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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
LICENSE NO. DPR 73
DOCKET NOS. 50-289 AND 50-320

SUBJECT: 2013 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM REPORT

In accordance with TMI 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, 2013, for the Three Mile Island Nuclear Station.

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

Sincerely,

Mark M. Newcomer
Plant Manager

MMN/LKW/dam

Attachments/Enclosures

cc: Region 1 Administrator
TMI Senior Resident Inspector
TMI-1 Senior Project Manager
TMI-2 Project Manager
GPU Nuclear Cognizant Officer
Department of Environmental Protection, Bureau of Radiation Protection

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Docket No: 50-289
50-320

THREE MILE ISLAND NUCLEAR STATION
UNITS 1 and 2

Annual Radiological
Environmental Operating Report

1 January Through 31 December 2013

Prepared By
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Environmental Services

Three Mile Island Nuclear Station
Middletown, PA 17057

April 2014

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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 2013 through 31 December 2013. During that time period, 1,703 analyses were performed on 1,307 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.

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, precipitation water and storm water results are now being reported in the ARGPPR, Appendix G. 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 ten 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 one sediment sample. 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 for I-131.

Cow milk samples were analyzed for concentrations of I-131, gamma emitting nuclides, Sr-89 and Sr-90. No I-131, Sr-89, Sr-90 activities were detected. Concentrations of naturally occurring K-40 were consistent with those detected in previous years. Occasionally Sr-90 activities are detected and are 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. Strontium-90 activity was 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.

Beginning in 2012, Exelon changed the type of dosimetry used for the Radiological Environmental Monitoring Program (REMP). Optically Stimulated Luminescent Dosimetry (OSLD) were deployed and Thermo-luminescent Dosimetry (TLD) were discontinued. This change resulted in a slight change in process and reporting of quarterly results. The relative comparison to control locations remains valid. OSLD technology is different than that used in a TLD but has the same purpose (to measure direct radiation).

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 2013 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 2013 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), Landauer and Environmental Inc. (Midwest Labs) on samples collected during the period 1 January 2013 through 31 December 2013.

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 2013. 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 three locations (B10-2, E1-2 and H1-2), in lieu of milk sampling and annually from the four food product groups at two locations (B10-2 and H1-2). B10-2 was the control location for both annual and monthly sampling. Five different kinds of vegetation samples and eleven different kinds of vegetation leaves were collected and placed in new unused plastic bags, and sent to the laboratory for analysis.

Ambient Gamma Radiation

Beginning in 2012, Exelon changed the type of dosimetry used for the Radiological Environmental Monitoring Program (REMP). Optically Stimulated Luminescent Dosimetry (OSLD) were deployed and Thermo-luminescent Dosimetry (TLD) were discontinued. This change may result in a step change in readings, up or down, depending on site characteristics. The relative comparison to control locations remains valid. OSLD technology is different than that used in a TLD but has the same purpose (to measure direct radiation). The OSLDs were placed at locations 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 dosimeter 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 station has two Al_2O_3:C Optically Stimulated Luminescence Dosimeters enclosed in plastic placed at each location in a frame located approximately three to six feet above ground level. Since each OSLD responds to radiation independently, this provides two independent detectors at each station.

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 2013. 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 affecting 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 2013 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

Q15-1

1. For the following sampling periods, the breaker was found tripped. There was a low volume but the samples were valid and sent for analyses. Breaker was reset and sampler operated normally. (IR 488572)

   01/31/13 – 02/07/13
   02/27/13 – 03/07/13
   03/14/13 – 03/21/13

A3-1

2. Numerous weekly samples impacted due to substation maintenance and power outages. Temporary power was supplied when available. Lower than normal volumes occurred, but samples were valid and sent for analyses (IR 1499482). The following weeks were impacted:

   03/28/13 – 04/04/13
   04/17/13 – 04/25/13
   04/25/13 – 05/02/13
   05/02/13 – 05/09/13
   05/16/13 – 05/23/13
   05/23/13 – 05/30/13

Q15-1

3. For the following sampling periods, the breaker was found tripped. There was insufficient or low volume. On 6/26/13 the sampler unit was replaced. Replacement sampler operated normally (IR 1523365/1534450).

   04/25/13 – 05/02/13 – sufficient volume, sample was sent, breaker reset
   05/30/13 – 06/06/13 – insufficient volume, sample not sent, breaker reset
   06/13/13 – 06/20/13 – sufficient volume, sample was sent, breaker reset
   06/20/13 – 06/26/13 – insufficient volume, sample not sent, sampler replaced

H3-1

4. For the sampling period 05/30/13 – 06/06/13, the sampler was found not running with the breaker tripped. The pump and timer were not operating. The sample volume was insufficient. The samples were not valid and were not sent for analysis. The pump was replaced and

breaker reset and the sampler was returned to service (IR 1523365).

E1-2Q

5. For the sampling period 07/04/13 – 07/11/13, the sample pump malfunctioned with the timer still running. The sample volume was insufficient. Per procedure, the samples were not valid and were not sent to the laboratory for analysis. The pump was replaced on 07/13/13 and the sampler was returned to service (IR 1538298).

G2-1

6. For the following sampling periods 09/25/13 – 10/02/13, the sampler was found not running with the breaker tripped. The sample volume was insufficient. The samples were not valid and were not sent to the laboratory for analysis. The pump was replaced on 10/09/13 and the sampler was returned to service. (IR 1574816)

   09/25/13 – 10/02/13 – insufficient volume, sample not sent, breaker reset.
   10/02/13 – 10/09/13 – insufficient volume, sample not sent, pump replaced.

<u>WATER</u>

J1-2

1. Hourly composite samples were missed when the sample line into the Susquehanna became lifted or disconnected from its anchoring cinderblocks due to river conditions. The line was repositioned and reconnected to anchor and sampler verified operating during sample collection. At all times enough sample was collected for the weekly composite sample so no grab sampling was required. (IR 488572) The impacted sampling periods were:

   01/29/13 – 02/05/13 – sufficient volume, no grab sample required
   02/05/13 – 02/12/13 – sufficient volume, no grab sample required

Q9-1Surface water

2. For the sampling period 03/26/13 – 04/02/13, the sampler was found unplugged. Plant personnel removed plug to use outlet and inadvertently did not replug. Power was re-established and 26 samples were missed. Sufficient volume was available so no grab sample was required. (IR 488572)

G15-2

3. For the sampling period 06/18/13 – 06/25/13, sampler pump error due to pump jammed/power loss. Unplugged sampler and reset. Sampler

operated normally. Sufficient sample volume collected. No grab sample was required. (IR 488572)

G15-3

4. For the following sampling periods, hourly samples were missed when sampler was turned off by water treatment plant personnel due to maintenance and equipment problems with the sewage system (IR 488572).

   07/15/13 – 07/23/13 – sufficient volume, no grab required.
   07/23/13 – 07/30/13 – sufficient volume, no grab required.
   07/30/13 – 08/07/13 – sufficient volume, no grab required.
   08/07/13 – 08/13/13 – sufficient volume, no grab required.

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

No program changes for 2013.

IV. Results and Discussion

A. Aquatic Environment

1. Surface Water

Samples were taken weekly from a continuous sampler at two locations (J1-2 and Q9-1) and weekly grab samples from one location (A3-2). Weekly samples were 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 10 of 12 samples at location J1-2 which is located immediately downstream of the TMINS effluent outfall. The concentrations ranged from 735 to 5,580 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 one sample, at a concentration of 1.1 pCi/l.

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 24 of 36 samples. The concentrations ranged from 1.7 to 5.2 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 I-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 concentration ranged from 386 to 537 pCi/L (Figures C–4, Appendix C). The hypothetical dose to the maximum exposed individual from consuming this water during both the time periods was calculated as <0.0061 mrem. (IR 1566255/1596165)

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 all 12 samples. The concentrations ranged from 2.9 to 7.0 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 not detected in any of the samples.

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 645 to 97,000 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 <3.4 pCi/l for Sr-89 and at <0.8 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 <4.0 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 2,924 to 5,278 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 8,026 to 19,290 pCi/kg dry. Cesium-137 was detected in one sediment sample at a concentration of 202 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 38 E–3 pCi/m^3 with a mean of 16 E–3 pCi/m^3. The results from the intermediate offsite locations (Group II) ranged from 6 to 48 E–3 pCi/m^3 with a mean of 17 E–3 pCi/m^3. The results from the Control location (Group III) ranged from 8 to 44 E–3 pCi/m^3 with a mean of 18 E–3 pCi/m^3. Comparison of the 2013 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 2013 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 27 samples. These concentrations ranged from 51 to 118 E–3 pCi/m3. All other 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 for I-131.

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). 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–VIII.2, Appendix C). No Sr-89 or Sr-90 activity was detected. Occasionally Sr-90 is detected and is 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 715 to 1,793 pCi/l. All other nuclides were less than the MDC.

b. Food Products

Food products were collected monthly at three locations (B10-2, E1-2 and H1-2), in lieu of milk sampling and annually from the four food product groups at two locations (B10-2, E1-2 and H1-2). B10-2 was the control location for both annual and monthly sampling. The following analyses were performed:

Strontium

Twenty-six of 32 food product samples were analyzed for concentrations of Sr-90 (Table C-IX.1, Appendix C). Strontium-90 activity was detected in 21 of 26 samples. The concentrations ranged from 3 to 30 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 20 of 32 samples. These concentrations ranged from 141 to 2,637 pCi/l. Naturally occurring K-40 activity was found in all samples. The concentrations ranged from

2,005 to 9,046 pCi/l. All other nuclides were less than the MDC.

C. Ambient Gamma Radiation

Ambient gamma radiation levels were measured utilizing Optically Stimulated Luminescence Dosimeter (OSLD). Ninety OSLD locations were established around the site. Results of OSLD measurements are listed in Tables C–X.1 to C–X.3, Appendix C

All of the OSLD measurements were below 40 mR/quarter, with a range of 14.0 to 30.9 mR/standard quarter. 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. 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 through December 2013 and January 2014 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	1.2	-	2.4
3	NE	0.5	0.6	4.2	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	1.6	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	4.9
11	SW	0.5	1.0	-	-
12	WSW	0.5	1.3	-	-
13	W	0.7	1.4	-	-
14	WNW	0.4	2.2	3.7	2.4
15	NW	0.4	1.2	-	-
16	NNW	1.1	2.4	-	-

E. Radiological Impact of TMINS Operations

An assessment of potential radiological impact indicated that radiation doses to the public from 2013 operations at TMINS were well below all applicable regulatory limits and were significantly less than doses received from natural sources of radiation. The 2013 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 0.21 mrem. This dose is equivalent to 0.07% 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. Optically Stimulated Luminescent Dosimetry (OSLDs) 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 USGS Stream gauging station 01570500 located at Harrisburg, PA.

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, 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 receptors. 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, each year the hypothetical individual 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. The exposure pathway through goat milk does not currently exist. Therefore, goat milk is not included.

2. Result of Dose Calculations

The maximum hypothetical doses due to 2013 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 2013 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 2013 TMI-1 and TMI-2 liquid and airborne effluents combined was conservatively calculated to be 0.21 mrem. This dose is equivalent to 0.07% 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 2013 TMINS operations were the result of efforts to maintain releases "as low as reasonably achievable" (ALARA).

In conclusion, radioactive materials related to 2013 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 2013 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 2013 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 2013 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	2.48E-2	1.84E-4
	10 any organ	2.59E-2	2.92 E-4
From Radionuclides In Airborne Releases (Noble Gases)	5 total body, or	1.04E-4	0*
	15 skin	1.60E-4	0*
From Radionuclides In Airborne Releases (Iodines, Tritium and Particulates)	15 any organ	1.81E-1	2.67E-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	0.58
	25 total body or other organs	0.72

* *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 dosimeter data. For this calculation, exposure is assumed to be equal to dose.

The direct radiation dose from 2013 TMINS operations was 0.51 mrem. This dose was based on a maximum net fence-line exposure rate of 0.94 mR/std qtr 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 (0.21 mrem) and the dose from direct radiation (0.51 mrem) yielded a maximum hypothetical dose of 0.72 mrem.

TABLE 2

Calculated Whole Body Doses to the Maximum Individual From 2013 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	2.48E-2	1.84E-4
From Radionuclides in Airborne Releases (Noble Gases)	1.04E-4	0*
From Radionuclides In Airborne Releases (Iodines, Tritium and Particulates)	4.50E-2	2.67E-5

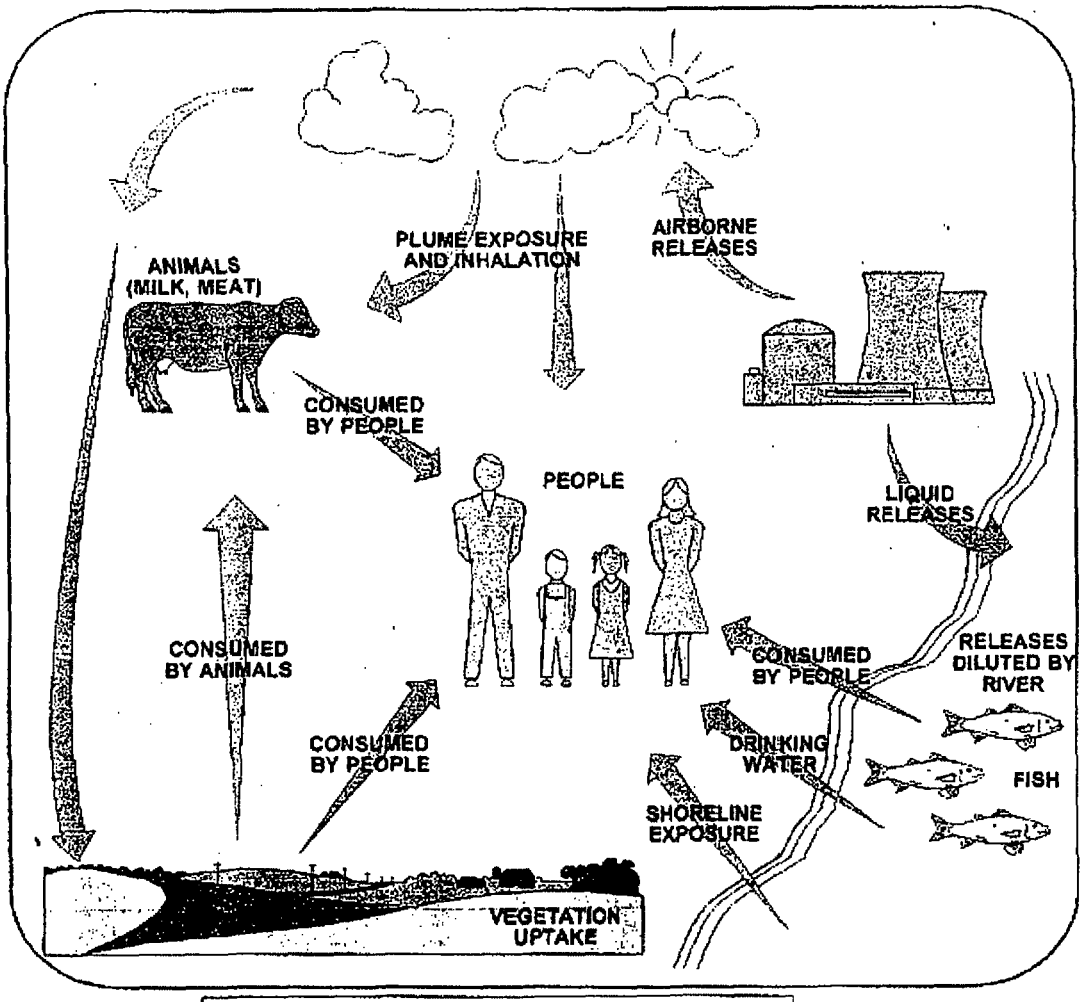
*No noble gases were released from TMI-2.

Individual Whole Body Dose Due to TMI-1 and TMI-2 Operations:	0.21 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. Errata Data

Teledyne Brown Engineering (TBE) provides data results [activity, uncertainty and minimum detectable concentration {MDC}]. We are required to calculate the MDC using a multiplier of 4.66.

$$MDA = \frac{4.66\sqrt{\frac{\beta}{\Delta t}}}{2.22\,(v)(y)\,(a)(\varepsilon)}$$

Where:

Δt = counting time for sample (minutes)

β = background rate of instrument blank (cpm)

2.22 = dpm/pCi or : 2.22×10^6 dpm/μCi

v = volume or mass of sample analyzed

y = chemical yield

ε = efficiency of the counter

The formulas for calculating the activity, uncertainty and MDC are contained in the software of the counting equipment. For the gamma system, when the new detector number 08 was added to the system in January 2012, the default value of 3.29 was used to calculated the MDCs on detector 08. The activity and uncertainty were not affected. The multiplier has been changed from 3.29 to the required 4.66.

When the MDCs are recalculated using 4.66, the MDC values will increase by 41.6%. The greatest impact will be on the short-lived nuclides which have an LLD requirement, e.g. I-131, Ba-140 and La-140. Which means there could be some missed LLDs which will be identified in the Errata Data Appendix table of the 2013 annual report. This is not a reportable issue for the NRC. There is also the possibility that naturally produced nuclides that were detected would become a non-detect, e.g Th-228, Th-230, etc.

G. 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 TBE laboratory, 178 out of 185 analyses performed met the specified acceptance criteria. Seven analyses (Sr-89 and Sr-90 in milk, Co-57, Zn-65 and Sr-90 in soil, Cs-134 in air particulate and Sr-90 in vegetation [two low warning in a row]) did not meet the specified acceptance criteria or internal QA requirements for the following reason:

1. Teledyne Brown Engineering's Analytics September 2013 Sr-89 in milk result of 63.9 pCi/L was lower than the known value of 96.0 pCi/L. The failure was a result of analyst error and was specific to the Analytics sample. Client samples for the associated time period were evaluated and no client samples were affected by this failure. NCR 13-15

2. Teledyne Brown Engineering's Analytics September 2013 Sr-90 in milk result of 8.88 pCi/L was lower than the known value of 13.2 pCi/L. The failure was a result of analyst error and was specific to the Analytics sample. Client samples for the associated time period were evaluated and no client samples were affected by this failure. NCR 13-15

3. & 4. Teledyne Brown Engineering's MAPEP September 2013 Co-57 and Zn-65 in soil were evaluated as failing the false positive test. While MAPEP evaluated the results as failures, the gamma software listed the results as non identified nuclides. The two nuclides would never have been reported as detected nuclides to a client. MAPEP does not allow laboratories to put in qualifiers for the submitted data nor "less than" results. MAPEP evaluates results based on the relationship between the activity and the uncertainty. MAPEP spiked the soil sample with an extremely large concentration of Eu-152, which was identified by the gamma software as an interfering nuclide, resulting in forced activity results that were evaluated by MAPEP as detected Co-57 and Zn-65. No client samples were affected by these failures. NCR 13-14

5. Teledyne Brown Engineering's MAPEP September 2013 Sr-90 in soil result of 664 Bq/kg was higher than the known value of 460 Bq/kg, exceeding the upper control limit of 598 Bq/kg. An incorrect Sr-90 result was entered into the MAPEP database. The correct Sr-90 activity of 322 Bq/kg would have been evaluated as acceptable with warning. No client samples were affected by this failure. NCR 13-14

6. Teledyne Brown Engineering's MAPEP September 2013 Cs-134 in air particulate activity of -0.570 Bq/sample was evaluated as a failed false positive test, based on MAPEP's evaluation of the result as a significant negative value at 3 standard deviations. A negative number would never have been reported as a detected nuclide to a client, therefore no client samples were affected by this failure. NCR 13-14

7. Teledyne Brown Engineering's MAPEP September 2013 Sr-90 in vegetation result was investigated due to two low warnings in a row. It appears the September sample was double spike with carrier, resulting in a low activity. With a recovery of around 50% lower, the Sr-90 result would have fallen within the acceptance range. No client samples were affected by this issue. NCR 13-14

For the EIML laboratory, 89 of 92 analyses met the specified acceptance criteria. Three analyses (AP - Gross Alpha, Soil - Sr-90 and Co-57) did not meet the specified acceptance criteria for the following reasons:

1. Environmental Inc., Midwest Laboratory's MAPEP February 2013 air particulate gross alpha result of 0.14 Bq/total sample was lower than the known value of 1.20 Bq/total sample, exceeding the lower control limit of 0.36 Bq/total sample. The filter was recounted overnight. No significant activity could be detected.
2. Environmental Inc., Midwest Laboratory's MAPEP February 2013 soil Co-57 result of 408.40 Bq/kg was lower than the known value of 628.0 Bq/kg, exceeding the lower control limit of 440.0 Bq/kg. The sample was reanalyzed using additional fuming nitric separations. The reanalysis result of 574.4 fell within the control limits.
3. Environmental Inc., Midwest Laboratory's MAPEP August 2013 soil C-57 result of 699.60 Bq/kg was higher than the known value of 0.00 Bq/kg, exceeding the upper control limit of 5.00 Bq/kg. Interference from Eu-152 resulted in misidentification of Co-57.

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.

APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT SUMMARY

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE THREE MILE ISLAND NUCLEAR STATION, 2013

NAME OF FACILITY: THREE MILE ISLAND NUCLEAR STATION **DOCKET NUMBER: 50-289 & 50-320**
LOCATION OF FACILITY: MIDDLETOWN COUNTY PA **REPORTING PERIOD: 2013**

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	2025 (10/12) (735/5580)	<LLD	2025 (10/12) (735/5580)	J1-2 INDICATOR WEST SHORE; TMI 0.5 MILES S OF SITE	0
	I-131	12	1	NA	1.1 (1/12)	1.1 (1/12)	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
	NB-95		15	<LLD	<LLD	-		0
SURFACE WATER (PCI/LITER)	ZR-95		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, 2013

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	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	3.1 (18/24) (1.8/5.2)	2.4 (6/12) (1.7/2.9)	3.3 (11/12) (1.8/5.2)	G15-2 INDICATOR WRIGHTS WATER SUPPLY 13.3 MILES SE OF SITE	0
	I-131	36	1	<LLD	<LLD	-		0
	H-3	36	2000	462 (2/24) (386/537)	<LLD	462 (2/12) (386/537)	G15-3 INDICATOR LANCASTER WATER AUTHORITY 14.8 MILES SE OF SITE	0
DRINKING WATER (PCI/LITER)	GAMMA MN-54	36	15	<LLD	<LLD	-		0
	CO-58		15	<LLD	<LLD	-		0

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	FE-59		30	<LLD	<LLD	-		0
	CO-60		15	<LLD	<LLD	-		0
	ZN-65		30	<LLD	<LLD	-		0
	NB-95		15	<LLD	<LLD	-		0
	ZR-95		30	<LLD	<LLD	-		0
	CS-134		15	<LLD	<LLD	-		0
DRINKING WATER (PCI/LITER)	CS-137		18	<LLD	<LLD	-		0
	BA-140		60	<LLD	<LLD	-		0
	LA-140		15	<LLD	<LLD	-		0

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EFFLUENT WATER (PCI/LITER)	GR-B	12	4	4.8 (12/12) (2.9/7.0)	NA	4.8 (12/12) (2.9/7.0)	K1-1 INDICATOR MAIN STATION LIQ. DISCHARGE ONSITE	0
	I-131	12	1	<LLD	NA	-		0
	H-3	12	2000	20928 (11/12) (645/97000)	NA	20928 (11/12) (645/97000)	K1-1 INDICATOR MAIN STATION LIQ. DISCHARGE ONSITE	0
	SR-89	2	5	<LLD	NA	-		0
	SR-90	2	2	<LLD	NA	-		0
EFFLUENT WATER (PCI/LITER)	GAMMA MN-54	12	15	<LLD	NA	-		0
	CO-58		15	<LLD	NA	-		0
	FE-59		30	<LLD	NA	-		0

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NAME OF FACILITY: THREE MILE ISLAND NUCLEAR STATION **DOCKET NUMBER: 50-289 & 50-320**
LOCATION OF FACILITY: MIDDLETOWN COUNTY PA **REPORTING PERIOD: 2013**

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
	CO-60		15	<LLD	NA	-		0
	ZN-65		30	<LLD	NA	-		0
	NB-95		15	<LLD	NA	-		0
	ZR-95		30	<LLD	NA	-		0
	CS-134		15	<LLD	NA	-		0
EFFLUENT WATER (PCI/LITER)	CS-137		18	<LLD	NA	-		0
	BA-140		60	<LLD	NA	-		0
	LA-140		15	<LLD	NA	-		0
BOTTOM FEEDER (PCI/KG WET)	SR-90	4	10	<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, 2013

NAME OF FACILITY: THREE MILE ISLAND NUCLEAR STATION **DOCKET NUMBER: 50-289 & 50-320**
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	GAMMA	4						
	K-40		NA	3300 (2/2) (2924/3676)	3669 (2/2) (3492/3846)	3669 (2/2) (3492/3846)	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
BOTTOM FEEDER (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
PREDATOR (PCI/KG WET)	SR-90	4	10	<LLD	<LLD	-		0

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE THREE MILE ISLAND NUCLEAR STATION, 2013

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LOCATION OF FACILITY: MIDDLETOWN COUNTY PA **REPORTING PERIOD:**

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
	GAMMA	4						
	K-40		NA	3588 (2/2) (3349/3826)	4130 (2/2) (2982/5278)	4130 (2/2) (2982/5278)	BKGP CONTROL CITY ISLAND UPSTREAM OF DISCHARGE	0
	MN-54		130	<LLD	<LLD	-		0
	CO-58		130	<LLD	<LLD	-		0
PREDATOR (PCI/KG WET)	FE-59		260	<LLD	<LLD	-		0
	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	GAMMA	7						

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE THREE MILE ISLAND NUCLEAR STATION, 2013

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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
(PCI/KG DRY)	K-40		NA	14580 (5/5) (8026/19290)	15915 (2/2) (13750/18080)	18710 (1/1)	EDCB INDICATOR STORM WATER BASIN 0.2 MILES SE OF SITE	0
	MN-54		NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0
SEDIMENT (PCI/KG DRY)	CO-60		NA	<LLD	<LLD	-		0
	CS-134		150	<LLD	<LLD	-		0
	CS-137		180	202 (1/5)	<LLD	202 (1/1)	EDCB INDICATOR STORM WATER BASIN 0.2 MILES SE OF SITE	0
AIR PARTICULATE (E-3 PCI/CU.METER)	GR-B	359	10	17 (297/309) (6/48)	18 (47/50) (8/44)	18 (47/50) (8/44)	Q15-1 CONTROL WEST FAIRVIEW 13.5 MILES NW OF SITE	0
	GAMMA BE-7	28	NA	72 (23/24) (51/118)	70 (4/4) (58/77)	78 (4/4) (70/94)	A3-1 INDICATOR MIDDLETOWN 2.6 MILES N OF SITE	0
	MN-54		NA	<LLD	<LLD	-		0

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE THREE MILE ISLAND NUCLEAR STATION, 2013

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	CO-58		NA	<LLD	<LLD	-		0
	CO-60		NA	<LLD	<LLD	-		0
AIR PARTICULATE (E-3 PCI/CU.METER)	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	359	70	<LLD	<LLD	-		0
MILK (PCI/LITER)	I-131	110	1	<LLD	<LLD	-		0
	SR-89	20	5	<LLD	<LLD	-		0

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE THREE MILE ISLAND NUCLEAR STATION, 2013

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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
	SR-90	20	2	<LLD	<LLD	-		0
MILK (PCI/LITER)	GAMMA K-40	110	NA	1265 (88/88) (715/1793)	1312 (22/22) (1132/1465)	1395 (22/22) (1129/1526)	F4-1 INDICATOR TURNPIKE ROAD FARM 3.0 MILES ESE OF SITE	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
VEGETATION (PCI/KG WET)	SR-90	26	10	13 (12/13) (4/27)	10 (9/13) (3/30)	14 (11/12) (4/27)	H1-2 INDICATOR RED HILL MARKET, ALONG ROUTE 44 1.0 MILES SSE OF SITE	0
	GAMMA BE-7	32	NA	615 (11/16) (141/1435)	930 (9/16) (147/2637)	930 (9/16) (147/2637)	B10-2 CONTROL MILTON HERSHEY SCHOOL 10.1 MILES NNE OF SITE	0

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE THREE MILE ISLAND NUCLEAR STATION, 2013

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VEGETATION (PCI/KG WET)	K-40		NA	4186 (16/16) (2431/8483)	4903 (16/16) (2005/9046)	4903 (16/16) (2005/9046)	B10-2 CONTROL MILTON HERSHEY SCHOOL 10.1 MILES NNE 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.)	OSLD-QUARTERLY	360	NA	19.9 (316/316) (14.0/30.9)	22.1 (44/44) (17.6/29.7)	29.6 (4/4) (29.4/29.9)	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

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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, 2013

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, 2013

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, 2013

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 (OSLD)
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, 2013

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, 2013

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, 2013

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, 2013

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
OSLD	Optically Stimulated Luminescence Dosimetry	Quarterly OSLDs comprised of two Al_2O_3:C Landauer Incorporated elements.	ER-TMI-02 Collection of OSLD samples for radiological analysis (Three Mile Island Nuclear Station)	2 badges with 3 dosimeters	Landauer Incorporated

