Exelon Generation

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Peach Bottom Atomic Power Station Unit Nos. 2 and 3
Facility Operating License Nos. DPR-44 and DPR-56
NRC Docket Nos. 50-277 and 50-278

SUBJECT: Annual Radiological Environmental Operating Report 71
January 1, 2013 through December 31, 2013

In accordance with the requirements of Section 5.6.2 of the Peach Bottom Atomic Power Station, Units 2 and 3 Technical Specifications, this letter submits the Annual Radiological Environmental Operating Report 71. This report provides the 2013 results for the Radiological Environmental Monitoring Program (REMP) as called for in the Offsite Dose Calculation Manual.

In assessing the data collected for the REMP, we have concluded that the operation of PBAPS, Units 2 and 3, had no adverse impact on the environment. There are no commitments contained in this letter.

If you have any questions or require additional information, please do not hesitate to contact Gerard Stenclik at (717) 456-4491.

Sincerely,

for P. NAVIN

Patrick D. Navin, Plant Manager
Peach Bottom Atomic Power Station

PDN/FML/GRS/JCC/EAS/bcb

Enclosure

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Annual Radiological Environmental Operating Report 71
January 1, 2013 through December 31, 2013

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PEACH BOTTOM ATOMIC POWER STATION
UNITS 2 and 3

Annual Radiological
Environmental Operating Report

Report No. 71
1 January Through 31 December 2013

Prepared By

Exelon Generation Company, LLC
Peach Bottom Atomic Power Station
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May 2014

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I. Executive Summary

In 2013, the dose from both liquid and gaseous effluents was conservatively calculated for the Maximum Exposed Member of the Public for PBAPS. The results of those calculations and their comparison to the allowable limits were as follows:

Effluent	Applicable Organ	Estimated Dose	Age Group	Location		% of Applicable Limit	Limit	Unit
				Distance (meters)	Direction (toward)			
Noble Gas	Gamma - Air Dose	2.05E-01	All	1.10E+03	SSE	1.02E+00	2.00E+01	mrad
Noble Gas	Beta - Air Dose	1.41E-01	All	1.10E+03	SSE	3.51E-01	4.00E+01	mrad
Noble Gas	Total Body (gamma)	2.25E-01	All	1.10E+03	SSE	2.25E+00	1.00E+01	mrem
Noble Gas	Skin (Beta)	2.93E-01	All	1.10E+03	SSE	9.77E-01	3.00E+01	mrem
Gaseous Iodine, Particulate, Carbon-14 & Tritium	Bone	5.49E-01	Child	1.10E+03	SSE	1.83E+00	3.00E+01	mrem
Gaseous Iodine, Particulate, & Tritium	Thyroid	1.25E-02	Infant	1.10E+03	SSE	4.17E-02	3.00E+01	mrem
Liquid	Total Body (gamma)	8.29E-05	Child	Site Boundary		1.38E-03	6.00E+00	mrem
Liquid	Liver	8.71E-05	Child			4.35E-04	2.00E+01	mrem
Direct Radiation	Total Body	0.00E+00	All	1.15E+03	SSE	0.00E+00	2.20E+01	mrem

40 CFR Part 190 Compliance								
Total Dose	Total Body	2.25E-01	All	1.15E+03	SSE	9.00E-01	2.50E+01	mrem
Total Dose	Thyroid	1.25E-01	All	1.15E+03	SSE	1.67E-02	7.50E+01	mrem
Total Dose	Bone	5.50E-01	All	1.15E+03	SSE	2.20E+00	2.50E+01	mrem
Total Dose	Total Body	2.25E-01	All	1.15E+03	SSE	7.50E+00	3.00E+00	mrem
Total Dose	Bone	5.49E-01	All	1.15E+03	SSE	1.83E+01	3.00E+00	mrem
Total Dose	Thyroid	2.17E-01	All	1.15E+03	SSE	3.95E-01	5.50E+01	mrem

Doses calculated were well below all ODCM limits.

This report on the Radiological Environmental Monitoring Program (REMP) conducted for the Peach Bottom Atomic Power Station (PBAPS) by Exelon Nuclear covers the period 1 January 2013 through 31 December 2013. During that time period 1,222 analyses were performed on 952 samples.

Surface water samples were analyzed for concentrations of tritium and gamma emitting nuclides. No tritium, fission or activation products were found.

Drinking water samples were analyzed for concentrations of gross beta, iodine-131 (I-131), tritium and gamma emitting nuclides. No fission or activation products were found. Gross beta activity detected was consistent with those observed in previous years. Tritium was not detected in drinking water.

Precipitation samples were analyzed under the Radiological Groundwater Protection Program (RGPP) in 2013.

The remaining sample media representing the aquatic environment included fish and sediment samples. These media were analyzed for concentrations of gamma emitting nuclides. Fish samples showed no detectable fission or activation products from the operation of PBAPS. Cesium-137 (Cs-137) activity was found at one of three sediment locations and was consistent with data from previous years.

The atmospheric environment was divided into two parts for examination: airborne and terrestrial. Sample media for determining airborne affects included air particulates and air iodine samples. Analyses performed on air particulate samples included gross beta and gamma spectrometry. No fission or activation products were found. The gross beta results were consistent with results from the previous years. Furthermore, no notable differences between control and indicator locations were observed. These findings indicate no measurable effects from the operation of PBAPS.

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

Examination of the terrestrial environment was accomplished by analyzing milk and food product samples. Milk samples were analyzed for low level concentrations of I-131 and gamma emitting nuclides. Food product samples were analyzed for concentrations of gamma emitting nuclides. No PBAPS activation or fission products were detected.

Ambient gamma radiation levels were measured quarterly throughout the year. Most measurements were below 10 mR/standard month and the results were consistent with those measured in previous years.

The results of the Optically-Stimulated Luminescent Dosimetry (OSLD) monitoring program were used to confirm that the Independent Spent Fuel Storage Installation (ISFSI) had no measurable impact on the dose rate in the environs.

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

II. Introduction

PBAPS is located along the Susquehanna River between Holtwood and Conowingo Dams in Peach Bottom Township, York County, Pennsylvania. The initial loading of fuel into Unit 1, a 115 MWth High Temperature, Gas-cooled Reactor (HTGR) began on 5 February 1966 and initial criticality was achieved on 3 March 1966. Shutdown of Peach Bottom Unit 1 for decommissioning was on 31 October 1974. For the purposes of the monitoring program, the beginning of the operational period for Unit 1 was considered to be 5 February 1966. A summary of the Unit 1 preoperational monitoring program was presented in a previous report [(1)]. PBAPS Units 2 and 3 are boiling water reactors, each with a rated full-power output of approximately 3,514 MWth. The first fuel was loaded into Peach Bottom Unit 2 on 9 August 1973. Criticality was achieved on 16 September 1973 and full power was reached on 16 June 1974. The first fuel was loaded into Peach Bottom Unit 3 on 5 July 1974. Criticality was achieved on 7 August 1974 and full power was first reached on 21 December 1974. Preoperational summary reports [(2)(3)] for Units 2 and 3 have been previously issued and summarize the results of all analyses performed on samples collected from 5 February 1966 through 8 August 1973.

The REMP for PBAPS was initiated in 1966. This report covers those analyses performed by Teledyne Brown Engineering (TBE), Landauer and Environmental Inc.-Midwest Labs (EIML) on samples collected during the period 01 January 2013 through 31 December 2013.

A. Objectives

The objectives of the REMP are:

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

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

B. Implementation of the Objectives

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 plant operation to assess station radiological effects (if any) on man and the environment.

III. Program Description

A. Sample Collection

Normandeau Associates Inc., (NAI), collected samples for the PBAPS REMP for Exelon Nuclear. This section describes the general collection methods used by NAI to obtain environmental samples for the PBAPS REMP in 2013. Sample locations and descriptions can be found in Table B-1 and Figures B-1 through B-3, Appendix B. The collection procedures used by NAI are listed in Table B-2, Appendix B.

Aquatic Environment

The aquatic environment was evaluated by performing radiological analyses on samples of surface water, drinking water, precipitation, fish and sediment. Surface water from two locations (1LL and 1MM) and drinking water from three locations (13B, 4L and 6I) were collected weekly by automatic sampling equipment. Weekly samples from each of the surface and drinking water locations were composited into a separate monthly sample for analysis. Approximately two quarts of water were removed from the weekly sample container and placed into a clean two-gallon polyethylene bottle to form a monthly composite. Control locations were 1LL and 6I. Fish samples comprising the flesh from two groups: Bottom Feeder (channel catfish, flathead catfish, carp, redhorse, and quillback) and Predator (smallmouth bass, largemouth bass, green sunfish, and walleye) were collected semiannually from two locations (4 and 6; 6 is the control). Sediment samples composed of recently deposited substrate were collected semiannually at three locations (4J, 4T and 6F; 6F is the control).

Atmospheric Environment

The atmospheric environment was evaluated by performing radiological analyses on air particulate and airborne iodine samples. Air particulate and air iodine samples were collected and analyzed weekly from five locations (1B, 1C, 1Z, 3A and 5H2; 5H2 is the control). 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 1 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 milk and food product samples. Milk samples were collected biweekly at five locations (J, R, S, U and V; V is the control) from April through November and monthly from December through March. Six additional locations (C, D, E, L, P and W; C and E are the controls) were sampled quarterly. 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 product samples were collected annually at three locations (1Q, 2B and 55; 55 is the control) in May through September. All samples were collected in new unused plastic bags and shipped promptly to the laboratory.

Ambient Gamma Radiation

Beginning in 2012, Exelon changed the type of dosimetry used for the 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 OSLD locations were placed on and around the PBAPS site as follows:

A site boundary ring, consisting of 20 locations (1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K, 1L, 1M, 1NN, 1P, 1Q, 1R, 2, 2B and 40), 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 PBAPS releases.

An intermediate distance ring, consisting of 23 locations (14, 15, 17, 22, 23, 26, 27, 31A, 32, 3A, 42, 43, 44, 45, 46, 47, 48, 49, 4K, 5, 50, 51 and 6B), extending to approximately 5 miles from the site and designed to measure possible exposures to close-in population.

The balance of four locations (16, 18, 19 and 24) representing control and special interests areas such as population centers, schools, etc.

The specific OSLD 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 36 ten-degree sectors around the site, where estimated annual dose from PBAPS, if any, would be more significant;

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

4. Near the dwelling closest to the vents in the prevailing down wind direction.

Two dosimeters – each comprised of elements enclosed in plastic – were placed at each location in a Formica "birdhouse" or polyethylene jar located approximately six feet above ground level. The dosimetry sets were exchanged quarterly, and sent to the laboratory for analysis.

B. Sample Analysis

This section describes the general analytical methods used by Teledyne Brown Engineering and Environmental Inc. to analyze the environmental samples for radioactivity for the PBAPS REMP in 2013. The analytical procedures used by the laboratories are listed in Table B-2, Appendix B.

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

1. Concentrations of beta emitters in drinking water and air particulates.
2. Concentrations of gamma emitting nuclides in surface and drinking water, air particulates, milk, fish, sediment and food products.
3. Concentrations of tritium in surface and drinking water.
4. Concentrations of I-131 in drinking water, surface water, air and milk.
5. Ambient gamma radiation levels at various site environs.

C. Data Interpretation

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

1. Lower Limit of Detection and Minimum Detectable Concentration

The lower limit of detection (LLD) is 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 is 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 are designed to achieve the required PBAPS detection capabilities for environmental sample analysis.

The minimum detectable concentration (MDC) is defined similarly as above for LLD; however the MDC is an after-the-fact estimate vice a before-the-fact as in LLD.

2. Net Activity Calculation and Reporting of Results

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

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

For surface and drinking water, 11 nuclides, manganese-54 (Mn-54), cobalt-58 (Co-58), iron-59 (Fe-59), cobalt-60 (Co-60), zinc-65 (Zn-65), zirconium-95 (Zr-95), niobium-95 (Nb-95), cesium-134 (Cs-134), Cs-137, barium-140 (Ba-140) and lanthanum-140 (La-140) were reported.

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

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

For air particulate, six nuclides, beryllium-7 (Be-7), Mn-54, Co-58, Co-60, Cs-134 and Cs-137 were reported.
For milk, five nuclides, K-40, Cs-134, Cs-137, Ba-140 and La-140 were reported.

For food products, eight nuclides, Be-7, K-40, Mn-54, Co-58, Co-60, 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 PBAPS REMP had a sample collection recovery rate of better than 99%. The exceptions to this program are listed below:

1. On 14 March 2013, the environmental sampling contractor informed the Licensee that the 1Z sample pump was found to have failed. The pump was immediately replaced. An identical air sampler (1A) is located within 6 feet of the 1Z as a quality control independent replicate sample (which is provided to a different laboratory for analysis). A review of the 1A gross beta and iodine data shows no activity, which is consistent with sampling results before and after the 1Z pump failure. The 1Z samples for gross beta and iodine before and after the pump failure are also consistent with historical. No activity was observed in any sample above background.

2. In May 2013, sufficient mass of broad-leaf vegetation was not obtained due to low crop yield. Vegetation/ Food Products are not required if milk sampling is available and these milk samples were obtained satisfactorily. Two of three samples were obtained from the Station 1Q Indicator Location and zero of three samples were obtained from the Station 2B Indicator Location. All three samples from the Station 55 Control Location were satisfactorily collected. Subsequent vegetation samples for the year were of satisfactory mass for analysis. No nuclear power-production radioactivity was above the detection level in any of the samples collected.

3. The environmental contractor performing sampling of vegetation in July 2013 reported not enough edible portions of plants were available and, using the approved procedures, non-edible portions were collected (e.g. corn and tobacco leaves) at 2 of the three gardens. Although vegetation food-products are desirable for analysis of the dose impact to the public, if not enough edible portions are available, non-edible portions of the same plants are acceptable rather than selecting non-edible plant materials. No nuclear power-production radioactivity was above the detection level in any of the

samples collected.

4. At the beginning of August, the environmental sampling contractor, NAI, found the enclosure bottle for the dosimeter at location ID Station 26 damaged, possibly by farm activity which suggested that the OSLDs had been dropped to the ground. However, it appears that at some time before the regular change-out, someone replaced the dosimeter in the damaged holder. While the conditions for measurement were not consistent with other quarters, the data indicated that Station 26 direct radiation is consistent with the trends of other quarters. This is most likely due to the dosimeter remaining in the same location relative to Peach Bottom as well as the Independent Spent-Fuel Storage Facility Installation (ISFSI) which is the historical location of the highest-indicating dosimeter (Station ID 1R)

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 a recurrence. Occasional equipment breakdowns and power outages were unavoidable.

E. Program Changes

There were no program changes in 2013.

IV. Results and Discussion

A. Aquatic Environment

1. Surface Water

Samples were taken from a continuous sampler at two locations (1LL and 1MM) on a monthly schedule. Of these locations, 1MM located downstream, could be affected by Peach Bottom's effluent releases. The following analyses were performed:

Tritium

Monthly samples from both locations were composited quarterly and analyzed for tritium activity (Table C-I.1, Appendix C). Tritium activity was less than the MDC.

Iodine

Monthly samples from both locations were analyzed for I-131. All results were less than the MDC (Table C-I.2, Appendix C).

Gamma Spectrometry

Samples from both locations 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 (13B, 4L and 6I). Two locations (13B and 4L) could be affected by Peach Bottom's effluent releases. The following analyses were performed:

Gross Beta

Samples from all locations were analyzed for concentrations of total gross beta activity (Tables C-II.1 and Figures C-1 Appendix C). Gross beta was detected in 26 of 36 samples. The values ranged from 1.6 to 5.6 pCi/l. Concentrations detected were generally below those detected in previous years.

Tritium

Monthly samples from three locations were composited quarterly and analyzed for tritium activity (Table C-II.2, Appendix C). Tritium activity was less than the MDC.

Iodine

Monthly samples from three locations were analyzed for I-131 (Table C-II.3, Appendix C). All results were less than the MDC.

Gamma Spectrometry

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

3. Precipitation

Precipitation samples were analyzed under the RGPP in 2013.

4. Fish

Fish samples comprised of bottom feeder and predator were collected at two locations (4 and 6) semiannually. Location 4 could be affected by Peach Bottom's effluent releases. The following analysis was performed:

Gamma Spectrometry

The edible portion of fish samples from both locations was analyzed for gamma emitting nuclides (Table C-III.1, Appendix C). Naturally occurring K-40 was found at all stations and ranged from 2,793 to 4,790 pCi/kg wet and was consistent with levels detected in previous years. No Peach Bottom fission or activation products were found in 2013. A gradual increase in the Cs-137 MDC has been observed over the last few years. This change in the baseline is likely the result of historical heat exchanger leaks or nuclear weapons testing legacy material. Historical levels of Cs-137 are shown in Figure C-2, Appendix C.

5. Sediment

Aquatic samples were collected at three locations (4J, 4T and 6F) semiannually. Of these locations two, 4J and 4T located downstream, could be affected by Peach Bottom's effluent releases. The following analysis was performed:

Gamma Spectrometry

Sediment samples from all three locations were analyzed for gamma emitting nuclides (Table C-IV.1, Appendix C). Potassium-40 was found in all locations and ranged from 11,170 to 27,460 pCi/kg dry. The fission product Cs-137 was detected in one of six samples at a concentration of 241 pCi/kg. The activity of Cs-137 detected was consistent with those detected in the preoperational years. Historical levels of Cs-137 are shown in Figure C-3, Appendix C. No other Peach Bottom fission or activation products were found.

B. Atmospheric Environment

1. Airborne

a. Air Particulates

Continuous air particulate samples were collected from five locations on a weekly basis. The five locations were separated into three groups: Group I represents locations within the PBAPS site boundary (1B, 1C and 1Z), Group II represents the location at an intermediate distance from the PBAPS site (3A) and Group III represents the control location at a remote distance from PBAPS (5H2). The following analyses were performed.

Gross Beta

Weekly samples were analyzed for concentrations of beta emitters (Tables C-V.1 and C-V.2 and Figures C-5 and C-6, Appendix C).

Detectable gross beta activity was observed at all locations. Comparison of results among the three groups aid in determining the effects, if any, resulting from the operation of PBAPS. The results from the On-Site locations (Group I) ranged from 6 to 45 E-3 pCi/m^3, with a mean of 18 E-3 pCi/m^3. The results from the Intermediate Distance location (Group II) ranged from 8 to 36 E-3 pCi/m^3 with a mean of 18 E-3 pCi/m^3. The results from the Distant location (Group III) ranged from 6 to 30 E-3 pCi/m^3 with a mean of 16 E-3 pCi/m^3. A comparison of the weekly mean values for 2013 indicate no notable differences among the three groups (Figure C-4, Appendix C). In addition, a comparison of the 2013 air particulate data with previous years data indicate no effects from the operation of PBAPS (Figure C-5, Appendix C).

Gamma Spectrometry

Weekly samples were composited quarterly and analyzed for gamma emitting nuclides (Table C-V.3, Appendix C). Naturally occurring Be-7 due to cosmic ray activity was detected in 19 of 20 samples. The values ranged from 49 to 89 E-3 pCi/m^3. All other nuclides were less than the MDC and all required LLDs were met.

b. Airborne Iodine

Continuous air samples were collected from five locations (1B, 1Z, 1C, 3A, and 5H2) and analyzed weekly for I-131 (Table C-VI.1, Appendix C). All results were less than the MDC for I-131.

2. Terrestrial

a. Milk

Samples were collected from five locations (J, R, S, U and V) biweekly April through November and monthly December through March. Samples from six additional locations (C, D, E, L, P and W) were taken quarterly. The following analyses were performed:

Iodine-131

Milk samples from all locations were analyzed for concentrations of I-131 (Tables C-VII.1, Appendix C). All results were less than the MDC for I-131. All results were less than MDC for I-131 and all required LLDs were met.

Gamma Spectrometry

Each milk sample from locations J, R, S, U and V was analyzed for concentrations of gamma emitting nuclides (Table C-VII.2, Appendix C).

Naturally occurring K-40 was found in all samples and ranged from 1,059 to 1,575 pCi/l. All other nuclides were less than the MDC and all required LLDs were met. Comparison of the 2013 Cs-137 milk data with previous years data indicate no effects from the operation of PBAPS (Figure C-6, Appendix C).

b. Food Products

Food product samples were collected at three locations (1Q, 2B and 55) when available. Of these locations, 1Q and 55 could be affected by Peach Bottom's effluent releases. The following analysis was performed:

Gamma Spectrometry

Each food product sample from locations 1Q, 2B and 55 was analyzed for concentrations of gamma emitting nuclides (Table C-VIII.1, Appendix C).

Naturally occurring Be-7 activity was found in 27 of 39 samples and ranged from 108 to 4,236 pCi/kg wet. Potassium-40 activity was found in all samples and ranged from 2,415 to 11,180 pCi/kg wet. All other nuclides were less than the MDC.

C. Ambient Gamma Radiation

Beginning in 2012, Exelon changed the type of dosimetry used for the REMP. OSLDs were deployed however, TLD monitoring is continuing at PBAPS as a side-by-side technology comparison study but official reporting is from OSLD data. 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). Results of OSLD measurements are listed in Tables C-IX.1 through C-IX.3 and Figure C-7, Appendix C.

Most OSLD measurements were below 10 mR per standard month, with a range of 5.0 to 13.0 mR per standard month. A comparison of the Site Boundary and Intermediate Distance data to the Control locations data indicate that the ambient gamma radiation levels from the Control locations 16, 18, 19 and 24 were essentially the same as the other locations. The historical ambient gamma radiation data from the Control locations was plotted along with similar data from the Site and the Intermediate Distance locations (Figure C-7, Appendix C).

D. Independent Spent Fuel Storage Installation (ISFSI)

ISFSI was utilized beginning June 2000. During 2013, a total of 5 TN-68 casks, each loaded with 68 fuel bundles, were added to the ISFSI pad. Onsite location 1R, which is located on the hillside overlooking the ISFSI showed a general increase of 1 to 2 mR per standard month from pre-ISFSI loading (Figure C-8, Appendix C) for the period of 2000 to about 2007. A general decrease has been observed, however, for the period of 2007 to the present. Location 2B, which represents the nearest residence, showed a small effect in dose rate from the ISFSI pad. Data from location 2B is used to demonstrate compliance to both 40CFR190 and 10CFR72.104 limits. The large reduction in multiple direct radiation

locations for 2013 is a result of the difference in technology used for radiation measurement (from TLD to OSLD).

E. Land Use Census

A Land Use Survey conducted during the fall of 2013 around the PBAPS was performed by NAI for Exelon Nuclear to comply with Section 3.8.E.2 of PBAPS's Offsite Dose Calculation Manual Specifications (ODCMS) and Bases. The purpose of the survey was to document the nearest milk producing animal in each of the sixteen meteorological sectors out to five miles. In addition, the nearest residence and garden of >500 square feet were documented. The distance and direction of all locations were positioned using Global Positioning System (GPS) technology. The results of this survey are summarized below. There were no changes in the nearest residence, garden or milk farms from the previous year.

Distance in Miles from the PBAPS Reactor Buildings				
Sector		Residence Feet	Garden Feet	Milk Farm Feet
1	N	12,522	14,003	14,450
2	NNE	11,142	11,041	10,843
3	NE	10,080	10,080	10,492
4	ENE	10,524	12,417	10,925
5	E	10,369	14,471	14,540
6	ESE	16,085	20,430	20,210
7	SE	19,412	19,412	19,176
8	SSE	3,918	3,918	-
9	S	5,515	5,515	-
10	SSW	6,365	8,167	11,602
11	SW	4,771	4,837	4,860
12	WSW	4,041	9,072	-
13	W	5,242	5,242	5,136
14	WNW	2,903	4,192	22,068
15	NW	2,930	9,427	9,427
16	NNW	5,093	-	-

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.

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

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

ν = volume or mass of sample analyzed

y = chemical yield

ε = efficiency of the counter

λ = radioactive decay constant for the particular radionuclide

a = exp $(-\lambda\Delta t)$

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 thorium-228 (Th-228), thorium-230 (Th-230), etc.

The errata data are given in Appendix F of this report

G. Secondary Laboratory Analysis

The Appendix D section of this report presents the results of data analysis performed by the QC laboratory, EIML. Duplicate samples were obtained from several locations and media and split between the primary laboratory, TBE and the EIML. Comparisons of the results for all media were within expected ranges.

H. Summary of Results – Inter-Laboratory Comparison Program

The primary and secondary laboratories analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, food

products and water matrices (Appendix E). The PE samples, supplied by Eckert & Ziegler Analytics, Inc., Environmental Resource Associates (ERA) and DOE's Mixed Analyte Performance Evaluation Program (MAPEP), were evaluated against the following pre-set acceptance criteria:

1. Analytics Evaluation Criteria

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

2. ERA Evaluation Criteria

   The Environmental Resource Associates' evaluation report provides an acceptance range for control and warning limits with associated flag values. The Environmental Resource Associates' acceptance limits are established per the United States Environmental Protection Agency (USEPA), National Environmental Laboratory Accreditation Conference (NELAC), state specific performance testing program requirements or ERA's standard operating procedure 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. TBE'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. Non-Conformance Report (NCR) 13-15

2. TBE'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. TBE'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 europium-152 (Eu-152), which was identified by the gamma software as an interfering nuclide, resulting in <u>forced</u> 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. TBE'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. TBE'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. TBE'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 spiked with carrier, resulting in a low activity. With a recovery of around 50% less, 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. EIML'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. EIML'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. EIML's MAPEP August 2013 soil Co-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 Interlaboratory Comparison Program (ICP) provides evidence of "in control" counting systems and methods, and that the laboratories are producing accurate and reliable data.

V. References

1. Preoperational Environs Radioactivity Survey Summary Report, March 1960 through January 1966. (September 1967).

2. Interex Corporation, Peach Bottom Atomic Power Station Regional Environs Radiation Monitoring Program Preoperational Summary Report, Units 2 and 3, 5 February 1966 through 8 August 1973, June 1977, Natick, Massachusetts.

3. Radiation Management Corporation Publication, Peach Bottom Atomic Power Station Preoperational Radiological Monitoring Report for Unit 2 and 3, January 1974, Philadelphia, Pennsylvania.

APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT SUMMARY

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE PEACH BOTTOM ATOMIC POWER STATION, 2013

NAME OF FACILITY: PEACH BOTTOM ATOMIC POWER STATION **DOCKET NUMBER:** 50-277 & 50-278
LOCATION OF FACILITY: YORK 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	8	200	<LLD	<LLD	-		0
	I-131	24	1	<LLD	<LLD	-		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

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

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SURFACE WATER (PCI/LITER)	ZR-95		30	<LLD	<LLD	-		0
	CS-134		15	<LLD	<LLD	-		0
	CS-137		18	<LLD	<LLD	-		0
	BA-140		60	<LLD	<LLD	-		0
	LA-140		15	<LLD	<LLD	-		0
DRINKING WATER (PCI/LITER)	GR-B	36	4	2.9 (19/24) (1.6/5.6)	2.9 (7/12) (1.6/5.3)	3.3 (10/12) (1.9/5.6)	13B INDICATOR CHESTER WATER AUTHORITY SUSQUEHANNA PUMPING STATION 13306 FEET ESE	0
	H-3	12	200	<LLD	<LLD	-		0
	I-131	36	1	<LLD	<LLD	-		0

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DRINKING WATER (PCI/LITER)	GAMMA	36						
	MN-54		15	<LLD	<LLD	-		0
	CO-58		15	<LLD	<LLD	-		0
	FE-59		30	<LLD	<LLD	-		0
	CO-60		15	<LLD	<LLD	-		0
	ZN-65		30	<LLD	<LLD	-		0
	NB-95		15	<LLD	<LLD	-		0
	ZR-95		30	<LLD	<LLD	-		0
	CS-134		15	<LLD	<LLD	-		0

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DRINKING WATER (PCI/LITER)	CS-137		18	<LLD	<LLD	-		0
	BA-140		60	<LLD	<LLD	-		0
	LA-140		15	<LLD	<LLD	-		0
BOTTOM FEEDER (PCI/KG WET)	GAMMA K-40	4	NA	3843 (2/2) (3345/4341)	3427 (2/2) (2793/4060)	3843 (2/2) (3345/4341)	4 INDICATOR CONOWINGO POND 7162 FEET SE	0
	MN-54		130	<LLD	<LLD	-		0
	CO-58		130	<LLD	<LLD	-		0
	FE-59		260	<LLD	<LLD	-		0
	CO-60		130	<LLD	<LLD	-		0

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BOTTOM FEEDER (PCI/KG WET)	ZN-65		260	<LLD	<LLD	-		0
	CS-134		130	<LLD	<LLD	-		0
	CS-137		150	<LLD	<LLD	-		0
PREDATOR (PCI/KG WET)	GAMMA K-40	4	NA	4443.5 (2/2) (4097/4790)	3929.5 (2/2) (3913/3946)	4443.5 (2/2) (4097/4790)	4 INDICATOR CONOWINGO POND 7162 FEET SE	0
	MN-54		130	<LLD	<LLD	-		0
	CO-58		130	<LLD	<LLD	-		0
	FE-59		260	<LLD	<LLD	-		0
	CO-60		130	<LLD	<LLD	-		0

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PREDATOR (PCI/KG WET)	ZN-65		260	<LLD	<LLD	-		0
	CS-134		130	<LLD	<LLD	-		0
	CS-137		150	<LLD	<LLD	-		0
SEDIMENT (PCI/KG DRY)	GAMMA K-40	6	NA	19410 (4/4) (11170/27460)	17310 (2/2) (14440/20180)	25000 (2/2) (22540/27460)	4T INDICATOR CONOWINGO POND NEAR CONOWINGO DAM 41818 FEET SE	0
	MN-54		NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0
	CO-60		NA	<LLD	<LLD	-		0
	CS-134		150	<LLD	<LLD	-		0

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SEDIMENT (PCI/KG DRY)	CS-137		180	241 (1/4)	<LLD	241 (1/2)	4T INDICATOR CONOWINGO POND NEAR CONOWINGO DAM 41818 FEET SE	0
AIR PARTICULATE (E-3 PCI/CU.METER)	GR-B	259	10	18 (201/208) (6/45)	18 (50/51) (6/36)	19 (49/52) (8/45)	1B INDICATOR WEATHER STATION #2 2587 FEET NW	0
	GAMMA BE-7	20	NA	68.1 (15/16) (53/87)	67.9 (4/4) (49/89)	78.5 (4/4) (65/87)	1B INDICATOR WEATHER STATION #2 2587 FEET NW	0
	MN-54		NA	<LLD	NA	-		0
	CO-58		NA	<LLD	NA	-		0
	CO-60		NA	<LLD	NA	-		0
	CS-134		50	<LLD	NA	-		0
	CS-137		60	<LLD	NA	-		0

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AIR IODINE (E-3 PCI/CU.METER)	GAMMA I-131	258	70	<LLD	NA	-		0
MILK (PCI/LITER)	I-131	134	1	<LLD	<LLD	-		0
	GAMMA K-40	134	NA	1306 (104/104) (1059/1575)	1263 (30/30) (1102/1444)	1367 (4/4) (1138/1575)	W INDICATOR 89232 FEET S	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

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

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE PEACH BOTTOM ATOMIC POWER STATION, 2013

NAME OF FACILITY: PEACH BOTTOM ATOMIC POWER STATION **DOCKET NUMBER:** 50-277 & 50-278 2013
LOCATION OF FACILITY: YORK 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
VEGETATION (PCI/KG WET)	GAMMA	39						
	BE-7		NA	1024 (18/24) (126/4236)	740 (9/15) (108/2015)	1166 (9/13) (126/4236)	1Q INDICATOR 3274 FEET SE	0
	K-40		NA	4585 (24/24) (2415/11180)	5444 (15/15) (3258/8216)	5489 (11/11) (2508/11180)	2B INDICATOR SSE SECTOR 3749 FEET SSE	0
	MN-54		NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0
	CO-60		NA	<LLD	<LLD	-		0
	I-131		60	<LLD	<LLD	-		0
	CS-134		60	<LLD	<LLD	-		0
	CS-137		80	<LLD	<LLD	-		0

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

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE PEACH BOTTOM ATOMIC POWER STATION, 2013

NAME OF FACILITY: PEACH BOTTOM ATOMIC POWER STATION **DOCKET NUMBER:** 50-277 & 50-278
LOCATION OF FACILITY: YORK 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
DIRECT RADIATION (MREM/STD.MO.)	OSLD-QUARTERLY	188	NA	8.7 (172/172) (5.0/13.0)	8.5 (16/16) (6.6/10.3)	11.5 (4/4) (10.2/13.0)	1R INDICATOR TRANSMISSION LINE HILL 2798 FEET SSE	0

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

APPENDIX B

SAMPLE DESIGNATION AND LOCATIONS

TABLE B-1 Radiological Environmental Monitoring Program – Sampling Locations, Distance and Direction from Reactor Buildings, Peach Bottom Atomic Power Station, 2013

Location	Location Description	Distance & Direction from Site
A. Surface Water		
1LL	Peach Bottom Units 2 and 3 Intake - Composite (Control)	1,256 feet NE
1MM	Peach Bottom Canal Discharge -Composite	5,470 feet SE
B. Drinking (Potable) Water		
4L	Conowingo Dam EL 33' MSL - Composite	45,721 feet SE
6I	Holtwood Dam Hydroelectric Station - Composite (Control)	30,337 feet NW
13B	Chester Water Authority (CWA) Susquehanna Pumping Station- Composite	13,306 feet ESE
C. Precipitation		
1A		1,396 feet SE
1B		2,587 feet NW
4M		45,989 feet SE
D. Fish		
4	Conowingo Pond	7,162 feet SE
6	Holtwood Pond (Control)	57,347 feet NW
E. Sediment		
4J	Conowingo Pond near Berkin's Run	7,346 feet SE
4T	Conowingo Pond near Conowingo Dam	41,818 feet SE
6F	Holtwood Dam (Control)	31,469 feet NW
F. Air Particulate - Air Iodine		
1B	Weather Station #2	2,587 feet NW
1Z	Weather Station #1	1,396 feet SE
1A	Weather Station #1	1,396 feet SE
1C	Peach Bottom South Sub Station	4,513 feet SSE
3A	Delta, PA – Substation	19,144 feet SW
5H2	Manor Substation (Control)	162,565 feet NE
G. Milk – bi-weekly / monthly		
J		5,119 feet W
R		4,694 feet WSW
S		19,061 feet SE
U		11,414 feet SSW
V	(Control)	34,584 feet W
H. Milk – quarterly		
C	(Control)	5,037 feet NW
D		18,533 feet NE

TABLE B-1 Radiological Environmental Monitoring Program – Sampling Locations, Distance and Direction from Reactor Buildings, Peach Bottom Atomic Power Station, 2013

Location	Location Description	Distance & Direction from Site
H. Milk – quarterly (cont'd)		
E	(Control)	46,147 feet N
L		11,194 feet NE
P		10,982 feet ENE
W		89,232 feet S
I. Food Products – monthly when available		
1Q		4,171 feet NW
2B		3,854 feet SSE
55	(Control)	52,272 feet NE
J. Environmental Dosimetry - OSLD		
Site Boundary		
1L	Peach Bottom Unit 3 Intake	1,256 feet NE
1P	Tower B & C Fence	2,112 feet ESE
1A	Weather Station #1	1,396 feet SE
1Q	Tower D & E Fence	3,274 feet SE
1D	140° Sector	3,538 feet SE
2	Peach Bottom 130° Sector Hill	4,661 feet SE
2B	Burk Property	3,749 feet SSE
1M	Discharge	5,438 feet SE
1R	Transmission Line Hill	2,798 feet SSE
1I	Peach Bottom South Substation	2,851 feet SSE
1C	Peach Bottom South Substation	4,513 feet SSE
1J	Peach Bottom 180° Sector Hill	3,755 feet S
1K	Peach Bottom Site Area	4,604 feet SW
1F	Peach Bottom 200° Sector Hill	2,707 feet SSW
40	Peach Bottom Site Area	7,709 feet SW
1NN	Peach Bottom Site	2,547 feet WSW
1H	Peach Bottom 270° Sector Hill	3,104 feet W
1G	Peach Bottom North Substation	3,173 feet WNW
1B	Weather Station #2	2,587 feet NW
1E	Peach Bottom 350° Sector Hill	3,136 feet NNW
Intermediate Distance		
5	Wakefield, PA	24,499 feet E
15	Silver Spring Rd	19,449 feet N
22	Eagle Road	13,230 feet NNE
44	Goshen Mill Rd	27,480 feet NE
32	Slate Hill Rd	15,213 feet ENE
45	PB-Keeney Line	18,524 feet ENE
14	Peters Creek	10,397 feet E
17	Riverview Rd	21,966 feet ESE
31A	Eckman Rd	24,105 feet SE
4K	Conowingo Dam Power House Roof	45,721 feet SE
23	Peach Bottom 150° Sector Hill	5,276 feet SSE
27	N. Cooper Road	13,859 feet S
48	Macton Substation	26,347 feet SSW

TABLE B-1 Radiological Environmental Monitoring Program – Sampling Locations, Distance and Direction from Reactor Buildings, Peach Bottom Atomic Power Station, 2013

Location	Location Description	Distance & Direction from Site
J. Environmental Dosimetry – OSLD (cont'd)		
Intermediate Distance (cont'd)		
3A	Delta, PA Substation	19,114 feet SW
49	PB-Conastone Line	20,673 feet WSW
50	TRANSCO Pumping Station	25,677 feet W
51	Fin Substation	20,511 feet WNW
26	Slab Road	22,093 feet NW
6B	Holtwood Dam Power House Roof	30,538 feet NW
42	Muddy Run Environ. Laboratory	21,954 feet NNW
43	Drumore Township School	26,931 feet NNE
46	Broad Creek	23,483 feet SSE
47	Broad Creek Scout Camp	22,153 feet S
Control		
16	Nottingham, PA Substation (Control)	67,788 feet E
24	Harrisville, MD Substation (Control)	58,048 feet ESE
18	Fawn Grove, PA (Control)	51,413 feet W
19	Red Lion, PA (Control)	106,354 feet WNW

TABLE B-2 Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Peach Bottom Atomic Power 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.	NAI-ER15 Collection of water samples for radiological analysis (Peach Bottom Atomic Power Station)	2 gallon	TBE, TBE-2007 Gamma emitting radioisotope analysis EIML, GS-01 Determination of gamma emitters by gamma spectroscopy
Surface Water	Tritium	Quarterly composite from a continuous water compositor.	NAI-ER15 Collection of water samples for radiological analysis (Peach Bottom Atomic Power Station)	500 ml	TBE, TBE-2010 Tritium and carbon-14 analysis by liquid scintillation EIML, T-02 Determination of tritium in water (direct method)
Surface Water	I-131	Monthly composite from a continuous water compositor.	NAI-ER15 Collection of water samples for radiological analysis (Peach Bottom Atomic Power Station)	2 gallon	TBE, TBE-2012 Radioiodine in various matrices EIML, I-131-01 Determination of I-131 in water by ion exchange
Drinking Water	Gross Beta	Monthly composite from a continuous water compositor.	NAI-ER15 Collection of water samples for radiological analysis (Peach Bottom Atomic Power Station)	2 gallon	TBE, TBE-2008 Gross alpha and/or gross beta activity in various matrices EIML, W(DS)-01 Determination of gross alpha and/or gross beta in water (dissolved solids or total residue)
Drinking Water	I-131	Monthly composite from a continuous water compositor.	NAI-ER15 Collection of water samples for radiological analysis (Peach Bottom Atomic Power Station)	2 gallon	TBE, TBE-2031 Radioiodine in drinking water EIML, I-131-01 Determination of I-131 in water by an ion exchange
Drinking Water	Gamma Spectroscopy	Monthly composite from a continuous water compositor.	NAI-ER15 Collection of water samples for radiological analysis (Peach Bottom Atomic Power Station)	2 gallon	TBE, TBE-2007 Gamma emitting radioisotope analysis EIML, GS-01 Determination of gamma emitters by gamma spectroscopy
Drinking Water	Tritium	Quarterly composite from a continuous water compositor.	NAI-ER15 Collection of water samples for radiological analysis (Peach Bottom Atomic Power Station)	500 ml	TBE, TBE-2010 Tritium and carbon-14 analysis by liquid scintillation EIML, T-02 Determination of tritium in water (direct method)
Fish	Gamma Spectroscopy	Semi-annual samples collected via electroshocking or other techniques	NAI-ER3 Collection of fish samples for radiological analysis (Peach Bottom Atomic Power Station)	1000 grams (wet)	TBE, TBE-2007 Gamma emitting radioisotope analysis
Sediment	Gamma Spectroscopy	Semi-annual grab samples	NAI-ER2 Collection of sediment samples for radiological analysis (Peach Bottom Atomic Power Station)	500 grams (dry)	TBE, TBE-2007 Gamma emitting radioisotope analysis

TABLE B-2 Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Peach Bottom Atomic Power Station, 2013

Sample Medium	Analysis	Sampling Method	Collection Procedure Number	Sample Size	Analytical Procedure Number
Air Particulates	Gross Beta	One-week composite of continuous air sampling through glass fiber filter paper	NAI-ER16 Collection of air particulate and air iodine samples for radiological analysis (Peach Bottom Atomic Power Station)	1 filter (approximately 280 cubic meters weekly)	TBE, TBE-2008 Gross alpha and/or gross beta activity in various matrices EIML, 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 EIML, GS-01 Determination of gamma emitters by gamma spectroscopy
Air Iodine	Gamma Spectroscopy	One-week composite of continuous air sampling through charcoal filter	NAI-ER8 Collection of air particulate and air iodine samples for radiological analysis (Peach Bottom Atomic Power Station)	1 filter (approximately 280 cubic meters weekly)	TBE, TBE-2007 Gamma emitting radioisotope analysis EIML, 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	NAI-ER10 Collection of milk samples for radiological analysis (Peach Bottom Atomic Power Station)	2 gallon	TBE, TBE-2012 Radioiodine in various matrices EIML, I-131-01 Determination of I-131 in milk by an ion exchange
Milk	Gamma Spectroscopy	Bi-weekly grab sample when cows are on pasture. Monthly all other times	NAI-ER10 Collection of milk samples for radiological analysis (Peach Bottom Atomic Power Station)	2 gallon	TBE, TBE-2007 Gamma emitting radioisotope analysis EIML, GS-01 Determination of gamma emitters by gamma spectroscopy
Food Products	Gamma Spectroscopy	Monthly when available	NAI-ER12 Collection of vegetation samples for radiological analysis (Peach Bottom Atomic Power Station)	1000 grams	TBE, TBE-2007 Gamma emitting radioisotope analysis EIML, GS-01 Determination of gamma emitters by gamma spectroscopy
OSLD	Optically Stimulated Luminescence Dosimetry	Quarterly OSLDs comprised of two Al_2O_3:C Landauer Incorporated elements.	NAI-ER9 Collection of OSLD samples for radiological analysis (Peach Bottom Atomic Power Station)	2 dosimeters	Landauer Incorporated

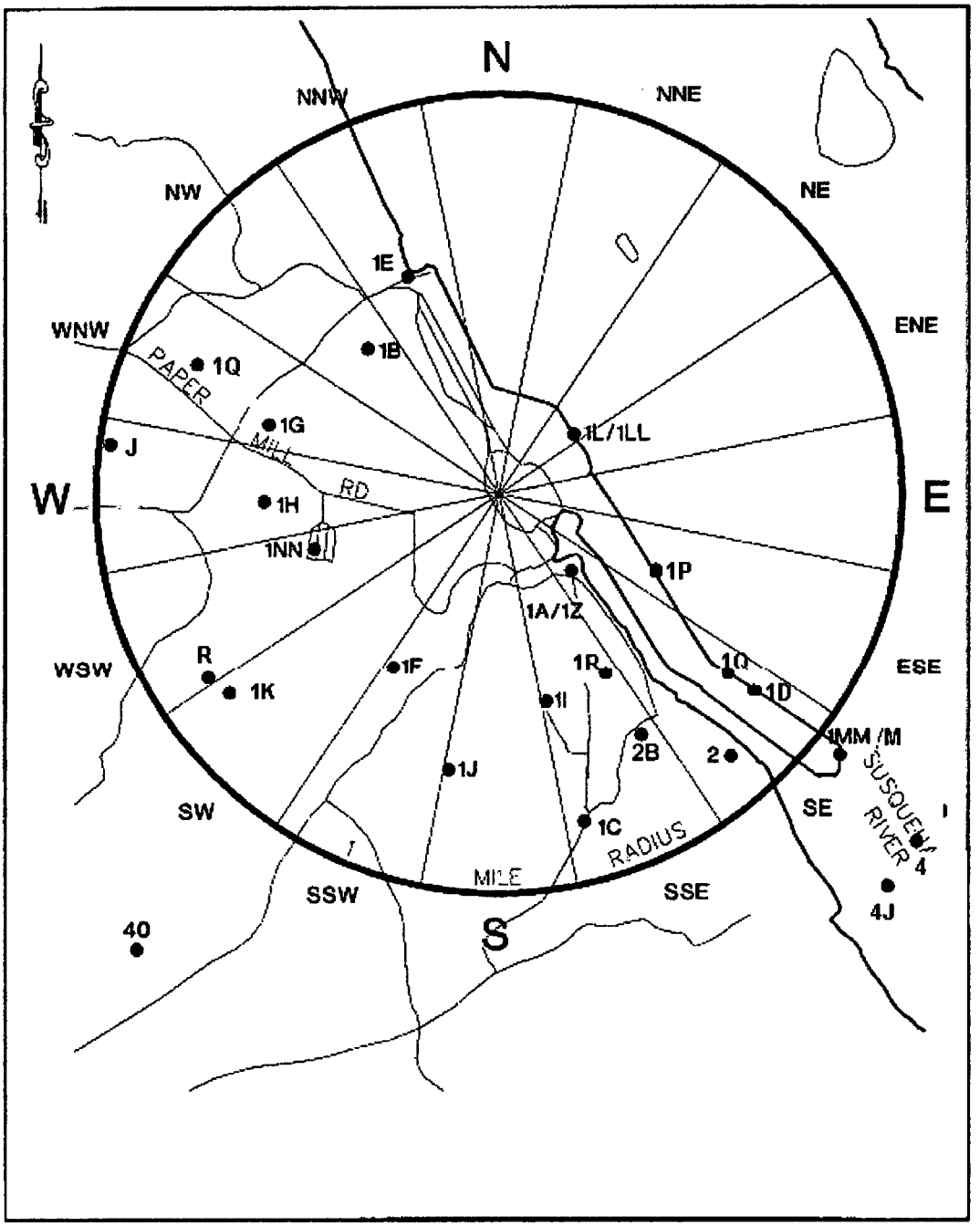


Figure B-1
Environmental Sampling Locations Within One
Mile of the Peach Bottom Atomic Power Station, 2013

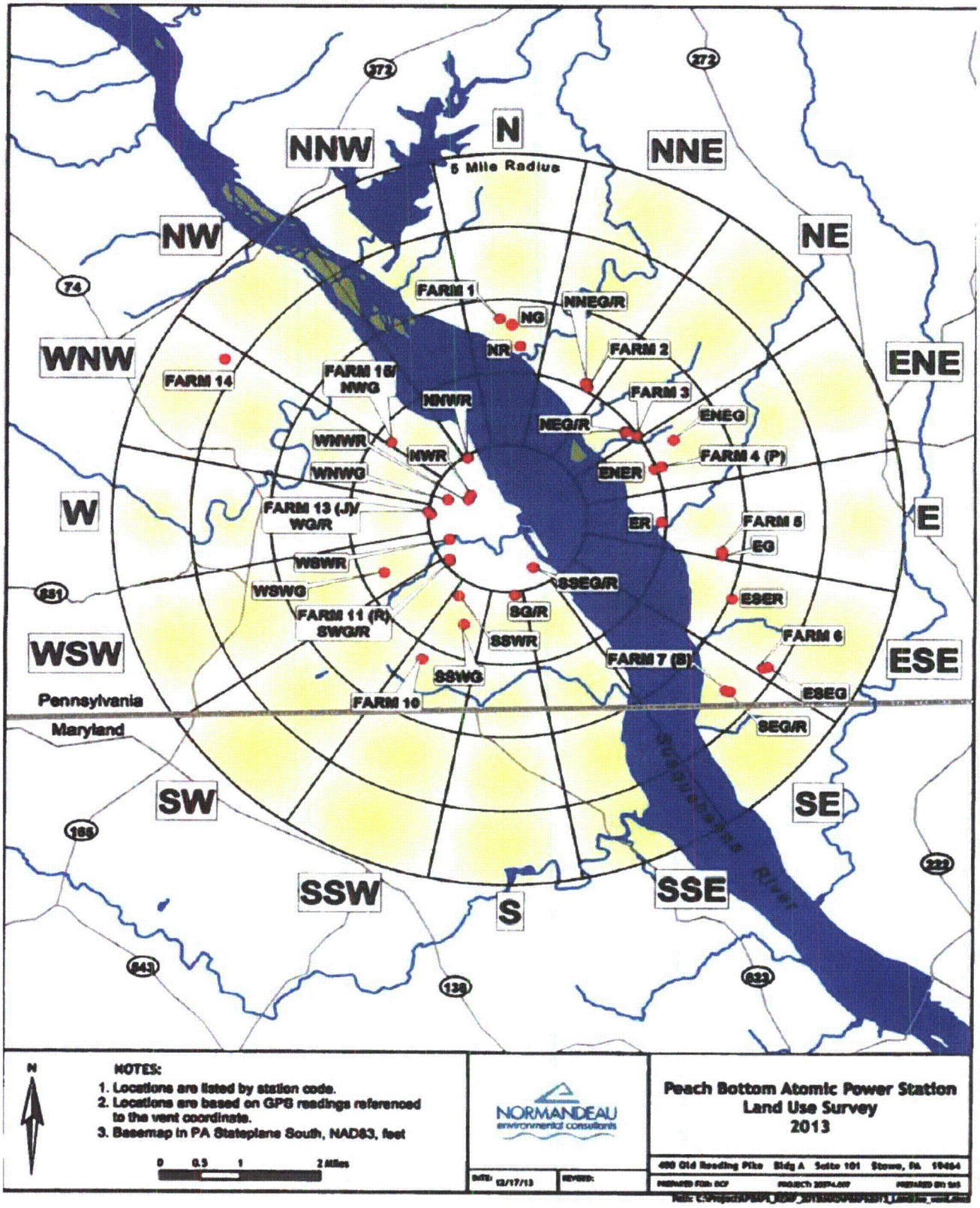


Figure B-2
Environmental Sampling Locations Between One and Approximately Five Miles of the Peach Bottom Atomic Power Station, 2013

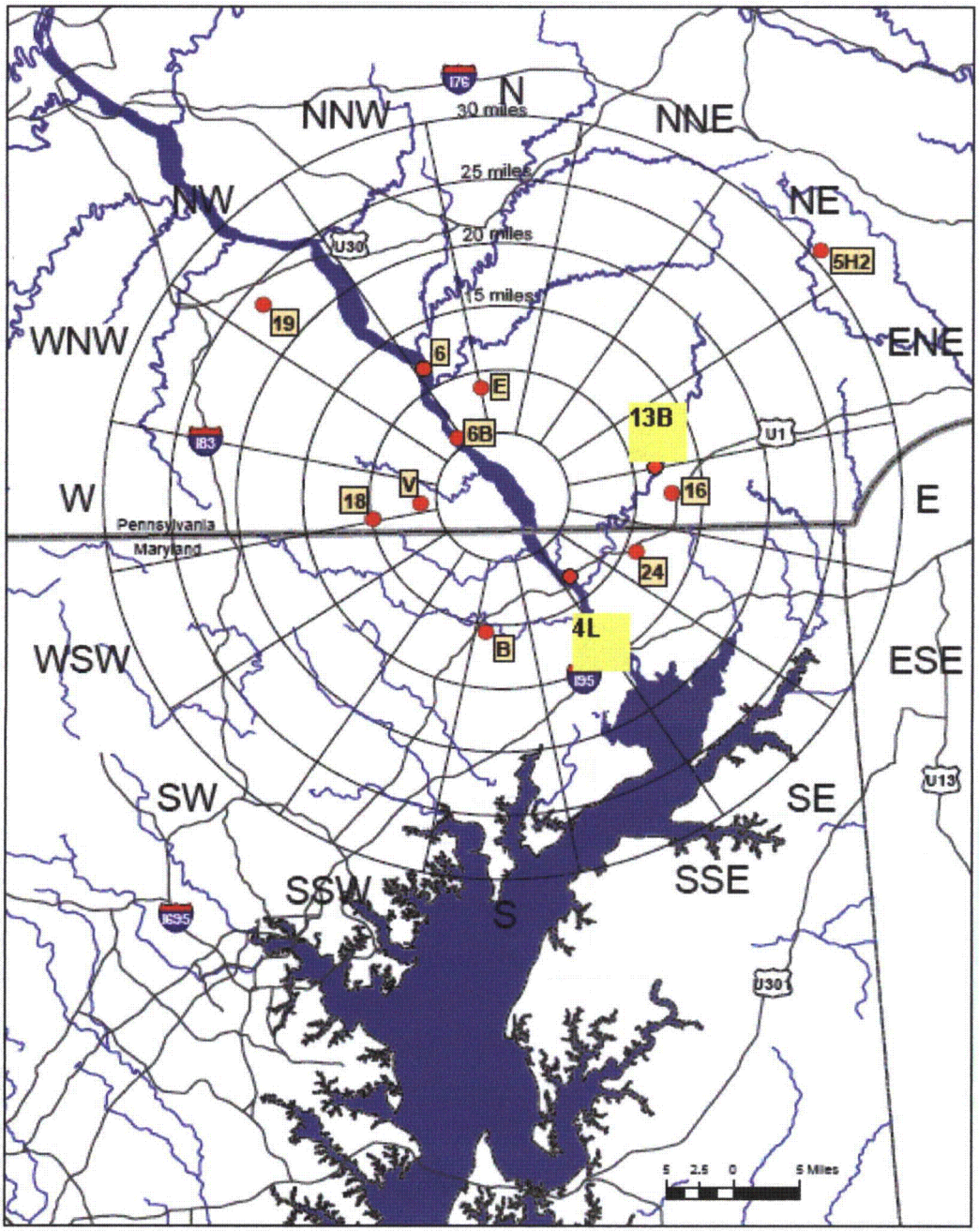


Figure B-3
Environmental Sampling Locations Greater Than
Five Miles from the Peach Bottom Atomic Power Station, 2013

APPENDIX C

DATA TABLES AND FIGURES
PRIMARY LABORATORY

Table C-I.1 **CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	1LL	1MM
01/02/13 - 03/27/13	< 159	< 162
03/27/13 - 06/26/13	< 191	< 191
07/03/13 - 10/02/13	< 188	< 189
10/02/13 - 1/1/2014	< 193	< 190
MEAN	-	-

