	A
			Sr-90	Bq/L	15.8	14.2	9.9 - 18.5	A
			Zn-65	Bq/L	27.3	28.5	20.0 - 37.1	A

TABLE E-3 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2011
(PAGE 2 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
September 2011	11-GrW25	Water	Gr-A	Bq/L	0.894	0.866	0.260 - 1.472	A
			Gr-B	Bq/L	5.87	4.81	2.41 - 7.22	A
	11-MaS25	Soil	Cs-134	Bq/kg	-0.213		(1)	A
			Cs-137	Bq/kg	1110	979	685 - 1273	A
			Co-57	Bq/kg	1290	1180	826 - 1534	A
			Co-60	Bq/kg	731	644	451 - 837	A
			Mn-54	Bq/kg	987	848	594 - 1102	A
			K-40	Bq/kg	753	625	438 - 813	W
			Sr-90	Bq/kg	276	320	224 - 416	A
			Zn-65	Bq/kg	1870	1560	1092 - 2028	A
September 2011	11-RdF25	AP	Cs-134	Bq/sample	-0.043		(1)	A
			Cs-137	Bq/sample	3.09	2.60	1.82 - 3.38	A
			Co-57	Bq/sample	5.36	5.09	3.56 - 6.62	A
			Co-60	Bq/sample	3.41	3.20	2.24 - 4.16	A
			Mn-54	Bq/sample	0.067		(1)	A
			Sr-90	Bq/sample	1.84	1.67	1.17 - 2.17	A
			Zn-65	Bq/sample	5.17	4.11	2.88 - 5.34	W
	11-GrF25	AP	Gr-A	Bq/sample	0.0058		(1)	A
			Gr-B	Bq/sample	-0.01		(1)	A
	11-RdV25	Vegetation	Cs-134	Bq/sample	0.0081		(1)	A
			Cs-137	Bq/sample	4.94	4.71	3.30 - 6.12	A
			Co-57	Bq/sample	0.0639		(1)	A
			Co-60	Bq/sample	3.36	3.38	2.37 - 4.39	A
			Mn-54	Bq/sample	5.89	5.71	4.00 - 7.42	A
			Sr-90	Bq/sample	1.31	1.26	0.88 - 1.64	A
			Zn-65	Bq/sample	6.54	6.39	4.47 - 8.31	A

(1) False positive test.

(2) Evaluated as failed due to not reporting a previously reported analyte. NCR 11-11

(3) The filter for Gross Alpha was counted on the wrong side. Recounted on the correct side resulted in acceptable results. NCR 11-11

(a) Teledyne Brown Engineering reported result.

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

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

TABLE E-4 ERA (a) STATISTICAL SUMMARY PROFICIENCY TESTING PROGRAM[a]
ENVIRONMENTAL, INC., 2011

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result [b]	ERA Result [c]	Control Limits	Acceptance
STW-1243	04/04/11	Sr-89	68.2 ± 5.8	63.2	51.1 - 71.2	Pass
STW-1243	04/04/11	Sr-90	44.3 ± 2.4	42.5	31.3 - 48.8	Pass
STW-1244	04/04/11	Ba-133	69.8 ± 3.9	75.3	63.0 - 82.8	Pass
STW-1244	04/04/11	Co-60	87.9 ± 3.8	88.8	79.9 - 100.0	Pass
STW-1244	04/04/11	Cs-134	69.5 ± 3.7	72.9	59.5 - 80.2	Pass
STW-1244	04/04/11	Cs-137	77.9 ± 5.3	77.0	69.3 - 87.4	Pass
STW-1244	04/04/11	Zn-65	105.2 ± 8.4	98.9	89.0 - 118.0	Pass
STW-1245	04/04/11	Gr. Alpha	41.5 ± 2.3	50.1	26.1 - 62.9	Pass
STW-1245	04/04/11	Gr. Beta	48.9 ± 1.8	49.8	33.8 - 56.9	Pass
STW-1246	04/04/11	I-131	26.6 ± 1.7	27.5	22.9 - 32.3	Pass
STW-1248	04/04/11	H-3	10322 ± 285	10200.0	8870 - 11200	Pass
STW-1256	10/07/11	Sr-89	68.7 ± 6.0	69.7	56.9 - 77.9	Pass
STW-1256	10/07/11	Sr-90	36.9 ± 2.4	41.1	30.2 - 47.2	Pass
STW-1257	10/07/11	Ba-133	88.2 ± 7.8	96.9	81.8 - 106.0	Pass
STW-1257	10/07/11	Co-60	116.5 ± 7.1	119.0	107.0 - 133.0	Pass
STW-1257 [d]	10/07/11	Cs-134	38.8 ± 8.0	33.4	26.3 - 36.7	Fail
STW-1257	10/07/11	Cs-137	45.6 ± 7.3	44.3	39.4 - 51.7	Pass
STW-1257	10/07/11	Zn-65	84.9 ± 15.4	76.8	68.9 - 92.5	Pass
STW-1258	10/07/11	Gr. Alpha	35.7 ± 3.8	53.2	27.8 - 66.6	Pass
STW-1258	10/07/11	Gr. Beta	36.1 ± 3.3	45.9	30.9 - 53.1	Pass
STW-1259	10/07/11	I-131	25.0 ± 1.1	27.5	22.9 - 32.3	Pass
STW-1261	10/07/11	H-3	17435 ± 382	17400	15200 - 19100	Pass

[a] Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the crosscheck program for proficiency testing in drinking water conducted by Environmental Resources Associates (ERA).

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

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

[d] The sample was reanalyzed. Result of reanalysis was acceptable, 32.9 ± 7.4 pCi/L.

TABLE E-5 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)[a]
ENVIRONMENTAL, INC., 2011
(Page 1 of 2)

			Concentration [b]			
Lab Code [c]	Date	Analysis	Laboratory result	Activity	Limits [d]	Acceptance
STW-1237	02/01/11	Co-57	< 0.2	0.00	-	Pass
STW-1237	02/01/11	Co-60	24.10 ± 0.40	24.60	17.20 - 32.00	Pass
STW-1237	02/01/11	Cs-134	19.80 ± 0.40	21.50	15.10 - 28.00	Pass
STW-1237	02/01/11	Cs-137	29.40 ± 0.50	29.40	20.60 - 38.20	Pass
STW-1237	02/01/11	H-3	238.90 ± 8.80	243.00	170.00 - 316.00	Pass
STW-1237	02/01/11	K-40	95.40 ± 3.10	91.00	64.00 - 118.00	Pass
STW-1237	02/01/11	Mn-54	32.50 ± 0.60	31.60	22.10 - 41.10	Pass
STW-1237	02/01/11	Sr-90	8.70 ± 0.70	8.72	6.10 - 11.34	Pass
STW-1237	02/01/11	Zn-65	< 0.5	0.00	-	Pass
STW-1238	02/01/11	Gr. Alpha	0.82 ± 0.07	1.14	0.34 - 1.93	Pass
STW-1238	02/01/11	Gr. Beta	2.82 ± 0.07	2.96	1.48 - 4.44	Pass
STVE-1239	02/01/11	Co-57	11.27 ± 0.21	9.94	6.96 - 12.92	Pass
STVE-1239	02/01/11	Co-60	4.95 ± 0.16	4.91	3.44 - 6.38	Pass
STVE-1239	02/01/11	Cs-134	5.18 ± 0.19	5.50	3.85 - 7.15	Pass
STVE-1239	02/01/11	Cs-137	< 0.09	0.00	-	Pass
STVE-1239	02/01/11	Mn-54	6.91 ± 0.25	6.40	4.48 - 8.32	Pass
STVE-1239	02/01/11	Zn-65	3.10 ± 0.32	2.99	2.09 - 3.89	Pass
STSO-1240	02/01/11	Co-57	984.10 ± 4.10	927.00	649.00 - 1205.00	Pass
STSO-1240	02/01/11	Co-60	540.70 ± 3.00	482.00	337.00 - 627.00	Pass
STSO-1240	02/01/11	Cs-134	726.70 ± 5.92	680.00	476.00 - 884.00	Pass
STSO-1240	02/01/11	Cs-137	883.10 ± 4.70	758.00	531.00 - 985.00	Pass
STSO-1240	02/01/11	K-40	622.70 ± 16.70	540.00	378.00 - 702.00	Pass
STSO-1240	02/01/11	Mn-54	-0.30 ± 1.00	0.00	-	Pass
STSO-1240	02/01/11	Zn-65	1671.00 ± 13.10	1359.00	951.00 - 1767.00	Pass
STAP-1241	02/01/11	Co-57	3.48 ± 0.06	3.33	2.33 - 4.33	Pass
STAP-1241	02/01/11	Co-60	0.00 ± 0.02	0.00	-0.10 - 0.10	Pass
STAP-1241	02/01/11	Cs-134	3.44 ± 0.27	3.49	2.44 - 4.54	Pass
STAP-1241	02/01/11	Cs-137	2.46 ± 0.27	2.28	1.60 - 2.96	Pass
STAP-1241	02/01/11	Gr. Alpha	0.39 ± 0.05	0.66	0.20 - 1.12	Pass
STAP-1241	02/01/11	Gr. Beta	1.54 ± 0.07	1.32	0.66 - 1.99	Pass
STAP-1241	02/01/11	Mn-54	2.90 ± 0.10	2.64	1.85 - 3.43	Pass
STAP-1241 e	02/01/11	Sr-90	1.89 ± 0.15	1.36	0.95 - 1.77	Fail
STAP-1241	02/01/11	Zn-65	3.80 ± 0.18	3.18	2.23 - 4.13	Pass
STVE-1250	08/01/11	Co-57	0.01 ± 0.02	0.00	-	Pass
STVE-1250	08/01/11	Co-60	3.57 ± 0.13	3.38	2.37 - 4.39	Pass
STVE-1250	08/01/11	Cs-134	-0.02 ± 0.04	0.00	-0.10 - 0.10	Pass
STVE-1250	08/01/11	Cs-137	5.28 ± 0.20	4.71	3.30 - 6.12	Pass
STVE-1250	08/01/11	Mn-54	6.48 ± 0.22	5.71	4.00 - 7.42	Pass
STVE-1250	08/01/11	Zn-65	7.35 ± 0.34	6.39	4.47 - 8.31	Pass