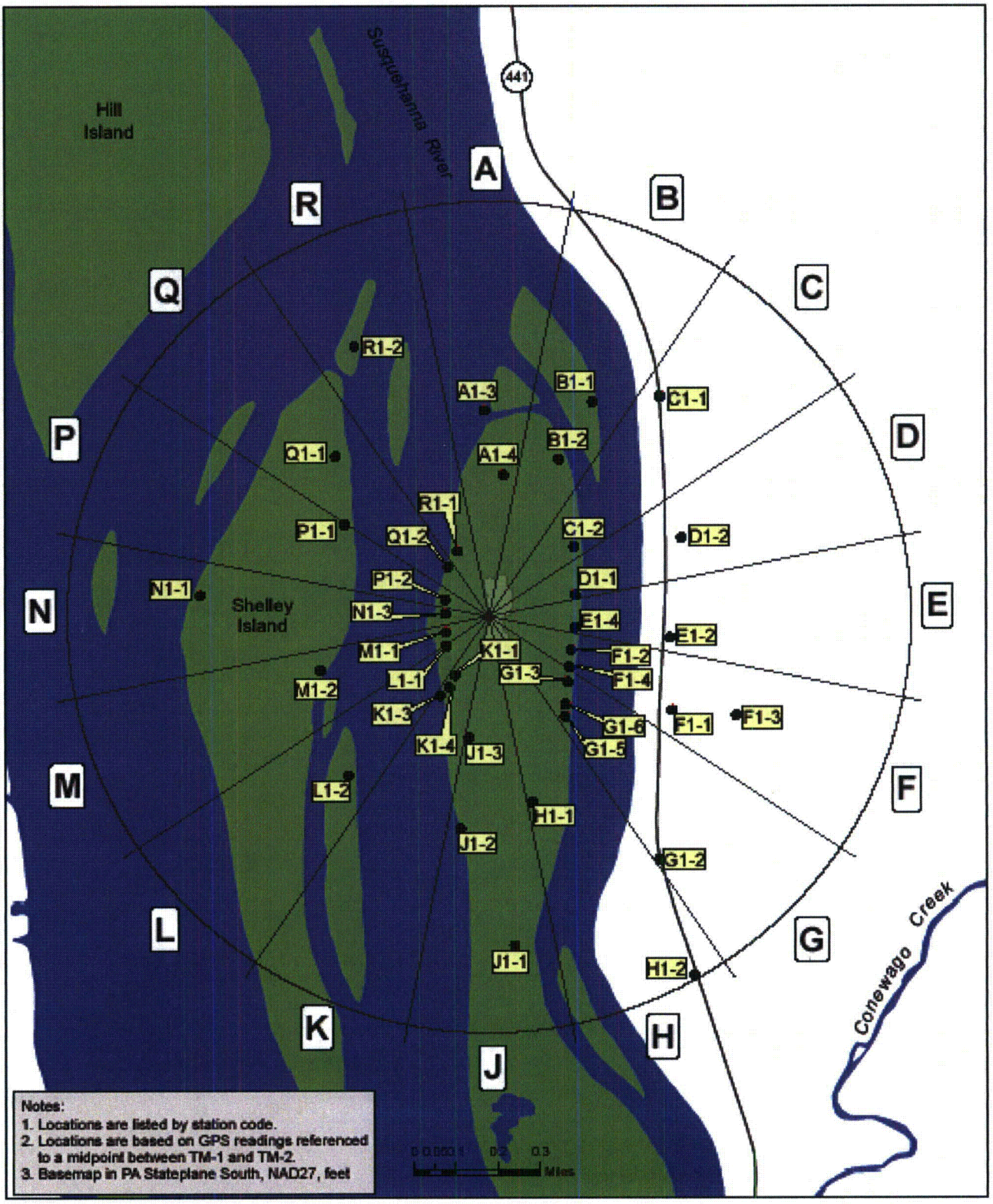

Figure B-1
Environmental Sampling Locations Within One Mile of the Three Mile Island Nuclear Station, 2013

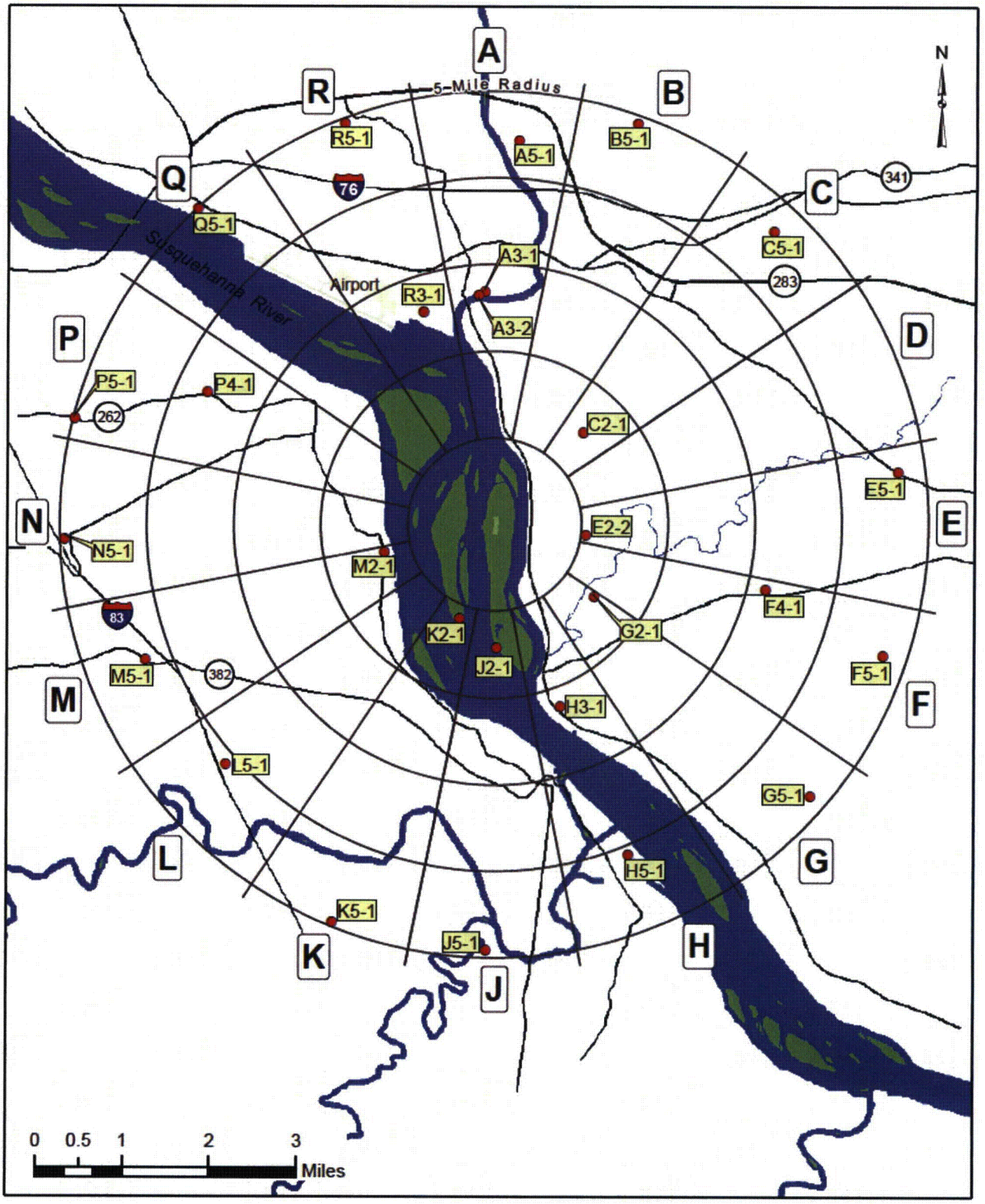

Figure B-2
Environmental Sampling Locations Between One and Five Miles of the Three Mile Island Nuclear Station, 2013

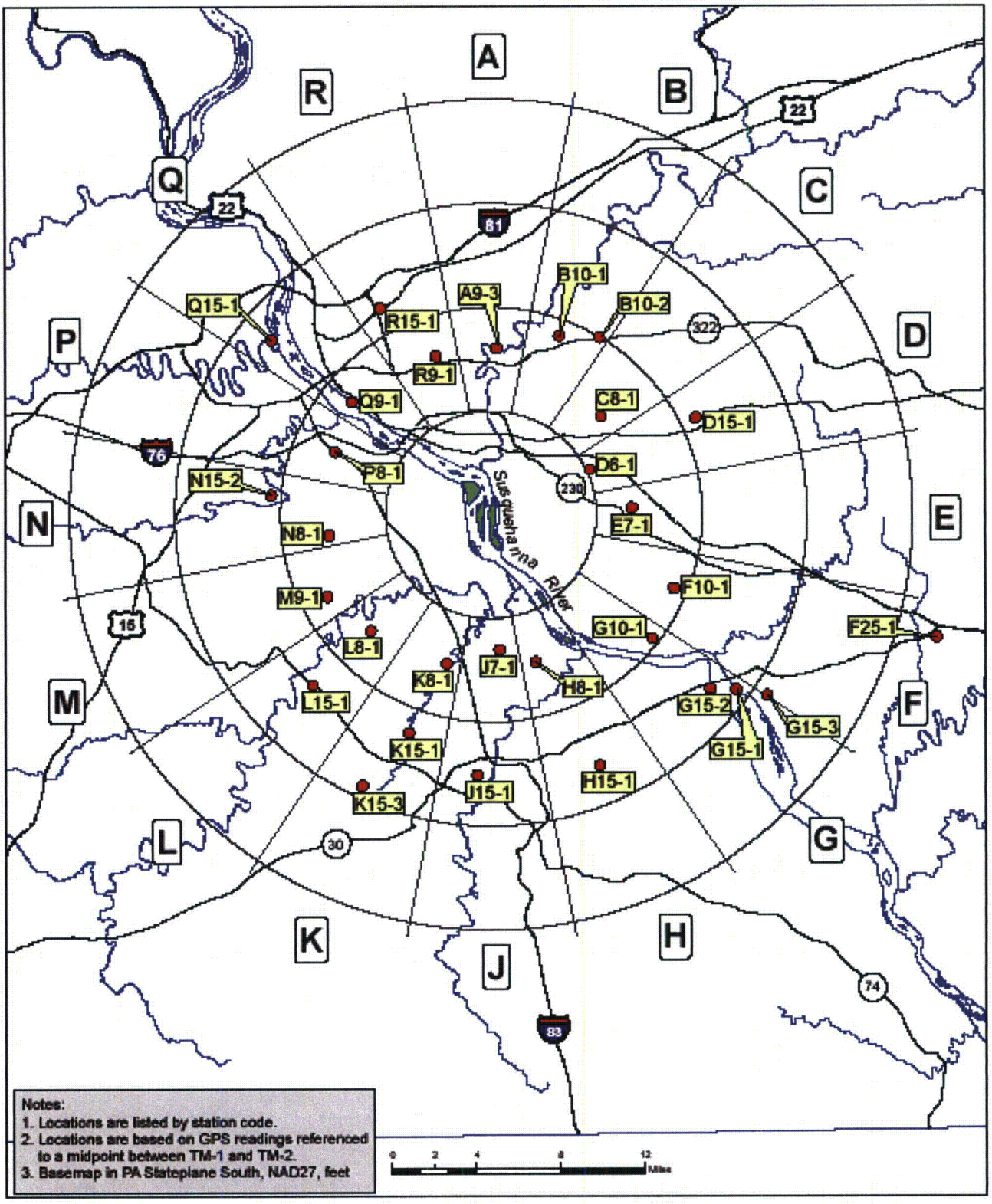

Figure B-3
Environmental Sampling Locations Greater than Five Miles of the Three Mile Island Nuclear Station, 2013

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APPENDIX C

DATA TABLES AND FIGURES - PRIMARY LABORATORY

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Table C-I.1 **CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	J1-2		Q9-1	
12/31/12 - 01/29/13	735 ± 143		< 169	
01/29/13 - 02/26/13	935 ± 158	(1)	< 166	
02/26/13 - 04/02/13	1180 ± 171		< 161	(1)
04/02/13 - 04/30/13	1500 ± 203		< 169	
04/30/13 - 05/28/13	1890 ± 242		< 178	
05/28/13 - 07/02/13	1220 ± 185		< 194	
07/02/13 - 07/30/13	5580 ± 597		< 180	
07/30/13 - 09/03/13	955 ± 167		< 186	
09/03/13 - 10/01/13	2730 ± 314		< 164	
10/01/13 - 10/29/13	3520 ± 401		< 197	
10/29/13 - 12/03/13	< 172		< 172	
12/03/13 - 12/31/13	< 178		< 166	
MEAN	2025 ± 3057		-	

Table C-I.2 **CONCENTRATIONS OF I-131 IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	A3-2
01/08/13 - 01/29/13	< 0.5
02/05/13 - 02/26/13	1.1 ± 0.6
03/05/13 - 04/02/13	< 0.8
04/09/13 - 04/30/13	< 0.9
05/07/13 - 05/28/13	< 0.8
06/03/13 - 07/02/13	< 0.7
07/09/13 - 07/30/13	< 0.6
08/07/13 - 09/03/13	< 0.6
09/10/13 - 10/01/13	< 0.7
10/08/13 - 10/29/13	< 0.6
11/05/13 - 12/03/13	< 0.7
12/10/13 - 12/31/13	< 0.8
MEAN	-

THE MEAN AND TWO STANDARD DEVIATION 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, 2013**

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	12/31/12 - 01/29/13	< 5	< 6	< 9	< 7	< 9	< 7	< 11	< 5	< 7	< 29	< 9
	01/29/13 - 02/26/13 (1)	< 4	< 4	< 8	< 3	< 7	< 3	< 7	< 3	< 4	< 20	< 6
	02/26/13 - 04/02/13	< 4	< 4	< 10	< 5	< 8	< 5	< 7	< 4	< 5	< 23	< 8
	04/02/13 - 04/30/13	< 6	< 6	< 13	< 5	< 11	< 6	< 10	< 6	< 6	< 25	< 8
	04/30/13 - 05/28/13	< 6	< 6	< 12	< 5	< 9	< 5	< 8	< 5	< 6	< 25	< 7
	05/28/13 - 07/02/13	< 4	< 4	< 10	< 5	< 9	< 4	< 9	< 4	< 5	< 24	< 8
	07/02/13 - 07/30/13	< 6	< 5	< 12	< 7	< 11	< 7	< 12	< 5	< 6	< 35	< 11
	07/30/13 - 09/03/13	< 5	< 4	< 11	< 6	< 12	< 6	< 9	< 5	< 6	< 34	< 11
	09/03/13 - 10/01/13	< 7	< 7	< 15	< 8	< 17	< 7	< 14	< 6	< 8	< 30	< 12
	10/01/13 - 10/29/13	< 5	< 5	< 12	< 6	< 12	< 6	< 11	< 5	< 6	< 30	< 7
	10/29/13 - 12/03/13	< 7	< 6	< 11	< 5	< 11	< 7	< 10	< 5	< 6	< 27	< 13
	12/03/13 - 12/31/13	< 4	< 3	< 9	< 4	< 8	< 3	< 8	< 3	< 4	< 28	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-
Q9-1	12/31/12 - 01/29/13	< 5	< 5	< 12	< 7	< 12	< 6	< 11	< 6	< 6	< 27	< 9
	01/29/13 - 02/26/13	< 4	< 4	< 8	< 4	< 9	< 5	< 8	< 4	< 5	< 21	< 8
	02/26/13 - 04/02/13 (1)	< 5	< 5	< 10	< 5	< 10	< 5	< 9	< 4	< 5	< 22	< 8
	04/02/13 - 04/30/13	< 7	< 6	< 15	< 6	< 10	< 7	< 11	< 6	< 7	< 34	< 13
	04/30/13 - 05/28/13	< 6	< 5	< 10	< 5	< 9	< 5	< 9	< 5	< 5	< 26	< 9
	05/28/13 - 07/02/13	< 5	< 5	< 11	< 4	< 10	< 4	< 9	< 5	< 6	< 27	< 8
	07/02/13 - 07/30/13	< 5	< 5	< 10	< 5	< 10	< 5	< 11	< 5	< 5	< 29	< 9
	07/30/13 - 09/03/13	< 6	< 6	< 13	< 5	< 7	< 5	< 10	< 5	< 5	< 28	< 7
	09/03/13 - 10/01/13	< 6	< 7	< 13	< 4	< 12	< 6	< 10	< 5	< 7	< 32	< 11
	10/01/13 - 10/29/13	< 7	< 6	< 11	< 6	< 13	< 7	< 11	< 5	< 7	< 33	< 11
	10/29/13 - 12/03/13	< 6	< 6	< 10	< 8	< 14	< 7	< 13	< 6	< 6	< 35	< 11
	12/03/13 - 12/31/13	< 4	< 4	< 8	< 4	< 8	< 4	< 6	< 3	< 4	< 26	< 9
	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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	G15-2	G15-3	Q9-1
12/31/12 - 01/29/13	2.3 ± 1.4	< 2.1	< 2.0
01/29/13 - 02/26/13	1.8 ± 1.1	< 1.5	< 1.5
02/26/13 - 04/02/13	3.3 ± 1.1	< 1.5	< 1.6
04/02/13 - 04/30/13	3.0 ± 1.1	1.9 ± 0.9	1.7 ± 0.9
04/30/13 - 05/28/13	< 2.1	< 2.0	< 2.0
05/28/13 - 07/02/13	2.0 ± 1.0 (1)	1.8 ± 1.0	2.3 ± 0.9
07/02/13 - 07/30/13	3.4 ± 1.3	2.2 ± 1.2 (1)	< 1.8
07/30/13 - 09/03/13	3.8 ± 1.1	2.8 ± 1.0 (1)	2.6 ± 1.0
09/03/13 - 10/01/13	3.5 ± 1.0	3.3 ± 1.0	2.7 ± 1.0
10/01/13 - 10/29/13	2.5 ± 1.1	2.7 ± 1.1	2.6 ± 1.0
10/29/13 - 12/03/13	5.1 ± 1.1	4.5 ± 1.1	2.9 ± 1.0
12/03/13 - 12/31/13	5.2 ± 1.9	< 2.4	< 2.3
MEAN	3.3 ± 2.2	2.7 ± 1.9	2.4 ± 0.8

Table C-II.2 **CONCENTRATIONS OF I-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	G15-2	G15-3	Q9-1
12/31/12 - 01/29/13	< 0.6	< 0.6	< 0.5
01/29/13 - 02/26/13	< 0.6	< 0.6	< 0.6
02/26/13 - 04/02/13	< 0.7	< 0.6	< 0.6
04/02/13 - 04/30/13	< 0.6	< 0.6	< 0.9
04/30/13 - 05/28/13	< 0.5	< 0.7	< 0.5
05/28/13 - 07/02/13	< 0.7 (1)	< 0.9	< 0.8
07/02/13 - 07/30/13	< 0.8	< 0.6 (1)	< 0.7
07/30/13 - 09/03/13	< 0.7	< 0.7 (1)	< 0.7
09/03/13 - 10/01/13	< 0.7	< 0.9	< 0.8
10/01/13 - 10/29/13	< 0.8	< 0.7	< 0.7
10/29/13 - 12/03/13	< 0.6	< 0.7	< 0.6
12/03/13 - 12/31/13	< 0.5	< 0.8	< 0.8
MEAN	-	-	-

Table C-II.3 **CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	G15-2	G15-3	Q9-1
12/31/12 - 01/29/13	< 166	< 174	< 171
01/29/13 - 02/26/13	< 183	< 153	< 166
02/26/13 - 04/02/13	< 172	< 163	< 157
04/02/13 - 04/30/13	< 169	< 167	< 166
04/30/13 - 05/28/13	< 174	< 175	< 172
05/28/13 - 07/02/13	< 192 (1)	< 193	< 193
07/02/13 - 07/30/13	< 179	537 ± 144 (1)	< 182
07/30/13 - 09/03/13	< 188	< 187 (1)	< 190
09/03/13 - 10/01/13	< 172	< 184	< 171
10/01/13 - 10/29/13	< 200	386 ± 141	< 193
10/29/13 - 12/03/13	< 171	< 172	< 168
12/03/13 - 12/31/13	< 176	< 180	< 172
MEAN	-	462 ± 214	-

THE MEAN AND TWO STANDARD DEVIATION 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, 2013**

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	12/31/12 - 01/29/13		< 6	< 6	< 12	< 5	< 12	< 6	< 12	< 5	< 6	< 25	< 8
	01/29/13 - 02/26/13		< 4	< 4	< 9	< 5	< 8	< 5	< 8	< 4	< 5	< 23	< 6
	02/26/13 - 04/02/13		< 3	< 3	< 5	< 3	< 6	< 4	< 6	< 3	< 3	< 16	< 5
	04/02/13 - 04/30/13		< 5	< 6	< 13	< 6	< 9	< 6	< 11	< 5	< 6	< 27	< 9
	04/30/13 - 05/28/13		< 4	< 4	< 10	< 5	< 8	< 4	< 9	< 4	< 5	< 21	< 8
	05/28/13 - 07/02/13	(1)	< 9	< 9	< 18	< 9	< 21	< 9	< 16	< 10	< 8	< 43	< 13
	07/02/13 - 07/30/13		< 6	< 5	< 10	< 5	< 11	< 6	< 9	< 5	< 5	< 32	< 11
	07/30/13 - 09/03/13		< 7	< 6	< 13	< 5	< 11	< 6	< 11	< 5	< 6	< 35	< 10
	09/03/13 - 10/01/13		< 6	< 6	< 14	< 6	< 13	< 6	< 9	< 6	< 7	< 35	< 12
	10/01/13 - 10/29/13		< 5	< 5	< 14	< 8	< 15	< 7	< 10	< 6	< 8	< 31	< 10
	10/29/13 - 12/03/13		< 6	< 6	< 11	< 6	< 11	< 6	< 9	< 6	< 7	< 29	< 13
	12/03/13 - 12/31/13		< 4	< 4	< 8	< 3	< 7	< 4	< 7	< 3	< 4	< 28	< 8
	MEAN		-	-	-	-	-	-	-	-	-	-	-
G15-3	12/31/12 - 01/29/13		< 6	< 5	< 12	< 4	< 8	< 6	< 10	< 5	< 6	< 32	< 6
	01/29/13 - 02/26/13		< 4	< 4	< 9	< 5	< 9	< 4	< 7	< 3	< 4	< 21	< 7
	02/26/13 - 04/02/13		< 5	< 5	< 10	< 5	< 10	< 5	< 9	< 4	< 4	< 27	< 8
	04/02/13 - 04/30/13		< 6	< 7	< 13	< 8	< 12	< 6	< 11	< 6	< 7	< 31	< 12
	04/30/13 - 05/28/13		< 5	< 5	< 11	< 6	< 13	< 7	< 9	< 5	< 7	< 24	< 7
	05/28/13 - 07/02/13		< 5	< 6	< 12	< 6	< 12	< 6	< 10	< 7	< 6	< 30	< 9
	07/02/13 - 07/30/13	(1)	< 4	< 4	< 12	< 5	< 10	< 5	< 9	< 5	< 5	< 39	< 11
	07/30/13 - 09/03/13	(1)	< 6	< 5	< 15	< 7	< 14	< 6	< 13	< 6	< 6	< 33	< 11
	09/03/13 - 10/01/13		< 5	< 5	< 13	< 6	< 9	< 6	< 10	< 6	< 6	< 34	< 11
	10/01/13 - 10/29/13		< 6	< 5	< 12	< 6	< 10	< 5	< 9	< 6	< 7	< 30	< 9
	10/29/13 - 12/03/13		< 6	< 6	< 14	< 7	< 15	< 8	< 12	< 6	< 6	< 34	< 11
	12/03/13 - 12/31/13		< 4	< 4	< 9	< 4	< 9	< 5	< 8	< 4	< 5	< 29	< 9
	MEAN		-	-	-	-	-	-	-	-	-	-	-

(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, 2013**

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	12/31/12 - 01/29/13	< 5	< 5	< 9	< 5	< 9	< 5	< 8	< 4	< 5	< 24	< 7
	01/29/13 - 02/26/13	< 4	< 4	< 9	< 5	< 8	< 4	< 8	< 4	< 5	< 20	< 6
	02/26/13 - 04/02/13	< 4	< 4	< 9	< 4	< 10	< 5	< 7	< 4	< 5	< 23	< 8
	04/02/13 - 04/30/13	< 4	< 5	< 9	< 4	< 11	< 5	< 8	< 4	< 5	< 21	< 11
	04/30/13 - 05/28/13	< 5	< 5	< 11	< 5	< 10	< 4	< 8	< 5	< 5	< 25	< 9
	05/28/13 - 07/02/13	< 5	< 7	< 11	< 6	< 13	< 6	< 9	< 6	< 6	< 25	< 4
	07/02/13 - 07/30/13	< 5	< 6	< 13	< 5	< 14	< 5	< 12	< 5	< 6	< 28	< 11
	07/30/13 - 09/03/13	< 6	< 6	< 11	< 7	< 11	< 5	< 10	< 5	< 6	< 31	< 8
	09/03/13 - 10/01/13	< 6	< 5	< 11	< 6	< 9	< 6	< 9	< 5	< 6	< 32	< 11
	10/01/13 - 10/29/13	< 5	< 5	< 10	< 5	< 10	< 6	< 10	< 7	< 6	< 29	< 10
	10/29/13 - 12/03/13	< 6	< 7	< 15	< 6	< 15	< 7	< 11	< 7	< 6	< 36	< 7
	12/03/13 - 12/31/13	< 4	< 4	< 9	< 4	< 8	< 4	< 7	< 4	< 5	< 29	< 9
	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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	GR-B	I-131	H-3	SR-89	SR-90
K1-1	12/31/12 - 01/29/13	3.5 ± 1.5	< 0.5	4060 ± 454		
	12/31/12 - 07/02/13				< 3.2	< 0.8
	01/29/13 - 02/26/13	3.0 ± 1.1	< 0.5	4980 ± 545		
	02/26/13 - 04/02/13	2.9 ± 1.2	< 0.8	4680 ± 510		
	04/02/13 - 04/30/13	3.7 ± 1.1	< 0.8	15600 ± 1610		
	04/30/13 - 05/28/13	3.0 ± 1.5	< 0.7	28000 ± 2840		
	05/28/13 - 07/02/13	6.4 ± 1.3	< 0.9	12900 ± 1330		
	07/02/13 - 07/30/13	7.0 ± 1.6	< 0.6	97000 ± 7060		
	07/02/13 - 12/31/13				< 3.4	< 0.6
	08/07/13 - 09/03/13	6.0 ± 1.6	< 0.7	7840 ± 838		
	09/03/13 - 10/01/13	5.0 ± 1.3	< 0.7	30800 ± 3110		
	10/01/13 - 10/29/13	6.2 ± 1.3	< 0.7	23700 ± 2410		
	10/29/13 - 12/03/13	4.2 ± 1.1	< 0.7	645 ± 138		
	12/03/13 - 12/31/13	6.5 ± 2.0	< 0.7	< 177		
	MEAN	4.8 ± 3.1	-	20928 ± 54481	-	-

THE MEAN AND TWO STANDARD DEVIATION 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, 2013**

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	12/31/12 - 01/29/13	< 6	< 6	< 13	< 5	< 10	< 7	< 10	< 6	< 6	< 30	< 9
	01/29/13 - 02/26/13	< 4	< 4	< 8	< 3	< 9	< 4	< 7	< 4	< 4	< 17	< 7
	02/26/13 - 04/02/13	< 3	< 3	< 8	< 3	< 7	< 4	< 6	< 3	< 3	< 16	< 4
	04/02/13 - 04/30/13	< 4	< 5	< 11	< 6	< 14	< 5	< 10	< 5	< 6	< 24	< 10
	04/30/13 - 05/28/13	< 6	< 6	< 9	< 5	< 11	< 5	< 10	< 5	< 5	< 23	< 9
	05/28/13 - 07/02/13	< 5	< 5	< 11	< 5	< 9	< 6	< 10	< 5	< 5	< 24	< 6
	07/02/13 - 07/30/13	< 3	< 4	< 9	< 3	< 8	< 4	< 6	< 3	< 3	< 21	< 9
	08/07/13 - 09/03/13	< 4	< 5	< 8	< 4	< 7	< 4	< 6	< 4	< 4	< 27	< 10
	09/03/13 - 10/01/13	< 6	< 6	< 10	< 6	< 11	< 5	< 10	< 5	< 5	< 27	< 10
	10/01/13 - 10/29/13	< 8	< 9	< 19	< 8	< 14	< 8	< 12	< 7	< 8	< 37	< 10
	10/29/13 - 12/03/13	< 6	< 5	< 11	< 7	< 11	< 6	< 11	< 7	< 6	< 35	< 12
	12/03/13 - 12/31/13	< 4	< 4	< 10	< 5	< 9	< 5	< 8	< 4	< 4	< 31	< 11
	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, 2013**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Sr-90
INDP	PREDATOR	
	06/07/13	< 2.9
	09/24/13	< 2.9
	MEAN	-
INDB	BOTTOM FEEDER	
	06/07/13	< 3.2
	09/24/13	< 4.0
	MEAN	-
BKGP	PREDATOR	
	06/11/13	< 3.0
	09/25/13	< 2.3
	MEAN	-
BKGB	BOTTOM FEEDER	
	06/11/13	< 2.8
	09/25/13	< 2.8
	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, 2013**

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								
	06/11/13	3846 ± 904	< 54	< 53	< 106	< 54	< 109	< 54	< 53
	09/25/13	3492 ± 777	< 46	< 48	< 142	< 54	< 95	< 47	< 48
	MEAN	3669 ± 501	-	-	-	-	-	-	-
BKGP	PREDATOR								
	06/11/13	2982 ± 962	< 54	< 57	< 123	< 52	< 88	< 50	< 60
	09/25/13	5278 ± 737	< 48	< 58	< 128	< 55	< 100	< 44	< 51
	MEAN	4130 ± 3247	-	-	-	-	-	-	-
INDB	BOTTOM FEEDER								
	06/07/13	3676 ± 871	< 63	< 65	< 127	< 63	< 117	< 60	< 66
	09/24/13	2924 ± 709	< 46	< 49	< 118	< 46	< 100	< 43	< 40
	MEAN	3300 ± 1063	-	-	-	-	-	-	-
INDP	PREDATOR								
	06/07/13	3349 ± 681	< 38	< 47	< 91	< 53	< 102	< 40	< 54
	09/24/13	3826 ± 868	< 53	< 50	< 142	< 46	< 123	< 44	< 55
	MEAN	3588 ± 675	-	-	-	-	-	-	-

Table C-V.1 **CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLE## IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

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	06/14/13	13750 ± 1261	< 66	< 62	< 64	< 65	< 81
	10/30/13	18080 ± 2233	< 98	< 99	< 107	< 84	< 128
	MEAN	15915 ± 6124	-	-	-	-	-
EDCB	10/30/13	18710 ± 1836	< 77	< 87	< 99	< 77	202 ± 114
	MEAN	-	-	-	-	-	-
J2-1	06/14/13	17790 ± 1717	< 88	< 65	< 89	< 70	< 94
	10/30/13	19290 ± 1785	< 88	< 85	< 107	< 88	< 93
	MEAN	18540 ± 2121	-	-	-	-	-
K1-3	06/14/13	8026 ± 1000	< 52	< 53	< 59	< 49	< 71
	10/30/13	9084 ± 1317	< 72	< 88	< 76	< 71	< 90
	MEAN	8555 ± 1496	-	-	-	-	-