Table C-I.2 **CONCENTRATIONS OF I-131 IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	1LL	1MM
01/02/13 - 01/30/13	< 0.5	< 0.5
01/30/13 - 02/27/13	< 0.6	< 0.6
02/27/13 - 03/27/13	< 0.6	< 0.7
03/27/13 - 05/01/13	< 0.7	< 0.8
05/01/13 - 05/29/13	< 0.5	< 0.6
06/05/13 - 06/26/13	< 0.6	< 0.6
07/03/13 - 07/31/13	< 0.7	< 0.7
08/07/13 - 08/28/13	< 0.7	< 0.7
09/04/13 - 10/02/13	< 0.6	< 0.7
10/09/13 - 10/30/13	< 0.6	< 0.6
11/06/13 - 11/27/13	< 0.7	< 0.8
11/27/13 - 01/01/14	< 0.6	< 0.7
MEAN	-	-

Table C-I.3 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER 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
1LL	01/02/13 - 01/30/13	< 6	< 7	< 13	< 7	< 11	< 6	< 9	< 5	< 7	< 27	< 8
	01/30/13 - 02/27/13	< 4	< 4	< 8	< 4	< 8	< 4	< 7	< 4	< 4	< 23	< 6
	02/27/13 - 03/27/13	< 4	< 4	< 9	< 4	< 8	< 4	< 7	< 4	< 4	< 33	< 8
	03/27/13 - 05/01/13	< 3	< 4	< 8	< 3	< 8	< 4	< 6	< 3	< 4	< 23	< 7
	05/01/13 - 05/29/13	< 4	< 4	< 10	< 4	< 8	< 5	< 7	< 4	< 4	< 24	< 9
	06/05/13 - 06/26/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 5
	07/03/13 - 07/31/13	< 1	< 1	< 3	< 1	< 3	< 2	< 3	< 1	< 1	< 10	< 3
	08/07/13 - 08/28/13	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 2	< 2	< 19	< 5
	09/04/13 - 10/02/13	< 4	< 4	< 10	< 4	< 6	< 3	< 8	< 3	< 4	< 29	< 12
	10/09/13 - 10/30/13	< 2	< 2	< 10	< 5	< 6	< 3	< 7	< 3	< 3	< 23	< 6
	11/06/13 - 11/27/13	< 5	< 5	< 10	< 5	< 10	< 5	< 9	< 5	< 5	< 32	< 12
	11/27/13 - 01/01/14	< 4	< 4	< 6	< 3	< 6	< 4	< 7	< 3	< 3	< 29	< 7
	MEAN	-	-	-	-	-	-	-	-	-	-	-
1MM	01/02/13 - 01/30/13	< 5	< 4	< 11	< 5	< 11	< 6	< 8	< 5	< 6	< 25	< 8
	01/30/13 - 02/27/13	< 6	< 6	< 13	< 5	< 9	< 5	< 11	< 5	< 6	< 30	< 12
	02/27/13 - 03/27/13	< 5	< 5	< 11	< 5	< 11	< 5	< 10	< 4	< 5	< 38	< 11
	03/27/13 - 05/01/13	< 4	< 4	< 11	< 5	< 10	< 6	< 8	< 4	< 5	< 31	< 10
	05/01/13 - 05/29/13	< 4	< 5	< 12	< 5	< 10	< 6	< 8	< 5	< 5	< 31	< 11
	06/05/13 - 06/26/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 2	< 2	< 13	< 5
	07/03/13 - 07/31/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 2	< 2	< 12	< 5
	08/07/13 - 08/28/13	< 1	< 2	< 3	< 1	< 3	< 2	< 3	< 1	< 2	< 16	< 4
	09/04/13 - 10/02/13	< 4	< 5	< 10	< 6	< 9	< 5	< 10	< 4	< 5	< 33	< 4
	10/09/13 - 10/30/13	< 4	< 2	< 7	< 3	< 6	< 3	< 6	< 3	< 3	< 19	< 3
	11/06/13 - 11/27/13	< 4	< 4	< 10	< 4	< 8	< 4	< 8	< 4	< 4	< 32	< 11
	11/27/13 - 01/01/14	< 4	< 4	< 9	< 3	< 8	< 4	< 7	< 4	< 4	< 30	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-II.1 **CONCENTRATIONS OF GROSS BETA IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	13B	4L	6I
01/08/13 - 01/28/13	2.1 ± 1.2	< 1.8	< 1.9
02/04/13 - 02/26/13	4.9 ± 1.4	1.8 ± 1.2	2.0 ± 1.2
03/04/13 - 03/25/13	< 2.0	1.6 ± 1.0	< 1.4
04/01/13 - 04/29/13	< 1.5	2.6 ± 1.1	5.3 ± 1.2
05/08/13 - 05/28/13	2.0 ± 1.0	< 1.5	1.6 ± 1.0
06/03/13 - 06/24/13	2.3 ± 1.3	< 1.9	< 1.9
07/01/13 - 07/29/13	5.0 ± 1.4	2.6 ± 1.2	< 1.7
08/05/13 - 08/26/13	1.9 ± 1.0	2.2 ± 1.1	2.9 ± 1.1
09/03/13 - 09/30/13	3.2 ± 1.1	2.7 ± 1.0	2.5 ± 1.0
10/02/13 - 10/31/13	3.2 ± 1.8	3.6 ± 1.8	2.6 ± 1.8
11/04/13 - 11/25/13	2.8 ± 1.5	2.3 ± 1.5	< 2.1
11/27/13 - 01/02/14	5.6 ± 1.8	2.7 ± 1.6	3.1 ± 1.6
MEAN	3.3 ± 2.8	2.5 ± 1.2	2.9 ± 2.4

Table C-II.2 **CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	13B	4L	6I
01/08/13 - 03/25/13	< 161	< 159	< 165
03/28/13 - 06/27/13	< 191	< 190	< 188
07/01/13 - 09/30/13	< 191	< 184	< 184
10/02/13 - 01/02/14	< 177	< 179	< 192
MEAN	-	-	-

Table C-II.3 **CONCENTRATIONS OF I-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	13B	4L	6I
01/08/13 - 01/28/13	< 0.6	< 0.6	< 0.4
02/04/13 - 02/26/13	< 0.7	< 0.9	< 0.6
03/04/13 - 03/25/13	< 0.3	< 0.5	< 0.6
04/01/13 - 04/29/13	< 0.7	< 0.6	< 0.7
05/08/13 - 05/28/13	< 0.6	< 0.6	< 0.6
06/03/13 - 06/24/13	< 0.8	< 0.5	< 0.5
07/01/13 - 07/29/13	< 0.6	< 0.9	< 0.8
08/05/13 - 08/26/13	< 0.7	< 0.6	< 0.7
09/03/13 - 09/30/13	< 0.4	< 0.9	< 0.6
10/02/13 - 10/31/13	< 0.7	< 0.6	< 0.5
11/04/13 - 11/25/13	< 0.6	< 0.7	< 0.7
11/27/13 - 01/02/14	< 0.7	< 0.6	< 0.7
MEAN	-	-	-

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

Table C-II.4 **CONCENTRATIONS OF GAMMA EMITTER IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER 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
13B	01/08/13 - 01/28/13	< 5	< 6	< 8	< 5	< 13	< 6	< 9	< 5	< 5	< 25	< 9
	02/04/13 - 02/26/13	< 4	< 5	< 11	< 6	< 10	< 5	< 9	< 4	< 5	< 31	< 11
	03/04/13 - 03/25/13	< 2	< 3	< 5	< 4	< 5	< 3	< 5	< 3	< 3	< 26	< 4
	04/01/13 - 04/29/13	< 5	< 5	< 11	< 5	< 9	< 6	< 10	< 5	< 5	< 37	< 11
	05/08/13 - 05/28/13	< 4	< 5	< 9	< 4	< 8	< 5	< 7	< 4	< 4	< 28	< 8
	06/03/13 - 06/24/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 12	< 4
	07/01/13 - 07/29/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 16	< 6
	08/05/13 - 08/26/13	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 1	< 1	< 17	< 5
	09/03/13 - 09/30/13	< 3	< 3	< 7	< 4	< 6	< 4	< 5	< 3	< 3	< 25	< 5
	09/30/13 - 10/28/13	< 2	< 2	< 5	< 3	< 5	< 2	< 5	< 3	< 3	< 19	< 4
	11/04/13 - 11/25/13	< 4	< 4	< 8	< 4	< 8	< 3	< 7	< 4	< 3	< 27	< 8
	11/25/13 - 12/30/13	< 3	< 4	< 7	< 3	< 9	< 4	< 7	< 3	< 4	< 25	< 10
	MEAN	-	-	-	-	-	-	-	-	-	-	-
4L	01/03/13 - 01/31/13	< 7	< 5	< 13	< 7	< 14	< 7	< 10	< 6	< 7	< 25	< 8
	01/31/13 - 02/28/13	< 4	< 4	< 10	< 4	< 10	< 5	< 10	< 4	< 4	< 25	< 10
	02/28/13 - 03/28/13	< 4	< 4	< 6	< 4	< 7	< 5	< 8	< 4	< 4	< 27	< 7
	03/28/13 - 05/02/13	< 6	< 6	< 14	< 6	< 12	< 6	< 11	< 5	< 6	< 38	< 11
	05/02/13 - 05/29/13	< 4	< 6	< 11	< 4	< 11	< 5	< 8	< 4	< 6	< 31	< 9
	05/29/13 - 06/27/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 5
	06/27/13 - 08/01/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 2	< 2	< 11	< 4
	08/01/13 - 08/29/13	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 2	< 2	< 17	< 7
	08/29/13 - 10/02/13	< 5	< 4	< 10	< 5	< 8	< 4	< 8	< 4	< 5	< 30	< 9
	10/02/13 - 10/31/13	< 3	< 3	< 7	< 2	< 5	< 4	< 6	< 3	< 3	< 18	< 7
	10/31/13 - 11/27/13	< 4	< 4	< 8	< 3	< 7	< 4	< 7	< 3	< 4	< 26	< 7
	11/27/13 - 01/02/14	< 5	< 5	< 12	< 5	< 8	< 6	< 11	< 4	< 6	< 35	< 13
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-II.4 **CONCENTRATIONS OF GAMMA EMITTER IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER 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
6I	01/03/13 - 01/31/13	< 5	< 5	< 9	< 5	< 10	< 5	< 9	< 4	< 5	< 20	< 7
	01/31/13 - 02/28/13	< 3	< 4	< 9	< 4	< 9	< 4	< 7	< 3	< 4	< 24	< 8
	02/28/13 - 03/28/13	< 5	< 5	< 10	< 6	< 10	< 5	< 8	< 4	< 5	< 29	< 8
	03/28/13 - 05/02/13	< 4	< 4	< 10	< 4	< 9	< 5	< 8	< 4	< 4	< 24	< 9
	05/02/13 - 05/29/13	< 4	< 5	< 9	< 4	< 8	< 6	< 8	< 4	< 5	< 31	< 10
	05/29/13 - 06/27/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 4
	06/27/13 - 08/01/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 5
	08/01/13 - 08/29/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 19	< 6
	08/29/13 - 10/02/13	< 4	< 5	< 12	< 6	< 9	< 6	< 9	< 5	< 5	< 32	< 12
	10/02/13 - 10/31/13	< 5	< 5	< 11	< 4	< 8	< 4	< 8	< 4	< 5	< 38	< 9
	10/31/13 - 11/27/13	< 5	< 5	< 11	< 6	< 10	< 5	< 8	< 4	< 4	< 33	< 10
	11/27/13 - 01/02/14	< 4	< 4	< 9	< 4	< 7	< 4	< 7	< 4	< 4	< 23	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-III.1 **CONCENTRATIONS OF GAMMA EMITTERS IN PREDATOR AND BOTTOM FEEDER (FISH) SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER 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
4	PREDATOR								
	06/14/13	4097 ± 829	< 52	< 43	< 111	< 57	< 105	< 50	< 44
	10/01/13	4790 ± 1036	< 58	< 75	< 138	< 61	< 120	< 55	< 62
	MEAN	4444 ± 980	-	-	-	-	-	-	-
4	BOTTOM FEEDER								
	06/14/13	4341 ± 696	< 36	< 48	< 114	< 60	< 82	< 37	< 41
	10/01/13	3345 ± 656	< 25	< 38	< 80	< 39	< 89	< 34	< 34
	MEAN	3843 ± 1409	-	-	-	-	-	-	-
6	PREDATOR								
	06/07/13	3913 ± 963	< 49	< 51	< 141	< 53	< 108	< 46	< 44
	09/26/13	3946 ± 866	< 63	< 71	< 161	< 58	< 151	< 65	< 65
	MEAN	3930 ± 47	-	-	-	-	-	-	-
6	BOTTOM FEEDER								
	06/07/13	4060 ± 995	< 49	< 51	< 72	< 56	< 108	< 48	< 57
	09/26/13	2793 ± 653	< 53	< 61	< 144	< 59	< 125	< 55	< 52
	MEAN	3427 ± 1792	-	-	-	-	-	-	-

Table C-IV.1 **CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

RESULTS IN UNITS OF PC/KG DRY ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Mn-54	Co-58	Co-60	Cs-134	Cs-137
4J	06/20/13	11170 ± 788	< 33	< 31	< 38	< 30	< 37
	11/25/13	16470 ± 1426	< 55	< 59	< 75	< 49	< 65
	MEAN	13820 ± 7495	-	-	-	-	-
4T	06/20/13	27460 ± 2736	< 93	< 117	< 129	< 92	241 ± 80
	11/25/13	22540 ± 2355	< 117	< 118	< 118	< 103	< 144
	MEAN	25000 ± 6958	-	-	-	-	-
6F	06/20/13	20180 ± 1358	< 56	< 58	< 63	< 44	< 56
	11/25/13	14440 ± 1419	< 69	< 71	< 79	< 58	< 77
	MEAN	17310 ± 8118	-	-	-	-	-

Table C-V.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

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

COLLECTION PERIOD	GROUP I			GROUP II	GROUP III
	1B	1C	1Z	3A	5H2
12/31/12 - 01/06/13					25 ± 6
01/03/13 - 01/09/13	45 ± 7	39 ± 7	36 ± 7	36 ± 7	
01/06/13 - 01/14/13					25 ± 5
01/09/13 - 01/17/13	22 ± 5	25 ± 5	20 ± 5	21 ± 5	
01/14/13 - 01/22/13					13 ± 4
01/17/13 - 01/24/13	21 ± 5	21 ± 5	23 ± 5	19 ± 5	
01/22/13 - 01/29/13					19 ± 5
01/24/13 - 01/31/13	30 ± 5	24 ± 5	26 ± 5	27 ± 5	
01/29/13 - 02/04/13					20 ± 5
01/31/13 - 02/07/13	36 ± 7	25 ± 5	30 ± 6	27 ± 6	
02/04/13 - 02/11/13					21 ± 5
02/07/13 - 02/15/13	18 ± 5	16 ± 4	16 ± 4	14 ± 4	
02/11/13 - 02/19/13					16 ± 4
02/15/13 - 02/22/13	12 ± 4	12 ± 5	12 ± 5	15 ± 5	
02/19/13 - 02/25/13					26 ± 6
02/22/13 - 02/28/13	9 ± 5	10 ± 5	9 ± 5	8 ± 5	
02/25/13 - 03/04/13					6 ± 4
02/28/13 - 03/07/13	9 ± 4	7 ± 4	6 ± 4	10 ± 4	
03/04/13 - 03/11/13					< 6
03/07/13 - 03/14/13	8 ± 4	8 ± 4	(1)	10 ± 4	
03/11/13 - 03/18/13					14 ± 5
03/14/13 - 03/21/13	15 ± 5	21 ± 5	20 ± 5	18 ± 5	
03/18/13 - 03/26/13					10 ± 4
03/21/13 - 03/28/13	< 6	8 ± 4	7 ± 4	8 ± 4	
03/26/13 - 04/01/13					9 ± 5
03/28/13 - 04/04/13	13 ± 4	14 ± 5	11 ± 4	15 ± 5	
04/01/13 - 04/08/13					16 ± 5
04/04/13 - 04/12/13	16 ± 4	21 ± 5	16 ± 4	18 ± 4	
04/08/13 - 04/15/13					9 ± 4
04/12/13 - 04/18/13	11 ± 5	11 ± 5	18 ± 6	16 ± 6	
04/15/13 - 04/22/13					11 ± 5
04/18/13 - 04/26/13	15 ± 5	13 ± 5	11 ± 4	12 ± 4	
04/22/13 - 04/29/13					14 ± 5
04/26/13 - 05/02/13	23 ± 6	23 ± 6	20 ± 6	20 ± 5	
04/29/13 - 05/06/13					14 ± 5
05/02/13 - 05/09/13	12 ± 4	11 ± 4	12 ± 4	15 ± 4	
05/06/13 - 05/13/13					10 ± 4
05/09/13 - 05/16/13	12 ± 5	13 ± 5	12 ± 5	11 ± 5	
05/13/13 - 05/20/13					13 ± 5
05/16/13 - 05/23/13	15 ± 5	13 ± 5	15 ± 5	18 ± 5	
05/20/13 - 05/28/13					11 ± 4
05/23/13 - 05/29/13	< 8	< 8	< 8	11 ± 6	
05/28/13 - 06/03/13					21 ± 6
05/29/13 - 06/06/13	19 ± 5	17 ± 5	13 ± 4	18 ± 5	
06/03/13 - 06/10/13					13 ± 5
06/06/13 - 06/13/13	13 ± 4	18 ± 5	13 ± 4	10 ± 4	
06/10/13 - 06/17/13					13 ± 4
06/13/13 - 06/20/13	16 ± 5	17 ± 5	14 ± 5	15 ± 5	
06/17/13 - 06/24/13					12 ± 5
06/20/13 - 06/27/13	12 ± 5	13 ± 5	15 ± 5	11 ± 5	
06/24/13 - 07/01/13					12 ± 5
06/27/13 - 07/03/13	14 ± 6	16 ± 6	15 ± 6	14 ± 6	

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

Table C-V.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

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

COLLECTION PERIOD	GROUP I			GROUP II	GROUP III
	1B	1C	1Z	3A	5H2
07/01/13 - 07/08/13					12 ± 5
07/03/13 - 07/11/13	10 ± 5	10 ± 5	11 ± 5	11 ± 5	
07/08/13 - 07/15/13					15 ± 4
07/11/13 - 07/18/13	20 ± 5	20 ± 5	16 ± 5	18 ± 5	
07/15/13 - 07/22/13					17 ± 6
07/18/13 - 07/25/13	14 ± 5	20 ± 5	18 ± 5	17 ± 5	
07/22/13 - 07/29/13					7 ± 5
07/25/13 - 08/01/13	20 ± 5	19 ± 5	16 ± 5	17 ± 5	
07/29/13 - 08/05/13					17 ± 5
08/01/13 - 08/08/13	20 ± 5	13 ± 5	15 ± 5	19 ± 5	
08/05/13 - 08/12/13					16 ± 5
08/08/13 - 08/15/13	16 ± 5	14 ± 5	19 ± 5	17 ± 5	
08/12/13 - 08/19/13					9 ± 5
08/15/13 - 08/22/13	18 ± 5	16 ± 5	15 ± 5	14 ± 6	
08/19/13 - 08/26/13					18 ± 5
08/22/13 - 08/29/13	29 ± 6	25 ± 6	27 ± 6	26 ± 6	
08/26/13 - 09/03/13					24 ± 5
08/29/13 - 09/05/13	31 ± 9	21 ± 6	20 ± 6	21 ± 6	
09/03/13 - 09/09/13					16 ± 6
09/05/13 - 09/12/13	27 ± 6	27 ± 6	29 ± 6	26 ± 6	
09/09/13 - 09/16/13					28 ± 6
09/12/13 - 09/19/13	16 ± 5	15 ± 5	18 ± 5	17 ± 5	
09/16/13 - 09/23/13					12 ± 5
09/19/13 - 09/26/13	16 ± 5	13 ± 5	21 ± 5	11 ± 5	
09/23/13 - 09/30/13					11 ± 4
09/26/13 - 10/02/13	22 ± 6	17 ± 6	23 ± 6	20 ± 6	
09/30/13 - 10/07/13					30 ± 6
10/02/13 - 10/10/13	29 ± 5	30 ± 5	26 ± 5	24 ± 5	
10/07/13 - 10/15/13					13 ± 4
10/10/13 - 10/17/13	16 ± 5	21 ± 6	13 ± 5	15 ± 5	
10/15/13 - 10/21/13					16 ± 6
10/17/13 - 10/24/13	23 ± 6	21 ± 6	19 ± 6	21 ± 6	
10/21/13 - 10/28/13					19 ± 5
10/24/13 - 10/31/13	19 ± 6	14 ± 5	24 ± 6	20 ± 6	
10/28/13 - 11/04/13					28 ± 6
10/31/13 - 11/07/13	15 ± 5	12 ± 5	8 ± 5	16 ± 5	
11/04/13 - 11/11/13					12 ± 5
11/07/13 - 11/14/13	16 ± 6	17 ± 5	15 ± 5	16 ± 5	
11/11/13 - 11/18/13					16 ± 5
11/14/13 - 11/21/13	19 ± 5	18 ± 5	20 ± 5	21 ± 5	
11/18/13 - 11/25/13					8 ± 5
11/21/13 - 11/27/13	< 9	< 8	9 ± 6	< 8	
11/25/13 - 12/02/13					15 ± 5
11/27/13 - 12/05/13	35 ± 6	29 ± 5	35 ± 6	34 ± 6	
12/02/13 - 12/09/13					25 ± 6
12/05/13 - 12/12/13	21 ± 5	18 ± 5	21 ± 5	19 ± 5	
12/09/13 - 12/16/13					28 ± 6
12/12/13 - 12/19/13	31 ± 6	29 ± 6	32 ± 6	25 ± 6	
12/16/13 - 12/23/13					24 ± 6
12/19/13 - 12/26/13	23 ± 6	17 ± 5	29 ± 6	18 ± 5	
12/23/13 - 12/30/13					16 ± 5
12/26/13 - 01/01/14	20 ± 6	22 ± 6	22 ± 6	18 ± 6	
MEAN	19 ± 15	18 ± 13	18 ± 14	18 ± 12	16 ± 12

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

Table C-V.2 **MONTHLY AND YEARLY MEAN VALUES OF GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

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

GROUP I - ON-SITE LOCATIONS				GROUP II - INTERMEDIATE DISTANCE LOCATIONS				GROUP III - CONTROL LOCATIONS			
COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD
01/03/13 - 01/31/13	20	45	28 ± 16	01/03/13 - 01/31/13	19	36	26 ± 16	01/06/13 - 02/04/13	13	25	19 ± 10
01/31/13 - 02/28/13	9	36	17 ± 18	01/31/13 - 02/28/13	8	27	16 ± 16	02/04/13 - 03/04/13	6	26	17 ± 17
02/28/13 - 04/04/13	6	21	11 ± 10	02/28/13 - 04/04/13	8	18	12 ± 8	03/11/13 - 04/08/13	9	16	12 ± 7
04/04/13 - 05/02/13	11	23	17 ± 9	04/04/13 - 05/02/13	12	20	17 ± 7	04/08/13 - 05/06/13	9	14	12 ± 5
05/02/13 - 05/23/13	11	15	13 ± 2	05/02/13 - 05/29/13	11	18	14 ± 7	05/06/13 - 06/03/13	10	21	14 ± 10
05/29/13 - 07/03/13	12	19	15 ± 4	05/29/13 - 07/03/13	10	18	14 ± 6	06/03/13 - 07/08/13	12	13	12 ± 1
07/03/13 - 08/01/13	10	20	16 ± 8	07/03/13 - 08/01/13	11	18	16 ± 6	07/08/13 - 08/05/13	7	17	14 ± 9
08/01/13 - 08/29/13	13	29	19 ± 11	08/01/13 - 08/29/13	14	26	19 ± 11	08/05/13 - 09/03/13	9	24	17 ± 12
08/29/13 - 10/02/13	13	31	21 ± 11	08/29/13 - 10/02/13	11	26	19 ± 11	09/03/13 - 10/07/13	11	30	19 ± 18
10/02/13 - 10/31/13	13	30	21 ± 11	10/02/13 - 10/31/13	15	24	20 ± 8	10/07/13 - 11/04/13	13	28	19 ± 13
10/31/13 - 11/27/13	8	20	15 ± 8	10/31/13 - 11/21/13	16	21	18 ± 6	11/04/13 - 12/02/13	8	16	13 ± 7
11/27/13 - 01/01/14	17	35	26 ± 12	11/27/13 - 01/01/14	18	34	23 ± 14	12/02/13 - 12/30/13	25	25	23 ± 10
01/03/13 - 01/01/14	6	45	18 ± 14	01/03/13 - 01/01/14	8	36	18 ± 12	12/31/12 - 12/30/13	6	30	16 ± 12

Table C-V.3 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

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

SITE	COLLECTION PERIOD	Be-7	Mn-54	Co-58	Co-60	Cs-134	Cs-137
1B	01/03/13 - 04/04/13	65 ± 27	< 3	< 3	< 3	< 3	< 2
	04/04/13 - 07/03/13	87 ± 24	< 3	< 3	< 3	< 3	< 2
	07/03/13 - 10/02/13	85 ± 35	< 3	< 4	< 4	< 4	< 3
	10/02/13 - 01/01/14	77 ± 21	< 3	< 3	< 2	< 2	< 2
	MEAN	79 ± 21	-	-	-	-	-
1C	01/03/13 - 04/04/13	56 ± 28	< 4	< 5	< 3	< 3	< 3
	04/04/13 - 07/03/13	72 ± 25	< 3	< 3	< 3	< 4	< 3
	07/03/13 - 10/02/13	77 ± 42	< 3	< 5	< 5	< 5	< 4
	10/02/13 - 01/01/14	60 ± 25	< 3	< 3	< 3	< 3	< 2
	MEAN	66 ± 20	-	-	-	-	-
1Z	01/03/13 - 04/04/13	49 ± 22	< 2	< 3	< 2	< 2	< 2
	04/04/13 - 07/03/13	78 ± 19	< 3	< 3	< 3	< 3	< 2
	07/03/13 - 10/02/13	89 ± 40	< 5	< 5	< 3	< 4	< 4
	10/02/13 - 01/01/14	55 ± 30	< 3	< 4	< 4	< 3	< 3
	MEAN	68 ± 38	-	-	-	-	-
3A	01/03/13 - 04/04/13	66 ± 28	< 2	< 4	< 4	< 3	< 3
	04/04/13 - 07/03/13	53 ± 33	< 3	< 5	< 5	< 4	< 5
	07/03/13 - 10/02/13	53 ± 29	< 3	< 4	< 2	< 3	< 3
	10/02/13 - 01/01/14	61 ± 29	< 4	< 6	< 6	< 4	< 3
	MEAN	58 ± 13	-	-	-	-	-
5H2	12/31/12 - 04/01/13	< 63	< 4	< 6	< 4	< 4	< 3
	04/01/13 - 07/01/13	74 ± 24	< 3	< 2	< 3	< 2	< 2
	07/01/13 - 09/30/13	70 ± 33	< 3	< 3	< 3	< 4	< 3
	09/30/13 - 12/30/13	65 ± 30	< 4	< 5	< 4	< 5	< 3
	MEAN	69 ± 9	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING POSITIVE VALUES