TABLE E-5 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)[a] ENVIRONMENTAL, INC., 2011

			Concentration [b]			
Lab Code [c]	Date	Analysis	Laboratory result	Known Activity	Control Limits [d]	Acceptance
STSO-1251	08/01/11	Co-57	1333.90 ± 4.20	1180.00	826.00 - 1534.00	Pass
STSO-1251	08/01/11	Co-60	701.30 ± 3.40	644.00	451.00 - 837.00	Pass
STSO-1251	08/01/11	Cs-134	0.71 ± 1.05	0.00	-	Pass
STSO-1251	08/01/11	Cs-137	1106.00 ± 5.60	979.00	685.00 - 1273.00	Pass
STSO-1251	08/01/11	K-40	749.20 ± 19.00	625.00	438.00 - 813.00	Pass
STSO-1251	08/01/11	Mn-54	984.30 ± 5.40	848.00	594.00 - 1102.00	Pass
STSO-1251 f	08/01/11	Sr-90	219.40 ± 16.70	320.00	224.00 - 416.00	Fail
STSO-1251	08/01/11	Zn-65	1639.90 ± 11.40	1560.00	1092.00 - 2028.00	Pass
STAP-1252	08/01/11	Co-57	5.06 ± 0.08	5.09	3.56 - 6.62	Pass
STAP-1252	08/01/11	Co-60	3.13 ± 0.09	3.20	2.24 - 4.16	Pass
STAP-1252	08/01/11	Cs-134	0.01 ± 0.03	0.00	-0.10 - 0.10	Pass
STAP-1252	08/01/11	Cs-137	2.61 ± 0.09	2.60	1.82 - 3.38	Pass
STAP-1252	08/01/11	Mn-54	0.01 ± 0.03	0.00	-0.10 - 0.10	Pass
STAP-1252	08/01/11	Sr-90	1.65 ± 0.16	1.67	1.17 - 2.17	Pass
STAP-1252	08/01/11	Zn-65	4.46 ± 0.23	4.11	2.88 - 5.34	Pass
STW-1254	08/01/11	Co-57	37.20 ± 0.50	36.60	25.60 - 47.60	Pass
STW-1254	08/01/11	Co-60	28.80 ± 0.40	29.30	20.50 - 38.10	Pass
STW-1254	08/01/11	Cs-134	18.00 ± 0.60	19.10	13.40 - 24.80	Pass
STW-1254	08/01/11	Cs-137	0.06 ± 0.13	0.00	-	Pass
STW-1254	08/01/11	H-3	1039.90 ± 17.90	1014.00	710.00 - 1318.00	Pass
STW-1254	08/01/11	K-40	161.40 ± 4.10	156.00	109.00 - 203.00	Pass
STW-1254	08/01/11	Mn-54	25.70 ± 0.50	25.00	17.50 - 32.50	Pass
STW-1254	08/01/11	Sr-90	15.60 ± 1.80	14.20	9.90 - 18.50	Pass
STW-1254	08/01/11	Zn-65	30.20 ± 0.90	28.50	20.00 - 37.10	Pass
STW-1255	08/01/11	Gr. Alpha	0.72 ± 0.12	0.87	0.26 - 1.47	Pass
STW-1255	08/01/11	Gr. Beta	4.71 ± 0.15	4.81	2.41 - 7.22	Pass

[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] Results are reported in units of Bq/kg (soil), Bq/L (water) or Bq/total sample (filters, vegetation).

[c] Laboratory codes as follows: STW (water), STAP (air filter), STSO (soil), STVE (vegetation).

[d] MAPEP results are presented as the known values and expected laboratory precision (1 sigma, 1 determination) and control limits as defined by the MAPEP. A known value of "zero" indicates an analysis was included in the testing series as a "false positive". MAPEP does not provide control limits.

[e] No errors found in calculation or procedure, results of reanalysis; 1.73 Bq/filter.

[f] The analyses were repeated through a strontium column; mean result of triplicate analyses, 304.2 Bq/kg.

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APPENDIX F

ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

Docket No: 50-289
50-320

THREE MILE ISLAND NUCLEAR STATION
UNITS 1 and 2

Annual Radiological
Groundwater Protection Program Report (ARGPPR)

1 January Through 31 December 2011

Prepared By

Teledyne Brown Engineering
Environmental Services

Exelon SM
Nuclear

Three Mile Island Nuclear Station
Middletown, PA 17057

April 2012

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Appendix C Data Tables

Tables

I. Summary and Conclusions

In 2006, Exelon instituted a comprehensive program to evaluate the impact of station operations on groundwater and surface water in the vicinity of Three Mile Island Nuclear Station. At Three Mile Island Nuclear, 31 new permanent groundwater monitoring wells were installed in 2006. The results for all TMI wells are included in this report. This report covers groundwater, surface water, storm water, and precipitation samples, collected from the environment, both on and off station property in 2011. During that time period, 594 analyses were performed on 279 samples from 64 locations.

In assessing all the data gathered for this report, it was concluded that the operation of Three Mile Island Nuclear Station had no adverse radiological impact on the environment, and there were no known active releases at the end of 2011 into the groundwater at Three Mile Island Nuclear Station.

Gamma-emitting radionuclides associated with licensed plant operations were not detected at concentrations greater than their respective Lower Limits of Detection (LLDs) as specified in the Offsite Dose Calculation Manual (ODCM) in any of the groundwater, surface water, storm water and precipitation samples. In the case of tritium, Exelon specified that its laboratories achieve a lower limit of detection 10 times lower than that required by federal regulation.

Strontium-89/90 was not detected at a concentration greater than the LLD of 1.0 picoCurie per liter (pCi/L) in the groundwater samples tested.

Tritium was not detected in any groundwater, surface water, storm water, or precipitation water samples at concentrations greater than the United States Environmental Protection Agency (USEPA) drinking water standard (and the Nuclear Regulatory Commission Reporting Limit) of 20,000 pCi/L. Low levels of tritium were detected at concentrations greater than the LLD of 200 pCi/L in 33 of 52 groundwater monitoring locations. The groundwater tritium concentrations ranged from 170 ± 110 pCi/L to 3,780 ± 430 pCi/L. Tritium that was detected in groundwater at the Station is believed to be the result of historical releases, the recapture of gaseous tritium releases via rainwater and/or background from external sources greater than 200 pCi/L.

Gross Alpha and Gross Beta analyses in the dissolved and suspended fractions were performed on groundwater samples during the first and second quarter sampling in 2011. Gross Alpha (dissolved) was not detected in any of the groundwater locations. Gross Alpha (suspended) was detected in 3 of 31 groundwater locations. The concentrations ranged from 1.2 to 17.5 pCi/L. Gross Beta (dissolved) was detected in 27 of 31 groundwater locations. The concentrations ranged from 1.8 to 44.3 pCi/L. Gross Beta (suspended) was

detected in 2 of 31 groundwater locations. The concentrations ranged from 5.1 to 10.6 pCi/L.

Hard-To-Detect analyses were performed on a select group of groundwater locations to establish background levels. The analyses included Fe-55, Ni-63, Am-241, Cm-242, Cm-243/244, Pu-238, Pu-239/240, U-233/234, U-235 and U-238. The isotopes of U-233/234 and U-238 were detected in three of four groundwater monitoring locations. The U-233/234 concentrations ranged from 0.4 to 0.9 pCi/L and the U-238 concentrations ranged from 0.2 to 0.5 pCi/L. The levels detected are from naturally occurring isotopes and are considered background.

All other hard-to-detect nuclides were not detected at concentrations greater than their respective MDCs. The concentrations detected are from naturally occurring isotopes and are considered background.

II. Introduction

The Three Mile Island Nuclear Station (TMINS) established a revised and more comprehensive groundwater monitoring program in 2006 as part of an Exelon Nuclear fleetwide assessment.

Conestoga Rovers & Associates (CRA) performed the initial assessment. CRA prepared a Hydrogeologic Investigation Report (HIR) for Exelon to determine whether groundwater at and near TMINS has been adversely impacted by any releases of radionuclides. The CRA report documents the results of the May 2006 Hydrogeologic Investigation Work Plan. CRA assessed groundwater quality at the Station and identified locations designated as Areas for Further Evaluation. The results and conclusions of this Phase 1 study were made available to state and federal regulators, as well as the public, on an Exelon web site for station specific reports.

As a result of the Phase 1 study, the Radiological Groundwater Protection Program (RGPP) was revised to a long term monitoring program. This report covers those analyses performed by Teledyne Brown Engineering (TBE) and Environmental Inc. (Midwest Labs) on well water, surface water, precipitation water and storm water samples collected in 2011. TMINS groundwater movement is into the Susquehanna River which surrounds the station on all sides.