Table C-VI.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

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	
01/02/13 - 01/09/13	38 ± 6	38 ± 6	41 ± 6	40 ± 6	42 ± 6	48 ± 7	44 ± 6	
01/09/13 - 01/17/13	27 ± 6	21 ± 5	19 ± 5	21 ± 5	20 ± 5	23 ± 5	23 ± 5	
01/17/13 - 01/24/13	23 ± 6	22 ± 5	21 ± 5	17 ± 5	18 ± 5	19 ± 5	17 ± 5	
01/24/13 - 01/31/13	20 ± 6	19 ± 5	26 ± 6	20 ± 5	17 ± 5	18 ± 5	21 ± 5	
01/31/13 - 02/07/13	21 ± 6	28 ± 6	26 ± 6	23 ± 6	26 ± 6	22 ± 6	24 ± 9	(1)
02/07/13 - 02/15/13	19 ± 5	18 ± 5	15 ± 4	15 ± 4	17 ± 5	20 ± 5	17 ± 4	
02/15/13 - 02/21/13	18 ± 6	11 ± 5	17 ± 5	16 ± 5	15 ± 5	13 ± 5	27 ± 6	
02/21/13 - 02/27/13	< 10	< 9	< 9	< 9	10 ± 6	< 9	< 9	
02/27/13 - 03/07/13	8 ± 4	7 ± 4	10 ± 4	9 ± 4	12 ± 5	6 ± 4	< 10	(1)
03/07/13 - 03/14/13	< 8	8 ± 5	13 ± 5	10 ± 5	11 ± 5	13 ± 6	8 ± 5	
03/14/13 - 03/21/13	11 ± 5	17 ± 5	20 ± 5	13 ± 5	20 ± 5	11 ± 5	19 ± 6	(1)
03/21/13 - 03/28/13	9 ± 5	9 ± 4	8 ± 4	9 ± 4	8 ± 4	8 ± 4	8 ± 4	
03/28/13 - 04/04/13	11 ± 5	14 ± 5	13 ± 5	(1) 11 ± 5	14 ± 5	14 ± 5	14 ± 5	
04/04/13 - 04/11/13	15 ± 5	18 ± 5	20 ± 5	15 ± 5	17 ± 5	16 ± 5	17 ± 5	
04/11/13 - 04/17/13	17 ± 6	10 ± 5	14 ± 6	< 8	18 ± 6	18 ± 6	18 ± 6	
04/17/13 - 04/25/13	9 ± 4	15 ± 5	13 ± 5	(1) 10 ± 4	13 ± 5	14 ± 4	13 ± 4	
04/25/13 - 05/02/13	13 ± 5	15 ± 5	14 ± 5	(1) 19 ± 5	23 ± 6	21 ± 6	21 ± 14	(1)
05/02/13 - 05/09/13	< 7	7 ± 4	9 ± 5	(1) 10 ± 5	8 ± 5	8 ± 5	< 6	
05/09/13 - 05/16/13	10 ± 5	15 ± 5	16 ± 5	14 ± 5	15 ± 6	13 ± 5	16 ± 5	
05/16/13 - 05/23/13	9 ± 5	13 ± 5	15 ± 5	(1) 15 ± 5	13 ± 5	22 ± 6	13 ± 5	
05/23/13 - 05/30/13	18 ± 5	19 ± 5	17 ± 5	(1) 17 ± 5	20 ± 5	14 ± 5	14 ± 5	
05/30/13 - 06/06/13	17 ± 6	12 ± 5	13 ± 5	12 ± 5	(1)	17 ± 6	(1)	
06/06/13 - 06/12/13	10 ± 6	< 8	14 ± 6	< 8	8 ± 5	< 8	11 ± 6	
06/12/13 - 06/20/13	15 ± 4	15 ± 4	19 ± 4	20 ± 5	21 ± 5	16 ± 4	9 ± 5	(1)
06/20/13 - 06/26/13	17 ± 6	18 ± 6	17 ± 5	19 ± 6	16 ± 6	20 ± 6	(1)	
06/26/13 - 07/04/13	7 ± 4	10 ± 4	7 ± 4	14 ± 4	9 ± 4	10 ± 4	12 ± 4	
07/04/13 - 07/10/13	18 ± 6	10 ± 5	13 ± 5	12 ± 5	10 ± 5	21 ± 6	12 ± 5	
07/10/13 - 07/18/13	13 ± 4	17 ± 4	16 ± 4	17 ± 4	19 ± 5	20 ± 5	14 ± 4	
07/18/13 - 07/25/13	15 ± 5	17 ± 5	15 ± 5	17 ± 5	15 ± 5	15 ± 5	15 ± 5	
07/25/13 - 08/01/13	8 ± 4	19 ± 5	16 ± 5	13 ± 5	15 ± 5	16 ± 5	16 ± 5	
08/01/13 - 08/08/13	15 ± 4	21 ± 5	24 ± 5	20 ± 5	20 ± 5	18 ± 5	18 ± 5	
08/08/13 - 08/15/13	15 ± 5	16 ± 5	18 ± 5	14 ± 5	24 ± 6	15 ± 5	19 ± 5	
08/15/13 - 08/21/13	17 ± 6	13 ± 6	11 ± 6	13 ± 6	9 ± 6	14 ± 6	20 ± 6	
08/21/13 - 08/29/13	18 ± 5	25 ± 5	28 ± 5	24 ± 5	22 ± 5	27 ± 5	18 ± 5	
08/29/13 - 09/05/13	9 ± 5	17 ± 6	21 ± 6	21 ± 6	20 ± 6	21 ± 6	17 ± 6	
09/05/13 - 09/12/13	15 ± 5	20 ± 6	19 ± 5	21 ± 6	28 ± 6	22 ± 6	18 ± 6	
09/12/13 - 09/19/13	14 ± 5	14 ± 5	15 ± 5	11 ± 5	17 ± 5	16 ± 5	11 ± 5	
09/19/13 - 09/25/13	< 9	11 ± 6	11 ± 6	11 ± 6	12 ± 6	10 ± 6	13 ± 6	
09/25/13 - 10/02/13	17 ± 5	14 ± 5	18 ± 5	(1)	17 ± 6	19 ± 6	20 ± 6	
10/02/13 - 10/10/13	28 ± 5	25 ± 5	26 ± 5	(1)	27 ± 5	28 ± 5	27 ± 5	
10/10/13 - 10/17/13	14 ± 5	14 ± 5	21 ± 5	15 ± 5	18 ± 5	19 ± 5	19 ± 5	
10/17/13 - 10/24/13	19 ± 6	16 ± 5	14 ± 5	14 ± 5	18 ± 6	15 ± 5	16 ± 5	
10/24/13 - 10/31/13	18 ± 5	14 ± 5	26 ± 6	19 ± 5	16 ± 5	20 ± 5	20 ± 5	
10/31/13 - 11/07/13	14 ± 5	11 ± 5	15 ± 5	17 ± 5	12 ± 5	18 ± 5	16 ± 5	
11/07/13 - 11/14/13	9 ± 5	13 ± 5	16 ± 5	15 ± 5	14 ± 5	12 ± 5	14 ± 5	
11/14/13 - 11/21/13	17 ± 5	18 ± 5	15 ± 5	16 ± 5	20 ± 5	18 ± 5	20 ± 5	
11/21/13 - 11/27/13	11 ± 5	16 ± 5	17 ± 6	14 ± 5	12 ± 5	12 ± 5	15 ± 6	
11/27/13 - 12/05/13	32 ± 6	32 ± 5	35 ± 6	29 ± 5	30 ± 5	31 ± 6	35 ± 6	
12/05/13 - 12/11/13	17 ± 6	20 ± 6	13 ± 6	14 ± 6	14 ± 6	15 ± 6	16 ± 6	
12/11/13 - 12/19/13	19 ± 5	26 ± 5	26 ± 5	29 ± 5	29 ± 5	24 ± 5	24 ± 5	
12/19/13 - 12/26/13	20 ± 6	17 ± 5	20 ± 5	13 ± 5	19 ± 6	17 ± 5	16 ± 5	
12/26/13 - 01/02/14	18 ± 5	17 ± 5	21 ± 5	21 ± 5	18 ± 5	20 ± 5	24 ± 6	
MEAN	16 ± 12	17 ± 12	18 ± 13	17 ± 12	17 ± 13	18 ± 13	18 ± 13	

THE MEAN AND TWO STANDARD DEVIATION 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, 2013**

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
01/02/13 - 01/31/13	19	38	26 ± 15	01/02/13 - 01/31/13	17	48	26 ± 21	01/02/13 - 01/31/13	17	44	26 ± 24
01/31/13 - 02/21/13	11	28	19 ± 11	01/31/13 - 02/27/13	10	26	18 ± 10	01/31/13 - 02/21/13	17	27	22 ± 10
02/27/13 - 04/04/13	7	17	10 ± 6	02/27/13 - 04/04/13	6	20	12 ± 7	03/07/13 - 04/04/13	8	19	12 ± 11
04/04/13 - 05/02/13	9	18	14 ± 6	04/04/13 - 05/02/13	10	23	16 ± 7	04/04/13 - 05/02/13	13	21	17 ± 7
05/02/13 - 05/30/13	7	19	13 ± 9	05/02/13 - 05/30/13	8	22	14 ± 8	05/09/13 - 05/30/13	13	16	14 ± 3
05/30/13 - 07/04/13	7	18	13 ± 8	05/30/13 - 07/04/13	7	21	15 ± 9	06/06/13 - 07/04/13	9	12	11 ± 3
07/04/13 - 08/01/13	8	19	15 ± 8	07/04/13 - 08/01/13	10	21	16 ± 6	07/04/13 - 08/01/13	12	16	14 ± 3
08/01/13 - 08/29/13	13	25	17 ± 8	08/01/13 - 08/29/13	9	28	19 ± 11	08/01/13 - 08/29/13	18	20	19 ± 1
08/29/13 - 10/02/13	9	20	15 ± 6	08/29/13 - 10/02/13	10	28	17 ± 9	08/29/13 - 10/02/13	11	20	16 ± 7
10/02/13 - 10/31/13	14	28	18 ± 10	10/02/13 - 10/31/13	14	28	20 ± 10	10/02/13 - 10/31/13	16	27	20 ± 9
10/31/13 - 11/27/13	9	18	14 ± 6	10/31/13 - 11/27/13	12	20	15 ± 5	10/31/13 - 11/27/13	14	20	16 ± 5
11/27/13 - 01/02/14	17	32	22 ± 12	11/27/13 - 01/02/14	13	35	22 ± 14	11/27/13 - 01/02/14	16	35	23 ± 16
01/02/13 - 01/02/14	7	38	16 ± 12	01/02/13 - 01/02/14	6	48	17 ± 13	01/02/13 - 01/02/14	8	44	18 ± 13

Table C-VI.3 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

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	01/02/13 - 04/04/13	74 ± 24	< 2	< 3	< 2	< 3	< 7	< 2	< 2
	03/28/13 - 06/26/13	94 ± 32	< 3	< 2	< 3	< 4	< 7	< 3	< 3
	06/26/13 - 10/02/13	70 ± 24	< 2	< 2	< 2	< 3	< 5	< 2	< 1
	10/02/13 - 01/02/14	73 ± 24	< 2	< 3	< 1	< 3	< 5	< 2	< 2
	MEAN	78 ± 22	-	-	-	-	-	-	-
E1-2	01/02/13 - 04/04/13	59 ± 25	< 3	< 4	< 2	< 4	< 6	< 2	< 2
	03/28/13 - 06/26/13	83 ± 35	< 3	< 4	< 3	< 5	< 6	< 3	< 3
	06/26/13 - 10/02/13	53 ± 21	< 2	< 3	< 2	< 4	< 7	< 2	< 3
	10/02/13 - 01/02/14	61 ± 25	< 4	< 5	< 4	< 4	< 9	< 3	< 3
	MEAN	64 ± 26	-	-	-	-	-	-	-
F1-3	01/02/13 - 04/04/13	59 ± 19	< 2	< 2	< 2	< 3	< 6	< 3	< 2
	03/28/13 - 06/26/13	118 ± 32	< 3	< 4	< 3	< 5	< 8	< 4	< 3
	06/26/13 - 10/02/13	59 ± 27	< 3	< 2	< 2	< 3	< 6	< 3	< 2
	10/02/13 - 01/02/14	70 ± 24	< 5	< 5	< 5	< 5	< 9	< 4	< 4
	MEAN	76 ± 57	-	-	-	-	-	-	-
G2-1	01/02/13 - 04/04/13	65 ± 23	< 2	< 3	< 1	< 4	< 6	< 3	< 1
	03/28/13 - 06/26/13	79 ± 39	< 4	< 5	< 4	< 5	< 10	< 5	< 5
	06/26/13 - 10/02/13	51 ± 18	< 2	< 3	< 3	< 3	< 5	< 3	< 2
	10/10/13 - 01/02/14	74 ± 26	< 3	< 3	< 3	< 4	< 8	< 3	< 3
	MEAN	67 ± 25	-	-	-	-	-	-	-
H3-1	01/02/13 - 04/04/13	66 ± 38	< 4	< 5	< 5	< 6	< 10	< 5	< 5
	03/28/13 - 06/26/13	85 ± 39	< 3	< 3	< 2	< 5	< 7	< 3	< 3
	06/26/13 - 10/02/13	63 ± 22	< 2	< 3	< 3	< 4	< 5	< 3	< 3
	10/02/13 - 01/02/14	74 ± 24	< 3	< 3	< 2	< 4	< 6	< 2	< 2
	MEAN	72 ± 19	-	-	-	-	-	-	-
M2-1	01/02/13 - 04/04/13	74 ± 35	< 3	< 4	< 3	< 4	< 8	< 3	< 3
	03/28/13 - 06/26/13	85 ± 23	< 3	< 3	< 1	< 3	< 5	< 3	< 2
	06/26/13 - 10/02/13	55 ± 27	< 2	< 3	< 3	< 4	< 7	< 3	< 3
	10/02/13 - 01/02/14	< 38	< 4	< 6	< 4	< 5	< 8	< 3	< 4
	MEAN	72 ± 30	-	-	-	-	-	-	-
Q15-1	01/02/13 - 04/04/13	70 ± 45	< 4	< 6	< 4	< 6	< 10	< 4	< 4
	03/28/13 - 06/26/13	73 ± 32	< 3	< 4	< 4	< 4	< 10	< 5	< 4
	06/26/13 - 10/02/13	77 ± 35	< 4	< 5	< 4	< 5	< 7	< 4	< 3
	10/02/13 - 01/02/14	58 ± 30	< 4	< 4	< 3	< 5	< 9	< 4	< 3
	MEAN	70 ± 17	-	-	-	-	-	-	-

Table C-VII.1 **CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

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
01/02/13 - 01/09/13	< 17	< 39	< 38	< 40	< 41	< 38	< 37
01/09/13 - 01/17/13	< 49	< 48	< 42	< 20	< 50	< 42	< 42
01/17/13 - 01/24/13	< 39	< 38	< 48	< 39	< 40	< 49	< 48
01/24/13 - 01/31/13	< 40	< 39	< 52	< 39	< 16	< 52	< 52
01/31/13 - 02/07/13	< 33	< 32	< 36	< 33	< 33	< 36	< 61 (1)
02/07/13 - 02/15/13	< 21	< 21	< 27	< 21	< 28	< 11	< 26
02/15/13 - 02/21/13	< 68	< 66	< 58	< 67	< 69	< 58	< 58
02/21/13 - 02/27/13	< 44	< 43	< 38	< 43	< 44	< 38	< 37
02/27/13 - 03/07/13	< 36	< 35	< 36	< 35	< 36	< 36	< 68 (1)
03/07/13 - 03/14/13	< 54	< 53	< 37	< 53	< 38	< 37	< 15
03/14/13 - 03/21/13	< 42	< 41	< 42	< 41	< 42	< 42	< 49 (1)
03/21/13 - 03/28/13	< 39	< 38	< 12	< 39	< 36	< 36	< 34
03/28/13 - 04/04/13	< 49	< 48	< 36 (1)	< 48	< 49	< 30	< 30
04/04/13 - 04/11/13	< 54	< 23	< 50	< 53	< 55	< 51	< 49
04/11/13 - 04/17/13	< 33	< 32	< 45	< 32	< 33	< 45	< 44
04/17/13 - 04/25/13	< 17	< 40	< 30 (1)	< 41	< 42	< 28	< 27
04/25/13 - 05/02/13	< 34	< 33	< 27 (1)	< 33	< 34	< 26	< 68 (1)
05/02/13 - 05/09/13	< 67	< 65	< 42 (1)	< 22	< 67	< 41	< 41
05/09/13 - 05/16/13	< 48	< 46	< 35	< 47	< 48	< 36	< 35
05/16/13 - 05/23/13	< 47	< 46	< 40 (1)	< 47	< 18	< 37	< 37
05/23/13 - 05/30/13	< 48	< 47	< 54 (1)	< 47	< 48	< 53	< 52
05/30/13 - 06/06/13	< 31	< 16	< 30	< 30	(1)	< 30	(1)
06/06/13 - 06/12/13	< 62	< 60	< 66	< 61	< 67	< 34	< 66
06/12/13 - 06/20/13	< 46	< 45	< 7	< 45	< 19	< 18	< 63 (1)
06/20/13 - 06/26/13	< 34	< 33	< 32	< 34	< 33	< 32	(1)
06/26/13 - 07/04/13	< 35	< 14	< 31	< 34	< 35	< 31	< 32
07/04/13 - 07/10/13	< 25	< 64	< 47	< 64	< 66	< 48	< 47
07/10/13 - 07/18/13	< 52	< 50	< 59	< 51	< 53	< 59	< 60
07/18/13 - 07/25/13	< 62	< 60	< 51	< 61	< 64	< 51	< 51
07/25/13 - 08/01/13	< 43	< 15	< 46	< 16	< 44	< 47	< 47
08/01/13 - 08/08/13	< 61	< 59	< 53	< 60	< 56	< 54	< 54
08/08/13 - 08/15/13	< 54	< 52	< 38	< 53	< 55	< 39	< 39
08/15/13 - 08/21/13	< 57	< 56	< 43	< 56	< 18	< 43	< 43
08/21/13 - 08/29/13	< 34	< 33	< 38	< 34	< 41	< 16	< 39
08/29/13 - 09/05/13	< 48	< 47	< 48	< 49	< 49	< 48	< 48
09/05/13 - 09/12/13	< 28	< 27	< 34	< 28	< 36	< 34	< 18
09/12/13 - 09/19/13	< 40	< 39	< 50	< 39	< 41	< 51	< 51
09/19/13 - 09/25/13	< 67	< 65	< 66	< 67	< 69	< 66	< 67
09/25/13 - 10/02/13	< 62	< 60	< 67	(1)	< 62	< 68	< 69
10/02/13 - 10/10/13	< 59	< 57	< 60	(1)	< 60	< 60	< 61
10/10/13 - 10/17/13	< 67	< 65	< 59	< 66	< 68	< 59	< 60
10/17/13 - 10/24/13	< 20	< 46	< 52	< 47	< 56	< 53	< 53
10/24/13 - 10/31/13	< 65	< 63	< 54	< 64	< 68	< 55	< 55
10/31/13 - 11/07/13	< 59	< 57	< 68	< 24	< 60	< 68	< 69
11/07/13 - 11/14/13	< 57	< 56	< 62	< 57	< 58	< 63	< 63
11/14/13 - 11/21/13	< 59	< 57	< 50	< 58	< 60	< 52	< 52
11/21/13 - 11/27/13	< 64	< 63	< 60	< 63	< 25	< 59	< 59
11/27/13 - 12/05/13	< 54	< 53	< 51	< 53	< 54	< 51	< 50
12/05/13 - 12/11/13	< 39	< 38	< 51	< 39	< 40	< 16	< 53
12/11/13 - 12/19/13	< 58	< 56	< 66	< 57	< 59	< 67	< 67
12/19/13 - 12/26/13	< 69	< 67	< 67	< 68	< 70	< 68	< 68
12/26/13 - 01/02/14	< 57	< 55	< 23	< 56	< 63	< 60	< 61
MEAN	-	-	-	-	-	-	-

(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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION	CONTROL FARM	INDICATOR FARM			
PERIOD	K15-3	E2-2	F4-1	G2-1	P4-1
01/16/13	< 0.9	< 0.9	< 0.9	< 0.9	< 1.0
02/13/13	< 0.7	< 0.6	< 0.7	< 0.8	< 0.7
03/13/13	< 0.7	< 0.8	< 0.6	< 0.7	< 0.8
03/27/13	< 0.7	< 0.7	< 0.6	< 0.7	< 0.6
04/10/13	< 0.6	< 0.7	< 0.6	< 0.6	< 0.7
04/24/13	< 0.8	< 0.8	< 0.9	< 0.8	< 0.8
05/08/13	< 0.4	< 0.6	< 0.4	< 0.5	< 0.4
05/22/13	< 0.7	< 0.6	< 0.6	< 0.6	< 0.6
06/05/13	< 0.6	< 0.6	< 0.6	< 0.6	< 0.8
06/19/13	< 0.8	< 0.9	< 0.6	< 0.8	< 0.7
07/03/13	< 0.7	< 0.8	< 0.6	< 0.8	< 0.8
07/17/13	< 0.7	< 0.7	< 1.0	< 0.5	< 0.9
07/31/13	< 0.8	< 0.8	< 0.7	< 0.7	< 0.6
08/14/13	< 0.7	< 0.6	< 0.7	< 0.5	< 0.6
08/28/13	< 0.7	< 0.8	< 0.7	< 0.7	< 0.9
09/11/13	< 0.6	< 0.7	< 0.6	< 0.7	< 0.7
09/25/13	< 0.6	< 0.5	< 0.5	< 0.5	< 0.5
10/09/13	< 0.6	< 0.6	< 0.7	< 0.7	< 0.6
10/23/13	< 0.6	< 0.7	< 0.6	< 0.7	< 0.6
11/06/13	< 0.8	< 0.9	< 1.0	< 0.7	< 1.0
11/20/13	< 0.9	< 1.0	< 0.7	< 0.9	< 0.9
12/04/13	< 0.6	< 0.7	< 0.7	< 0.6	< 0.7
MEAN	-	-	-	-	-

Table C-VIII.2 **CONCENTRATIONS OF STRONTIUM IN MILK SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION	CONTROL FARM		INDICATOR FARMS							
	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
01/16/13 - 03/27/13	< 2.3	< 1.0	< 2.6	< 0.9	< 2.5	< 0.9	< 2.7	< 1.0	< 2.4	< 0.8
04/10/13 - 06/19/13	< 4.9	< 1.0	< 4.6	< 0.7	< 4.7	< 0.8	< 4.6	< 1.0	< 4.8	< 0.7
07/03/13 - 09/25/13	< 4.9	< 0.7	< 4.8	< 0.8	< 4.3	< 0.6	< 4.6	< 0.7	< 2.9	< 0.9
10/09/13 - 12/04/13	< 4.0	< 0.6	< 3.8	< 0.9	< 4.2	< 0.6	< 3.9	< 0.8	< 4.2	< 0.6
MEAN	-	-	-	-	-	-	-	-	-	-

Table C-VIII.3 **CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
E2-2	01/16/13	1253 ± 97	< 4	< 5	< 27	< 10
	02/13/13	1224 ± 169	< 9	< 11	< 51	< 10
	03/13/13	1233 ± 146	< 5	< 7	< 27	< 10
	03/27/13	1355 ± 113	< 4	< 5	< 22	< 8
	04/10/13	1189 ± 127	< 5	< 6	< 20	< 6
	04/24/13	1193 ± 144	< 5	< 6	< 33	< 11
	05/08/13	1253 ± 123	< 5	< 6	< 28	< 7
	05/22/13	1146 ± 169	< 5	< 6	< 46	< 15
	06/05/13	1147 ± 187	< 8	< 9	< 42	< 9
	06/19/13	1276 ± 168	< 7	< 8	< 37	< 14
	07/03/13	1484 ± 140	< 5	< 6	< 41	< 10
	07/17/13	1521 ± 160	< 6	< 6	< 29	< 8
	07/31/13	1322 ± 139	< 6	< 7	< 31	< 9
	08/14/13	1397 ± 187	< 7	< 7	< 32	< 10
	08/28/13	1338 ± 113	< 4	< 4	< 46	< 13
	09/11/13	1223 ± 161	< 6	< 7	< 37	< 6
	09/25/13	1314 ± 153	< 6	< 7	< 52	< 14
	10/09/13	1208 ± 137	< 5	< 6	< 30	< 10
	10/23/13	1440 ± 135	< 5	< 5	< 33	< 9
	11/06/13	1151 ± 150	< 6	< 6	< 40	< 11
	11/20/13	1278 ± 145	< 5	< 7	< 47	< 12
	12/04/13	1319 ± 164	< 8	< 8	< 43	< 13
	MEAN	1285 ± 212	-	-	-	-
F4-1	1/16/2013	1438 ± 94	< 3	< 4	< 28	< 8
	02/13/13	1374 ± 170	< 7	< 9	< 36	< 12
	03/13/13	1482 ± 171	< 6	< 7	< 36	< 10
	03/27/13	1403 ± 129	< 5	< 6	< 23	< 8
	04/10/13	1474 ± 190	< 6	< 8	< 31	< 12
	04/24/13	1362 ± 125	< 5	< 6	< 34	< 7
	05/08/13	1313 ± 169	< 5	< 7	< 32	< 10
	05/22/13	1427 ± 164	< 5	< 6	< 45	< 12
	06/05/13	1361 ± 164	< 6	< 8	< 32	< 11
	06/19/13	1439 ± 155	< 6	< 6	< 22	< 9
	07/03/13	1321 ± 134	< 5	< 7	< 41	< 12
	07/17/13	1129 ± 148	< 5	< 6	< 31	< 7
	07/31/13	1341 ± 148	< 4	< 6	< 24	< 8
	08/14/13	1403 ± 177	< 7	< 7	< 36	< 10
	08/28/13	1450 ± 105	< 4	< 4	< 41	< 12
	09/11/13	1224 ± 153	< 5	< 6	< 31	< 10
	09/25/13	1411 ± 144	< 5	< 6	< 43	< 11
	10/09/13	1513 ± 150	< 5	< 7	< 30	< 11
	10/23/13	1415 ± 119	< 5	< 6	< 36	< 11
	11/06/13	1464 ± 152	< 6	< 6	< 44	< 13
	11/20/13	1424 ± 140	< 5	< 6	< 39	< 15
	12/04/13	1526 ± 156	< 7	< 8	< 38	< 12
	MEAN	1395 ± 184	-	-	-	-

Table C-VIII.3 **CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
G2-1	1/16/2013	866 ± 92	< 4	< 5	< 30	< 10
	2/13/2013	1220 ± 133	< 6	< 6	< 38	< 11
	3/13/2013	785 ± 134	< 7	< 7	< 38	< 10
	03/27/13	1306 ± 115	< 4	< 5	< 26	< 6
	04/10/13	996 ± 130	< 6	< 8	< 33	< 11
	04/24/13	1194 ± 116	< 5	< 5	< 30	< 9
	05/08/13	1139 ± 158	< 8	< 9	< 43	< 13
	05/22/13	912 ± 135	< 5	< 7	< 48	< 11
	06/05/13	718 ± 151	< 7	< 8	< 38	< 12
	06/19/13	1031 ± 140	< 6	< 7	< 35	< 10
	07/03/13	740 ± 131	< 6	< 7	< 42	< 13
	07/17/13	1793 ± 152	< 5	< 7	< 30	< 9
	07/31/13	1010 ± 144	< 7	< 8	< 37	< 14
	08/14/13	966 ± 158	< 8	< 9	< 50	< 12
	08/28/13	920 ± 109	< 4	< 5	< 44	< 15
	09/11/13	925 ± 134	< 6	< 7	< 30	< 11
	09/25/13	1113 ± 150	< 6	< 7	< 46	< 13
	10/09/13	715 ± 140	< 6	< 6	< 35	< 9
	10/23/13	788 ± 98	< 4	< 4	< 33	< 12
	11/06/13	745 ± 128	< 7	< 8	< 48	< 12
	11/20/13	1003 ± 127	< 6	< 6	< 42	< 11
	12/04/13	902 ± 143	< 7	< 7	< 40	< 9
	MEAN	990 ± 492	-	-	-	-
K15-3	01/16/13	1262 ± 100	< 4	< 4	< 28	< 9
	02/13/13	1217 ± 151	< 8	< 8	< 40	< 8
	03/13/13	1232 ± 130	< 5	< 6	< 31	< 8
	03/27/13	1266 ± 114	< 4	< 5	< 20	< 6
	04/10/13	1336 ± 148	< 8	< 8	< 37	< 8
	04/24/13	1369 ± 141	< 6	< 7	< 36	< 10
	5/8/2013	1325 ± 151	< 6	< 7	< 29	< 6
	05/22/13	1419 ± 152	< 7	< 6	< 48	< 11
	6/5/2013	1132 ± 172	< 7	< 6	< 33	< 9
	06/19/13	1353 ± 147	< 5	< 7	< 30	< 8
	07/03/13	1426 ± 148	< 6	< 5	< 39	< 11
	07/17/13	1211 ± 131	< 6	< 7	< 31	< 8
	07/31/13	1465 ± 145	< 6	< 6	< 28	< 8
	08/14/13	1336 ± 161	< 6	< 5	< 35	< 12
	08/28/13	1410 ± 141	< 5	< 6	< 54	< 15
	09/11/13	1368 ± 146	< 6	< 7	< 35	< 9
	09/25/13	1308 ± 138	< 5	< 6	< 43	< 13
	10/09/13	1243 ± 125	< 5	< 6	< 30	< 8
	10/23/13	1429 ± 130	< 4	< 5	< 36	< 11
	11/06/13	1187 ± 132	< 6	< 6	< 43	< 9
	11/20/13	1264 ± 137	< 6	< 7	< 49	< 15
	12/04/13	1300 ± 137	< 5	< 6	< 34	< 9
	MEAN	1312 ± 178	-	-	-	-