Table C-VI.1 **CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

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

COLLECTION	GROUP I			GROUP II	GROUP III
PERIOD	1B	1C	1Z	3A	5H2
12/31/12 - 01/06/13					< 21
01/03/13 - 01/09/13	< 51	< 52	< 20	< 52	
01/06/13 - 01/14/13					< 15
01/09/13 - 01/17/13	< 23	< 59	< 60	< 59	
01/14/13 - 01/22/13					< 17
01/17/13 - 01/24/13	< 26	< 26	< 27	< 26	
01/22/13 - 01/29/13					< 10
01/24/13 - 01/31/13	< 25	< 14	< 25	< 25	
01/29/13 - 02/04/13					< 11
01/31/13 - 02/07/13	< 51	< 38	< 40	< 38	
02/04/13 - 02/11/13					< 15
02/07/13 - 02/15/13	< 31	< 28	< 28	< 11	
02/11/13 - 02/19/13					< 9
02/15/13 - 02/22/13	< 18	< 19	< 19	< 18	
02/19/13 - 02/25/13					< 24
02/22/13 - 02/28/13	< 49	< 49	< 20	< 49	
02/25/13 - 03/04/13					< 11
02/28/13 - 03/07/13	< 25	< 24	< 25	< 24	
03/04/13 - 03/11/13					< 8
03/07/13 - 03/14/13	< 16	< 38	(1)	< 38	
03/11/13 - 03/18/13					< 11
03/14/13 - 03/21/13	< 27	< 27	< 28	< 27	
03/18/13 - 03/26/13					< 13
03/21/13 - 03/28/13	< 20	< 11	< 20	< 20	
03/26/13 - 04/01/13					< 13
03/28/13 - 04/04/13	< 28	< 29	< 28	< 28	
04/01/13 - 04/08/13					< 10
04/04/13 - 04/12/13	< 45	< 45	< 46	< 19	
04/08/13 - 04/15/13					< 10
04/12/13 - 04/18/13	< 25	< 26	< 26	< 25	
04/15/13 - 04/22/13					< 12
04/18/13 - 04/26/13	< 29	< 28	< 12	< 28	
04/22/13 - 04/29/13					< 10
04/26/13 - 05/02/13	< 35	< 35	< 36	< 35	
04/29/13 - 05/06/13					< 15
05/02/13 - 05/09/13	< 14	< 33	< 34	< 33	
05/06/13 - 05/13/13					< 11
05/09/13 - 05/16/13	< 37	< 37	< 38	< 37	
05/13/13 - 05/20/13					< 8
05/16/13 - 05/23/13	< 25	< 14	< 26	< 25	
05/20/13 - 05/28/13					< 16
05/23/13 - 05/29/13	< 58	< 59	< 59	< 59	
05/28/13 - 06/03/13					< 17
05/29/13 - 06/06/13	< 17	< 17	< 17	< 17	
06/03/13 - 06/10/13					< 17
06/06/13 - 06/13/13	< 43	< 44	< 44	< 17	
06/10/13 - 06/17/13					< 11
06/13/13 - 06/20/13	< 50	< 50	< 19	< 49	
06/17/13 - 06/24/13					< 12
06/20/13 - 06/27/13	< 21	< 21	< 21	< 21	
06/24/13 - 07/01/13					< 14
06/27/13 - 07/03/13	< 69	< 67	< 67	< 67	

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VI.1 **CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

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

COLLECTION PERIOD	GROUP I 1B	GROUP I 1C	GROUP I 1Z	GROUP II 3A	GROUP III 5H2
07/01/13 - 07/08/13					< 26
07/03/13 - 07/11/13	< 55	< 55	< 55	< 55	
07/08/13 - 07/15/13					< 19
07/11/13 - 07/18/13	< 50	< 50	< 49	< 49	
07/15/13 - 07/22/13					< 34
07/18/13 - 07/25/13	< 49	< 49	< 48	< 48	
07/22/13 - 07/29/13					< 16
07/25/13 - 08/01/13	< 62	< 24	< 62	< 62	
07/29/13 - 08/05/13					< 17
08/01/13 - 08/08/13	< 18	< 18	< 17	< 18	
08/05/13 - 08/12/13					< 27
08/08/13 - 08/15/13	< 49	< 50	< 49	< 19	
08/12/13 - 08/19/13					< 25
08/15/13 - 08/22/13	< 29	< 28	< 28	< 68	
08/19/13 - 08/26/13					< 21
08/22/13 - 08/29/13	< 47	< 47	(1)	< 47	
08/26/13 - 09/03/13					< 6
08/29/13 - 09/05/13	< 54	< 37	< 37	< 37	
09/03/13 - 09/09/13					< 29
09/05/13 - 09/12/13	< 24	< 61	< 61	< 61	
09/09/13 - 09/16/13					< 52
09/12/13 - 09/19/13	< 45	< 45	< 45	< 45	
09/16/13 - 09/23/13					< 28
09/19/13 - 09/26/13	< 43	< 18	< 42	< 42	
09/23/13 - 09/30/13					< 28
09/26/13 - 10/02/13	< 54	< 54	< 53	< 54	
09/30/13 - 10/07/13					< 16
10/02/13 - 10/10/13	< 60	< 60	< 59	< 59	
10/07/13 - 10/15/13					< 12
10/10/13 - 10/17/13	< 42	< 41	< 41	< 41	
10/15/13 - 10/21/13					< 34
10/17/13 - 10/24/13	< 54	< 53	< 21	< 53	
10/21/13 - 10/28/13					< 15
10/24/13 - 10/31/13	< 65	< 66	< 65	< 65	
10/28/13 - 11/04/13					< 23
10/31/13 - 11/07/13	< 68	< 28	< 66	< 67	
11/04/13 - 11/11/13					< 38
11/07/13 - 11/14/13	< 65	< 55	< 56	< 55	
11/11/13 - 11/18/13					< 46
11/14/13 - 11/21/13	< 63	< 70	< 69	< 27	
11/18/13 - 11/25/13					< 22
11/21/13 - 11/27/13	< 68	< 68	< 67	< 67	
11/25/13 - 12/02/13					< 41
11/27/13 - 12/05/13	< 24	< 23	< 13	< 23	
12/02/13 - 12/09/13					< 34
12/05/13 - 12/12/13	< 59	< 59	< 58	< 58	
12/09/13 - 12/16/13					< 23
12/12/13 - 12/19/13	< 68	< 68	< 67	< 67	
12/16/13 - 12/23/13					< 23
12/19/13 - 12/26/13	< 54	< 53	< 53	< 53	
12/23/13 - 12/30/13					< 54
12/26/13 - 01/01/14	< 68	< 69	< 70	< 69	
MEAN	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VII.1 **CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

	CONTROL FARM			INDICATOR FARM							
COLLECTION PERIOD	C	E	V	D	J	L	P	R	S	U	W
01/08/13			< 0.7		< 0.6			< 0.6	< 0.8	< 0.7	
02/05/13	< 0.8	< 0.6	< 0.5	< 0.7	< 0.8	< 0.7	< 0.7	< 0.8	< 0.7	< 0.6	< 0.6
03/04/13			< 0.7		< 0.7			< 0.7	< 0.6	< 0.7	
04/01/13			< 0.7		< 0.7			< 0.7	< 0.6	< 0.8	
04/16/13			< 0.4		< 0.4			< 0.5	< 0.4	< 0.4	
04/30/13			< 0.7		< 0.7			< 0.8	< 0.6	< 0.6	
05/14/13	< 0.8	< 0.7	< 0.6	< 0.7	< 0.6	< 0.7	< 0.8	< 0.6	< 0.8	< 0.7	< 0.7
05/28/13			< 0.8		< 0.7			< 0.7	< 0.6	< 0.7	
06/10/13			< 0.7		< 0.6			< 0.7	< 0.8	< 0.9	
06/24/13			< 0.8		< 0.7			< 0.8	< 0.7	< 0.8	
07/08/13			< 0.7		< 0.7			< 0.7	< 0.7	< 0.7	
07/22/13			< 0.6		< 0.8			< 1.0	< 0.8	< 0.9	
08/06/13	< 0.8	< 0.7	< 0.8	< 0.8	< 0.7	< 0.8	< 0.8	< 0.9	< 1.0	< 0.8	< 0.7
08/19/13			< 0.9		< 0.8			< 0.8	< 0.8	< 0.7	
09/02/13			< 0.8		< 0.8			< 0.7	< 0.7	< 0.8	
09/16/13			< 0.8		< 0.7			< 0.6	< 0.7	< 0.7	
09/30/13			< 0.8		< 0.6			< 0.7	< 0.6	< 0.6	
10/14/13			< 0.3		< 0.4			< 0.4	< 0.6	< 0.4	
10/28/13			< 0.8		< 0.7			< 0.8	< 0.7	< 0.8	
11/12/13	< 0.4	< 0.5	< 0.7	< 0.4	< 0.6	< 0.4	< 0.5	< 0.5	< 0.7	< 0.6	< 0.4
11/25/13			< 0.7		< 0.6			< 0.6	< 0.6	< 0.7	
12/09/13			< 0.7		< 0.7			< 0.8	< 0.8	< 0.7	
MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-VII.2 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
C	02/04/13	1230 ± 148	< 6	< 7	< 35	< 11
	05/13/13	1209 ± 148	< 6	< 7	< 47	< 15
	08/05/13	1268 ± 154	< 5	< 6	< 34	< 14
	11/11/13	1256 ± 163	< 7	< 8	< 35	< 11
	MEAN	1241 ± 53	-	-	-	-
E	02/05/13	1289 ± 168	< 6	< 8	< 40	< 10
	05/14/13	1328 ± 147	< 6	< 6	< 41	< 14
	08/06/13	1288 ± 165	< 5	< 7	< 40	< 14
	11/11/13	1117 ± 157	< 6	< 7	< 32	< 6
	MEAN	1256 ± 188	-	-	-	-
V	01/08/13	1208 ± 112	< 5	< 5	< 24	< 6
	02/04/13	1290 ± 120	< 5	< 5	< 27	< 9
	03/04/13	1222 ± 126	< 5	< 5	< 30	< 9
	04/01/13	1444 ± 109	< 4	< 5	< 26	< 9
	04/16/13	1324 ± 114	< 4	< 6	< 33	< 10
	04/30/13	1177 ± 138	< 5	< 7	< 31	< 13
	05/13/13	1116 ± 158	< 6	< 6	< 46	< 8
	05/28/13	1293 ± 135	< 6	< 6	< 37	< 11
	06/10/13	1257 ± 167	< 7	< 7	< 45	< 12
	06/24/13	1328 ± 147	< 6	< 6	< 32	< 10
	07/08/13	1389 ± 146	< 6	< 7	< 34	< 9
	07/22/13	1281 ± 112	< 5	< 6	< 34	< 8
	08/05/13	1249 ± 137	< 6	< 7	< 38	< 12
	08/17/13	1250 ± 128	< 5	< 6	< 37	< 10
	09/02/13	1240 ± 153	< 5	< 7	< 41	< 11
	09/14/13	1234 ± 103	< 4	< 5	< 31	< 8
	09/28/13	1330 ± 130	< 5	< 5	< 40	< 14
	10/14/13	1102 ± 117	< 5	< 6	< 42	< 15
	10/28/13	1278 ± 147	< 6	< 6	< 35	< 12
	11/09/13	1228 ± 108	< 5	< 5	< 33	< 9
	11/22/13	1301 ± 107	< 5	< 5	< 45	< 13
	12/07/13	1371 ± 162	< 6	< 6	< 32	< 8
	MEAN	1269 ± 162	-	-	-	-
D	02/05/13	1386 ± 139	< 5	< 5	< 26	< 7
	05/14/13	1352 ± 137	< 5	< 5	< 43	< 14
	08/06/13	1417 ± 136	< 5	< 5	< 32	< 13
	11/11/13	1277 ± 141	< 6	< 5	< 29	< 11
	MEAN	1358 ± 120	-	-	-	-

Table C-VII.2 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
J	01/08/13	1303 ± 134	< 5	< 5	< 30	< 9
	02/04/13	1364 ± 152	< 6	< 7	< 36	< 11
	03/04/13	1311 ± 162	< 5	< 6	< 25	< 9
	04/01/13	1387 ± 113	< 4	< 5	< 29	< 8
	04/16/13	1241 ± 93	< 3	< 4	< 24	< 7
	04/30/13	1307 ± 149	< 5	< 6	< 29	< 12
	05/13/13	1274 ± 151	< 6	< 6	< 48	< 14
	05/28/13	1267 ± 179	< 8	< 8	< 45	< 14
	06/10/13	1262 ± 142	< 6	< 7	< 37	< 13
	06/24/13	1245 ± 125	< 5	< 7	< 33	< 12
	07/08/13	1445 ± 168	< 6	< 7	< 38	< 8
	07/22/13	1183 ± 126	< 4	< 6	< 27	< 10
	08/05/13	1269 ± 138	< 6	< 6	< 34	< 9
	08/19/13	1324 ± 125	< 5	< 6	< 36	< 11
	09/02/13	1416 ± 161	< 5	< 6	< 50	< 14
	09/16/13	1273 ± 108	< 4	< 5	< 25	< 7
	09/30/13	1325 ± 151	< 6	< 8	< 42	< 14
	10/14/13	1243 ± 122	< 5	< 5	< 41	< 12
	10/28/13	1294 ± 108	< 4	< 5	< 25	< 6
	11/11/13	1251 ± 123	< 5	< 6	< 32	< 10
	11/25/13	1447 ± 157	< 6	< 6	< 49	< 12
	12/09/13	1474 ± 150	< 5	< 6	< 31	< 7
	MEAN	1314 ± 155	-	-	-	-
L	02/04/13	1296 ± 139	< 5	< 5	< 31	< 7
	05/13/13	1355 ± 122	< 5	< 6	< 41	< 11
	08/05/13	1237 ± 141	< 6	< 6	< 44	< 12
	11/11/13	1353 ± 139	< 7	< 8	< 35	< 10
	MEAN	1310 ± 112	-	-	-	-
P	02/04/13	1295 ± 125	< 4	< 6	< 26	< 9
	05/13/13	1203 ± 120	< 5	< 5	< 39	< 10
	08/05/13	1339 ± 137	< 6	< 7	< 52	< 12
	11/11/13	1138 ± 143	< 6	< 8	< 43	< 8
	MEAN	1244 ± 181	-	-	-	-

Table C-VII.2 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
R	01/08/13	1404 ± 135	< 4	< 5	< 21	< 5
	02/04/13	1292 ± 132	< 5	< 5	< 26	< 8
	03/04/13	1381 ± 186	< 8	< 7	< 40	< 11
	04/01/13	1334 ± 115	< 4	< 5	< 26	< 9
	04/16/13	1338 ± 153	< 5	< 7	< 43	< 7
	04/30/13	1266 ± 138	< 5	< 7	< 36	< 9
	05/13/13	1258 ± 126	< 5	< 6	< 41	< 13
	05/28/13	1352 ± 159	< 6	< 7	< 37	< 14
	06/10/13	1257 ± 163	< 7	< 9	< 41	< 9
	06/24/13	1366 ± 108	< 5	< 5	< 27	< 9
	07/08/13	1257 ± 154	< 6	< 6	< 36	< 8
	07/22/13	1242 ± 141	< 6	< 7	< 40	< 11
	08/05/13	1161 ± 144	< 5	< 6	< 34	< 5
	08/19/13	1267 ± 146	< 5	< 7	< 32	< 10
	09/02/13	1186 ± 151	< 5	< 7	< 51	< 13
	09/16/13	1269 ± 108	< 4	< 5	< 25	< 9
	09/30/13	1157 ± 164	< 7	< 8	< 53	< 14
	10/14/13	1184 ± 113	< 7	< 8	< 57	< 9
	10/28/13	1300 ± 136	< 6	< 7	< 31	< 10
	11/11/13	1330 ± 129	< 5	< 5	< 27	< 5
	11/25/13	1059 ± 134	< 6	< 7	< 49	< 12
	12/09/13	1447 ± 141	< 8	< 9	< 46	< 9
	MEAN	1278 ± 183	-	-	-	-
S	01/08/13	1251 ± 141	< 5	< 6	< 35	< 11
	02/04/13	1297 ± 150	< 6	< 8	< 38	< 11
	03/04/13	1257 ± 180	< 9	< 9	< 36	< 12
	04/01/13	1266 ± 109	< 5	< 6	< 28	< 7
	04/16/13	1269 ± 104	< 4	< 4	< 30	< 8
	04/30/13	1344 ± 174	< 6	< 8	< 38	< 12
	05/13/13	1328 ± 123	< 5	< 5	< 39	< 14
	05/28/13	1340 ± 171	< 6	< 7	< 30	< 10
	06/10/13	1212 ± 177	< 6	< 8	< 44	< 13
	06/24/13	1389 ± 138	< 5	< 5	< 26	< 10
	07/08/13	1204 ± 143	< 5	< 6	< 32	< 8
	07/22/13	1293 ± 132	< 5	< 5	< 27	< 5
	08/05/13	1358 ± 166	< 5	< 6	< 21	< 6
	08/19/13	1246 ± 131	< 4	< 5	< 26	< 10
	09/02/13	1462 ± 143	< 6	< 7	< 46	< 12
	09/16/13	1350 ± 121	< 4	< 5	< 27	< 9
	09/30/13	1362 ± 134	< 5	< 6	< 34	< 13
	10/14/13	1325 ± 124	< 5	< 5	< 42	< 14
	10/28/13	1302 ± 173	< 8	< 8	< 49	< 11
	11/11/13	1250 ± 122	< 5	< 5	< 24	< 8
	11/25/13	1297 ± 146	< 6	< 6	< 47	< 13
	12/09/13	1296 ± 165	< 6	< 7	< 41	< 14
	MEAN	1304 ± 121	-	-	-	-

Table C-VII.2 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
U	01/08/13	1150 ± 95	< 4	< 4	< 21	< 5
	02/04/13	1354 ± 146	< 6	< 6	< 28	< 12
	03/04/13	1346 ± 167	< 6	< 6	< 38	< 11
	04/01/13	1301 ± 128	< 5	< 6	< 29	< 9
	04/16/13	1243 ± 149	< 7	< 8	< 46	< 8
	04/30/13	1286 ± 148	< 6	< 7	< 31	< 8
	05/13/13	1377 ± 143	< 5	< 6	< 47	< 12
	05/28/13	1364 ± 187	< 6	< 8	< 32	< 11
	06/10/13	1403 ± 161	< 6	< 6	< 33	< 4
	06/24/13	1314 ± 142	< 5	< 6	< 33	< 9
	07/08/13	1471 ± 158	< 5	< 7	< 33	< 12
	07/22/13	1230 ± 137	< 5	< 6	< 33	< 9
	08/05/13	1421 ± 148	< 6	< 6	< 32	< 10
	08/19/13	1513 ± 148	< 4	< 5	< 34	< 9
	09/02/13	1326 ± 180	< 6	< 7	< 50	< 12
	09/16/13	1260 ± 93	< 3	< 4	< 21	< 5
	09/30/13	1416 ± 191	< 7	< 8	< 56	< 12
	10/14/13	1271 ± 131	< 7	< 6	< 50	< 12
	10/28/13	1207 ± 119	< 5	< 5	< 29	< 8
	11/11/13	1156 ± 130	< 6	< 7	< 33	< 6
	11/25/13	1405 ± 116	< 4	< 5	< 35	< 12
	12/09/13	1209 ± 171	< 8	< 9	< 35	< 13
	MEAN	1319 ± 197	-	-	-	-
W	02/04/13	1138 ± 160	< 5	< 5	< 28	< 12
	05/14/13	1415 ± 118	< 5	< 5	< 39	< 10
	08/06/13	1575 ± 162	< 5	< 6	< 40	< 10
	11/12/13	1340 ± 155	< 6	< 6	< 32	< 9
	MEAN	1367 ± 363	-	-	-	-

Table C-VIII.1

CONCENTRATIONS OF GAMMA EMITTERS IN FOOD PRODUCT SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD			Be-7	K-40	Mn-54	Co-58	Co-60	I-131	Cs-134	Cs-137
1Q	05/31/13	Green Cabbage		< 207	4432 ± 426	< 18	< 18	< 20	< 59	< 18	< 20
	05/31/13	Lettuce		159 ± 136	4105 ± 367	< 18	< 20	< 22	< 52	< 17	< 19
	05/31/13	No vegetation available	(1)	-	-	-	-	-	-	-	-
	06/24/13	Green Cabbage		166 ± 104	3711 ± 216	< 9	< 11	< 11	< 38	< 9	< 10
	06/24/13	Lettuce		126 ± 67	2526 ± 177	< 9	< 9	< 10	< 38	< 9	< 10
	07/24/13	Field Corn Leaves	(1)	1634 ± 285	3516 ± 502	< 21	< 25	< 32	< 46	< 22	< 23
	07/24/13	Green Cabbage		< 154	2415 ± 339	< 17	< 16	< 18	< 33	< 18	< 17
	07/24/13	Tobacco Leaves	(1)	209 ± 169	5261 ± 537	< 22	< 19	< 33	< 44	< 23	< 22
	08/26/13	Field Corn Leaves		4236 ± 440	3404 ± 550	< 20	< 22	< 24	< 55	< 22	< 26
	08/26/13	Green Cabbage		< 199	2923 ± 413	< 17	< 17	< 17	< 39	< 18	< 15
	08/26/13	Tobacco Leaves		< 311	4439 ± 620	< 27	< 28	< 33	< 59	< 23	< 31
	09/23/13	Field Corn Leaves		3009 ± 112	3417 ± 154	< 7	< 8	< 8	< 33	< 6	< 7
	09/23/13	Green Cabbage		272 ± 73.3	3875 ± 190	< 8	< 9	< 9	< 42	< 8	< 9
	09/23/13	Red Beet Leaves		684 ± 68	5648 ± 180	< 7	< 8	< 8	< 35	< 7	< 7
	MEAN			1166 ± 3007	3821 ± 1928	-	-	-	-	-	-
2B	05/31/13	No vegetation available	(1)	-	-	-	-	-	-	-	-
	05/31/13	No vegetation available	(1)	-	-	-	-	-	-	-	-
	05/31/13	No vegetation available	(1)	-	-	-	-	-	-	-	-
	06/24/13	Green Cabbage		< 122	5426 ± 292	< 12	< 14	< 15	< 48	< 12	< 13
	06/24/13	Zucchini Leaves		177 ± 85	6164 ± 278	< 11	< 12	< 12	< 43	< 11	< 11
	07/24/13	Green Cabbage		325 ± 218	4181 ± 499	< 22	< 17	< 24	< 44	< 19	< 21
	07/24/13	Squash Leaves		398 ± 287	5502 ± 734	< 34	< 32	< 42	< 60	< 32	< 43
	07/24/13	Zucchini Leaves		678 ± 189	5584 ± 584	< 22	< 24	< 29	< 39	< 21	< 19
	08/26/13	Green Cabbage		< 235	2508 ± 420	< 23	< 22	< 27	< 46	< 17	< 19
	08/26/13	Sweet Corn Leaves		1141 ± 374	5229 ± 648	< 28	< 27	< 29	< 53	< 27	< 25
	08/26/13	Zucchini Leaves		585 ± 260	4987 ± 585	< 20	< 25	< 31	< 60	< 24	< 23
	09/23/13	Green Cabbage		838 ± 103	5233 ± 185	< 8	< 9	< 10	< 38	< 7	< 8
	09/23/13	Sweet Corn Leaves		2519 ± 112	4384 ± 165	< 7	< 7	< 7	< 38	< 7	< 7
	09/23/13	Sweet Pepper Leaves		1272 ± 87	11180 ± 254	< 8	< 8	< 11	< 34	< 6	< 7
	MEAN			882 ± 1427	5489 ± 4245	-	-	-	-	-	-
55	05/31/13	Broccoli Leaves		159 ± 85	5992 ± 345	< 10	< 12	< 16	< 29	< 10	< 11
	05/31/13	Green Cabbage		185 ± 107	4388 ± 288	< 11	< 12	< 13	< 50	< 12	< 11
	05/31/13	Lettuce		< 154	4017 ± 294	< 13	< 13	< 16	< 45	< 12	< 11
	06/24/13	Broccoli Leaves		< 89	5876 ± 215	< 8	< 9	< 11	< 36	< 8	< 9
	06/24/13	Green Cabbage		< 128	3615 ± 283	< 13	< 15	< 15	< 47	< 12	< 13
	06/24/13	Lettuce		108 ± 71	4590 ± 170	< 7	< 7	< 9	< 27	< 7	< 7
	07/24/13	Green Cabbage		< 213	3526 ± 441	< 19	< 22	< 25	< 42	< 21	< 21
	07/24/13	Rhubarb Leaves		389 ± 194	3258 ± 466	< 20	< 19	< 28	< 31	< 22	< 23
	07/24/13	Swiss Chard		< 255	7861 ± 622	< 25	< 25	< 26	< 48	< 24	< 25
	08/26/13	Leaf Lettuce		< 261	6719 ± 700	< 24	< 32	< 32	< 51	< 23	< 24
	08/26/13	Neck Pumpkin Leaves		1128 ± 316	6159 ± 677	< 22	< 22	< 33	< 47	< 20	< 19
	08/26/13	Zucchini Leaves		394 ± 226	5153 ± 636	< 19	< 26	< 31	< 54	< 20	< 23
	09/23/13	Broccoli Leaves		325 ± 62	7558 ± 171	< 5	< 5	< 6	< 22	< 4	< 5
	09/23/13	Sweet Corn Leaves		1954 ± 99	4739 ± 156	< 6	< 7	< 7	< 30	< 6	< 6
	09/23/13	Sweet Potato Leaves		2015 ± 112	8216 ± 230	< 8	< 9	< 10	< 42	< 7	< 8
	MEAN			740 ± 1535	5444 ± 3246	-	-	-	-	-	-

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

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-IX.1 QUARTERLY OSLD RESULTS FOR PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF MREM/STD. MONTH ± STANDARD DEVIATIONS

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
16	9.0 ± 1.6	8.2	10	9.3	8.5
18	9.1 ± 2.1	8.0	10	9.6	8.4
19	8.4 ± 1.8	7.7	9.7	8.5	7.8
24	7.4 ± 1.5	6.6	7.9	8.1	6.9
5	8.4 ± 1.8	7.3	9.4	8.7	8.2
14	8.7 ± 1.6	7.7	9.5	9.1	8.4
15	8.9 ± 1.5	8.0	9.7	9.4	8.6
17	10 ± 2.2	8.7	11	11	9.6
22	8.9 ± 1.5	7.9	9.7	8.9	8.9
23	9.3 ± 1.9	8.2	11	9.4	9.0
26	10 ± 2.3	9.0	12	10 (1)	9.7
27	9.4 ± 2.1	8.2	11	9.7	8.9
32	9.7 ± 1.7	8.6	11	10	9.7
3A	6.7 ± 1.6	5.9	7.5	7.3	6.2
42	8.1 ± 1.4	7.2	8.9	8.2	7.9
43	9.9 ± 2.2	8.5	11	10	9.7
44	8.5 ± 1.9	7.4	9.6	8.8	8.0
45	9.4 ± 1.4	8.5	10	9.8	9.1
46	8.2 ± 1.7	7.2	9.2	8.4	7.9
47	9.9 ± 2.0	8.7	11	10	9.5
48	9.1 ± 2.2	7.8	10	9.8	8.6
49	8.9 ± 1.7	7.9	9.7	9.5	8.6
4K	6.2 ± 1.4	5.4	6.9	6.5	5.8
50	10 ± 1.6	9.3	11	11	10
51	9.1 ± 2.0	8.1	10	9.4	8.6
6B	7.6 ± 1.4	6.7	8.3	8.0	7.4
31A	7.7 ± 1.6	6.8	8.7	8.0	7.4
2	8.6 ± 1.7	7.5	9.4	9.2	8.4
1A	8.6 ± 1.8	7.7	9.8	8.7	8.1
1B	7.7 ± 1.7	6.9	8.7	8.1	7.1
1C	9.2 ± 1.8	8.0	10	9.5	9.0
1D	8.9 ± 1.9	7.9	10	9.2	8.5
1E	8.7 ± 1.4	8.0	9.5	9.0	8.1
1F	10 ± 2.8	8.8	12	11	9.5
1G	7.1 ± 1.9	6.1	8.3	7.3	6.8
1H	9.1 ± 1.7	8.0	9.9	9.6	8.8
1I	8.1 ± 1.5	7.3	9.0	8.4	7.7
1J	10 ± 2.5	9.1	12	11	9.4
1K	9.9 ± 2.0	8.7	11	10	9.7
1L	7.2 ± 1.2	6.7	8.0	7.2	6.8
1M	5.6 ± 1.1	5.0	6.3	5.8	5.4
1P	6.4 ± 1.3	5.6	7.1	6.6	6.1
1Q	7.3 ± 1.4	6.7	8.2	7.5	6.9
1R	12 ± 2.4	10	13	12	11
2B	8.4 ± 1.9	7.4	9.6	8.7	8.0
40	11 ± 2.2	9.2	12	11	10
1NN	9.4 ± 2.5	7.8	11	9.9	9.2