This report covers those analyses performed by Teledyne Brown Engineering (TBE) and Environmental Inc. (Midwest Labs) on samples collected in 2011.

A. Objective of the RGPP

The long-term objectives of the Radiological Groundwater Protection Program (RGPP) are as follows:

1. Identify suitable locations to monitor and evaluate potential impacts from station operations before significant radiological impact to the environment and potential drinking water sources.

2. Understand the local hydrogeologic regime in the vicinity of the station and maintain up-to-date knowledge of flow patterns on the surface and shallow subsurface.

3. Perform routine water sampling and radiological analysis of water from selected locations.

4. Notify stakeholders in a timely manner for new leaks, spills, or other detections with potential radiological significance.

5. Regularly assess analytical results to identify adverse trends.

6. Take necessary corrective actions to protect groundwater resources.

B. Implementation of the Objectives

The objectives identified have been implemented at Three Mile Island Nuclear Station as discussed below:

1. Three Mile Island Nuclear Station continues to sample and monitor the groundwater at the station in accordance with station procedures. Sample frequencies and locations are adjusted based on monitoring results and investigations.

2. The Three Mile Island Nuclear Station reports describe the local hydrogeologic regime. Periodically, the flow patterns on the surface and shallow subsurface are updated based on ongoing measurements.

3. Three Mile Island Nuclear Station will continue to perform routine sampling and radiological analysis of water from selected locations.

4. Three Mile Island Nuclear Station has implemented procedures to identify and report leaks, spills, or other detections with potential radiological significance in a timely manner.

5. Three Mile Island Nuclear Station staff and consulting hydrogeologist assess analytical results on an ongoing basis to identify adverse trends.

C. Program Description

1. Sample Collection

Sample locations can be found in Table A-1 and Figures A-1 and A-2, Appendix A.

<u>Groundwater, Surface Water, Storm Water, and Precipitation</u>

Samples of water are collected, managed, transported and analyzed in accordance with approved procedures. Groundwater, surface water, storm water and precipitation are collected. Sample locations, sample collection frequencies and analytical frequencies are controlled in accordance with approved station procedures. Contractor and/or station personnel are trained in the collection,

preservation management, and shipment of samples, as well as in documentation of sampling events. For split samples, collectors will periodically collect samples that are sent to Midwest Labs to confirm that TBE is producing comparable data. Analytical laboratories are subject to internal quality assurance programs, industry cross-check programs, as well as nuclear industry audits. Station personnel review and evaluate all analytical data deliverables as data are received.

Analytical data results are reviewed by both station personnel and an independent hydrogeologist for adverse trends or changes to hydrogeologic conditions.

D. Characteristics of Tritium (H-3)

Tritium (chemical symbol H-3) is a radioactive isotope of hydrogen. The most common form of tritium is tritium oxide, which is also called "tritiated water." Tritiated water behaves chemically and physically like non-tritiated water in the subsurface, and therefore tritiated water will travel at the same velocity as the average groundwater velocity.

Tritium is created in the environment from naturally occurring processes both cosmic and subterranean, as well as from anthropogenic (i.e., man-made) sources. Tritium is produced naturally in the upper atmosphere when cosmic rays strike air molecules. This "cosmogenic" tritium combines with oxygen to form tritiated water, which will then enter the hydrologic cycle. Below ground, "lithogenic" tritium is produced by the bombardment of natural lithium present in crystalline rocks by neutrons produced by the radioactive decay of naturally abundant uranium and thorium. Lithogenic production of tritium is usually negligible compared to other sources due to the limited abundance of lithium in rock. The lithogenic tritium is introduced directly to groundwater.

A major anthropogenic source of tritium and strontium-90 comes from the former atmospheric testing of thermonuclear weapons. Levels of tritium in precipitation increased significantly during the 1950s and early 1960s, and later with additional testing, resulting in the release of significant amounts of tritium to the atmosphere. The Canadian heavy water nuclear power reactors, other commercial power reactors, nuclear research and weapons production continue to influence tritium concentrations in the environment.

The chemical properties of tritium are essentially those of ordinary hydrogen. Tritium can be taken into the body by drinking water, breathing air, eating food, or absorption through skin. Once tritium enters the body,

it disperses quickly and is uniformly distributed throughout the body. Tritium is excreted primarily through urine with a clearance rate characterized by an effective biological half-life of about 14 days. Within one month or so after ingestion, all tritium is essentially cleared. Organically bound tritium (tritium that is incorporated in organic compounds) can remain in the body for a longer period.

Tritium has a radiological half-life of approximately 12.3 years. It decays spontaneously to helium-3 (He-3). This radioactive decay releases a beta particle (low-energy electron). The radioactive decay of tritium is the source of the health risk from exposure to tritium. Tritium is one of the least dangerous radionuclides, because it emits very weak radiation and leaves the body relatively quickly. Since tritium is almost always found as water, it goes directly into soft tissues and organs. The associated dose to these tissues is generally uniform and is dependent on the water content of the specific tissue.

III. Program Description

A. Sample Analysis

This section describes the general analytical methodologies used by TBE and Midwest Labs to analyze the environmental samples for radioactivity for the Three Mile Island Nuclear Station RGPP in 2011.

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

1. Concentrations of gamma emitters in groundwater, surface water, precipitation water, and storm water.

2. Concentrations of strontium in groundwater.

3. Concentrations of tritium in groundwater, surface water, precipitation water and storm water.

4. Concentrations of Am-241 in groundwater.

5. Concentrations of Cm-242 and Cm-243/244 in groundwater.

6. Concentrations of Pu-238 and PU-239/240 in groundwater.

7. Concentrations of U-234, U-235 and U-238 in groundwater.

8. Concentrations of Fe-55 in groundwater.

9. Concentrations of Ni-63 in groundwater.

B. Data Interpretation

1. Lower Limit of Detection and Minimum Detectable Concentration

The lower limit of detection (LLD) is specified by federal regulation as a minimum sensitivity value that must be achieved routinely by the analytical parameter.

2. Laboratory Measurements Uncertainty

The estimated uncertainty in measurement of tritium in environmental samples is frequently on the order of 50% of the measurement value.

Statistically, the exact value of a measurement is expressed as a range with a stated level of confidence. The convention is to report results with a 95% level of confidence. The uncertainty comes from calibration standards, sample volume or weight measurements, sampling uncertainty and other factors. Exelon reports the uncertainty of a measurement created by statistical process (counting error).

Analytical uncertainties are reported at the 95% confidence level in this report for reporting consistency with the AREOR.

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

For groundwater, surface water, and storm water 13 nuclides, Be-7, K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, Cs-134, Cs-137, Ba-140 and La-140 were reported.

The radio-analytical laboratory is counting tritium results to an LLD of 200 pCi/L. Typically, the lowest positive measurement will be reported within a range of 40 – 240 pCi/L or 140 ± 100 pCi/L. Clearly, these sample results cannot be distinguished as different from background at this concentration.

IV. Results and Discussion

A. Groundwater Results

Samples were collected from on and off-site wells in accordance with the station radiological groundwater protection program. Analytical results and anomalies are discussed below.

Tritium

Samples from 52 locations were analyzed for tritium activity (Table B–I.1, Appendix B). Tritium values ranged from the detection limit to 3,780 pCi/L. Two of the locations were offsite drinking water wells with no detectable concentration of tritium.

Tritium Split Samples

Tritium values ranged from detection limit to 2,912 pCi/L (Table C–1.1, Appendix C).

Strontium

Strontium-90 was not detected above the required detection limit of 1.0 pCi/L (Table B–I.1, Appendix B)

Strontium Split Samples

Strontium-89 and Strontium-90 were not detected above the required detection limit of 1.0 pCi/L (Table C–1.1, Appendix C).

Gross Alpha and Gross Beta (dissolved and suspended)

Gross Alpha and Gross Beta analyses in the dissolved and suspended fractions were performed on groundwater water samples during the second sampling in 2011. Gross Alpha (dissolved) was not detected in any of the groundwater locations. Gross Alpha (suspended) was detected in 3 of 31 groundwater locations. The concentrations ranged from 1.2 to 17.5 pCi/L. Gross Beta (dissolved) was detected in 27 of 31 groundwater locations. The concentrations ranged from 1.8 to 44.3 pCi/L. Gross Beta (suspended) was detected in 2 of 31 groundwater locations. The concentrations ranged from 5.1 to 10.6 pCi/L (Table B-I.1, Appendix B).

Gross Alpha and Gross Beta (dissolved and suspended) Split Samples

Gross Alpha (dissolved) was not detected in any of the groundwater locations. Gross Alpha was detected in 1 of 3 groundwater locations at a concentration of 2.1 pCi/L. Gross Beta was detected in all 3 groundwater locations. The concentrations ranged from 1.4 to 2.9 pCi/L. (Table C-I.1, Appendix B).

Gamma Emitters

Potassium-40 was detected in one of 68 samples at a concentration of 65 pCi/L. No other gamma-emitting nuclides were detected (Table B–I.2, Appendix B).

Gamma Emitters Split Samples

No gamma-emitting nuclides were detected (Table C–I.2, Appendix C).

