NEXTera® ENERGY
POINT BEACH

April 29, 2014

NRC 2014-0030
10 CFR 72.44
TS 5.6.2

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

Point Beach Nuclear Plant, Units 1 and 2
Dockets 50-266, 50-301 and 72-005
Renewed License Nos. DPR-24 and DPR-27

2013 Annual Monitoring Report

In accordance with Point Beach Nuclear Plant (PBNP) Technical Specification 5.6.2, enclosed is the Annual Monitoring Report for PBNP Units 1 and 2, for the period January 1 through December 31, 2013.

The Annual Monitoring Report contains information relating to the effluent impact upon the public, as well as information relating to plant releases, solid waste shipments, results from the radiological environmental monitoring program, the groundwater protection program, and miscellaneous monitoring activities which occurred in 2013. The report also covers the results of radiological monitoring of the PBNP Independent Spent Fuel Storage Installation (ISFSI), as required by 10 CFR 72.44. The contracted laboratory's final Radiological Environmental Monitoring Program (REMP) results (Appendix 1) and the 2013 revised Environmental Manual (Appendix 2) are included.

This letter contains no new regulatory commitments and no revisions to existing regulatory commitments.

Very truly yours,

NextEra Energy Point Beach, LLC

Michael Millen
Licensing Manager

Enclosures

cc: Administrator, Region III, USNRC
Project Manager, Point Beach Nuclear Plant, USNRC
Resident Inspector, Point Beach Nuclear Plant, USNRC
PSCW
American Nuclear Insurers
WI Division of Public Health, Radiation Protection Section

ENCLOSURE 1

ANNUAL MONITORING REPORT 2013

NEXTERA ENERGY POINT BEACH, LLC
POINT BEACH NUCLEAR PLANT

DOCKETS 50-266 (UNIT 1), 50-301 (UNIT 2), 72-005 (ISFSI)
RENEWED LICENSES DPR-24 and DPR-27

January 1, 2013 through December 31, 2013

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SUMMARY

The Annual Monitoring Report for the period from January 1, 2013, through December 31, 2013, is submitted in accordance with Point Beach Nuclear Plant (PBNP) Units 1 and 2, Technical Specification 5.6.2 and filed under Dockets 50-266 and 50-301 for Facility Operating Licenses DPR-24 and DPR-27, respectively. It also contains results of monitoring in support of the Independent Spent Fuel Storage Installation (ISFSI) Docket 72-005. The report presents the results of effluent and environmental monitoring programs, solid waste shipments, non-radioactive chemical releases, and circulating water system operation.

During 2013, the following Curies (Ci) of radioactive material were released via the liquid and atmospheric pathways:

	Liquid	Atmospheric
Tritium (Ci)	737	64.1
[1]Particulate (Ci)	0.0299	0.000008
Noble Gas (Ci)	(-)	1.02
C-14[2]	0.00138	11.74

(-)Noble gases in the liquids are added to the atmospheric release totals.
[1]Atmospheric particulate includes radioiodine (I-131 - I-133).
[2]Liquid is measured, atmospheric is calculated.

For the purpose of compliance with the effluent design objectives of Appendix I to 10 CFR 50, doses from effluents are calculated for the hypothetical maximally exposed individual (MEI) for each age group and compared to the Appendix I objectives. Doses less than or equal to the Appendix I values are considered to be evidence that PBNP releases are as low as reasonably achievable (ALARA). The maximum annual calculated doses in millirem (mrem) or millirad (mrad) are shown below and compared to the corresponding design objectives of 10 CFR 50, Appendix I.

LIQUID RELEASES

Dose Category	Calculated Dose	Appendix I Dose
Whole body dose	0.00705 mrem	6 mrem
Organ dose	0.00705 mrem	20 mrem

ATMOSPHERIC RELEASES

Dose Category	Calculated Dose	Appendix I Dose
Particulate organ dose	0.241 mrem	30 mrem
Noble gas beta air dose	0.000107 mrad	40 mrad
Noble gas gamma ray air dose	0.000242 mrad	20 mrad
Noble gas dose to the skin	0.000345 mrem	30 mrem
Noble gas dose to the whole body	0.000229 mrem	10 mrem

The results show that during 2013, the doses from PBNP effluents were a small percentage ($\leq$0.80%) of the Appendix I design objectives. Therefore, operation of PBNP continues to be ALARA.

A survey of land use with respect to the location of dairy cattle was made pursuant to Section 2.5 of the PBNP Environmental Manual. As in previous years, no dairy cattle were found to be grazing at the site boundary. Therefore, the assumption that cattle graze at the site boundary used in the evaluation of doses from PBNP effluents remains conservative. Of the sixteen compass sectors around PBNP, six are over Lake Michigan. A land use census (LUC) of remaining ten land containing sectors identified the closest garden, occupied dwelling, and dairy in each sector. The LUC results confirm the assumption that, for the purpose of calculating effluent doses, the maximally exposed person lives at the south boundary remains conservative.

The 2013 Radiological Environmental Monitoring Program (REMP) collected 789 individual samples for radiological analyses. Quarterly composites of weekly air particulate filters generated an additional 24 samples and quarterly composites of monthly lake water samples resulted in a further 16 samples. This yields a total of 829 samples. The ambient radiation measures in the vicinity of PBNP and the ISFSI was conducted using 146 sets of thermoluminescent dosimeters (TLDs).

Air monitoring from six different sites did not reveal any effect from Point Beach effluents.

Terrestrial monitoring consisting of soil, vegetation and milk found no influence from PBNP. Similarly, samples from the aquatic environment, consisting of lake and well water, fish and algae revealed no buildup of PBNP radionuclides released in liquid effluents. Therefore, the data show no plant effect on its environs.

No new dry storage units added to the ISFSI in 2013. The total number remains at 39 dry storage casks: 16 ventilated, vertical storage casks (VSC-24) and 23 NUHOMS®, horizontally stacked storage modules. The subset of the PBNP REMP samples used to evaluate the environmental impact of the PBNP ISFSI showed no environmental impact from its operation.

Two hundred twenty (220) samples were analyzed for H-3 a part of the groundwater protection program (GWPP). These samples came from drinking water wells, monitoring wells, yard drain outfalls, yard manholes, and surface water on site. Also included in this number were a sump and manholes associated with the subsurface drainage system (SSD) located under the plant foundation and four groundwater containment integrity monitoring wells located in the facades. The results show no substantial change in H-3 from previous years. Low levels of tritium continue under the plant foundation. No drinking water wells (depth >100 feet) have any detectable H-3. Tritium continues to be confined to the upper soil layer where the flow is toward the lake. Groundwater samples from wells in the vicinity of the remediated, former earthen retention pond continue to show low levels of H-3 whereas none was detectable in the wells monitoring the potential offsite tritium movement.

The results of GWPP monitoring indicate no significant change from previous years.

The environmental monitoring conducted during 2013 confirmed that the effluent control program at PBNP ensured a minimal impact on the environment.

Part A
EFFLUENT MONITORING

1.0 INTRODUCTION

The PBNP effluent monitoring program is designed to comply with federal regulations for ensuring the safe operation of PBNP with respect to releases of radioactive material to the environment and its subsequent impact on the public. Pursuant to 10 CFR 50.34a, operations should be conducted to keep the levels of radioactive material in effluents to unrestricted areas as low as reasonably achievable (ALARA). In 10 CFR 50, Appendix I, the Nuclear Regulatory Commission (NRC) provides the numerical values for what it considers to be the appropriate ALARA design objectives to which the licensee's calculated effluent doses may be compared. These doses are a small fraction of the dose limits specified by 10 CFR 20.1301 and lower than the Environmental Protection Agency (EPA) limits specified in 40 CFR 190.

10 CFR 20.1302 directs PBNP to make the appropriate surveys of radioactive materials in effluents released to unrestricted and controlled areas. Liquid wastes are monitored by inline radiation monitors as well as by isotopic analyses of samples of the waste stream prior to discharge from PBNP. Airborne releases of radioactive wastes are monitored in a similar manner. Furthermore, for both liquid and atmospheric releases, the appropriate portions of the radwaste treatment systems are used as required to keep releases ALARA. Prior to release, results of isotopic analyses are used to adjust the release rate of discrete volumes of liquid and atmospheric wastes (from liquid waste holdup tanks and from gas decay tanks) such that the concentrations of radioactive material in the air and water beyond PBNP are below the PBNP Technical Specification concentration limits for liquid effluents and release rate limits for gaseous effluents.

Solid wastes are shipped offsite for disposal at NRC licensed facilities. The amount of radioactivity in the solid waste is determined prior to shipment in order to determine the proper shipping configuration as regulated by the Department of Transportation and the NRC.

10 CFR 72.210 grants a general license for an Independent Spent Fuel Storage Installation (ISFSI) to all nuclear power reactor sites operating under 10 CFR 50. The annual reporting requirement pursuant to 10 CFR 72.44(d)(3) is no longer applicable. However, any release of radioactive materials from the operation of the ISFSI must also comply with the limits of Part 20 and Part 50 Appendix I design objectives. The dose criteria for effluents and direct radiation specified by 10 CFR 72.104 states that during normal operations and anticipated occurrences, the annual dose equivalent to any real individual beyond the controlled area must not exceed 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any other organ. The dose from naturally occurring radon and its decay products are exempt. Because the loading of the storage casks occurs within the primary auxiliary building of PBNP, the doses from effluents due to the loading process will be assessed and quantified as part of the PBNP Radiological Effluent Control Program.

2.0 RADIOACTIVE LIQUID RELEASES

The radioactive liquid release path to the environment is via the circulating water discharge. A liquid waste treatment system in conjunction with administrative controls is used to minimize the impact on the environment and maintain doses to the public ALARA from the liquid releases.

2.1 Doses From Liquid Effluent

Doses from liquid effluent are calculated using the methodology of the Offsite Dose Calculation Manual (ODCM). These calculated doses use parameters such as the amount of radioactive material released, the total volume of liquid, the total volume of dilution water, and usage factors (e.g., water and fish consumption, shoreline and swimming factors). These calculations produce a conservative estimation of the dose. For compliance with 10 CFR 50, Appendix I design objectives, the annual dose is calculated to the hypothetical maximally exposed individual (MEI). The MEI is assumed to reside at the site boundary in the highest χ/Q sector and is maximized with respect to occupancy, food consumption, and other uses of this area. As such, the MEI represents an individual with reasonable deviations from the average for the general population in the vicinity of PBNP. A comparison of the calculated doses to the 10 CFR 50, Appendix I design objectives is presented in Table 2-1. The conservatively calculated dose to the MEI is a very small fraction of the Appendix I design objective.

Table 2-1
Comparison of 2013 Liquid Effluent Calculated Doses to 10 CFR 50 Appendix I Design Objectives

Annual Limit [mrem]	Highest Total Calculated Dose [mrem]	% of Design Objective
6 (whole body)	0.00705	0.118 %
20 (any organ)	0.00705	0.035 %

2.2 2013 Circulating Water Radionuclide Release Summary

Radioactive liquid releases via the circulating water discharge are summarized by individual source and total curies released on a monthly basis and presented in Table 2-2. These releases are composed of processed waste, wastewater effluent, and blowdown from Units 1 and 2. The wastewater effluent consists of liquid from turbine hall sumps, plant well house backwashes, sewage treatment plant effluent, water treatment plant backwashes, the Unit 1 and 2 facade sumps and the subsurface drainage system sump.

Two errors were discovered in Table 2-2 for 2012. A corrected table is presented in Section 2.8

2.3 2013 Isotopic Composition of Circulating Water Discharges

The isotopic composition of circulating water discharges during the current reporting period is presented in Table 2-3. The noble gases released in liquids are reported with the airborne releases in Section 3.

In 2013, the discharged volume of processed waste (Table 2-2) decreased approximately 30% (9.14E+05 to 6.39E+05 gallons) from 2012. In addition to the decrease in volume, the total isotopic curie distribution (gamma emitters plus hard-to-detects other that strontium) for 2013 decreased by about 50% from 2012 (5.72E-02 to 2.99E-02). The largest decreases (Table 2-3) were 80% in C-14 (1.43E-02 to 1.38E-03) and 95% (4.52E-04 to 2.23E-05) for the total Sb isotopes (Sb -122, -124, and -125) with a similar decrease for Sn-113 + Sn-117m from 4.82E-03 to 1.52E-03. As in 2012, no Sr-89 or Sr-90 was detected in liquids during 2013. H-3 was down about 10% from 2012 (829 Ci to 737 Ci). Tritium continues to be the major radionuclide released via liquid discharges.

2.4 Beach Drain System Releases Tritium Summary

Beach drain is the term used to describe the point at which the site yard drainage system empties onto the beach of Lake Michigan. Six of these outfalls carry yard and roof drain runoff to the beach. A seventh drains a small portion of the grassy area on top of the bluff overlooking the lake. Each drain is sampled monthly. The quarterly results of monitoring the beach drains are presented in Table 2-4. The total monthly flow is calculated assuming that the flow rate at the time of sampling persists for the whole month. During 2013, no tritium was observed in any of the beach drains at the effluent LLDs. No H-3 found in the beach drains is included in the effluent totals unless it can be shown to be the result of a spill or similar event. Because the source of beach drain H-3 has been determined to be recapture, including beach drain H-3 in the effluent totals would be double counting (NRC RIS 2008-03, Return/re-use of previously discharged radioactive effluents).

The principle source of water for the beach drains is the yard drain system. Yard drain water sources are rain and snow melt. During the winter, natural melting is enhanced by the use of snow melting machines. The melt water is emptied into the yard drains. [See Sections 14.2 and 14.6 for further discussion.] Additionally, various roof drains connect to the yard drain system. In addition to precipitation, the roof drains also carry condensate from various building air conditioning units. A secondary source may be groundwater in leakage. This is evidenced by flow during periods of no precipitation.

Because there are no external storage tanks or piping that carries radioactive liquids, the main source of radioactivity for this system is recapture/washout of airborne H-3 discharges via the yard drain system. Groundwater inleakage may bring groundwater flow of H-3 from the up gradient area of the former retention pond as well as precipitation recharging the groundwater close to the plant in areas not drained by the yard drains. Because of these various recapture sources, the beach drains also are sampled as part of the groundwater monitoring program. These results and other groundwater monitoring results are presented in Part D of this Annual Monitoring Report.

Table 2-2
Summary of Circulating Water Discharge
January 1, 2013 through December 31, 2013

	Jan	Feb	Mar	Apr	May	Jun	Total Jan-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
Total Activity Released (Ci)														
Gamma Scan(+HTDs)[1]	5.92E-04	8.44E-04	1.32E-03	2.61E-03	6.71E-04	4.64E-04	6.50E-03	2.06E-02	7.42E-04	5.04E-04	7.93E-04	2.68E-04	4.70E-04	2.99E-02
Gross Alpha	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tritium	3.56E+01	7.39E+01	5.25E+01	1.52E+01	3.31E+01	4.12E+00	2.14E+02	5.00E+00	1.55E+02	4.47E+00	1.57E+02	8.21E+00	1.93E+02	7.37E+02
Strontium (89/90/92)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Vol Released (gal)														
Processed Waste	2.39E+04	6.96E+04	1.16E+05	1.26E+05	5.58E+04	2.24E+04	4.14E+05	2.28E+04	5.30E+04	7.85E+03	3.90E+04	2.34E+04	4.84E+04	6.08E+05
Waste Water Effluent[2]	3.27E+06	2.87E+06	3.22E+06	3.64E+06	2.63E+06	2.11E+06	1.77E+07	2.34E+06	2.17E+06	2.30E+06	2.65E+06	3.13E+06	3.02E+06	3.33E+07
U1 SG Blowdown	3.18E+06	2.33E+06	1.51E+06	2.73E+06	3.75E+06	3.42E+06	1.69E+07	3.84E+06	3.87E+06	3.25E+06	2.39E+06	1.94E+06	2.80E+06	3.50E+07
U2 SG Blowdown	3.62E+06	2.35E+06	2.65E+06	2.62E+06	3.35E+06	3.41E+06	1.80E+07	2.71E+06	2.63E+06	2.72E+06	2.20E+06	1.71E+06	2.37E+06	3.23E+07
Total Gallons	1.01E+07	7.61E+06	7.50E+06	9.12E+06	9.79E+06	8.97E+06	5.31E+07	8.91E+06	8.72E+06	8.28E+06	7.28E+06	6.80E+06	8.24E+06	1.01E+08
Total cc	3.82E+10	2.88E+10	2.84E+10	3.45E+10	3.70E+10	3.39E+10	2.01E+11	3.37E+10	3.30E+10	3.13E+10	2.76E+10	2.58E+10	3.12E+10	3.83E+11
Dilution vol(cc)[3]	6.84E+13	6.18E+13	5.55E+13	7.08E+13	1.20E+14	1.17E+14	4.94E+14	1.26E+14	1.26E+14	1.22E+14	1.26E+14	1.22E+14	8.63E+13	1.20E+15
Avg diluted discharge conc (µCi/cc)														
Gamma Scan (+HTDs)[1]	8.65E-12	1.36E-11	2.38E-11	3.69E-11	5.59E-12	3.96E-12		1.64E-10	5.90E-12	4.15E-12	6.31E-12	2.21E-12	5.45E-12	
Gross Alpha	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Tritium	5.20E-07	1.20E-06	9.46E-07	2.15E-07	2.76E-07	3.52E-08		3.98E-08	1.23E-06	3.68E-08	1.25E-06	6.75E-08	2.23E-06	
Strontium (89/90/92)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Max Batch Discharge Conc (µCi/cc)														
Tritium	2.95E-05	3.41E-05	2.26E-05	9.76E-06	2.03E-05	3.22E-06		1.84E-06	3.87E-05	5.24E-06	3.78E-05	3.05E-06	3.33E-05	
Gamma Scan	1.33E-10	2.52E-10	1.55E-09	1.26E-09	1.59E-10	1.48E-11		6.51E-12	7.95E-11	3.81E-12	1.52E-11	4.40E-12	2.08E-11	

1 HTDs include Fe-55, C-14, Ni-63, and Tc-99. Does not include strontium which is totaled separately.
2 The waste water effluent system replaced the Retention Pond which was taken out of service in September 2002.
3 Circulating water discharge from both units.
Note: Dissolved noble gases detected in liquid effluents (e.g., Xe-133, Xe-135, etc.) are added to the atmospheric release summaries

Table 2-3
Isotopic Composition of Circulating Water Discharges (Ci)
January, 2013 through December 31, 2013

Nuclide	Jan	Feb	Mar	Apr	May	Jun	Total Jan-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Jan-Dec
H-3	3.56E+01	7.39E+01	5.25E+01	1.52E+01	3.31E+01	4.12E+00	2.14E+02	5.00E+00	1.55E+02	4.47E+00	1.57E+02	8.21E+00	1.93E+02	7.37E+02
C-14	9.06E-05	1.27E-04	9.65E-05	2.96E-04	0.00E+00	0.00E+00	6.10E-04	0.00E+00	1.72E-04	0.00E+00	4.14E-04	0.00E+00	1.83E-04	1.38E-03
F-18	3.34E-04	2.84E-04	2.53E-04	3.70E-04	2.86E-04	4.46E-04	1.97E-03	2.05E-02	2.86E-04	4.83E-04	2.87E-04	2.61E-04	1.72E-04	2.40E-02
Cr-51	0.00E+00	1.04E-05	5.40E-06	1.82E-04	0.00E+00	0.00E+00	1.98E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-04
Mn-54	0.00E+00	0.00E+00	0.00E+00	4.58E-06	1.99E-06	0.00E+00	6.57E-06	0.00E+00	2.28E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.85E-06
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-57	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	1.54E-05	3.52E-05	7.18E-04	7.15E-04	3.73E-05	1.76E-05	1.54E-03	1.59E-05	6.64E-05	3.24E-06	3.02E-06	5.11E-06	7.03E-06	1.64E-03
Co-60	1.83E-05	7.18E-05	8.35E-05	2.67E-04	1.12E-04	0.00E+00	5.52E-04	0.00E+00	6.57E-05	0.00E+00	2.74E-05	2.49E-06	2.89E-05	6.77E-04
Ni-63	1.18E-05	5.80E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.98E-05	0.00E+00	5.01E-05	1.75E-05	3.25E-05	0.00E+00	4.95E-05	2.19E-04
Zn-65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
As-76	0.00E+00	0.00E+00	0.00E+00	1.05E-05	0.00E+00	0.00E+00	1.05E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-05
Sr-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	1.73E-06	1.73E-06	0.00E+00	4.13E-05	5.79E-06	0.00E+00	5.05E-05	0.00E+00	9.05E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.96E-05
Nb-97	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zr-95	0.00E+00	0.00E+00	0.00E+00	2.00E-05	0.00E+00	0.00E+00	2.00E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-05
Tc-99	2.08E-05	4.22E-06	2.63E-05	0.00E+00	0.00E+00	0.00E+00	5.13E-05	3.71E-05	1.52E-05	0.00E+00	2.66E-06	0.00E+00	1.19E-05	1.18E-04
Ag-110m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-06
Sn-113	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sn-117m	9.93E-05	2.50E-04	1.40E-04	6.98E-04	2.26E-04	0.00E+00	1.41E-03	0.00E+00	5.80E-05	0.00E+00	2.71E-05	0.00E+00	1.48E-05	1.51E-03
Sb-122	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-124	0.00E+00	0.00E+00	0.00E+00	5.27E-07	1.70E-06	0.00E+00	2.23E-06	0.00E+00	3.31E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.54E-06
Sb-125	0.00E+00	0.00E+00	0.00E+00	6.70E-06	0.00E+00	0.00E+00	6.70E-06	0.00E+00	1.01E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-05
I-131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Te-132	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	0.00E+00	1.56E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-06	0.00E+00	9.18E-07	0.00E+00	0.00E+00	0.00E+00	2.86E-06	5.34E-06
Ba-140	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
La-140	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce-141	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Note: The dissolved noble gases detected in liquid effluents (e.g., Xe-133, Xe-135, etc.) are added to the atmospheric release summaries. "-" = no analysis

Table 2-4
Subsoil System Drains - Tritium Summary
January 1, 2013, through December 31, 2013

	S-1	S-3	S-7	S-8	S-9	S-10	S-11
1st Qtr							
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	8.04E+05	5.58E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2nd Qtr							
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	7.27E+06	5.66E+06	9.07E+05	2.72E+06	4.32E+05	3.35E+05	8.36E+05
3rd Qtr							
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	8.58E+05	1.22E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
4th Qtr							
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	1.34E+06	4.30E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.89E+04

2.6 Land Application of Sewage Sludge

On January 13, 1988, pursuant to 10 CFR 20.302(a), PBNP received NRC approval for the disposal of sewage sludge, which may contain trace amounts of radionuclides, by land application on various properties surrounding the plant. Land application of sewage sludge is regulated by the Wisconsin Department of Natural Resources. PBNP has not land applied sewage sludge for over a decade. Therefore, PBNP has not renewed its WI DNR permit to dispose of sewage sludge in this manner.

There were no sludge disposals by land application during 2013. All disposals were done at the Manitowoc Sewage Treatment Plant.

2.7 Carbon-14

Carbon-14 (C-14) is a naturally occurring radionuclide. Nuclear weapons testing of the 1950s and 1960s significantly increased the amount of C-14 in the atmosphere. Small amounts of C-14 also are produced by nuclear reactors, but the amounts produced are less than C-14 produced by weapons testing or that occur naturally. NextEra Point Beach began evaluating C-14 liquid discharges in 2009, prior to the issuance of Regulatory Guide 1.21 [RG 1.21], Rev 2 in June of 2009. Point Beach continues to analyze batch liquid waste discharges for C-14 and reporting the results in the Annual Monitoring Report.

Beginning with the 2010 monitoring reports, the NRC requested that all nuclear plants report C-14 emissions. Pursuant to NRC guidance in RG 1.21(Rev 2), evaluation of C-14 in liquid wastes is not required because the quantity released via this pathway is much less than that contributed by gaseous emissions. However, based upon information received at the industry sponsored RETS-REMP Workshops, Point Beach began C-14 analyses and reporting prior to the issuance of RG 1.21 (Rev 2). The results show that C-14 meets the principal radionuclide criterion of RG 1.21. A principal radionuclide may be determined based on its relative contribution to the public dose compared to the 10 CFR 50, Appendix I dose objectives, or the amount of activity discharged compared to other radionuclides in its effluent type. In this case, it is compared to other radionuclides discharged in liquids. Furthermore, RG 1.21 states that a radionuclide is a principal effluent component if it contributes greater than 1% of the Appendix I design objective dose compared to the other radionuclides in the effluent type, or, if it is greater than 1% of the activity of all radionuclides in the effluent type. For 2013, the liquid discharge monthly and total C-14 (1.38E-03 Ci) in liquid discharges are documented in Table 2-3. The liquid C-14 dose contribution is included in the doses calculated for the hypothetically, maximally exposed individual.

2.8 Errata to 2012 Annual Monitoring Report

Two errors were discovered in Table 2-2 of the 2012 Annual Monitoring Report. For September 2012 the waste water discharge was listed in mL (9.75E+09) instead of gallons (2.58E+06). As a result, the total waste water discharged in 2012 also was in error. And, for December, the average diluted discharge concentration for radionuclides in the category "Gamma Scans (+ HTDs)" was omitted. A corrected table is shown below.