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-IX.2 MEAN QUARTERLY OSLD RESULTS FOR THE SITE BOUNDARY, INTERMEDIATE AND CONTROL LOCATIONS FOR PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF MREM/MONTH ± 2 STANDARD DEVIATIONS OF THE STATION DATA

COLLECTION PERIOD	SITE BOUNDARY ± 2 S.D.	INTERMEDIATE	CONTROL
JAN-MAR	7.6 ± 2.5	7.8 ± 1.9	7.6 ± 1.4
APR-JUN	9.7 ± 3.4	9.8 ± 2.4	9.5 ± 2.2
JUL-SEP	8.9 ± 3.1	9.2 ± 2.1	8.9 ± 1.4
OCT-DEC	8.2 ± 2.9	8.5 ± 2.2	7.9 ± 1.5

TABLE C-IX.3 SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF MREM/STD. MONTH

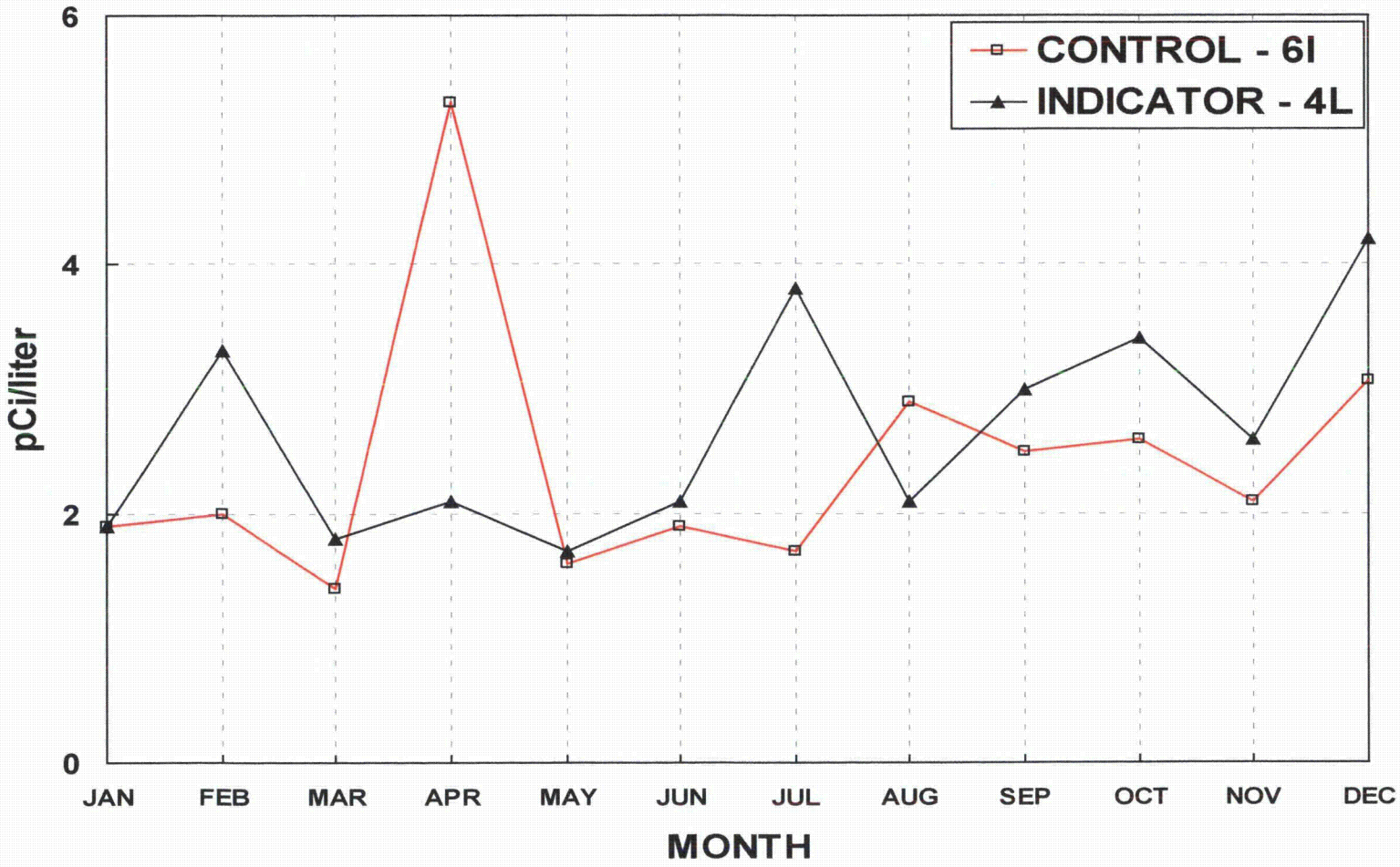
LOCATION	SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN ± 2 S.D.
SITE BOUNDARY	80	5.0	13	8.6 ± 3.3
INTERMEDIATE	92	5.4	12	8.8 ± 2.6
CONTROL	16	6.6	10	8.5 ± 2.1

SITE BOUNDARY STATIONS - 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K, 1L, 1M, 1NN, 1P, 1Q, 1R, 2, 2B, 40

INTERMEDIATE STATIONS - 14, 15, 17, 22, 23, 26, 27, 31A, 32, 3A, 42, 43, 44, 45, 46, 47, 48, 49, 4K, 5, 50, 51, 6B

CONTROL STATIONS - 16, 18, 19, 24

FIGURE C-1
MONTHLY TOTAL GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PBAPS, 2013



Previous data included summation of less than values.

FIGURE C-2
MEAN ANNUAL CS-137 CONCENTRATIONS IN FISH SAMPLES COLLECTED IN THE VICINITY OF PBAPS, 1971 – 2013

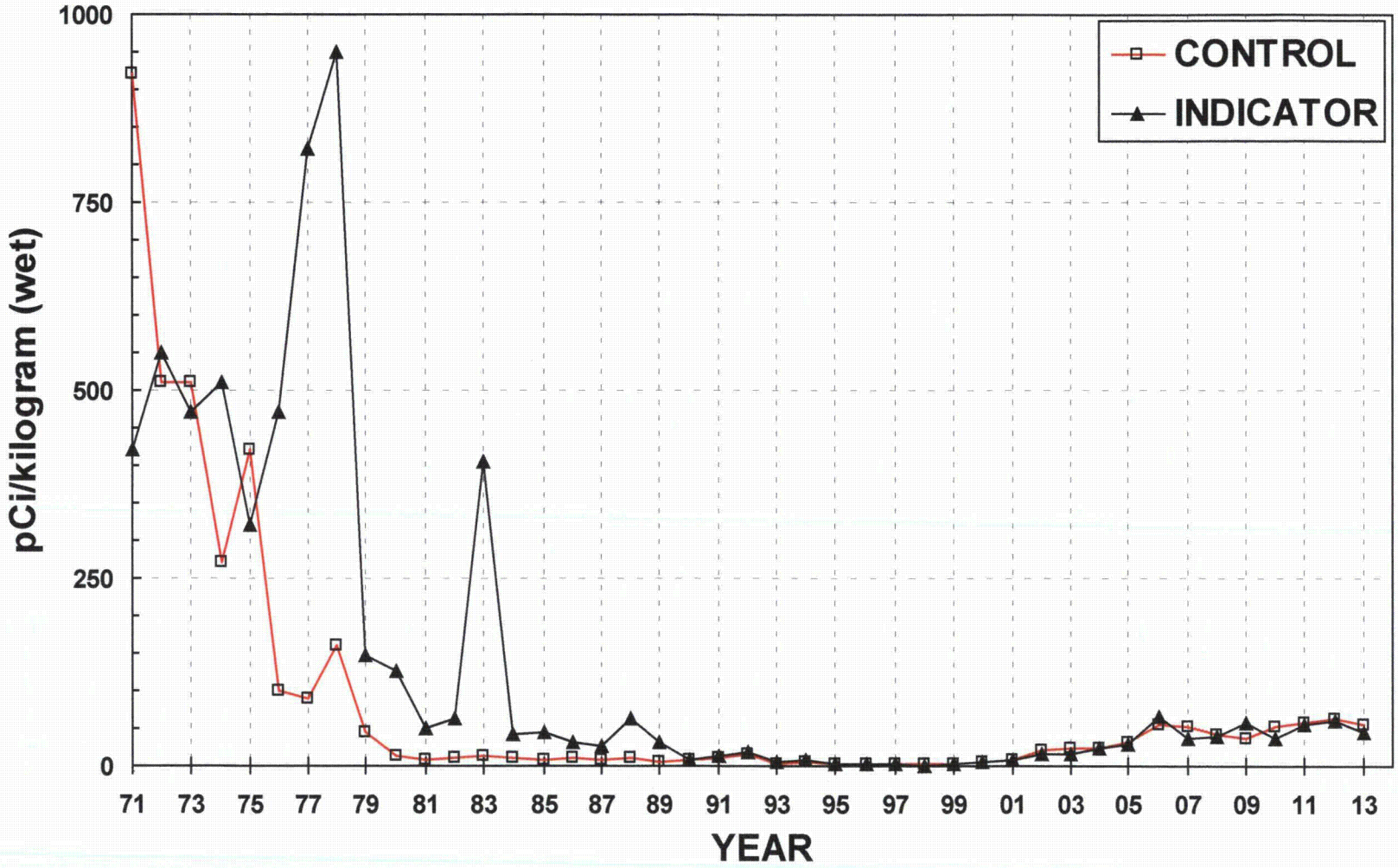
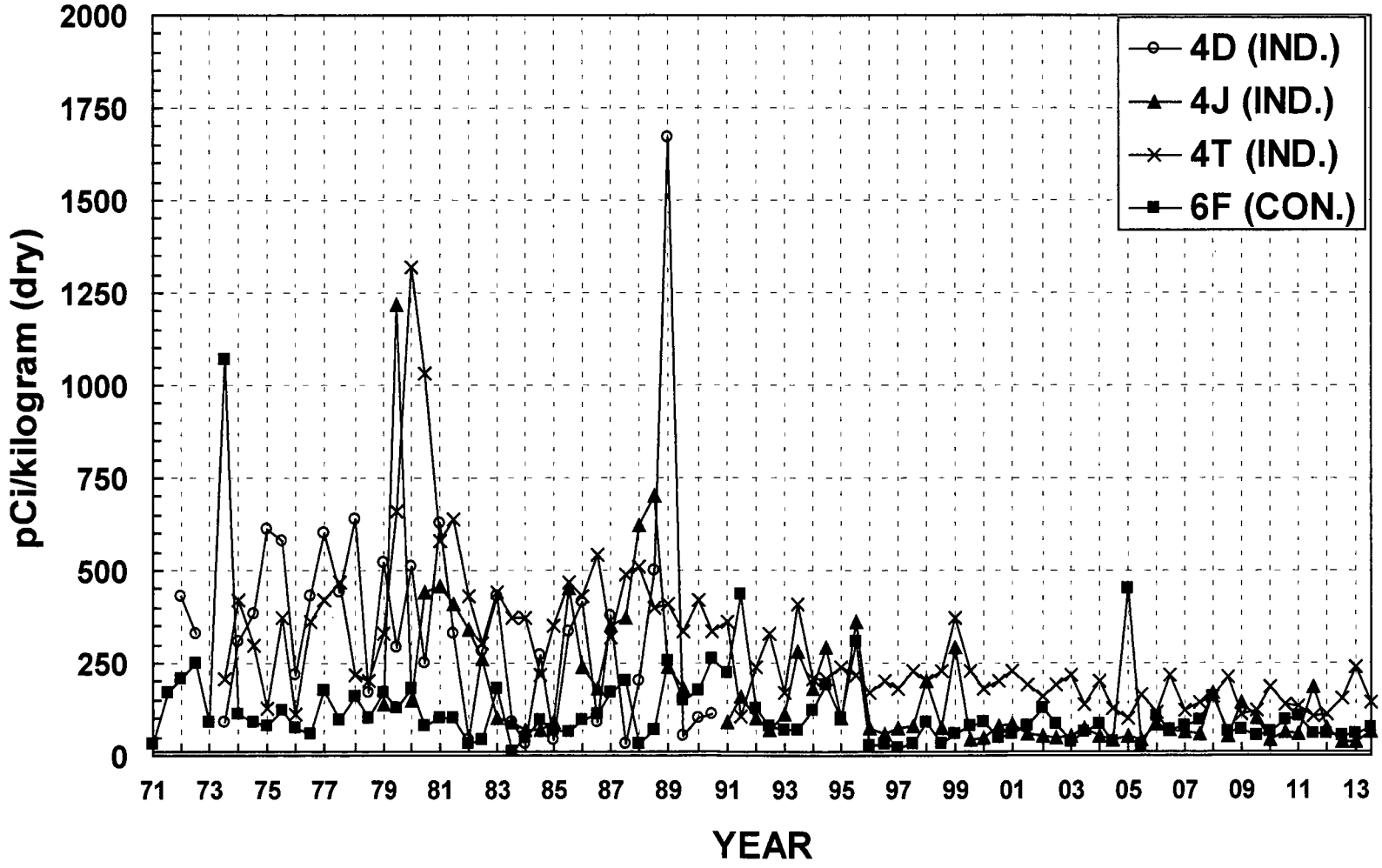


FIGURE C-3
MEAN SEMI-ANNUAL CS-137 CONCENTRATIONS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF PBAPS, 1971 – 2013



No sample collected from Station 4J in 1990 and Station 4D discontinued beginning 1991

FIGURE C-4
MEAN WEEKLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF PBAPS, 2013

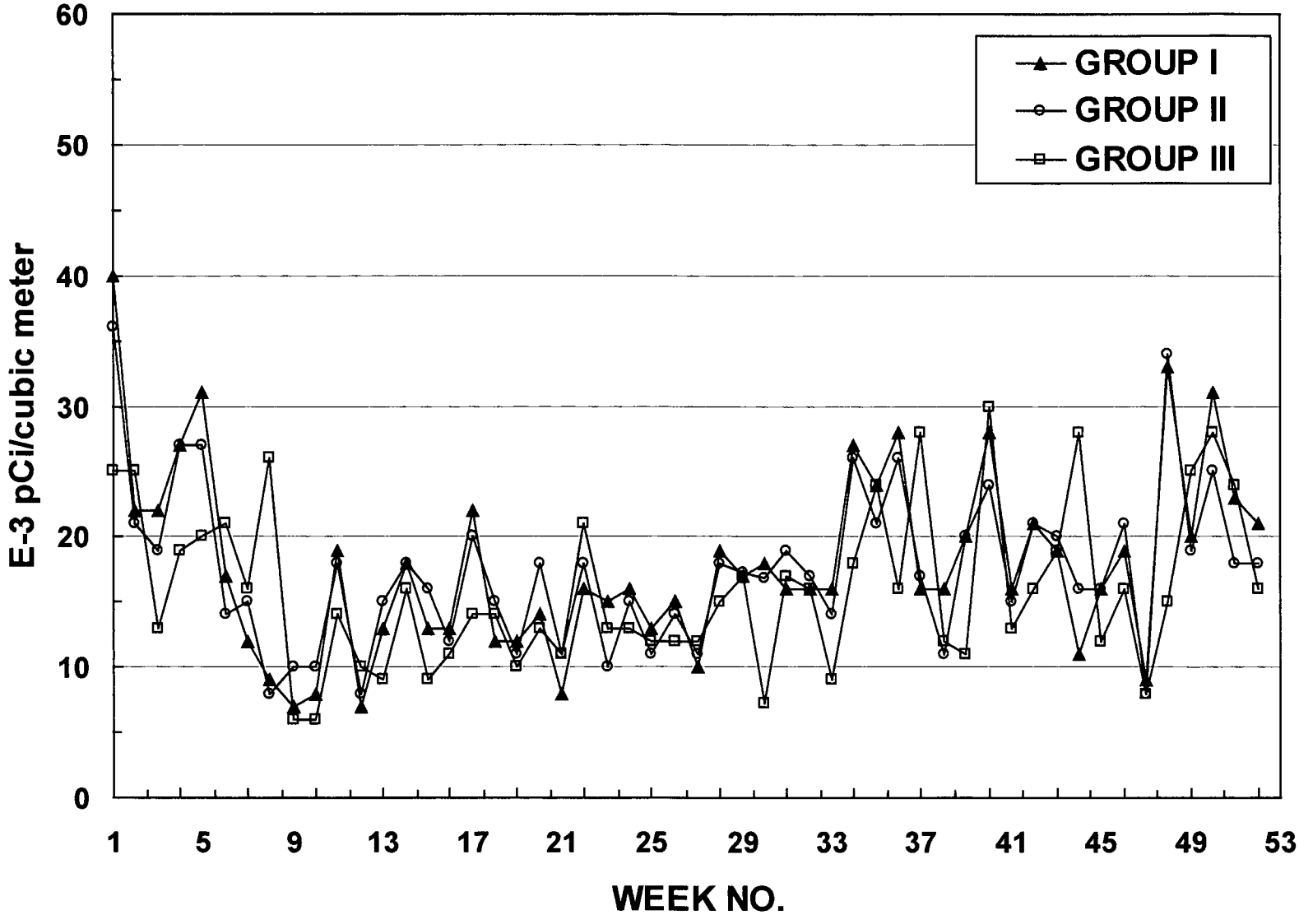
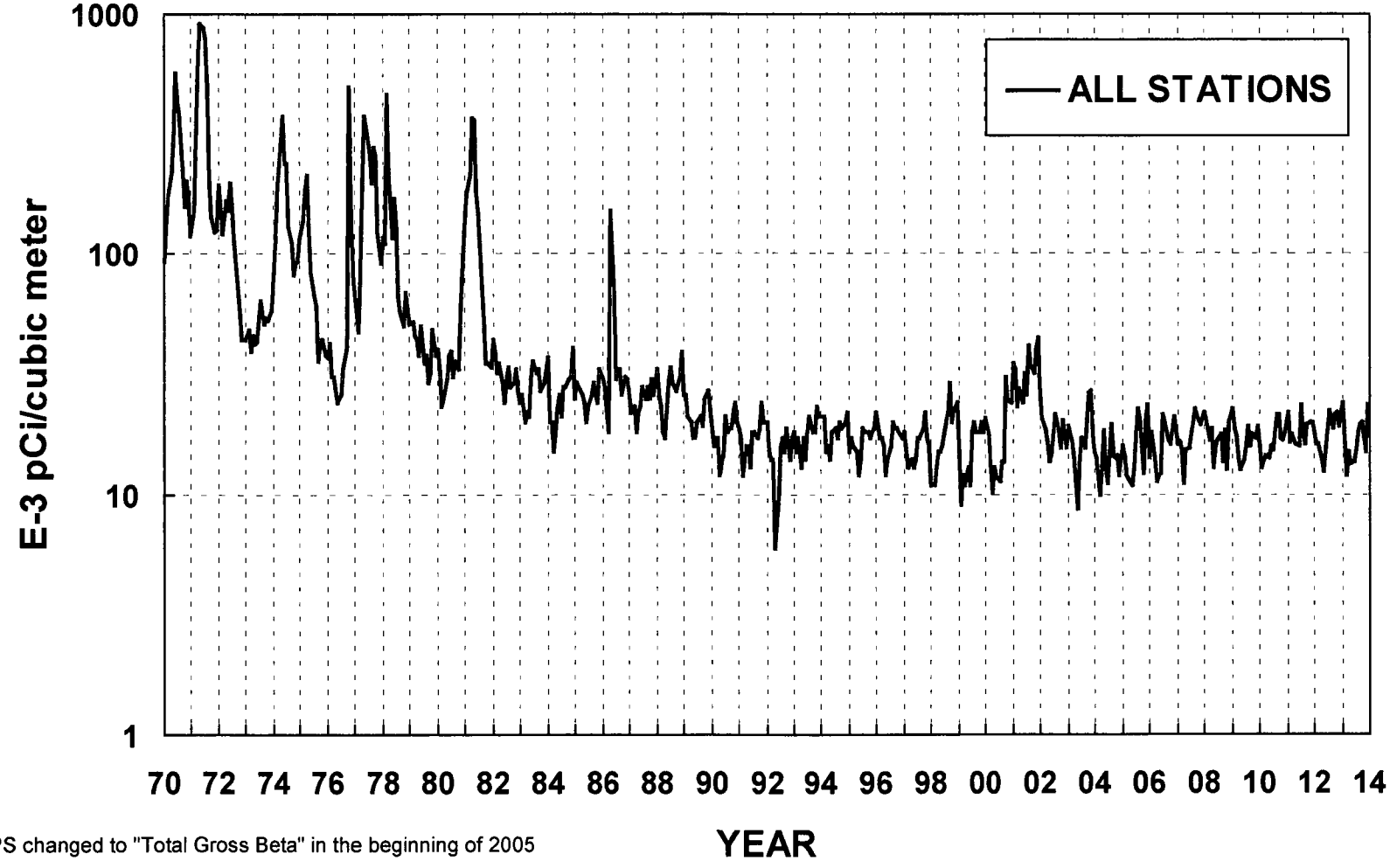
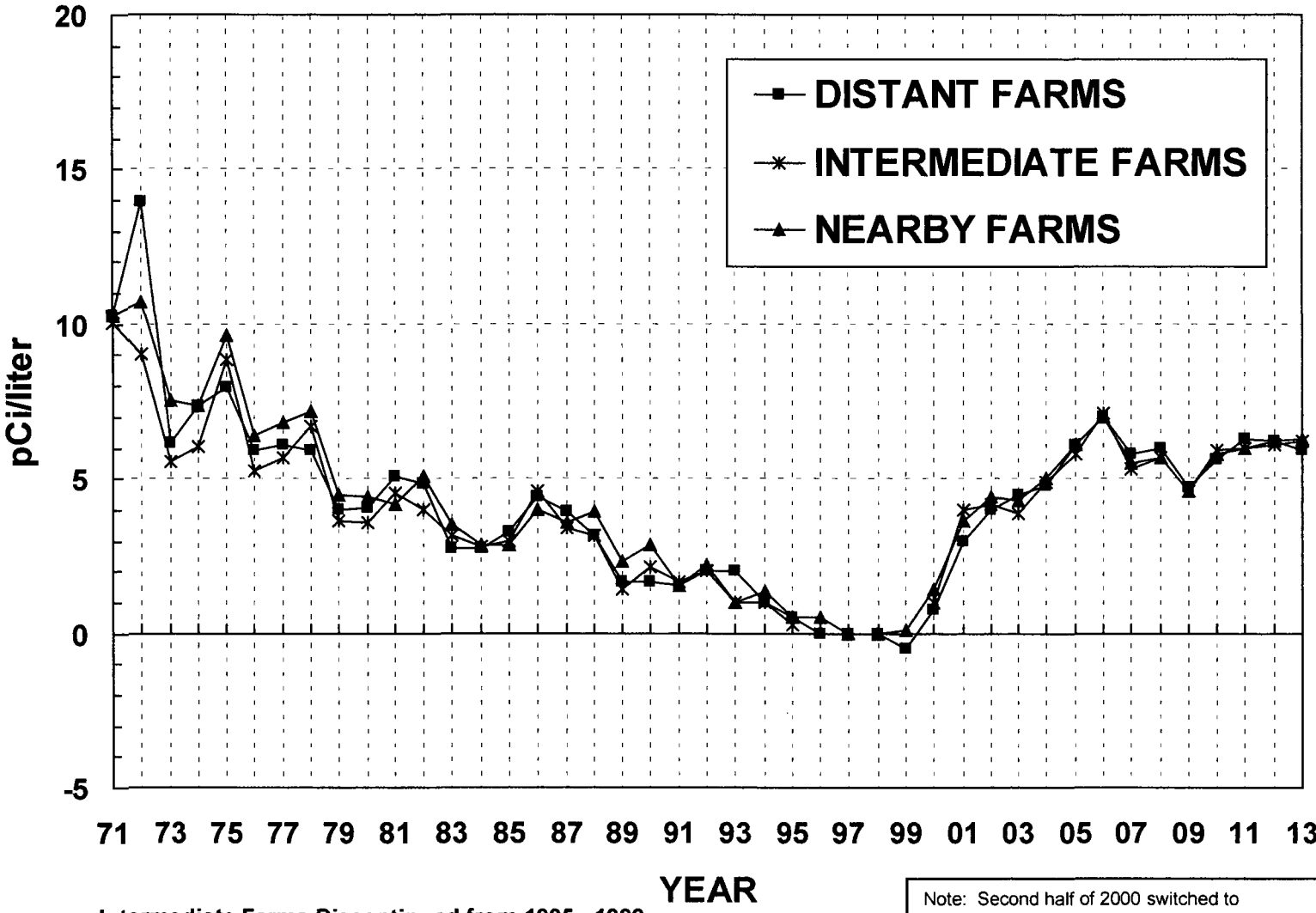


FIGURE C-5
MEAN MONTHLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE
SAMPLES COLLECTED IN THE VICINITY OF PBAPS, 1970 – 2013



PBAPS changed to "Total Gross Beta" in the beginning of 2005

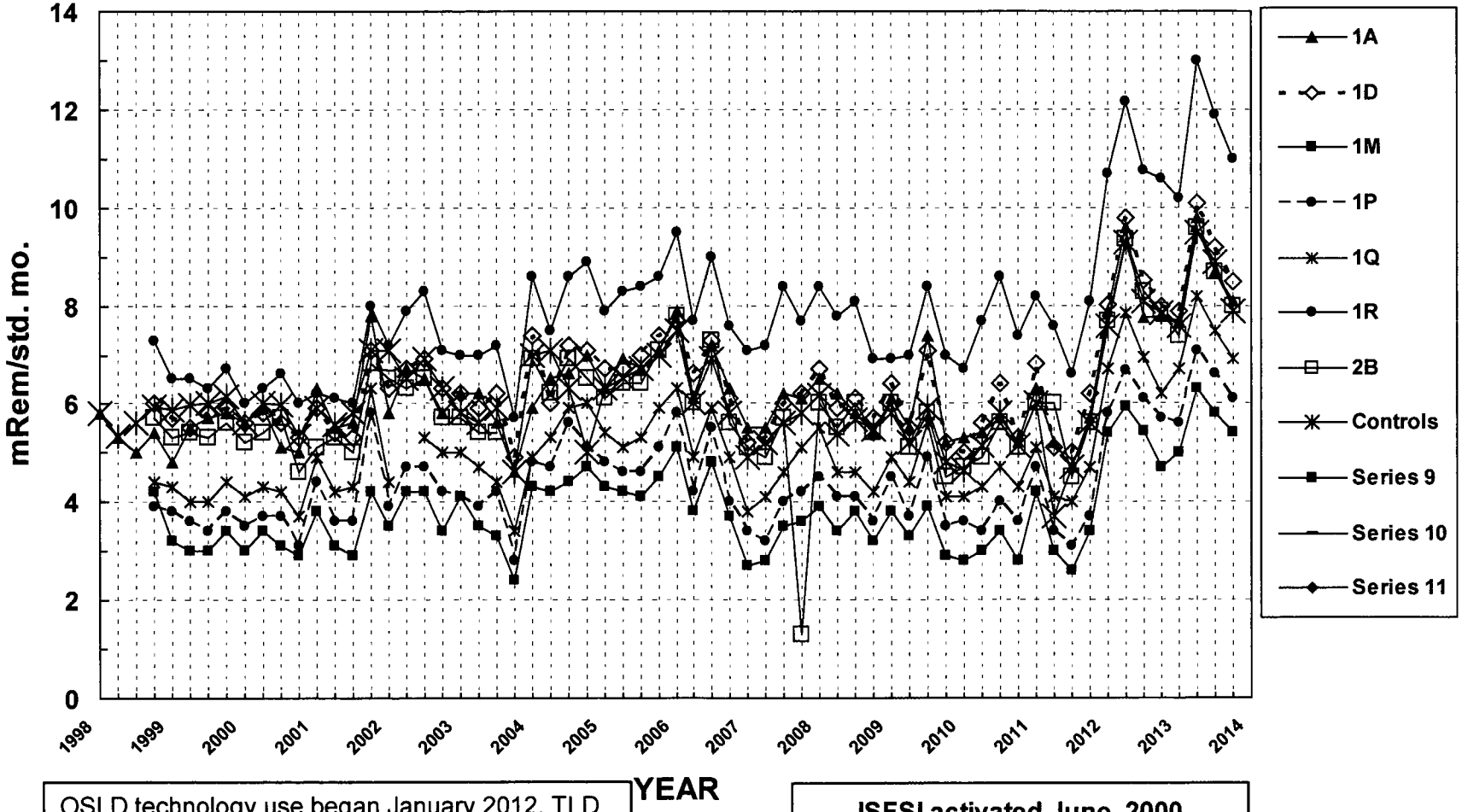
FIGURE C-6
MEAN ANNUAL CS-137 CONCENTRATIONS IN MILK SAMPLES COLLECTED IN THE VICINITY OF PBAPS, 1971 - 2013



Intermediate Farms Discontinued from 1995 - 1999
Cs-137 milk LLD = 18 pCi/liter

Note: Second half of 2000 switched to reporting < MDA when no activity was detected. Using MDA values result in a larger number.