Hard-To-Detect

Hard-To-Detect analyses were performed on a select group of groundwater locations to establish background levels. The analyses included Fe-55, Ni-63, Am-241, Cm-242, Cm-243/244, Pu-238, Pu-239/240, U-233/234, U-235 and U-238. The isotopes of U-233/234 and U-238 were detected in three of four groundwater monitoring locations. The U-233/234 concentrations ranged from 0.4 to 0.9 pCi/L and the U-238 concentrations ranged from 0.2 to 0.5 pCi/L. The concentrations detected are from naturally occurring isotopes and are considered background (Table B-I.3, Appendix B).

Hard-To-Detect Split Samples

Hard to detects were not analyzed on split samples in 2011 (Table C-I.3, Appendix B).

B. Surface Water Results

Samples were collected from surface water locations in accordance with the station radiological groundwater protection program. Analytical results and anomalies are discussed below.

Tritium

Tritium was not detected above the required detection limit of 200 pCi/L (Table B-II.1, Appendix B).

Tritium Split Samples

Tritium was not detected above the required detection limit of 200 pCi/L (Table C–II.1, Appendix C)

Strontium

Surface water samples were not analyzed for Strontium-90 in 2011 (Table B–II.1, Appendix B).

Gamma Emitters

No gamma-emitting nuclides were detected (Table B–II.2, Appendix B).

Gamma Emitters Split Samples

No gamma-emitting nuclides were detected (Table C–II.2, Appendix C

C. Storm Water Results

Samples were collected from storm water locations in accordance with the station radiological groundwater protection program. Analytical results and anomalies are discussed below.

Tritium

Tritium was detected in two samples above the required detection limit of 200 pCi/L. The concentration ranged from 233 to 337 pCi/L (Table B–III.1, Appendix B).

Gamma Emitters

Samples from three locations were analyzed for gamma-emitting nuclides. No gamma emitting nuclides were detected (Table B–III.2, Appendix B).

D. Precipitation Water Results

Samples were collected at seven locations. The following analysis was performed:

Tritium

Samples from seven locations were analyzed for tritium activity. Tritium activity was detected at six of seven locations. The concentrations ranged from 200 to 783 pCi/L (Table B–IV.1, Appendix B).

Tritium Split Samples

Samples from one location were analyzed for tritium activity. Tritium activity was detected in seven of nine samples. The concentrations ranged from 153 to 685 pCi/L (Table C–III.1, Appendix C).

Gamma Emitters

Samples from four locations were analyzed for gamma-emitting nuclides. Naturally occurring K-40 was detected in two of seven samples. The concentrations ranged from 78 to 469 pCi/L. No other gamma-emitting nuclides were detected (Table B–IV.2, Appendix B).

Gamma Emitters Split Samples

No gamma-emitting nuclides were detected (Table C–III.2, Appendix C).

E. Leaks, Spills, and Releases

No new active leaks were identified at TMI in 2011. TMI continues to monitor tritium plumes from previous years and reports the dose to the public in the AREOR. No spills were determined to be reportable under voluntary reporting requirements for the NEI Groundwater Protection Initiative (GPI) as implemented in Exelon's Reportability procedure LS-AA-1120, RAD 1.34.

F. Actions Taken

1. Compensatory Actions

TMI continues to monitor groundwater radioactivity as part of natural monitored attenuation of historical leaks.

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APPENDIX A

LOCATION DESIGNATION & DISTANCE

TABLE A-1: **Radiological Groundwater Protection Program - Sampling Locations and Distance, Three Mile Island Nuclear Station, 2011**

Site	Site Type
#3	Monitoring Well
48N	Monitoring Well
48S	Production Potable Well
E1-2	Monitoring Well, Offsite
EDCB	Storm Water
GP-12	Monitoring Well
GP-6	Monitoring Well
GP-8	Monitoring Well
GP-9	Monitoring Well
MS-1	Monitoring Well
MS-19	Monitoring Well
MS-2	Monitoring Well
MS-20	Monitoring Well
MS-21	Monitoring Well
MS-22	Monitoring Well
MS-3	Monitoring Well
MS-4	Monitoring Well
MS-5	Monitoring Well
MS-6	Monitoring Well
MS-7	Monitoring Well
MS-8	Monitoring Well
MW-1	Monitoring Well
MW-2	Monitoring Well
MW-3	Monitoring Well
MW-4	Monitoring Well
N2-1	Monitoring Well, Offsite
NW-A	Production Well
NW-B	Production Well
NW-C	Production Well
NW-CW	Clearwell
OS-13B	Monitoring Well
OS-14	Monitoring Well
OS-16	Monitoring Well
OS-17	Monitoring Well
OS-18	Monitoring Well
OSF	Production Potable Well
RW-1	Monitoring Well
RW-2	Monitoring Well
SW-E-1	Surface Water
SW-E-2	Surface Water
SW-E-3	Surface Water
MW-TMI-9S*	Monitoring Well
MW-TMI-10D	Monitoring Well
MW-TMI-10I	Monitoring Well
MW-TMI-10S	Monitoring Well
MW-TMI-11S*	Monitoring Well
MW-TMI-12S	Monitoring Well
MW-TMI-13I	Monitoring Well
MW-TMI-13S	Monitoring Well
MW-TMI-14D	Monitoring Well
MW-TMI-14I	Monitoring Well
MW-TMI-14S	Monitoring Well
MW-TMI-16D	Monitoring Well
MW-TMI-16I	Monitoring Well
TM-PR-ESE	Precipitation Water
TM-PR-MS-1	Precipitation Water
TM-PR-MS-2	Precipitation Water
TM-PR-MS-20	Precipitation Water
TM-PR-MS-4	Precipitation Water
TM-PR-NW-B	Precipitation Water

TABLE A-1: **Radiological Groundwater Protection Program - Sampling Locations and Distance, Three Mile Island Nuclear Station, 2011**

Site	Site Type
MW-TMI-17D	Monitoring Well
MW-TMI-17I	Monitoring Well
MW-TMI-18D	Monitoring Well
MW-TMI-19D	Monitoring Well
MW-TMI-19I	Monitoring Well
MW-TMI-1D	Monitoring Well
MW-TMI-2D	Monitoring Well
MW-TMI-3I	Monitoring Well
MW-TMI-4I	Monitoring Well
MW-TMI-4S	Monitoring Well
MW-TMI-5D	Monitoring Well
MW-TMI-6D	Monitoring Well
MW-TMI-6I	Monitoring Well
MW-TMI-7S	Monitoring Well
MW-TMI-8S	Monitoring Well
MW-TMI-9I	Monitoring Well
MW-TMI-9S	Monitoring Well
TRAINING CENTER	Offsite Monitoring Well