Table 2-5 Corrected 2012 AMR Table 2-2
Summary of Circulating Water Discharge
January 1, 2012 through December 31, 2012

							Total							Annual
	Jan	Feb	Mar	Apr	May	Jun	Jan-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total Activity Released (Ci)														
Gamma Scan(+HTDs)[1]	3.56E-05	5.09E-03	1.89E-04	7.98E-04	2.63E-03	4.64E-05	8.79E-03	1.79E-03	4.62E-03	7.42E-03	1.44E-03	1.94E-02	1.38E-02	5.72E-02
Gross Alpha	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tritium	3.86E+00	9.98E+00	6.87E+00	5.97E+00	8.54E+01	1.36E+01	1.26E+02	2.56E+02	7.36E+01	2.27E+02	8.39E+01	3.07E+01	3.23E+01	8.29E+02
Strontium (89/90/92)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Vol Released (gal)														
Processed Waste	2.41E+04	6.49E+04	4.93E+04	2.50E+04	7.18E+04	6.17E+04	2.97E+05	1.22E+05	5.78E+04	8.82E+04	1.14E+05	1.32E+05	1.03E+05	9.14E+05
Waste Water Effluent[2]	3.14E+06	3.10E+06	3.38E+06	3.05E+06	3.07E+06	2.39E+06	1.81E+07	2.97E+06	2.69E+06	2.58E+06	3.51E+06	3.06E+06	3.39E+06	3.63E+07
U1 SG Blowdown	6.14E+06	5.42E+06	4.60E+06	4.16E+06	4.43E+06	3.69E+06	2.84E+07	5.04E+06	5.13E+06	4.92E+06	2.93E+06	4.20E+06	2.64E+06	5.33E+07
U2 SG Blowdown	3.95E+06	3.55E+06	2.89E+06	4.37E+06	3.63E+06	2.90E+06	2.13E+07	5.00E+06	4.69E+06	4.23E+06	2.84E+06	1.81E+05	5.11E+06	4.34E+07
Total Gallons	1.33E+07	1.21E+07	1.09E+07	1.16E+07	1.12E+07	9.05E+06	6.82E+07	1.31E+07	1.26E+07	1.18E+07	9.40E+06	7.57E+06	1.12E+07	1.34E+08
Total cc	5.02E+10	4.59E+10	4.13E+10	4.39E+10	4.24E+10	3.42E+10	2.58E+11	4.97E+10	4.76E+10	4.48E+10	3.56E+10	2.87E+10	4.26E+10	5.07E+11
Dilution vol(cc)[3]	6.62E+13	5.98E+13	6.62E+13	1.03E+14	1.15E+14	1.11E+14	5.21E+14	1.15E+14	1.15E+14	1.11E+14	1.13E+14	5.91E+13	9.42E+13	1.13E+15
Avg diluted discharge conc (μCi/cc)														
Gamma Scan (+HTDs)[1]	5.38E-13	8.51E-11	2.85E-12	7.75E-12	2.29E-11	4.18E-13		1.56E-11	4.02E-11	6.67E-11	1.28E-11	3.28E-10	1.46E-10	
Gross Alpha	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		1.76E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Tritium	5.83E-08	1.67E-07	1.04E-07	5.80E-08	7.43E-07	9.53E-07		2.23E-06	6.41E-07	2.04E-06	7.45E-07	5.19E-07	3.43E-07	
Strontium (89/90/92)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Max Batch Discharge Conc (μCi/cc)														
Tritium	5.28E-06	1.04E-05	3.71E-06	6.13E-06	3.37E-05	4.25E-06		3.73E-05	3.51E-05	3.98E-05	2.44E-05	9.74E-06	1.42E-05	
Gamma Scan	3.73E-11	6.80E-10	1.19E-11	5.82E-11	8.92E-11	9.65E-12		7.34E-10	4.07E-11	1.77E-11	1.21E-09	8.17E-09	8.55E-09	

1 HTDs include Fe-55, C-14, Ni-63, and Tc-99. Does not include strontium which is totaled separately.
2 The waste water effluent system replaced the Retention Pond which was taken out of service in September 2002.
3 Circulating water discharge from both units.
Note: Dissolved noble gases detected in liquid effluents (e.g., Xe-133, Xe-135, etc.) are added to the atmospheric release summaries

3.0 RADIOACTIVE AIRBORNE RELEASES

The release paths to the environment contributing to radioactive airborne release totals during this reporting period were the auxiliary building vent stack, the drumming area vent stack, the letdown gas stripper, the Unit 1 containment purge stack, and the Unit 2 containment purge stack. A gaseous radioactive effluent treatment system in conjunction with administrative controls is used to minimize the impact on the environment from the airborne releases and maintain doses to the public ALARA.

3.1 Doses from Airborne Effluent

Doses from airborne effluent are calculated for the maximum exposed individual (MEI) following the methodology contained in the PBNP ODCM. These calculated doses use parameters such as the amount of radioactive material released, the concentration at and beyond the site boundary, the average site weather conditions, and usage factors (e.g., breathing rates, food consumption). In addition to the MEI doses, the energy deposited in the air by noble gas beta particles and gamma rays is calculated and compared to the corresponding Appendix I design objectives. A comparison of the annual Appendix I design objectives for atmospheric effluents to the highest organ dose and the noble gas doses calculated using ODCM methodology is listed in Table 3-1. The calculated doses include the C-14 contribution. The C-14 dose contribution has been required since 2010 (see Sections 3.4 through 3.6, below, for a more detailed description). The comparison between airborne effluent doses with and without C-14 is shown in Table 3-4. The highest dose is the child-bone category. The doses demonstrate that releases from PBNP to the atmosphere continue to be ALARA.

3.2 Radioactive Airborne Release Summary

Radioactivity released in airborne effluents for 2013 is summarized in Table 3-2. The total noble gas is about 13 percent higher than 2012 value. Airborne particulates dropped by roughly 90%. Airborne tritium is about 8% lower.

3.3 Isotopic Airborne Releases

The monthly isotopic airborne releases for 2013, from which the airborne doses were calculated, are presented in Table 3-3. Carbon-14 is not included in Table 3-3 because it was calculated and not measured. C-14 is discussed in the following sections.

3.4 Carbon-14

C-14 is a naturally occurring radionuclide. Nuclear weapons testing of the 1950s and 1960s significantly increased the amount of C-14 in the atmosphere. Small amounts of C-14 also are produced by nuclear reactors as neutrons interact with the dissolved oxygen and nitrogen in the primary coolant. However, these amounts produced by nuclear reactors are much less that those produced by weapons testing or that occur naturally. The NRC has requested that nuclear plants report C-14 emissions.

Pursuant to NRC guidance (Regulatory Guide 1.21, Rev 2, p. 16, June 2009), most of the C-14 emissions from nuclear plant occur in the gaseous phase.

C-14 is a hard-to-detect radionuclide. It is not a gamma emitter and must be chemically separated from the effluent stream before it can be measured. Because nuclear plants currently are not equipped to perform this type of sampling, RG 1.21 allows for calculating C-14 discharges based on fission rates.

The Electric Power Research Institute (EPRI) undertook the task of developing the methodology for calculating C-14 generation and releases for the nuclear industry. The results were published as Technical Report 1021106 (December 2010), "Estimation of Carbon-14 in Nuclear Power Plant Gaseous Effluents."

The Point Beach C-14 generation for 2013 was calculated using the EPRI guidance and the new core parameter resulting from the power uprate. The calculated amounts were 5.86 Ci for Unit 1 and 5.88 Ci for Unit 2 yielding a total of 11.74 Ci which is 0.07 Ci higher than 2012. This calculated total is roughly 850 times higher than the 1.38E-02 Ci of C-14 determined by analyses of composites from liquid waste batch discharges, steam generator blowdown, and other waste streams.

3.5 C-14 Airborne Effluent Dose Calculation

The dose from the airborne C-14 is dependent on its chemical form. The C-14 released to the atmosphere consists of both organic and inorganic species. Both the inorganic and organic C-14 contributes to the inhalation dose. Only the inorganic $^{14}CO_2$ species contributes to the dose from the ingestion of photosynthetically incorporated C-14. The organic forms such as methane, CH_4, are not photosynthetically active. For PWRs such as PBNP most of the gaseous C-14 occurs as methane, $^{14}CH_4$, not as carbon dioxide, $^{14}CO_2$.

The amount of $^{14}CO_2$ present in the PBNP airborne effluent has not been measured. However, such measurements have been made at a comparable PWR sites similar to the PBNP design. The Ginna nuclear generating station is of similar design to PBNP. It is a Westinghouse 2-loop PWR of the same vintage as PBNP and approximately the same power (prior to the PBNP power uprate). Measurements at Ginna for 18 months in 1980 - 1981 (Kunz, "Measurement of ^{14}C Production and Discharge From the Ginna Nuclear Power Reactor," 1982) found that ten percent of the C-14 was discharged as $^{14}CO_2$. Therefore, 10% of the 11.67 Ci of C-14 calculated for PBNP by EPRI will be used in the ingestion dose calculations.

C-14 dose calculations were made using the dose factors and the methodology of Regulatory Guide 1.109. The inhalation dose was calculated using all of the C-14 calculated to be released. All the C-14 is used because whether the C-14 is in the form of $^{14}CO_2$ or one of the organic forms, such as CH_4, both would be inhaled and contribute to a lung dose.

For the other existing pathways, milk, meat, and produce, the dose depends upon the amount incorporated into biomass consumed by cattle and people: forage for cattle and produce for humans. Incorporation only occurs via photosynthesis. Photosynthesis only incorporates $^{14}CO_2$ and hence the use only of the 10% fraction of the total C-14 release for these pathways.

The airborne effluent C-14 dose calculations were made as described above. They were made for the MEI as explained in Section 2.1. This approach utilizes all the pathways that are applicable to a hypothetical person residing at the site boundary. Because C-14 is present as a gas, the pathways are milk, meat, and produce (vegetables, fruit, and grain). The Regulatory Guide 1.109, Table E-5 usage factors were applied to the calculation. As such, the resulting dose will be conservative in that the produce usage factor includes grain and fruit and these pathways do not exist in the vicinity of the point for which the C-14 doses are calculated. Furthermore, because leafy vegetables are included in the produce pathway, they are not used as a separate pathway because that would result in double accounting for leafy vegetable dose contribution.

3.6 C-14 Measurements

No C-14 measurements were made of PBNP airborne effluents. In 2010, C-14 was measured in crops grown on fields in the owner controlled area located in the highest χ/Q sector at the site's south boundary. One field is leased for feed corn by a dairy south of the plant. That dairy is part of the REMP. In an adjacent field soybeans are grown by another farmer. These two crops were sampled in this sector and as well as in a background location about 17 miles SW of the plant. Based on the measurement error, there was no statistical difference between the results obtained on site in the highest χ/Q sector as compared to the background site some 17 miles away (2013 AMR, Table 10-3). These results demonstrated that the dose from C-14 in Point Beach airborne effluents should not measurably increase the C-14 dose compared to that received from naturally occurring C-14 in plants (1 mrem: NCRP Report 93, Ionizing Radiation Exposure of the Population of the United States, 1987, p.12).

3.7 Errata to Previous Annual Monitoring Reports

An error was found in airborne effluent calculations for January 2012. As a result, Tables 3-1, 3-2, and 3-3 of the 2012 AMR needed to be corrected. Complete copies of the corrected tables are presented below. Corrections for the 2010 and 2011 AMRs are presented in Section 16. Annual totals increased by less than one percent.

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Table 3-1
Comparison of 2013 Airborne Effluent Calculated Doses to 10 CFR 50 Appendix I Design Objectives

Category	Annual Appendix I Design Objective	January-December Calculated Dose	Percent of Appendix I Design Objective
Particulate	30 mrem/organ	0.241 mrem	0.804
Noble gas	40 mrad (beta air)	0.000107 mrad	0.00027
Noble gas	20 mrad (gamma air)	0.000242 mrad	0.00121
Noble gas	30 mrem (skin)	0.000345 mrem	0.00115
Noble gas	10 mrem (whole body)	0.000229 mrem	0.00229

Table 3-2
Radioactive Airborne Effluent Release Summary
January 1, 2013, through December 31, 2013

	Jan	Feb	Mar	Apr	May	Jun	Total Jan-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total NG from Liq (Ci)	2.03E-03	7.26E-03	1.52E-03	8.54E-04	4.18E-03	0.00E+00	1.58E-02	0.00E+00	8.99E-04	0.00E+00	4.23E-04	0.00E+00	3.56E-03	2.07E-02
Total Noble Gas (Ci)[1]	3.36E-01	5.94E-02	3.45E-02	4.03E-02	6.02E-02	5.25E-02	5.82E-01	4.36E-02	4.11E-02	5.21E-02	5.67E-02	3.62E-02	2.09E-01	1.02E+00
Total Radioiodines (Ci)[2]	0.00E+00	0.00E+00	1.10E-06	8.78E-08	0.00E+00	0.00E+00	1.18E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-06
Total Particulate (Ci)[3]	5.54E-10	1.10E-09	4.19E-06	3.72E-06	1.23E-10	1.41E-10	7.91E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.91E-06
Alpha (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Strontium(Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
All other beta + gamma (Ci)	5.54E-10	1.10E-09	4.19E-06	3.72E-06	1.23E-10	1.41E-10	7.91E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.91E-06
Total Tritium (Ci)	5.86E+00	5.31E+00	7.24E+00	6.92E+00	5.28E+00	4.02E+00	3.46E+01	3.75E+00	2.86E+00	5.33E+00	4.44E+00	5.96E+00	7.18E+00	6.41E+01
Max NG H'rly Rel.(Ci/sec)	1.17E-06	6.12E-08	2.29E-07	5.45E-08	1.01E-06	6.12E-08		4.74E-08	5.39E-07	4.77E-08	4.86E-08	4.97E-08	5.89E-08	

[1] Total noble gas (airborne + liquid releases) does not include F-18 which is not a noble gas. F-18 monthly and annual totals are presented in Table 3-3..
[2] Airborne radioiodines only include I-131 and I-133. Although for dose calculations iodines are grouped with particulates, for this reporting table they are separated from the particulate group.
[3] Total Particulate is the sum of alpha, strontium, and others. It does not include radioiodines or C-14. C-14 was calculated for the year and no monthly values are available.

TABLE 3-3
Isotopic Composition of Airborne Releases
January 1, 2013 through December 31, 2013

Nuclide	Jan (Ci)	Feb (Ci)	Mar (Ci)	Apr (Ci)	May (Ci)	Jun (Ci)	Semi-Annual	Jul (Ci)	Aug (Ci)	Sep (Ci)	Oct (Ci)	Nov (Ci)	Dec (Ci)	Total (Ci)
H-3	5.86E+00	5.31E+00	7.24E+00	6.92E+00	5.28E+00	4.02E+00	3.46E+01	3.75E+00	2.86E+00	5.33E+00	4.44E+00	5.96E+00	7.18E+00	6.41E+01
Ar-41	4.47E-02	4.67E-02	3.05E-02	3.75E-02	4.24E-02	5.24E-02	2.54E-01	4.36E-02	4.01E-02	5.21E-02	5.77E-02	3.58E-02	5.77E-02	5.41E-01
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.52E-04	1.52E-04
Kr-87	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-88	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-131m	2.49E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.49E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.27E-04	6.76E-04
Xe-133	2.90E-01	1.24E-02	3.95E-03	2.72E-03	1.76E-02	1.02E-04	3.27E-01	0.00E+00	1.02E-03	0.00E+00	9.76E-04	3.67E-04	1.37E-01	4.66E-01
Xe-133m	4.78E-04	6.11E-05	0.00E+00	0.00E+00	1.46E-04	0.00E+00	6.85E-04	0.00E+00	8.54E-06	0.00E+00	0.00E+00	0.00E+00	2.45E-03	3.14E-03
Xe-135	1.34E-04	2.02E-04	1.16E-04	1.15E-04	5.16E-05	0.00E+00	6.19E-04	0.00E+00	1.19E-06	0.00E+00	1.14E-06	0.00E+00	1.17E-02	1.23E-02
Xe-135m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-138	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
F-18	1.74E-09	0.00E+00	1.25E-05	0.00E+00	0.00E+00	0.00E+00	1.25E-05	2.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-01
Cr-51	0.00E+00	0.00E+00	0.00E+00	9.13E-08	0.00E+00	0.00E+00	9.13E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.13E-08
Mn-54	0.00E+00	0.00E+00	1.20E-07	0.00E+00	0.00E+00	0.00E+00	1.20E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-07
Co-58	0.00E+00	0.00E+00	2.73E-06	2.81E-06	0.00E+00	0.00E+00	5.54E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.54E-06
Co-60	0.00E+00	6.48E-10	4.39E-07	9.84E-08	0.00E+00	0.00E+00	5.38E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.38E-07
Zn-65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	0.00E+00	0.00E+00	6.71E-08	4.47E-07	0.00E+00	0.00E+00	5.14E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.14E-07
Zr-95	0.00E+00	0.00E+00	0.00E+00	2.24E-07	0.00E+00	0.00E+00	2.24E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-07
I-131	0.00E+00	0.00E+00	1.10E-06	8.78E-08	0.00E+00	0.00E+00	1.18E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-06
I-132	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ni-63	5.54E-10	4.50E-10	8.36E-07	4.41E-08	1.23E-10	1.41E-10	8.81E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.81E-07
Tc-99	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Note: The Noble Gases listed above include the liquid contribution

Table 3-4 Corrected 2012 Table 3-1
Comparison of 2012 Airborne Effluent Calculated Doses to 10 CFR 50 Appendix I Design Objectives

Category	Annual Appendix I Design Objective	January-December Calculated Dose	Percent of Appendix I Design Objective
Particulate	30 mrem/organ	0.240 mrem	0.800
Noble gas	40 mrad (beta air)	0.000101 mrad	0.00025
Noble gas	20 mrad (gamma air)	0.000238 mrad	0.00119
Noble gas	30 mrem/skin	0.000338 mrem	0.00013
Noble gas	10 mrem (whole body)	0.000225 mrem	0.00225

Table 3-5 Corrected 2012 Table 3-2
Radioactive Airborne Effluent Release Summary
January 1, 2012, through December 31, 2012

	Jan	Feb	Mar	Apr	May	Jun	Total Jan-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total NG from Liq (Ci)	0.00E+00	4.76E-04	0.00E+00	0.00E+00	1.81E-04	0.00E+00	6.57E-04	3.80E-03	5.44E-04	2.18E-03	1.03E-02	1.06E-02	1.51E-02	4.32E-02
Total Noble Gas (Ci)[1]	7.55E-02	6.11E-02	6.48E-02	5.03E-02	5.15E-02	4.99E-02	3.53E-01	6.63E-02	4.73E-02	4.33E-02	1.35E-01	1.85E-01	6.47E-02	8.94E-01
Total Radioiodines (Ci)[2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-05	0.00E+00	0.00E+00	0.00E+00	1.04E-05	0.00E+00	2.85E-05
Total Particulate (Ci)[3]	1.34E-10	9.78E-11	1.28E-10	7.28E-11	5.81E-11	5.84E-11	5.49E-10	1.01E-06	1.25E-06	9.89E-07	0.00E+00	5.48E-05	0.00E+00	5.80E-05
Alpha (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Strontium(Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
All other beta + gamma (Ci)	1.34E-10	9.78E-11	1.28E-10	7.28E-11	5.81E-11	5.84E-11	5.49E-10	1.01E-06	1.25E-06	9.89E-07	0.00E+00	5.48E-05	0.00E+00	5.80E-05
Total Tritium (Ci)	6.29E+00	4.38E+00	6.41E+00	7.04E+00	7.02E+00	4.57E+00	3.57E+01	6.32E+00	8.69E+00	2.66E+00	3.81E+00	7.66E+00	4.99E+00	6.98E+01
Max NG H'rly Rel.(Ci/sec)	4.60E-08	9.19E-08	5.99E-08	5.38E-08	5.61E-08	6.15E-08		5.61E-08	6.54E-08	5.88E-08	6.01E-08	4.76E-08	5.18E-08	

[1] Total noble gas (airborne + liquid releases).
[2] Airborne radioiodines only include I-131 and I-133. Although for dose calculations iodines are grouped with particulates, for this reporting table they are separated from the particulate group.
[3] Total Particulate is the sum of alpha, strontium, and others. It does not include radioiodines or C-14. C-14 was calculated for the year and no monthly values are available.

Table 3-6 Corrected 2012 TABLE 3-3
Isotopic Composition of Airborne Releases
January 1, 2012 through December 31, 2012

Nuclide	Jan (Ci)	Feb (Ci)	Mar (Ci)	Apr (Ci)	May (Ci)	Jun (Ci)	Semi-Annual	Jul (Ci)	Aug (Ci)	Sep (Ci)	Oct (Ci)	Nov (Ci)	Dec (Ci)	Total (Ci)
H-3	6.29E+00	4.38E+00	6.41E+00	7.04E+00	7.02E+00	4.57E+00	3.57E+01	6.32E+00	8.69E+00	2.66E+00	3.81E+00	7.66E+00	4.99E+00	6.98E+01
Ar-41	4.82E-02	4.15E-02	5.21E-02	4.25E-02	4.54E-02	4.24E-02	2.72E-01	5.45E-02	3.75E-02	3.49E-02	5.62E-02	1.48E-02	4.81E-02	5.18E-01
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-05	7.62E-04	0.00E+00	7.75E-04
Kr-87	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.98E-04	0.00E+00	1.98E-04
Kr-88	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.54E-04	0.00E+00	9.54E-04
Xe-131m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.23E-04	0.00E+00	3.23E-04
Xe-133	2.70E-02	1.97E-02	1.27E-02	7.74E-03	6.14E-03	7.44E-03	8.07E-02	1.15E-02	9.67E-03	8.40E-03	7.58E-02	1.47E-01	1.62E-02	3.49E-01
Xe-133m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.07E-06	0.00E+00	0.00E+00	1.08E-03	2.33E-03	1.50E-04	3.57E-03
Xe-135	2.82E-04	1.72E-06	0.00E+00	7.49E-05	0.00E+00	0.00E+00	3.59E-04	2.91E-04	4.71E-05	4.72E-05	1.79E-03	1.82E-02	2.34E-04	2.09E-02
Xe-135m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-138	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
F-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-08	0.00E+00	0.00E+00	0.00E+00	1.47E-08
Cr-51	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-05	0.00E+00	2.36E-05
Mn-54	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.75E-06	0.00E+00	4.75E-06
Co-58	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.90E-06	0.00E+00	5.90E-06
Co-60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.30E-06	0.00E+00	7.30E-06
Zn-65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.39E-07	0.00E+00	4.39E-07
Nb-95	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.80E-06	0.00E+00	5.80E-06
Zr-95	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.49E-06	0.00E+00	3.49E-06
I-131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.48E-06	0.00E+00	0.00E+00	0.00E+00	6.05E-07	0.00E+00	2.09E-06
I-132	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.84E-06	0.00E+00	9.84E-06
I-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.66E-05
Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.98E-08	0.00E+00	6.98E-08
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E-08	0.00E+00	4.55E-08
Cs-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.44E-07	0.00E+00	0.00E+00	1.12E-08	0.00E+00	2.56E-07
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.39E-06	0.00E+00	2.39E-06
Ni-63	1.34E-10	9.78E-11	1.28E-10	0.00E+00	0.00E+00	0.00E+00	3.60E-10	1.01E-06	1.01E-06	9.75E-07	0.00E+00	1.52E-06	0.00E+00	4.51E-06
Tc-99	0.00E+00	0.00E+00	0.00E+00	7.28E-11	5.81E-11	5.84E-11	1.89E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E-10
Sr-89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Note: The Noble Gases listed above include the liquid contribution

Table 3-7
Comparison of Airborne Effluent Doses

2013 Airborne Particulate + Tritium Dose (mrem)

	Bone	Liver	T-WB	Thyroid	Kidney	Lung	GI-LLI	Skin
Adult	6.07E-05	1.50E-02	1.53E-02	1.50E-02	1.50E-02	1.50E-02	1.50E-02	5.81E-04
Teen	8.25E-05	1.73E-02	1.75E-02	1.73E-02	1.73E-02	1.73E-02	1.73E-02	5.81E-04
Child	1.20E-04	2.52E-02	2.55E-02	2.53E-02	2.52E-02	2.52E-02	2.52E-02	5.81E-04
Infant	5.96E-05	1.11E-02	1.14E-02	1.12E-02	1.11E-02	1.11E-02	1.11E-02	5.81E-04

2013 Carbon-14 Dose (mrem)

	Bone	Liver	T. Body	Thyroid	Kidney	Lungs	GI-LLI	Skin
Adult	6.65E-02	1.32E-02	1.32E-02	1.32E-02	1.32E-02	1.32E-02	1.32E-02	0.00E+00
Teen	1.04E-01	2.08E-02	2.08E-02	2.08E-02	2.08E-02	2.08E-02	2.08E-02	0.00E+00
Child	2.41E-01	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02	4.81E-02	0.00E+00
Infant	1.23E-01	2.61E-02	2.61E-02	2.61E-02	2.61E-02	2.61E-02	2.61E-02	0.00E+00

2013 Total Airborne Non-Noble Gas Dose (Particulate + H-3 + C-14 (mrem))

	Bone	Liver	T-WB	Thyroid	Kidney	Lung	GI-LLI	Skin
Adult	6.66E-02	2.82E-02	2.85E-02	2.83E-02	2.82E-02	2.82E-02	2.82E-02	5.81E-04
Teen	1.04E-01	3.80E-02	3.83E-02	3.80E-02	3.80E-02	3.80E-02	3.80E-02	5.81E-04
Child	2.41E-01	7.33E-02	7.36E-02	7.33E-02	7.33E-02	7.33E-02	7.33E-02	5.81E-04
Infant	1.23E-01	3.72E-02	3.74E-02	3.73E-02	3.72E-02	3.72E-02	3.72E-02	5.81E-04
Ann.Limit	3.00E+01	3.00E+01		3.00E+01	3.00E+01	3.00E+01	3.00E+01	3.00E+01
% Limit	8.04E-01	2.44E-01		2.44E-01	2.44E-01	2.44E-01	2.44E-01	1.94E-03

The percent of limit is calculated using the highest total dose, the Child Age Group.

4.0 RADIOACTIVE SOLID WASTE SHIPMENTS

4.1 Types, Volumes, and Activity of Shipped Solid Waste

The following types, volumes, and activity of solid waste were shipped from PBNP for offsite disposal or burial during 2013. No Type C or D waste was shipped. No irradiated fuel was shipped offsite. The volume, activity and type of waste are listed in Table 4-1.

Table 4-1
Quantities and Types of Waste Shipped from PBNP in 2013

Type of Waste	Quantity	Activity
A. Spent resins, filter sludge, evaporator bottoms, etc.	2.400 m^3	0.180 Ci
	84.0 ft^3	
B. Dry compressible waste, contaminated equipment, etc	217.5 m^3	232.394 Ci
	7680.0 ft^3	
C. Irradiated components, control rods, etc.	0.00 m^3	N/A Ci
	ft^3	
D. Other	0.00 m^3	N/A Ci
	ft^3	

4.2 Major Nuclide Composition (by Type of Waste)

The major radionuclide content of the 2013 solid waste was determined by gamma isotopic analysis and the application of scaling factors for certain indicator radionuclides based on the measured isotopic content of representative waste stream samples. The estimated isotopic content is presented in Table 4-2. Only those radionuclides with detectable activity are listed.