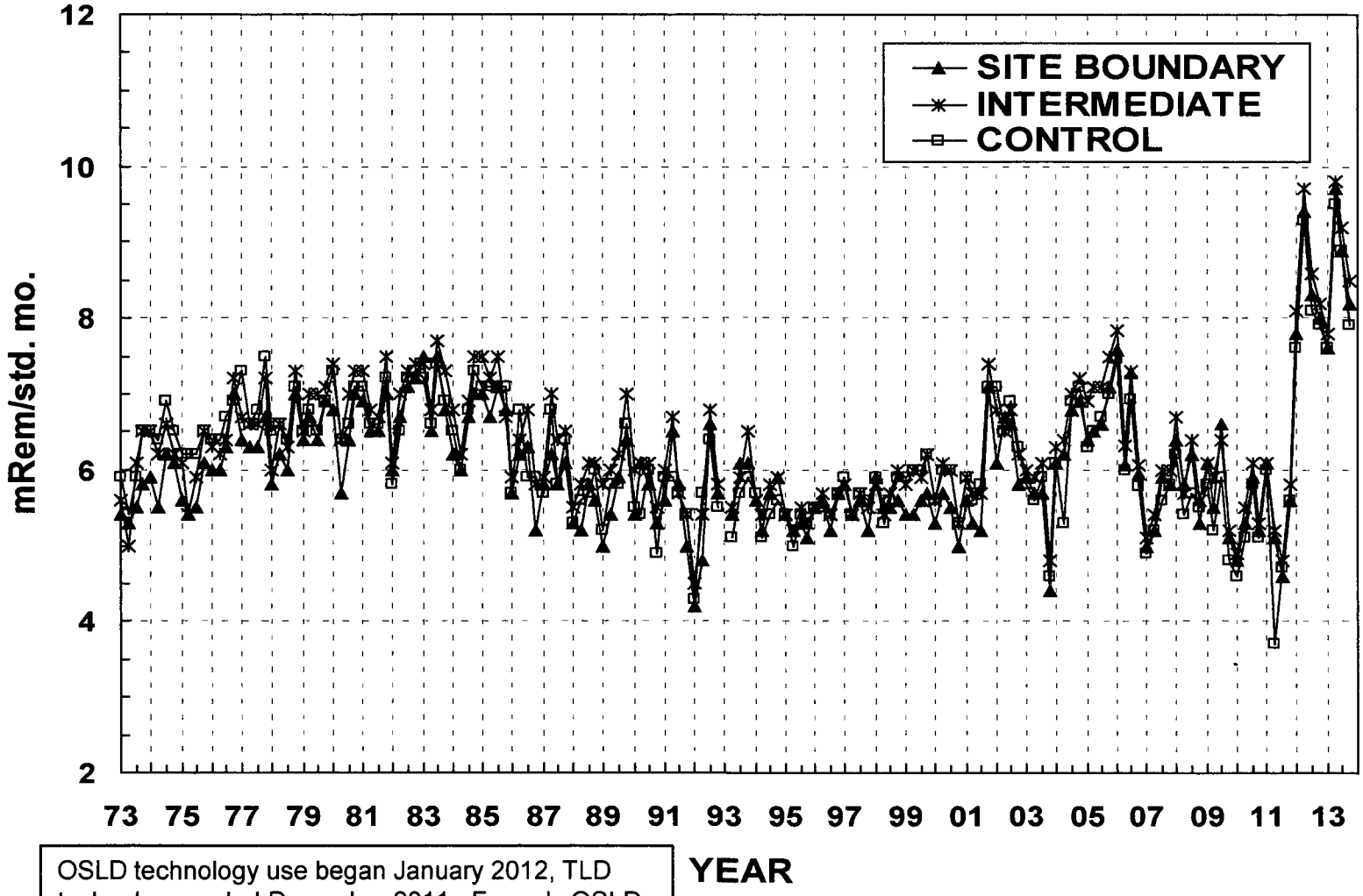
FIGURE C-8
QUARTERLY AMBIENT GAMMA RADIATION LEVELS NEAR THE INDEPENDENT SPENT FUEL STORAGE INSTALLATION LOCATED AT PBAPS, 1998 – 2013



OSLD technology use began January 2012, TLD technology ended December 2011. For only OSLD data, Gross mRem per standard month is reported.

ISFSI activated June, 2000

FIGURE C- 7
MEAN QUARTERLY AMBIENT GAMMA RADIATION LEVELS IN THE VICINITY OF PBAPS, 1973 – 2013



OSLD technology use began January 2012, TLD technology ended December 2011. For only OSLD data, Gross mRem per standard month is reported.

APPENDIX D

DATA TABLES AND FIGURES
QC LABORATORY

TABLE D-I.1 CONCENTRATIONS OF GROSS BETA INSOLUBLE IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	4L
JAN	< 2.0
FEB	< 1.9
MAR	< 2.0
APR	< 1.9
MAY	< 1.9
JUN	< 1.9
JUL	< 1.9
AUG	< 1.9
SEP	< 1.8
OCT	< 1.8
NOV	< 1.9
DEC	< 1.7
MEAN	-

TABLE D-I.2 CONCENTRATIONS OF GROSS BETA SOLUBLE IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	4L
JAN	2.3 ± 0.9
FEB	< 1.8
MAR	< 1.8
APR	< 1.5
MAY	< 0.9
JUN	1.5 ± 0.6
JUL	0.9 ± 0.5
AUG	2.2 ± 0.8
SEP	0.9 ± 0.4
OCT	1.6 ± 0.4
NOV	2.5 ± 1.7
DEC	2.2 ± 0.8
MEAN	1.7 ± 1.3

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

TABLE D-I.3 CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	4L
JAN-MAR	< 148
APR-JUN	< 157
JUL-SEP	< 143
OCT-DEC	< 150
MEAN	-

TABLE D-I.4 CONCENTRATIONS OF I-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	4L
JAN	< 0.3
FEB	< 0.3
MAR	< 0.2
APR	< 0.3
MAY	< 0.3
JUN	< 0.3
JUL	< 0.4
AUG	< 0.3
SEP	< 0.4
OCT	< 0.3
NOV	< 0.3
DEC	< 0.3
MEAN	-

TABLE D-I.5 CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER 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
4L	JAN	< 3	< 7	< 3	< 3	< 4	< 4	< 3	< 2	< 3	< 23	< 2
	FEB	< 2	< 4	< 3	< 3	< 6	< 5	< 3	< 3	< 3	< 16	< 5
	MAR	< 3	< 6	< 2	< 2	< 3	< 6	< 3	< 2	< 3	< 24	< 2
	APR	< 3	< 6	< 2	< 2	< 3	< 5	< 4	< 3	< 3	< 12	< 3
	MAY	< 3	< 6	< 3	< 4	< 8	< 6	< 4	< 5	< 4	< 18	< 3
	JUN	< 2	< 7	< 3	< 2	< 3	< 4	< 3	< 3	< 3	< 14	< 2
	JUL	< 3	< 6	< 4	< 3	< 8	< 7	< 3	< 4	< 4	< 21	< 3
	AUG	< 3	< 3	< 2	< 2	< 3	< 4	< 3	< 3	< 2	< 22	< 7
	SEP	< 1	< 3	< 1	< 2	< 2	< 2	< 2	< 1	< 1	< 11	< 2
	OCT	< 2	< 4	< 2	< 2	< 3	< 4	< 3	< 3	< 2	< 17	< 4
	NOV	< 2	< 3	< 2	< 2	< 4	< 4	< 3	< 2	< 3	< 12	< 4
	DEC	< 2	< 4	< 2	< 1	< 4	< 3	< 2	< 3	< 2	< 6	< 4
	MEAN	-	-	-	-	-	-	-	-	-	-	-

TABLE D-II.1 CONCENTRATIONS OF GROSS BETA INSOLUBLE IN AIR PARTICULATE AND I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013

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

COLLECTION PERIOD	1A GROSS BETA	1A I-131
1	49 ± 6	< 18
2	33 ± 4	< 14
3	31 ± 4	< 22
4	34 ± 4	< 15
5	38 ± 4	< 22
6	25 ± 4	< 20
7	18 ± 4	< 11
8	10 ± 4	< 23
9	10 ± 4	< 21
10	15 ± 3	< 16
11	25 ± 4	< 17
12	10 ± 3	< 15
13	20 ± 4	< 22
14	26 ± 4	< 14
15	17 ± 4	< 21
16	19 ± 4	< 9
17	32 ± 5	< 21
18	13 ± 4	< 14
19	20 ± 4	< 15
20	23 ± 4	< 22
21	17 ± 5	< 20
22	25 ± 4	< 23
23	16 ± 4	< 12
24	23 ± 5	< 17
25	23 ± 5	< 20
26	20 ± 5	< 21
27	20 ± 4	< 19
28	23 ± 5	< 26
29	23 ± 5	< 13
30	20 ± 4	< 16
31	25 ± 5	< 21
32	24 ± 5	< 20
33	26 ± 5	< 21
34	31 ± 5	< 13
35	31 ± 5	< 16
36	35 ± 5	< 21
37	23 ± 4	< 12
38	20 ± 4	< 21
39	28 ± 5	< 21
40	39 ± 5	< 22
41	24 ± 5	< 21
42	31 ± 5	< 16
43	35 ± 5	< 19
44	30 ± 5	< 12
45	22 ± 4	< 15
46	32 ± 5	< 20
47	15 ± 5	< 28
48	45 ± 5	< 16
49	22 ± 4	< 10
50	34 ± 5	< 16
51	26 ± 5	< 15
52	26 ± 5	< 18
MEAN	25 ± 17	-

TABLE D-II.2 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013**

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

SITE	COLLECTION PERIOD	Be-7	Mn-54	Co-58	Co-60	Cs-134	Cs-137
1A	01/03/13 - 03/28/13	61 ± 13	< 0.5	< 0.3	< 0.6	< 0.8	< 0.7
	03/28/13 - 07/03/13	75 ± 12	< 0.4	< 0.5	< 0.3	< 0.4	< 0.8
	07/03/13 - 10/02/13	79 ± 18	< 0.8	< 0.7	< 0.4	< 0.9	< 0.5
	10/02/13 - 01/01/14	79 ± 17	< 0.8	< 0.7	< 0.6	< 0.7	< 1.0
	MEAN*	74 ± 17	-	-	-	-	-

TABLE D-III.1 CONCENTRATIONS OF I-131 BY CHEMICAL SEPARATION AND GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	I-131	K-40	Cs-134	Cs-137	Ba-140	La-140
J	02/04/13	< 0.3	1590 ± 106	< 3	< 2	< 23	< 4
	05/13/13	< 0.3	1236 ± 110	< 3	< 3	< 28	< 3
	08/13/13	< 0.2	1322 ± 102	< 3	< 4	< 35	< 6
	11/11/13	< 0.3	1375 ± 109	< 5	< 3	< 27	< 2
	MEAN	-	1381 ± 301	-	-	-	-
S	02/04/13	< 0.4	1488 ± 92	< 4	< 3	< 36	< 8
	05/13/13	< 0.2	1389 ± 93	< 2	< 3	< 29	< 8
	08/13/13	< 0.2	1464 ± 86	< 2	< 2	< 30	< 3
	11/11/13	< 0.3	1365 ± 100	< 3	< 4	< 19	< 3
	MEAN	-	1427 ± 117	-	-	-	-
V	02/04/13	< 0.4	1358 ± 88	< 3	< 2	< 44	< 8
	05/13/13	< 0.4	1373 ± 90	< 4	< 3	< 33	< 8
	08/13/13	< 0.2	1444 ± 91	< 3	< 3	< 20	< 4
	11/11/13	< 0.3	1246 ± 104	< 2	< 2	< 25	< 4
	MEAN	-	1355 ± 164	-	-	-	-

TABLE D-IV.1 SUMMARY OF COLLECTION DATES FOR SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2013

DRINKING WATER (GROSS BETA & GAMMA SPECTROSCOPY)

COLLECTION PERIOD	4L
JAN	01/03/13 - 01/31/13
FEB	01/31/13 - 02/28/13
MAR	02/28/13 - 03/28/13
APR	03/28/13 - 05/02/13
MAY	05/02/13 - 05/29/13
JUN	05/29/13 - 06/27/13
JUL	06/27/13 - 08/01/13
AUG	08/01/13 - 08/29/13
SEP	08/29/13 - 10/02/13
OCT	10/02/13 - 10/31/13
NOV	10/31/13 - 11/27/13
DEC	11/27/13 - 01/02/14

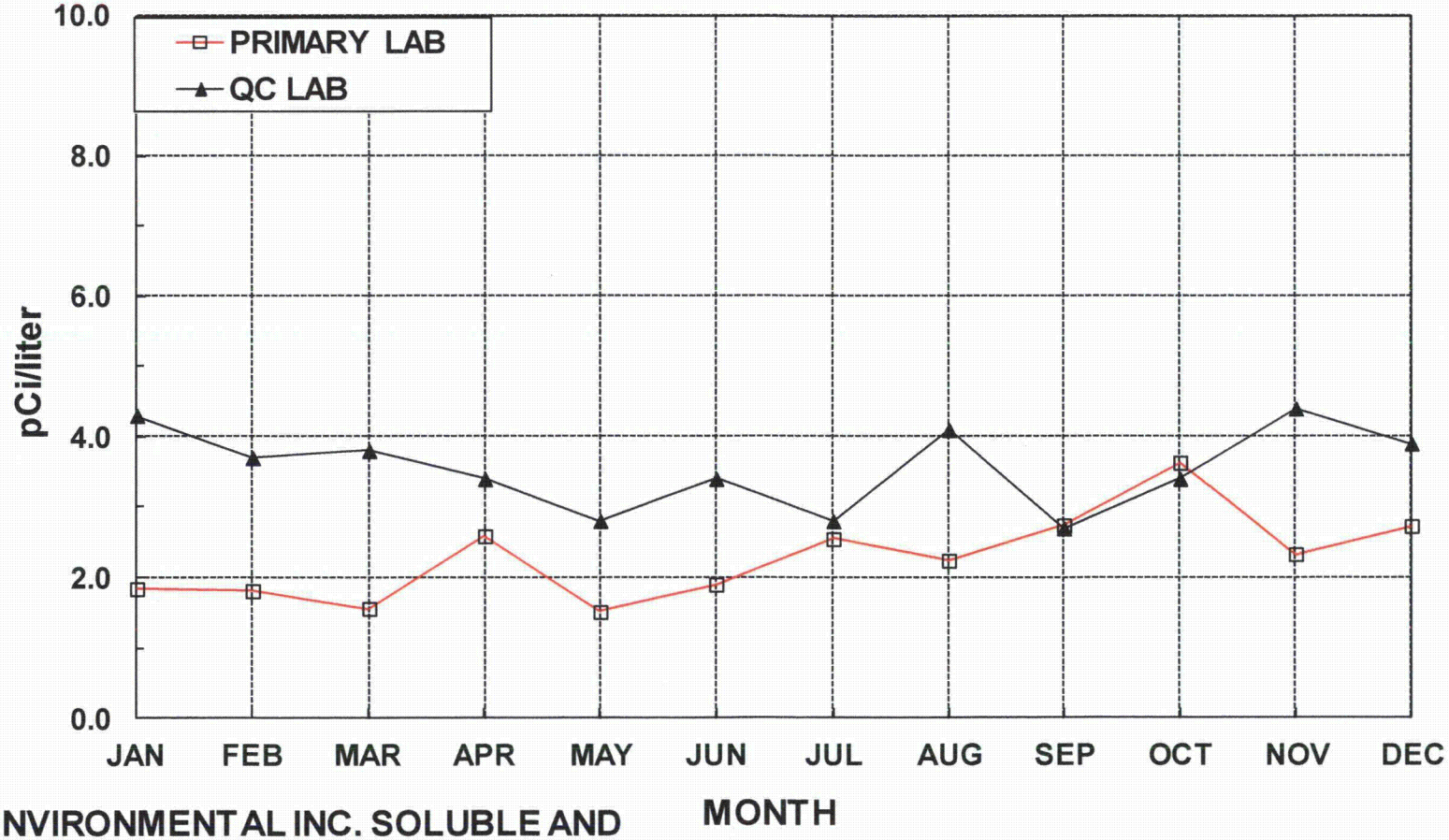
AIR PARTICULATE (GAMMA SPECTROSCOPY)

COLLECTION PERIOD	1A
JAN-MAR	01/03/13 - 03/28/13
APR-JUN	03/28/13 - 07/03/13
JUL-SEP	07/03/13 - 10/02/13
OCT-DEC	10/02/13 - 01/01/14

AIR PARTICULATE (GROSS BETA) AND AIR IODINE (I-131)

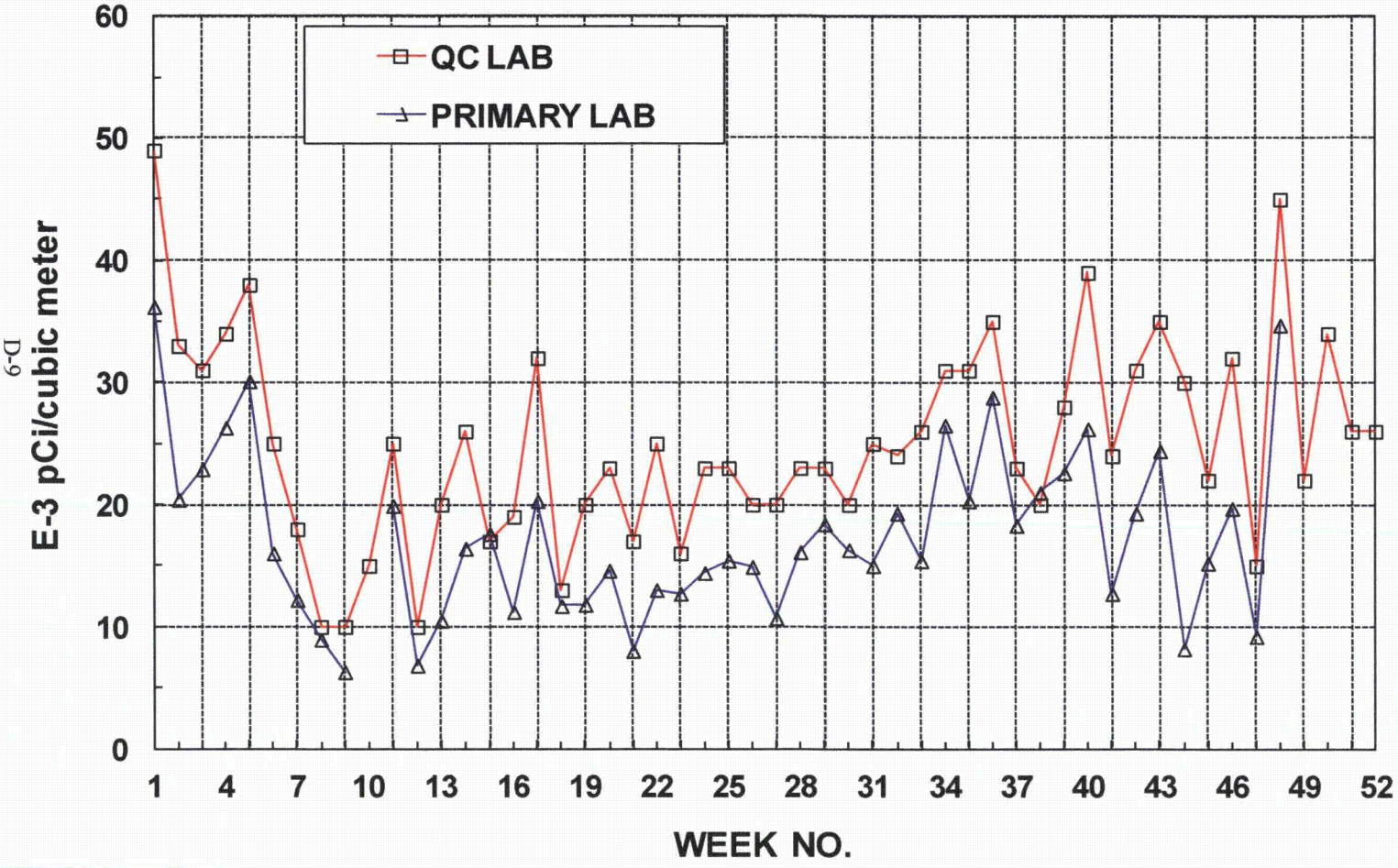
COLLECTION PERIOD	1A	COLLECTION PERIOD	1A
1	01/03/13 - 01/09/13	27	07/03/13 - 07/11/13
2	01/09/13 - 01/17/13	28	07/11/13 - 07/18/13
3	01/17/13 - 01/24/13	29	07/18/13 - 07/25/13
4	01/24/13 - 01/31/13	30	07/25/13 - 08/01/13
5	01/31/13 - 02/07/13	31	08/01/13 - 08/08/13
6	02/07/13 - 02/15/13	32	08/08/13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

FIGURE D-1
COMPARISON OF MONTHLY TOTAL GROSS BETA CONCENTRATIONS IN DRINKING WATER SAMPLES SPLIT BETWEEN THE PRIMARY AND QC LABORATORIES, 2013



ENVIRONMENTAL INC. SOLUBLE AND INSOLUBLE FRACTIONS WERE COMBINED FOR TOTAL GROSS BETA

FIGURE D-2
COMPARISON OF WEEKLY GROSS BETA CONCENTRATIONS FROM COLLOCATED AIR PARTICULATE LOCATIONS SPLIT BETWEEN THE PRIMARY AND QC LABORATORIES, 2013



APPENDIX E

QUALITY CONTROL INTER-LABORATORY COMPARISON PROGRAM

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
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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
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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
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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
(Page 1 of 1)

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
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			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
(Page 2 of 2)

			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.

APPENDIX F

ERRATA DATA

Errata Data

Incorrect Setting on Gamma Spectroscopy Detector at TBE

Due to an incorrect setting on gamma detector 08, 3.29 rather than 4.66 was used in the 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.

2011

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
13B	12/06/11	12/27/11	Drinking Water	I-131	<15	<19.09	pCi/L

2012

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
1MM	12/28/11	02/01/12	Surface Water	I-131	<15	<15.4	pCi/L
13B	01/03/12	01/30/12	Drinking Water	I-131	<15	<18.33	pCi/L
4L	02/02/12	03/01/12	Drinking Water	*	*	*	*
V	02/06/12	02/06/12	Milk	La-140	<15	<15.24	pCi/L
1MM	03/28/12	05/02/12	Surface Water	La-140	<15	<15.05	pCi/L
1MM	05/02/12	05/30/12	Surface Water	I-131	<15	<15.09	pCi/L
13B	05/07/12	05/30/12	Drinking Water	I-131	<15	<20.53	pCi/L
13B	05/07/12	05/30/12	Drinking Water	La-140	<15	<16.47	pCi/L
MW-PB-22	05/07/12		Ground Water	I-131	<15	<15.3	pCi/L
D	05/07/12	05/07/12	Milk	*	*	*	*
MW-PB-11	05/08/12		Ground Water	*	*	*	*
MW-PB-29	05/08/12		Ground Water	*	*	*	*
MW-PB-31	05/08/12		Ground Water	I-131	<15	<15.6	pCi/L
MW-PB-31	05/08/12		Ground Water	La-140	<15	<18.58	pCi/L
MW-PB-6	05/09/12		Ground Water	*	*	*	*
1MM	05/30/12	06/27/12	Surface Water	I-131	<15	<17.4	pCi/L
1Q	05/31/12	05/31/12	Vegetation	I-131	<60	<77.94	pCi/kg Wet
S	06/04/12	06/04/12	Milk	*	*	*	*
1Q	07/30/12	07/30/12	Vegetation	*	*	*	*
2B	07/30/12	07/30/12	Vegetation	*	*	*	*
E	08/13/12	08/13/12	Milk	*	*	*	*
V	08/13/12	08/13/12	Milk	*	*	*	*
2B	08/27/12	08/27/12	Vegetation	I-131	<60	<76.04	pCi/kg Wet
U	08/27/12	08/27/12	Milk	*	*	*	*
4L	08/30/12	09/27/12	Drinking Water	I-131	<15	<19.51	pCi/L
4L	08/30/12	09/27/12	Drinking Water	La-140	<15	<16.59	pCi/L
2B	09/24/12	09/24/12	Vegetation	I-131	<60	<82.59	pCi/kg Wet
R	09/24/12	09/24/12	Milk	La-140	<15	<20.04	pCi/L
4Q12 5H2	10/01/12	12/31/12	Air Particulate	*	*	*	*
S	11/05/12	11/05/12	Milk	*	*	*	*
MW-PB-15	11/07/12		Ground Water	*	*	*	*
1MM	11/28/12	01/02/13	Surface Water	I-131	<15	<19.2	pCi/L
S	12/04/12	12/04/12	Milk	*	*	*	*

*Required LLDs were achieved.

2013

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
4L	01/03/13	01/31/13	Drinking Water	*	*	*	*
S	02/04/13	02/04/13	Milk	*	*	*	*
S	03/04/13	03/04/13	Milk	*	*	*	*

*Required LLDs were achieved.

APPENDIX G

ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

Docket No: 50-277
50-278

PEACH BOTTOM ATOMIC POWER STATION UNITS 2 and 3

Annual Radiological
Groundwater Protection Program Report

1 January 2013 Through 31 December 2013

Prepared By

Teledyne Brown Engineering
Environmental Services

Exelon Generation Company, LLC

Peach Bottom Atomic Power Station
Delta, PA 17314

May 2014

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Appendix A Sampling Locations, Distance and Direction

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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 and Seep Samples Collected as Part of the Radiological Groundwater Protection Program, Peach Bottom Atomic Power Station, 2013.