* NO WATER PRESENT TO SAMPLE

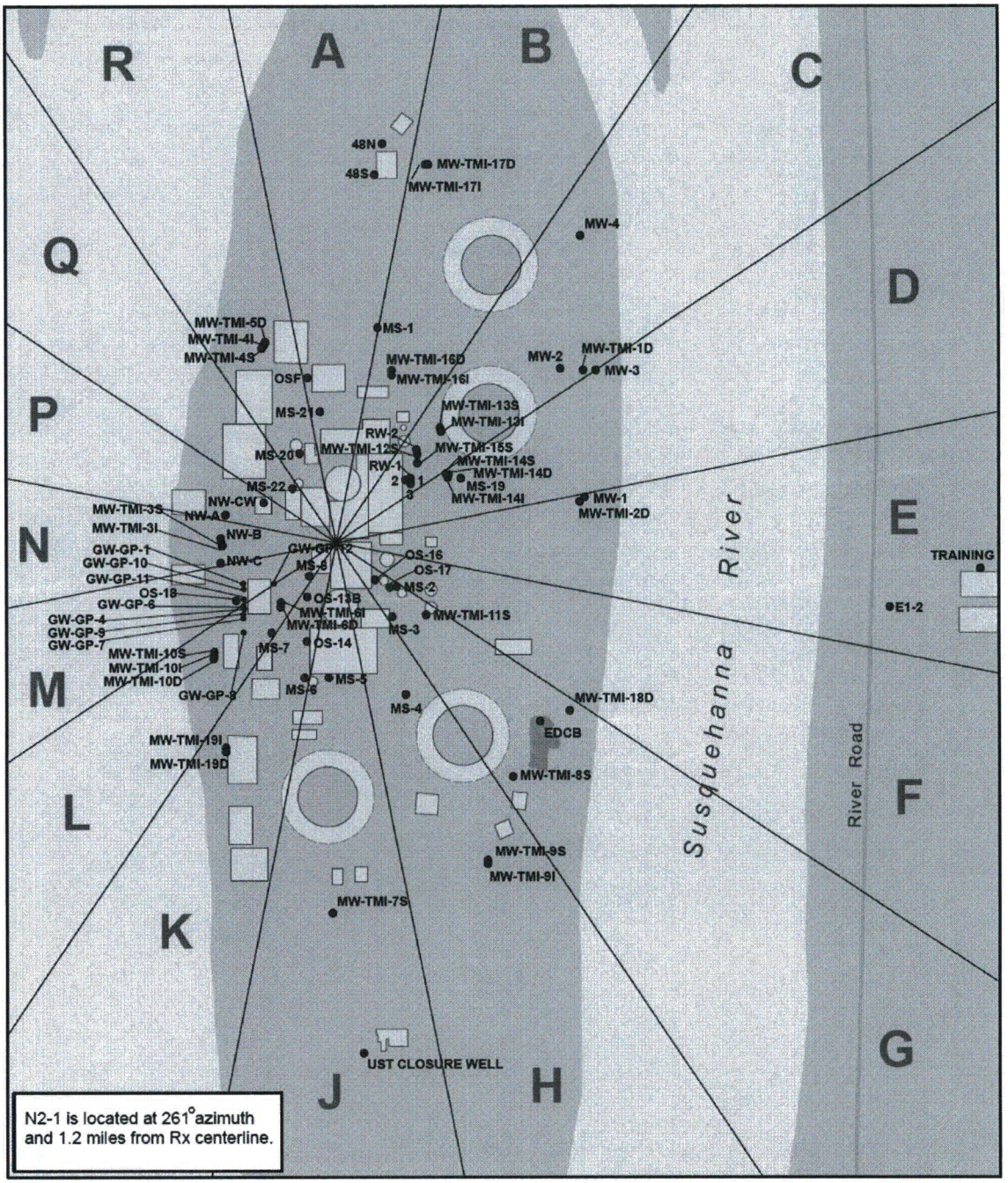

Figure A – 1
Sampling Locations at the Three Mile Island Nuclear Station, 2011

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APPENDIX B

DATA TABLES

TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	SR-90	GR-A (DIS)	GR-A (SUS)	GR-B (DIS)	GR-B (SUS)
3	01/25/11	< 163					
3	04/15/11	< 182					
3	05/03/11	< 171	< 0.7	< 0.8	1.7 ± 0.9	< 1.4	< 2.2
3	07/26/11	525 ± 133					
3	10/19/11	< 196					
3	10/19/11	< 199					
48S	01/27/11	< 177					
48S	05/03/11	< 180	< 0.7	< 1.3	< 0.4	< 2.2	< 1.9
48S	07/27/11	< 184					
48S	10/18/11	< 182					
MS-1	01/25/11	172 ± 111					
MS-1	05/04/11	< 200	< 0.8	< 2.4	< 0.5	6.4 ± 1.7	< 2.0
MS-1	07/27/11	< 183					
MS-1	10/19/11	179 ± 118					
MS-19	01/27/11	< 179					
MS-19	01/27/11	< 179					
MS-19	05/05/11	< 174	< 0.6	< 0.6	< 0.4	1.8 ± 0.9	< 1.9
MS-19	07/26/11	< 184					
MS-19	10/19/11	450 ± 135					
MS-2	01/27/11	286 ± 117					
MS-2	01/27/11	< 178					
MS-2	04/15/11	394 ± 132					
MS-2	05/03/11	325 ± 127	< 0.7	< 1.0	< 0.7	1.9 ± 1.1	< 1.9
MS-2	06/01/11	< 182					
MS-2	06/29/11	217 ± 119					
MS-2	07/26/11	353 ± 123					
MS-2	10/19/11	332 ± 135					
MS-20	01/25/11	517 ± 124		< 2.9	< 0.7	4.4 ± 2.6	< 2.6
MS-20	05/03/11	404 ± 128	< 0.7	< 1.1	< 0.6	5.5 ± 1.3	< 2.1
MS-20	07/26/11	461 ± 129					
MS-20	10/19/11	< 197					
MS-21	01/25/11	1490 ± 203					
MS-21	04/15/11	525 ± 138					
MS-21	05/03/11	348 ± 131	< 0.7	< 0.7	< 0.6	3.9 ± 1.0	< 1.8
MS-21	06/01/11	189 ± 119					
MS-21	06/29/11	< 174					
MS-21	07/26/11	190 ± 115					
MS-22	01/25/11	846 ± 143					
MS-22	05/03/11	928 ± 155	< 0.8	< 1.2	< 0.6	10.9 ± 1.5	< 2.1
MS-22	07/26/11	867 ± 150					
MS-22	10/19/11	767 ± 157					
MS-3	01/27/11	250 ± 115					
MS-3	04/15/11	198 ± 119					
MS-3	05/03/11	321 ± 128	< 0.6	< 1.1	1.5 ± 0.9	4.3 ± 1.2	< 1.9
MS-3	05/03/11	243 ± 124	< 0.7	< 1.1	1.2 ± 0.8	3.7 ± 1.2	< 1.9
MS-3	06/01/11	198 ± 118					
MS-3	06/29/11	252 ± 120					
MS-3	07/26/11	448 ± 129					
MS-3	10/19/11	314 ± 137					
MS-4	04/15/11	214 ± 122					

TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	SR-90	GR-A (DIS)	GR-A (SUS)	GR-B (DIS)	GR-B (SUS)
MS-4	05/04/11	208 ± 121					
MS-4	06/01/11	196 ± 123					
MS-4	06/29/11	262 ± 121					
MS-5	01/27/11	< 168					
MS-5	05/04/11	< 177	< 0.8				
MS-5	06/01/11	< 176					
MS-5	06/29/11	< 177					
MS-5	07/26/11	< 166					
MS-5	10/19/11	< 193					
MS-7	01/25/11	< 178					
MS-7	05/03/11	< 179	< 0.6	< 1.2	< 0.6	8.9 ± 1.5	< 1.8
MS-7	06/01/11	< 177					
MS-7	06/29/11	< 176					
MS-7	07/26/11	< 182					
MS-7	10/19/11	< 196					
MS-8	01/27/11	248 ± 111		< 2.1	< 0.8	4.9 ± 0.9	< 2.6
MS-8	05/04/11	252 ± 118	< 0.6				
MS-8	07/26/11	236 ± 126					
MS-8	07/26/11	263 ± 118					
MS-8	10/19/11	223 ± 129					
MW-1	05/05/11	< 168					
MW-2	05/05/11	< 173					
MW-TMI-10D	01/25/11	< 169					
MW-TMI-10D	05/04/11	293 ± 123					
MW-TMI-10D	07/27/11	270 ± 122					
MW-TMI-10D	10/19/11	249 ± 125					
MW-TMI-10I	01/25/11	1320 ± 192					
MW-TMI-10I	02/07/11	880 ± 141	< 0.9	< 2.6	< 1.4	3.1 ± 1.3	5.1 ± 1.9
MW-TMI-10I	05/04/11	1560 ± 213	< 0.6	< 0.8	< 0.8	3.9 ± 1.1	< 2.0
MW-TMI-10I	07/27/11	1570 ± 206					
MW-TMI-10I	10/19/11	1630 ± 226					
MW-TMI-10I	10/19/11	1510 ± 214					
MW-TMI-10S	01/25/11	3780 ± 430					
MW-TMI-10S	05/04/11	1200 ± 180	< 0.7	< 0.8	< 0.8	5.7 ± 1.2	< 2.0
MW-TMI-10S	07/27/11	3310 ± 374					
MW-TMI-10S	07/27/11	2640 ± 318					
MW-TMI-10S	10/19/11	2140 ± 275					
MW-TMI-12S	01/25/11	< 159		< 3.3	< 0.8	24.1 ± 4.4	< 2.6
MW-TMI-12S	05/03/11	< 175	< 0.7	< 0.6	< 0.4	2.3 ± 0.9	< 1.9
MW-TMI-12S	07/27/11	< 199					
MW-TMI-12S	10/19/11	< 194					
MW-TMI-13I	01/27/11	419 ± 122					
MW-TMI-13I	05/04/11	282 ± 140					
MW-TMI-13I	07/26/11	350 ± 124					
MW-TMI-13I	10/18/11	231 ± 125					
MW-TMI-13I	10/18/11	301 ± 129					
MW-TMI-13S	01/27/11	< 166					
MW-TMI-13S	05/04/11	< 179	< 0.7	< 0.9	< 0.5	8.0 ± 1.3	< 2.0
MW-TMI-13S	05/04/11	< 200	< 0.6	< 0.8	< 0.5	5.7 ± 1.1	< 2.0
MW-TMI-13S	07/26/11	< 180					

TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	SR-90	GR-A (DIS)	GR-A (SUS)	GR-B (DIS)	GR-B (SUS)
MW-TMI-13S	10/18/11	< 182					
MW-TMI-14D	01/27/11	694 ± 136					
MW-TMI-14D	05/03/11	475 ± 150					
MW-TMI-14D	07/26/11	400 ± 139					
MW-TMI-14D	10/19/11	399 ± 133					
MW-TMI-14I	01/27/11	< 172					
MW-TMI-14I	05/03/11	< 198					
MW-TMI-14I	07/26/11	250 ± 124					
MW-TMI-14I	10/19/11	187 ± 122					
MW-TMI-14S	01/27/11	< 168					
MW-TMI-14S	05/03/11	< 177	< 1.0	< 0.5	< 0.5	2.2 ± 0.9	< 2.0
MW-TMI-14S	07/26/11	245 ± 125					
MW-TMI-14S	07/26/11	344 ± 131					
MW-TMI-14S	10/19/11	< 178					
MW-TMI-16D	01/27/11	729 ± 139					
MW-TMI-16D	01/27/11	591 ± 136					
MW-TMI-16D	05/04/11	562 ± 135					
MW-TMI-16D	07/27/11	266 ± 127					
MW-TMI-16D	10/19/11	423 ± 141					
MW-TMI-16I	01/27/11	170 ± 110					
MW-TMI-16I	05/04/11	< 179					
MW-TMI-16I	07/27/11	< 181					
MW-TMI-16I	10/19/11	< 195					
MW-TMI-17I	05/04/11	< 173					
MW-TMI-18D	05/04/11	< 182					
MW-TMI-18D	05/04/11	< 176					
MW-TMI-19I	05/03/11	< 191					
MW-TMI-1D	05/05/11	413 ± 133					
MW-TMI-2D	01/27/11	513 ± 126					
MW-TMI-2D	05/04/11	357 ± 127	< 0.6	< 0.5	< 0.8	5.0 ± 0.9	< 2.0
MW-TMI-2D	07/26/11	657 ± 140					
MW-TMI-2D	10/19/11	358 ± 136					
MW-TMI-3I	01/25/11	190 ± 112					
MW-TMI-3I	05/05/11	368 ± 131	< 0.5	< 2.2	< 0.6	6.3 ± 1.6	< 1.9
MW-TMI-3I	07/27/11	254 ± 116					
MW-TMI-3I	10/20/11	< 175					
MW-TMI-3I	10/20/11	< 175					
MW-TMI-4I	05/03/11	< 193					
MW-TMI-4I	05/03/11	< 191					
MW-TMI-4S	05/03/11	< 190	< 0.7	< 1.7	< 0.5	6.5 ± 1.7	< 1.9
MW-TMI-6D	01/25/11	< 169					
MW-TMI-6D	05/03/11	< 191	< 1.0	< 2.3	< 0.9	12.7 ± 1.8	< 2.0
MW-TMI-6D	05/03/11	< 192	< 0.7	< 2.3	< 0.9	44.3 ± 2.7	< 2.0
MW-TMI-6D	07/26/11	364 ± 125					
MW-TMI-6D	10/19/11	< 194					
MW-TMI-6I	01/25/11	348 ± 119					
MW-TMI-6I	05/03/11	201 ± 127	< 0.6	< 1.1	< 0.9	< 1.6	< 2.0
MW-TMI-6I	07/26/11	< 178					
MW-TMI-6I	10/19/11	< 194					
MW-TMI-7S	05/05/11	< 181					

TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	SR-90	GR-A (DIS)	GR-A (SUS)	GR-B (DIS)	GR-B (SUS)
MW-TMI-8S	05/03/11	< 200					
MW-TMI-9I	05/03/11	< 191					
MW-TMI-9S	05/03/11	< 192					
NW-A	01/27/11	512 ± 134					
NW-A	05/03/11	494 ± 136	< 0.6	< 1.1	< 1.0	3.3 ± 1.1	< 1.9
NW-A	08/02/11	448 ± 133					
NW-A	10/20/11	462 ± 133					
NW-B	01/27/11	405 ± 129					
NW-B	05/03/11	627 ± 145	< 0.5	< 1.2	< 1.0	3.6 ± 1.2	< 1.9
NW-B	08/02/11	501 ± 138					
NW-B	10/20/11	361 ± 124					
NW-C	01/27/11	1380 ± 200	< 0.9	< 2.2	< 1.1	< 1.9	< 2.3
NW-C	05/03/11	1660 ± 221	< 0.6	< 1.1	< 1.0	2.2 ± 1.0	< 1.9
NW-C	08/02/11	1450 ± 200					
NW-CW	01/27/11	759 ± 149					
NW-CW	01/27/11	636 ± 139					
NW-CW	05/03/11	654 ± 147	< 0.7	< 1.2	< 1.0	2.7 ± 1.1	< 1.9
NW-CW	08/02/11	602 ± 140					
NW-CW	10/20/11	463 ± 132					
OS-13B	10/19/11	206 ± 131					
OS-14	01/27/11	< 166		< 2.7	17.5 ± 2.7	7.8 ± 3.4	10.6 ± 2.2
OS-14	05/04/11	< 167	< 0.5				
OS-14	07/26/11	< 177					
OS-14	07/26/11	< 183					
OS-14	10/19/11	< 195					
OS-16	01/27/11	394 ± 121					
OS-16	04/15/11	489 ± 136					
OS-16	05/03/11	400 ± 127	< 0.6	< 0.5	< 0.5	4.6 ± 1.0	< 1.9
OS-16	07/26/11	522 ± 134					
OS-16	10/19/11	379 ± 140					
OS-17	04/15/11	252 ± 126					
OS-18	01/25/11	307 ± 123					
OS-18	05/03/11	247 ± 130	< 0.6	< 0.8	< 0.9	3.0 ± 1.0	< 2.0
OS-18	06/01/11	< 178					
OS-18	06/01/11	184 ± 117					
OS-18	06/29/11	< 176					
OS-18	06/29/11	< 178					
OS-18	07/26/11	186 ± 122					
OS-18	10/20/11	< 175					
OSF	01/27/11	304 ± 122					
OSF	05/03/11	218 ± 137	< 0.9	< 2.6	< 0.4	7.9 ± 2.0	< 1.9
OSF	07/27/11	< 180					
OSF	10/18/11	253 ± 123					
RW-1	01/25/11	< 161					
RW-1	05/03/11	< 175	< 0.6	< 0.7	< 0.6	2.1 ± 0.9	< 2.1
RW-1	07/26/11	< 199					
RW-1	10/19/11	< 197					
RW-2	01/25/11	< 161					
RW-2	05/03/11	< 180	< 0.8	< 1.1	< 0.7	4.2 ± 1.3	< 1.9
RW-2	06/01/11	< 186					

TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	SR-90	GR-A (DIS)	GR-A (SUS)	GR-B (DIS)	GR-B (SUS)
RW-2	06/29/11	182 ± 119					
RW-2	07/27/11	< 176					
RW-2	10/19/11	< 199					
TRAINING CENTEF	05/04/11	< 173					

TABLE B-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
3	05/03/11	< 26	< 19	< 2	< 3	< 6	< 3	< 5	< 3	< 5	< 2	< 2	< 26	< 6
MS-19	05/05/11	< 25	< 47	< 2	< 3	< 7	< 2	< 5	< 3	< 5	< 2	< 3	< 25	< 8
MS-2	05/03/11	< 24	< 19	< 2	< 3	< 7	< 2	< 4	< 3	< 4	< 2	< 2	< 47	< 14
MS-20	05/03/11	< 23	< 51	< 2	< 3	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 24	< 7
MS-21	05/03/11	< 26	< 14	< 2	< 2	< 6	< 2	< 4	< 3	< 5	< 2	< 2	< 41	< 11
MS-22	05/03/11	< 24	< 21	< 2	< 2	< 6	< 2	< 4	< 3	< 4	< 2	< 2	< 22	< 5
MS-3	01/27/11	< 41	< 40	< 4	< 4	< 9	< 5	< 8	< 5	< 7	< 4	< 5	< 22	< 9
MS-3	05/03/11	< 28	< 14	< 2	< 3	< 5	< 2	< 3	< 3	< 5	< 2	< 2	< 34	< 14
MS-3	05/03/11	< 26	< 70	< 2	< 3	< 7	< 2	< 4	< 3	< 5	< 2	< 2	< 48	< 14
MS-3	07/26/11	< 49	< 55	< 4	< 5	< 11	< 5	< 9	< 5	< 9	< 4	< 5	< 39	< 12
MS-3	10/19/11	< 39	< 76	< 4	< 4	< 8	< 4	< 7	< 5	< 8	< 4	< 4	< 28	< 11
MS-4	05/04/11	< 19	< 34	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 1	< 2	< 35	< 9
MS-5	01/27/11	< 43	< 52	< 5	< 6	< 11	< 5	< 12	< 6	< 10	< 4	< 6	< 26	< 9
MS-5	05/04/11	< 26	< 57	< 2	< 3	< 7	< 1	< 4	< 2	< 5	< 2	< 2	< 42	< 15
MS-5	07/26/11	< 45	< 80	< 4	< 5	< 11	< 4	< 9	< 5	< 8	< 5	< 4	< 30	< 10
MS-5	10/19/11	< 32	< 100	< 4	< 4	< 11	< 4	< 7	< 4	< 8	< 4	< 4	< 26	< 9
MS-7	05/03/11	< 28	< 17	< 2	< 3	< 6	< 2	< 5	< 3	< 5	< 2	< 2	< 44	< 13
MS-8	05/04/11	< 25	< 20	< 2	< 2	< 6	< 2	< 4	< 3	< 4	< 2	< 2	< 37	< 15
MS-8	07/26/11	< 45	< 81	< 5	< 5	< 11	< 5	< 10	< 4	< 8	< 4	< 4	< 32	< 9
MS-8	07/26/11	< 36	< 61	< 4	< 4	< 11	< 4	< 9	< 4	< 8	< 4	< 4	< 33	< 9
MS-8	10/19/11	< 34	< 28	< 3	< 3	< 8	< 3	< 7	< 4	< 6	< 3	< 4	< 26	< 7
MW-1	05/05/11	< 17	< 13	< 2	< 2	< 4	< 1	< 3	< 2	< 3	< 1	< 1	< 19	< 7
MW-2	05/05/11	< 22	< 22	< 2	< 2	< 5	< 2	< 4	< 3	< 5	< 2	< 3	< 20	< 7
MW-TMI-10I	02/07/11	< 46	< 51	< 6	< 6	< 10	< 6	< 12	< 6	< 9	< 5	< 6	< 32	< 10
MW-TMI-10I	05/04/11	< 44	< 45	< 4	< 5	< 8	< 4	< 7	< 5	< 7	< 5	< 5	< 35	< 9
MW-TMI-10I	10/19/11	< 23	< 31	< 2	< 3	< 8	< 3	< 4	< 3	< 6	< 3	< 3	< 21	< 9
MW-TMI-10I	10/19/11	< 36	< 25	< 3	< 4	< 7	< 3	< 7	< 4	< 6	< 3	< 3	< 24	< 8
MW-TMI-10S	05/04/11	< 34	< 72	< 3	< 4	< 9	< 4	< 7	< 4	< 8	< 4	< 4	< 26	< 8
MW-TMI-10S	10/19/11	< 40	< 105	< 5	< 5	< 10	< 5	< 10	< 6	< 10	< 4	< 5	< 33	< 11
MW-TMI-12S	05/03/11	< 21	65 ± 41	< 2	< 2	< 5	< 2	< 4	< 3	< 4	< 2	< 2	< 24	< 7
MW-TMI-13S	05/04/11	< 18	< 11	< 1	< 2	< 3	< 1	< 3	< 2	< 2	< 1	< 2	< 27	< 14
MW-TMI-13S	05/04/11	< 22	< 14	< 2	< 2	< 6	< 2	< 3	< 3	< 4	< 2	< 2	< 41	< 12
MW-TMI-14S	05/03/11	< 24	< 15	< 2	< 2	< 6	< 2	< 4	< 2	< 5	< 2	< 2	< 44	< 13
MW-TMI-17I	05/04/11	< 28	< 27	< 3	< 3	< 7	< 3	< 6	< 4	< 6	< 3	< 3	< 23	< 8