Table 4-2
2013 Estimated Solid Waste Major Radionuclide Composition

TYPE A		TYPE B		TYPE C		TYPE D	
	Percent		Percent		Percent		Percent
Nuclide	Abundance	Nuclide	Abundance	Nuclide	Abundance	Nuclide	Abundance
Co-58	41.48717%	Co-60	45.86037%				
Ni-63	32.43226%	Fe-55	13.67567%				
Co-60	20.72182%	Nb-95	12.19132%				
Mn-54	1.86758%	Ni-63	9.85561%				
Sb-125	1.61944%	Sb-125	3.04844%				
Ni-59	0.40312%	Zr-95	2.84456%				
Co-57	0.39876%	Cs-137	2.15047%				
Fe-55	0.39441%	Co-58	1.96695%				
Sb-124	0.12886%	Tc-99	1.53465%				
Pu-241	0.12407%	Mn-54	1.49294%				
Zn-65	0.11710%	Sb-124	1.36708%				
Ce-144	0.08576%	H-3	1.21643%				
C-14	0.08054%	Ag-110m	0.74438%				
Ag-110n	0.06835%	Ce-144	0.62441%				
Cs-137	0.04440%	Zn-65	0.51913%				
Sr-89	0.01054%	Nb-94	0.17758%				
H-3	0.00823%	Sr-89	0.13921%				
Sr-90	0.00657%	Ag-108m	0.13526%				
Tc-99	0.00036%	Co-57	0.11978%				
Am-241	0.00020%	C-14	0.10754%				
Pu-238	0.00020%	Sr-90	0.08298%				
Cm-243	0.00014%	Pu-241	0.07645%				
Pu-239	0.00008%	Am-241	0.04583%				
Cm-242	0.00005%	Cm-243	0.00756%				
		Pu-238	0.00538%				
		Pu-239	0.00531%				
		Pu-240	0.00371%				
		Cm-242	0.00097%				
		In-113m	0.00000%				

4.3 Solid Waste Disposition

There were four solid waste shipments from PBNP during 2013. The dates and destinations are shown in Table 4-3.

Table 4-3
2013 PBNP Radioactive Waste Shipments

Date	Destination
04/02/13	Oak Ridge
04/10/13	Oak Ridge
04/24/13	Oak Ridge
09/29/13	Erwin, TN

5.0 NONRADIOACTIVE CHEMICAL RELEASES

5.1 Scheduled Chemical Waste Releases

Scheduled chemical waste releases to the circulating water system from January 1, 2013, to June 30, 2013, included 6.84E+05 gallons of neutralized wastewater. The wastewater contained 6.35E+00 lbs. of suspended solids and 7.47E+03 lbs. of dissolved solids.

Scheduled chemical waste releases to the circulating water system from July 1, 2013, to December 31, 2013, included 3.95E+04 gallons of neutralized wastewater. The wastewater contained 1.14E+00 lbs. of suspended solids and 7.86E+00 lbs. of dissolved solids.

Scheduled chemical waste releases are based on the average analytical results obtained from sampling a representative number of neutralizing tanks.

5.2 Miscellaneous Chemical Waste Releases

Miscellaneous chemical waste releases from the wastewater effluent (based on effluent analyses) to the circulating water for January 1, 2013, to June 30, 2013, included 1.75E+07 gallons of clarified wastewater. The wastewater contained 2.21E+03 lbs. of suspended solids.

Miscellaneous chemical waste releases from the wastewater effluent (based on effluent analyses) to the circulating water for July 1, 2013, to December 31, 2013, included 1.56E+07 gallons of clarified wastewater. The wastewater contained 2.40E+03 lbs. of suspended solids.

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from January 1, 2013, to June 30, 2013, included 4.36E+05 lbs. of sodium bisulfite solution (1.66E+05 lbs. sodium bisulfite), 4.70E+05 lbs of Sodium Hypochlorite Solution (5.87E+04 lbs. sodium hypochlorite), and 5.48E+03 lbs. Acti-Brom 1338 (2.47E+03 lbs. sodium bromide).

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from July 1, 2013, to December 31, 2013, included 5.80E+05 lbs. of sodium bisulfite solution (2.20E+05 lbs. sodium bisulfite), 4.38E+05 lbs. Sodium Hypochlorite Solution (5.48E+04 lbs. sodium hypochlorite), 6.04E+03 lbs. Acti-Brom 1338 (2.72E+03 lbs. sodium bromide).

6.0 CIRCULATING WATER SYSTEM OPERATION

The circulating water system operation during this reporting period is described in Table 6-1.

Table 6-1
Circulating Water System Operation for 2013

	UNIT	JAN	FEB	MAR	APR	MAY	JUN
Average Volume Cooling Water Discharge [million gal/day]**	1	291.9	291.9	170.6	258.8	541.8	542.5
	2	322.5	343.8	350.3	425.0	547.6	548.3
Average Cooling Water Intake Temperature [°F]	1	39.3	38.6	38.0	45.8	50.0	52.4
	2	40.1	39.4	40.9	42.9	50.3	52.8
Average Cooling Water Discharge Temperature [°F]	1	75.6	75.1	69.7	54.6	68.4	70.9
	2	72.1	71.7	69.6	65.7	66.1	68.8
Average Ambient Lake Temperature [°F]		34.7	35.3	37.0	45.6	45.6	47.4

Table 6-1(continued)
Circulating Water System Operation for 2013

	UNIT	JUL	AUG	SEP	OCT	NOV*	DEC
Average Volume Cooling Water Discharge [million gal/day]**	1	542.5	542.5	542.5	542.5	542.5	366.4
	2	548.3	548.3	548.3	548.3	548.3	388.8
Average Cooling Water Intake Temperature [°F]	1	56.9	56.4	61.8	51.5	43.1	38.7
	2	57.7	57.0	62.1	52.0	43.3	39.5
Average Cooling Water Discharge Temperature [°F]	1	75.4	73.9	80.6	70.0	61.2	68.3
	2	73.6	72.5	78.5	68.3	59.8	67.1
Average Ambient Lake Temperature [°F]		51.7	50.9	57.1	47.3	39.8	34.8

*U1 outage circ water shut down 3/19/13 - 4/12/13
** For days with cooling water discharge flow.

Part B
Miscellaneous Reporting Requirements

7.0 ADDITIONAL REPORTING REQUIREMENTS

7.1 Revisions to the PBNP Effluent and Environmental Programs

Neither the ODCM nor the RECM were revised in 2013. The Environmental Manual (EM) was revised in October 2013. A copy of the EM, Revision 24, October 1, 2013, is provided with this Annual Monitoring Report

7.2 Interlaboratory Comparison Program

ATI Environmental, Inc, Midwest Laboratory, the analytical laboratory contracted to perform the radioanalyses of the PBNP environmental samples, participated in the Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP) as well as in the interlaboratory comparison studies administered by Environmental Resources Associates (ERA) during 2013. The ERA environmental crosscheck program replaces the Environmental Measurements Laboratory (EML) Quality Assessment Program which was discontinued. The results of these comparisons can be found in Appendix A.

7.3 Special Circumstances

No special circumstances report regarding operation of the explosive gas monitor for the waste gas holdup system was needed during 2013.

Part C
RADIOLOGICAL ENVIRONMENTAL MONITORING

8.0 INTRODUCTION

The objective of the PBNP Radiological Environmental Monitoring Program (REMP) is to determine whether the operation of PBNP or the ISFSI has radiologically impacted the environment. To accomplish this, the REMP collects and analyzes air, water, milk, soil, vegetation, and fish samples for radionuclides and uses thermoluminescent dosimeters (TLDs) to determine the ambient radiation background. The analyses of the various environmental media provide data on measurable levels of radiation and radioactive materials in the principal pathways of environmental exposure. These measurements also serve as a check of the efficacy of PBNP effluent controls.

The REMP fulfills the requirements of 10 CFR 20.1302, PBNP General Design Criterion (GDC) 17, GDC 64 of Appendix A to 10 CFR 50, and Sections IV.B.2 and IV.B.3 of Appendix I to 10 CFR 50 for the operation of the plant. A subset of the PBNP REMP samples, consisting of air, soil and vegetation also fulfills 10 CFR 72.44(d)(2) for operation of the ISFSI. Additionally,TLDs provide the means to measure changes in the ambient environmental radiation levels at sites near the ISFSI and at the PBNP site boundary to ensure that radiation levels from the ISFSI are maintained within the dose limits of 10 CFR 72.104. Because the ISFSI is within the PBNP site boundary, radiation doses from PBNP and the ISFSI, combined, must be used to assess compliance with 10 CFR 72.122 and 40 CFR 190. Therefore, radiological environmental monitoring for the ISFSI is provided by selected sampling sites, which are part of the PBNP REMP.

For the aquatic environment, the samples include water as well as the biological integrators, such as fish and filamentous algae. Because of their migratory behavior, fish are wide area integrators. In contrast, the filamentous algae periphyton is attached to shoreline rocks and concentrate nuclides from the water flowing by their point of attachment. Grab samples of lake water provide a snapshot of radionuclide concentrations at the time the sample is taken; whereas analysis of fish and filamentous algae yield concentrations integrated over time.

The air-grass-cow-milk exposure pathway unites the terrestrial and atmospheric environments. This pathway is important because of the many dairy farms around PBNP. Therefore, the REMP includes samples of air, general grasses, and milk from the PBNP environs. An annual land use survey is made to determine whether the assumptions on the location of dairy cattle remain conservative with respect to dose calculations for PBNP effluents. The dose calculations assume that the dairy cattle are located at the south site boundary, the highest depositional sector. In addition, soil samples are collected and analyzed in order to monitor the potential for long-term buildup of radionuclides in the vicinity of PBNP.

For the measurement of ambient environmental radiation levels that may be affected by direct radiation from PBNP or by noble gas effluents, the REMP employs a series of TLDs situated around PBNP and the ISFSI.

9.0 PROGRAM DESCRIPTION

9.1 Results Reporting Convention

The vendor used by PBNP to analyze the environmental samples is directed to report analysis results as measured by a detector, which can meet the required lower limit of detection (LLD) as specified in Table 2-2 of the Environmental Manual for each sample. The report provided by the vendor (see Appendix 1) contains values, which can be either negative, positive or zero plus/minus the two sigma counting uncertainty, which provides the 95% confidence level for the measured value.

The LLD is an *a priori* concentration value that specifies the performance capability of the counting system used in the analyses of the REMP samples. The parameters for the *a priori* LLD are chosen such that only a five percent chance exists of falsely concluding a specific radionuclide is present when it is not present at the specified LLD. Based on detector efficiency and average background activity, the time needed to count the sample in order to achieve the desired LLD depends upon the sample size. Hence, the desired LLD may be achieved by adjusting various parameters. When a suite of radionuclides are required to be quantified in an environmental sample such as lake water, the count time used is that required to achieve the LLD for the radionuclide with the longest counting time. Therefore, in fulfilling the requirement for the most difficult to achieve radionuclide LLD, the probability of detecting the other radionuclides is increased because the counting time used is longer than that required to achieve the remaining radionuclide LLDs.

The REMP results in this report are reported as averages of the measurements made throughout the calendar year plus/minus the associated standard deviation. If all net sample concentrations are equal to or less than zero, the result is reported as "Not Detectable" (ND), indicating no detectable level of activity present in the sample. If any of the net sample concentrations indicate a positive result statistically greater than zero, all of the data reported are used to generate the reported statistics. Because of the statistical nature of radioactive decay, when the radionuclide of interest is not present in the sample, negative and positive results centered about zero will be seen. Excluding validly measured concentrations, whether negative or as small positive values below the LLD, artificially inflates the calculated average value. Therefore, all generated data are used to calculate the statistical values (i.e., average, standard deviation) presented in this report. The calculated average may be a negative number.

As mentioned above, radioactive decay is a statistical process which has an inherent uncertainty in the analytical result. No two measurements will yield exactly the same result. However, the results are considered equal if the results fall within a certain range based upon the statistical parameters involved in the process. The REMP analytical results are reported at the 95% confidence limit in which the true result may be two standard deviations above or below the reported result. This means that there is only a 5% chance of concluding that the identified radioactive atom is not there when it really is present in the sample. A false positive is an analytical result which statistically shows that the radionuclide is present in the sample when it really is not there. Typically, if the 95%

confidence interval for a positive does not include zero, the radionuclide is considered to be present. For example, the result is reported as 100 ± 90. One hundred minus 90 yields a positive result and therefore may be considered to be present. However, this may be a false positive. If the radionuclide was not in the plant effluent, this result would fall into that category which 5% of the time it is falsely concluded that the radionuclide is present when in actuality it is not. This usually happens at low concentrations at or near the LLD where fluctuations in the background during the counting process skew the results to produce a positive result.

In interpreting the data, effects due to the plant must be distinguished from those due to other sources. A key interpretive aid in assessment of these effects is the design of the PBNP REMP, which is based upon the indicator-control concept. Most types of samples are collected at both indicator locations and at control locations. A plant effect would be indicated if the radiation level at an indicator location was significantly larger than that at the control location. The difference would have to be greater than could be accounted for by typical fluctuation in radiation levels arising from other sources.

9.2 Sampling Parameters

Samples are collected and analyzed at the frequency indicated in Table 9-1 from the locations described in Table 9-2 and shown in Figures 9-1, 9-2 and 9-3. (The latter two figures show sampling locations not shown in preceding figures due to space limitations. The location of the former retention pond, retired and remediated to NRC unrestricted access criteria, is indicated in Figure 9-3). The list of PBNP REMP sampling sites used to determine environmental impact around the ISFSI is found in Table 9-3. The minimum acceptable sample size is found in Table 9-4. In addition, Table 9-1 indicates the collection and analysis frequency of the ISFSI fence TLDs.

9.3 Deviations from Required Collection Frequency

Deviations from the collection frequency given in Table 9-1 are allowed because of hazardous conditions, automatic sampler malfunction, seasonal unavailability, and other legitimate reasons (Section 2.2.6 of the Environmental Manual). Table 9-5 lists the deviations from the scheduled sampling frequency that occurred during the reporting period.

9.4 Assistance to the State of Wisconsin

The Radiation Protection Unit of the Wisconsin Department of Health and Family Services maintains a radiological environmental monitoring program to confirm the results from the PBNP REMP. As a courtesy to the State of Wisconsin, PBNP personnel also collects certain environmental samples (Table 9-6) for the State from sites that are near PBNP sampling sites, or are co-located.

9.5 Program Modifications

No new permanent monitoring sites were added in 2013.

Table 9-1
PBNP REMP Sample Analysis and Frequency

Sample Type	Sample Codes	Analyses	Frequency
Environmental Radiation Exposure	E-01, -02, -03, -04, -05 -06, -07, -08, -09, -12 -14, -15, -16, -17, -18, -20, -22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -38, -39,-41, -42,-43, -TC	TLD	Quarterly
Vegetation	E-01, -02, -03, -04, -06, -08, -09, -20,	Gross Beta Gamma Isotopic Analysis	3x/yr as available
Algae	E-05, -12	Gross Beta Gamma Isotopic Analysis	3x/yr as available
Fish	E-13	Gross Beta Gamma Isotopic Analysis (Analysis of edible portions only)	3x/yr as available
Well Water	E-10	Gross Beta, H-3 Sr-89, 90, I-131 Gamma Isotopic Analysis	Quarterly
Lake Water	E-01, -05, -06, -33	Gross Beta, Sr-89/90, H-3 I-131 Gamma Isotopic Analysis	Monthly / Quarterly composite of monthly collections Monthly Monthly
Milk	E-11, -40, -21	Sr-89, 90 I-131 Gamma Isotopic Analysis	Monthly
Air Filters	E-01, -02, -03, -04, -08, -20	Gross Beta I-131 Gamma Isotopic Analysis	Weekly (particulate) Weekly (charcoal) Quarterly (on composite particulate filters)
Soil	E-01, -02, -03, -04, -06, -08, -09, -20,	Gross Beta Gamma Isotopic Analysis	2x/yr
Shoreline Sediment	E-01, -05, -06, -12, -33,	Gross Beta Gamma Isotopic Analysis	2x/yr
ISFSI Ambient Radiation Exposure	North, East, South, West Fence Sections	TLD	Quarterly

Table 9-2
PBNP REMP Sampling Locations

Location Code	Location Description
E-01	Primary Meteorological Tower South of the Plant
E-02	Site Boundary Control Center - East Side of Building
E-03	Tapawingo Road, about 0.4 Miles West of Lakeshore Road
E-04	North Boundary
E-05	Two Creeks Park
E-06	Point Beach State Park - Coast Guard Station; TLD located South of the Lighthouse on Telephone pole
E-07	WPSC Substation on County V, about 0.5 Miles West of Hwy 42
E-08	G.J. Francar Property at Southeast Corner of the Intersection of Cty. B and Zander Road
E-09	Nature Conservancy
E-10	PBNP Site Well
E-11	Dairy Farm about 3.75 Miles West of Site
E-12	Discharge Flume/Pier
E-13	Pumphouse
E-14	South Boundary, about 0.2 miles East of Site Boundary Control Center
E-15	Southwest Corner of Site
E-16	WSW, Hwy 42, a residence about 0.25 miles North of Nuclear Road
E-17	North of Mishicot, Cty. B and Assman Road, Northeast Corner of Intersection
E-18	Northwest of Two Creeks at Zander and Tannery Roads
E-20	Reference Location, 17 miles Southwest, at Silver Lake College
E-21	Local Dairy Farm just South of Site on Lakeshore and Irish Roads
E-22	West Side of Hwy 42, about 0.25 miles North of Johanek Road
E-23	Greenfield Lane, about 4.5 Miles South of Site, 0.5 Miles East of Hwy 42
E-24	North Side of County Rt. V, near intersection of Saxonburg Road
E-25	South Side of County Rt. BB, about 0.5 miles West of Norman Road
E-26	804 Tapawingo Road, about 0.4 miles East of Cty. B, North Side of Road
E-27	Intersection of Saxonburg and Nuclear Roads, Southwest Corner, about 4 Miles WSW
E-28	TLD site on western most pole between the 2nd and 3rd parking lots.
E-29	Area of North Meteorological Tower.
E-30	NE corner at Intersection of Tapawingo and Lakeshore Roads.
E-31	On utility pole North side of Tapawingo Road closest to the gate at the West property line.
E-32	On a tree located at the junction of property lines, as indicated by trees and shrubs, about 500 feet east of the west gate on Tapawingo Road and about 1200 feet south of Tapawingo Road. The location is almost under the power lines between the blue and gray transmission towers.
E-33	Lake Michigan shoreline accessed from the SE corner of KNPP parking lot. Sample South of creek.
E-38	Tree located at the West end of the area previously containing the Retention Pond.
E-39	Tree located at the East end of the area previously containing the Retention Pond.
E-40	Local Dairy Farm, W side of Hwy 42, about 1.8 miles north of the Nuclear Rd intersection
E-41	NW corner of Woodside and Nuclear Rds (Kewaunee County)
E-42	NW corner of Church and Division, East of Mishicot
E-43	West side of Tannery Rd south of Elmwood (7th pole south of Elmwood)
E-TC	Transportation Control; Reserved for TLDs