Table C-VIII.3 **CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
P4-1	01/16/13	1371 ± 106	< 4	< 4	< 28	< 10
	02/13/13	1325 ± 150	< 6	< 7	< 32	< 10
	03/13/13	1309 ± 121	< 4	< 4	< 21	< 7
	03/27/13	1345 ± 86	< 4	< 4	< 18	< 5
	04/10/13	1373 ± 133	< 5	< 6	< 27	< 8
	04/24/13	1296 ± 151	< 5	< 7	< 44	< 10
	05/08/13	1398 ± 168	< 6	< 7	< 31	< 9
	05/22/13	1419 ± 166	< 7	< 6	< 44	< 12
	06/05/13	1289 ± 192	< 7	< 8	< 32	< 10
	06/19/13	1412 ± 166	< 7	< 6	< 34	< 11
	07/03/13	1393 ± 110	< 5	< 4	< 32	< 8
	07/17/13	1362 ± 162	< 7	< 7	< 39	< 12
	07/31/13	1507 ± 149	< 5	< 6	< 28	< 10
	08/14/13	1418 ± 173	< 6	< 7	< 30	< 11
	08/28/13	1350 ± 110	< 4	< 5	< 41	< 10
	09/11/13	1481 ± 175	< 6	< 9	< 33	< 11
	09/25/13	1475 ± 156	< 5	< 6	< 44	< 15
	10/09/13	1464 ± 170	< 6	< 6	< 28	< 9
	10/23/13	1412 ± 135	< 5	< 6	< 37	< 11
	11/06/13	1395 ± 185	< 5	< 6	< 37	< 11
	11/20/13	1483 ± 146	< 6	< 5	< 39	< 14
	12/04/13	1257 ± 138	< 5	< 7	< 29	< 7
	MEAN	1388 ± 137	-	-	-	-

Table C-IX.1 **CONCENTRATIONS OF STRONTIUM AND GAMMA EMITTERS IN FOOD PRODUCT SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

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							
Cauliflower Leaves	06/25/13	5 ± 2	< 172	4304 ± 431	< 33	< 17	< 18
Green Cabbage	06/25/13	< 3	< 204	3836 ± 463	< 35	< 19	< 22
Sunflower Leaves	06/25/13	8 ± 3	362 ± 175	7715 ± 525	< 34	< 16	< 20
Cabbage	07/09/13	3 ± 2	< 215	2416 ± 448	< 44	< 20	< 24
Broccoli Leaves	07/22/13	7 ± 3	386 ± 189	3660 ± 461	< 47	< 24	< 24
Green Cabbage	07/22/13	< 5	< 175	2005 ± 416	< 38	< 18	< 16
Sunflower Leaves	07/22/13	8 ± 3	736 ± 239	8009 ± 734	< 38	< 21	< 23
Sweet Corn	07/31/13		< 121	2205 ± 309	< 32	< 16	< 17
Tomatoes	07/31/13		< 174	2182 ± 305	< 40	< 19	< 17
Neck Pumpkin Leaves	08/28/13	7 ± 3	1538 ± 208	5273 ± 375	< 49	< 17	< 18
Red Beet Greens	08/28/13	< 4	387 ± 169	9046 ± 465	< 48	< 15	< 16
Sunflower Leaves	08/28/13	< 4	1021 ± 173	6884 ± 477	< 51	< 17	< 21
Gourd Leaves	09/30/13	30 ± 3	2637 ± 127	4848 ± 192	< 58	< 7	< 8
Radish Greens	09/30/13	14 ± 2	147 ± 65	5850 ± 171	< 48	< 5	< 6
Sunflower Leaves	09/30/13	9 ± 2	1153 ± 98	5934 ± 204	< 57	< 7	< 7
Sweet Potatoes	09/30/13		< 53	4274 ± 141	< 39	< 5	< 6
	MEAN	10 ± 16	930 ± 1566	4903 ± 4426	-	-	-
E1-2							
Cabbage	07/09/13	7 ± 2	< 196	3536 ± 452	< 43	< 17	< 20
Sweet Corn	07/31/13		< 128	2576 ± 379	< 32	< 17	< 18
Tomatoes	07/31/13		< 129	2431 ± 341	< 28	< 14	< 17
Sweet Potatoes	09/30/13		< 62	3534 ± 147	< 46	< 6	< 6
	MEAN	-	-	3019 ± 1197	-	-	-
H1-2							
Eggplant Leaves	06/25/13	12 ± 3	359 ± 155	8483 ± 488	< 38	< 17	< 17
Squash Leaves	06/25/13	7 ± 4	< 146	5337 ± 458	< 32	< 16	< 18
Zucchini Leaves	06/25/13	17 ± 3	141 ± 96	5472 ± 350	< 25	< 12	< 13
Eggplant Leaves	07/22/13	16 ± 4	610 ± 248	4113 ± 620	< 54	< 21	< 31
Squash Leaves	07/22/13	27 ± 5	869 ± 282	3476 ± 571	< 50	< 20	< 19
Zucchini Leaves	07/22/13	16 ± 4	768 ± 228	4663 ± 574	< 49	< 20	< 21
Eggplant Leaves	08/28/13	12 ± 3	1435 ± 192	3087 ± 311	< 42	< 15	< 16
Neck Pumpkin Leaves	08/28/13	< 4	888 ± 179	4083 ± 344	< 48	< 15	< 16
Zucchini Leaves	08/28/13	8 ± 3	261 ± 171	4272 ± 361	< 48	< 14	< 17
Squash Leaves	09/30/13	24 ± 3	723 ± 84	3217 ± 149	< 56	< 6	< 7
Turnip Greens	09/30/13	4 ± 2	188 ± 62	5369 ± 148	< 45	< 5	< 6
Zucchini Leaves	09/30/13	11 ± 2	527 ± 71	3334 ± 153	< 56	< 6	< 7
	MEAN	14 ± 14	615 ± 762	4576 ± 2994	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-X.1 QUARTERLY OSLD RESULTS FOR THREE MILE ISLAND NUCLEAR STATION, 2013

RESULTS IN UNITS OF MILLI-ROENTGEN/QUARTER

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
A1-4	17.2 ± 2.9	18.9	16.4	15.6	17.7
A3-1	16.9 ± 2.5	18.2	16.1	15.7	17.8
A5-1	21.1 ± 0.8	21.7	21.0	20.8	21.0
A9-3	18.4 ± 2.6	19.6	18.9	16.6	18.5
B1-1	17.7 ± 2.4	19.3	17.2	16.5	17.8
B1-2	17.4 ± 3.4	19.5	16.2	15.8	18.1
B2-1	18.1 ± 1.8	18.6	18.0	16.9	19.0
B5-1	20.5 ± 2.9	21.7	21.3	18.5	20.7
C1-1	20.1 ± 2.3	21.3	20.3	18.5	20.4
C1-2	17.2 ± 3.7	19.2	16.2	15.2	18.3
C2-1	20.2 ± 2.6	20.9	20.8	18.3	20.9
C5-1	20.9 ± 3.2	22.5	21.0	18.7	21.6
C8-1	21.3 ± 3.7	23.1	21.9	18.7	21.8
D1-1	18.3 ± 3.3	19.8	17.4	16.5	19.6
D1-2	19.2 ± 2.5	20.7	19.2	17.7	19.2
D2-2	23.3 ± 3.0	24.4	23.0	21.4	24.7
D6-1	22.3 ± 2.8	23.3	22.8	20.2	22.7
E1-2	18.3 ± 3.5	20.1	17.5	16.3	19.5
E1-4	20.7 ± 5.1	22.3	19.2	17.9	23.3
E2-3	21.7 ± 2.0	22.6	21.8	20.3	22.2
E5-1	20.6 ± 2.7	21.5	21.1	18.7	21.4
E7-1	20.3 ± 3.2	22.0	19.8	18.3	21.0
F1-1	19.7 ± 2.6	21.1	18.3	18.9	20.5
F1-2	25.5 ± 8.3	25.5	24.7	20.8	30.9
F1-4	23.8 ± 7.5	24.2	22.0	20.2	28.8
F2-1	22.1 ± 2.3	23.6	22.0	20.8	22.2
F5-1	23.0 ± 2.7	24.2	23.9	21.3	22.8
G1-2	20.1 ± 2.7	20.9	19.3	18.6	21.5
G1-3	20.9 ± 3.7	21.9	19.6	19.0	22.9
G1-5	18.3 ± 2.5	18.7	17.4	17.2	19.9
G1-6	19.8 ± 2.4	20.3	18.9	18.7	21.2
G2-4	24.2 ± 2.3	25.4	24.5	22.7	24.5
G5-1	19.8 ± 2.6	21.4	18.8	18.7	20.3
H1-1	19.4 ± 2.0	20.7	19.4	18.3	19.2
H3-1	16.8 ± 2.1	18.1	16.4	15.6	17.2
H5-1	15.8 ± 3.2	17.3	14.8	14.0	16.9
H8-1	29.6 ± 0.5	29.4	29.9	29.5	29.6
J1-1	18.2 ± 2.8	19.5	18.9	16.3	18.1
J1-3	15.9 ± 2.5	17.3	15.3	14.5	16.5
J3-1	19.7 ± 2.3	21.3	19.8	18.6	19.1
J5-1	21.8 ± 2.4	23.4	20.9	20.9	22.0
J7-1	22.9 ± 2.2	23.8	23.0	21.3	23.4
K1-4	17.7 ± 1.4	18.3	17.5	16.8	18.2
K2-1	21.7 ± 2.1	21.7	22.2	20.3	22.7
K3-1	18.0 ± 2.0	18.6	18.7	16.5	18.1

Table C-X.1 QUARTERLY OSLD RESULTS FOR THREE MILE ISLAND NUCLEAR STATION, 2013

RESULTS IN UNITS OF MILLI-ROENTGEN/QUARTER

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
K5-1	21.7 ± 1.5	22.8	21.3	21.2	21.5
K8-1	21.1 ± 2.9	22.4	20.8	19.2	22.1
L1-1	18.1 ± 2.6	19.8	17.2	16.9	18.5
L1-2	18.3 ± 2.4	19.5	18.2	16.7	18.8
L2-1	19.9 ± 2.5	21.3	19.3	18.6	20.5
L5-1	18.2 ± 2.3	19.2	18.4	16.5	18.6
L8-1	19.8 ± 1.5	20.7	20.1	18.9	19.5
M1-1	16.6 ± 2.9	18.2	16.2	14.8	17.1
M1-2	19.8 ± 2.6	21.0	20.1	18.0	20.3
M2-1	17.6 ± 2.0	19.0	17.4	16.6	17.4
M5-1	20.1 ± 2.6	21.4	20.4	18.3	20.3
M9-1	23.9 ± 1.8	25.1	23.9	22.9	23.9
N1-1	18.9 ± 1.9	19.4	19.5	17.5	19.3
N1-3	17.7 ± 3.0	19.5	16.5	16.5	18.5
N2-1	20.5 ± 2.1	21.9	20.4	19.3	20.4
N5-1	17.0 ± 2.4	18.5	16.6	15.6	17.3
N8-1	21.0 ± 2.3	22.6	20.9	19.8	20.6
P1-1	19.0 ± 1.7	20.0	18.7	18.0	19.3
P1-2	18.4 ± 3.9	20.1	18.7	15.6	19.3
P2-1	22.9 ± 1.8	23.9	22.9	21.8	23.3
P5-1	20.0 ± 3.1	21.6	19.6	18.0	20.8
P8-1	17.3 ± 2.9	18.8	17.3	15.4	17.7
Q1-1	19.2 ± 2.0	19.8	19.1	17.8	20.0
Q1-2	16.4 ± 3.2	18.2	16.0	14.4	16.9
Q2-1	18.0 ± 1.6	19.0	17.8	17.1	18.0
Q5-1	18.2 ± 2.4	19.8	17.6	17.1	18.3
Q9-1	19.3 ± 1.6	20.2	18.8	18.5	19.7
R1-1	17.0 ± 3.2	18.8	15.6	15.8	17.9
R1-2	17.8 ± 2.0	18.8	17.7	16.5	18.4
R3-1	22.1 ± 2.1	23.1	22.7	20.7	22.1
R5-1	21.5 ± 2.3	23.0	21.3	20.3	21.6
R9-1	21.5 ± 2.4	22.5	20.9	20.1	22.5
B10-1	19.9 ± 2.5	20.8	19.8	18.3	20.9
D15-1	20.3 ± 1.8	21.2	20.1	19.1	20.7
F10-1	24.2 ± 1.6	25.0	23.8	23.3	24.7
F25-1	21.1 ± 2.1	22.3	21.0	19.8	21.3
G10-1	28.4 ± 2.7	29.5	27.1	27.5	29.7
G15-1	25.2 ± 2.8	26.3	25.4	23.1	25.9
H15-1	21.3 ± 2.9	22.6	22.1	19.3	21.3
J15-1	23.3 ± 3.1	25.0	22.6	21.6	24.2
K15-1	19.7 ± 2.5	21.3	19.6	18.3	19.6
L15-1	20.5 ± 2.3	21.3	20.5	18.9	21.3
N15-2	22.1 ± 0.9	22.5	21.9	22.5	21.6
Q15-1	21.9 ± 2.3	23.0	21.4	20.5	22.6
R15-1	19.2 ± 2.4	20.5	19.6	17.6	19.3

TABLE C-X.2 MEAN QUARTERLY OSLD RESULTS FOR THE SITE BOUNDARY, INDICATOR AND CONTROL LOCATIONS FOR THREE MILE ISLAND NUCLEAR STATION, 2013

RESULTS IN UNITS OF MILLI-ROENTGEN/QUARTER ± 2 STANDARD DEVIATIONS OF THE STATION DATA

COLLECTION PERIOD	SITE BOUNDARY ± 2 S.D.	INDICATOR	CONTROL
JAN-MAR	20.0 ± 4.2	21.3 ± 4.4	23.2 ± 5.4
APR-JUN	17.9 ± 4.7	20.1 ± 5.0	21.9 ± 4.8
JUL-SEP	16.8 ± 3.7	18.8 ± 4.9	20.7 ± 5.7
OCT-DEC	20.1 ± 7.8	20.6 ± 4.6	22.5 ± 6.1

TABLE C-X.3 SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR THREE MILE ISLAND NUCLEAR STATION, 2013

RESULTS IN UNITS OF MILLI-ROENTGEN/QUARTER

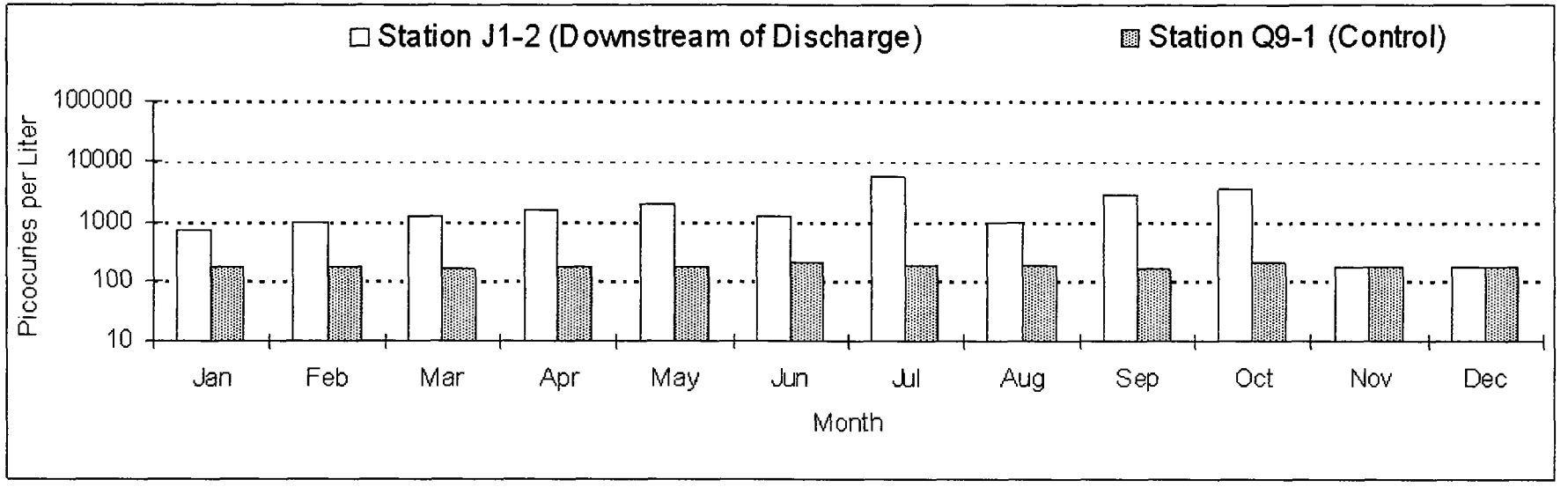
LOCATION	SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN ± 2 S.D.
SITE BOUNDARY	76	14.4	30.9	18.7 ± 6.0
INDICATOR	240	14.0	29.9	20.2 ± 5.1
CONTROL	44	17.6	29.7	22.1 ± 5.6

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, 2013



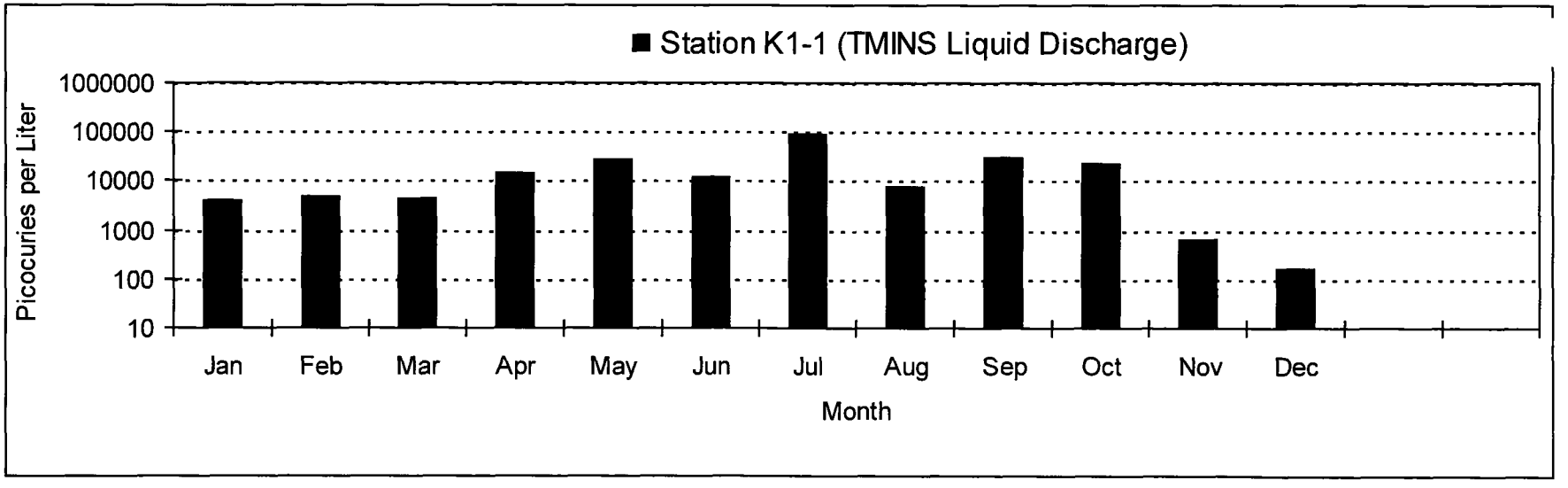


FIGURE C-2
Mean Quarterly Tritium Concentrations in Surface Water
Three Mile Island Nuclear Station, 1974 - 2013

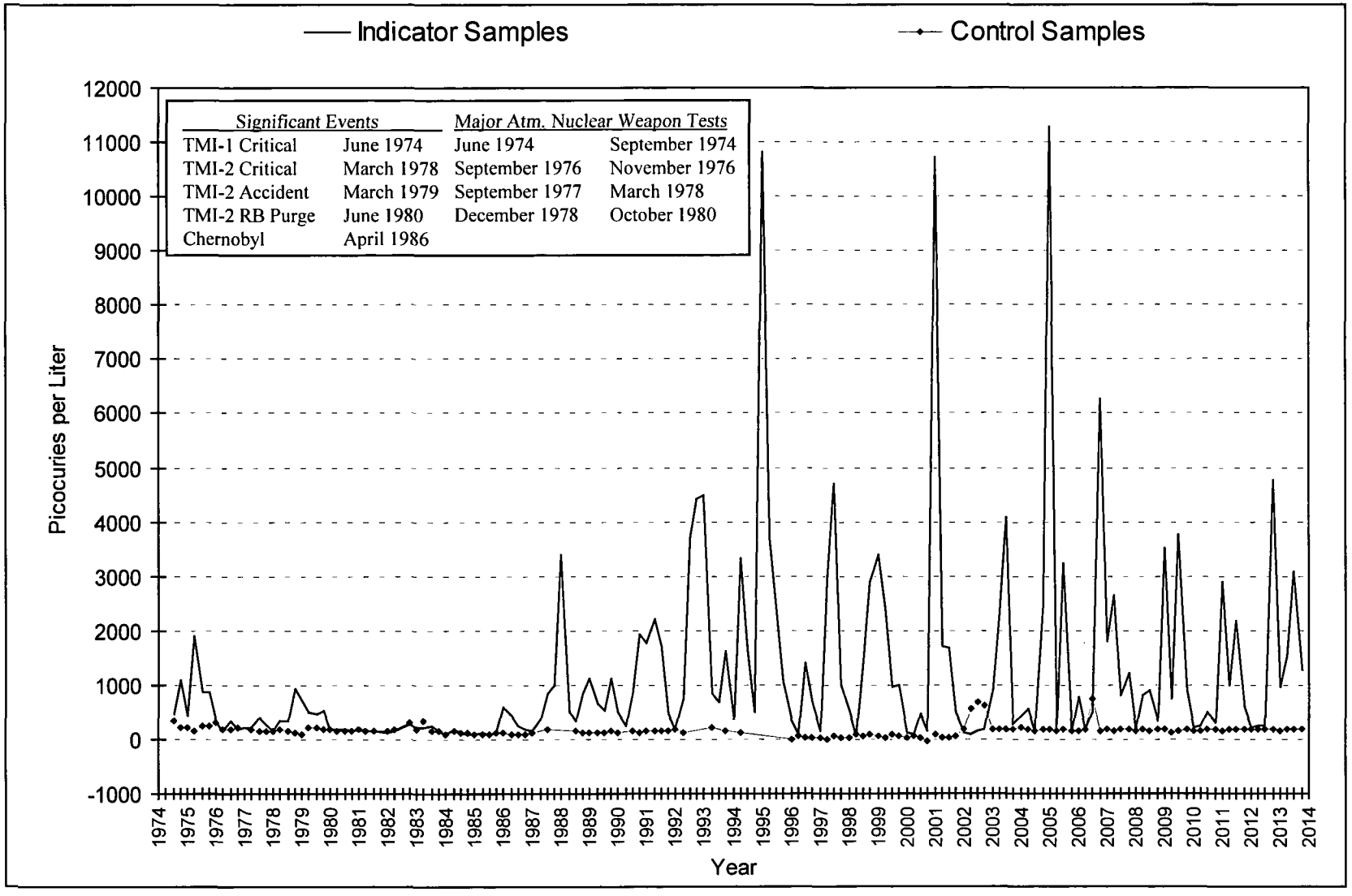


FIGURE C-3
Mean Monthly Gross Beta Concentrations in Drinking Water
Three Mile Island Nuclear Station, 2013

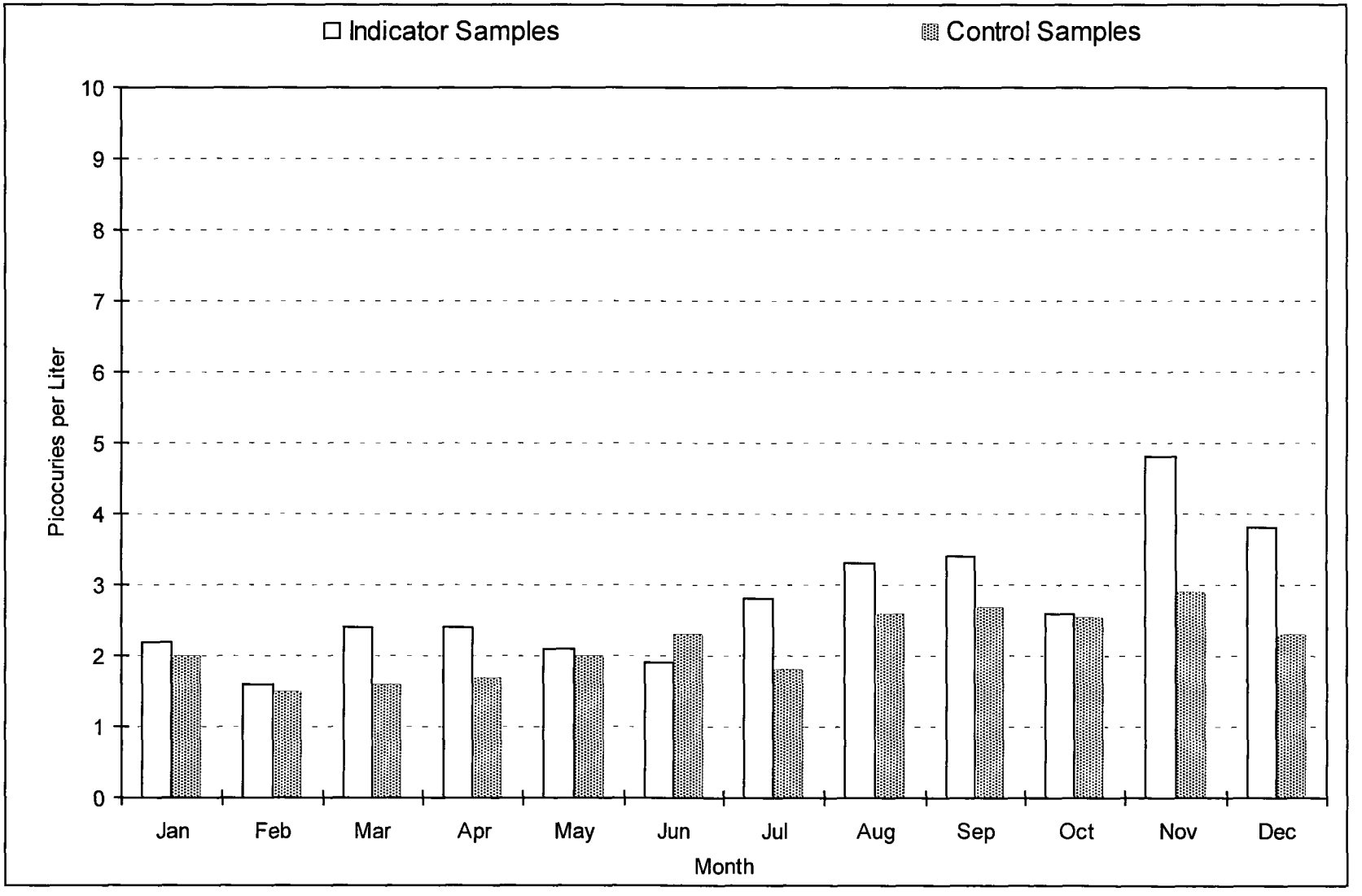
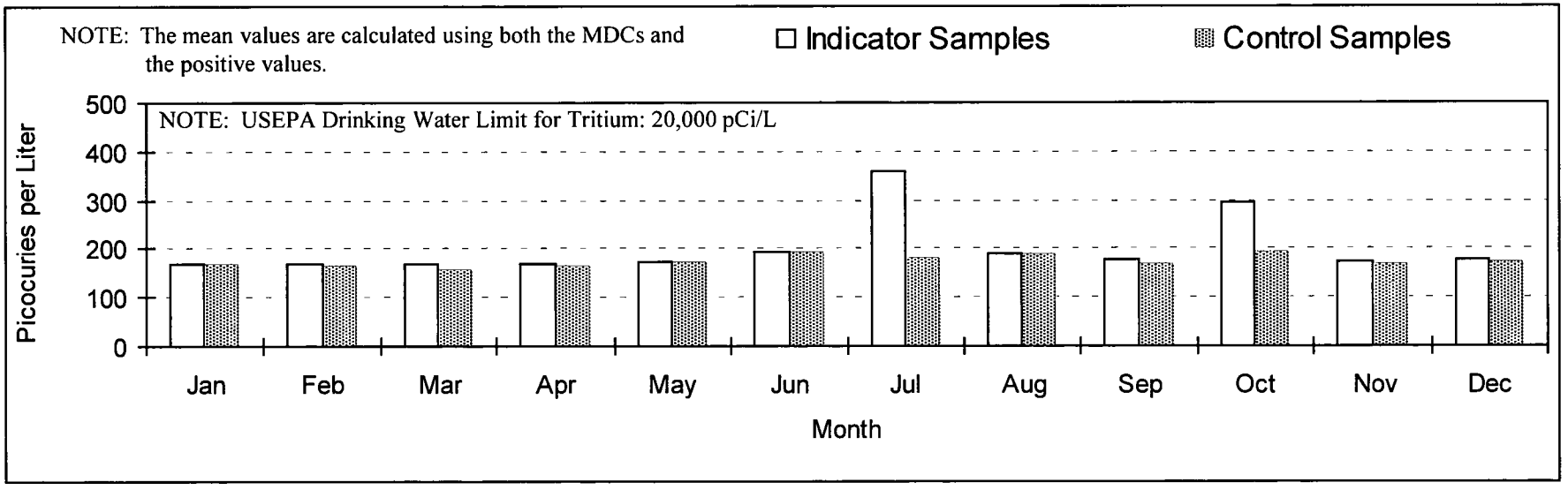


FIGURE C-4
Mean Monthly Tritium Concentrations in Drinking Water and Effluent Water
Three Mile Island Nuclear Station, 2013