Table B-I.2 Concentrations of Gamma Emitters in Groundwater and Seep Water Samples Collected as Part of the Radiological Groundwater Protection Program, Peach Bottom Atomic Power Station, 2013.

Table B-I.3 Concentrations of Hard-to-Detects in Groundwater Samples Collected as Part of the Radiological Groundwater Protection Program, Peach Bottom Atomic Power Station, 2013.

Table B-II.1 Concentrations of Tritium in Surface Water Samples Collected as Part of the Radiological Groundwater Protection Program, Peach Bottom Atomic Power Station, 2013.

Table B-II.2 Concentrations of Gamma Emitters in Surface Water Samples Collected as Part of the Radiological Groundwater Protection Program, Peach Bottom Atomic Power Station, 2013.

Table B-III.1 Concentrations of Tritium in Precipitation Water Samples Collected as Part of the Radiological Groundwater Protection Program, Peach Bottom Atomic Power Station, 2013.

I. Summary and Conclusions

This report on the Radiological Groundwater Protection Program (RGPP) conducted for the Peach Bottom Atomic Power Station (PBAPS) by Exelon Nuclear covers the period 01 January 2013 through 31 December 2013. This evaluation involved numerous station personnel and contractor support personnel. At PBAPS, there are 31 permanent groundwater monitoring wells. Installation of the wells began in 2006. Of these monitoring locations, none were assigned to the station's REMP. This is the seventh in a series of annual reports on the status of the RGPP conducted at PBAPS. This report covers groundwater, surface water and seep water samples collected from the environment on station property in 2013. During that time period, 465 analyses were performed on more than 243 samples from 41 locations. These 41 locations include 27 groundwater monitoring wells, 3 surface water sample points, 3 groundwater seeps and 2 yard drain sumps (groundwater) and 6 precipitation water sampling points. Phase 1 of the monitoring was part of a comprehensive study initiated by Exelon to determine whether groundwater or surface water in the vicinity of PBAPS had been adversely impacted by any releases of radionuclides. Phase 1 was conducted by Conestoga Rovers and Associates (CRA) and the conclusions were made available to state and federal regulators as well as the public. Phase 2 of the RGPP was conducted by Exelon corporate and station personnel to initiate follow up of Phase 1 and begin long-term monitoring at groundwater and surface water locations selected during Phase 1. All analytical results from Phase 2 monitoring are reported herein.

In assessing all the data gathered for this report, it was concluded that the operation of PBAPS had no adverse radiological impact on the environment and there are no known active releases into the groundwater at PBAPS.

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 or surface water 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 (Sr-89) and strontium-90 (Sr-90) were not detected in any of the samples. (Table B-I.1, Appendix B).

Tritium was not detected in any groundwater locations at concentrations greater than the United States Environmental Protection Agency (USEPA) drinking water standard (and the Nuclear Regulatory Commission [NRC] Reporting Limit) of 20,000 pCi/L. Low levels of tritium were detected at concentrations greater than the minimum detectable concentration (MDC) in 10 of 27 groundwater monitoring wells. The tritium concentrations ranged from 176 ± 115 pCi/L to 10,700 ± 1,110

pCi/L (Table B–I.1, Appendix B). Tritium was not detected at concentrations greater than the MDC in any surface water, seep water or precipitation water sample locations. Based on the sample data tritium is not migrating off the station property at detectable concentrations. No tritium was detected in any surface water samples (Table B–II.1, Appendix B). No tritium was detected in any precipitation water samples (Table B–III.1, Appendix B).

Gross Alpha and Gross Beta analyses in the dissolved and suspended fractions were performed on groundwater samples during 2013. Gross Alpha (dissolved) was detected in 10 of 25 groundwater locations analyzed. The concentrations ranged from 0.7 to 12.1 pCi/L. Gross Alpha (suspended) was detected in 4 of 25 groundwater locations analyzed. The concentrations ranged from 1.2 to 4.2 pCi/L. Gross Beta (dissolved) was detected in all 25 groundwater locations analyzed. The concentrations ranged from 1.2 to 20.3 pCi/L. Gross Beta (suspended) was detected in 8 of 25 groundwater locations analyzed. The concentrations ranged from 2.6 to 10.8 pCi/L. The activity detected is consistent with historical levels.

Hard-To-Detect analyses were performed on a select group of groundwater and surface water locations to establish baseline levels (Table B–I.3, Appendix B). The analyses for groundwater included iron-55 (Fe-55), nickel-63 (Ni-63), americium-241 (Am-241), curium-242 (Cm-242), Cm-243/244, plutonium-238 (Pu-238), Pu-239/240, uranium-234 (U-234), U-235 and U-238. U-234 was detected in four of five groundwater monitoring locations analyzed. The concentrations ranged from 0.53 to 7.30 pCi/L. U-238 was detected in three of five groundwater monitoring locations analyzed. The concentrations ranged from 0.61 to 3.32 pCi/L. No plant produced radionuclides were detected.

II. Introduction

PBAPS is located along the Susquehanna River between Holtwood and Conowingo Dams in Peach Bottom Township, York County, Pennsylvania. The initial loading of fuel into Unit 1, a 115 MWth high temperature, gas-cooled reactor (HTGR) began on 5 February 1966, and initial criticality was achieved on 3 March 1966. Shutdown of Peach Bottom Unit 1 for decommissioning was on 31 October 1974. For the purposes of the monitoring program, the beginning of the operational period for Unit 1 was considered to be 5 February 1966. A summary of the Unit 1 preoperational monitoring program was presented in a previous report [(1)]. PBAPS Units 2 and 3 are boiling water reactors, each with a rated full-power output of approximately 3514 MWth. The first fuel was loaded into Peach Bottom Unit 2 on 9 August 1973. Criticality was achieved on 16 September 1973 and full power was reached on 16 June 1974. The first fuel was loaded into Peach Bottom Unit 3 on 5 July 1974. Criticality was achieved on 7 August 1974 and full power was first reached on 21 December 1974. Preoperational summary reports [(2)(3)] for Units 2 and 3 have been previously issued and summarize the results of all analyses performed on samples collected from 5 February 1966 through 8 August 1973.

This report covers those analyses performed by Teledyne Brown Engineering (TBE) on samples collected in 2013.

A. Objective of the RGPP

The objectives of the RGPP are as follows:

1. Ensure that the site characterization of geology and hydrology provides an understanding of predominant ground water gradients based upon current site conditions.

2. Identify site risk based on plant design and work practices.

3. Establish an on-site ground water monitoring program to ensure timely detection of inadvertent radiological releases to ground water, soil or surface water.
4. Establish a remediation protocol to prevent migration of licensed material off-site and to minimize decommissioning impacts.

5. Ensure that records of leaks, spills, remediation efforts are retained and retrievable to meet the requirements of 10 CFR 50.75(g).

6. Conduct initial and periodic briefings of their site specific Groundwater Protection Initiative (GPI) program with the designated State/Local officials.

7. Make informal communication as soon as practicable to appropriate State/Local officials, with follow-up notifications to the NRC, as appropriate, regarding significant on-site leaks/spills into ground water and on-site or off-site water sample results exceeding the criteria in the REMP as described in the OCDM.

8. Submit a written 30-day report to the NRC for any water sample result for on-site ground water that is or may be used as a source of drinking water that exceeds any of the criteria in the licensee's existing REMP/ODCM for 30-day reporting of off-site water sample results.

9. Document all on-site ground water sample results and a description of any significant on-site leaks/spills into ground water for each calendar year in the Annual Radiological Environmental Operating Report (AREOR) for REMP or the Annual Radioactive Effluent Release Report (ARERR).

10. Perform a self-assessment of the GPI program.

11. Conduct a review of the GPI program, including at a minimum the licensee's self assessments, under the auspices of the Nuclear Energy Institute (NEI).

B. Implementation of the Objectives

The objectives identified have been implemented at PBAPS via Corporate and Site specific procedures. These procedures include:

1. EN-AA-407, Response to Inadvertent Releases of Licensed Materials to Groundwater, Surface Water, Soil or Engineered Structures.

2. EN-AA-408, Radiological Groundwater Protection Program

3. EN-AA-408-4000, Radiological Groundwater Protection Program Implementation.

4. EN-PB-408-4160, Peach Bottom RGPP Reference Material

C. Program Description

1. Sample Collection

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

Groundwater, Surface Water and Precipitation Water

Samples of water are collected, managed, transported and analyzed in accordance with approved procedures. Groundwater, surface water, and precipitation water 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. 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 hydro geologist 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." The chemical properties of tritium are essentially those of ordinary hydrogen.

Tritiated water behaves the same as ordinary water in both the environment and the body. 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 essentially all tritium is cleared. Organically bound tritium (tritium that is incorporated in organic compounds) can remain in the body for a longer period.

Tritium is produced naturally in the upper atmosphere when cosmic rays strike air molecules. Tritium is also produced during nuclear weapons explosions, as a by-product in reactors producing electricity and in special production reactors, where the isotopes lithium-7 and/or boron-10 are activated to produce tritium. Like normal water, tritiated water is colorless and odorless. 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 has a 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 emits a low energy beta particle 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 Environmental Inc. Midwest Laboratories (EIML) to analyze the environmental samples for radioactivity for the PBAPS RGPP in 2013.

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

1. Concentrations of Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, I-131, Cs-134, Cs-137, Ba-140 and La-140 in groundwater and surface water.
2. Concentrations of Sr-89, Sr-90 in groundwater
3. Concentrations of H-3 in groundwater, surface water and precipitation water.
4. Concentrations of 'hard-to-detect' isotopes (Am-241, Cm-242, Cm-243/244, Pu-238, Pu-239/240, U-233/234, U-235, U-238, Fe-55 and Ni-63) in groundwater. These analyses are required based on tritium results.

B. Data Interpretation

The radiological data collected prior to PBAPS becoming operational were used as a baseline with which these operational data were compared. For the purpose of this report, PBAPS was considered operational at initial criticality. Several factors were important in the interpretation of the data:

1. <u>Lower Limit of Detection</u>

   The lower limit of detection (LLD) is 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) as well as all sources of error (Total Propagated Uncertainty or TPU). Each result has two values calculated. Exelon reports the TPU by following the result with plus or minus ± the estimated sample standard deviation as TPU, that is obtained by propagating all sources of analytical uncertainty in measurements.

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 and surface water 12 nuclides, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, I-131, Cs-134, Cs-137, Ba-140 and La-140 were reported.

C. Background Analysis

A pre-operational REMP was conducted to establish background radioactivity levels prior to operation of the Station. The environmental media sampled and analyzed during the pre-operational REMP were atmospheric radiation, fall-out, domestic water, surface water, marine life and foodstuffs. The results of the monitoring were detailed in the report entitled PBAPS, Environs Radiation Monitoring Program, Preoperational Summary Report Units 2 and 3, September 1970- August 1973, January 1974 and PBAPS, Environs Radiation Monitoring Program, Preoperational Summary Report Units 2 and 3, June 1977. The pre-operational REMP contained analytical results from samples collected from the surface water, discharge, well and rain water.

1. Background Concentrations of Tritium

The purpose of the following discussion is to summarize background measurements of tritium in various media performed by others. Additional detail may be found by consulting references (CRA 2006).

a. Tritium Production

Tritium is created in the environment from naturally occurring processes both cosmic and subterranean, as well as from anthropogenic (i.e., man-made) sources. In the upper atmosphere, "Cosmogenic" tritium is produced from the bombardment of stable nuclides and 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.

b. Precipitation Data

Precipitation samples are routinely collected at stations around the world for the analysis of tritium and other radionuclides. Two publicly available databases that provide tritium concentrations in precipitation are Global Network of Isotopes in Precipitation (GNIP) and USEPA's RadNet database. GNIP provides tritium precipitation concentration data for samples collected worldwide from 1960 to 2006. RadNet provides tritium precipitation concentration data for samples collected at stations throughout the U.S. from 1960 up to and including 2006. Based on GNIP data for sample

stations located in the U.S. Midwest, tritium concentrations peaked around 1963. This peak, which approached 10,000 pCi/L for some stations, coincided with the atmospheric testing of thermonuclear weapons. Tritium concentrations in surface water showed a sharp decline up until 1975 followed by a gradual decline since that time. Tritium concentrations have typically been below 100 pCi/L since around 1980. Tritium concentrations in wells may still be above the 200 pCi/L detection limit from the external causes described above. Water from previous years and decades is naturally captured in groundwater, so some well water sources today are affected by the surface water from the 1960s that was elevated in tritium.

c. Surface Water Data

Surface water level measurements were collected at the surface water monitoring locations during the groundwater level measurement event. The purpose of the surface water monitoring was to provide surface water elevation data to evaluate the groundwater/surface water interaction at the Station.

The USEPA RadNet surface water data typically has a reported 'Combined Standard Uncertainty' of 35 to 50 pCi/L. According to USEPA, this corresponds to a ± 70 to 100 pCi/L 95% confidence bound on each given measurement. Therefore, the typical background data provided may be subject to measurement uncertainty of approximately ± 70 to 100 pCi/L.

The radio-analytical laboratory is counting tritium results to an Exelon specified 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

Groundwater

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

Tritium

Samples from 27 locations were analyzed for tritium activity (Table B-I.1, Appendix B). Tritium values ranged from the detection limit to 10,700 pCi/l. The existing wells at or near the owner-controlled boundary showed no tritium. The location most representative of potential offsite user of drinking water is less than the MDC (Table B-I.1, Appendix B).

Strontium

Sr-89 and Sr-90 were not detected in any of the samples (Table B-I.1, Appendix B).

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 2013. Gross Alpha (dissolved) was detected in 10 of 25 groundwater locations analyzed. The concentrations ranged from 0.7 to 12.1 pCi/L. Gross Alpha (suspended) was detected in 4 of 25 groundwater locations analyzed. The concentrations ranged from 1.2 to 4.2 pCi/L. Gross Beta (dissolved) was detected in all 25 groundwater locations analyzed. The concentrations ranged from 1.2 to 20.3 pCi/L. Gross Beta (suspended) was detected in 8 of 25 groundwater locations analyzed. The concentrations ranged from 2.6 to 10.8 pCi/L. The activity detected is naturally occurring and the levels are considered to be background (Table B-I.1, Appendix B).

Hard-To-Detect

Hard-To-Detect analyses were performed on a select group of groundwater and surface water locations to establish baseline levels. The analyses for groundwater included Fe-55, Ni-63, Am-

241, Cm-242, Cm-243/244, Pu-238, Pu-239/240, U-234, U-235, and U-238. U-234 was detected in four of five groundwater monitoring locations analyzed. The concentrations ranged from 0.53 to 7.30 pCi/L. U-238 was detected in three of five groundwater monitoring locations analyzed. The concentrations ranged from 0.61 to 3.32 pCi/L. The activity detected is naturally occurring and the levels are considered to be background (Table B–I.3, Appendix B).

Gamma Emitters

No power-production gamma emitters were detected in any of the samples (Table B–I.2, Appendix B).

B. Surface Water Results

Surface Water

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

Tritium

Samples from three locations were analyzed for tritium activity. Tritium was not detected in any samples (Table B–II.1, Appendix B).

Gamma Emitters

No power-production gamma emitters were detected in any of the samples. No other gamma emitting nuclides were detected (Table B–II.2, Appendix B).

C. Precipitation Water Results

Precipitation Water

Samples were collected at six locations (1A, 1B, 1S, 1SSE, 1Z, and 4M). The following analysis was performed:

Tritium

Samples from six locations were analyzed for tritium activity. Tritium activity was not detected in any samples (Table B-III.1, Appendix B).

D. Drinking Water Well Survey

A drinking water well survey was conducted during the summer 2006 by CRA (CRA 2006) around the PBAPS. The water well inventory was updated in 2012. The updated water well database search indicated a new water well off Station property within a one mile radius of the Station. The well is described as a "test" well and its use is listed as "unused". In summary, there were no significant changes in off Station groundwater use from 2006-2012.

E. Summary of Results – Inter-Laboratory Comparison Program

Inter-Laboratory Comparison Program results for TBE and Environmental Inc. (Midwest Labs) are presented in the AREOR.

F. Leaks, Spills and Releases

There were no leaks, spills or releases of water containing licensed material to environment in 2013.

G. Trends

A tritium plume has been identified northeast of the Unit 3 Turbine Building. The plume extends eastward toward well MW-PB-4. The plume is bounded on the north by wells MW-PB-12 and MW-PB-22. The plume is bounded on the south by wells MW-PB-20 and MW-PB-21.

Wells MW-PB-4, 24, 25, 26 and 27 were each sampled and analyzed 9 times during 2013. On 8 occasions, MW-PB-25 samples had the highest tritium activity. MW-PB-27 had the highest activity 1 time, on January 2, 2013.

MW-PB-27 activity from the sample on January 2, 2013, was the result of the tritium plume migrating southward due to groundwater dewatering activities associated with a buried pipe inspection. In the next sampling, performed on January 7, 2013, MW-PB-25, had the highest tritium activity. In each subsequent 2013, MW-PB-25 had the highest tritium activity. This was an expected condition as the dewatering activities terminated in December 2012, returning the tritium plume to its pre-dewatering location.

All wells exhibited decreasing trends during 2013. The increased sampling frequency to monitor changes due to dewatering, was continued through January 2013. The sampling frequency returned to quarterly after well activity trended toward pre-dewatering results.

H. Investigations

MW-PB-4

In 2006, monitoring wells MW-PB-1 through MW-PB-14 were installed. Tritium activity was detected in MW-PB-4, located north of the Unit 3 Circulating Water Pump Structure and MW-PB-12, north of the Administration Building. Groundwater flow on site is from west to east. Monitoring wells were installed to the west, southwest and northwest of monitoring wells MW-PB-4 and MW-PB-12. The wells with the highest tritium activity are the wells installed directly east of and adjacent to the Unit 3 Turbine Building, wells MW-PB-24, 25, 26 and 27.

Investigation of potential sources identified that the likely source of groundwater contamination was due to degraded floor seams in the Unit 3 Turbine Building Moisture Separator area 116' elevation. Leaks internal to the building entered the groundwater through the degraded floor seams. The floor seams were repaired in August 2010. The floor in the Unit 3 Turbine Building Moisture Separator area 116' elevation was sealed and recoated in October 2011. Monitoring well activity has been decreasing since floor seam repairs were completed.

MW-PB-29, 30 and 31

An extent-of-condition inspection of the Unit 2 Turbine Building Moisture Separator area 116' elevation floor was performed in October 2010. Minor degradation of the floor seams was identified and repaired. In May 2011, monitoring wells MW-PB-29 and 30 were installed directly east of and adjacent to the Unit 2 Turbine Building; MW-PB-31 was installed southeast of and adjacent to the Unit 2 Turbine Building. These wells were installed to determine if a condition existed east of the Unit 2 Turbine Building that is similar to the condition east of the Unit 3 Turbine Building.

Wells MW-PB-29, 30 and 31 were sampled a total of 18 times in 2013. Tritium activity in the wells ranged from less than the MDC 449 ± 144 pCi/L. Samples from these wells were also analyzed for gamma emitting isotopes and hard to detect radionuclides. All results were less than the MDC for each isotope.

The Unit 2 Turbine Building Moisture Separator area 116' elevation floor was sealed and recoated in October 2012. Groundwater intrusion into a ventilation pit on the east side of the area was identified. The groundwater was removed and degraded seams in the ventilation pit were successfully repaired.

MW-PB-4, 24, 25, 26 and 27

Wells MW-PB-4, 24, 25, 26 and 27 are considered the wells of primary interest. These wells were sampled on a frequency that ranged from weekly to quarterly. Below are 2 tables. The first lists the highest tritium activity of the wells of primary interest and the date of the sampling. The second table lists the tritium activity of the wells from the last sampling of 2013. The tritium activity is in pCi/L.

Well #	Tritium Activity	Date
MW-PB-4	17,200	5/24/2010
MW-PB-24	33,500	3/15/2010
MW-PB-25	161,000	3/8/2010
MW-PB-26	196,000	3/8/2010
MW-PB-27	71,800	2/22/2010

Well #	Tritium Activity	Date
MW-PB-4	376	10/28/2013
MW-PB-24	220	10/28/2013
MW-PB-25	5,770	10/28/2013
MW-PB-26	283	10/28/2013
MW-PB-27	470	10/28/2013

Potential sources of tritium in the groundwater were investigated via procedural processes and documented in the corrective action program. The most likely pathway for tritium to enter the groundwater was determined to be leaks internal to the Unit 3 Turbine Building Moisture Separator 116', migrating through degraded floor seams. The floor seams were repaired and the entire floor was sealed and a coating applied during the refuel outage in the fall of 2011. The wells have been on a generally-decreasing trend since these repairs were completed

I. Actions Taken

1. Compensatory Actions

Wells, MW-PB-4, 20, 21, 22, 24, 25, 26, 27, 29 and 30 were sampled and analyzed for tritium on a weekly to quarterly frequency. These wells were sampled on a frequency greater than that required by Station procedures, when determined to be necessary to evaluate potential changes in tritium activity. The increased sample frequency was performed to monitor the effectiveness of repairs completed in the Unit 3 Turbine Building and to

monitor potential changes in the tritium plume due to dewatering of the excavation used for the buried pipe inspection.

2. Installation of Monitoring Wells

No groundwater monitoring wells were installed in 2013.

3. Actions to Recover/Reverse Plumes

There were no actions to recover the plume.

J. Deviations

The data tables show that duplicate samples were obtained at several wells during 2013. These duplicate samples were obtained and analyzed for quality control purposes.

There are no additional deviations to report.

V. References

1. Conestoga Rovers and Associates, Fleetwide Assessment, Peach Bottom Atomic Power Station, Delta, PA, Fleetwide Assessment, Rev. 1, September 1, 2006.

2. Peach Bottom Atomic Power Station, Environs Radiation Monitoring Program, Preoperational Summary Report units 2 and 3, June 1977.

3. Peach Bottom Atomic Power Station, Environs Radiation Monitoring Program, Preoperational Summary Report units 2 and 3, September 1970-August 1973, January 1974.

4. Conestoga Rovers and Associates, Hydrogeologic Investigation Report, Peach Bottom Atomic Power Station, November 2012.

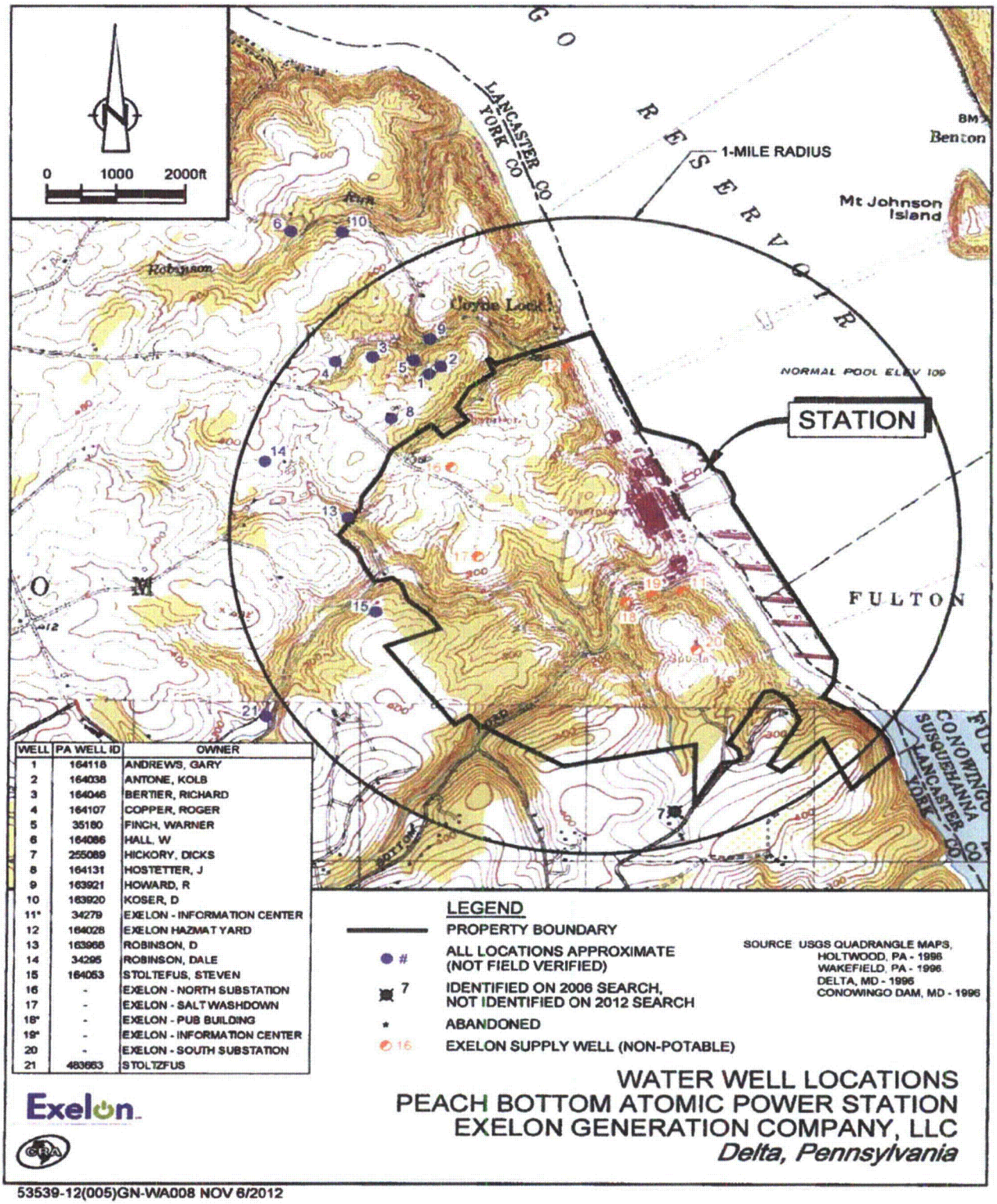
5. AMO Environmental Decisions, RGPP Summary Monitoring Report, March 2013, June 2013, October 2013.