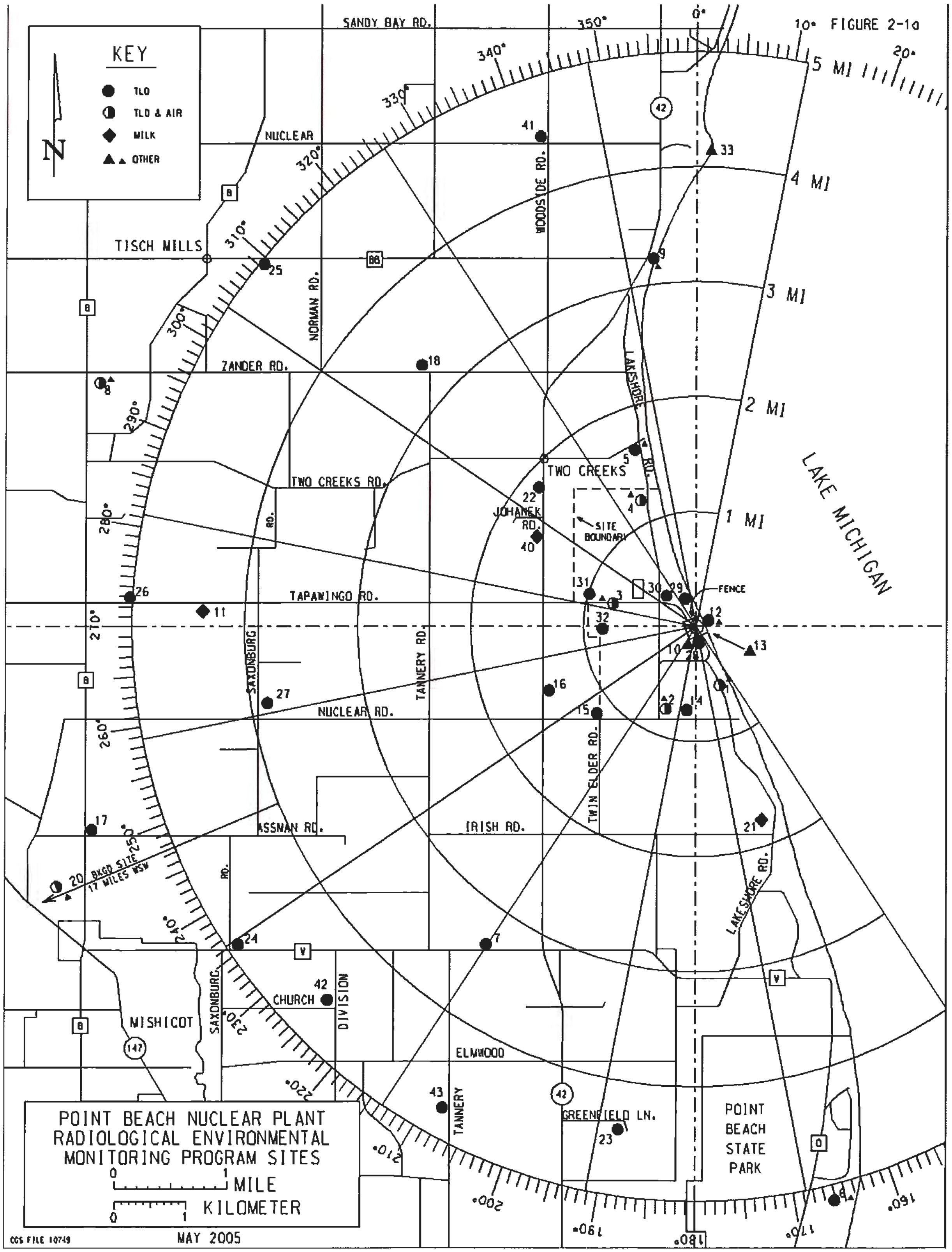


Figure 9-1
PBNP REMP Sampling Sites

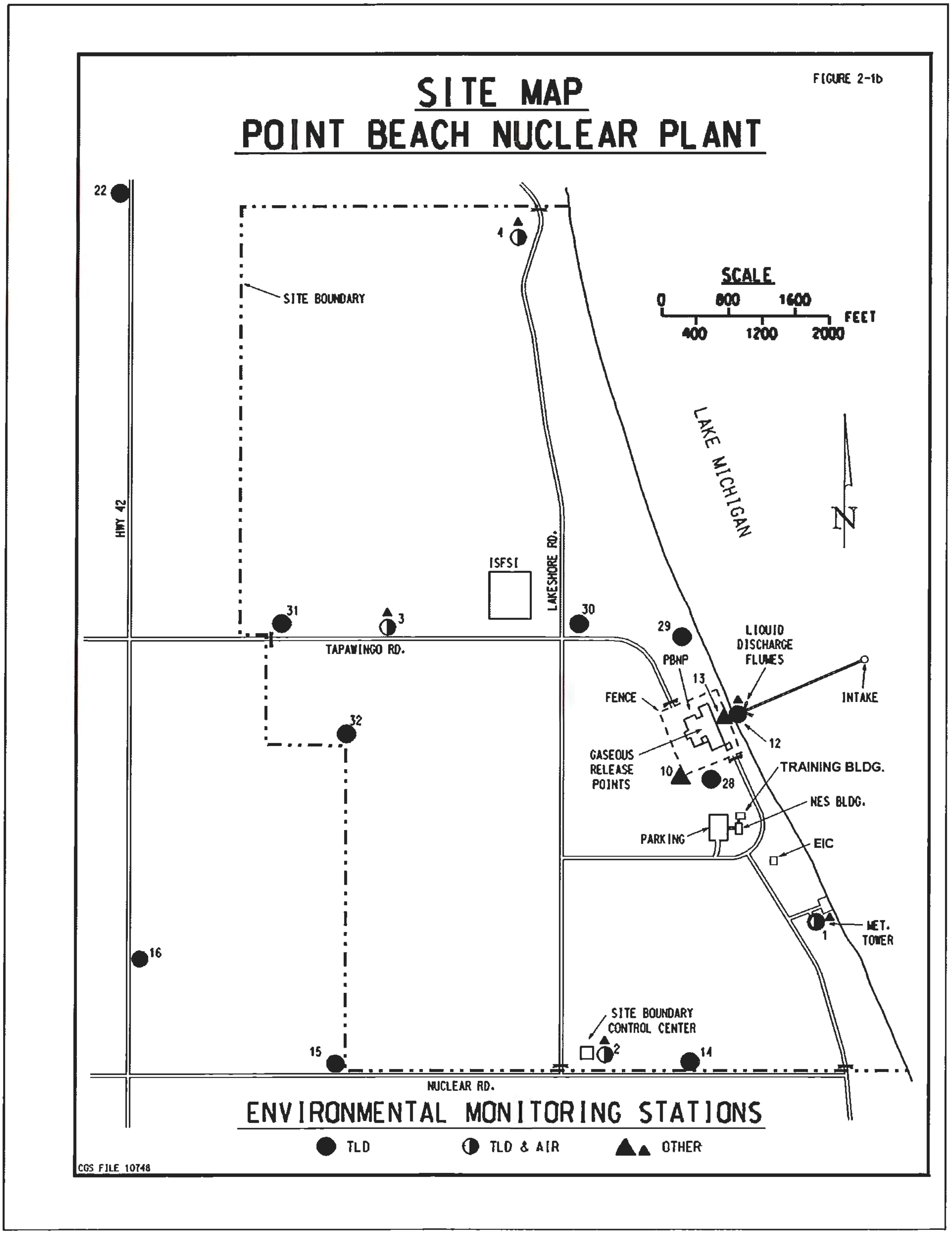


Figure 9-2
Map of REMP Sampling Sites Located Around PBNP

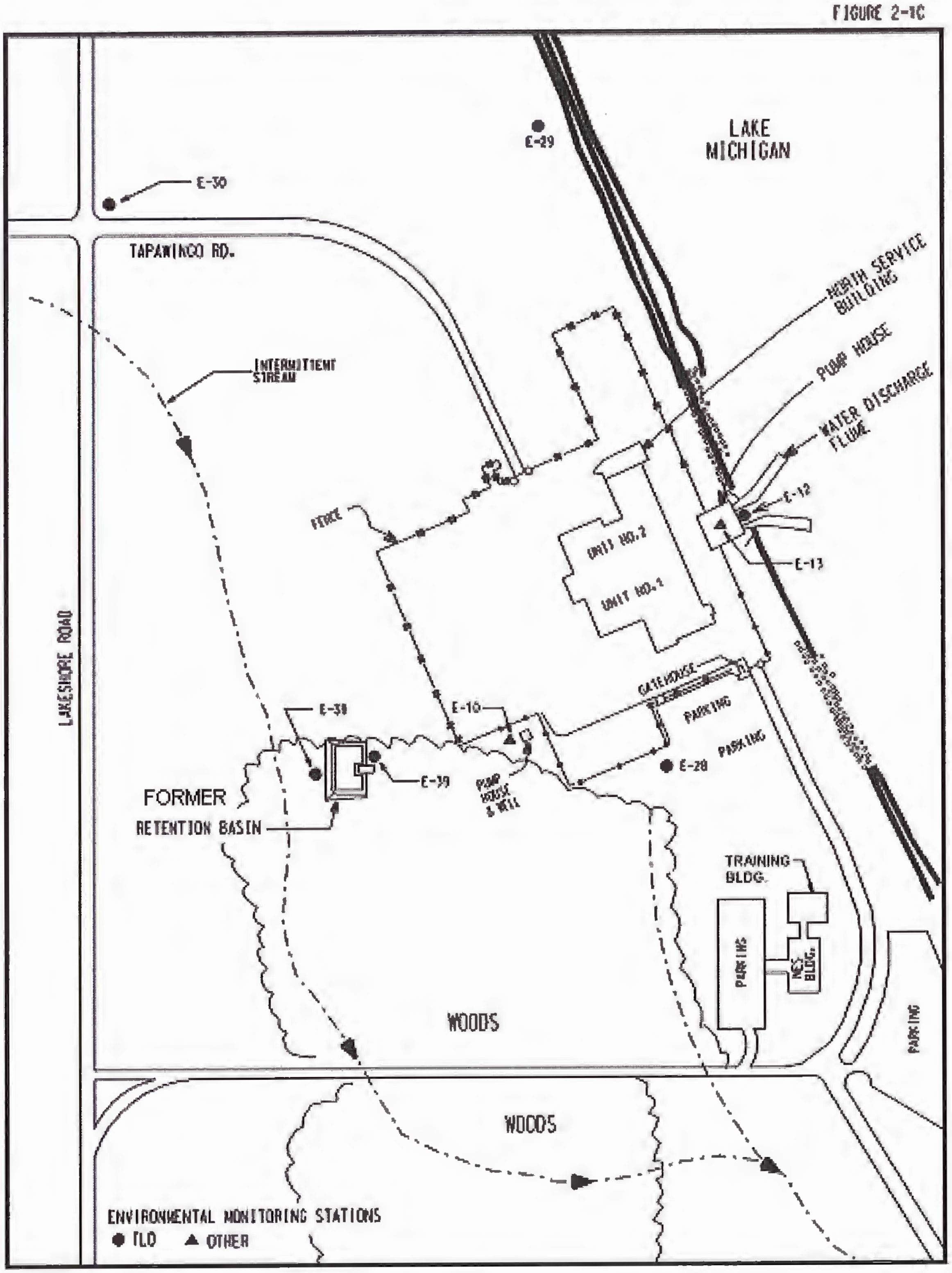


Figure 9-3
Enhanced Map Showing REMP Sampling Sites Closest to PBNP

Table 9-3
ISFSI Sampling Sites

Ambient Radiation Monitoring (TLD)	Soil, Vegetation and Airborne Monitoring
E-03	E-02
E-28	E-03
E-29	E-04
E-30	
E-31	
E-32	

Table 9-4
Minimum Acceptable Sample Size

Sample Type	Size
Vegetation	100-1000 grams
Lake Water	8 liters
Air Filters	250 m3 (volume of air)
Well Water	8 liters
Milk	8 liters
Algae	100-1000 grams
Fish (edible portions)	1000 grams
Soil	500-1000 grams
Shoreline Sediment	500-1000 grams

Table 9-5
Deviations from Scheduled Sampling and Frequency During 2013

Sample Type	Location	Collection Date	Reason for not conducting REMP as required	Plans for Preventing Recurrence
LW	E-06	1/17/13 2/14/13	Icy conditions at the shore prevented getting close enough to the lake to get a water sample on both dates.	Nautral occurrence
AP/I	E-01	2/28/13 3/06/13 3/13/13	No power to sampler	Determined to be an incorrect setting in the control box. Re-set control of timer.
Algae	E-12	6/5/2013	No algae found growing in area	Natural occurrence

Table 9-6
Sample Collections for State of Wisconsin

Sample Type	Location	Frequency
Lake Water	E-01	Monthly
Air Filters	E-07 E-08	Weekly
Fish	E-13	Quarterly, As Available
Precipitation	E-04 E-08	Twice a month, As Available
Milk	E-11 E-19	Monthly
Well Water	E-10	Twice per year

9.6 Analytical Parameters

The types of analyses and their frequencies are given in Table 9-1. The LLDs for the various analyses are found in the Section 10 (Table 10-1) with the summary of the REMP results. All environmental LLDs listed in Table 2-2 of the Environmental Manual (also in Table 10-1) were achieved during 2013.

9.7 Description of Analytical Parameters in Table 9-1

9.7.1 Gamma isotopic analysis

Gamma isotopic analysis consists of a computerized scan of the gamma ray spectrum from 80 keV to 2048 keV. Specifically included in the scan are Mn-54, Fe-59, Co-58, Co-60, Zr-95, Nb-95, Ru-103, Ru-106, I-131, Ba-La-140, Cs-134, Cs-137, Ce-141, and Ce-144. However, other detected nuclear power plant produced radionuclides also are noted. The above radionuclides detected by gamma isotopic analysis are decay corrected to the time of collection. Frequently detected, but not normally reported in the Annual Monitoring Report, are the naturally occurring radionuclides Ra-226, Bi-214, Pb-212, Tl-208, Ac-228, Be-7, and K-40.

9.7.2 Gross Beta Analysis

Gross beta analysis is a non-specific analysis that consists of measuring the total beta activity of the sample. No individual radionuclides are identifiable by this method. Gross beta analysis is a quick method of screening samples for the presence of elevated activity that may require additional, immediate analyses.

9.7.3 Water Samples

Water samples include both Lake Michigan and well water. The Lake Michigan samples are collected along the shoreline at two locations north and two locations south of PBNP. The well water is sampled from the on-site PBNP well. Gross beta measurements are made on the solids remaining after evaporation of the unfiltered sample to dryness. Gamma isotopic analyses are performed using 1-liter liquid samples. Strontium is determined by chemical separation and beta counting.

9.7.4 Air Samples

Particulate air filters are allowed to decay at least 72 hours before gross beta measurements are made in order for naturally occurring radionuclides to become a negligible part of the total activity. Gross beta measurements serve as a quick check for any unexpected activity that may require immediate investigation. Quarterly composites of the particulate air filters are analyzed for long-lived radionuclides such as Cs-134 and Cs-137. Charcoal cartridges for radioiodine are counted as soon as possible so the I-131 will undergo only minimal decay prior to analyses. The weekly charcoal cartridges are screened for I-131 by counting them all at the same time to achieve a lower LLD. If a positive result is obtained, each cartridge is counted individually.

In order to ensure that the air sampling pumps are operating satisfactorily, a gross leak check is performed weekly. The pumps are changed out annually for calibration and maintenance beyond what can be accomplished in the field.

9.7.5 Vegetation

Vegetation samples consist predominantly of green, growing plant material (grasses and weeds most likely to be eaten by cattle if they were present at the sampling site). Care is taken not to include dirt associated with roots by cutting the vegetation off above the soil line.

No special vegetation samples were obtained for C-14 analyses in 2013.

9.7.6 Environmental Radiation Exposure

The 2013 environmental radiation exposure measurements were made using TLD cards. The TLD card is a small passive detector, which integrates radiation exposure. Each TLD consists of a Teflon sheet coated with a crystalline, phosphorus material (calcium sulfate containing dysprosium) which absorbs the gamma ray energy deposited in them. Each TLD is read in four distinct areas to yield four exposure values which are averaged. Prior to the third quarter of 2001, exposure data was obtained using three lithium fluoride (LiF) TLD chips sealed in black plastic. The difference in material types can impact the amount of exposure measured. An evaluation of the response difference between the two types of TLD in 2001 demonstrated that the TLD cards produced a 14% higher response than the LiF chips (2011 AMR, Table 9-7, p. 36).

The reported field exposure is the arithmetic average of the measured exposure values at each location minus the exposure transportation control TLD (exposure received while the field TLD is in storage and transit). The gamma rays may originate from PBNP produced radionuclides or from naturally occurring radionuclides. The TLDs remain at the monitoring site for roughly three months prior to analyses and the results are reported as mrem per seven days. Because the TLDs are constantly bombarded by naturally occurring gamma radiation, even during shipment to and from PBNP, the amount of exposure during transportation is measured using transportation controls with each shipment of TLDs to and from the laboratory. The doses recorded on the transportation controls are subtracted from the monitoring TLDs in order to obtain the net *in situ* dose.

9.7.7 ISFSI Ambient Radiation Exposure

The ISFSI fence TLDs are part of the 10CFR72.44 monitoring and are not considered part of the REMP. However, their results can be used indirectly to determine whether the operation of the ISFSI is having an impact on the ambient environmental radiation beyond the site boundary. Impacts are determined by comparison of fence TLD results to the results of the monitoring at PBNP site boundary and other selected locations. These results are used as part of the 40CFR190 compliance demonstration.

10.0 RESULTS

10.1 Summary of 2013 REMP Results

Radiological environmental monitoring conducted at PBNP from January 1, 2013, through December 31, 2013, consisted of analysis of air filters, milk, lake water, well water, soil, fish, shoreline sediments, algae, and vegetation as well as TLDs. The results are summarized in Table 10-1 which contain the following information:

Sample:	Type of the sample medium
Description:	Type of measurement
LLD:	*a priori* lower limit of detection
N:	Number of samples analyzed
Average:	Average value ± the standard deviation of N samples
High:	Highest measured value ± it's associated 2 sigma counting error
Units:	Units of measurement

For certain analyses, an LLD, which is lower than that required by REMP, is used because the lower value derives from the counting time required to obtain the LLDs for radionuclides that are more difficult to detect. For these analyses, both LLDs are listed with the technical specification required REMP LLD given in parentheses. The results are discussed in the narrative portion of this report (Section 11). Blank values have not been subtracted from the results presented in Table 10-1. A listing of all the individual results obtained from the contracted analytical laboratory and the laboratory's radioanalytical quality assurance results and Interlaboratory Crosscheck Program results are presented in the Appendix.

In Table 10-1, no results are reported as less than LLD (<LLD). All results are reported to PBNP by the contracted radioanalytical laboratory "as measured" whether positive or negative (see Section 9-1). Based on these results, a radionuclide is considered detected if it meets the criterion that the measured value minus its 2σ counting error is greater than zero ($x-2\sigma > 0$). An "ND" entry in Table 10-1 means that for this radionuclide the criterion was not satisfied for any of the measurements. If one analysis fulfilled the criterion, then all of the reported results, both positive and negative, were used in calculating the average shown in Table 10-1.

The method of determining averages based on "as measured" results follows the recommendations made in NUREG-0475 (1978), “Radiological Environmental Monitoring by NRC Licensees for Routine Operations of Nuclear Facilities Task Force Report,” and in Health Physics Society Committee Report HPSR-1 (1980) “Upgrading Environmental Radiation Data” released as document EPA 520/1-80-012 and in more recent documents such as ANSI N42.23-1996, “Instrument Quality Assurance for Radioassay Laboratories;” ANSI N13.30-1996, “Performance Criteria for Radiobioassay;” DE91-013607, “Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance” and NUREG-1576, "Multi-Agency Radiological Laboratory Analytical Protocols Manual."

In addition to the required radionuclides for each medium analyzed, Table 10-1 also has an additional radionuclide listed known to originate with nuclear power plants. This radionuclide is either Co-60, Ru-103, or any other radionuclide which has the lowest LLD based on the analytical parameters needed to meet the LLDs required for radionuclides specified for the medium being analyzed. The radionuclide is identified by parentheses.

During the analyses for those radionuclides specifically required to be identified, naturally occurring radionuclides such as Ra-226, Be-7 and K-40 are detected in many samples. Their concentrations are presented in Table 10-1 for a comparison to those radionuclides for which specific analyses are required by the regulations. There are no regulatory required LLDs for naturally occurring radionuclides.

Finally, PBNP reports the results for soil analyses. There is no regulatory requirement for soil analyses in standard RETS (NUREG-0472 and NUREG-1301). PBNP includes soil analyses in the REMP to be able to compare current results to the historical record.

Table 10-2 contains the ISFSI fence TLD results.

Table 10-1
Summary of Radiological Environmental Monitoring Results for 2013

Sample	Description	N	LLD (a)	Average ± 1 Std. Deviation (b)	High ± 2 sigma	Units
TLD	Environmental Radiation	126	1 mrem	1.14 ± 0.20	1.57 ± 0.06	mR/7days
	Control (E-20)	4	1 mrem	1.22 ± 0.21	1.50 ± 0.11	mR/7days
Air	Gross Beta	259	0.01	0.024 ± 0.011	0.070 ± 0.005	pCi/m3
	Control (E-20) Gross beta	52	0.01	0.024 ± 0.010	0.062 ± 0.005	pCi/m3
	I-131	259	0.030 (0.07)	ND	-	pCi/m3
	Control (E-20) I-131	52	0.030 (0.07)	ND	-	pCi/m3
	Cs-134	20	0.01(0.05)	ND	-	pCi/m3
	Control (E-20) Cs-134	4	0.01(0.05)	ND	-	pCi/m3
	Cs-137	20	0.01(0.06)	ND	-	pCi/m3
	Control (E-20) Cs-137	4	0.01(0.06)	ND	-	pCi/m3
	Other gamma emitters	20	0.1	ND	-	pCi/m3
	Control (E-20) Other	4	0.1	ND	-	pCi/m3
	Natural Be-7	20	-	0.066 ± 0.011	0.085 ± 0.015	pCi/m3
	Control (E-20) Natural Be-7	4	-	0.064 ± 0.017	0.086 ± 0.017	pCi/m3
Milk	Sr-89	36	5	ND	-	pCi/L
	Sr-90	36	1	0.7 ± 0.3	1.6 ± 0.4	pCi/L
	I-131	36	0.5	ND	-	pCi/L
	Cs-134	36	5 (15)	ND	-	pCi/L
	Cs-137	36	5 (18)	0.5 ± 1.3	3.0 ± 2.5	pCi/L
	Ba-La-140	36	5 (15)	-0.9 ± 1.9	3.5 ± 1.2	pCi/L
	Other gamma emitters(Co-60)	36	15	ND	-	
	Natural K-40	36	-	1436 ± 69	1546 ± 95	pCi/L
Well Water	Gross beta	4	4	2.3 ± 0.3	2.6 ± 1.7	pCi/L
	H-3	4	200 (3000)	ND	-	pCi/L
	Sr-89	4	5(10)	ND	-	pCi/L
	Sr-90	4	1 (2)	ND	-	pCi/L
	I-131	4	0.5 (2)	ND	-	pCi/L
	Mn-54	4	10 (15)	ND	-	pCi/L
	Fe-59	4	30	ND	-	pCi/L
	Co-58	4	10(15)	ND	-	pCi/L
	Co-60	4	10(15)	ND	-	pCi/L
	Zn-65	4	30	ND	-	pCi/L
	Zr-Nb-95	4	15	ND	-	pCi/L
	Cs-134	4	10(15)	ND	-	pCi/L
	Cs-137	4	10(18)	ND	-	pCi/L
	Ba-La-140	4	15	ND	-	pCi/L
	Other gamma emitters(Ru-103)	4	30	0.3 ± 1.4	2.4 ± 2.2	pCi/L
Algae	Gross beta	5	0.25	3.48 ± 0.52	3.97 ± 0.19	pCi/g
	Co-58	5	0.25	ND	-	pCi/g
	Co-60	5	0.25	0.006 ± 0.005	0.013 ± 0.007	pCi/g
	Cs-134	5	0.25	ND	-	pCi/g
	Cs-137	5	0.25	0.013 ± 0.009	0.028 ± 0.012	pCi/g
	Natural Be-7	5	-	0.96 ± 0.48	1.54 ± 0.21	pCi/g
	Natural K-40	5	-	3.14 ± 0.49	3.78 ± 0.11	pCi/g

Table 10-1 (continued)
Summary of Radiological Environmental Monitoring Results for 2013

Sample	Description	N	LLD (a)	Average ± 1 Std. Deviation (b)	High ± 2 sigma	Units
Lake Water	Gross beta	46	4	1.6 ± 1.1	6.6 ± 1.0	pCi/L
	I-131	46	0.5 (2)	ND	-	pCi/L
	Mn-54	46	10 (15)	0.3 ± 0.8	2.1 ± 1.6	pCi/L
	Fe-59	46	30	-0.3 ± 1.7	3.8 ± 2.4	pCi/L
	Co-58	46	10(15)	-0.1 ± 0.9	3.0 ± 1.5	pCi/L
	Co-60	46	10(15)	ND	-	pCi/L
	Zn-65	46	30	-0.1 ± 1.8	3.6 ± 3.2	pCi/L
	Zr-Nb-95	46	15	-0.1 ± 1.1	2.3 ± 1.6	pCi/L
	Cs-134	46	10 (15)	ND	-	pCi/L
	Cs-137	46	10 (18)	0.2 ± 0.9	2.2 ± 1.7	pCi/L
	Ba-La-140	46	15	-0.9 ± 2.1	2.6 ± 1.6	pCi/L
	Other gamma (Ru-103)	46	30	-0.5 ± 0.9	1.9 ± 1.3	pCi/L
	Sr-89	16	5(10)	ND	-	pCi/L
	Sr-90	16	1 (2)	0.25 ± 0.14	0.45 ± 0.26	pCi/L
	H-3	16	200 (3000)	66 ± 88	348 ± 87	pCi/L
Fish	Gross beta	14	0.5	3.51 ± 0.66	4.45 ± 0.09	pCi/g
	Mn-54	14	0.13	0.001 ± 0.007	0.011 ± 0.009	pCi/g
	Fe-59	14	0.26	-0.001 ± 0.018	0.026 ± 0.020	pCi/g
	Co-58	14	0.13	-0.004 ± 0.010	0.010 ± 0.008	pCi/g
	Co-60	14	0.13	0.000 ± 0.007	0.014 ± 0.007	pCi/g
	Zn-65	14	0.26	-0.016 ± 0.040	0.043 ± 0.019	pCi/g
	Cs-134	14	0.13	0.000 ± 0.005	0.008 ± 0.006	pCi/g
	Cs-137	14	0.15	0.028 ± 0.026	0.111 ± 0.054	pCi/g
	Other gamma (Ru-103)	14	0.5	-0.003 ± 0.010	0.014 ± 0.008	pCi/g
	Natural K-40	14	-	2.89 ± 0.38	3.68 ± 0.39	pCi/g
Shoreline Sediment	Gross beta	10	2	10.56 ± 1.28	12.38 ± 0.90	pCi/g
	Cs-134	10	0.18	ND		pCi/g
	Cs-137	10	0.15	0.020 ± 0.011	0.032 ± 0.016	pCi/g
	Natural Be-7	10	-	0.061 ± 0.046	0.130 ± 0.050	pCi/g
	Natural K-40	10	-	6.58 ± 1.77	8.80 ± 0.50	pCi/g
	Natural Ra-226	10	-	0.35 ± 0.08	0.49 ± 0.16	pCi/g
Soil	Gross beta	16	2	22.58 ± 4.80	31.17 ± 1.27	pCi/g
	Cs-134	16	0.15	ND		pCi/g
	Cs-137	16	0.15	0.10 ± 0.06	0.24 ± 0.03	pCi/g
	Natural Be-7	16	-	0.13 ± 0.20	0.78 ± 0.32	pCi/g
	Natural K-40	16	-	13.38 ± 2.9	17.59 ± 0.82	pCi/g
	Natural Ra-226	16	-	0.79 ± 0.28	1.47 ± 0.35	pCi/g
Vegetation	Gross beta	24	0.25	5.56 ± 1.67	9.32 ± 0.22	pCi/g
	I-131	24	0.06	0.002 ± 0.009	0.019 ± 0.009	pCi/g
	Cs-134	24	0.06	0.001 ± 0.005	0.012 ± 0.011	pCi/g
	Cs-137	24	0.08	0.004 ± 0.012	0.056 ± 0.025	pCi/g
	Other gamma emitters (Co-60)	24	0.25	ND	-	pCi/g
	Natural Be-7	24	-	1.47 ± 0.92	4.27 ± 0.3	pCi/g
	Natural K-40	24	-	5.15 ± 1.20	7.21 ± 0.52	pCi/g

(a) When two LLD values are listed, the required LLD per the PBNP REMP is enclosed in the parentheses. Whenever possible, PBNP uses the lower value to obtain greater sensitivity.

(b) "ND" indicates that the sample result is Not Detectable, i.e., sample concentrations were statistically equal to zero or <MDA.

Table 10-2
ISFSI Fence TLD Results for 2013

Fence Location	Average	±	Standard Deviation	Units
North	2.62	±	0.41	mR/7 days
East	3.66	±	0.10	mR/7 days
South	1.15	±	0.07	mR/7 days
West	4.28	±	0.14	mR/7 days

11.0 DISCUSSION

11.1 TLD Cards

The ambient radiation was measured in the general area of the site boundary, at an outer ring four – five miles from the plant, at special interest areas, and at one control location, roughly 17 miles southwest of the plant. The average indicator TLD is 1.14 ± 0.20 mR/7-days compared to 1.22 ± 0.21 mR/7-days at the background location. These two values are not significantly different from each other. Neither are the indicator TLD values significantly different from those observed from 2001 through 2012 for the same type of TLD (tabulated below in Table 11-1). Prior to third quarter of 2001 TLD LiF chips were used versus the current TLD cards, see Section 9.7.6 for additional information.

Table 11-1
Average Indicator TLD Results from 1993 – 2013

Year	Average	±	St. Dev*	Units
1993	0.82	±	0.15	mR/7 days
1994	0.90	±	0.12	mR/7 days
1995	0.87	±	0.13	mR/7 days
1996	0.85	±	0.12	mR/7 days
1997	0.87	±	0.11	mR/7 days
1998	0.79	±	0.13	mR/7 days
1999	0.79	±	0.21	mR/7 days
2000	0.91	±	0.15	mR/7 days
2001	1.06	±	0.19	mR/7 days
2002	1.17	±	0.21	mR/7 days
2003	1.10	±	0.20	mR/7 days
2004	1.10	±	0.22	mR/7 days
2005	1.04	±	0.21	mR/7 days
2006	1.14	±	0.21	mR/7 days
2007	1.08	±	0.20	mR/7 days
2008	1.05	±	0.17	mR/7 days
2009	1.08	±	0.17	mR/7 days
2010	1.11	±	0.15	mR/7 days
2011	1.14	±	0.50	mR/7 days
2012	1.17	±	0.17	mR/7 days
2013	1.14	±	0.20	mR/7 days

*St. Dev = Standard Deviation

There were no new dry fuel storage cask additions to the ISFSI in 2013. The west fence TLDs continue to record higher exposures. The north and east fence TLDs are statistically equal at the 95% confidence level (2.62± 0.82 *vs.* 3.66± 0.20). The south fence continues to record the lowest exposures (Table 11-2).

There is no significant exposure impact on the TLD monitoring locations around the ISFSI (Table 11-3). The results continue to be higher at E-03 and E-31 which

Table 11-2
Average ISFSI Fence TLD Results (mR/7 days)

TLD FENCE LOCATION				
	North	East	South	West
1995	1.29	1.28	1.10	1.26
1996	2.12	1.39	1.10	1.68
1997	2.05	1.28	1.00	1.66
1998	2.08	1.37	1.02	1.86
1999	2.57	1.84	1.11	3.26
2000	2.72	2.28	1.25	5.05
2001	2.78	2.54	1.36	6.08
2002	2.79	2.74	1.42	6.46
2003	2.70	2.60	1.50	6.88
2004	2.61	2.12	1.41	6.50
2005	2.54	2.05	1.44	5.63
2006	2.73	2.35	1.38	5.80
2007	2.72	2.73	1.34	5.47
2008	2.64	2.37	1.36	5.36
2009	2.36	2.35	1.20	4.63
2010	2.64	3.02	1.41	5.05
2011	2.44	2.62	1.31	4.75
2012	2.59	3.27	1.40	4.92
2013	2.62	3.66	1.15	4.28

are west of the ISFSI corresponding to the higher exposure at the west fence. As expected, the values at E-03, being closer to the ISFSI, are higher than those at E-31 located at the site boundary (see Figs. 9-1 and 9-2 for locations). The results for the two locations nearest the site boundary (E-31, 1.21 ± 0.34; E-32, 1.39 ± 0.15) are higher than at the background site E-20 (1.11 ± 0.14) but comparable at the 95% confidence level, indicating a small, but not significant, increase in ambient gamma radiation at the site boundary due to the operation of the ISFSI.