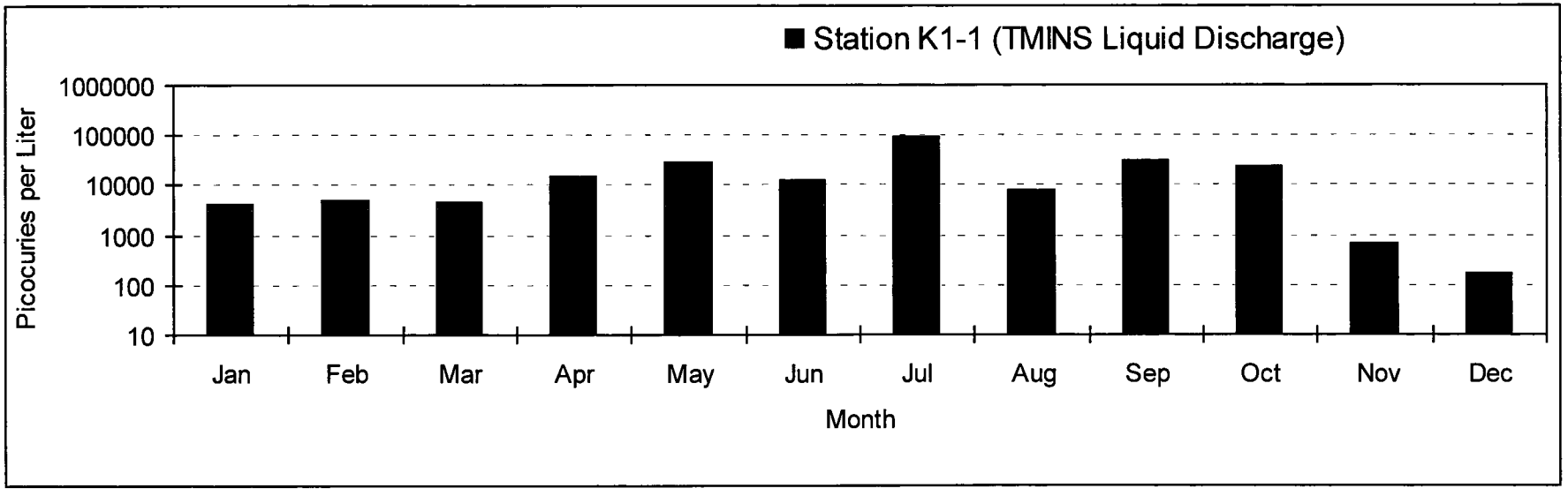


FIGURE C-5
Mean Cesium-137 Concentrations in Aquatic Sediments
Three Mile Island Nuclear Station, 1984 – 2013

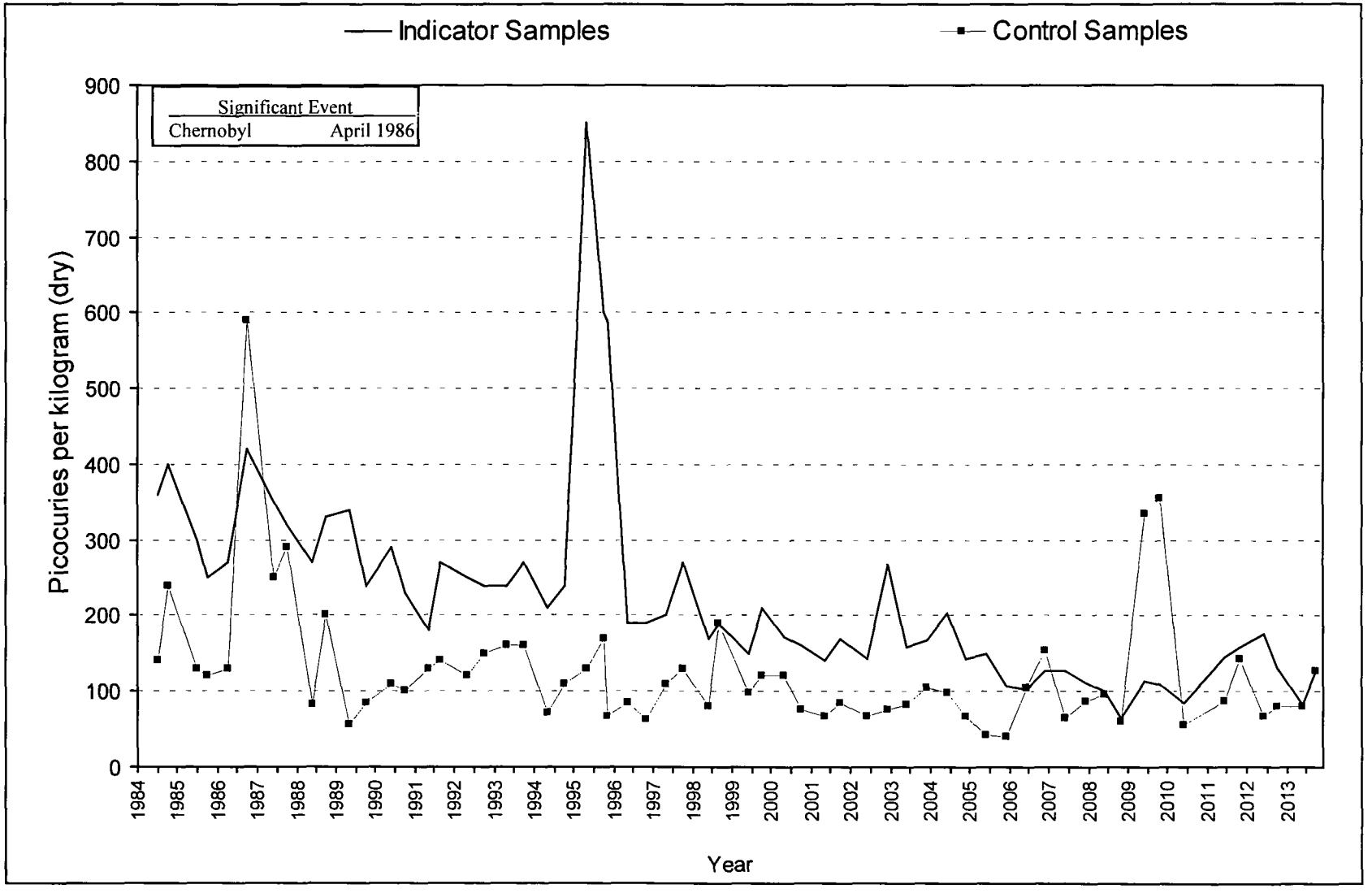


FIGURE C-6
Mean Quarterly Gross Beta Concentrations in Air Particulates
Three Mile Island Nuclear Station, 1972 - 2013

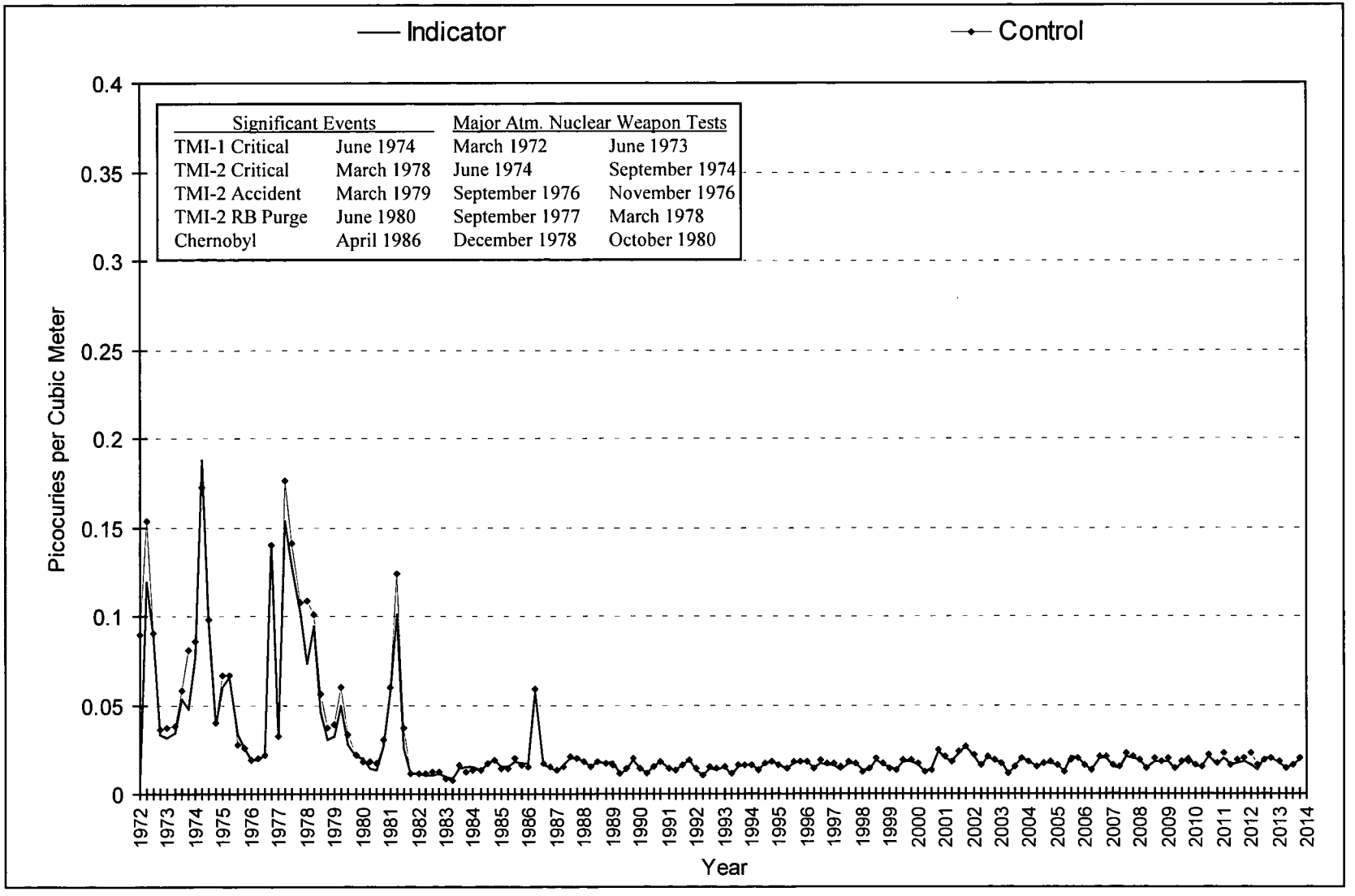
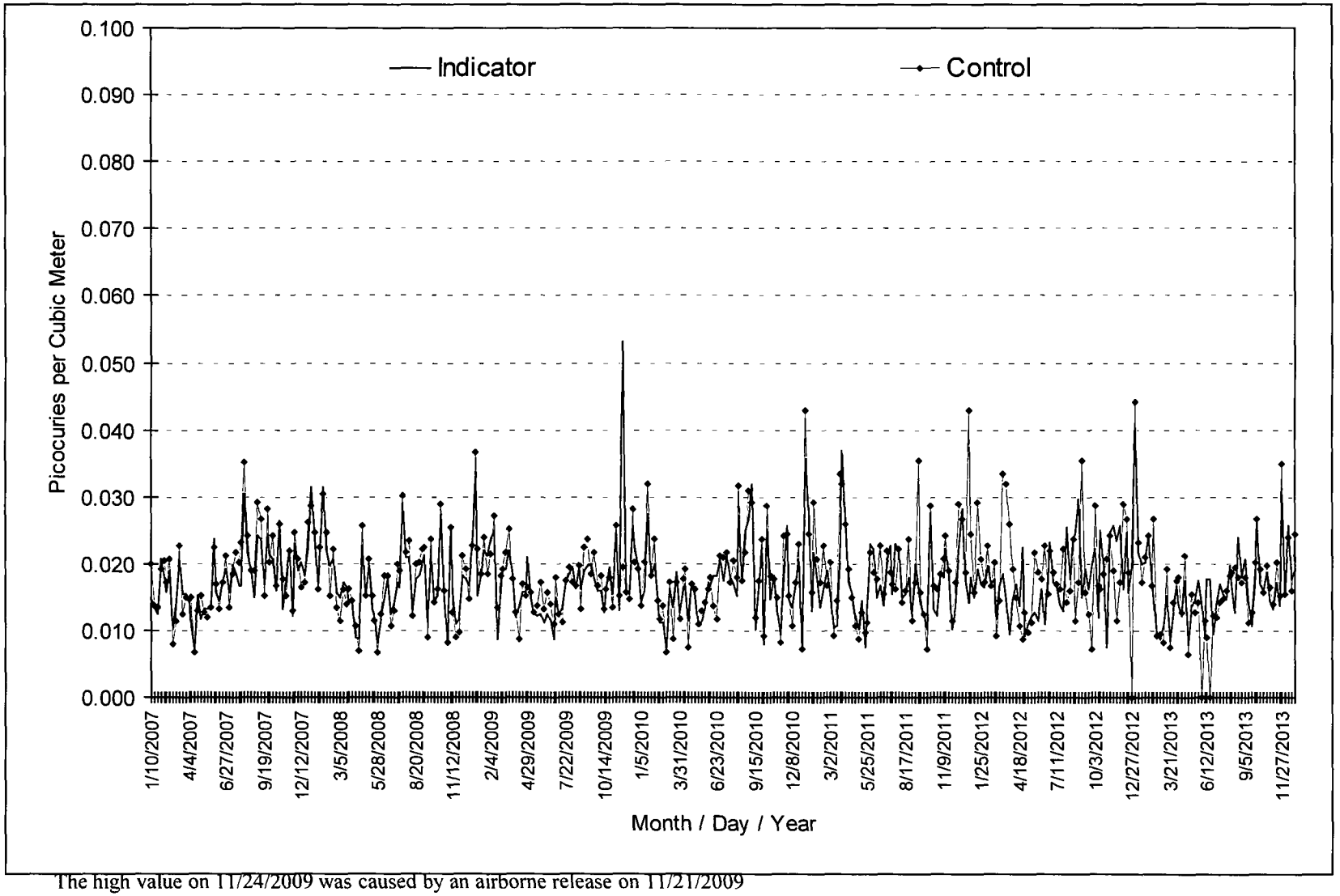
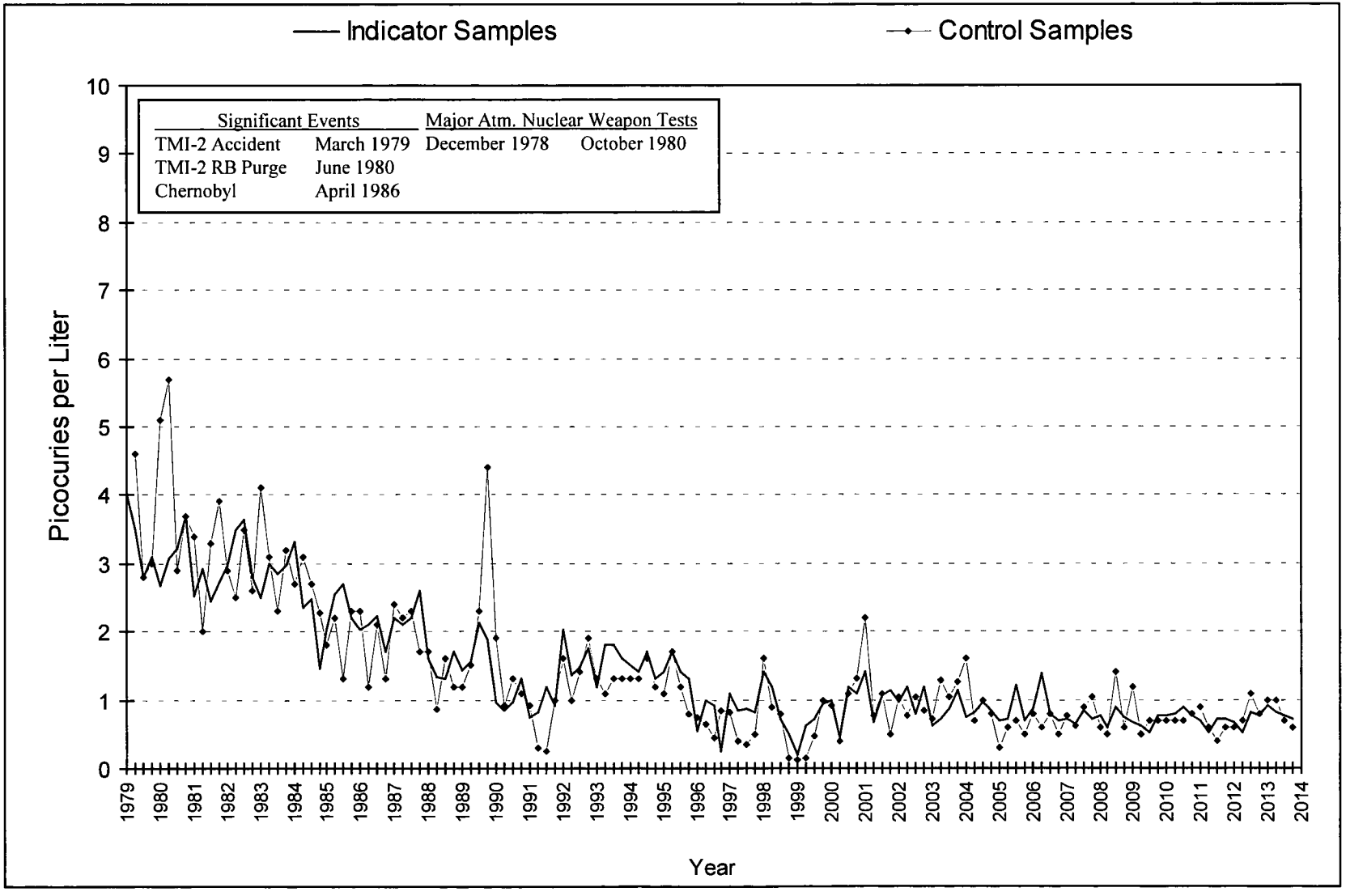


FIGURE C-7
Mean Weekly Gross Beta Concentrations in Air Particulates
Three Mile Island Nuclear Station, 2007 - 2013



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 - 2013



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APPENDIX D

DATA TABLES AND FIGURES
COMPARISON LABORATORY

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The following section presents the results of data analysis performed by the QC laboratory, Environmental Inc. Duplicate samples were obtained from several locations and media and split between the primary laboratory, Teledyne Brown Engineering (TBE) and the QC laboratory. 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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	Q9-1Q
12/31/12 - 01/29/13	1.6 ± 0.7
01/29/13 - 02/26/13	1.9 ± 1.0
02/26/13 - 04/02/13	< 1.2
04/02/13 - 04/30/13	1.3 ± 0.7
04/30/13 - 05/28/13	< 0.8
05/28/13 - 07/02/13	0.7 ± 0.4
07/02/13 - 07/30/13	1.8 ± 0.6
07/30/13 - 09/03/13	< 0.9
09/03/13 - 10/01/13	1.9 ± 0.9
10/01/13 - 10/29/13	1.3 ± 0.4
10/29/13 - 12/03/13	0.9 ± 0.3
12/03/13 - 12/31/13	< 1.3
MEAN	1.4 ± 0.9

TABLE D-I.2 **CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	Q9-1Q
12/31/12 - 01/29/13	< 143
01/29/13 - 02/26/13	< 139
02/26/13 - 04/02/13	< 150
04/02/13 - 04/30/13	< 142
04/30/13 - 05/28/13	< 188
05/28/13 - 07/02/13	< 165
07/02/13 - 07/30/13	< 156
07/30/13 - 09/03/13	< 150
09/03/13 - 10/01/13	< 152
10/01/13 - 10/29/13	< 145
10/29/13 - 12/03/13	< 148
12/03/13 - 12/31/13	< 150
MEAN	-

TABLE D-I.3 **CONCENTRATIONS OF IODINE-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	Q9-1Q
12/31/12 - 01/29/13	< 0.5
01/29/13 - 02/26/13	< 0.4
02/26/13 - 04/02/13	< 0.3
04/02/13 - 04/30/13	< 0.3
04/30/13 - 05/28/13	< 0.4
05/28/13 - 07/02/13	< 0.5
07/02/13 - 07/30/13	< 0.3
07/30/13 - 09/03/13	< 0.4
09/03/13 - 10/01/13	< 0.2
10/01/13 - 10/29/13	< 0.2
10/29/13 - 12/03/13	< 0.2
12/03/13 - 12/31/13	< 0.4
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, 2013

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	12/31/12 - 01/29/13	< 3	< 9	< 2	< 2	< 4	< 5	< 3	< 2	< 3	< 28	< 5
	01/29/13 - 02/26/13	< 3	< 6	< 2	< 3	< 6	< 4	< 2	< 4	< 2	< 14	< 3
	02/26/13 - 04/02/13	< 2	< 5	< 2	< 2	< 2	< 3	< 3	< 3	< 3	< 18	< 3
	04/02/13 - 04/30/13	< 6	< 9	< 3	< 8	< 11	< 7	< 4	< 7	< 8	< 38	< 5
	04/30/13 - 05/28/13	< 2	< 5	< 3	< 2	< 4	< 4	< 1	< 3	< 3	< 19	< 3
	05/28/13 - 07/02/13	< 2	< 5	< 2	< 2	< 3	< 3	< 4	< 2	< 2	< 26	< 5
	07/02/13 - 07/30/13	< 3	< 3	< 2	< 3	< 3	< 3	< 3	< 4	< 3	< 22	< 5
	07/30/13 - 09/03/13	< 3	< 5	< 2	< 2	< 3	< 5	< 3	< 3	< 3	< 19	< 4
	09/03/13 - 10/01/13	< 1	< 3	< 2	< 1	< 2	< 3	< 2	< 1	< 1	< 16	< 3
	10/01/13 - 10/29/13	< 2	< 7	< 2	< 2	< 5	< 4	< 2	< 2	< 3	< 18	< 5
	10/29/13 - 12/03/13	< 3	< 6	< 2	< 3	< 2	< 4	< 3	< 3	< 3	< 18	< 2
	12/03/13 - 12/31/13	< 2	< 2	< 2	< 2	< 3	< 3	< 2	< 3	< 3	< 12	< 3

TABLE D-II.1 **CONCENTRATIONS OF STRONTIUM AND GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

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	09/24/13	< 8	< 4	3220 ± 360	< 8	< 13	< 34	< 8	< 17	< 12	< 6

TABLE D-III.1 CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137
J2-1	10/30/13	13490 ± 8800	< 38	88 ± 43

TABLE D-IV.1 CONCENTRATIONS OF GAMMA EMITTERS AND STRONTIUM IN FOOD PRODUCT SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013

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	07/22/13	4710 ± 360	< 24	< 15	< 16	< 17	15 ± 4
B10-2Q	07/09/13	1520 ± 160	< 11	< 5	< 5	< 2	< 1
MEAN		3115 ± 4511	-	-	-	-	-

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, 2013

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

COLLECTION PERIOD	E1-2Q GROSS BETA	E1-2Q I-131
01/02/13 - 01/09/13	55 ± 6	< 21
01/09/13 - 01/17/13	32 ± 4	< 15
01/17/13 - 01/24/13	34 ± 5	< 16
01/24/13 - 01/31/13	28 ± 5	< 20
01/31/13 - 02/07/13	38 ± 5	< 24
02/07/13 - 02/15/13	24 ± 4	< 12
02/15/13 - 02/21/13	19 ± 5	< 15
02/21/13 - 02/27/13	13 ± 5	< 13
02/27/13 - 03/07/13	13 ± 4	< 20
03/07/13 - 03/14/13	18 ± 4	< 24
03/14/13 - 03/21/13	26 ± 4	< 13
03/21/13 - 03/28/13	11 ± 4	< 24
03/28/13 - 04/04/13	21 ± 4	< 25
04/04/13 - 04/11/13	29 ± 5	< 12
04/11/13 - 04/17/13	17 ± 5	< 18
04/17/13 - 04/25/13	20 ± 4	< 17
04/25/13 - 05/02/13	30 ± 5	< 26
05/02/13 - 05/09/13	12 ± 4	< 24
05/09/13 - 05/16/13	21 ± 5	< 13
05/16/13 - 05/23/13	19 ± 5	< 16
05/23/13 - 05/30/13	25 ± 4	< 10
05/30/13 - 06/06/13	23 ± 5	< 18
06/06/13 - 06/12/13	14 ± 5	< 24
06/12/13 - 06/20/13	22 ± 4	< 22
06/20/13 - 06/26/13	38 ± 5	< 17
06/26/13 - 07/04/13	16 ± 4	< 27
07/04/13 - 07/10/13	(1)	(1)
07/10/13 - 07/18/13	31 ± 6	< 35
07/18/13 - 07/25/13	19 ± 5	< 22
07/25/13 - 08/01/13	19 ± 4	< 21
08/01/13 - 08/08/13	28 ± 5	< 18
08/08/13 - 08/15/13	24 ± 5	< 21
08/15/13 - 08/21/13	30 ± 5	< 17
08/21/13 - 08/29/13	36 ± 5	< 17
08/29/13 - 09/05/13	38 ± 5	< 17
09/05/13 - 09/12/13	41 ± 5	< 25
09/12/13 - 09/19/13	18 ± 4	< 14
09/19/13 - 09/25/13	20 ± 5	< 20
09/25/13 - 10/02/13	25 ± 5	< 8
10/02/13 - 10/10/13	38 ± 5	< 21
10/10/13 - 10/17/13	25 ± 4	< 16
10/17/13 - 10/24/13	27 ± 5	< 25
10/24/13 - 10/31/13	29 ± 5	< 14
10/31/13 - 11/07/13	27 ± 5	< 12
11/07/13 - 11/14/13	16 ± 4	< 26
11/14/13 - 11/21/13	28 ± 5	< 9
11/21/13 - 11/27/13	20 ± 5	< 19
11/27/13 - 12/05/13	48 ± 5	< 15
12/05/13 - 12/11/13	27 ± 5	< 21
12/11/13 - 12/19/13	40 ± 5	< 10
12/19/13 - 12/26/13	25 ± 4	< 22
12/26/13 - 01/02/14	28 ± 5	< 24
MEAN	26 ± 19	-

(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, 2013

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

SITE	COLLECTION PERIOD	Be-7	Cs-134	Cs-137
E1-2Q	01/02/13 - 03/28/13	60 ± 18	< 1.2	< 0.6
	03/28/13 - 06/26/13	95 ± 14	< 0.4	< 0.7
	06/26/13 - 10/02/13	95 ± 18	< 1.0	< 0.5
	10/02/13 - 01/02/14	77 ± 16	< 0.9	< 0.5
	MEAN	82 ± 34	-	-

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, 2013

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	01/16/13	< 0.4	774 ± 123	< 8	< 6	< 33	< 5		
	02/13/13	< 0.4	1069 ± 85	< 4	< 2	< 19	< 6		
	03/13/13	< 0.4	913 ± 87	< 4	< 4	< 20	< 4		
	03/27/13	< 0.5	1428 ± 113	< 3	< 3	< 16	< 5	< 0.6	< 0.5
	04/10/13	< 0.3	946 ± 98	< 6	< 4	< 24	< 5		
	04/24/13	< 0.4	1275 ± 97	< 4	< 4	< 18	< 3		
	05/08/13	< 0.4	1287 ± 113	< 3	< 4	< 16	< 4		
	05/22/13	< 0.3	1126 ± 85	< 3	< 4	< 12	< 3		
	06/05/13	< 0.5	952 ± 78	< 3	< 3	< 28	< 7		
	06/19/13	< 0.3	918 ± 121	< 4	< 6	< 23	< 5	< 0.6	< 0.5
	07/03/13	< 0.3	1050 ± 95	< 4	< 4	< 22	< 3		
	07/17/13	< 0.2	1665 ± 119	< 3	< 3	< 22	< 4		
	07/31/13	< 0.3	935 ± 95	< 3	< 3	< 28	< 3		
	08/14/13	< 0.1	880 ± 84	< 4	< 4	< 24	< 3		
	08/28/13	< 0.3	978 ± 102	< 5	< 4	< 29	< 2		
	09/11/13	< 0.5	1295 ± 98	< 3	< 4	< 18	< 2		
	09/25/13	< 0.2	1086 ± 100	< 3	< 4	< 27	< 5	< 0.8	< 0.7
	10/09/13	< 0.5	937 ± 118	< 6	< 5	< 44	< 5		
	10/23/13	< 0.4	1002 ± 84	< 4	< 2	< 27	< 4		
	11/06/13	< 0.3	850 ± 180	< 6	< 7	< 43	< 2		
	11/20/13	< 0.2	1224 ± 105	< 4	< 3	< 18	< 4		
	12/04/13	< 0.3	933 ± 88	< 4	< 4	< 28	< 4	< 0.5	< 0.5
	MEAN		1069 ± 436	-	-	-	-	-	-