TABLE B-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
MW-TMI-18D	05/04/11	< 31	< 73	< 3	< 3	< 8	< 3	< 7	< 5	< 6	< 3	< 4	< 26	< 9
MW-TMI-18D	05/04/11	< 30	< 65	< 3	< 4	< 7	< 3	< 7	< 4	< 6	< 3	< 4	< 26	< 8
MW-TMI-19I	05/03/11	< 11	< 25	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 1	< 1	< 18	< 5
MW-TMI-1D	05/05/11	< 28	< 15	< 2	< 3	< 7	< 2	< 3	< 3	< 4	< 2	< 2	< 40	< 13
MW-TMI-2D	05/04/11	< 41	< 97	< 5	< 5	< 10	< 5	< 9	< 5	< 9	< 4	< 5	< 37	< 6
MW-TMI-3I	05/05/11	< 23	< 57	< 2	< 3	< 6	< 2	< 4	< 3	< 4	< 2	< 2	< 40	< 12
MW-TMI-4I	05/03/11	< 10	< 27	< 1	< 1	< 2	< 1	< 2	< 1	< 2	< 1	< 1	< 15	< 5
MW-TMI-4I	05/03/11	< 11	< 23	< 1	< 1	< 2	< 1	< 2	< 1	< 2	< 1	< 1	< 16	< 5
MW-TMI-4S	05/03/11	< 9	< 6	< 1	< 1	< 2	< 1	< 2	< 1	< 2	< 1	< 1	< 14	< 4
MW-TMI-6D	05/03/11	< 10	< 8	< 1	< 1	< 2	< 1	< 2	< 1	< 2	< 1	< 1	< 16	< 5
MW-TMI-6D	05/03/11	< 11	< 7	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 1	< 1	< 17	< 6
MW-TMI-6I	05/03/11	< 7	< 13	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 11	< 4
MW-TMI-7S	05/05/11	< 22	< 19	< 2	< 3	< 5	< 1	< 4	< 2	< 4	< 2	< 2	< 37	< 8
MW-TMI-8S	05/03/11	< 9	< 5	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 14	< 4
MW-TMI-9I	05/03/11	< 8	< 6	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 14	< 4
MW-TMI-9S	05/03/11	< 9	< 7	< 1	< 1	< 2	< 1	< 2	< 1	< 2	< 1	< 1	< 17	< 6
NW-C	01/27/11	< 20	< 41	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 4
OS-13B	10/19/11	< 36	< 38	< 4	< 4	< 8	< 4	< 8	< 4	< 7	< 4	< 4	< 32	< 9
OS-14	05/04/11	< 22	< 18	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 2	< 2	< 36	< 13
OS-14	07/26/11	< 36	< 37	< 3	< 3	< 8	< 3	< 7	< 4	< 8	< 4	< 4	< 27	< 9
OS-14	07/26/11	< 36	< 94	< 4	< 4	< 10	< 6	< 9	< 5	< 10	< 4	< 5	< 30	< 10
OS-14	10/19/11	< 35	< 36	< 3	< 3	< 8	< 3	< 6	< 4	< 6	< 3	< 3	< 27	< 9
OS-16	01/27/11	< 40	< 95	< 5	< 5	< 8	< 4	< 9	< 6	< 9	< 4	< 5	< 24	< 7
OS-16	05/03/11	< 23	< 22	< 2	< 2	< 6	< 2	< 4	< 3	< 5	< 2	< 2	< 23	< 9
OS-16	07/26/11	< 37	< 35	< 3	< 4	< 9	< 3	< 7	< 5	< 6	< 3	< 4	< 28	< 9
OS-16	10/19/11	< 40	< 76	< 4	< 4	< 9	< 5	< 7	< 5	< 8	< 4	< 4	< 27	< 10
RW-1	05/03/11	< 24	< 20	< 2	< 2	< 6	< 2	< 4	< 3	< 5	< 2	< 2	< 23	< 8
RW-2	05/03/11	< 29	< 24	< 2	< 2	< 8	< 2	< 3	< 3	< 4	< 2	< 3	< 48	< 12
TM-48S	05/03/11	< 26	< 49	< 2	< 2	< 4	< 2	< 4	< 3	< 4	< 2	< 2	< 43	< 15
TM-MS-1	05/04/11	< 37	< 76	< 2	< 4	< 5	< 2	< 3	< 3	< 5	< 2	< 3	< 44	< 14
TM-NW-A	05/03/11	< 24	< 12	< 1	< 2	< 5	< 1	< 3	< 2	< 4	< 2	< 2	< 37	< 11
TM-NW-B	05/03/11	< 21	< 14	< 2	< 2	< 5	< 2	< 4	< 3	< 5	< 1	< 2	< 34	< 15
TM-NW-C	05/03/11	< 24	< 17	< 2	< 2	< 6	< 2	< 3	< 2	< 4	< 2	< 2	< 36	< 14
TM-NW-CW	05/03/11	< 19	< 15	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 2	< 2	< 35	< 12

TABLE B-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
TM-OS-18	05/03/11	< 8	< 18	< 1	< 1	< 2	< 1	< 1	< 1	< 2	< 1	< 1	< 15	< 4
TM-OSF	05/03/11	< 25	< 82	< 2	< 3	< 8	< 3	< 4	< 4	< 6	< 2	< 3	< 52	< 13
TRAINING CENTER	05/04/11	< 40	< 67	< 4	< 4	< 9	< 4	< 9	< 6	< 8	< 4	< 4	< 30	< 9

TABLE B-I.3 **CONCENTRATIONS OF HARD TO DETECTS IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	AM-241	CM-242	CM-243/244	PU-238	PU-239/240	U-233/234	U-235	U-238	FE-55	NI-63
MW-TMI-10I	02/07/11	< 0.12	< 0.10	< 0.04	< 0.03	< 0.05	0.4 ± 0.2	< 0.07	0.4 ± 0.2	< 153	< 3.0
MW-TMI-10I	05/04/11	< 0.10	< 0.10	< 0.06	< 0.14	< 0.05	0.4 ± 0.2	< 0.06	0.2 ± 0.1	< 166	< 3.7
MW-TMI-10S	05/04/11	< 0.12	< 0.11	< 0.05	< 0.06	< 0.07	< 0.1	< 0.07	< 0.1	< 72	< 3.6
NW-C	01/27/11	< 0.03	< 0.12	< 0.13	< 0.08	< 0.08	0.9 ± 0.2	< 0.03	0.5 ± 0.2	< 127	< 3.1

TABLE B-II.1 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
SW-E-1	01/24/11	< 176
SW-E-1	05/04/11	< 199
SW-E-1	07/27/11	< 182
SW-E-1	10/18/11	< 183
SW-E-2	01/25/11	< 174
SW-E-2	05/04/11	< 200
SW-E-2	07/27/11	< 185
SW-E-2	10/18/11	< 182
SW-E-3	01/25/11	< 167
SW-E-3	05/04/11	< 199
SW-E-3	05/04/11	< 199
SW-E-3	07/27/11	< 183
SW-E-3	10/18/11	< 182

TABLE B-II.2 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
SW-E-1	05/04/11	< 40	< 12	< 4	< 3	< 8	< 3	< 7	< 4	< 7	< 3	< 3	< 57	< 15
SW-E-2	05/04/11	< 34	< 69	< 3	< 4	< 8	< 3	< 7	< 4	< 6	< 3	< 3	< 29	< 8
SW-E-3	05/04/11	< 39	< 39	< 4	< 4	< 6	< 4	< 8	< 4	< 7	< 3	< 4	< 31	< 9
SW-E-3	05/04/11	< 34	< 28	< 3	< 3	< 7	< 3	< 6	< 4	< 7	< 3	< 3	< 26	< 6

TABLE B-III.1 CONCENTRATIONS OF TRITIUM IN STORM WATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	H-3
EDCB	02/08/11 - 03/29/11	233 ± 102
EDCB	05/03/11 - 06/28/11	< 178
EDCB	08/02/11 - 09/27/11	< 188
EDCB	11/08/11 - 01/03/12	337 ± 124