Further data supporting this conclusion is the comparison of the TLD results at selected locations around the ISFSI before and after the storage of spent fuel at the ISFSI (Figure 11-1). As stated in Section 9.7.6, the TLD values increased by 14% in the second half of 2001 when the TLD monitoring devices were changed from LiF chips in the first half of the 2001 to calcium sulfate impregnated TLD cards. After that initial change, the measured radiation exposure, as measured by the TLD cards, has remained fairly constant with a slight increase with the addition of stored fuel at the ISFSI. Each year the variations in the TLD results appear to move in concert with each other and with the background site, E-20, which is 17 miles south west of the ISFSI.

Comparing the ISFSI TLD results to results from surrounding REMP indicator and background TLDs reveals little, if any, impact of the ISFSI on the surrounding radiation levels (Figure 11-2). As previously discussed, the small increase is more related to the switch from the LiF chips to the calcium sulfate impregnated Teflon TLD cards as evidenced by the synchronicity with E-20, the background site. LiF TLD chips were replaced with calcium sulfate impregnated Teflon TLD cards which resulted in a higher reported background exposure.

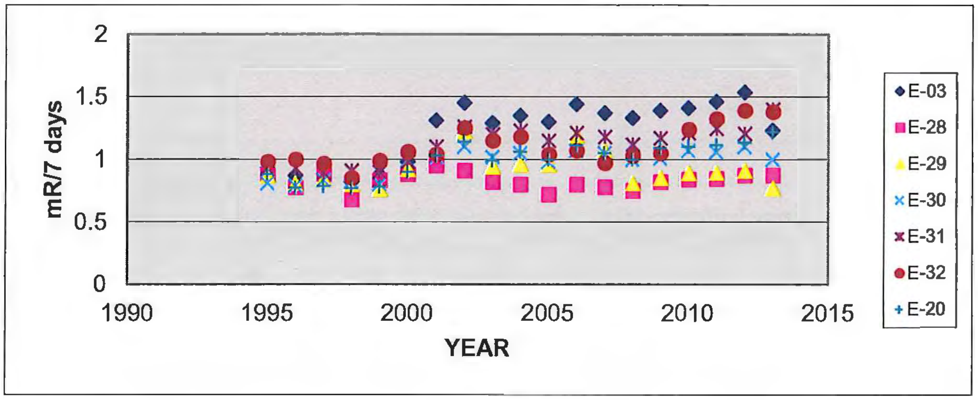


Figure 11-1 ISFSI AREA TLD RESULTS (1995 - 2013)

Table 11-3
Average TLD Results Surrounding the ISFSI (mR/7 days)

	Sampling Site						
	E-03	E-28	E-29	E-30	E-31**	E-32**	E-20***
Pre-Operation*	0.93	0.87	0.87	0.81	0.93	0.98	0.88
1996	0.87	0.78	0.81	0.79	0.93	1.00	0.78
1997	0.91	0.89	0.84	0.84	0.89	0.97	0.79
1998	0.82	0.68	0.80	0.82	0.91	0.85	0.77
1999	0.88	0.83	0.76	0.80	0.90	0.99	0.78
2000	0.98	0.88	0.92	0.99	0.98	1.06	0.90
2001	1.31	0.95	1.07	1.02	1.10	1.04	1.03
2002	1.45	0.91	1.22	1.10	1.26	1.25	1.14
2003	1.29	0.82	0.94	1.02	1.20	1.15	0.99
2004	1.35	0.80	0.96	1.05	1.23	1.18	1.06
2005	1.30	0.72	0.96	0.98	1.15	1.04	1.00
2006	1.44	0.80	1.19	1.07	1.21	1.07	1.11
2007	1.37	0.78	1.07	1.05	1.18	0.97	1.05
2008	1.33	0.75	0.81	1.00	1.12	1.03	1.00
2009	1.39	0.82	0.85	1.01	1.17	1.05	1.09
2010	1.41	0.84	0.89	1.07	1.21	1.24	1.10
2011	1.46	0.85	0.90	1.06	1.25	1.32	1.12
2012	1.54	0.87	0.91	1.10	1.21	1.39	1.14
2013	1.23	0.87	0.77	1.00	1.40	1.38	1.22

*Pre-Operational data are the averages of the years 1992 through 3rd quarter of 1995.
**Sites E-31 and E-32 are located at the Site Boundary to the West and South-West of the ISFSI.
***E-20 is located approximately 17 miles WSW of the ISFSI.

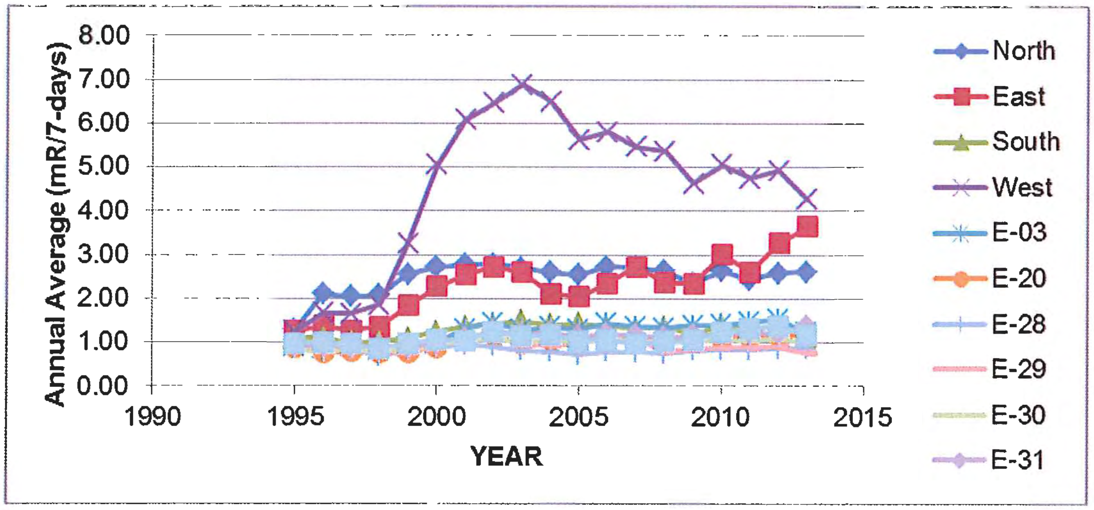


Figure 11-2 Comparison of ISFSI Fence TLDs to Selected REMP TLDs

11.2 Milk

Naturally occurring potassium-40 (1436 ± 69 pCi/l) continues to be the most prevalent radionuclide measured in milk at concentrations roughly 2000 times higher than the only potential plant related radionuclide, Sr-90 (0.7 ± 0.6 pCi/l), detected in milk. The annual average Sr-90 concentrations in milk continue to be similar to previous years. None of the other required radionuclides in the milk analyses, I-131, Cs-134/137, and Ba-La-140, or other radionuclides such as Co-60 was detected.

Although the average Sr-90 concentrations have not changed much over the last sixteen (16) years, 1.2 ± 0.5 pCi/L in 1997 to 0.7 ± 0.5 pCi/L in 2013, a graph of the annual averages displays a logarithmic decrease over time (Figure 11-3). The annual averages are from the monthly Sr-90 measurements from three different dairies (Fig. 9-1). Only dairy site E-21 has been in the program over the entire 1997 – 2013 timespan under consideration. It is located south of the plant. The other two, E-40 and E-11, are replacements for dairies which had dropped out of the program at various times during this time interval. The replacements were chosen to maintain, to the extent possible, the former sampling sites west and north of Point Beach.

The calculated Sr-90 decrease half-live over the last 16 years is 20.6 years. Because the radiological half-life is 28 years, the shorter environmental half-life indicates that environmental factors as well as radioactive decay are working to decrease the concentration of Sr-90 in milk. The calculated physical removal half-life is 73.3 years. Given the 2σ error associated with each annual average used in the calculation and the fact that only one of the sampling sites is the same as it was in 1997, there probably is not a significant difference between this value and the 59.3 years calculated for the 2012 AMR.

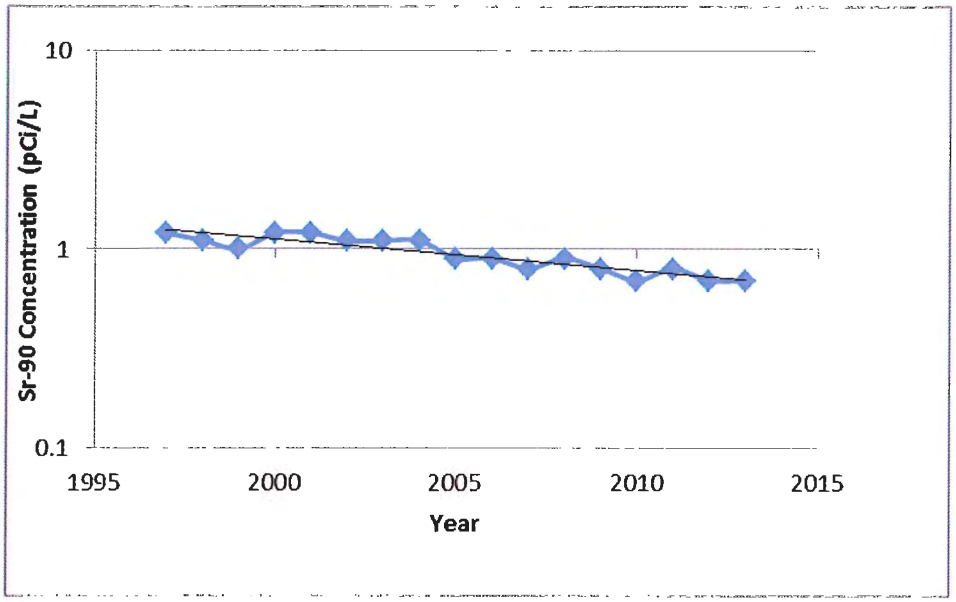


Figure 11-3
Sr-90 Concentration in Milk (1997 – 2013)

The Sr-90 in milk persists due to cycling in the biosphere after the atmospheric weapons tests of the '50s, '60s, and '70s and the Chernobyl accident in the late 1980s. It is concluded that the milk data for 2013 show no radiological effects of the plant operation.

11.3 Air

The average annual gross beta concentrations (plus/minus the two-sigma uncertainty) in weekly airborne particulates at the indicator and control locations were 0.026 ± 0.020 pCi/m^3 and 0.026 ± 0.022 pCi/m^3, respectively, and are similar to levels observed from 1993 through 2012 (Table 11-4).

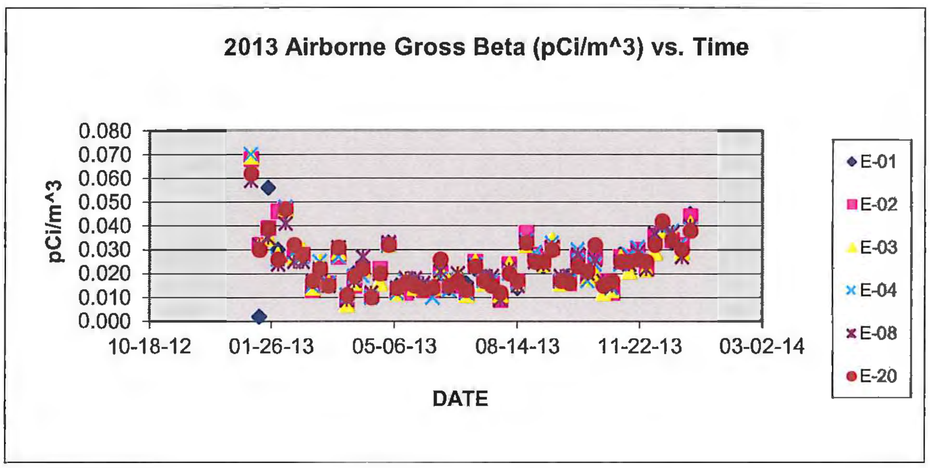
The 2013 weekly gross beta concentrations reveal higher winter values and lower summer values (Figure 11-4). This is a repeat of the patterns seen in 2006 - 2012. There is much less week-to-week scatter in the 2013 data than in the 2012 data. Whereas during 2012 there was week-to-week scatter in August and in November through December, the 2013 results are much smoother with only a slight rise in August to October. The cause of the late summer increase is not known. However, the control and indicators are moving in concert. Therefore, a plant effect can be ruled out.

There is one anomalous data point. The E-01 mid-January gross beta result (0.002) is much lower than the other results (0.030 – 0.032) for that time period. Although the flow totalizers indicated comparable volumes (305 – 320 m^3) the analytical lab noted that the AP filter color was lighter than the others. The cause for the lower value and lighter filter color is unknown.

Table 11-4
Annual Average Gross Beta Measurements in Air

1993	0.022
1994	0.022
1995	0.021
1996	0.021
1997	0.021
1998	0.022
1999	0.024
2000	0.022
2001	0.023
2002	0.023
2003	0.023
2004	0.021
2005	0.024
2006	0.021
2007	0.025
2008	0.023
2009	0.025
2010	0.022
2011	0.026
2012	0.026
2013	0.024

Figure 11-4



No I-131 was detected during 2013. In 2005, the new method of evaluating airborne I-131 was instituted. Instead of counting each charcoal cartridge separately, all six cartridges for the week are counted as one sample in a predetermined geometry to screen the samples for I-131. If any airborne radioiodine is detected, each sample cartridge is counted individually. With no detectable I-131, the reported analytical result is the minimum detectable activity (MDA) conservatively calculated using the smallest of the six sample volumes. The reported MDAs ranged from 0.004 to 0.0.24 pCi/m^3. Because the analysis LLD is based on counting only one cartridge, the use of six cartridges or roughly six times the sample volume with the same count time as would be needed to achieve the desired LLD for only one sample, the actual LLD is about six times lower than the programmatic value given in Table 10-1. Similarly, the actual MDA is about one-sixth of that reported, in the range of 0.001 to 0.003 pCi/m^3.

At each sampling location, the particulate filters are composited quarterly and analyzed for Cs-134, Cs-137 and any other (Co-60) detectable gamma emitters. As summarized in Table 10-1, no gamma emitters attributable to PBNP were detected. By contrast, naturally occurring Beryllium-7 was found in all of the quarterly composites. Be-7 ($T_{1/2}$ = 53.3 days) is produced in the atmosphere by the interaction of cosmic rays with oxygen and nitrogen nuclei. Its half-life is long enough to allow for it to be detected in the quarterly composited filters.

In summary, the 2013 air data does not demonstrate an environmental impact from the operation of PBNP.

11.4 Lake Water

For the REMP-specified gamma emitting radionuclides listed in Table 10-1, reported concentrations continue to occur as small, negative and positive values scattered around zero, indicating no radiological impact from the operation of PBNP. Lake Michigan water samples are collected north (E-33 and E-05) and south (E-01 and E-06) of PBNP (see Figure 9-1).

There were twenty-one, slightly positive indications of gamma emitters during 2013. Twelve positive results occurred at the two locations 1.5 and 4.5 miles north of the plant. These locations are considered to be upstream based on the north to south current flow on the west shore of Lake Michigan and therefore are unlikely to be an indication of PBNP effluent. Positive results for Fe-59, Ba/La-140 and Ru-103 are considered false positives for PBNP effluents because none of these radionuclide were discharged by PBNP during 2013. A false positive is concluding an isotope is present when it isn't. False positives occur most often at the detection limit when the random fluctuations of the background result in lower than normal background activity. The result is a higher net count and hence falsely concluding an isotope is present when it isn't because the value is statistically above zero.

Only one positive Cs-137 result was obtained during 2013 and that was from a site about 4.5 miles upstream of PBNP based on the lake current structure. Positive results for Cs-137 may be expected because of its environmental persistence from atmospheric weapons testing fallout in the '50s and '60s as well as events like Chernobyl. This source is made up of direct fallout onto the lake surface as well as watershed runoff. Other minor contributions are the discharges from past and current nuclear plants on Lake Michigan. The 30-year Cs-137 half-life and the 62-year hydraulic residence time for Lake Michigan water indicates that Cs-137 remains in the lake environment for many years. Because of the strong affinity of Cs-137 for Lake Michigan sediments, it is not usually in liquids. Its occurrence in this lake water sample may be the result of fine particles in the water. Fine particulate matter containing Cs-137 has been shown to have a residence time of approximately 42 years in near shore environments. Small amounts of Cs-137 were discharged in February, August, and December.

Although the Cs-137 is attributable largely to fallout, it is not possible to distinguish the fallout component from that which has been contributed since the early 1970s by current and past nuclear plants on Lake Michigan.

The remaining positive results are for Mn-54, Co-58, and Zr/Nb-95. Co-58 may be a false positive because comparable amounts of Co-58 and Co-60 were discharged monthly from PBNP. The non-detection of Co-60 sheds doubt on the positive Co-58 result. Zr/Nb-95 discharges occurred in five of the months prior to the positive result in October, one month after the preceding discharge, at the location about 2500 feet south of the PBNP discharge. Because the identification of Zr/Nb-95 did not occur during any of the months they were being discharged, a PBNP contribution seems unlikely but cannot be entirely discounted.

The December identification of Mn-54 occurred about four months after the last discharge. Its presence as a PBNP effluent is unlikely. Mn-54, which was discharged for only three of the 12 months, was detected whereas Co-60, which was discharged 9 of the 12 months of 2013, was not detected in any lake water sample. Also, the amount of Co-60 discharged was about 150 times greater than the amount of Mn-54. Although the lake water Mn-54 cannot be entirely ruled out as an indication of a PBNP effluent, the aforementioned reasons suggest that attributing it to PBNP would not be valid. Therefore, it is concluded that the identified Mn-54 is a false positive.

In conclusion, based on the results of the gamma scans of Lake Michigan water, there is no measureable impact on the lake from PBNP discharges.

Aliquots of the monthly samples are composited quarterly and analyzed for Sr-89/90 and for tritium. No Sr-89 was detected in any of the samples. As in 2012, PBNP did not discharge any Sr-89 or Sr-90 in 2013. There were seven lake water composites in which the Sr-90 concentrations were slightly positive. The occurrences were evenly distributed north and south of the plant. Sr-90 has a 28-year half-life and, like Cs-137, is a remnant of atmospheric weapons testing in the '50s and '60s. Therefore, positive Sr-90 concentrations are indicative of fallout being recycled in Lake Michigan.

Tritium, in addition to being produced by water-cooled reactors such as PBNP, also is a naturally occurring radionuclide. It also was produced by atmospheric weapons testing. However, due to its mobility, any H-3 now found in Lake Michigan at the concentrations typically found in monitoring programs cannot be from that time period. It is the result of power plant discharges. PBNP discharges on the order of 700 - 800 Ci per year.

All but one of the positive H-3 indications occurred north, or upstream, from PBNP. The highest, 348 ± 87 pCi/l, was from a first quarter composite sample about 4.5 miles E-33 north of PBNP. Two quarterly composites from E-05, location approximately 1.6 miles north of PBNP also were positive for H-3. The individual months of the first quarter composite were analyzed and a high of 882 ± 109 pCi/l as found in the February sample. No H-3 was found in the

January and March samples. This high value is lower than the 3,975 ± 197 pCi/l and 2184 ± 159 pCi/l found north of PBNP in June and August of 2012.

Based on tritium and strontium analyses of Lake Michigan water, there is no measureable impact on the waters of Lake Michigan from PBNP discharges.

11.5 Algae

Filamentous algae attached to rocks along the Lake Michigan shoreline are known to concentrate radionuclides from the water. Samples were obtained at Two Creeks Park and at the PBNP discharge (locations 5 and 12 in Figure 9-1) In order to allow the algae time to grow, no samples are collected until June and then again August and October. This is done to ensure that there is enough new growth to provide a sample. Cs-137 was detected in all five samples. As previously discussed, fallout Cs-137 recycles in Lake Michigan and is attached to particles. There also may be a small contribution, but unknown, amount from past nuclear plant discharges. The highest positive result (0.028 ± 0.012 pCi/g) occurred at E-05 north of the plant on August 7th when the concentration near the PBNP discharge was 0.010± 0.003 pCi/g. The only PBNP Cs-137 discharge in August occurred on August 20. The prior Cs-137 discharge was in February. Therefore, the positive results are attributable to the recycling of bomb fallout, from weapons testing in the '50s, 60's and other nuclear events such as Chernobyl, in the Lake Michigan environment. Also, past discharges from the six nuclear plants, current and past, located on Lake Michigan may have contributed.

PBNP discharged cobalt, either as Co-60 or as Co-58 every month in 2013. No Co-58 was found. However, there were three small positive indications of Co-60 with the highest at E-05, about 1.5 miles north. No Co-60 was detected near the discharge. Because these results occurred without any Co-58, it is unlikely that the Co-60 results are related to PBNP discharges. Therefore, these results are considered to be false positives.

The Co-60 and Cs-137 results are well below the naturally occurring radionuclides Be-7 and K-40. The concentrations of these two radionuclides range from 0.57 ± 0.06 to 1.54 ± 0.21 pCi/g for Be-7 and from 2.51 ± 0.10 to 3.78 ± 0.11 pCi/g for K-40. The naturally occurring radionuclides K-40 and Be-7 were at concentrations about 100 times higher than Cs-137. K-40 is primordial isotope of potassium with a billion year half-life. By contrast Be-7 is produce by cosmic ray interactions with oxygen and nitrogen atoms in the atmosphere.

Assuming that the low concentrations of Co-60 and Cs-137 were from PBNP, the algae monitoring results would indicate a minimal effect by PBNP upon the environs.

11.6 Fish

Fourteen fish were analyzed in 2013. Eleven of the 14 fish had detectable amounts of Cs-137 with results ranging from 0.013 ± 0.011 to 0.111 ± 0.054 pCi/g. The positive Cs-137 concentrations ranged from a low of

0.015 ± 0.012 pCi/g to a high of 0.074 ± 0.023 pCi/g (Table 10-1). The Cs-137 is attributable to the recycling of this radionuclide in Lake Michigan. The majority of Cs-137 entered Lake Michigan as fallout from atmospheric weapons testing in the '50s and '60s with lesser amounts from events at Chernobyl and Fukushima.

Fish analyses also yielded small amounts of Mn-54, Fe-59, Co-58, Co-60, Zn-65, Cs-134, and Ru-103 also were detected. No Fe-59, Zn-65, Cs-134, or Ru-103 was released during 2013. Although not attributable to PBNP, given the migratory behavior of fish, these radionuclides could have been acquired elsewhere on the lake and therefore these results cannot definitely be considered to be false positives. The Mn-54, Co-58, and Co-60 could be related to PBNP effluents, but given the migratory habits of fish, also could have originated from other nuclear sites on Lake Michigan. Given that the measured concentrations are several orders of magnitude below their required LLDs, and assuming that the positive results originated from PBNP effluents, the imputed impact is minimal.

By comparison to the aforementioned radionuclides, the concentration of naturally occurring K-40 (2.31– 3.68 pCi/g) is roughly 20 times higher than the highest Cs-137 concentration.

Based on these results, it is concluded that there is only a slight indication of plant effluents in fish.

11.7 Well Water

No plant related radionuclides were detected in well water during 2013, as all results were less than the MDC and not significantly different from zero. The gross beta values result from naturally occurring radionuclides. Therefore, it is concluded that there is no evidence of PBNP effluents getting into the aquifer supplying drinking water to PBNP.

11.8 Soil

Cs-137 is present in the soils throughout North America and the world resulting from the atmospheric nuclear weapons testing in the 1950s, 1960s, and 1970s and from the 1986 Chernobyl accident, and more recently, from the Fukushima event. Soil is an integrating sample media, in that it is a better indicator of long term buildup of Cs-137 as opposed to current deposition for local sources. In addition to erosion and radioactive decay, human activities can modify the soil Cs-137 concentrations. Evidence for the latter are the typically higher Cs-137 concentrations found at E-06, where trees growing and incorporating Cs-137 during the time of atmospheric fallout are now being burned in camp fires thereby releasing the incorporated Cs-137 to the surrounding area. All 2013 samples had low levels of Cs-137 with the highest level (0.24 ± 0.03 pCi/g) being found at E-08, greater than 5 mile upwind from the plant. Unlike past years, the highest Cs-137 concentration at E-06 was lower in 2013. The highest E-06 Cs-137 concentration 0.088 ± 0.031 pCi/g is lower than the 0.14 ± 0.031 pCi/g found at E-20, the background location some 17 miles away in the low χ/Q sector. Therefore, there is no indication of a plant effect based on the comparison of indicator and background results. By comparison to naturally occurring radionuclides, the Cs-137 concentrations continue to be present in soil samples at well below levels of naturally occurring K-40 (8.31 ± 0.59 to 18.29 ± 0.97 pCi/g). In addition to K-40, other naturally occurring radionuclides such as Be-7 and Ra-226 were found in the soil. There is no evidence of PBNP effluent in the soil samples.

11.9 Shoreline Sediment

Shoreline sediment consists of sand and other sediments washed up on the Lake Michigan shore. As in soil samples, the only non-naturally occurring radionuclide found in these samples is Cs-137. Seven of the ten samples have Cs-137 concentrations statistically different from zero. The shoreline sediment Cs-137 concentrations continue to be about one-tenth of that found in soils. This is expected because Cs-137 in the geological media is bound to fine particles, such as clay, as opposed to the sand found on the beach. Lake Michigan sediments are a known reservoir of fallout Cs-137. Wave action suspends lake sediments depositing them on the beach. The fine particles deposited on the beach eventually are winnowed from the beach leaving the heavier sand; hence the lower Cs-137 concentrations in beach samples. In contrast to Cs-137, K-40, which is actually part of the minerals making up the clay and sand, is at a concentration about several hundred times higher than the Cs-137 that is attached to particle surfaces. Therefore, it is not surprising that Cs-137 is present at concentrations 1% or less of the naturally occurring concentrations of K-40. The absence of any PBNP effluent nuclides, such as Co-58/60, other than Cs-137 indicates that the most likely source of the observed Cs-137 is the cycling of radionuclide in the Lake Michigan environment and not current PBNP discharges. As with soil, the naturally occurring radionuclides such as Be-7, K-40, and Ra-226 are found in the shoreline sediment samples. In all but two samples, the concentrations of naturally Be-7 are higher than those of Cs-137. Therefore, the shoreline sediment data indicate no radiological effects from current plant operation.