FIGURE D-1
MONTHLY GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES COLLECTED FROM TMINS LOCATION Q9-1Q, 2013

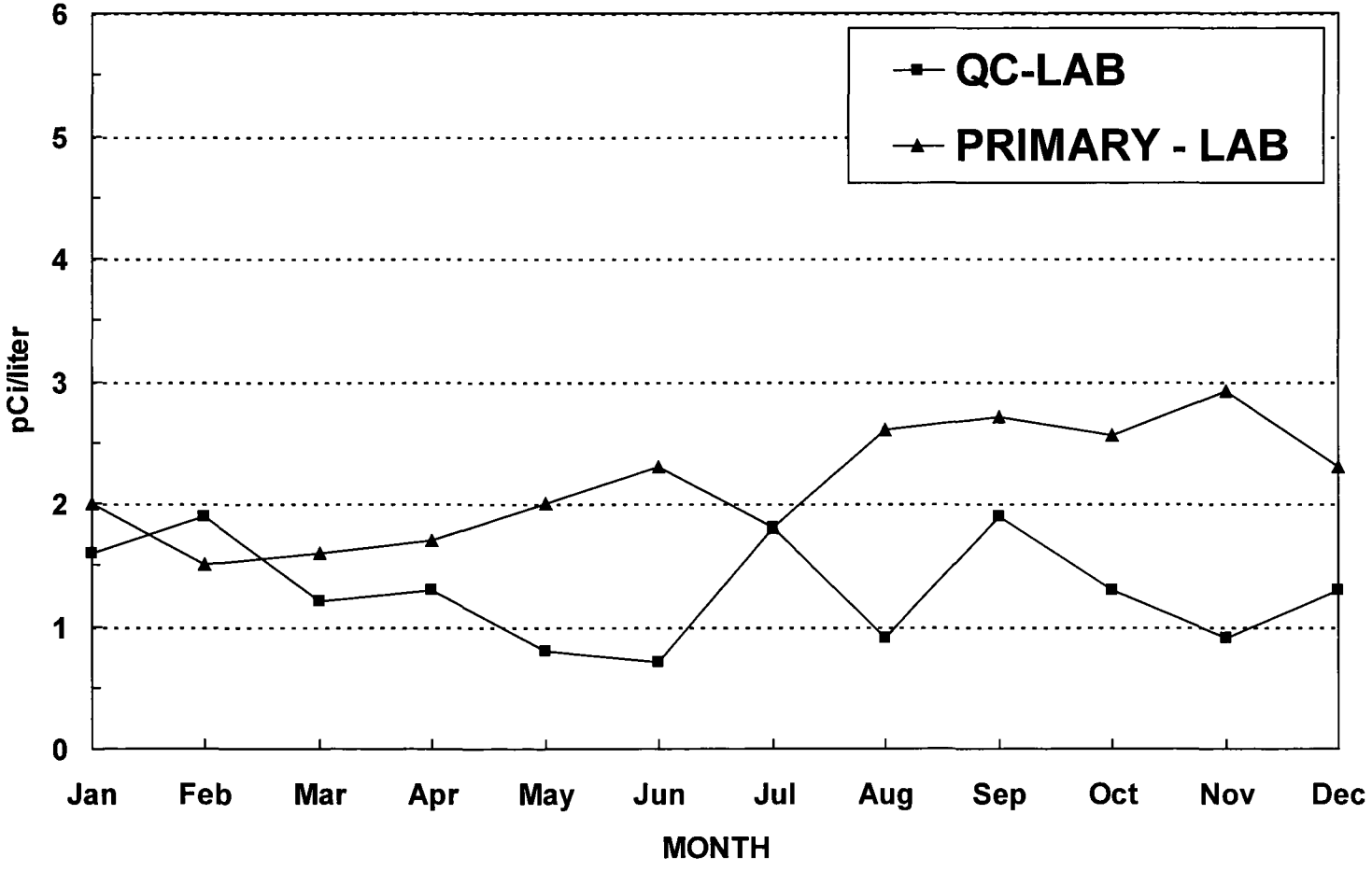
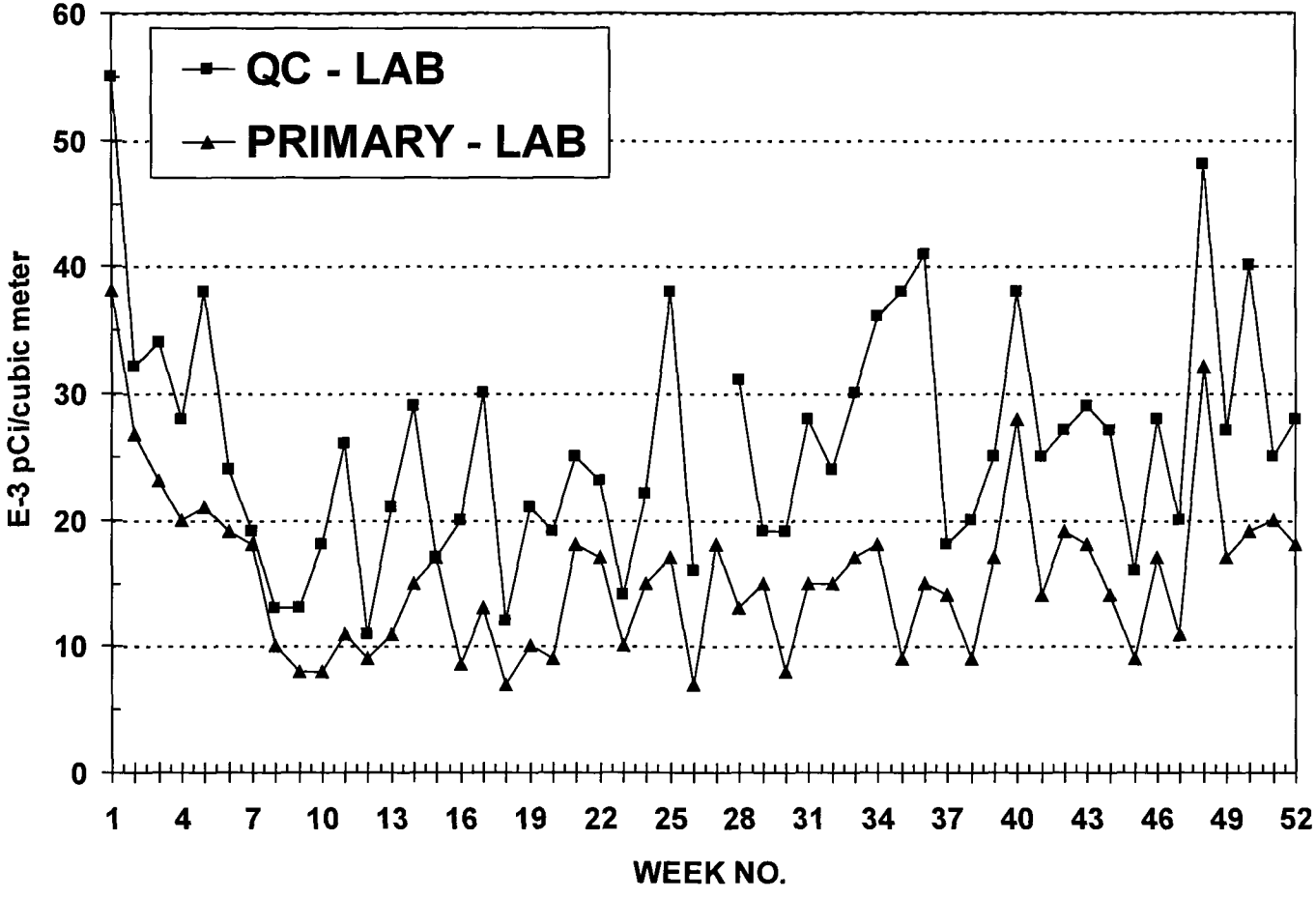


FIGURE D-2
WEEKLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED FROM TMINS LOCATION E1-2Q, 2013



APPENDIX E

INTER-LABORATORY COMPARISON PROGRAM

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TABLE E-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2013
(PAGE 1 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2013	E10477	Milk	Sr-89	pCi/L	120	99.7	1.20	A
			Sr-90	pCi/L	9.21	11.0	0.84	A
	E10478	Milk	I-131	pCi/L	87.1	100	0.87	A
			Ce-141	pCi/L	186	187	0.99	A
			Cr-51	pCi/L	463	472	0.98	A
			Cs-134	pCi/L	201	214	0.94	A
			Cs-137	pCi/L	262	266	0.98	A
			Co-58	pCi/L	200	208	0.96	A
			Mn-54	pCi/L	215	208	1.03	A
			Fe-59	pCi/L	266	252	1.06	A
			Zn-65	pCi/L	311	301	1.03	A
			Co-60	pCi/L	384	400	0.96	A
	E10480	AP	Ce-141	pCi	95.3	95.6	1.00	A
			Cr-51	pCi	264	241	1.10	A
			Cs-134	pCi	123	109	1.13	A
			Cs-137	pCi	142	136	1.04	A
			Co-58	pCi	112	106	1.06	A
			Mn-54	pCi	115	106	1.08	A
			Fe-59	pCi	139	129	1.08	A
			Zn-65	pCi	163	153	1.07	A
			Co-60	pCi	212	204	1.04	A
	E10479	Charcoal	I-131	pCi	90.1	92.6	0.97	A
	E10481	Water	Fe-55	pCi/L	1840	1890	0.97	A
June 2013	E10564	Milk	Sr-89	pCi/L	110	95.0	1.16	A
			Sr-90	pCi/L	15.8	17.0	0.93	A
	E10545	Milk	I-131	pCi/L	92.6	95.5	0.97	A
			Ce-141	pCi/L	83.1	90.4	0.92	A
			Cr-51	pCi/L	253	250	1.01	A
			Cs-134	pCi/L	118	125	0.94	A
			Cs-137	pCi/L	143	151	0.95	A
			Co-58	pCi/L	87.1	94.0	0.93	A
			Mn-54	pCi/L	171	172	0.99	A
			Fe-59	pCi/L	125	120	1.04	A
			Zn-65	pCi/L	220	217	1.01	A
			Co-60	pCi/L	169	175	0.97	A
	E10547	AP	Ce-141	pCi	56.8	56.7	1.00	A
			Cr-51	pCi	168	157	1.07	A
			Cs-134	pCi	85.2	78.4	1.09	A
			Cs-137	pCi	101	94.6	1.07	A
			Co-58	pCi	62.7	58.9	1.06	A
			Mn-54	pCi	125	108	1.16	A
			Fe-59	pCi	85.7	75.0	1.14	A
			Zn-65	pCi	169	136	1.24	W
			Co-60	pCi	116	110	1.05	A
	E10546	Charcoal	I-131	pCi	86.5	89.7	0.96	A

TABLE E-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2013
(PAGE 2 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
June 2013	E10549	Water	Fe-55	pCi/L	1610	1610	1.00	A
September 2013	E10646	Milk	Sr-89	pCi/L	63.9	96.0	0.67	N (1)
			Sr-90	pCi/L	8.88	13.2	0.67	N (1)
	E10647	Milk	I-131	pCi/L	93.9	98.3	0.96	A
			Ce-141	pCi/L				NA (2)
			Cr-51	pCi/L	272	277	0.98	A
			Cs-134	pCi/L	150	172	0.87	A
			Cs-137	pCi/L	125	131	0.95	A
			Co-58	pCi/L	105	108	0.97	A
			Mn-54	pCi/L	138	139	0.99	A
			Fe-59	pCi/L	125	130	0.96	A
			Zn-65	pCi/L	264	266	0.99	A
			Co-60	pCi/L	187	196	0.95	A
	E10672	AP	Ce-141	pCi				NA (2)
			Cr-51	pCi	208	223	0.93	A
			Cs-134	pCi	143	139	1.03	A
			Cs-137	pCi	106	105	1.01	A
			Co-58	pCi	97.0	86.5	1.12	A
			Mn-54	pCi	116	112	1.04	A
			Fe-59	pCi	98.6	105	0.94	A
			Zn-65	pCi	219	214	1.02	A
			Co-60	pCi	166	158	1.05	A
	E10648	Charcoal	I-131	pCi	76.3	71.7	1.06	A
	E10673	Water	Fe-55	pCi/L	1790	1690	1.06	A
December 2013	E10774	Milk	Sr-89	pCi/L	97.3	93.8	1.04	A
			Sr-90	pCi/L	13.3	12.9	1.03	A
	E10775	Milk	I-131	pCi/L	89.7	96.1	0.93	A
			Ce-141	pCi/L	99.8	110	0.91	A
			Cr-51	pCi/L	297	297	1.00	A
			Cs-134	pCi/L	129	142	0.91	A
			Cs-137	pCi/L	126	126	1.00	A
			Co-58	pCi/L	116	112	1.04	A
			Mn-54	pCi/L	167	168	0.99	A
			Fe-59	pCi/L	117	110	1.06	A
			Zn-65	pCi/L	757	741	1.02	A
			Co-60	pCi/L	141	147	0.96	A
	E10777	AP	Ce-141	pCi	85.1	88.0	0.97	A
			Cr-51	pCi	278	238	1.17	A
			Cs-134	pCi	123	114	1.08	A
			Cs-137	pCi	102	101	1.01	A
			Co-58	pCi	84.4	89.9	0.94	A
			Mn-54	pCi	132	135	0.98	A
			Fe-59	pCi	101	88.3	1.14	A
			Zn-65	pCi	506	595	0.85	A
			Co-60	pCi	118	118	1.00	A

TABLE E-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2013
(PAGE 3 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2013	E10776	Charcoal	I-131	pCi	84.7	80.5	1.05	A
	E10778	Water	Fe-55	pCi/L	2010	1910	1.05	A

(1) Milk, Sr-89/90 - The failure was due to analyst error. No client samples were affected by this failure. NCR 13-15

(2) The sample was not spiked with Ce-141.

(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, 2013
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2013	RAD-93	Water	Sr-89	pCi/L	48.3	41.3	31.6 - 48.4	A
			Sr-90	pCi/L	19.3	23.9	17.2 - 28.0	A
			Ba-133	pCi/L	81.9	82.1	69.0 - 90.3	A
			Cs-134	pCi/L	40.9	42.8	34.2 - 47.1	A
			Cs-137	pCi/L	44.0	41.7	37.0 - 48.8	A
			Co-60	pCi/L	61.9	65.9	59.3 - 75.0	A
			Zn-65	pCi/L	202	189	170 - 222	A
			Gr-A	pCi/L	34.2	40.8	21.1 - 51.9	A
			Gr-B	pCi/L	18.0	21.6	13.0 - 29.7	A
			I-131	pCi/L	23.8	23.8	19.7 - 28.3	A
			U-Nat	pCi/L	60.4	61.2	49.8 - 67.9	A
			H-3	pCi/L	3970	4050	3450 - 4460	A
	MRAD-18	Filter	Gr-A	pCi/filter	Lost during processing			
November 2013	RAD-95	Water	Sr-89	pCi/L	25.5	21.9	14.4 - 28.2	A
			Sr-90	pCi/L	14.3	18.1	12.8 - 21.5	A
			Ba-133	pCi/L	57.2	54.2	44.7 - 59.9	A
			Cs-134	pCi/L	83.3	86.7	71.1 - 95.4	A
			Cs-137	pCi/L	201	206	185 - 228	A
			Co-60	pCi/L	104	102	91.8 - 114	A
			Zn-65	pCi/L	361	333	300 - 389	A
			Gr-A	pCi/L	29.5	42.8	22.2 - 54.3	A
			Gr-B	pCi/L	30.1	32.2	20.8 - 39.9	A
			I-131	pCi/L	23.1	23.6	19.6 - 28.0	A
			U-Nat	pCi/L	5.53	6.24	4.70 - 7.44	A
			H-3	pCi/L	17650	17700	15500 - 19500	A
	MRAD-19	Filter	Gr-A	pCi/filter	33.0	83.0	27.8 - 129	A

(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, 2013
(PAGE 1 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2013	13-MaW28	Water	Cs-134	Bq/L	21.0	24.4	17.1 - 31.7	A
			Cs-137	Bq/L	0.0446		(1)	A
			Co-57	Bq/L	28.3	30.9	21.6 - 40.2	A
			Co-60	Bq/L	18.2	19.56	13.69 - 25.43	A
			H-3	Bq/L	506	507	355 - 659	A
			Mn-54	Bq/L	25.7	27.4	19.2 - 35.6	A
			K-40	Bq/L	2.09		(1)	A
			Sr-90	Bq/L	10.5	10.5	7.4 - 13.7	A
			Zn-65	Bq/L	29.2	30.4	21.3 - 39.5	A
	13-GrW28	Water	Gr-A	Bq/L	2.74	2.31	0.69 - 3.93	A
			Gr-B	Bq/L	15.6	13.0	6.5 - 19.5	A
	13-MaS28	Soil	Cs-134	Bq/kg	859	887	621 - 1153	A
			Cs-137	Bq/kg	633	587	411 - 763	A
			Co-57	Bq/kg	0.256		(1)	A
			Co-60	Bq/kg	738	691	484 - 898	A
			Mn-54	Bq/kg	0.671		(1)	A
			K-40	Bq/kg	714	625.3	437.7 - 812.9	A
			Sr-90	Bq/kg	442	628	440 - 816	W
			Zn-65	Bq/kg	1057	995	697 - 1294	A
	13-RdF28	AP	Cs-134	Bq/sample	1.73	1.78	1.25 - 2.31	A
			Cs-137	Bq/sample	2.73	2.60	1.82 - 3.38	A
			Co-57	Bq/sample	2.38	2.36	1.65 - 3.07	A
			Co-60	Bq/sample	0.0302		(1)	A
			Mn-54	Bq/sample	4.36	4.26	2.98 - 5.54	A
			Sr-90	Bq/sample	1.43	1.49	1.04 - 1.94	A
			Zn-65	Bq/sample	3.14	3.13	2.19 - 4.07	A
	13-GrF28	AP	Gr-A	Bq/sample	0.767	1.20	0.36 - 2.04	A
			Gr-B	Bq/sample	0.871	0.85	0.43 - 1.28	A
	13-RdV28	Vegetation	Cs-134	Bq/sample	-0.197		(1)	A
			Cs-137	Bq/sample	7.39	6.87	4.81 - 8.93	A
			Co-57	Bq/sample	9.87	8.68	6.08 - 11.28	A
			Co-60	Bq/sample	6.08	5.85	4.10 - 7.61	A
			Mn-54	Bq/sample	-0.0104		(1)	A
			Sr-90	Bq/sample	1.28	1.64	1.15 - 2.13	W
			Zn-65	Bq/sample	6.84	6.25	4.38 - 8.13	A
September 2013	13-MaW29	Water	Cs-134	Bq/L	29.1	30.0	21.0 - 39.0	A
			Cs-137	Bq/L	34.5	31.6	22.1 - 41.1	A
			Co-57	Bq/L	0.0358		(1)	A
			Co-60	Bq/L	24.6	23.58	16.51 - 30.65	A
			H-3	Bq/L	2.45		(1)	A
			Mn-54	Bq/L	0.0337		(1)	A
			K-40	Bq/L	0.193		(1)	A
			Sr-90	Bq/L	9.12	7.22	5.05 - 9.39	W
			Zn-65	Bq/L	38.1	34.6	24.2 - 45.0	A
	13-GrW29	Water	Gr-A	Bq/L	1.13	0.701	0.210 - 1.192	A
			Gr-B	Bq/L	7.61	5.94	2.97 - 8.91	A

TABLE E-3 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2013
(PAGE 2 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
September 2013	13-MaS29	Soil	Cs-134	Bq/kg	1150	1172	820 - 1524	A
			Cs-137	Bq/kg	1100	977	684 - 1270	A
			Co-57	Bq/kg	670		(1)	N (2)
			Co-60	Bq/kg	502	451	316 - 586	A
			Mn-54	Bq/kg	758	674	472 - 876	A
			K-40	Bq/kg	796	633	443 - 823	W
			Sr-90	Bq/kg	664	460	322 - 598	N (2)
			Zn-65	Bq/kg	210		(1)	N (2)
	13-RdF29	AP	Cs-134	Bq/sample	-0.570		(1)	N (2)
			Cs-137	Bq/sample	2.85	2.7	1.9 - 3.5	A
			Co-57	Bq/sample	3.30	3.4	2.4 - 4.4	A
			Co-60	Bq/sample	2.41	2.3	1.6 - 3.0	A
			Mn-54	Bq/sample	3.65	3.5	2.5 - 4.6	A
			Sr-90	Bq/sample	1.40	1.81	1.27 - 2.35	W
			Zn-65	Bq/sample	2.90	2.7	1.9 - 3.5	A
	13-GrF29	AP	Gr-A	Bq/sample	0.872	0.9	0.3 - 1.5	A
			Gr-B	Bq/sample	1.57	1.63	0.82 - 2.45	A
	13-RdV29	Vegetation	Cs-134	Bq/sample	5.29	5.20	3.64 - 6.76	A
			Cs-137	Bq/sample	7.48	6.60	4.62 - 8.58	A
			Co-57	Bq/sample	0.0129		(1)	A
			Co-60	Bq/sample	0.0523		(1)	A
			Mn-54	Bq/sample	8.78	7.88	5.52 - 10.24	A
			Sr-90	Bq/sample	1.63	2.32	1.62 - 3.02	W (2)
			Zn-65	Bq/sample	3.18	2.63	1.84 - 3.42	W

(1) False positive test.

(2) Soil, Co-57 & Zn-65 identified by gamma software as not detected, MAPEP evaluated as failing the false positive test. A large concentration of Eu-152 was spiked into the sample, causing interference in the analysis. Gamma software recognized the interference and identified them as not detected. MAPEP does not allow clients to enter non-detect designation. NCR 13-04
Soil, Sr-90 - incorrect results were submitted to MAPEP. Actual result was 332 bq/kg, which is within the acceptance range. NCR 13-04
AP, Cs-134 - MAPEP evaluated the -0.570 as a failed false positive test. No client samples were affected by these failures. NCR 13-04
Vegetation, Sr-90 - it appears that the carrier was double spiked into the sample, resulting in the low activity for this sample. NCR 13-04

(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., 2013

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result (b)	ERA Result (c)	Control Limits	Acceptance
ERW-1593	04/08/13	Sr-89	43.6 ± 4.3	41.30	31.6 - 48.4	Pass
ERW-1593	04/08/13	Sr-90	23.2 ± 1.7	23.90	17.2 - 28.0	Pass
ERW-1596	04/08/13	Ba-133	74.80 4.00	82.10	69.00 90.30	Pass
ERW-1596	04/08/13	Co-60	65.50 3.42	65.90	59.30 75.00	Pass
ERW-1596	04/08/13	Cs-134	41.10 3.47	42.80	34.20 47.10	Pass
ERW-1596	04/08/13	Cs-137	42.30 4.03	41.70	37.00 48.80	Pass
ERW-1596	04/08/13	Zn-65	200.3 ± 10.1	189.0	170.0 - 222.0	Pass
ERW-1598	04/08/13	Gr. Alpha	34.30 1.98	40.80	21.10 51.90	Pass
ERW-1598	04/08/13	Gr. Beta	18.70 0.98	21.60	13.00 29.70	Pass
ERW-1600	04/08/13	I-131	23.00 ± 1.10	23.80	19.70 - 28.30	Pass
ERW-1600	04/08/13	I-131(G)	23.48 ± 9.44	23.80	19.70 ± 28.30	Pass
ERW-1606	04/08/13	H-3	4041 ± 194	4050	3450 - 4460	Pass
ERW-6009	10/07/13	Sr-89	22.00 2.80	21.90	14.40 28.20	Pass
ERW-6009	10/07/13	Sr-90	17.10 2.55	18.10	12.80 21.50	Pass
ERW-6012	10/07/13	Ba-133	48.20 4.29	54.20	44.70 59.90	Pass
ERW-6012	10/07/13	Co-60	100.8 ± 4.7	102.0	91.8 - 114.0	Pass
ERW-6012	10/07/13	Cs-134	87.30 4.35	86.70	71.10 95.40	Pass
ERW-6012	10/07/13	Cs-137	199.6 ± 7.4	206.0	185.0 - 228.0	Pass
ERW-6012	10/07/13	Zn-65	356.2 ± 13.2	333.0	300.0 - 389.0	Pass
ERW-6015	10/07/13	Gr. Alpha	30.70 11.90	42.80	22.20 54.30	Pass
ERW-6015	10/07/13	Gr. Beta	25.70 6.48	32.20	20.80 39.90	Pass
ERW-6019	10/07/13	I-131	22.50 1.01	23.60	19.60 28.00	Pass
ERW-6024	10/07/13	H-3	18397 695	17700	15500 19500	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.

TABLE E-5 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP) ENVIRONMENTAL, INC., 2013

			Concentration (a)			
Lab Code (b)	Date	Analysis	Laboratory result	Known Activity	Control Limits (c)	Acceptance
MAAP-738	02/01/13	Co-57	2.58 ± 0.06	2.36	1.65 - 3.07	Pass
MAAP-738	02/01/13	Co-60	0.01 ± 0.03	0.00	0.00 - 0.10	Pass
MAAP-738	02/01/13	Cs-134	1.82 ± 0.13	1.78	1.25 - 2.31	Pass
MAAP-738	02/01/13	Cs-137	2.93 ± 0.10	2.60	1.82 - 3.38	Pass
MAAP-738	02/01/13	Mn-54	4.87 ± 0.13	4.26	2.98 - 5.54	Pass
MAAP-738	02/01/13	Sr-90	1.39 ± 0.14	1.49	1.04 - 1.94	Pass
MAAP-738	02/01/13	Zn-65	3.84 ± 0.20	3.13	2.19 - 4.07	Pass
MAAP-738 d	02/01/13	Gr. Alpha	0.14 ± 0.03	1.20	0.36 - 2.04	Fail (1)
MAAP-738	02/01/13	Gr. Beta	0.93 ± 0.06	0.85	0.43 - 1.28	Pass
MAW-806	02/01/13	Co-57	31.20 0.40	30.90	21.60 40.20	Pass
MAW-806	02/01/13	Co-60	19.70 ± 0.30	16.56	13.69 - 25.43	Pass
MAW-806	02/01/13	Cs-134	23.20 ± 0.50	24.40	17.10 - 31.70	Pass
MAW-806	02/01/13	Cs-137	0.03 ± 0.12	0.00	0.00 - 1.00	Pass
MAW-806	02/01/13	Fe-55	34.00 ± 3.30	44.00	30.80 - 57.20	Pass
MAW-806	02/01/13	H-3	511.60 ± 12.50	507.00	355.00 - 659.00	Pass
MAW-806	02/01/13	K-40	2.20 ± 0.90	0.00	0.00 - 5.00	Pass
MAW-806	02/01/13	Mn-54	27.60 ± 0.50	27.40	19.20 - 35.60	Pass
MAW-806	02/01/13	Sr-90	9.30 ± 0.80	10.50	7.40 - 13.70	Pass
MAW-806	02/01/13	Zn-65	31.60 ± 0.80	30.40	21.30 - 39.50	Pass
MAW-811	02/01/13	Gr. Alpha	1.87 ± 0.09	2.31	0.69 - 3.93	Pass
MAW-811	02/01/13	Gr. Beta	13.04 ± 0.13	13.00	6.50 - 19.50	Pass
MASO-739	02/01/13	Co-57	0.60 ± 0.50	0.00	0.00 - 5.00	Pass
MASO-739	02/01/13	Co-60	739.20 ± 28.50	691.00	484.00 - 898.00	Pass
MASO-739	02/01/13	Cs-134	863.30 ± 34.10	887.00	621.00 - 1153.00	Pass
MASO-739	02/01/13	Cs-137	661.80 ± 25.70	587.00	411.00 - 763.00	Pass
MASO-739	02/01/13	K-40	745.80 ± 33.30	625.30	437.70 - 812.90	Pass
MASO-739	02/01/13	Mn-54	1.10 ± 1.00	0.00	0.00 - 5.00	Pass
MASO-739	02/01/13	Zn-65	1109.60 ± 44.10	995.00	697.00 - 1294.00	Pass
MASO-744 e	02/01/13	Sr-90	408.40 ± 14.00	628.00	440.00 - 816.00	Fail (2)
MAVE-747	02/01/13	Co-57	10.37 ± 0.17	8.68	6.08 - 11.28	Pass
MAVE-747	02/01/13	Co-60	6.48 ± 0.17	5.85	4.10 - 7.61	Pass
MAVE-747	02/01/13	Cs-134	0.02 ± 0.04	0.00	0.00 - 0.10	Pass
MAVE-747	02/01/13	Cs-137	7.79 ± 0.21	6.87	4.81 - 8.93	Pass
MAVE-747	02/01/13	Mn-54	0.00 ± 0.05	0.00	0.00 - 0.10	Pass
MAVE-747	02/01/13	Zn-65	7.29 ± 0.33	6.25	4.38 - 8.13	Pass
MASO-5043 f	08/01/13	Co-57	699.60 ± 3.90	0.00	0.00 - 5.00	Fail (3)
MASO-5043	08/01/13	Cs-134	1191.70 ± 23.00	1172.00	820.00 - 1524.00	Pass
MASO-5043	08/01/13	Cs-137	1072.00 ± 5.10	977.00	684.00 - 1270.00	Pass
MASO-5043	08/01/13	K-40	760.00 ± 16.20	633.00	443.00 - 823.00	Pass
MASO-5043	08/01/13	Mn-54	753.80 ± 4.90	674.00	472.000 - 876.000	Pass

TABLE E-5 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP) ENVIRONMENTAL, INC., 2013

			Concentration (a)			
Lab Code (b)	Date	Analysis	Laboratory result	Known Activity	Control Limits (c)	Acceptance
MASO-5043	08/01/13	Sr-90	383.90 ± 14.50	460.00	322.00 - 598.00	Pass
MASO-5043	08/01/13	Zn-65	-351.50 ± 5.50	0.00	0.00 - 0.00	Pass
MAW-5094	08/01/13	Co-57	0.01 ± 0.09	0.00	0.00 - 5.00	Pass
MAW-5094	08/01/13	Co-60	23.20 ± 0.32	23.58	16.51 - 30.65	Pass
MAW-5094	08/01/13	Cs-134	27.60 ± 0.58	30.40	21.00 - 39.00	Pass
MAW-5094	08/01/13	Cs-137	32.31 ± 0.52	31.60	22.10 - 41.10	Pass
MAW-5094	08/01/13	Fe-55	39.20 ± 3.50	53.30	37.30 - 69.30	Pass
MAW-5094	08/01/13	Gr. Alpha	0.54 ± 0.05	0.70	0.21 - 1.19	Pass
MAW-5094	08/01/13	Gr. Beta	5.85 ± 0.09	5.94	2.97 - 8.91	Pass
MAW-5094	08/01/13	H-3	1.20 ± 3.00	0.00	0.00 - 5.00	Pass
MAW-5094	08/01/13	K-40	2.22 ± 0.90	0.00	0.00 - 5.00	Pass
MAW-5094	08/01/13	Mn-54	0.010 ± 0.11	0.00	0.00 - 5.00	Pass
MAW-5094	08/01/13	Sr-90	6.40 ± 0.60	7.22	5.05 - 9.39	Pass
MAW-5094	08/01/13	Zn-65	35.30 ± 0.90	34.60	24.20 - 45.00	Pass
MAVE-5046	08/01/13	Co-57	0.01 ± 0.03	0.00	0.00 - 0.00	Pass
MAVE-5046	08/01/13	Co-60	0.00 ± 0.04	0.00	0.00 - 0.00	Pass
MAVE-5046	08/01/13	Cs-134	5.71 ± 0.23	5.20	3.64 - 6.76	Pass
MAVE-5046	08/01/13	Cs-137	7.64 ± 0.20	6.60	4.62 - 8.58	Pass
MAVE-5046	08/01/13	Mn-54	9.08 ± 0.24	7.88	5.52 - 10.24	Pass
MAVE-5046	08/01/13	Zn-65	2.92 ± 0.25	2.63	1.84 - 3.42	Pass
MAAP-5046	08/01/13	Co-57	3.48 ± 0.14	3.40	1.90 - 3.50	Pass
MAAP-5046	08/01/13	Co-60	2.44 ± 0.08	3.40	1.60 - 3.00	Pass
MAAP-5046	08/01/13	Cs-134	0.01 ± 0.03	0.00	0.02 - 0.04	Pass
MAAP-5046	08/01/13	Cs-137	3.09 ± 0.13	2.70	1.90 - 3.50	Pass
MAAP-5046	08/01/13	Gr. Alpha	0.28 ± 0.04	0.90	0.27 - 1.53	Pass
MAAP-5046	08/01/13	Gr. Beta	1.90 ± 0.08	1.63	0.82 - 2.45	Pass
MAAP-5046	08/01/13	Mn-54	3.95 ± 0.12	3.50	2.50 - 4.60	Pass
MAAP-5046	08/01/13	Sr-90	1.69 ± 4.10	1.81	1.27 - 2.35	Pass
MAAP-5046	08/01/13	Zn-65	3.27 ± 0.18	2.70	2.50 - 4.60	Pass

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

b Laboratory codes as follows: MAW (water), MAAP (air filter), MASO (soil), MAVE (vegetation).