APPENDIX A

SAMPLING LOCATIONS, DISTANCE AND DIRECTION

TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations, Distance and Direction, Peach Bottom Atomic Power Station, 2013

Site	Site Type	Sector	Distance (ft.)
MW-PB-1	Groundwater Well	SW	1,166.6
MW-PB-2	Groundwater Well	WNW	309.0
MW-PB-3	Groundwater Well	SSE	709.7
MW-PB-4	Groundwater Well	ENE	350.2
MW-PB-5	Groundwater Well	NNW	1,146.1
MW-PB-6	Groundwater Well	NE	1,072.4
MW-PB-7	Groundwater Well	SE	813.9
MW-PB-8	Groundwater Well	SE	1,167.0
MW-PB-9	Groundwater Well	SE	2,816.9
MW-PB-10	Groundwater Well	SSE	1,125.1
MW-PB-11	Groundwater Well	SE	438.4
MW-PB-12	Groundwater Well	NNE	317.2
MW-PB-13	Groundwater Well	NW	329.4
MW-PB-14	Groundwater Well	S	1,231.2
MW-PB-15	Groundwater Well	SE	1,087.9
MW-PB-16	Groundwater Well	SE	1,101.6
MW-PB-17	Groundwater Well	SE	1,005.4
MW-PB-18	Groundwater Well	SE	1,010.0
MW-PB-19	Groundwater Well	NW	226.8
MW-PB-20	Groundwater Well	E	260.5
MW-PB-21	Groundwater Well	E	363.3
MW-PB-22	Groundwater Well	NE	315.4
MW-PB-24	Groundwater Well	N	185.9
MW-PB-25	Groundwater Well	N	159.7
MW-PB-26	Groundwater Well	NNE	121.1
MW-PB-27	Groundwater Well	NNE	139.1
MW-PB-28	Groundwater Well	NW	249.6
MW-PB-29	Groundwater Well	SE	325.0
MW-PB-30	Groundwater Well	SE	379.2
MW-PB-31	Groundwater Well	SE	450.1
SW-PB-1	Surface Water	NNW	2,850.5
SW-PB-5	Surface Water	SE	675.1
SW-PB-6	Surface Water	SE	1,305.9
SP-PB-1	Groundwater Seep	S	514.2
SP-PB-2	Groundwater Seep	WNW	311.6
SP-PB-3	Groundwater Seep	NNW	1,281.1
U/2 YARD DRAIN SUMP	Groundwater	SSE	498.7
U/3 YARD DRAIN SUMP	Groundwater	WSW	175.8
1A	Precipitation Water	SE	1,396
1B	Precipitation Water	NW	2,587
1S	Precipitation Water	S	1,315
1SSE	Precipitation Water	SSE	1,281
1Z	Precipitation Water	SE	1,396
4M	Precipitation Water	SE	45,989



WELL	PA WELL ID	OWNER
1	164118	ANDREWS, GARY
2	164038	ANTONE, KOLB
3	164046	BERTIER, RICHARD
4	164107	COPPER, ROGER
5	35180	FINCH, WARNER
6	164086	HALL, W
7	255089	HICKORY, DICKS
8	164131	HOSTETTER, J
9	163921	HOWARD, R
10	163920	KOSER, D
11*	34279	EXELON - INFORMATION CENTER
12	164028	EXELON HAZMAT YARD
13	163968	ROBINSON, D
14	34295	ROBINSON, DALE
15	164053	STOLTEFUS, STEVEN
16	-	EXELON - NORTH SUBSTATION
17	-	EXELON - SALT WASHDOWN
18*	-	EXELON - PUB BUILDING
19*	-	EXELON - INFORMATION CENTER
20	-	EXELON - SOUTH SUBSTATION
21	483663	STOLTZFUS

Figure A-1
Well Water Locations, Peach Bottom Atomic Power Station, 2013

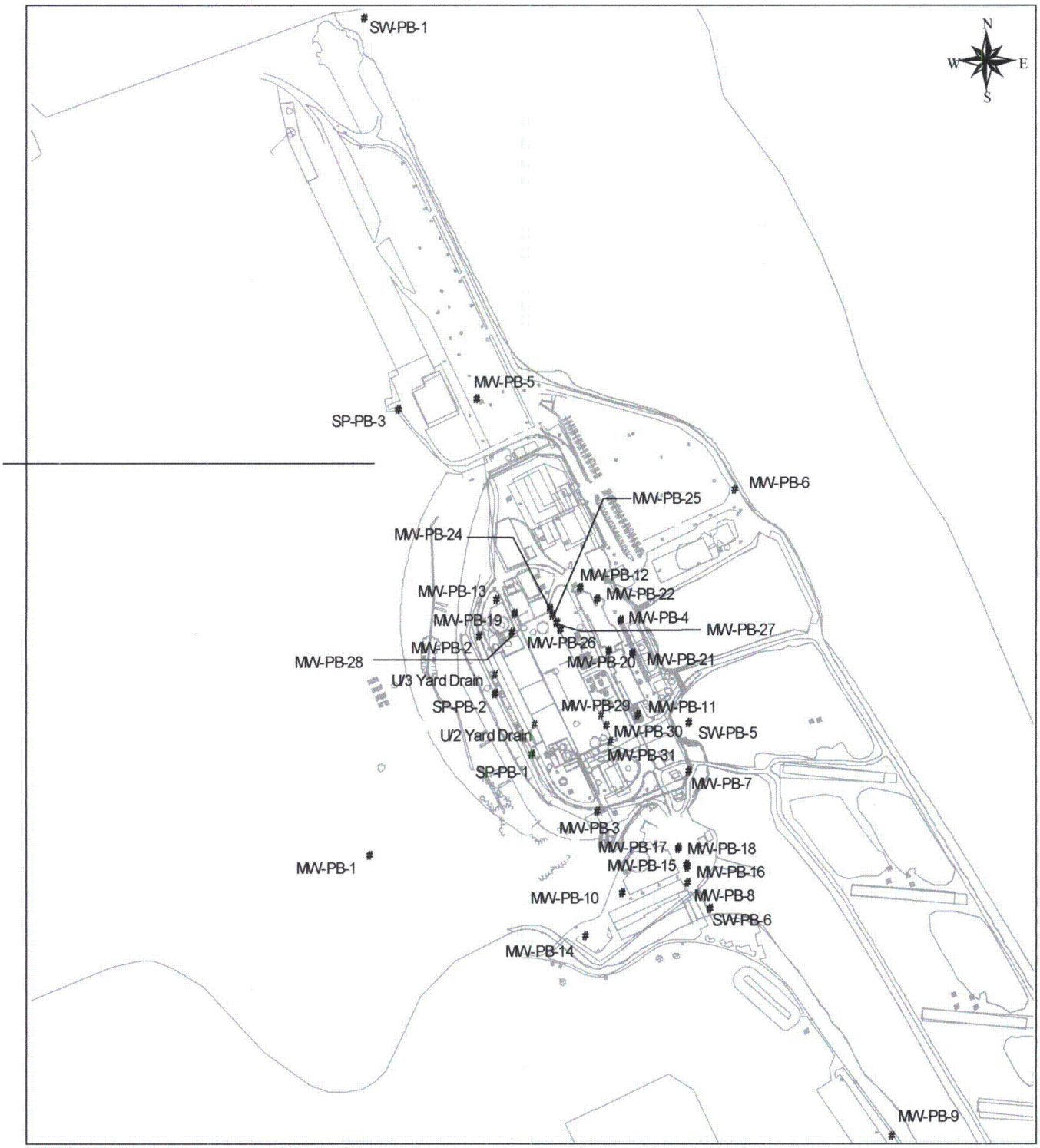


Figure A-2
RGPP Monitoring Locations, Peach Bottom Atomic Power Station, 2013

APPENDIX B

DATA TABLES

TABLE B-I.1 **CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA IN GROUNDWATER AND SEEP SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER 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-PB-1	04/17/13	< 172						
MW-PB-10	02/05/13	< 171						
MW-PB-10	04/16/13	< 171	< 4.4	< 0.8	< 1.0	2.9 ± 1.0	8.5 ± 1.3	3.9 ± 1.2
MW-PB-10	08/06/13	< 193						
MW-PB-10	10/29/13	< 177						
MW-PB-11	02/05/13	< 181						
MW-PB-11	02/05/13	< 192						
MW-PB-11	04/16/13	< 168	< 4.9	< 0.7	< 0.5	< 0.6	1.5 ± 0.7	< 1.5
MW-PB-11	08/07/13	< 191						
MW-PB-11	10/29/13	< 181						
MW-PB-12	02/05/13	< 178						
MW-PB-12	04/17/13	< 170	< 4.5	< 0.6	< 0.5	< 0.6	1.2 ± 0.7	< 1.5
MW-PB-12	08/08/13	230 ± 130						
MW-PB-12	10/29/13	238 ± 127						
MW-PB-12	10/29/13	259 ± 127						
MW-PB-13	02/06/13	< 191						
MW-PB-13	04/16/13	< 169	< 4.1	< 0.6	12.1 ± 4.7	< 1.6	20.3 ± 3.0	5.0 ± 2.0
MW-PB-13	08/07/13	< 196						
MW-PB-13	10/28/13	< 176						
MW-PB-14	04/16/13	< 173						
MW-PB-15	02/06/13	< 189						
MW-PB-15	04/16/13	< 169	< 3.6	< 0.7	< 0.7	< 1.0	7.9 ± 1.1	< 1.5
MW-PB-15	08/06/13	< 166						
MW-PB-15	10/29/13	< 175						
MW-PB-16	02/06/13	< 189						
MW-PB-16	04/16/13	< 170	< 4.4	< 0.7	4.7 ± 1.0	3.3 ± 1.2	7.8 ± 1.0	3.6 ± 1.2
MW-PB-16	04/16/13	< 170	< 3.4	< 0.7	4.1 ± 0.9	1.2 ± 0.8	7.1 ± 1.0	< 1.5
MW-PB-16	08/06/13	< 191						
MW-PB-16	10/29/13	< 180						
MW-PB-19	02/06/13	< 182						
MW-PB-19	04/16/13	< 174	< 8.0	< 0.7	0.8 ± 0.4	< 1.0	2.7 ± 0.7	< 1.5
MW-PB-19	08/07/13	< 193						
MW-PB-19	10/28/13	< 176						
MW-PB-2	02/06/13	< 191						
MW-PB-2	04/16/13	< 170	< 3.9	< 0.6	3.1 ± 0.8	< 0.9	11.5 ± 1.1	< 1.6
MW-PB-2	08/07/13	< 188						
MW-PB-2	10/28/13	< 177						
MW-PB-20	01/02/13	< 194						
MW-PB-20	01/07/13	< 196						
MW-PB-20	01/14/13	< 176						
MW-PB-20	02/05/13	< 180						
MW-PB-20	04/17/13	< 170	< 4.2	< 0.7	< 2.6	< 0.8	10.9 ± 1.7	6.0 ± 1.4
MW-PB-20	08/07/13	< 186						
MW-PB-20	10/29/13	< 177						
MW-PB-21	01/02/13	< 170						
MW-PB-21	01/07/13	< 177						
MW-PB-21	01/14/13	< 179						
MW-PB-21	02/05/13	< 180						
MW-PB-21	02/05/13	< 180						
MW-PB-21	04/17/13	< 171	< 3.5	< 0.6	< 0.9	< 0.8	7.0 ± 1.2	< 1.6
MW-PB-21	08/07/13	< 181						
MW-PB-21	10/29/13	< 179						
MW-PB-22	01/02/13	610 ± 163						
MW-PB-22	01/07/13	631 ± 155						

TABLE B-I.1 **CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA IN GROUNDWATER AND SEEP SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER 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-PB-22	01/14/13		485 ± 135						
MW-PB-22	02/05/13		441 ± 134						
MW-PB-22	02/05/13		445 ± 133						
MW-PB-22	04/17/13		830 ± 151	< 3.3	< 0.6	< 0.8	< 1.0	2.9 ± 0.9	< 1.6
MW-PB-22	08/07/13		1080 ± 175						
MW-PB-22	10/29/13		904 ± 164						
MW-PB-22	10/29/13		633 ± 151						
MW-PB-24	01/02/13		199 ± 128						
MW-PB-24	01/07/13		337 ± 138						
MW-PB-24	01/14/13		295 ± 123						
MW-PB-24	01/22/13		450 ± 150						
MW-PB-24	02/06/13		228 ± 119						
MW-PB-24	04/17/13		688 ± 141	< 3.3	< 0.7	< 0.8	< 1.0	2.2 ± 0.9	< 1.6
MW-PB-24	08/08/13		367 ± 136						
MW-PB-24	08/27/13		253 ± 126						
MW-PB-24	10/30/13		220 ± 114						
MW-PB-25	01/02/13		4600 ± 501						
MW-PB-25	01/07/13		7550 ± 800						
MW-PB-25	01/14/13		9020 ± 945						
MW-PB-25	01/22/13		5710 ± 605						
MW-PB-25	02/06/13		7620 ± 806						
MW-PB-25	04/17/13		4610 ± 506	< 3.7	< 0.8	< 0.7	< 1.0	9.5 ± 1.0	< 1.6
MW-PB-25	08/08/13	Original	10700 ± 1110						
MW-PB-25	08/08/13	Reanalysis	10100 ± 1070						
MW-PB-25	08/27/13		6760 ± 729						
MW-PB-25	10/30/13		5770 ± 636						
MW-PB-26	01/02/13		1420 ± 206						
MW-PB-26	01/07/13		1710 ± 228						
MW-PB-26	01/14/13		1370 ± 195						
MW-PB-26	01/22/13		1520 ± 212						
MW-PB-26	02/06/13		1290 ± 183						
MW-PB-26	04/17/13		502 ± 129	< 3.4	< 0.6	3.2 ± 0.9	< 1.0	5.7 ± 1.0	2.6 ± 1.2
MW-PB-26	08/08/13		379 ± 138						
MW-PB-26	08/27/13		333 ± 130						
MW-PB-26	10/30/13		283 ± 146						
MW-PB-27	01/02/13		7850 ± 821						
MW-PB-27	01/07/13		7420 ± 787						
MW-PB-27	01/14/13		3850 ± 435						
MW-PB-27	01/22/13		875 ± 177						
MW-PB-27	02/06/13		698 ± 139						
MW-PB-27	04/17/13		865 ± 147	< 3.7	< 0.7	2.8 ± 0.8	4.2 ± 1.2	5.5 ± 0.9	4.7 ± 1.4
MW-PB-27	08/08/13		827 ± 162						
MW-PB-27	08/08/13		1090 ± 176						
MW-PB-27	08/27/13		737 ± 152						
MW-PB-27	10/30/13		470 ± 154						
MW-PB-28	02/06/13		< 178						
MW-PB-28	04/16/13		< 170	< 4.5	< 0.7	0.7 ± 0.4	2.7 ± 1.3	3.2 ± 0.7	10.8 ± 2.0
MW-PB-28	08/07/13		< 192						
MW-PB-28	10/28/13		< 180						
MW-PB-29	01/02/13		379 ± 148						
MW-PB-29	01/07/13		449 ± 144						
MW-PB-29	01/14/13		240 ± 123						
MW-PB-29	02/05/13		193 ± 118						
MW-PB-29	04/16/13		< 171	< 3.9	< 0.7	< 0.3	< 0.8	3.5 ± 0.7	< 1.8

TABLE B-I.1 **CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA IN GROUNDWATER AND SEEP SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER 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-PB-29	08/07/13	< 168						
MW-PB-29	10/29/13	< 176						
MW-PB-3	02/05/13	< 176						
MW-PB-3	04/16/13	< 170	< 4.1	< 0.7	1.8 ± 0.7	< 0.8	2.7 ± 0.8	< 1.6
MW-PB-3	08/07/13	< 194						
MW-PB-3	10/29/13	< 182						
MW-PB-30	01/02/13	286 ± 140						
MW-PB-30	01/07/13	437 ± 144						
MW-PB-30	01/14/13	438 ± 132						
MW-PB-30	02/05/13	< 178						
MW-PB-30	02/05/13	291 ± 138						
MW-PB-30	04/16/13	< 171	< 3.9	< 0.7	< 0.3	< 0.8	2.8 ± 0.7	< 1.8
MW-PB-30	08/07/13	262 ± 119						
MW-PB-30	10/29/13	270 ± 127						
MW-PB-31	02/05/13	< 177						
MW-PB-31	04/16/13	176 ± 115	< 4.0	< 0.7	< 0.7	< 0.8	1.6 ± 0.8	< 1.5
MW-PB-31	08/07/13	258 ± 116						
MW-PB-31	10/29/13	195 ± 122						
MW-PB-4	01/02/13	1090 ± 192						
MW-PB-4	01/07/13	942 ± 157						
MW-PB-4	01/14/13	800 ± 147						
MW-PB-4	01/22/13	1090 ± 186						
MW-PB-4	02/05/13	848 ± 148						
MW-PB-4	04/17/13	610 ± 138	< 3.9	< 0.8	< 1.2	< 0.8	8.2 ± 1.3	< 1.6
MW-PB-4	04/17/13	618 ± 137	< 4.3	< 0.7	< 1.6	< 0.9	9.3 ± 1.4	< 1.6
MW-PB-4	08/07/13	665 ± 156						
MW-PB-4	08/27/13	633 ± 145						
MW-PB-4	10/30/13	376 ± 152						
MW-PB-5	04/17/13	< 170						
MW-PB-6	04/17/13	< 169						
MW-PB-7	02/05/13	< 192						
MW-PB-7	04/17/13	< 170	< 4.4	< 0.6	< 1.5	< 0.9	6.2 ± 1.3	< 1.6
MW-PB-7	08/06/13	< 187						
MW-PB-7	08/06/13	< 195						
MW-PB-7	10/28/13	< 179						
MW-PB-8	02/05/13	< 189						
MW-PB-8	04/16/13	< 169	< 4.9	< 0.8	< 0.9	< 0.6	11.4 ± 1.3	< 1.5
MW-PB-8	08/06/13	< 189						
MW-PB-8	10/28/13	< 180						
SP-PB-1	02/05/13	< 181						
SP-PB-1	04/15/13	< 169						
SP-PB-1	08/07/13	< 188						
SP-PB-1	10/28/13	< 194						
SP-PB-2	02/06/13	< 181						
SP-PB-2	04/15/13	< 172						
SP-PB-2	08/07/13	< 191						
SP-PB-2	10/28/13	< 180						
SP-PB-3	02/06/13	< 178						
SP-PB-3	04/17/13	< 170						
SP-PB-3	08/07/13	< 194						
SP-PB-3	10/29/13	< 179						
U/2 YARD DRAIN	02/12/13	< 179						
U/2 YARD DRAIN	05/02/13	< 167	< 8.2	< 0.9	0.7 ± 0.4	< 0.3	2.3 ± 0.9	< 1.6
U/2 YARD DRAIN	08/21/13	181 ± 112						

TABLE B-I.1 **CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA IN GROUNDWATER AND SEEP SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER 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)
U/2 YARD DRAIN	10/29/13	< 179						
U/3 YARD DRAIN	02/12/13	< 178						
U/3 YARD DRAIN	05/02/13	< 166	< 7.9	< 0.9	0.9 ± 0.4	< 0.3	2.7 ± 0.8	4.9 ± 1.3
U/3 YARD DRAIN	08/21/13	< 157						
U/3 YARD DRAIN	10/29/13	< 193						

TABLE B-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER AND SEEP WATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
MW-PB-1	04/17/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 5	< 2	< 2	< 11	< 4
MW-PB-10	04/16/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 6	< 2	< 2	< 14	< 5
MW-PB-11	04/16/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 7	< 2	< 2	< 15	< 5
MW-PB-12	04/17/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 5	< 2	< 2	< 11	< 4
MW-PB-13	04/16/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 7	< 2	< 2	< 17	< 5
MW-PB-14	04/16/13	< 2	< 2	< 3	< 2	< 3	< 2	< 3	< 6	< 1	< 2	< 12	< 4
MW-PB-15	02/06/13	< 7	< 7	< 11	< 8	< 12	< 9	< 13	< 12	< 7	< 8	< 33	< 11
MW-PB-15	04/16/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 6	< 2	< 2	< 13	< 4
MW-PB-15	08/06/13	< 2	< 2	< 6	< 2	< 5	< 3	< 5	< 8	< 2	< 2	< 18	< 6
MW-PB-15	10/29/13	< 6	< 7	< 14	< 7	< 16	< 9	< 13	< 12	< 6	< 6	< 36	< 13
MW-PB-16	02/06/13	< 7	< 6	< 14	< 7	< 13	< 7	< 12	< 11	< 7	< 8	< 33	< 12
MW-PB-16	04/16/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 7	< 2	< 2	< 14	< 4
MW-PB-16	04/16/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 19	< 6
MW-PB-16	08/06/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 7	< 2	< 2	< 14	< 4
MW-PB-16	10/29/13	< 7	< 6	< 14	< 8	< 13	< 9	< 11	< 14	< 7	< 7	< 39	< 13
MW-PB-19	04/16/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 7	< 2	< 2	< 14	< 5
MW-PB-2	04/16/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 6	< 2	< 2	< 14	< 5
MW-PB-20	04/17/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 5	< 2	< 2	< 11	< 4
MW-PB-21	04/17/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 7	< 2	< 2	< 14	< 5
MW-PB-22	04/17/13	< 1	< 2	< 3	< 1	< 3	< 2	< 3	< 5	< 1	< 2	< 11	< 4
MW-PB-24	04/17/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 7	< 2	< 2	< 15	< 4
MW-PB-24	10/30/13	< 5	< 6	< 10	< 5	< 14	< 8	< 10	< 10	< 5	< 7	< 29	< 9
MW-PB-25	04/17/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 5	< 1	< 2	< 12	< 4
MW-PB-25	10/30/13	< 7	< 7	< 13	< 6	< 13	< 7	< 12	< 12	< 6	< 7	< 33	< 9
MW-PB-26	04/17/13	< 1	< 1	< 3	< 1	< 3	< 1	< 2	< 5	< 1	< 1	< 10	< 3
MW-PB-26	10/30/13	< 6	< 6	< 12	< 4	< 11	< 6	< 11	< 11	< 6	< 6	< 25	< 10
MW-PB-27	04/17/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 7	< 2	< 2	< 14	< 5
MW-PB-27	10/30/13	< 6	< 5	< 11	< 5	< 10	< 7	< 12	< 12	< 6	< 6	< 29	< 9
MW-PB-28	04/16/13	< 3	< 3	< 7	< 3	< 7	< 3	< 5	< 12	< 3	< 3	< 24	< 8
MW-PB-29	04/16/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 8	< 2	< 2	< 15	< 5
MW-PB-3	04/16/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 5	< 2	< 2	< 12	< 4
MW-PB-30	04/16/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 8	< 2	< 2	< 17	< 6
MW-PB-31	04/16/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 7	< 2	< 2	< 13	< 4
MW-PB-4	04/17/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 20	< 6
MW-PB-4	04/17/13	< 2	< 2	< 6	< 2	< 5	< 3	< 4	< 6	< 2	< 2	< 13	< 5
MW-PB-4	10/30/13	< 5	< 6	< 9	< 5	< 12	< 5	< 11	< 10	< 4	< 6	< 29	< 8

TABLE B-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER AND SEEP WATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
MW-PB-5	04/17/13	< 2	< 2	< 3	< 2	< 3	< 2	< 3	< 5	< 2	< 2	< 12	< 3
MW-PB-6	04/17/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 5	< 2	< 2	< 13	< 4
MW-PB-7	04/17/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 6	< 2	< 2	< 13	< 3
MW-PB-8	02/05/13	< 6	< 6	< 14	< 7	< 14	< 7	< 11	< 11	< 7	< 7	< 33	< 10
MW-PB-8	04/16/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 6	< 2	< 2	< 12	< 4
MW-PB-8	08/06/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 7	< 2	< 2	< 15	< 4
MW-PB-8	10/28/13	< 6	< 7	< 14	< 7	< 13	< 8	< 11	< 13	< 6	< 6	< 28	< 9
SP-PB-1	04/15/13	< 2	< 3	< 6	< 2	< 5	< 3	< 5	< 9	< 2	< 2	< 20	< 7
SP-PB-2	04/15/13	< 2	< 2	< 6	< 3	< 5	< 3	< 5	< 10	< 2	< 3	< 20	< 7
SP-PB-3	04/17/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 8	< 2	< 2	< 17	< 5
U/2 YARD DRAIN	05/02/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 6	< 2	< 2	< 14	< 4
U/3 YARD DRAIN	05/02/13	< 2	< 2	< 3	< 2	< 4	< 2	< 3	< 5	< 2	< 2	< 12	< 4

TABLE B-I.3 **CONCENTRATIONS OF HARD TO DETECTS IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER 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-PB-24	04/17/13	< 0.13	< 0.06	< 0.07	< 0.09	< 0.06	< 0.02	< 0.03	< 0.05	< 109	< 3.4
MW-PB-25	04/17/13	< 0.11	< 0.04	< 0.08	< 0.12	< 0.03	1.44 ± 0.35	< 0.06	0.61 ± 0.20	< 122	< 3.4
MW-PB-26	04/17/13	< 0.16	< 0.10	< 0.13	< 0.04	< 0.16	7.23 ± 1.34	< 0.03	3.32 ± 0.70	< 46	< 3.4
MW-PB-27	04/17/13	< 0.10	< 0.08	< 0.08	< 0.12	< 0.08	7.30 ± 1.45	< 0.04	2.17 ± 0.56	< 154	< 3.4
MW-PB-4	04/17/13	< 0.08	< 0.08	< 0.05	< 0.06	< 0.07	< 0.10	< 0.13	< 0.13	< 127	< 3.8
MW-PB-4	04/17/13	< 0.19	< 0.10	< 0.12	< 0.02	< 0.09	0.53 ± 0.19	< 0.02	< 0.09	< 103	< 4.4

TABLE B-II.1 **CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
SW-PB-1	02/04/13	< 183
SW-PB-1	04/15/13	< 174
SW-PB-1	04/15/13	< 173
SW-PB-1	08/06/13	< 184
SW-PB-1	10/28/13	< 179
SW-PB-1	10/28/13	< 176
SW-PB-5	02/04/13	< 181
SW-PB-5	04/17/13	< 169
SW-PB-5	08/28/13	< 155
SW-PB-5	08/28/13	< 155
SW-PB-5	10/28/13	< 174
SW-PB-6	02/04/13	< 186
SW-PB-6	04/17/13	< 173
SW-PB-6	04/17/13	< 174
SW-PB-6	08/28/13	< 159
SW-PB-6	10/28/13	< 171

TABLE B-II.2 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
SW-PB-1	04/15/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 9	< 2	< 2	< 16	< 5
SW-PB-1	04/15/13	< 2	< 2	< 5	< 2	< 3	< 2	< 4	< 11	< 2	< 2	< 18	< 6
SW-PB-5	04/17/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 6	< 2	< 2	< 13	< 5
SW-PB-6	04/17/13	< 1	< 1	< 3	< 1	< 3	< 2	< 3	< 7	< 1	< 1	< 13	< 4
SW-PB-6	04/17/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 9	< 2	< 2	< 16	< 5

TABLE B-III.1 **CONCENTRATIONS OF TRITIUM IN PRECIPITATION WATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
1A	01/03/13	< 166
1A	01/31/13	< 193
1A	02/28/13	< 169
1A	03/28/13	< 167
1A	05/02/13	< 188
1A	05/29/13	< 195
1A	06/27/13	< 181
1A	08/01/13	< 167
1A	08/29/13	< 167
1A	10/02/13	< 183
1A	10/31/13	< 158
1B	01/03/13	< 171
1B	01/31/13	< 192
1B	02/28/13	< 165
1B	03/28/13	< 162
1B	05/02/13	< 181
1B	05/29/13	< 187
1B	06/27/13	< 180
1B	08/01/13	< 167
1B	08/29/13	< 164
1B	10/02/13	< 184
1B	10/31/13	< 196
1S	01/03/13	< 172
1S	01/31/13	< 189
1S	02/28/13	< 170
1S	03/28/13	< 169
1S	05/02/13	< 164
1S	05/29/13	< 190
1S	06/27/13	< 180
1S	08/01/13	< 159
1S	08/29/13	< 162
1S	10/02/13	< 183
1S	10/31/13	< 191
1SSE	06/06/13	< 190
1SSE	06/27/13	< 180
1SSE	08/01/13	< 161
1SSE	08/29/13	< 168
1SSE	10/02/13	< 179
1SSE	10/31/13	< 192
1Z	01/03/13	< 169
1Z	01/31/13	< 186
1Z	02/28/13	< 169
1Z	03/28/13	< 168
1Z	05/02/13	< 167
1Z	05/29/13	< 187
1Z	06/27/13	< 186
1Z	08/01/13	< 162
1Z	08/29/13	< 165
1Z	10/02/13	< 181

TABLE B-III.1 CONCENTRATIONS OF TRITIUM IN PRECIPITATION WATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER STATION, 2013

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
1Z	10/31/13	< 198
4M	01/03/13	< 172
4M	01/31/13	< 191
4M	02/28/13	< 172
4M	03/28/13	< 169
4M	05/02/13	< 165
4M	05/29/13	< 189
4M	06/27/13	< 184
4M	08/01/13	< 162
4M	08/29/13	< 163
4M	10/02/13	< 181
4M	10/31/13	< 196