11.10 Vegetation

The naturally occurring radionuclides Be-7 and K-40 were found in all of the vegetation samples. The source of Be-7 is atmospheric deposition. It is continuously formed in the atmosphere by cosmic ray spallation of oxygen, carbon, and nitrogen atoms. (Spallation is a process whereby a cosmic ray breaks up the target atom's nucleus producing a radionuclide of lower mass.) Be-7 concentrations ranged from 0.55 ± 0.15 to 4.27 ± 0.30 pCi/g. The concentrations were lower in May than in July and September. This is consistent with the known temporal variability in Be-7 concentrations in air near the earth's surface and the gradual build-up of fallout on the vegetation over time. In contrast, K-40 is a primordial radionuclide which is incorporated into vegetation from the soil during the growing process. By not being dependent upon seasonal atmospheric variations and plant surface to capture deposition, the K-40 concentrations are more uniform, 3.33 ± 0.38 to 7.21 ± 0.52 pCi/g which is range that varies by about a factor of two whereas the Be-7 varies by a factor of roughly eight.

Cs-137 can be present in vegetation via both pathways. Fresh Cs-137 fallout is associated, like Be-7, with deposition on the plant surface. Old fallout from the '50s and '60s is now being incorporated into growing plants in the same manner as potassium because it is in the same chemical family as potassium. This fallout Cs-137 has been found in firewood ash at many locations in the United States that are far from any nuclear plants (S. Farber, "Cesium-137 in Wood Ash, Results of a Nationwide Survey," 5th Ann. Nat. Biofuels Conf., 10/21/1992).

In 2013 only three of the twenty-four vegetation samples had a positive indication for Cs-137 and only E-06 (0.056 ± 0.025) was significantly above background. This is similar to the 2012 result at E-06 (0.051 ± 0.022). Typically, only the vegetation collected at monitoring site E-06, in the Point Beach State Park south of PBNP, has detectable levels of Cs-137. This occurrence is attributed to the above described mechanism. No airborne Cs-137 was discharged by PBNP in 2013. Therefore, it is unlikely that the three positive Cs-137 values resulted from PBNP releases.

The only other radionuclides having positive indications are I-131 and Cs-134. Due its short half-life, it is unlikely that the airborne I-131 in March and ending on April 10 would be detectable in June, August, and September. No Cs-134 was released in 2013. A review of the 2003 – 2012 time span for Cs-134 found no airborne Cs-134 over this ten year period. Therefore the small, positive results for these two radionuclides are considered to be false positives.

Based on the 2013 vegetation sampling results, it is concluded that there little or no effect from PBNP effluents.

The above analyses were on grasses and other vegetation. In addition to these sample types, in September corn and soybeans grown on fields inside the site boundary at E-02 were gamma scanned. There was one positive Cs-137 indication (0.005 ± 0.004 pCi/g). Because the three other vegetation sample from the area had no detectable Cs-137, it is concluded that this Cs-137 is a false positive. The conclusion that there is little or no effect from PBNP effluents on vegetation is not changed by this result.

11.12 Land Use Census

In accordance with the requirements of Section 2.5 of the Environmental Manual, a visual verification of animals grazing in the vicinity of the PBNP site boundary was completed in 2013. No significant change in the use of pasturelands or grazing herds was noted. Therefore, the existing milk-sampling program continues to be acceptable. The nearest dairy lies in the SSE sector and it is one of the Point Beach REMP milk sampling sites. This dairy leases land in the S and SSE sectors at the PBNP site boundary for growing feed corn. Also, the highest χ/Q (1.09E-06) and D/Q (6.23E-09) values occur in these sectors. Therefore, dose calculations to the maximum exposed hypothetical individual, assumed to reside at the site boundary in the S sector, continues to be conservative for the purpose of calculating doses via the grass-cow-milk and the other ingestion pathways.

12.0 REMP CONCLUSION

Based on the analytical results from the 829 environmental samples, and from 128 sets of TLDs that comprised the PBNP REMP for 2013, PBNP effluents had no discernable effect on the surrounding environs. The calculated effluent doses are below the 10 CFR 50, Appendix I dose objectives demonstrate that PBNP continues to have good controls on effluent releases. The control of effluents from PBNP continues to be acceptable pursuant to the ALARA criteria of 10 CFR 50.34a. Additionally, when the TLD results are factored in to the overall exposure, the resulting doses are lower than the ISFSI (10 CFR 72.104) and EPA (40 CFR 190) limits of 25 mrem whole body, 75 mrem thyroid, and 25 mrem any other organ.

Part D
GROUNDWATER MONITORING

13.0 PROGRAM DESCRIPTION

PBNP monitors groundwater for tritium as part of the Groundwater Protection Program (GWPP). During 2013 the sampling program consisted of beach drains, intermittent stream and bog locations, drinking water wells, façade wells, yard electrical manholes, ground water monitoring wells, and the subsurface drainage (SSD) system sump located in the U-2 façade.

In the late 1970s, the beach drains entering Lake Michigan were found to contain tritium. The beach drains are the discharge points for yard drainage system, which carries storm water runoff, and are known to be infiltrated by groundwater as observed by discharges even when no rain has occurred. In the 1980s, the source of H-3 for this pathway was postulated to be spent fuel pool leakage into the groundwater under the plant. Based on this observation, modifications were made to the pool, and the tritium concentrations decreased below the effluent LLDs. Beach drain effluents continue to be monitored and are accounted for in the monthly effluent quantification process. Because the beach drains are susceptible to groundwater in-leakage from other sources such as the area around the former retention pond which is known to contain H-3, the beach drains are monitored as part of the groundwater monitoring program. In addition to H-3, groundwater beach drain samples also are gamma scanned for the same suite of radionuclides as lake water using the lake water LLDs.

Three intermittent stream locations and the Energy Information Center (EIC) well were added to the groundwater monitoring program in the late 1990s when it was discovered that tritium diffusion from the then operable, earthen retention pond was observable in the intermittent streams which transverse the site in a NW to SE direction. A fourth stream location closer to the plant was added in 2008. These streams pass on the east and west sides of the former retention pond and empty into Lake Michigan about half a mile south of the plant near the meteorological tower. The intermittent stream samples track H-3 in the surface groundwater.

The groundwater monitoring program also includes two bogs / ponds on site. One is located about 400 feet SSE of the former retention pond; the other, about 1500 feet N.

In addition to the main plant well, four other drinking water wells also are monitored. The Site Boundary Control Center well, located at the plant entrance, the Warehouse 6 well, on the north side of the plant, and the EIC well, located south of the plant. In 2012, a new building (Warehouse 7) was constructed for radwaste. The well for this building was added to the GWPP. These wells do not draw water from the top 20 - 30 feet of soil which is known to contain H-3. These wells monitor the deeper (200 - 600 feet), drinking water aquifer from which the main plant well draws its water. The two soil layers are separated by a gray, very dense till layer of low permeability identified by hydrological studies.

Manholes in the plant yard and for the subsurface drainage (SSD) system under the plant are available for obtaining ground water samples. The plant yard manholes for accessing electrical conduits are susceptible to ground water in-leakage. Therefore, a number of these were sampled. The SSD system was designed to lessen hydrostatic pressure on the foundation by controlling the flow of water under the plant and around the perimeter of the foundation walls. The SSD system flows to a sump in the Unit 2 facade. The sump was sampled monthly during 2013. Access to other parts of the SSD can be obtained vial manholes located in the facades, turbine building, and other locations. The SSD manholes were not sampled in 2013.

In the 1990s, two wells were sunk in each unit's façade to monitor the groundwater levels and look for evidence of concrete integrity as part of the ISI IWE Containment Inspection Program. These wells are stand pipes which are sampled periodically for chemical analyses. Façade well sampling has been part of the GWPP since 2007. These wells are sampled at least three times a year.

The groundwater sampling sites (other than the beach drains, SSDs and manholes) are shown in Figure 13.1.

Figure 13-1 Groundwater Monitoring Locations

14.0 RESULTS AND DISCUSSION

14.1 Streams and Bogs

The results from the surface groundwater monitoring associated with the former retention pond are presented in Table 14-1. For the most part, the creek results are barely above the detection level and less than the MDC. There are more positive and higher values for the East Creek and STP than for the West Creek and GW-01, the confluence of the two creeks south of the plant near Lake Michigan. GW-08, a bog SE of the former retention pond has a higher H-3 concentration than the bog at GW-07 which is north of the pond area.

Table 14-1 Intermittent Streams and Bogs
H-3 Concentration (pCi/l)

Month	GW-01(E-01)	GW-02	GW-03	GW-17	BOGS		MDC
	Creek Confluence	E. Creek	W. Creek	STP	GW-07	GW-08	
Jan	80 ± 75	222 ± 82	ND ±	165 ± 79			145
Feb	NS ±	NS ±	NS ±	234 ± 87			144
Mar	ND ±	290 ± 88	ND ±	458 ± 95			148
Apr	ND ±	246 ± 106	ND ±	160 ± 103			183
May	163 ± 84	201 ± 86	ND ±	211 ± 86	105 ± 77	209 ± 82	146
Jun	ND ±	ND ±	ND ±	ND ±			156
Jul	ND ±	91 ± 89	ND ±	138 ± 91			161
Aug	ND ±	ND ±	ND ±	ND ±			149
Sep	117 ± 81	NS ±	89 ± 80	123 ± 81			143
Oct	ND ±	ND ±	ND ±	ND ±			150
Nov	ND ±	148 ± 86	ND ± 80	133 ± 85			150
Dec	NS ±	NS ±	NS ±	NS ±			

NS = no sample due to dry or frozen. Streams are sampled monthly; bogs, annually.
Values are presented as the measured value and the 95% confidence level counting error.
ND = measured value is less than the minimum detectable concentration. The LLD = 200 pCi/l.

The analyses of these surface water samples show low concentrations of H-3. Although small positive H-3 concentrations occur in samples from the confluence of the two creeks (GW-01) and from the West Creek (GW-03), all of these concentrations are below their associated MDCs. In contrast, there are more positive results from GW-02 (south end of the East Creek) and GW-17 (located at the north end of the East Creek). GW-17 is east of the former retention pond area in the groundwater flow path to Lake Michigan. The higher values at GW-17 are consistent with this known west to east groundwater flow. The East Creek concentrations are generally lower than the 300 - 350 pCi/l found before the retention pond was remediated in 2002. It should be noted that the East Creek, in addition to being path of the west to east groundwater flow from the old retention pond, also is fed by yard runoff from the west side of the yard which may account for the higher values.

The bog (GW-08) SE of the former retention pond is higher than the bog at GW-07 north of the former retention pond. These results are in conformance with the west to east groundwater flow described in the Site Conceptual Model and the

FSAR. The E-08 bog result is down from the 3000 pCi/l seen before the pond was remediated.

14.2 Beach Drains

The 2013 results for the beach drains are presented in Table 14-2. [The drain data from left to right in the table are in the order of the drains from north to south.] S-1 collects yard drainage from the north part of the site yard. S-3 collects yard drainage from the south part of the site yard. Drains S-8 and S-9 carry water from the lake side yard drains whereas drains S-7 and S-10 are from the turbine building roof. S-11 is not connected to any yard drain system and mainly carries groundwater flow and runoff from a small lawn area south of the plant.

Table 14-2
2013 Beach Drain Tritium
Average H-3 Concentration (pCi/l)

Month	S-1	S-7	S-8	S-9	S-10	S-3	S-11	MDC
Jan	211 ± 83	NF ±	NF ±	NF ±	NF ±	332 ± 88	NF ±	137
Feb	NF ±	NF ±	NF ±	NF ±	NF ±	NF ±	NF ±	
Mar	240 ± 85	NF ±	NF ±	NF ±	NF ±	1481 ± 131	NF ±	148
Apr	118 ± 90	ND ±	ND ±	ND ±	ND ±	1351 ± 130	97 ± 89	182
May	207 ± 82	NF ±	NF ±	NF ±	NF ±	325 ± 87	NF ±	144
Jun	156 ± 79	NF ±	NF ±	NF ±	115 ± 77	398 ± 91	191 ± 84	146
Jul	163 ± 83	NF ±	NF ±	NF ±	NF ±	233 ± 86	NF ±	150
Aug	209 ± 106	NF ±	NF ±	NF ±	NF ±	284 ± 109	NF ±	184
Sep	82 ± 75	NF ±	NF ±	NF ±	NF ±	266 ± 85	NF ±	151
Oct	125 ± 72	NF ±	NF ±	NF ±	NF ±	420 ± 95	NF ±	152
Nov	159 ± 85	NF ±	NF ±	NF ±	NF ±	232 ± 89	131 ± 84	147
Dec	661 ± 101	NF ±	NF ±	NF ±	NF ±	1210 ± 121	ND ±	148
Avg =	212 ± 156					593 ± 492	140 ± 92	

ND = not detected and ≤MDC
NF = no sample due to no flow

Beach drains S-1 and S-3 had H-3 concentration peaks of >600 and >1000 pCi/l respectively. As in previous years, measureable H-3 results occur mostly in drains S-1 and S-3. As shown in previous reports, these high values are attributable to precipitation scavenging by rain and snow followed by melting. H-3 in snow samples collected in February ranged from106 ± 81 to 512 ± 96 pCi/l.

Gamma scans were performed on the beach drain samples at the LLD used for lake water. Seven indications of small, positive concentration values below the calculated MDC were found for Mn-54, Fe-59, Co-60, Zr-Nb-95, Ba-La-140, and Cs-137. In March, 1.20E-07 Ci of Mn-54 was released from the U-1 hatch during the outage. However, the concentration was 9.29E-14 µCi/cc or 9.29E-05 pCi/l. The December beach drain concentration was 2.3 ± 1.5 pCi/l. Therefore, it is unlikely that an airborne release would show up nine months later at a liquid concentration about 25,000 times higher. Therefore, it is concluded that the December Mn-54 is a false positive. Because no airborne Ba-La-140, Fe-59 or

Cs-137 were detected in PBNP discharge pathway, the Fe-59 value of 3.4 ± 2.6 pCi/L (MDC = 5.3) and Cs-137 value of 1.6 ± 1.5 pCi/L (MDC = 2.7) are considered to be false positives. Zr-Nb-95 was found in beach drain S-3 in April (2.1 ± 1.4 pCi/L MDC = 3.3) with similar levels in June and September. These could be false positives. However, during March and April, roughly 7E-07 Ci of Zr-Nb-95 was discharged from Unit 1. Because the activity occurred in beach drain S-3 which drains the yard adjacent to Unit 1, there is a possibility that this is a true indication of a Unit 1 airborne release brought about by recapture in a manner similar to that shown to exist for H-3.

14.3 Electrical Vaults and Other Manholes

Manholes for access to below ground electrical facilities are susceptible to groundwater in-leakage. The manholes east side of the plant, between the Turbine building and Lake Michigan have low H-3 concentrations (Table 14-4). These manholes, Z-066A and Z-067A through Z-066D AND Z-067D, run in parallel in the NE section of the yard beginning just north of the Unit 2 truck bay and run from the Unit 2 truck bay north to the EDG building. Z-068 is located just west of the EDG building and north of Z-66/67D. The two As, Bs, Cs, and Ds are beside each other. Based on being side-by-side, it is not unexpected that the each pair of manholes 66A/67A, etc. would have similar H-3 concentrations.

Table 14-3
2013 East Yard Area Manhole Tritium (pCi/l)

MH	4/30/2013	5/2/2013	10/15/2013
Z-066A		194 ± 81	185 ± 82
Z-067A		173 ± 80	193 ± 83
Z-066B		ND ±	ND ±
Z-067B		187 ± 81	ND ±
Z-066C	242 ± 83		
Z-067C	170 ± 80		
Z-066D	151 ± 79		
Z-067D	173 ± 80		
Z-068	225 82		154 ± 81
MDC	144	144	147
ND = not detected			

14.4 Façade Wells and Subsurface Drainage System

There are two methods of sampling the groundwater under the plant foundation. The first is a set of four shallow wells, two in each façade. The other is a subsurface drainage system (SSD). The façade wells were installed to monitor for groundwater conditions which may be detrimental to the integrity of the concrete and rebar of each unit's foundation. The SSD was designed to relieve hydrostatic pressure on each unit's foundation as well as the auxiliary and turbine buildings.

The façade wells are not located symmetrically in the two units. The Unit 1 façade wells are east of the containment in the SE (1Z-361A) and NE (1Z-361B) corners of the façade. However, in Unit 2, there is one well in the NW corner (2Z-361A) and the other rotated approximately 180° in the SW corner (2Z-361B). In each the well cap is level with the floor.

The 2013 façade well results are shown in Table 14-4. The Unit 1 wells continue to have higher H-3 concentrations than the U2 wells with 1Z-361A, in the SE corner of the Unit 1 façade, having the highest H-3 concentrations. In contrast to the 2012 high of 1342 ± 135, the highest 2013 H-3 concentration is 324 ± 93 pCi/l. The 2007 and 2008 high concentrations were 1169 - 1331 pCi/l. Based on these façade well results, the conclusion is that H-3 concentrations are decreasing and that the H-3 is not evenly distributed under the plant.

Table 14-4
2013 Facade Well Water Tritium (pCi/l)

Month	UNIT 1		UNIT 2		MDC
	1Z-361A	1Z-361B	2Z-361A	2Z-361B	
29-Jan*	288 ± 90	308 ± 91	NS ±	108 ± 82	146
28-Feb	308 ± 91	259 ± 89	ND ±	ND ±	146
27-Mar	324 ± 93	128 ± 85	ND ±	ND ±	149
11-Apr	255 ± 90	204 ± 88	ND ±	ND ±	149
1-Jun	278 ± 87	102 ± 78	102 ± 78	ND ±	148
21-Jun	189 ± 93	93 ± 89	ND ±	ND ±	161
3-Jul	223 ± 88	125 ± 84	ND ±	119 ± 84	148
1-Aug	214 ± 89	130 ± 85	ND ±	ND ±	150
26-Sep	ND ±	168 ± 101	ND ±	ND ±	155
31-Oct	257 ± 91	122 ± 84	ND ±	89 ± 83	148
22-Nov	240 ± 84	230 ± 84	126 ± 79	ND ±	145
17-Dec	169 ± 78	143 ± 76	NS ±	ND ±	142

* Duplicate sample = 257 ± 89 pCi/L
NS = no sample available ND = not detected

The internal SSD consist of perforated piping which drains groundwater by gravity to a sump located in the Unit 2 façade. The part of the SSD under the turbine building is at a higher elevation than the part under the facades. Along the drain path, the system is accessible by various clean outs and larger manholes. Each individual manhole and cleanout is no longer sampled individually. Instead, the sump which collects the groundwater is sampled monthly.

The monthly SSD sump results are presented in Table 14-5. The average concentration is not much different from the 513 ± 269 pCi/L seen in 2012. However, there is much more spread in the results and indicated by the larger confidence interval.

A comparison of the H-3 concentrations in the façade wells to those in the SSD sump located in Unit 2 suggests that the Unit 2 façade wells may have lower H-3 concentrations because their closer proximity to the SSD sump allows the groundwater to drain to the SSD sump more quickly than the water below the Unit 1 façade

The external SSD system runs along the external foundation walls for the Unit 1 and Unit 2 facades, the auxiliary building, the north service building, and the turbine hall. It is not connected to the internal SSD system. Both the north and south halves of the external SSD system drain toward the beach via piping that dead-heads into the bluff overlooking the beach. In October, manholes providing SSD access on the NE and SE portions of this system were opened and sampled. The H-3 concentrations (NE = 98 ± 81; SE = 237 ± 88 pCi/L) are comparable to yard electrical vaults (Table 4-3). Because the SSD covers are not sealed, rain and snow melt can enter the external SSD system. This may account for the higher concentration H-3 concentrations in the south by the same mechanism which makes the S-3 beach drain higher than the S-1 beach drain.

Table 14-5
2013 Unit 2 Facade SSD Sump H-3 (pCi/l)

Month	Avg		2σ	MDC
Jan	686	±	106	146
Feb	846	±	112	146
Mar	730	±	109	150
Apr	1021	±	119	149
May	335	±	91	143
Jun	349	±	100	162
Jul	609	±	110	161
Aug	714	±	110	152
Sep	543	±	97	151
Oct	806	±	112	154
Nov	593	±	105	148
Dec	488	±	95	145
Average	643	±	201	

In addition to H-3, the façade wells and SSD samples were gamma scanned. As in lake water samples, small positive values below their calculated, minimum detectable concentrations were found for Mn-54, Fe-59, Co-58, Co-60, Zn-65, Zr-Nb-95, Cs-134, Cs-137, and Ba-La-140. There is no known path for activation products to reach the SSD system as SSD manhole covers are sealed on the control side. Coupled with no Cs-134 and Ba-La-140 being detected in effluents suggests, as for lake water, that these results are false positives.

14.5 Potable Water and Monitoring Wells

Outside of the protected area, nine wells, in addition to the main plant well (Section 11.7), are used for monitoring H-3 in groundwater: the four potable water wells, GW-04 (Energy Information Center or EIC), GW-05 (Warehouse 6), GW-18 (Warehouse 7), and GW-06 (Site Boundary Control Center), and six H-3 groundwater monitoring wells, GW-11 through GW-16 (Figure 13-1). The potable water wells monitor the deep, drinking water aquifer whereas the monitoring wells penetrate less than 30 feet to monitor the top soil layer. The potable water aquifer is separated from the shallow, surface water aquifer by a thick, impermeable clay layer.

The monitoring well results are similar to that obtained in 2012. The highest H-3 concentrations occur at GW-15, the well closest to the former retention pond. The two monitoring wells showing consistent, detectable H-3 (GW-15, GW-16) are in the flow path from the retention pond area to the lake (Table 14-7). .

Table 14-6 2013 Quarterly Monitoring Well Tritium (pCi/l)

Q	MW-01 GW-11	MW-02 GW-12	MW-06 GW-13	MW-05 GW-14	MW-04 GW-15	MW-03 GW-16	**MDC**
1	115 ± 77	ND ±	ND ±	ND ±	278 ± 84	NS ±	143
2	128 ± 83	90 ± 81	84 ± 81	151 ± 84	277 ± 89	232 ± 87	146
3	ND ±	ND ±	106 ± 85	ND ±	252 ± 92	210 ± 90	152
4	87 ± 78	ND ±	ND ±	81 ± 78	255 ± 87	169 ± 83	149

ND= not statistically different from zero. NS = no sample available

Two of the monitoring wells, GW-15 and GW-16, are in the groundwater flow path from the former retention pond. The other four of the surface layer wells are located at the periphery of the area which may be affected by diffusion from the former retention pond.

The potable water wells have no detectable H-3 (Table 14-7).

Table 14-7
2013 Potable Well Water Tritium Concentration (pCi/l)

Month	EIC WELL GW-04	Warehouse 6 Well GW-05	SBCC Well GW-06	EIC MDC	GW-05,06 MDC	WH 7 GW-18	GW-18 MDC
Jan	ND	ND	ND	143	138		
Feb	ND			144		NS	
Mar	ND			148			
Apr	ND	ND	ND	183	182	ND	182
May	ND			146			
Jun	ND			156			
Jul	ND	ND	ND	161	150	ND	150
Aug	ND			149			
Sep	ND			143			
Oct	ND	ND	ND	150	147	ND	147
Nov	ND			150			
Dec	ND			145			

ND= not detected NS = no sample

14.6 AC Condensate and Condensation on Equipment

The results from the airborne H-3 recapture study presented in the 2011 AMR demonstrated that the H-3 via precipitation was higher close to the plant than away from the plant. Additionally, it was shown that the condensate from AC units located on building roofs and within the plant contained high concentrations of H-3. Similar results for AC condensate were demonstrated in 2012. A comparison of 2012 and 2013 of AC condensate H-3 concentrations is presented in Table 14-8.

Table 14-8
Comparison of 2012 and 2013 AC Condensate

Location	2012 H-3 (pCi/l) 2σ	2013 H-3 (pCi/l) 2σ
NSB (4th floor)	557 ± 102	478 ± 102
Turbine Bldg 66'	998 ± 118	757 ± 112
S Service Bldg Roof	5822 ± 231	2606 ± 166
South Gate Roof	473 ± 99	217 ± 91
Turbine Bldg 8'	602 ± 104	1055 ± 123
Training Bldg Roof	185 ± 86	203 ± 90

These results show that the H-3 concentrations are higher in the immediate vicinity of Units 1 and 2 (S. Service Building and South Gate) than at the training building, which is some 800 feet south. The higher concentrations occur within the area of the yard drains feeding beach drain S-3 and support the conclusion that precipitation scavenging and roof drains can account for the H-3 found in the beach drains.

The persistence of measureable H-3 concentrations in AC condensations units located inside (Turbine Bldg. and NSB) indicates that the condensation of indoor airborne H-3 has the possibility of impacting groundwater. Water condensing on piping and equipment could reach groundwater via piping floor penetrations.

To determine whether this were a significant source, condensate on various cooling equipment, whose condensate was observed to penetrate the floor at the point of the piping floor penetrations at the 8' level of the turbine hall, was collected and analyzed for H-3. As a check, samples were collected from the same 8' and 66' turbine hall AC units where condensate had been collected the previous week (Table 14-9). Although measureable H-3 occurred only on the 1HX-24, the low and non-detectable H-3 on the equipment may be an indication of a set of different conditions than those of the previous week. For these condensate samples (8/26/13) the 8' and 66' AC condensate H-3 results are much lower than the previously collected samples (8/16/13, Table 14-8).

Table 14-9 Equipment Condensate H-3 Concentrations (pCi/l)

UNIT 1	H-3 2σ	H-3 2σ	UNIT 2
TB 8' level	ND ±	234 ± 83	TB 66' Ctrl Rm AC
1HX-24	80 ± 75	ND ±	Condensate Pump Discharge Header
1HX-24 (W Side)	105 ± 77	ND ±	2HX-24
		ND ±	2XJ-3571
		ND ±	SW Return Drain Line

ND = not detected

15.0 GROUNDWATER SUMMARY

Groundwater monitoring indicates that low levels of tritium continue to occur in the upper soil layer but not in the deep, drinking water aquifer. These results also indicate that the low levels of tritium are restricted to a small, well defined area close to the plant. Results from precipitation analyses show that airborne H-3 concentrations are higher close to the plant as compared to results at the site boundaries. The observed tritium concentrations in the yard manholes can be explained by the higher H-3 in precipitation close to the plant. In addition to tritium captured by precipitation, the beach drains also receive the H-3 captured in the AC condensate because the condensate drainage is connected to the yard drain system.