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

(1) The filter was recounted overnight, no significant alpha activity could be detected.

(2) The sample was reanalyzed using additional fuming nitric separations. Result of reanalysis: 574.4 ± 35.2 Bq/kg.

(3) Interference from Eu-152 resulted in misidentification of Co-57.

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APPENDIX F

ERRATA DATA

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Due to an incorrect setting on gamma detector 08, 3.29 rather than 4.66 was used in the minimum detectable concentration (MDC) calculation. Nonconformance 13-07 was initiated and corrective actions have been implemented to address this issue. All samples counted on detector 08 were reprocessed using the correct calculation. As a result, all MDCs for these samples have increased by 41.6%. The previously reported activities and uncertainties were not affected. In some cases, the increased MDC resulted in missed LLDs. All samples with MDCs affected by this issue are listed below. The samples with missed LLDs are shown in the table for 2011, 2012, and 2013. All other required LLDs were met. Because of the quantity of tables involved over multiple years, individual tables are not provided. (IR 1646280)

2011

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
4Q11 TM-AP-Q15-1	09/28/11	12/28/11	Air Particulate				

2012

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
1Q12 TM-AP-Q15-1	12/28/11	03/28/12	Air Particulate				
TM-EW-K1-1	01/03/12	01/31/12	Effluent Water				
OS-16	01/31/12		RGPP	I-131	<15	<16.84	pCi/L
TM-M-G2-1	03/07/12	03/07/12	Milk				
2Q12 TM-AP-H3-1	03/28/12	06/27/12	Air Particulate				
TM-M-P4-1	04/18/12	04/18/12	Milk				
MW-TMI-17I	04/30/12		RGPP				
OSF	04/30/12		RGPP				
TM-EW-K1-1	05/01/12	05/29/12	Effluent Water				
MS-2	05/01/12		RGPP				
MW-TMI-3I	05/02/12		RGPP				
MS-3	05/03/12		RGPP				
TM-SW-Q9-1	05/29/12	07/03/12	Surface Water				
TM-M-F4-1	05/30/12	05/30/12	Milk				
TM-M-P4-1	06/13/12	06/13/12	Milk				
TM-FPL-B10-2	06/26/12	06/26/12	Vegetation				
3Q12 TM-AP-G2-1	06/27/12	10/03/12	Air Particulate				
3Q12 TM-AP-Q15-1	06/27/12	09/26/12	Air Particulate				
TM-M-K15-3	06/27/12	06/27/12	Milk	La-140	<15	<19.44	pCi/L
TM-FPV-B10-2	07/17/12	07/17/12	Vegetation				
OS-14	07/24/12		RGPP	I-131	<15	<20.55	pCi/L
OS-14	07/24/12		RGPP	La-140	<15	<15.9	pCi/L
TM-M-F4-1	07/25/12	07/25/12	Milk				
TM-M-P4-1	07/25/12	07/25/12	Milk				
TM-SW-J1-2	07/31/12	08/28/12	Surface Water	I-131	<15	<15.45	pCi/L
TM-DW-Q9-1	08/28/12	10/02/12	Drinking Water	I-131	<15	<18.1	pCi/L
TM-M-F4-1	09/19/12	09/19/12	Milk				
TM-FPL-B10-2	09/26/12	09/26/12	Vegetation	I-131	<60	<79.06	pCi/kg Wet
TM-SW-Q9-1	10/02/12	10/30/12	Surface Water				
4Q12 TM-AP-H3-1	10/03/12	01/02/13	Air Particulate				
MS-8	10/17/12		RGPP	I-131	<15	<16.04	pCi/L
MS-8	10/17/12		RGPP	La-140	<15	<17.86	pCi/L
TM-M-E2-2	10/17/12	10/17/12	Milk				
TM-SW-J1-2	10/30/12	11/27/12	Surface Water				
EDCB	10/30/12	12/31/12	RGPP				
TM-M-P4-1	10/31/12	10/31/12	Milk	La-140	<15	<15.24	pCi/L
TM-SW-Q9-1	11/27/12	12/31/12	Surface Water	I-131	<15	<17.38	pCi/L
TM-SW-Q9-1	11/27/12	12/31/12	Surface Water	La-140	<15	<18.63	pCi/L

2012

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
TM-M-K15-3	11/28/12	11/28/12	Milk	Ba-140	<60	<70.14	pCi/L

2013

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
MS-3	01/22/13		RGPP	I-131	<15	<19.17	pCi/L
TM-M-E2-2	02/13/13	02/13/13					
TM-M-F4-1	02/13/13	02/13/13					

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APPENDIX G

ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

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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 2013

Prepared By

Teledyne Brown Engineering
Environmental Services

Exelon Generation.

Three Mile Island Nuclear Station
Middletown, PA 17057

April 2014

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Appendices

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 2013. During that time period 802 analyses were performed on 452 samples from 68 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.

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 37 of 59 groundwater monitoring locations. The groundwater tritium concentrations ranged from 174 ± 111 pCi/L to 11,900 ± 1,240 pCi/L. Tritium that was detected in groundwater at the Station is believed to be the result of a potential leak, historical releases, the recapture of gaseous tritium releases via rainwater and/or background from external sources greater than 200 pCi/L. Tritium was detected in two of five precipitation water locations. The concentration ranged from 218 ± 116 to 530 ± 133 pCi/L. Tritium was not detected at any surface water location. Tritium was detected in three storm water samples. The concentrations ranged from 217 ± 131 to 289 ± 116 pCi/L.

Gross Alpha and Gross Beta analyses in the dissolved and suspended fractions were performed on groundwater samples during the second and fourth quarter sampling in 2013. Gross Alpha (dissolved) was detected in two of the 39 groundwater locations. The concentrations were 0.9 and 1.2 pCi/L. Gross Alpha (suspended) was detected in six of 39 groundwater locations. The

concentrations ranged from 0.9 to 10.8 pCi/L. Gross Beta (dissolved) was detected at all 39 groundwater locations. The concentrations ranged from 1.6 to 14.7 pCi/L. Gross Beta (suspended) was detected in five of 39 groundwater locations. The concentrations were 2.3 and 6.3 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-234, U-235 and U-238. The U-234 isotope was detected at all four groundwater location. The concentration ranged from 0.3 to 4.9 pCi/L. The U-238 isotope was detected at three of four groundwater locations. The concentration ranged from 0.4 to 3.4 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 2013. 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 2013.

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 2013.

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

1. Concentrations of gamma emitters in groundwater, surface 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.

10. Concentrations of Gross Alpha and Gross Beta (Dissolved and Suspended) 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 59 locations were analyzed for tritium activity. Tritium values ranged from the detection limit to 11,900 pCi/L (Table B-I.1, Appendix B).

Tritium Split Samples

Tritium values ranged from 389 to 7,822 pCi/L (Table C-I.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 (Table C-I.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 samples during the second and fourth quarter sampling in 2013. Gross Alpha (dissolved) was detected in two of the 39 groundwater locations. The concentrations were 0.9 and 1.2 pCi/L. Gross Alpha (suspended) was detected in six of 39 groundwater locations. The concentrations ranged from 0.9 to 10.8 pCi/L. Gross Beta (dissolved) was detected at all 39 groundwater locations. The concentrations ranged from 1.6 to 14.7 pCi/L. Gross Beta (suspended) was detected in five of 39 groundwater locations. The concentrations were 2.3 and 6.3 pCi/L (Table B-I.1, Appendix B).

Gross Alpha and Gross Beta Split Samples

Four split samples were analyzed for Gross Alpha and Gross Beta in 2013. Gross Alpha was detected one of four samples at a concentration of 2.4 pCi/L. Gross beta was detected in all four sample analyzed. The concentrations ranged from 2.3 to 6.7 pCi/L (Table C-I.1, Appendix C).

Gamma Emitters

Potassium-40 was detected in two of 75 samples with concentrations ranging from 82 pCi/L to 91 pCi/L. No other gamma-emitting nuclides were detected (Table B-I.2, Appendix B).

Gamma Emitters Split Samples

Seven locations were analyzed for gamma-emitting nuclides in 2013. Potassium-40 was detected in one sample at a concentration of 57 pCi/L. No other gamma-emitting nuclides were detected in any split samples (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-234, U-235 and U-238. The U-234 isotope was detected at all four groundwater location. The concentration ranged from 0.3 to 4.9 pCi/L. The U-238 isotope was detected at three of four groundwater locations. The concentration ranged from 0.4 to 3.4 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 any split samples in 2013 (Table C-I.3, Appendix C).

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

Three locations were analyzed for tritium in 2013. Tritium was not detected above the required detection limit of 200 pCi/L in any of the 14 samples analyzed (Table B-II.1, Appendix B).

Tritium Split Samples

Two locations were analyzed for tritium in 2013. Tritium was not detected above the required detection limit (Table C-II.1, Appendix C).

Strontium

Surface water samples were not analyzed for Sr-90 in 2013 (Table B–II.1, Appendix B).

Gamma Emitters

Three locations were analyzed for gamma-emitting nuclides in 2013. None of the four samples detected gamma-emitting nuclides (Table B–II.2, Appendix B).

Gamma Emitters Split Samples

One location was analyzed for gamma-emitting nuclides in 2013. 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

One location was analyzed for tritium. Tritium was detected in one of samples above the required detection limit of 200 pCi/L. A recount and reanalysis was performed and the concentrations ranged from 217 to 289 pCi/L (Table B–III.1, Appendix B).

Gamma Emitters

Samples from one location 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 five locations. The following analyses were performed:

Tritium

Samples from five locations were analyzed for tritium activity. Tritium activity was detected at two of five locations. The concentrations ranged from 218 to 530 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 two of four samples. The concentrations ranged from 173 to 244 pCi/L (Table C–III.1, Appendix C).

Gamma Emitters

Precipitation water was not analyzed for Gamma Emitters in 2013.

Gamma Emitters Split Samples

No gamma-emitting nuclides were analyzed in 2013.

E. Leaks, Spills, and Releases

A potential leak was identified at TMI in 2012 due to elevated MS-22 tritium concentration readings. TMI continues to monitor MS-22 and surrounding wells, in addition to tritium plumes from previous years and reports the activity and dose to the public in the ARERR. The elevated MS-22 well tritium concentrations were voluntarily reported under the reporting requirements for the NEI Groundwater Protection Initiative (GPI) as implemented in Exelon's Reportability procedure LS-AA-1120, RAD 1.34. (IR1385497/1515261)

F. Actions Taken

1. Compensatory Actions

TMI has an extensive groundwater monitoring program with over 50 monitoring wells. No monitoring wells outside the investigation area have seen elevated tritium.

In 2013, TMI installed eight new wells to help isolate the area of the leak. The tritium concentrations in the new wells ranged from 222 to 7,870 pCi/L. TMI also mitigated a number of potential sources for tritium during 2013. The Borated Water Storage Tank (BWST) tunnel sump was repaired and recoated and the BWST had an internal surface inspection during the TMI refueling outage. Additionally, an active input to the BWST tunnel sump (packing leak-off of a BWST isolation valve) was corrected. Two different leaks on the Condensate Storage Tank B were also identified and repaired. Finally, in December BS-T-1 & 2 and ancillary piping were drained and emptied.

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APPENDIX A

LOCATION DESIGNATION & DISTANCE

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TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations and Distance, Three Mile Island Nuclear Station, 2013

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
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-20D**	Monitoring Well

TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations and Distance, Three Mile Island Nuclear Station, 2013

Site	Site Type
MW-TMI-20I**	Monitoring Well
MW-TMI-21D**	Monitoring Well
MW-TMI-21I**	Monitoring Well
MW-TMI-21S**	Monitoring Well
MW-TMI-22D**	Monitoring Well
MW-TMI-22I**	Monitoring Well
MW-TMI-22S**	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
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-22	Precipitation Water
TM-PR-MS-4	Precipitation Water
TM-PR-NW-B	Precipitation Water

* NO WATER PRESENT TO SAMPLE
** NEW WELLS INSTALLED 2013

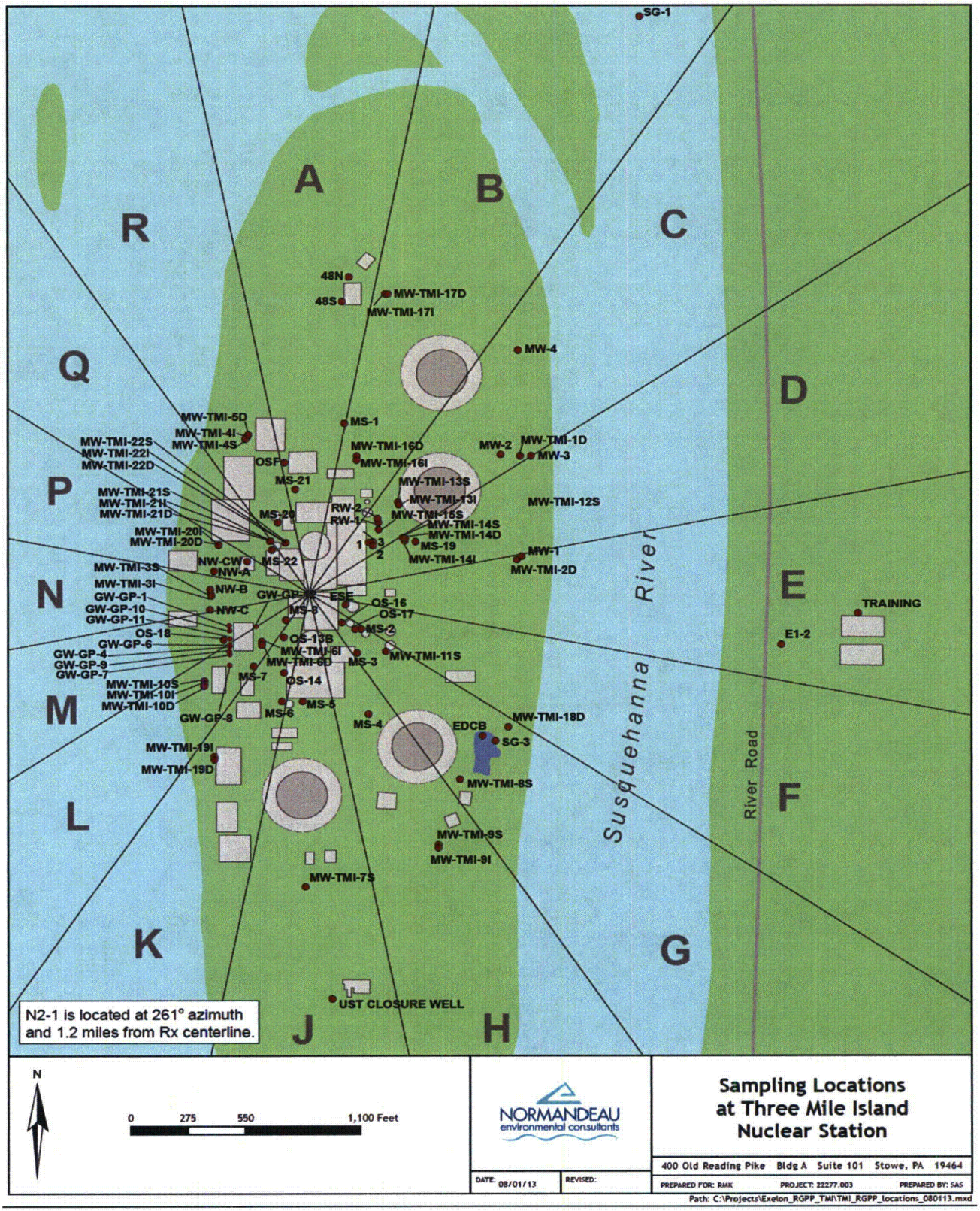

Figure A – 1
Sampling Locations at the Three Mile Island Nuclear Station, 2013

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APPENDIX B

DATA TABLES

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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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (DIS)	Gr-A (SUS)	Gr-B (DIS)	Gr-B (SUS)
3	01/23/13	< 178						
3	04/23/13	269 ± 134	< 7.6	< 0.7	< 0.4	1.3 ± 0.8	2.1 ± 0.7	2.3 ± 1.1
3	07/24/13	< 161						
3	10/23/13	< 172						
48S	01/21/13	< 181						
48S	02/19/13	< 181						
48S	04/15/13	< 193						
48S	04/25/13	< 183	< 8.4	< 0.7	< 1.4	< 0.4	2.4 ± 1.2	< 1.6
48S	05/20/13	< 166						
48S	07/01/13	< 171						
48S	07/25/13	< 186						
48S	09/04/13	< 168						
48S	10/24/13	< 177						
MS-1	01/23/13	< 175						
MS-1	04/25/13	< 179	< 9.0	< 0.8	< 2.3	< 0.4	5.4 ± 1.5	< 1.6
MS-1	07/23/13	< 188						
MS-1	10/22/13	195 ± 121						
MS-19	01/23/13	< 171						
MS-19	04/24/13	< 179	< 7.3	< 0.7	< 0.7	< 0.4	3.0 ± 0.9	< 1.5
MS-19	07/24/13	< 182						
MS-19	10/23/13	< 176						
MS-2	01/22/13	467 ± 148						
MS-2	01/22/13	536 ± 136						
MS-2	04/23/13	359 ± 143	< 6.6	< 0.7	< 0.6	< 0.7	3.8 ± 0.9	< 1.6
MS-2	07/23/13	226 ± 110						
MS-2	10/22/13	219 ± 125						
MS-20	01/07/13	588 ± 138						
MS-20	01/14/13	514 ± 136						
MS-20	01/21/13	652 ± 137						
MS-20	01/28/13	698 ± 159						
MS-20	02/04/13	< 169						
MS-20	02/11/13	293 ± 133						
MS-20	02/19/13	455 ± 131						
MS-20	02/25/13	518 ± 156						
MS-20	03/04/13	349 ± 129						
MS-20	03/11/13	371 ± 151						
MS-20	03/18/13	369 ± 144						
MS-20	03/25/13	533 ± 131						
MS-20	04/01/13	540 ± 138						
MS-20	04/08/13	569 ± 134						
MS-20	04/15/13	754 ± 164						
MS-20	04/18/13	521 ± 127						
MS-20	04/22/13	893 ± 147	< 7.9	< 0.6	< 0.6	< 0.4	4.0 ± 0.9	< 1.6
MS-20	04/29/13	567 ± 142						
MS-20	05/06/13	526 ± 150						
MS-20	05/13/13	535 ± 137						
MS-20	05/20/13	435 ± 124						
MS-20	05/28/13	237 ± 141						
MS-20	06/03/13	316 ± 127						
MS-20	06/10/13	430 ± 130						

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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (DIS)	Gr-A (SUS)	Gr-B (DIS)	Gr-B (SUS)
MS-20	06/17/13	378 ± 133						
MS-20	06/24/13	342 ± 126						
MS-20	07/01/13	415 ± 127						
MS-20	07/08/13	512 ± 132						
MS-20	07/15/13	547 ± 144						
MS-20	07/23/13	415 ± 138						
MS-20	09/03/13	640 ± 133						
MS-20	10/22/13	742 ± 141						
MS-20	10/22/13	528 ± 134						
MS-20	11/25/13	620 ± 158						
MS-20	12/16/13	416 ± 133						
MS-21	01/22/13	278 ± 123						
MS-21	04/23/13	270 ± 140	< 7.7	< 0.8	< 0.6	< 0.4	1.9 ± 0.7	< 1.4
MS-21	07/23/13	289 ± 113						
MS-22	01/07/13	4350 ± 482						
MS-22	01/14/13	6230 ± 670						
MS-22	01/21/13	3960 ± 435						
MS-22	01/28/13	6310 ± 672						
MS-22	02/04/13	3010 ± 349						
MS-22	02/11/13	4200 ± 477						
MS-22	02/19/13	3050 ± 358						
MS-22	02/25/13	5070 ± 541						
MS-22	03/04/13	2450 ± 298						
MS-22	03/11/13	2570 ± 319						
MS-22	03/18/13	2570 ± 312						
MS-22	03/25/13	3070 ± 352						
MS-22	04/01/13	4150 ± 474						
MS-22	04/08/13	6260 ± 668						
MS-22	04/15/13	11000 ± 1150						
MS-22	04/18/13	9870 ± 1020						
MS-22	04/22/13	9650 ± 1010	< 6.8	< 0.7	< 0.8	3.5 ± 1.1	4.7 ± 0.9	6.0 ± 1.4
MS-22	04/29/13	9470 ± 995						
MS-22	05/06/13	11900 ± 1240						
MS-22	05/13/13	7110 ± 758						
MS-22	05/20/13	9450 ± 985						
MS-22	05/28/13	4560 ± 529						
MS-22	06/03/13	6110 ± 663						
MS-22	06/10/13	4480 ± 501						
MS-22	06/17/13	2310 ± 283						
MS-22	06/24/13	5830 ± 633						
MS-22	07/01/13	8260 ± 864						
MS-22	07/08/13	8690 ± 910						
MS-22	07/15/13	9080 ± 945						
MS-22	07/22/13	9830 ± 1020						
MS-22	07/29/13	1860 ± 248						
MS-22	08/05/13	4720 ± 527						
MS-22	08/12/13	6120 ± 651						
MS-22	08/19/13	1980 ± 245						
MS-22	08/26/13	6900 ± 728						
MS-22	09/03/13	5180 ± 561						

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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		H-3	Sr-89	Sr-90	Gr-A (DIS)	Gr-A (SUS)	Gr-B (DIS)	Gr-B (SUS)
MS-22	09/09/13		6750 ± 729						
MS-22	09/16/13		5910 ± 629						
MS-22	09/23/13		5070 ± 551						
MS-22	09/30/13		3090 ± 356						
MS-22	10/07/13		2720 ± 324						
MS-22	10/22/13		2050 ± 251						
MS-22	11/04/13		4100 ± 452						
MS-22	11/25/13	Original	6290 ± 679						
MS-22	11/25/13	Recount	5890 ± 634						
MS-22	12/16/13		1190 ± 182						
MS-3	01/22/13		513 ± 134						
MS-3	04/23/13		596 ± 157	< 6.7	< 0.6	< 0.7	1.3 ± 0.8	7.0 ± 1.1	< 1.6
MS-3	07/23/13		471 ± 128						
MS-3	07/23/13		388 ± 136						
MS-3	10/22/13		233 ± 126						
MS-4	04/23/13		217 ± 136						
MS-5	01/22/13		< 176						
MS-5	04/23/13		< 199	< 6.9	< 0.8	0.9 ± 0.6	< 0.7	5.7 ± 1.0	< 1.6
MS-5	04/23/13		< 200	< 7.8	< 1.0	< 0.7	< 0.6	5.5 ± 1.1	< 1.8
MS-5	07/23/13		< 159						
MS-5	10/22/13		< 187						
MS-7	01/23/13		< 179						
MS-7	04/25/13		< 180	< 7.0	< 0.7	< 0.4	< 0.7	2.0 ± 0.6	< 1.6
MS-7	07/24/13		< 189						
MS-7	07/24/13		< 191						
MS-7	10/23/13		< 180						
MS-8	01/07/13		267 ± 121						
MS-8	01/21/13		368 ± 121						
MS-8	02/04/13		< 167						
MS-8	02/19/13		303 ± 126						
MS-8	03/04/13		198 ± 117						
MS-8	03/18/13		297 ± 136						
MS-8	04/01/13		268 ± 130						
MS-8	04/15/13		328 ± 139						
MS-8	04/23/13		< 195	< 6.9	< 0.7	< 0.6	10.8 ± 1.9	12.9 ± 1.2	6.3 ± 1.5
MS-8	05/06/13		199 ± 131						
MS-8	05/20/13		174 ± 111						
MS-8	06/03/13		303 ± 126						
MS-8	06/17/13		194 ± 123						
MS-8	07/01/13		289 ± 118						
MS-8	07/23/13		318 ± 119						
MS-8	09/03/13		322 ± 121						
MS-8	10/22/13		277 ± 129						
MW-1	04/25/13		< 177						
MW-2	04/25/13		< 179						
MW-2	04/25/13		< 196						
MW-TMI-10D	01/22/13		234 ± 121						
MW-TMI-10D	04/24/13		< 180						
MW-TMI-10D	07/24/13		332 ± 119						
MW-TMI-10D	10/23/13		292 ± 134						

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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (DIS)	Gr-A (SUS)	Gr-B (DIS)	Gr-B (SUS)
MW-TMI-10D	10/23/13	323 ± 127						
MW-TMI-10I	01/22/13	752 ± 148						
MW-TMI-10I	01/22/13	987 ± 175						
MW-TMI-10I	04/24/13	1020 ± 167	< 7.6	< 0.7	< 0.7	< 0.7	4.2 ± 1.0	< 1.6
MW-TMI-10I	07/24/13	903 ± 147						
MW-TMI-10I	10/23/13	818 ± 161						
MW-TMI-10S	01/22/13	1080 ± 171						
MW-TMI-10S	04/24/13	1530 ± 211	< 6.5	< 0.7	< 1.1	< 0.7	6.6 ± 1.2	< 1.6
MW-TMI-10S	07/24/13	1940 ± 241						
MW-TMI-10S	10/23/13	1170 ± 179						
MW-TMI-12S	01/23/13	< 176						
MW-TMI-12S	04/23/13	< 191	< 6.6	< 0.7	< 0.5	1.4 ± 0.8	5.8 ± 0.8	3.1 ± 1.2
MW-TMI-12S	07/24/13	< 159						
MW-TMI-12S	10/23/13	< 178						
MW-TMI-13I	01/22/13	326 ± 126						
MW-TMI-13I	04/24/13	341 ± 127						
MW-TMI-13I	07/24/13	415 ± 123						
MW-TMI-13I	10/22/13	295 ± 135						
MW-TMI-13I	10/22/13	388 ± 130						
MW-TMI-13S	01/22/13	239 ± 123						
MW-TMI-13S	04/24/13	282 ± 124	< 3.3	< 0.7	< 0.7	< 0.4	5.2 ± 1.0	< 1.5
MW-TMI-13S	07/24/13	422 ± 124						
MW-TMI-13S	10/22/13	< 186						
MW-TMI-14D	01/23/13	473 ± 136						
MW-TMI-14D	04/24/13	289 ± 125						
MW-TMI-14D	07/24/13	< 181						
MW-TMI-14D	10/23/13	345 ± 136						
MW-TMI-14I	01/23/13	< 179						
MW-TMI-14I	04/24/13	< 180						
MW-TMI-14I	07/24/13	< 184						
MW-TMI-14I	10/23/13	250 ± 131						
MW-TMI-14S	01/23/13	< 174						
MW-TMI-14S	01/23/13	< 174						
MW-TMI-14S	04/24/13	< 177	< 8.1	< 0.7	< 0.6	< 0.4	2.8 ± 0.8	< 1.6
MW-TMI-14S	07/24/13	< 188						
MW-TMI-14S	10/23/13	< 185						
MW-TMI-16D	01/24/13	439 ± 129						
MW-TMI-16D	01/24/13	520 ± 150						
MW-TMI-16D	04/25/13	602 ± 139						
MW-TMI-16D	07/23/13	389 ± 132						
MW-TMI-16D	10/22/13	744 ± 147						
MW-TMI-16I	01/24/13	249 ± 120						
MW-TMI-16I	04/25/13	185 ± 117						
MW-TMI-16I	07/23/13	< 183						
MW-TMI-16I	10/22/13	< 176						
MW-TMI-17I	04/22/13	< 179						
MW-TMI-18D	04/24/13	< 200						
MW-TMI-19I	04/24/13	< 182						
MW-TMI-1D	04/24/13	230 ± 121						
MW-TMI-20D	07/15/13	413 ± 137						

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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		H-3	Sr-89	Sr-90	Gr-A (DIS)	Gr-A (SUS)	Gr-B (DIS)	Gr-B (SUS)
MW-TMI-20D	07/22/13		287 ± 133						
MW-TMI-20D	07/29/13		234 ± 141						
MW-TMI-20D	09/04/13		222 ± 127						
MW-TMI-20D	10/21/13		274 ± 123	< 4.5	< 0.7	< 2.7	< 0.5	5.1 ± 1.5	< 1.6
MW-TMI-20I	07/15/13		496 ± 142						
MW-TMI-20I	07/22/13		493 ± 148						
MW-TMI-20I	07/29/13		435 ± 154						
MW-TMI-20I	09/04/13		335 ± 130						
MW-TMI-20I	10/21/13		435 ± 134	< 3.6	< 0.5	< 4.3	< 0.4	14.7 ± 2.0	< 1.6
MW-TMI-21D	07/15/13		2850 ± 332						
MW-TMI-21D	07/16/13		2530 ± 299						
MW-TMI-21D	07/22/13		2790 ± 328						
MW-TMI-21D	07/29/13		3040 ± 362						
MW-TMI-21D	08/05/13		2540 ± 297						
MW-TMI-21D	08/12/13		2370 ± 284						
MW-TMI-21D	08/19/13		3160 ± 371						
MW-TMI-21D	08/26/13		2810 ± 323						
MW-TMI-21D	09/03/13		2450 ± 306						
MW-TMI-21D	09/09/13		2650 ± 313						
MW-TMI-21D	09/16/13		2800 ± 318						
MW-TMI-21D	09/23/13		2650 ± 362						
MW-TMI-21D	09/30/13		2800 ± 333						
MW-TMI-21D	10/07/13		2410 ± 285						
MW-TMI-21D	10/21/13		2770 ± 334	< 5.0	< 0.5	< 1.7	< 0.9	3.0 ± 1.1	< 1.6
MW-TMI-21D	11/04/13		3150 ± 366						
MW-TMI-21D	11/25/13		2720 ± 321						
MW-TMI-21D	12/16/13		2890 ± 334						
MW-TMI-21I	07/15/13		584 ± 148						
MW-TMI-21I	07/22/13		723 ± 159						
MW-TMI-21I	07/29/13		539 ± 156						
MW-TMI-21I	08/05/13		820 ± 140						
MW-TMI-21I	08/12/13		937 ± 149						
MW-TMI-21I	08/19/13		1360 ± 199						
MW-TMI-21I	08/26/13	Original	1680 ± 214						
MW-TMI-21I	08/26/13	Recount	1790 ± 230						
MW-TMI-21I	09/03/13		1770 ± 240						
MW-TMI-21I	09/09/13		2730 ± 320						
MW-TMI-21I	09/16/13		3900 ± 427						
MW-TMI-21I	09/23/13		4940 ± 582						
MW-TMI-21I	09/30/13		5760 ± 625						
MW-TMI-21I	10/07/13		4080 ± 449						
MW-TMI-21I	10/21/13		5500 ± 587	< 5.5	< 0.6	< 0.9	< 0.9	2.9 ± 0.7	< 1.6
MW-TMI-21I	10/21/13		6290 ± 684	< 5.5	< 0.7	< 1.1	< 0.9	2.9 ± 0.8	< 1.6
MW-TMI-21I	11/04/13		4440 ± 493						
MW-TMI-21I	11/25/13		4730 ± 519						
MW-TMI-21I	12/16/13		1690 ± 216						
MW-TMI-21S	07/15/13		736 ± 156						
MW-TMI-21S	07/22/13		652 ± 157						
MW-TMI-21S	07/29/13		660 ± 166						
MW-TMI-21S	08/05/13		840 ± 144						