TABLE B-III.2 **CONCENTRATIONS OF GAMMA EMITTERS IN STORM WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
EDCB	02/08/11 - 03/29/11	< 14	< 11	< 1	< 1	< 3	< 1	< 2	< 2	< 2	< 1	< 1	< 12	< 3
EDCB	05/03/11 - 06/28/11	< 45	< 47	< 5	< 3	< 9	< 3	< 8	< 5	< 8	< 4	< 5	< 32	< 12
EDCB	08/02/11 - 09/27/11	< 14	< 30	< 2	< 2	< 3	< 2	< 3	< 2	< 3	< 2	< 2	< 7	< 2
EDCB	11/01/11 - 01/03/12	< 45	< 90	< 4	< 4	< 11	< 4	< 9	< 5	< 8	< 4	< 5	< 24	< 6

TABLE B-IV.1 CONCENTRATIONS OF TRITIUM IN PRECIPITATION WATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
TM-PR-ESE	03/07/11	< 198
TM-PR-ESE	03/15/11	461 ± 131
TM-PR-ESE	04/12/11	< 180
TM-PR-ESE	05/03/11	307 ± 130
TM-PR-ESE	05/27/11	315 ± 124
TM-PR-ESE	06/11/11	< 181
TM-PR-ESE	06/24/11	487 ± 147
TM-PR-ESE	07/10/11	211 ± 125
TM-PR-ESE	10/04/11	< 184
TM-PR-MS-1	03/07/11	< 178
TM-PR-MS-1	03/15/11	< 170
TM-PR-MS-1	04/12/11	< 181
TM-PR-MS-1	05/03/11	< 173
TM-PR-MS-1	05/27/11	< 172
TM-PR-MS-1	06/11/11	< 184
TM-PR-MS-1	06/24/11	< 195
TM-PR-MS-1	07/10/11	< 182
TM-PR-MS-1	10/04/11	< 181
TM-PR-MS-2	03/07/11	< 175
TM-PR-MS-2	03/15/11	489 ± 133
TM-PR-MS-2	04/12/11	< 180
TM-PR-MS-2	05/03/11	218 ± 125
TM-PR-MS-2	05/27/11	323 ± 124
TM-PR-MS-2	06/11/11	< 182
TM-PR-MS-2	06/24/11	343 ± 139
TM-PR-MS-2	07/10/11	228 ± 124
TM-PR-MS-2	10/04/11	< 187
TM-PR-MS-20	05/10/11	242 ± 125
TM-PR-MS-20	05/27/11	< 186
TM-PR-MS-20	06/11/11	200 ± 120
TM-PR-MS-20	06/24/11	< 198
TM-PR-MS-20	07/10/11	< 182
TM-PR-MS-20	10/04/11	405 ± 138
TM-PR-MS-4	03/07/11	< 193
TM-PR-MS-4	03/15/11	239 ± 119
TM-PR-MS-4	04/12/11	< 179
TM-PR-MS-4	05/03/11	< 183
TM-PR-MS-4	05/27/11	230 ± 119
TM-PR-MS-4	06/11/11	< 180
TM-PR-MS-4	06/24/11	< 198
TM-PR-MS-4	07/10/11	< 187
TM-PR-MS-4	10/04/11	< 185
TM-PR-NW-B	05/03/11	< 185
TM-PR-NW-B	05/10/11	300 ± 131
TM-PR-NW-B	05/18/11	< 184
TM-PR-NW-B	05/27/11	< 176
TM-PR-NW-B	06/01/11	306 ± 135
TM-PR-NW-B	06/11/11	< 167
TM-PR-NW-B	06/17/11	< 176
TM-PR-NW-B	06/24/11	< 195

TABLE B-IV.1 CONCENTRATIONS OF TRITIUM IN PRECIPITATION WATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
TM-PR-NW-B	07/10/11	< 184
TM-PR-NW-B	10/04/11	483 ± 131
TM-PR-RW-2	05/10/11	214 ± 124
TM-PR-RW-2	05/27/11	297 ± 127
TM-PR-RW-2	06/11/11	231 ± 122
TM-PR-RW-2	06/24/11	659 ± 154
TM-PR-RW-2	07/10/11	783 ± 153
TM-PR-RW-2	10/04/11	< 176

TABLE B-IV.1 **CONCENTRATIONS OF GAMMA EMITTERS IN PRECIPITATION WATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
TM-PR-ESE	03/07/11	< 73	< 64	< 8	< 8	< 18	< 9	< 16	< 8	< 15	< 8	< 9	< 57	< 18
TM-PR-ESE	03/15/11	< 39	< 28	< 3	< 4	< 8	< 2	< 7	< 4	< 6	< 4	< 4	< 24	< 8
TM-PR-MS-1	03/07/11	< 58	< 139	< 6	< 5	< 12	< 6	< 12	< 7	< 10	< 6	< 7	< 42	< 12
TM-PR-MS-2	03/07/11	< 78	< 74	< 8	< 8	< 17	< 8	< 16	< 9	< 14	< 8	< 9	< 58	< 18
TM-PR-MS-2	03/15/11	< 33	< 59	< 3	< 4	< 7	< 3	< 6	< 4	< 6	< 3	< 4	< 27	< 8
TM-PR-MS-4	03/07/11	< 60	469 ± 155	< 6	< 6	< 14	< 6	< 14	< 7	< 11	< 7	< 7	< 45	< 13
TM-PR-MS-4	03/15/11	< 34	78 ± 40	< 3	< 4	< 8	< 3	< 7	< 4	< 6	< 3	< 4	< 26	< 8

APPENDIX C

DATA TABLES

TABLE C-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA IN GROUNDWATER SPLIT SAMPLES COLLECTEDAS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	SR-89	SR-90	GR-A	GR-B
3	10/19/11	159 ± 84				
MS-19	01/27/11	233 ± 85				
MS-2	01/27/11	296 ± 87				
MS-3	05/03/11	212 ± 82	< 0.7	< 0.5	< 1.8	2.4 ± 1.1
MS-8	07/26/11	246 ± 96				
MW-TMI-10I	10/19/11	1727 ± 140				
MW-TMI-10S	07/27/11	2912 ± 177				
MW-TMI-13I	10/18/11	281 ± 90				
MW-TMI-13S	05/04/11	177 ± 83	< 1.0	< 0.6	< 0.9	2.9 ± 0.6
MW-TMI-14S	07/26/11	217 ± 95				
MW-TMI-16D	01/27/11	783 ± 107				
MW-TMI-18D	05/04/11	< 142				
MW-TMI-3I	10/20/11	< 145				
MW-TMI-4I	05/03/11	< 142				
MW-TMI-6D	05/03/11	191 ± 84	< 0.8	< 0.6	2.1 ± 0.9	1.4 ± 0.6
NW-CW	01/27/11	724 ± 104				
OS-14	07/26/11	202 ± 94				
TM-OS-18	06/01/11	235 ± 84				
TM-OS-18	06/29/11	174 ± 82				

TABLE C-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SPLIT SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
MW-TMI-6D	05/03/11	< 26	< 68	< 3	< 2	< 7	< 3	< 4	< 2	< 5	< 3	< 3	< 24	< 4
MW-TMI-4I	05/03/11	< 21	< 48	< 2	< 2	< 7	< 2	< 3	< 3	< 5	< 3	< 3	< 14	< 3
MW-TMI-13S	05/04/11	< 32	< 73	< 3	< 2	< 5	< 3	< 5	< 4	< 3	< 4	< 2	< 24	< 3
MW-TMI-18D	05/04/11	< 35	< 70	< 3	< 2	< 7	< 3	< 5	< 3	< 5	< 4	< 4	< 18	< 4
MS-3	05/03/11	< 31	< 67	< 3	< 3	< 5	< 3	< 4	< 2	< 4	< 3	< 2	< 29	< 4
OS-14	07/26/11	< 32	< 50	< 3	< 3	< 6	< 2	< 3	< 4	< 5	< 3	< 2	< 24	< 3
MS-8	07/27/11	< 26	< 46	< 1	< 3	< 5	< 2	< 3	< 2	< 5	< 2	< 2	< 21	< 4
MW-TMI-10I	10/19/11	< 27	< 54	< 3	< 2	< 6	< 2	< 5	< 5	< 5	< 3	< 3	< 10	< 3

TABLE C-I.3 CONCENTRATIONS OF HARD TO DETECTS IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	AM-241	CM-242	CM-243/244	PU-238	PU-239/240	U-233/234	U-235	U-238	FE-55	NI-63

NONE FOR 2011

TABLE C-II.1 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SPLIT SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
SW-E-3	5/4/2011	< 142

TABLE C-II.2 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SPLIT SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
SW-E-3	05/04/11	< 39	< 96	< 3	< 2	< 3	< 3	< 6	< 4	< 4	< 3	< 3	< 19	< 4

TABLE C-III.1 CONCENTRATIONS OF TRITIUM IN PRECIPITATION WATER SPLIT SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2011

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
TM-PR-MS-2Q	03/07/11	< 156
TM-PR-MS-2Q	03/15/11	407 ± 97
TM-PR-MS-2Q	04/12/11	153 ± 83
TM-PR-MS-2Q	05/03/11	225 ± 96
TM-PR-MS-2Q	05/27/11	215 ± 87
TM-PR-MS-2Q	06/11/11	378 ± 106
TM-PR-MS-2Q	06/24/11	685 ± 113
TM-PR-MS-2Q	07/10/11	171 ± 93
TM-PR-MS-2Q	10/18/11	< 149

TABLE C-III.2 **CONCENTRATIONS OF GAMMA EMITTERS IN PRECIPITATION WATER SPLIT SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2011**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
TM-PR-MS-2Q	04/12/11	< 33	< 55	< 2	< 3	< 6	< 2	< 4	< 4	< 4	< 3	< 3	< 11	< 2