Tritium continues in the soil below the plant foundation as evidenced by results from the subsurface drainage system and from the façade wells.

Except for the monitoring wells downstream from the former retention pond, the monitoring well tritium concentrations are not different from zero. These results conform to the known west-to-east groundwater flow at the site. Therefore, the impact of the flow of tritiated groundwater from the vicinity of the former retention pond toward the lake on the S-3 tritium results as cannot be discounted. The impact of this flow would be greater on beach drain S-3 than on S-1 because the eastward flow in the area of S-3 would be less impacted by plant structures than the drainage system feeding beach drain S-1.

In conclusion, the groundwater H-3 concentrations observed at PBNP are below the EPA drinking water standards prior to emptying into Lake Michigan where they will undergo further dilution. All analyses to date indicate that the drinking water contains no tritium. None of the H-3 in the upper soil layer is migrating off-site toward the surrounding population. This is based on the known west-to-east groundwater flow toward Lake Michigan and the negative results from the four wells (GW-11 through GW-14, Figure 13-1). Additionally, because no H-3 is detected in either of the four on-site drinking water wells close to the power block or from the drinking water well at the site boundary, none of the H-3 observed in the upper soil layer has penetrated into the drinking water aquifer to endanger either on-site or off-site personnel.

16.0 Corrections to 2010 – 2011 Annual Monitoring Reports

During the preparation of the 2013 AMR, a final review of the January monthly airborne effluent calculation found an error. The isotopic totals for the second Unit 1 forced vent permit were not included in the monthly Unit 1 totals. A review of previous monthly airborne effluent totals revealed that this was unique to the month of January for the years 2010 – 2012. The corrections to the affected tables in the 2012 AMR are presented in the appropriate sections of the 2013 AMR.

Corrections to the 2010 and 2011 tables are presented below. Revised tables are presented either totally or only with the January and Total columns and the corrected values being highlighted and compared to the original values to aid in comparison. Typically, the corrected value changes the original value by five percent or less whereas the annual totals differ by less than 0.1%. Because the January corrections are small, the monthly and annual totals may not be noticeable because they do not change the third significant figure in the totals.

16.1 Table 3-1 for 2010 AMR and 2011 AMRs

Revised Tables 3-1 for 2010 and 2011 are shown below. Table 3-1 is a summary of the annual airborne effluent doses. Each corrected table consists of the corrected values and the former values for a side-by-side comparison. Note that within the range of significant figures, the annual total dose values for 2011 do not change because, while the January noble gas doses increased at most by 4% (1.86E-05 to 1.94E-05 mrad gamma air) , the annual totals changed by, at most, 0.05% and therefore do not change the results in this table.

16.2 Tables 3-2 for 2010 AMR and 2011 AMRs

For the corrections to Table 3-2 in the 2010 and 2011 AMRs, only the affected columns, January and Total, are presented and compared. Again the January differences are small so that the annual totals did not change.

16.3 Tables 3-3 for 2010 AMR and 2011 AMRs

For the corrections to Table 3-3 in the 2010 and 2011 AMRs, only the affected columns, January and Total, are presented and compared. Again the January differences are small so that the annual totals did not change.

Table 16-1 Corrections to Table 3-1 in the 2010 and 2011 AMRs

Corrected 2010 AMR Table 3-1: Comparison of 2010 Airborne Effluent Calculated Doses to 10 CFR 50 Appendix I

		Corrected Values		Former Values	
Category	Annual Appendix I Design Objective	Jan - Dec Calculated Dose	Percent of Appendix I Design Objective	Jan - Dec Calculated Dose	Percent of Appendix I Design Objective
Particulate	30 mrem/organ	0.223	0.743	0.223	0.742
Noble Gas	40 mrad (beta air)	0.000186	0.00047	0.000186	0.00047
Noble Gas	20 mrad (gamma air)	0.000437	0.0022	0.000436	0.0022
Noble Gas	30 mrem/skin	0.000633	0.0021	0.000632	0.0021
Noble Gas	10 mrem (whole Body)	0.000416	0.0042	0.000414	0.0041

Corrected 2011 AMR Table 3-1: Comparison of 2011 Airborne Effluent Calculated Doses to 10 CFR 50 Appendix I

		Corrected Values		Former Values	
Category	Annual Appendix I Design Objective	Jan - Dec Calculated Dose	Percent of Appendix I Design Objective	Jan - Dec Calculated Dose	Percent of Appendix I Design Objective
Particulate	30 mrem/organ	0.223	0.743	0.223	0.743
Noble Gas	40 mrad (beta air)	0.000710	0.00178	0.000710	0.00178
Noble Gas	20 mrad (gamma air)	0.001500	0.00750	0.00150	0.00750
Noble Gas	30 mrem/skin	0.002190	0.00729	0.00219	0.00729
Noble Gas	10 mrem (whole Body)	0.001420	0.01420	0.00142	0.01420

Table 16-2 Corrections to Table 3-2 in 2010 AMR and 2011 AMRs

	Corrected 2010		Original 2010	
	Jan	Total	Jan	Total
Total NG from Liq (Ci)	5.85E-05	3.34E-02	5.85E-05	3.34E-02
Total Noble Gas (Ci)1	3.42E-01	1.35E+00	3.39E-01	1.35E+00
Total Radioiodines (Ci)[2]	0.00E+00	1.62E-04	0.00E+00	1.62E-04
Total Particulate (Ci)3	6.12E-07	9.86E-05	6.12E-07	9.86E-05
Alpha (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Strontium(Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
All other beta + gamma (Ci)	6.12E-07	9.86E-05	6.12E-07	9.86E-05
Total Tritium (Ci)	7.00E+00	6.35E+01	7.00E+00	6.35E+01
Max NG H'rly Rel.(Ci/sec)	1.14E-06		1.14E-06	

	Corrected 2011		Original 2011	
	Jan	Total	Jan	Total
Total NG from Liq (Ci)	5.45E-04	9.63E-03	5.45E-04	9.63E-03
Total Noble Gas (Ci)1	4.48E-02	6.23E+00	4.32E-02	6.23E+00
Total Radioiodines (Ci)[2]	1.46E-06	3.62E-06	1.46E-06	3.62E-06
Total Particulate (Ci)3	3.05E-05	2.13E-04	3.05E-05	2.13E-04
Alpha (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Strontium(Ci)	0.00E+00	1.59E-08	0.00E+00	1.59E-08
All other beta + gamma (Ci)	3.05E-05	2.13E-04	3.05E-05	2.13E-04
Total Tritium (Ci)	4.81E+00	7.83E+01	4.81E+00	7.83E+01
Max NG H'rly Rel.(Ci/sec)	4.42E-08		4.42E-08	

Table 16-3 Corrections to Table 3-3 in 2010 AMR and 2011 AMRs

	Corrected 2010		Original 2010		Corrected 2011		Original 2011	
	Jan	Total	Jan	Total	Jan	Total	Jan	Total
Nuclide	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)
Ar-41	2.03E-01	7.77E-01	2.00E-01	7.74E-01	4.37E-02	2.61E+00	4.21E-02	2.61E+00
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85m	4.54E-03	9.74E-03	4.54E-03	9.73E-03	0.00E+00	3.06E-02	0.00E+00	3.06E-02
Kr-87	1.12E-02	2.35E-02	1.12E-02	2.35E-02	0.00E+00	8.93E-02	0.00E+00	8.93E-02
Kr-88	1.11E-02	2.32E-02	1.11E-02	2.33E-02	0.00E+00	8.07E-02	0.00E+00	8.07E-02
Xe-131m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-133	9.83E-03	2.83E-01	9.77E-03	2.83E-01	1.05E-03	2.60E+00	1.05E-03	2.60E+00
Xe-133m	6.22E-05	2.11E-03	6.22E-05	2.11E-03	0.00E+00	1.71E-02	0.00E+00	1.71E-02
Xe-135	2.43E-02	6.14E-02	2.43E-02	6.14E-02	8.05E-06	1.97E-01	8.05E-06	1.97E-01
Xe-135m	2.49E-02	5.38E-02	2.49E-01	5.38E-02	0.00E+00	2.35E-01	0.00E+00	2.35E-01
Xe-138	5.28E-02	1.16E-01	5.28E-02	1.16E-01	0.00E+00	3.71E-01	0.00E+00	3.71E-01

APPENDIX 1

Environmental, Inc. Midwest Laboratory
Final Report for the Point Beach Nuclear Plant
and
Other Analyses
Reporting Period: January – December 2013

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FINAL REPORT
TO
NextEra Energy

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)
FOR
THE POINT BEACH NUCLEAR PLANT
TWO RIVERS, WISCONSIN

PREPARED AND SUBMITTED
BY
ENVIRONMENTAL INCORPORATED MIDWEST LABORATORY

Project Number: 8006

Reporting Period: January-December, 2013

Reviewed and Approved by
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Laboratory Manager

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POINT BEACH NUCLEAR PLANT

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POINT BEACH NUCLEAR PLANT

1.0 INTRODUCTION

The following constitutes the final 2013 Monthly Progress Report for the Environmental Radiological Monitoring Program conducted at the Point Beach Nuclear Plant, Two Rivers, Wisconsin. Results of analyses are presented in the attached tables. Data tables reflect sample analysis results for both Technical Specification requirements and Special Interest locations and samples are randomly selected within the Program monitoring area to provide additional data for cross-comparisons.

For gamma isotopic analyses, the spectrum covers an energy range from 80 to 2048 KeV. Specifically included are Mn-54, Fe-59, Co-58, Co-60, Zn-65, Zr-95, Nb-95, Ru-103, Ru-106, I-131, Ba-La-140, Cs-134, Cs-137, Ce-141, and Ce-144. Naturally occurring gamma-emitters, such as K-40 and Ra daughters, are frequently detected in soil and sediment samples. Specific isotopes listed are K-40, Tl-208, Pb-212, Bi-214, Ra-226 and Ac-228. Unless noted otherwise, the results reported under "Other Gammas" are for Co-60 and may be higher or lower for other radionuclides.

All concentrations, except gross beta, are decay corrected.

All samples were collected within the scheduled period unless noted otherwise in the Listing of Missed Samples.

POINT BEACH NUCLEAR PLANT

2.0 LISTING OF MISSED SAMPLES

Sample Type	Location	Expected Collection Date	Reason
LW	E-006	01-17-13	No sample due to icy conditions.
LW	E-006	02-14-13	No sample due to icy conditions.
AP/AI	E-01	02-28-13	No power to sampler.
AP/AI	E-01	03-06-13	No power to sampler.
AP/AI	E-01	03-13-13	No power to sampler.
SL	E-12	06-05-13	No aquatic vegetation available.

3.0 Data Tables

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
Location: E-01, Meteorological Tower
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Vol. (m^3)	Gross Beta	I-131	Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030	Required LLD		0.010	0.030
01-09-13	309	0.066 ± 0.005	< 0.010	07-10-13	299	0.022 ± 0.004	< 0.011
01-16-13	309	0.002 ± 0.002	< 0.010 [a]	07-17-13	299	0.018 ± 0.003	< 0.012
01-23-13	315	0.056 ± 0.004	< 0.005	07-24-13	299	0.015 ± 0.003	< 0.009
01-31-13	335	0.030 ± 0.004	< 0.009	07-31-13	304	0.010 ± 0.003	< 0.007
02-06-13	266	0.046 ± 0.005	< 0.013	08-07-13	302	0.020 ± 0.003	< 0.006
02-13-13	297	0.028 ± 0.004	< 0.009	08-14-13	309	0.014 ± 0.003	< 0.013
02-20-13	302	0.026 ± 0.003	< 0.011	08-21-13	294	0.033 ± 0.004	< 0.009
02-28-13		ND[b]		08-28-13	302	0.028 ± 0.004	< 0.009
03-06-13		ND[b]		09-04-13	301	0.023 ± 0.004	< 0.006
03-13-13		ND[b]		09-11-13	303	0.033 ± 0.004	< 0.007
03-21-13	335	0.027 ± 0.003	< 0.009	09-18-13	302	0.017 ± 0.003	< 0.008
03-28-13	301	0.009 ± 0.003	< 0.014	09-25-13	303	0.019 ± 0.003	< 0.012
04-03-13	255	0.020 ± 0.004	< 0.011	10-02-13	304	0.024 ± 0.004	< 0.011
1st Quarter Mean ± s.d.		0.031 ± 0.020	< 0.010	3rd Quarter Mean ± s.d.		0.021 ± 0.007	< 0.009
04-10-13	295	0.024 ± 0.003	< 0.008	10-10-13	343	0.018 ± 0.003	< 0.009
04-17-13	297	0.011 ± 0.003	< 0.013	10-16-13	260	0.028 ± 0.004	< 0.010
04-24-13	301	0.020 ± 0.003	< 0.011	10-23-13	303	0.017 ± 0.003	< 0.004
05-01-13	311	0.033 ± 0.004	< 0.016	10-30-13	299	0.015 ± 0.003	< 0.007
05-08-13	316	0.015 ± 0.003	< 0.012	11-06-13	301	0.028 ± 0.004	< 0.005
05-15-13	311	0.016 ± 0.003	< 0.009	11-13-13	316	0.025 ± 0.003	< 0.013
05-22-13	307	0.014 ± 0.003	< 0.011	11-20-13	295	0.030 ± 0.004	< 0.010
05-29-13	305	0.013 ± 0.003	< 0.011	11-27-13	300	0.024 ± 0.003	< 0.009
06-06-13	262	0.014 ± 0.004	< 0.024	12-04-13	298	0.036 ± 0.004	< 0.006
06-12-13	260	0.022 ± 0.004	< 0.011	12-10-13	271	0.040 ± 0.004	< 0.010
06-19-13	302	0.014 ± 0.003	< 0.008	12-18-13	351	0.033 ± 0.004	< 0.010
06-26-13	324	0.019 ± 0.003	< 0.008	12-26-13	352	0.030 ± 0.003	< 0.008
07-03-13	302	0.016 ± 0.003	< 0.010	01-02-14	313	0.045 ± 0.004	< 0.009
2nd Quarter Mean ± s.d.		0.018 ± 0.006	< 0.012	4th Quarter Mean ± s.d.		0.028 ± 0.009	< 0.008
				Cumulative Average		0.024 ± 0.012	< 0.010

[a] Filter light; MDC = <0.003
[b] "ND" = No data, see Table 2.0, Listing of Missed Samples.

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
Location: E-02, Site Boundary Control Center
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
01-09-13	310	0.068 ± 0.005	< 0.010
01-16-13	310	0.032 ± 0.004	< 0.010
01-23-13	305	0.039 ± 0.004	< 0.005
01-31-13	332	0.046 ± 0.004	< 0.009
02-06-13	270	0.047 ± 0.005	< 0.013
02-13-13	304	0.027 ± 0.004	< 0.009
02-20-13	299	0.028 ± 0.004	< 0.011
02-28-13	336	0.013 ± 0.003	< 0.013
03-06-13	272	0.021 ± 0.004	< 0.012
03-13-13	297	0.016 ± 0.003	< 0.009
03-21-13	342	0.027 ± 0.003	< 0.009
03-28-13	296	0.009 ± 0.003	< 0.014
04-03-13	258	0.015 ± 0.004	< 0.010
1st Quarter Mean ± s.d.		0.030 ± 0.017	< 0.010
04-10-13	285	0.022 ± 0.003	< 0.009
04-17-13	298	0.011 ± 0.003	< 0.012
04-24-13	302	0.022 ± 0.003	< 0.011
05-01-13	306	0.032 ± 0.004	< 0.016
05-08-13	301	0.013 ± 0.003	< 0.013
05-15-13	308	0.012 ± 0.003	< 0.009
05-22-13	292	0.016 ± 0.004	< 0.012
05-29-13	311	0.013 ± 0.003	< 0.010
06-06-13	351	0.013 ± 0.003	< 0.018
06-12-13	259	0.020 ± 0.004	< 0.011
06-19-13	301	0.015 ± 0.003	< 0.008
06-26-13	306	0.019 ± 0.003	< 0.008
07-03-13	304	0.012 ± 0.003	< 0.010
2nd Quarter Mean ± s.d.		0.017 ± 0.006	< 0.011
07-10-13	303	0.025 ± 0.004	< 0.011
07-17-13	307	0.018 ± 0.003	< 0.012
07-24-13	308	0.016 ± 0.003	< 0.008
07-31-13	310	0.009 ± 0.003	< 0.006
08-07-13	268	0.024 ± 0.004	< 0.007
08-14-13	315	0.017 ± 0.003	< 0.012
08-21-13	299	0.037 ± 0.004	< 0.009
08-28-13	288	0.028 ± 0.004	< 0.010
09-04-13	300	0.026 ± 0.004	< 0.006
09-11-13	309	0.031 ± 0.004	< 0.007
09-18-13	302	0.017 ± 0.003	< 0.008
09-25-13	301	0.016 ± 0.003	< 0.012
10-02-13	296	0.027 ± 0.004	< 0.011
3rd Quarter Mean ± s.d.		0.023 ± 0.008	< 0.009
10-10-13	347	0.018 ± 0.003	< 0.009
10-16-13	261	0.027 ± 0.004	< 0.010
10-23-13	308	0.017 ± 0.003	< 0.004
10-30-13	305	0.012 ± 0.003	< 0.007
11-06-13	300	0.027 ± 0.004	< 0.005
11-13-13	311	0.027 ± 0.004	< 0.014
11-20-13	293	0.030 ± 0.004	< 0.010
11-27-13	310	0.022 ± 0.003	< 0.008
12-04-13	291	0.036 ± 0.004	< 0.007
12-10-13	251	0.039 ± 0.005	< 0.011
12-18-13	355	0.034 ± 0.004	< 0.010
12-26-13	368	0.032 ± 0.003	< 0.008
01-02-14	319	0.044 ± 0.004	< 0.009
4th Quarter Mean ± s.d.		0.028 ± 0.009	< 0.009
Cumulative Average		0.024 ± 0.012	< 0.010

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
Location: E-03, West Boundary
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Vol. (m^3)	Gross Beta	I-131	Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030	Required LLD		0.010	0.030
01-09-13	305	0.069 ± 0.005	< 0.010	07-10-13	293	0.025 ± 0.004	< 0.011
01-16-13	305	0.032 ± 0.004	< 0.010	07-17-13	294	0.016 ± 0.003	< 0.012
01-23-13	306	0.035 ± 0.004	< 0.005	07-24-13	299	0.016 ± 0.003	< 0.008
01-31-13	343	0.028 ± 0.003	< 0.009	07-31-13	312	0.011 ± 0.003	< 0.006
02-06-13	265	0.047 ± 0.005	< 0.013	08-07-13	292	0.024 ± 0.004	< 0.007
02-13-13	310	0.027 ± 0.004	< 0.009	08-14-13	304	0.016 ± 0.003	< 0.013
02-20-13	306	0.030 ± 0.004	< 0.010	08-21-13	292	0.032 ± 0.004	< 0.010
02-28-13	335	0.014 ± 0.003	< 0.013	08-28-13	305	0.027 ± 0.004	< 0.010
03-06-13	269	0.025 ± 0.004	< 0.012	09-04-13	299	0.024 ± 0.004	< 0.006
03-13-13	298	0.016 ± 0.003	< 0.009	09-11-13	303	0.034 ± 0.004	< 0.007
03-21-13	346	0.029 ± 0.003	< 0.009	09-18-13	304	0.016 ± 0.003	< 0.008
03-28-13	298	0.007 ± 0.003	< 0.014	09-25-13	300	0.018 ± 0.003	< 0.012
04-03-13	258	0.016 ± 0.004	< 0.010	10-02-13	297	0.024 ± 0.004	< 0.011
1st Quarter Mean ± s.d.		0.029 ± 0.016	< 0.010	3rd Quarter Mean ± s.d.		0.022 ± 0.007	< 0.009
04-10-13	298	0.022 ± 0.003	< 0.008	10-10-13	351	0.018 ± 0.003	< 0.009
04-17-13	298	0.012 ± 0.003	< 0.012	10-16-13	262	0.020 ± 0.004	< 0.010
04-24-13	301	0.016 ± 0.003	< 0.011	10-23-13	302	0.012 ± 0.003	< 0.004
05-01-13	297	0.032 ± 0.004	< 0.017	10-30-13	307	0.013 ± 0.003	< 0.007
05-08-13	312	0.012 ± 0.003	< 0.012	11-06-13	304	0.027 ± 0.004	< 0.005
05-15-13	310	0.018 ± 0.003	< 0.009	11-13-13	307	0.021 ± 0.003	< 0.014
05-22-13	306	0.014 ± 0.003	< 0.011	11-20-13	298	0.028 ± 0.004	< 0.009
05-29-13	303	0.014 ± 0.003	< 0.011	11-27-13	308	0.022 ± 0.003	< 0.008
06-06-13	347	0.014 ± 0.003	< 0.018	12-04-13	299	0.029 ± 0.004	< 0.006
06-12-13	255	0.021 ± 0.004	< 0.011	12-10-13	274	0.038 ± 0.004	< 0.010
06-19-13	258	0.017 ± 0.004	< 0.009	12-18-13	353	0.037 ± 0.004	< 0.010
06-26-13	302	0.020 ± 0.003	< 0.008	12-26-13	348	0.029 ± 0.003	< 0.008
07-03-13	302	0.011 ± 0.003	< 0.010	01-02-14	308	0.041 ± 0.004	< 0.009
2nd Quarter Mean ± s.d.		0.017 ± 0.006	< 0.011	4th Quarter Mean ± s.d.		0.026 ± 0.009	< 0.008
				Cumulative Average		0.023 ± 0.011	< 0.010

POINT BEACH NUCLEAR PLANT

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
Location: E-04, North Boundary
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Vol. (m^3)	Gross Beta	I-131	Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030	Required LLD		0.010	0.030
01-09-13	311	0.070 ± 0.005	< 0.010	07-10-13	300	0.024 ± 0.004	< 0.011
01-16-13	311	0.032 ± 0.004	< 0.009	07-17-13	305	0.017 ± 0.003	< 0.012
01-23-13	318	0.035 ± 0.004	< 0.004	07-24-13	294	0.017 ± 0.004	< 0.009
01-31-13	337	0.026 ± 0.003	< 0.009	07-31-13	304	0.009 ± 0.003	< 0.007
02-06-13	266	0.048 ± 0.005	< 0.013	08-08-13	300	0.020 ± 0.003	< 0.006
02-13-13	314	0.029 ± 0.004	< 0.009	08-14-13	266	0.016 ± 0.004	< 0.015
02-20-13	309	0.027 ± 0.003	< 0.010	08-21-13	299	0.034 ± 0.004	< 0.009
02-28-13	345	0.015 ± 0.003	< 0.013	08-28-13	310	0.029 ± 0.004	< 0.010
03-06-13	265	0.025 ± 0.004	< 0.013	09-04-13	297	0.027 ± 0.004	< 0.006
03-13-13	299	0.016 ± 0.003	< 0.009	09-11-13	306	0.033 ± 0.004	< 0.007
03-21-13	343	0.027 ± 0.003	< 0.009	09-18-13	306	0.017 ± 0.003	< 0.008
03-28-13	306	0.011 ± 0.003	< 0.014	09-25-13	302	0.017 ± 0.003	< 0.012
04-03-13	259	0.019 ± 0.004	< 0.010	10-02-13	311	0.030 ± 0.004	< 0.010
1st Quarter Mean ± s.d.		0.029 ± 0.016	< 0.010	3rd Quarter Mean ± s.d.		0.022 ± 0.008	< 0.009
04-10-13	300	0.019 ± 0.003	< 0.008	10-10-13	340	0.017 ± 0.003	< 0.009
04-17-13	298	0.010 ± 0.003	< 0.012	10-16-13	262	0.024 ± 0.004	< 0.010
04-24-13	302	0.020 ± 0.003	< 0.011	10-23-13	305	0.017 ± 0.003	< 0.004
05-01-13	302	0.032 ± 0.004	< 0.016	10-30-13	300	0.014 ± 0.003	< 0.007
05-08-13	310	0.012 ± 0.003	< 0.012	11-06-13	302	0.024 ± 0.004	< 0.005
05-15-13	312	0.017 ± 0.003	< 0.009	11-13-13	311	0.028 ± 0.004	< 0.014
05-22-13	311	0.016 ± 0.003	< 0.011	11-20-13	298	0.031 ± 0.004	< 0.009
05-29-13	304	0.015 ± 0.003	< 0.011	11-27-13	310	0.022 ± 0.003	< 0.008
06-06-13	339	0.010 ± 0.003	< 0.018	12-04-13	301	0.037 ± 0.004	< 0.006
06-12-13	252	0.018 ± 0.004	< 0.011	12-10-13	274	0.039 ± 0.004	< 0.010
06-19-13	304	0.013 ± 0.003	< 0.008	12-18-13	361	0.038 ± 0.004	< 0.010
06-26-13	301	0.017 ± 0.003	< 0.008	12-26-13	352	0.033 ± 0.003	< 0.008
07-03-13	303	0.012 ± 0.003	< 0.010	01-02-14	313	0.039 ± 0.004	< 0.009
2nd Quarter Mean ± s.d.		0.016 ± 0.006	< 0.011	4th Quarter Mean ± s.d.		0.028 ± 0.009	< 0.008
				Cumulative Average		0.024 ± 0.011	< 0.010