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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (DIS)	Gr-A (SUS)	Gr-B (DIS)	Gr-B (SUS)
MW-TMI-21S	08/12/13	662 ± 136						
MW-TMI-21S	08/19/13	652 ± 149						
MW-TMI-21S	08/26/13	832 ± 137						
MW-TMI-21S	09/03/13	439 ± 138						
MW-TMI-21S	09/09/13	504 ± 127						
MW-TMI-21S	09/16/13	702 ± 133						
MW-TMI-21S	09/23/13	361 ± 171						
MW-TMI-21S	09/30/13	641 ± 153						
MW-TMI-21S	10/21/13	387 ± 149	< 4.5	< 0.5	< 0.7	< 1.1	9.0 ± 1.0	< 1.6
MW-TMI-21S	11/04/13	536 ± 148						
MW-TMI-21S	11/25/13	692 ± 145						
MW-TMI-21S	12/16/13	940 ± 148						
MW-TMI-22D	07/15/13	4910 ± 534						
MW-TMI-22D	07/22/13	4640 ± 508						
MW-TMI-22D	07/29/13	5550 ± 607						
MW-TMI-22D	08/05/13	4670 ± 507						
MW-TMI-22D	08/12/13	4810 ± 525						
MW-TMI-22D	08/19/13	5360 ± 587						
MW-TMI-22D	08/26/13	5130 ± 551						
MW-TMI-22D	09/03/13	4890 ± 545						
MW-TMI-22D	09/09/13	4790 ± 524						
MW-TMI-22D	09/16/13	4670 ± 504						
MW-TMI-22D	09/23/13	4090 ± 502						
MW-TMI-22D	09/30/13	4590 ± 509						
MW-TMI-22D	10/07/13	4860 ± 528						
MW-TMI-22D	10/21/13	5320 ± 584	< 5.4	< 0.6	< 0.9	< 1.1	5.2 ± 1.0	< 1.6
MW-TMI-22D	11/04/13	5580 ± 605						
MW-TMI-22D	11/25/13	4940 ± 539						
MW-TMI-22D	12/16/13	3980 ± 439						
MW-TMI-22I	07/15/13	6540 ± 696						
MW-TMI-22I	07/16/13	6910 ± 730						
MW-TMI-22I	07/22/13	6150 ± 660						
MW-TMI-22I	07/29/13	7050 ± 757						
MW-TMI-22I	08/05/13	6540 ± 691						
MW-TMI-22I	08/12/13	6080 ± 651						
MW-TMI-22I	08/19/13	7560 ± 803						
MW-TMI-22I	08/26/13	6990 ± 737						
MW-TMI-22I	09/03/13	6610 ± 716						
MW-TMI-22I	09/09/13	7370 ± 779						
MW-TMI-22I	09/16/13	7310 ± 767						
MW-TMI-22I	09/23/13	6470 ± 732						
MW-TMI-22I	09/30/13	7870 ± 835						
MW-TMI-22I	10/07/13	6230 ± 659						
MW-TMI-22I	10/21/13	7870 ± 837	< 4.1	< 0.4	< 0.9	< 1.1	7.8 ± 1.0	< 1.6
MW-TMI-22I	11/04/13	7540 ± 799						
MW-TMI-22I	11/25/13	7750 ± 817						
MW-TMI-22I	12/16/13	6790 ± 719						
MW-TMI-22S	07/15/13	7350 ± 774						
MW-TMI-22S	07/16/13	7410 ± 781						
MW-TMI-22S	07/22/13	6910 ± 735						

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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		H-3	Sr-89	Sr-90	Gr-A (DIS)	Gr-A (SUS)	Gr-B (DIS)	Gr-B (SUS)
MW-TMI-22S	07/22/13		7320 ± 776						
MW-TMI-22S	07/29/13		7190 ± 773						
MW-TMI-22S	08/05/13		6240 ± 663						
MW-TMI-22S	08/12/13		5710 ± 614						
MW-TMI-22S	08/19/13		5290 ± 579						
MW-TMI-22S	08/26/13		4870 ± 526						
MW-TMI-22S	09/03/13		5990 ± 653						
MW-TMI-22S	09/09/13		5790 ± 622						
MW-TMI-22S	09/16/13		5130 ± 551						
MW-TMI-22S	09/23/13		3250 ± 416						
MW-TMI-22S	09/30/13		2800 ± 328						
MW-TMI-22S	10/07/13		2650 ± 310						
MW-TMI-22S	10/21/13		3560 ± 414	< 4.9	< 0.6	< 0.7	< 1.1	9.2 ± 1.0	< 1.6
MW-TMI-22S	11/04/13		3330 ± 385						
MW-TMI-22S	11/25/13	Original	4540 ± 497						
MW-TMI-22S	11/25/13	Recount	4370 ± 482						
MW-TMI-22S	12/16/13		3860 ± 426						
MW-TMI-2D	01/22/13		200 ± 120						
MW-TMI-2D	04/24/13		323 ± 141	< 6.0	< 0.6	< 0.5	< 0.7	4.1 ± 0.8	< 1.6
MW-TMI-2D	07/24/13		386 ± 121						
MW-TMI-2D	07/24/13		508 ± 148						
MW-TMI-2D	10/22/13		258 ± 123						
MW-TMI-3I	01/07/13		< 168						
MW-TMI-3I	01/21/13		< 179						
MW-TMI-3I	02/04/13		< 168						
MW-TMI-3I	02/19/13		205 ± 118						
MW-TMI-3I	03/04/13		178 ± 118						
MW-TMI-3I	03/18/13		< 197						
MW-TMI-3I	04/01/13		< 191						
MW-TMI-3I	04/15/13		328 ± 140						
MW-TMI-3I	04/25/13		< 182	< 3.4	< 0.7	< 1.4	< 0.4	3.4 ± 1.2	< 1.5
MW-TMI-3I	05/06/13		329 ± 139						
MW-TMI-3I	05/20/13		< 160						
MW-TMI-3I	06/03/13		200 ± 122						
MW-TMI-3I	06/17/13		255 ± 126						
MW-TMI-3I	07/01/13		268 ± 118						
MW-TMI-3I	07/25/13		304 ± 126						
MW-TMI-3I	09/04/13		382 ± 123						
MW-TMI-3I	10/23/13		210 ± 121						
MW-TMI-4I	04/24/13		< 184						
MW-TMI-4S	04/24/13		< 179						
MW-TMI-6D	01/23/13		< 178						
MW-TMI-6D	04/25/13		< 182	< 7.3	< 0.8	< 0.7	< 0.4	2.3 ± 1.0	< 1.6
MW-TMI-6D	04/25/13		< 194	< 5.2	< 0.8	1.2 ± 0.7	< 0.6	1.8 ± 1.0	< 1.8
MW-TMI-6D	07/24/13		216 ± 111						
MW-TMI-6D	10/23/13		< 179						
MW-TMI-6I	01/23/13		< 175						
MW-TMI-6I	04/25/13		< 180	< 8.5	< 0.7	< 0.7	< 0.4	4.3 ± 1.0	< 1.6
MW-TMI-6I	07/24/13		< 188						
MW-TMI-6I	10/23/13		< 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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (DIS)	Gr-A (SUS)	Gr-B (DIS)	Gr-B (SUS)
MW-TMI-7S	04/25/13	< 197						
MW-TMI-7S	04/25/13	< 199						
MW-TMI-8S	04/25/13	< 179						
MW-TMI-9I	04/25/13	< 182						
N2-1	01/28/13	< 174						
NW-A	01/22/13	818 ± 165						
NW-A	03/05/13	606 ± 162						
NW-A	04/13/13	672 ± 158						
NW-A	05/12/13	783 ± 147	< 6.5	< 0.5	< 0.8	< 0.8	2.3 ± 0.8	< 1.5
NW-A	07/01/13	< 732						
NW-A	07/23/13	809 ± 144						
NW-A	09/08/13	854 ± 144						
NW-A	10/22/13	841 ± 149						
NW-B	03/05/13	246 ± 142						
NW-B	04/13/13	449 ± 145						
NW-B	05/12/13	201 ± 119	< 6.9	< 0.6	< 0.7	< 0.8	2.9 ± 0.8	< 1.5
NW-B	07/01/13	< 464						
NW-B	07/23/13	359 ± 119						
NW-B	09/08/13	266 ± 112						
NW-B	10/22/13	184 ± 117						
NW-C	01/22/13	1060 ± 178						
NW-C	03/05/13	1220 ± 194						
NW-C	04/13/13	1310 ± 191						
NW-C	05/12/13	1170 ± 177	< 5.4	< 0.6	< 0.8	< 0.8	1.6 ± 0.8	< 1.5
NW-C	07/01/13	< 751						
NW-C	07/23/13	1270 ± 189						
NW-C	07/23/13	1140 ± 165						
NW-C	09/08/13	1010 ± 153						
NW-C	10/22/13	1110 ± 175						
NW-CW	01/22/13	558 ± 136						
NW-CW	03/08/13	744 ± 172						
NW-CW	05/12/13	< 177	< 7.1	< 0.6	< 0.6	< 0.8	3.0 ± 0.7	< 1.5
NW-CW	07/02/13	< 479						
NW-CW	07/23/13	632 ± 150						
NW-CW	10/22/13	233 ± 117						
OS-14	01/22/13	< 173						
OS-14	04/23/13	< 179	< 7.5	< 0.5	< 0.9	< 0.4	9.1 ± 1.3	< 1.5
OS-14	07/23/13	< 186						
OS-14	10/22/13	< 179						
OS-16	01/22/13	666 ± 143						
OS-16	04/23/13	404 ± 142	< 8.0	< 0.7	< 0.6	< 0.5	5.5 ± 0.8	< 1.4
OS-16	07/23/13	< 158						
OS-16	10/22/13	220 ± 124						
OS-18	01/23/13	< 178						
OS-18	04/25/13	< 177	< 7.6	< 0.8	< 0.7	0.9 ± 0.6	4.7 ± 1.1	< 1.6
OS-18	07/25/13	< 182						
OS-18	10/22/13	< 179						
OSF	01/21/13	455 ± 128						
OSF	02/19/13	263 ± 121						
OSF	04/15/13	333 ± 137						

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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (DIS)	Gr-A (SUS)	Gr-B (DIS)	Gr-B (SUS)
OSF	04/25/13	651 ± 140	< 7.5	< 0.8	< 1.6	< 0.4	5.5 ± 1.3	< 1.6
OSF	05/20/13	< 162						
OSF	07/08/13	310 ± 120						
OSF	07/25/13	226 ± 125						
OSF	09/04/13	417 ± 125						
OSF	10/24/13	235 ± 120						
RW-1	01/23/13	< 179						
RW-1	04/23/13	< 199	< 7.8	< 0.6	< 0.8	< 0.4	3.9 ± 0.9	< 1.4
RW-1	07/24/13	< 185						
RW-1	10/23/13	< 174						
RW-2	01/23/13	< 176						
RW-2	04/23/13	< 196	< 7.4	< 0.7	< 0.4	< 0.7	6.2 ± 0.9	< 1.5
RW-2	04/23/13	< 189	< 6.7	< 0.7	< 0.6	< 0.6	5.5 ± 0.9	3.4 ± 1.3
RW-2	07/24/13	224 ± 113						
RW-2	10/23/13	< 179						
TRAINING CENTER	04/25/13	< 179						

TABLE B-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

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	04/23/13	< 20	< 18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 5
48S	04/25/13	< 41	< 65	< 4	< 4	< 10	< 4	< 9	< 5	< 8	< 4	< 4	< 28	< 8
MS-1	04/25/13	< 52	< 60	< 6	< 5	< 10	< 7	< 14	< 6	< 11	< 6	< 6	< 31	< 13
MS-19	04/24/13	< 47	< 37	< 4	< 4	< 9	< 5	< 9	< 5	< 10	< 4	< 5	< 31	< 8
MS-2	04/23/13	< 29	< 59	< 3	< 3	< 7	< 3	< 6	< 3	< 6	< 3	< 3	< 20	< 9
MS-20	04/22/13	< 35	< 66	< 4	< 4	< 9	< 4	< 8	< 4	< 7	< 3	< 4	< 23	< 9
MS-21	04/23/13	< 17	< 15	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 13	< 4
MS-22	04/22/13	< 32	< 59	< 3	< 3	< 8	< 3	< 7	< 4	< 6	< 3	< 3	< 26	< 7
MS-3	01/22/13	< 47	< 101	< 5	< 6	< 12	< 6	< 11	< 6	< 11	< 5	< 5	< 38	< 14
MS-3	04/23/13	< 34	< 30	< 3	< 4	< 9	< 3	< 6	< 4	< 7	< 3	< 3	< 27	< 8
MS-3	07/23/13	< 38	< 83	< 5	< 5	< 9	< 5	< 9	< 5	< 7	< 4	< 4	< 30	< 11
MS-3	07/23/13	< 38	< 37	< 4	< 4	< 8	< 4	< 8	< 4	< 8	< 4	< 4	< 27	< 9
MS-3	10/22/13	< 15	< 28	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 1	< 2	< 14	< 5
MS-4	04/23/13	< 38	< 26	< 4	< 4	< 9	< 4	< 8	< 4	< 8	< 4	< 4	< 33	< 9
MS-5	01/22/13	< 32	< 60	< 3	< 3	< 8	< 3	< 7	< 4	< 6	< 3	< 3	< 27	< 7
MS-5	04/23/13	< 35	< 33	< 4	< 4	< 8	< 3	< 7	< 3	< 6	< 3	< 4	< 25	< 8
MS-5	04/23/13	< 30	< 32	< 3	< 4	< 9	< 4	< 7	< 4	< 6	< 3	< 3	< 25	< 9
MS-5	07/23/13	< 42	< 81	< 4	< 4	< 8	< 4	< 7	< 5	< 8	< 4	< 4	< 29	< 8
MS-5	10/22/13	< 19	< 32	< 2	< 2	< 4	< 1	< 3	< 2	< 3	< 2	< 2	< 17	< 4
MS-7	04/25/13	< 40	< 43	< 4	< 4	< 10	< 4	< 9	< 5	< 8	< 4	< 4	< 27	< 8
MS-8	01/21/13	< 29	< 28	< 3	< 3	< 7	< 3	< 6	< 3	< 6	< 3	< 3	< 25	< 7
MS-8	04/23/13	< 31	< 33	< 3	< 3	< 8	< 3	< 7	< 4	< 6	< 3	< 4	< 23	< 8
MS-8	07/23/13	< 38	< 45	< 4	< 4	< 8	< 4	< 7	< 5	< 7	< 3	< 4	< 26	< 10
MS-8	10/22/13	< 21	< 40	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 19	< 7
MW-1	04/25/13	< 47	< 104	< 6	< 6	< 14	< 6	< 11	< 6	< 11	< 5	< 6	< 30	< 14
MW-2	04/25/13	< 39	< 90	< 4	< 4	< 10	< 5	< 10	< 4	< 7	< 4	< 4	< 27	< 8
MW-2	04/25/13	< 42	< 90	< 4	< 5	< 10	< 5	< 11	< 6	< 10	< 5	< 6	< 31	< 11
MW-TMI-10I	04/24/13	< 33	< 52	< 3	< 4	< 6	< 4	< 6	< 3	< 6	< 3	< 4	< 24	< 8
MW-TMI-10S	04/24/13	< 43	< 48	< 4	< 5	< 10	< 5	< 8	< 5	< 10	< 2	< 5	< 27	< 12
MW-TMI-12S	04/23/13	< 18	< 32	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 5
MW-TMI-13S	04/24/13	< 33	< 61	< 3	< 4	< 8	< 4	< 7	< 3	< 7	< 3	< 3	< 24	< 8
MW-TMI-14S	04/24/13	< 40	< 38	< 4	< 5	< 8	< 4	< 8	< 5	< 8	< 4	< 4	< 30	< 8
MW-TMI-17I	04/22/13	< 43	< 42	< 4	< 5	< 10	< 4	< 9	< 5	< 9	< 4	< 4	< 29	< 12
MW-TMI-18D	04/24/13	< 40	< 78	< 4	< 4	< 10	< 4	< 8	< 5	< 8	< 4	< 5	< 31	< 9
MW-TMI-19I	04/24/13	< 44	< 87	< 4	< 4	< 10	< 6	< 10	< 4	< 8	< 4	< 4	< 29	< 9
MW-TMI-1D	04/24/13	< 34	< 32	< 4	< 4	< 8	< 4	< 8	< 4	< 7	< 4	< 4	< 26	< 8

TABLE B-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

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-20D	10/21/13	< 20	< 39	< 2	< 2	< 5	< 2	< 5	< 2	< 4	< 2	< 2	< 19	< 7
MW-TMI-20I	10/21/13	< 15	< 26	< 1	< 2	< 4	< 2	< 3	< 2	< 3	< 1	< 2	< 14	< 5
MW-TMI-21D	10/21/13	< 16	< 15	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 13	< 4
MW-TMI-21I	10/21/13	< 26	91 ± 42	< 3	< 3	< 6	< 2	< 6	< 3	< 5	< 3	< 3	< 22	< 7
MW-TMI-21I	10/21/13	< 19	< 17	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 15	< 5
MW-TMI-21S	10/21/13	< 15	< 15	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 13	< 4
MW-TMI-22D	10/21/13	< 19	< 17	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 5
MW-TMI-22I	10/21/13	< 18	< 35	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 5
MW-TMI-22S	10/21/13	< 18	< 41	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 5
MW-TMI-2D	04/24/13	< 34	< 85	< 4	< 4	< 9	< 4	< 9	< 4	< 8	< 3	< 4	< 26	< 10
MW-TMI-3I	04/25/13	< 40	< 85	< 4	< 5	< 11	< 5	< 10	< 5	< 9	< 4	< 5	< 26	< 11
MW-TMI-4I	04/24/13	< 42	< 90	< 5	< 4	< 10	< 5	< 9	< 5	< 10	< 4	< 6	< 31	< 11
MW-TMI-4S	04/24/13	< 48	< 43	< 5	< 5	< 10	< 5	< 9	< 6	< 10	< 5	< 5	< 34	< 8
MW-TMI-6D	04/25/13	< 49	< 62	< 6	< 5	< 13	< 5	< 11	< 7	< 10	< 6	< 6	< 33	< 11
MW-TMI-6D	04/25/13	< 47	< 84	< 5	< 5	< 10	< 4	< 9	< 5	< 9	< 5	< 5	< 35	< 10
MW-TMI-6I	04/25/13	< 38	< 37	< 4	< 4	< 9	< 4	< 8	< 5	< 7	< 4	< 4	< 23	< 10
MW-TMI-7S	04/25/13	< 46	< 32	< 5	< 5	< 12	< 5	< 10	< 6	< 9	< 5	< 6	< 34	< 8
MW-TMI-7S	04/25/13	< 39	< 31	< 4	< 3	< 8	< 3	< 8	< 4	< 8	< 4	< 3	< 25	< 8
MW-TMI-8S	04/25/13	< 48	82 ± 48	< 5	< 5	< 9	< 5	< 10	< 5	< 9	< 5	< 5	< 31	< 8
MW-TMI-9I	04/25/13	< 40	< 74	< 4	< 4	< 9	< 4	< 8	< 5	< 8	< 4	< 4	< 28	< 9
N2-1	01/28/13	< 44	< 36	< 5	< 4	< 10	< 5	< 9	< 5	< 9	< 4	< 5	< 30	< 9
NW-A	05/12/13	< 34	< 41	< 4	< 5	< 9	< 5	< 10	< 5	< 8	< 3	< 4	< 23	< 9
NW-B	05/12/13	< 34	< 67	< 4	< 4	< 7	< 3	< 7	< 4	< 6	< 4	< 3	< 22	< 6
NW-C	05/12/13	< 53	< 38	< 6	< 6	< 11	< 6	< 10	< 6	< 9	< 6	< 6	< 34	< 9
NW-CW	05/12/13	< 41	< 38	< 3	< 4	< 8	< 4	< 8	< 4	< 8	< 4	< 4	< 24	< 7
OS-14	01/22/13	< 36	< 33	< 4	< 4	< 8	< 4	< 8	< 4	< 7	< 4	< 4	< 30	< 11
OS-14	04/23/13	< 46	< 87	< 4	< 5	< 11	< 3	< 9	< 6	< 8	< 4	< 5	< 35	< 10
OS-14	07/23/13	< 29	< 34	< 3	< 3	< 7	< 3	< 6	< 3	< 5	< 3	< 3	< 20	< 7
OS-14	10/22/13	< 16	< 31	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 16	< 5
OS-16	01/22/13	< 31	< 28	< 4	< 3	< 8	< 3	< 7	< 4	< 6	< 3	< 4	< 28	< 9
OS-16	04/23/13	< 33	< 25	< 3	< 4	< 7	< 3	< 8	< 4	< 7	< 3	< 4	< 26	< 9
OS-16	07/23/13	< 49	< 97	< 5	< 5	< 13	< 5	< 10	< 5	< 10	< 4	< 5	< 32	< 12
OS-16	10/22/13	< 16	< 14	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 1	< 2	< 15	< 5
OS-18	04/25/13	< 51	< 46	< 5	< 5	< 13	< 5	< 9	< 6	< 9	< 5	< 6	< 31	< 13
OSF	04/25/13	< 46	< 83	< 5	< 5	< 12	< 6	< 10	< 6	< 9	< 5	< 6	< 32	< 12

TABLE B-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

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
RW-1	04/23/13	< 25	< 26	< 2	< 3	< 6	< 3	< 5	< 3	< 5	< 2	< 3	< 18	< 6
RW-2	04/23/13	< 24	< 39	< 2	< 3	< 5	< 3	< 5	< 3	< 4	< 2	< 3	< 21	< 6
RW-2	04/23/13	< 23	< 22	< 2	< 3	< 5	< 2	< 4	< 3	< 5	< 2	< 2	< 17	< 6
TRAINING CENTER	04/25/13	< 48	< 49	< 6	< 5	< 11	< 6	< 9	< 5	< 8	< 5	< 5	< 31	< 10

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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		Am-241	Cm-242	Cm-243/244	Pu-238	Pu-239/240	U-234	U-235	U-238	Fe-55	Ni-63
MW-TMI-10I	04/24/13		< 0.14	< 0.10	< 0.07	< 0.02	< 0.09	0.9 ± 0.3	< 0.06	0.6 ± 0.2	< 165	< 3.4
MW-TMI-10S	04/24/13		< 0.08	< 0.09	< 0.04	< 0.02	< 0.04	0.3 ± 0.1	< 0.03	< 0.1	< 70	< 3.8
MW-TMI-20D	10/21/13	Original	< 0.16	< 0.05	< 0.10	< 0.12	< 0.11	0.9 ± 0.3	< 0.05	0.4 ± 0.2	< 86	< 4.5
MW-TMI-20D	10/21/13	Reanalysis						1.2 ± 0.3		0.7 ± 0.2		
MW-TMI-20I	10/21/13	Original	< 0.14	< 0.11	< 0.12	< 0.17	< 0.1	4.9 ± 1.0	< 0.03	3.4 ± 0.7	< 152	< 4.5
MW-TMI-20I	10/21/13	Reanalysis						4.2 ± 0.6		2.8 ± 0.5		

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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
SW-E-1	01/24/13	< 192
SW-E-1	04/25/13	< 176
SW-E-1	07/25/13	< 184
SW-E-1	10/24/13	< 181
SW-E-1	10/24/13	< 176
SW-E-2	01/24/13	< 194
SW-E-2	04/25/13	< 198
SW-E-2	04/25/13	< 181
SW-E-2	07/25/13	< 184
SW-E-2	10/24/13	< 180
SW-E-3	01/24/13	< 188
SW-E-3	04/25/13	< 178
SW-E-3	07/25/13	< 184
SW-E-3	10/24/13	< 177

TABLE B-II.2 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013**

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	04/25/13	< 36	< 32	< 4	< 3	< 10	< 3	< 6	< 4	< 6	< 3	< 4	< 24	< 6
SW-E-2	04/25/13	< 36	< 44	< 4	< 4	< 8	< 4	< 8	< 4	< 8	< 4	< 4	< 27	< 9
SW-E-2	04/25/13	< 40	< 90	< 4	< 4	< 10	< 5	< 8	< 6	< 8	< 5	< 5	< 30	< 9
SW-E-3	04/25/13	< 53	< 43	< 5	< 6	< 12	< 4	< 10	< 6	< 9	< 5	< 5	< 33	< 9

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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		H-3
EDCB	01/31/13		< 181
EDCB	04/30/13		< 191
EDCB	07/02/13		< 471
EDCB	07/30/13		< 188
EDCB	10/29/13	Original	233 ± 121
EDCB	10/29/13	Recount	289 ± 116
EDCB	10/29/13	Reanalysis	217 ± 131

TABLE B-III.2 CONCENTRATIONS OF GAMMA EMITTERS IN STORM WATER SAMPLES COLLECTED IN THE VICINITY OF THREE MILE ISLAND NUCLEAR STATION, 2013

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
EDCB	01/31/13	< 16	< 32	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 2	< 2	< 13	< 4
EDCB	04/30/13	< 44	< 48	< 4	< 5	< 10	< 6	< 9	< 6	< 7	< 4	< 4	< 18	< 6
EDCB	07/30/13	< 42	< 38	< 5	< 5	< 11	< 5	< 10	< 5	< 8	< 4	< 4	< 23	< 9
EDCB	10/29/13	< 37	< 70	< 3	< 4	< 9	< 3	< 7	< 4	< 7	< 4	< 4	< 31	< 8

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, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
PR-MS-22	01/07/13	530 ± 133
PR-MS-22	01/14/13	498 ± 136
PR-MS-22	02/19/13	441 ± 130
PR-MS-22	02/25/13	525 ± 156
TM-PR-ESE	02/26/13	< 172
TM-PR-ESE	05/01/13	< 172
TM-PR-ESE	07/15/13	< 166
TM-PR-ESE	10/08/13	< 198
TM-PR-MS-1	02/26/13	< 171
TM-PR-MS-1	05/01/13	< 175
TM-PR-MS-1	07/15/13	< 166
TM-PR-MS-1	10/08/13	< 169
TM-PR-MS-2	02/26/13	218 ± 116
TM-PR-MS-2	05/01/13	< 170
TM-PR-MS-2	07/15/13	< 167
TM-PR-MS-2	10/08/13	< 200
TM-PR-MS-4	02/26/13	< 168
TM-PR-MS-4	05/01/13	< 173
TM-PR-MS-4	07/15/13	< 168
TM-PR-MS-4	10/08/13	< 199

APPENDIX C

DATA TABLES AND FIGURES
PRIMARY LABORATORY

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TABLE C-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA IN GROUNDWATER SPLIT SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, THREE MILE ISLAND NUCLEAR STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A	Gr-B
MS-2	01/22/13	503 ± 93				
MW-TMI-10I	01/22/13	896 ± 108				
MW-TMI-14S	01/23/13	< 140				
MW-TMI-16D	01/24/13	495 ± 93				
MW-2	04/25/13	< 193				
MW-TMI-7S	04/25/13	< 193				
MS-5	04/23/13	< 193	< 0.8	< 0.6	< 0.9	3.3 ± 1.2
RW-2	04/23/13	< 193	< 0.7	< 0.5	< 0.9	6.7 ± 1.1
MW-TMI-6D	04/25/13	< 193	< 0.8	< 0.7	2.4 ± 1.0	3.3 ± 1.2
MW-TMI-22S	07/22/13	7822 ± 270				
MS-3	07/23/13	425 ± 107				
NW-C	07/23/13	1328 ± 139				
MS-7	07/24/13	< 179				
MW-TMI-2D	07/24/13	442 ± 108				
MW-TMI-21I	10/21/13	6499 ± 241	< 0.8	< 0.5	< 1.3	2.3 ± 0.8
MS-20	10/22/13	746 ± 111				
MW-TMI-13I	10/22/13	389 ± 97				
MW-TMI-10D	10/23/13	453 ± 99				

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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95	Nb-95	Cs-134	Cs-137	Ba-140	La-140
MS-3	07/23/13	< 28	< 59	< 3	< 7	< 3	< 2	< 4	< 6	< 2	< 2	< 2	< 19	< 4
MS-5	04/23/13	< 23	57 ± 31	< 2	< 6	< 3	< 1	< 2	< 4	< 2	< 2	< 3	< 12	< 3
MW-2	04/25/13	< 29	< 73	< 2	< 6	< 3	< 3	< 5	< 7	< 5	< 3	< 4	< 21	< 5
MW-TMI-21I	10/21/13	< 13	< 21	< 1	< 1	< 1	< 1	< 2	< 2	< 1	< 1	< 1	< 8	< 3
MW-TMI-6D	04/25/13	< 36	< 57	< 2	< 4	< 2	< 3	< 4	< 5	< 3	< 3	< 2	< 17	< 3
MW-TMI-7S	04/25/13	< 26	< 61	< 3	< 9	< 2	< 3	< 6	< 5	< 3	< 2	< 3	< 10	< 3
RW-2	04/23/13	< 24	< 63	< 2	< 7	< 3	< 2	< 6	< 4	< 3	< 4	< 2	< 18	< 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, 2013

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 2013

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, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
SW-E-1	10/24/13	< 149
SW-E-2	04/25/13	< 193

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, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	K-40	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95	Nb-95	Cs-134	Cs-137	Ba-140	La-140
SW-E-2	04/25/13	< 30	< 53	< 2	< 5	< 3	< 2	< 5	< 5	< 2	< 3	< 4	< 13	< 2

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, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
TM-PR-MS-2Q	03/15/13	244 ± 88
TM-PR-MS-2Q	05/20/13	< 139
TM-PR-MS-2Q	08/12/13	< 152
TM-PR-MS-2Q	10/16/13	173 ± 101