POINT BEACH NUCLEAR PLANT

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
Location: E-08, G.J. Francar Residence
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Vol. (m^3)	Gross Beta	I-131	Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030	Required LLD		0.010	0.030
01-09-13	317	0.059 ± 0.005	< 0.009	07-10-13	300	0.023 ± 0.004	< 0.011
01-16-13	317	0.032 ± 0.004	< 0.009	07-17-13	304	0.019 ± 0.003	< 0.012
01-23-13	309	0.035 ± 0.004	< 0.005	07-24-13	302	0.019 ± 0.004	< 0.008
01-31-13	337	0.024 ± 0.003	< 0.009	07-31-13	303	0.009 ± 0.003	< 0.007
02-06-13	266	0.041 ± 0.004	< 0.013	08-08-13	314	0.022 ± 0.003	< 0.006
02-13-13	313	0.025 ± 0.003	< 0.009	08-14-13	272	0.015 ± 0.004	< 0.014
02-20-13	309	0.025 ± 0.003	< 0.010	08-21-13	298	0.033 ± 0.004	< 0.009
02-28-13	343	0.017 ± 0.003	< 0.013	08-28-13	307	0.025 ± 0.004	< 0.010
03-06-13	270	0.022 ± 0.004	< 0.012	09-04-13	307	0.024 ± 0.004	< 0.006
03-13-13	298	0.015 ± 0.003	< 0.009	09-11-13	305	0.031 ± 0.004	< 0.007
03-21-13	340	0.031 ± 0.003	< 0.009	09-18-13	314	0.019 ± 0.003	< 0.008
03-28-13	302	0.009 ± 0.003	< 0.014	09-25-13	307	0.019 ± 0.003	< 0.012
04-03-13	259	0.017 ± 0.004	< 0.010	10-02-13	291	0.028 ± 0.004	< 0.011
1st Quarter Mean ± s.d.		0.027 ± 0.013	< 0.010	3rd Quarter Mean ± s.d.		0.022 ± 0.006	< 0.009
04-10-13	294	0.027 ± 0.004	< 0.008	10-10-13	345	0.020 ± 0.003	< 0.009
04-17-13	296	0.012 ± 0.003	< 0.013	10-16-13	261	0.026 ± 0.004	< 0.010
04-24-13	301	0.020 ± 0.003	< 0.011	10-23-13	305	0.017 ± 0.003	< 0.004
05-01-13	294	0.033 ± 0.004	< 0.017	10-30-13	300	0.015 ± 0.003	< 0.007
05-08-13	309	0.014 ± 0.003	< 0.012	11-06-13	312	0.025 ± 0.004	< 0.005
05-15-13	307	0.018 ± 0.003	< 0.009	11-13-13	309	0.024 ± 0.003	< 0.014
05-22-13	301	0.018 ± 0.004	< 0.012	11-20-13	294	0.029 ± 0.004	< 0.010
05-29-13	300	0.016 ± 0.003	< 0.011	11-27-13	320	0.022 ± 0.003	< 0.008
06-06-13	346	0.015 ± 0.003	< 0.018	12-04-13	293	0.037 ± 0.004	< 0.007
06-12-13	256	0.021 ± 0.004	< 0.011	12-10-13	282	0.040 ± 0.004	< 0.009
06-19-13	308	0.015 ± 0.003	< 0.008	12-18-13	359	0.037 ± 0.004	< 0.010
06-26-13	310	0.020 ± 0.003	< 0.008	12-26-13	344	0.027 ± 0.003	< 0.008
07-03-13	307	0.014 ± 0.003	< 0.010	01-02-14	316	0.040 ± 0.004	< 0.009
2nd Quarter Mean ± s.d.		0.019 ± 0.006	< 0.011	4th Quarter Mean ± s.d.		0.028 ± 0.008	< 0.008
				Cumulative Average		0.024 ± 0.009	< 0.010
				Indicator Locations Annual Mean ± s.d.		**0.024 ± 0.011**	**< 0.010**

Table 1. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
Location: E-20, Silver Lake
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Vol. (m^3)	Gross Beta	I-131	Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030	Required LLD		0.010	0.030
01-09-13	320	0.062 ± 0.005	< 0.009	07-10-13	299	0.023 ± 0.004	< 0.011
01-16-13	320	0.030 ± 0.003	< 0.009	07-17-13	297	0.017 ± 0.003	< 0.012
01-23-13	317	0.039 ± 0.004	< 0.005	07-24-13	300	0.015 ± 0.003	< 0.008
01-31-13	337	0.026 ± 0.003	< 0.009	07-31-13	309	0.012 ± 0.003	< 0.006
02-06-13	260	0.047 ± 0.005	< 0.013	08-07-13	306	0.020 ± 0.003	< 0.006
02-13-13	313	0.032 ± 0.004	< 0.009	08-14-13	306	0.017 ± 0.003	< 0.013
02-20-13	309	0.028 ± 0.003	< 0.010	08-21-13	295	0.033 ± 0.004	< 0.009
02-28-13	352	0.017 ± 0.003	< 0.012	08-28-13	304	0.025 ± 0.004	< 0.010
03-06-13	273	0.022 ± 0.004	< 0.012	09-04-13	306	0.025 ± 0.004	< 0.006
03-13-13	296	0.015 ± 0.003	< 0.009	09-11-13	306	0.030 ± 0.004	< 0.007
03-21-13	353	0.031 ± 0.003	< 0.009	09-18-13	306	0.017 ± 0.003	< 0.008
03-28-13	299	0.011 ± 0.003	< 0.014	09-25-13	301	0.016 ± 0.003	< 0.012
04-03-13	265	0.019 ± 0.004	< 0.010	10-02-13	301	0.023 ± 0.004	< 0.011
1st Quarter Mean ± s.d.		0.029 ± 0.014	< 0.010	3rd Quarter Mean ± s.d.		0.021 ± 0.006	< 0.009
04-10-13	288	0.022 ± 0.003	< 0.008	10-10-13	346	0.021 ± 0.003	< 0.009
04-17-13	305	0.010 ± 0.003	< 0.012	10-16-13	267	0.023 ± 0.004	< 0.009
04-24-13	307	0.020 ± 0.003	< 0.010	10-23-13	309	0.015 ± 0.003	< 0.004
05-01-13	303	0.032 ± 0.004	< 0.016	10-30-13	306	0.017 ± 0.003	< 0.007
05-08-13	307	0.014 ± 0.003	< 0.013	11-06-13	309	0.025 ± 0.004	< 0.005
05-15-13	295	0.016 ± 0.003	< 0.010	11-13-13	312	0.025 ± 0.004	< 0.013
05-22-13	308	0.015 ± 0.003	< 0.011	11-20-13	304	0.026 ± 0.004	< 0.009
05-29-13	310	0.013 ± 0.003	< 0.010	11-27-13	320	0.025 ± 0.003	< 0.008
06-06-13	353	0.014 ± 0.003	< 0.018	12-04-13	302	0.032 ± 0.004	< 0.006
06-12-13	260	0.026 ± 0.004	< 0.010	12-10-13	274	0.042 ± 0.004	< 0.010
06-19-13	305	0.015 ± 0.003	< 0.008	12-18-13	357	0.034 ± 0.004	< 0.010
06-26-13	297	0.017 ± 0.003	< 0.008	12-26-13	347	0.030 ± 0.003	< 0.008
07-03-13	312	0.013 ± 0.003	< 0.010	01-02-14	312	0.038 ± 0.004	< 0.009
2nd Quarter Mean ± s.d.		0.018 ± 0.006	< 0.011	4th Quarter Mean ± s.d.		0.027 ± 0.008	< 0.008
				Cumulative Average		0.024 ± 0.010	< 0.010
				Control Annual Mean ± s.d.		0.024 ± 0.010	< 0.010

Table 2. Gamma emitters in quarterly composites of air particulate filters

Units: pCi/m^3

Location	Lab Code Req. LLD	Be-7 -	Be-7 MDC	Cs-134 0.01	Cs-134 MDC	Cs-137 0.01	Cs-137 MDC	(Other) Co-60 (0.10)	(Other) (Co-60) MDC	Volume m^3
					1st Quarter					
E-01	EAP- 2062	0.066 ± 0.013	-	-0.0003 ± 0.0004	< 0.0006	0.0001 ± 0.0005	< 0.0009	-0.0001 ± 0.0003	< 0.0004	3022
E-02	- 2063	0.066 ± 0.013	-	0.0003 ± 0.0004	< 0.0006	0.0001 ± 0.0004	< 0.0006	-0.0001 ± 0.0006	< 0.0010	3931
E-03	- 2064	0.065 ± 0.020	-	0.0000 ± 0.0005	< 0.0007	-0.0003 ± 0.0005	< 0.0004	-0.0004 ± 0.0006	< 0.0004	3942
E-04	- 2065	0.077 ± 0.016	-	0.0002 ± 0.0005	< 0.0007	0.0001 ± 0.0005	< 0.0010	0.0001 ± 0.0006	< 0.0005	3984
E-08	- 2066	0.054 ± 0.013	-	0.0001 ± 0.0004	< 0.0006	0.0003 ± 0.0005	< 0.0007	-0.0001 ± 0.0003	< 0.0004	3979
E-20	- 2067	0.052 ± 0.011	-	0.0001 ± 0.0003	< 0.0005	0.0000 ± 0.0004	< 0.0005	0.0001 ± 0.0004	< 0.0004	4014
					2nd Quarter					
E-01	EAP- 4074	0.076 ± 0.015		0.0001 ± 0.0005	< 0.0011	0.0000 ± 0.0006	< 0.0010	0.0002 ± 0.0004	< 0.0006	3891
E-02	- 4075	0.082 ± 0.015		-0.0005 ± 0.0006	< 0.0009	-0.0001 ± 0.0006	< 0.0007	0.0002 ± 0.0007	< 0.0008	3923
E-03	- 4076	0.072 ± 0.013		0.0003 ± 0.0004	< 0.0007	0.0002 ± 0.0005	< 0.0009	0.0001 ± 0.0005	< 0.0005	3891
E-04	- 4077	0.072 ± 0.012		0.0001 ± 0.0003	< 0.0004	-0.0004 ± 0.0004	< 0.0003	0.0001 ± 0.0004	< 0.0004	3939
E-08	- 4078	0.074 ± 0.014		-0.0004 ± 0.0004	< 0.0006	-0.0001 ± 0.0006	< 0.0006	0.0002 ± 0.0006	< 0.0009	3930
E-20	- 4079	0.086 ± 0.017		0.0000 ± 0.0005	< 0.0006	-0.0004 ± 0.0006	< 0.0007	-0.0006 ± 0.0009	< 0.0008	3950
					3rd Quarter					
E-01	EAP- 6377	0.073 ± 0.016		-0.0003 ± 0.0006	< 0.0010	-0.0007 ± 0.0006	< 0.0005	0.0003 ± 0.0005	< 0.0004	3922
E-02	- 6378	0.069 ± 0.013		0.0000 ± 0.0005	< 0.0009	0.0000 ± 0.0006	< 0.0005	-0.0001 ± 0.0008	< 0.0004	3907
E-03	- 6379	0.063 ± 0.014		0.0002 ± 0.0005	< 0.0009	0.0001 ± 0.0006	< 0.0009	-0.0003 ± 0.0007	< 0.0009	3895
E-04	- 6380	0.066 ± 0.018		-0.0009 ± 0.0006	< 0.0009	0.0001 ± 0.0005	< 0.0005	0.0005 ± 0.0007	< 0.0010	3901
E-08	- 6381	0.085 ± 0.015		0.0003 ± 0.0004	< 0.0008	-0.0001 ± 0.0005	< 0.0004	0.0005 ± 0.0005	< 0.0006	3925
E-20	- 6382	0.069 ± 0.017		-0.0001 ± 0.0004	< 0.0009	-0.0001 ± 0.0006	< 0.0009	-0.0002 ± 0.0006	< 0.0007	3933
					4th Quarter					
E-01	EAP- 7854	0.051 ± 0.011		0.0002 ± 0.0005	< 0.0010	0.0004 ± 0.0005	< 0.0005	0.0000 ± 0.0005	< 0.0004	4000
E-02	- 7855	0.047 ± 0.014		0.0002 ± 0.0005	< 0.0010	0.0005 ± 0.0005	< 0.0006	0.0000 ± 0.0005	< 0.0004	4019
E-03	- 7856	0.056 ± 0.013		-0.0007 ± 0.0005	< 0.0009	0.0004 ± 0.0005	< 0.0005	0.0002 ± 0.0006	< 0.0005	4021
E-04	- 7857	0.050 ± 0.012		0.0003 ± 0.0003	< 0.0006	0.0003 ± 0.0004	< 0.0007	0.0002 ± 0.0006	< 0.0008	4029
E-08	- 7858	0.050 ± 0.013		0.0002 ± 0.0005	< 0.0008	0.0005 ± 0.0005	< 0.0007	0.0003 ± 0.0006	< 0.0006	4040
E-20	- 7859	0.049 ± 0.011		-0.0002 ± 0.0005	< 0.0010	-0.0002 ± 0.0005	< 0.0007	-0.0004 ± 0.0006	< 0.0007	4064
Annual Mean±s.d.		**0.065 ± 0.012**		**0.0000 ± 0.0003**	**< 0.0008**	**0.0000 ± 0.0003**	**< 0.0006**	**0.0000 ± 0.0003**	**< 0.0006**	

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-11 Lambert Dairy Farm

		MDC		MDC		MDC	Required LLD
Collection Date	01-09-13		02-13-13		03-13-13		
Lab Code	EMI- 99		EMI- 618		EMI- 1075		
Sr-89	0.2 ± 0.8	< 0.7	-0.1 ± 0.7	< 0.6	0.0 ± 0.8	< 0.8	5.0
Sr-90	1.2 ± 0.3	< 0.5	0.9 ± 0.3	< 0.5	1.0 ± 0.3	< 0.5	1.0
I-131	0.05 ± 0.16	< 0.29	0.16 ± 0.20	< 0.37	-0.20 ± 0.26	< 0.47	0.5
K-40	1237 ± 74	-	1503 ± 76	-	1315 ± 105	-	
Cs-134	1.1 ± 1.7	< 3.2	-0.5 ± 1.0	< 1.6	0.0 ± 1.5	< 3.2	5.0
Cs-137	0.6 ± 1.8	< 3.3	0.9 ± 1.4	< 2.0	0.7 ± 1.9	< 3.1	5.0
Ba-La-140	-0.9 ± 1.3	< 2.4	3.5 ± 1.2	< 4.1	-0.5 ± 1.9	< 1.2	5.0
Other (Co-60)	0.3 ± 1.8	< 2.7	-0.7 ± 1.4	< 2.0	0.8 ± 1.8	< 3.1	15.0

							Required LLD
Collection Date	04-10-13		05-15-13		06-12-13		
Lab Code	EMI- 1625		EMI- 2545		EMI- 3153		
Sr-89	0.4 ± 0.8	< 0.8	-0.2 ± 0.7	< 0.7	-0.2 ± 0.9	< 0.8	5.0
Sr-90	0.8 ± 0.3	< 0.5	0.9 ± 0.3	< 0.5	1.1 ± 0.4	< 0.7	1.0
I-131	-0.03 ± 0.14	< 0.26	-0.03 ± 0.17	< 0.31	0.02 ± 0.21	< 0.42	0.5
K-40	1421 ± 100	-	1443 ± 86	-	1450 ± 122	-	
Cs-134	-0.5 ± 1.7	< 2.9	0.2 ± 1.4	< 2.3	1.9 ± 2.0	< 3.3	5.0
Cs-137	0.0 ± 2.1	< 4.1	1.9 ± 1.6	< 2.6	3.0 ± 2.5	< 4.3	5.0
Ba-La-140	-2.3 ± 1.8	< 2.0	0.9 ± 1.3	< 4.4	-3.0 ± 1.7	< 3.5	5.0
Other (Co-60)	0.1 ± 1.9	< 2.4	-0.4 ± 1.8	< 2.7	0.3 ± 2.2	< 3.0	15.0

POINT BEACH NUCLEAR PLANT

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-11 Lambert Dairy Farm

Collection Date	07-10-13	MDC	08-14-13	MDC	09-11-13	MDC	Required LLD
Lab Code	EMI- 3773		EMI- 4754		EMI- 5381		
Sr-89	0.8 ± 0.9	< 0.8	0.1 ± 0.7	< 0.7	0.0 ± 0.7	< 0.7	5.0
Sr-90	0.8 ± 0.4	< 0.6	0.9 ± 0.3	< 0.5	0.9 ± 0.3	< 0.5	1.0
I-131	0.04 ± 0.14	< 0.26	0.02 ± 0.13	< 0.20	0.08 ± 0.20	< 0.42	0.5
K-40	1368 ± 101	-	1538 ± 94	-	1545 ± 126	-	
Cs-134	-1.2 ± 1.9	< 3.1	0.6 ± 1.5	< 2.2	1.2 ± 2.0	< 3.7	5.0
Cs-137	-0.1 ± 2.1	< 3.3	0.6 ± 1.9	< 3.2	2.3 ± 2.5	< 4.7	5.0
Ba-La-140	-1.9 ± 1.5	< 4.2	-3.2 ± 1.4	< 1.9	-3.5 ± 2.3	< 2.0	5.0
Other (Co-60)	1.4 ± 2.1	< 3.7	-0.2 ± 1.9	< 2.9	1.7 ± 2.6	< 2.4	15.0

Collection Date	10-09-13		11-13-13		12-11-13		Required LLD
Lab Code	EMI- 6065		EMI- 6999		EMI- 7492		
Sr-89	0.4 ± 0.9	< 0.8	0.2 ± 1.0	< 0.8	0.2 ± 0.7	< 0.7	5.0
Sr-90	1.0 ± 0.4	< 0.6	1.6 ± 0.4	< 0.5	0.9 ± 0.3	< 0.5	1.0
I-131	-0.01 ± 0.23	< 0.46	-0.08 ± 0.15	< 0.27	-0.02 ± 0.20	< 0.44	0.5
K-40	1366 ± 107	-	1465 ± 109	-	1532 ± 105	-	
Cs-134	-0.9 ± 1.9	< 3.8	-1.9 ± 1.8	< 3.5	-0.6 ± 1.8	< 3.7	5.0
Cs-137	1.5 ± 2.3	< 4.0	1.8 ± 2.1	< 4.0	0.7 ± 2.0	< 2.7	5.0
Ba-La-140	0.3 ± 1.7	< 2.1	0.4 ± 1.6	< 3.6	-1.2 ± 2.0	< 1.8	5.0
Other (Co-60)	0.2 ± 2.3	< 2.5	-1.9 ± 2.1	< 3.1	1.8 ± 2.1	< 3.3	15.0

POINT BEACH NUCLEAR PLANT

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-21 Strutz Dairy Farm

Collection Date	01-09-13	MDC	02-13-13	MDC	03-13-13	MDC	Required LLD
Lab Code	EMI- 100		EMI- 619		EMI- 1076		
Sr-89	0.0 ± 0.7	< 0.7	0.2 ± 0.5	< 0.6	0.2 ± 0.8	< 0.9	5.0
Sr-90	0.6 ± 0.3	< 0.5	0.1 ± 0.2	< 0.5	0.4 ± 0.3	< 0.6	1.0
I-131	-0.02 ± 0.15	< 0.27	0.10 ± 0.11	< 0.19	-0.08 ± 0.24	< 0.44	0.5
K-40	1505 ± 121	-	1441 ± 78	-	1348 ± 99	-	
Cs-134	-0.7 ± 2.1	< 3.2	-0.4 ± 1.2	< 1.9	-1.9 ± 1.4	< 2.0	5.0
Cs-137	0.3 ± 2.6	< 3.9	-0.3 ± 1.5	< 2.2	-0.7 ± 2.1	< 3.5	5.0
Ba-La-140	-0.8 ± 1.8	< 3.2	-2.0 ± 1.1	< 2.8	-0.1 ± 1.5	< 1.3	5.0
Other (Co-60)	0.2 ± 2.5	< 4.1	0.4 ± 1.4	< 2.1	0.4 ± 1.8	< 2.5	15.0

Collection Date	04-10-13		05-15-13		06-12-13		Required LLD
Lab Code	EMI- 1626		EMI- 2546		EMI- 3154		
Sr-89	-0.6 ± 0.7	< 0.9	-0.6 ± 0.6	< 0.7	0.2 ± 0.7	< 0.7	5.0
Sr-90	0.6 ± 0.3	< 0.5	0.6 ± 0.3	< 0.5	0.3 ± 0.4	< 0.7	1.0
I-131	0.01 ± 0.18	< 0.37	0.11 ± 0.26	< 0.50	0.03 ± 0.21	< 0.38	0.5
K-40	1437 ± 108	-	1397 ± 43	-	1513 ± 128	-	
Cs-134	0.2 ± 1.7	< 3.2	-0.8 ± 0.8	< 1.3	-0.9 ± 2.2	< 3.5	5.0
Cs-137	1.2 ± 2.0	< 3.6	-0.1 ± 0.9	< 1.5	-2.2 ± 2.6	< 4.5	5.0
Ba-La-140	0.4 ± 1.8	< 2.0	0.3 ± 0.7	< 3.3	-0.7 ± 1.6	< 3.6	5.0
Other (Co-60)	1.4 ± 2.3	< 3.1	-0.2 ± 0.9	< 1.5	0.7 ± 2.5	< 4.2	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-21 Strutz Dairy Farm

Collection Date	07-10-13	MDC	08-14-13	MDC	09-11-13	MDC	Required LLD
Lab Code	EMI- 3774		EMI- 4755		EMI- 5382		
Sr-89	0.1 ± 0.7	< 0.8	-0.3 ± 0.7	< 0.9	0.5 ± 0.8	< 0.8	5.0
Sr-90	0.5 ± 0.3	< 0.5	0.3 ± 0.3	< 0.7	0.5 ± 0.3	< 0.5	1.0
I-131	0.05 ± 0.14	< 0.25	0.08 ± 0.15	< 0.23	0.09 ± 0.19	< 0.39	0.5
K-40	1479 ± 98	-	1408 ± 91	-	1490 ± 125	-	
Cs-134	-0.2 ± 1.5	< 2.3	-0.4 ± 1.2	< 1.9	-1.4 ± 1.7	< 2.8	5.0
Cs-137	0.1 ± 1.6	< 2.5	-0.7 ± 1.6	< 2.6	2.7 ± 2.2	< 4.1	5.0
Ba-La-140	1.3 ± 1.4	< 3.3	0.8 ± 1.3	< 2.1	0.9 ± 1.3	< 2.0	5.0
Other (Co-60)	0.2 ± 1.9	< 2.4	0.4 ± 1.8	< 3.1	0.5 ± 2.6	< 3.8	15.0

Collection Date	10-09-13		11-13-13		12-11-13		Required LLD
Lab Code	EMI- 6066		EMI- 7000		EMI- 7493		
Sr-89	0.2 ± 0.6	< 0.8	0.0 ± 0.6	< 0.8	-0.6 ± 0.7	< 0.8	5.0
Sr-90	0.2 ± 0.3	< 0.5	0.2 ± 0.3	< 0.5	0.7 ± 0.3	< 0.5	1.0
I-131	0.03 ± 0.19	< 0.34	0.01 ± 0.20	< 0.39	0.21 ± 0.22	< 0.41	0.5
K-40	1403 ± 103	-	1484 ± 96	-	1433 ± 105	-	
Cs-134	-0.8 ± 1.8	< 2.9	-0.1 ± 1.6	< 2.9	-0.1 ± 1.9	< 3.5	5.0
Cs-137	-0.3 ± 2.1	< 3.6	0.5 ± 2.0	< 3.8	-1.7 ± 2.2	< 3.0	5.0
Ba-La-140	-0.1 ± 1.8	< 2.1	2.3 ± 1.5	< 3.2	-1.6 ± 1.6	< 2.2	5.0
Other (Co-60)	-1.2 ± 1.8	< 1.8	0.1 ± 1.8	< 1.7	0.2 ± 2.2	< 3.5	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-40 Barta

Collection Date	01-09-13	MDC	02-13-13	MDC	03-13-13	MDC	Required LLD
Lab Code	EMI- 101		EMI- 620		EMI- 1078		
Sr-89	-0.4 ± 0.7	< 0.7	-0.3 ± 0.6	< 0.6	-0.4 ± 0.7	< 0.7	5.0
Sr-90	0.8 ± 0.3	< 0.5	0.5 ± 0.3	< 0.5	0.7 ± 0.3	< 0.5	1.0
I-131	0.10 ± 0.15	< 0.26	0.19 ± 0.22	< 0.43	0.02 ± 0.18	< 0.33	0.5
K-40	1475 ± 96	-	1404 ± 73	-	1439 ± 106	-	
Cs-134	-1.2 ± 1.4	< 2.2	0.5 ± 1.0	< 1.6	-0.3 ± 1.9	< 2.9	5.0
Cs-137	-0.5 ± 1.7	< 3.0	0.3 ± 1.3	< 2.2	2.2 ± 2.1	< 4.2	5.0
Ba-La-140	-3.6 ± 1.4	< 2.5	-3.7 ± 1.2	< 2.5	-4.9 ± 2.0	< 2.1	5.0
Other (Co-60)	0.1 ± 1.8	< 2.4	-0.4 ± 1.4	< 2.1	1.8 ± 1.9	< 3.3	15.0

Collection Date	04-10-13		05-15-13		06-12-13		Required LLD
Lab Code	EMI- 1627		EMI- 2547		EMI- 3156		
Sr-89	0.0 ± 0.7	< 0.7	-0.1 ± 0.6	< 0.7	-0.2 ± 0.6	< 0.6	5.0
Sr-90	0.5 ± 0.3	< 0.5	0.7 ± 0.3	< 0.5	0.7 ± 0.3	< 0.5	1.0
I-131	-0.06 ± 0.15	< 0.27	0.03 ± 0.19	< 0.34	-0.14 ± 0.15	< 0.29	0.5
K-40	1361 ± 114	-	1427 ± 43	-	1487 ± 102	-	
Cs-134	-1.3 ± 2.2	< 3.6	0.1 ± 0.6	< 1.3	0.5 ± 1.3	< 2.3	5.0
Cs-137	1.8 ± 2.5	< 3.8	0.2 ± 0.8	< 1.5	2.0 ± 1.8	< 3.4	5.0
Ba-La-140	-1.7 ± 2.2	< 3.5	-0.9 ± 0.7	< 2.6	-2.1 ± 1.5	< 2.3	5.0
Other (Co-60)	-0.4 ± 2.5	< 3.3	0.6 ± 0.9	< 1.6	-1.5 ± 2.1	< 2.6	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-40 Barta

Collection Date	07-10-13	MDC	08-14-13	MDC	09-11-13	MDC	Required LLD
Lab Code	EMI- 3775		EMI- 4756		EMI- 5383		
Sr-89	-0.2 ± 0.7	< 0.8	-0.7 ± 0.7	< 0.6	-0.6 ± 0.7	< 0.7	5.0
Sr-90	0.6 ± 0.3	< 0.5	0.9 ± 0.3	< 0.5	1.1 ± 0.3	< 0.4	1.0
I-131	0.06 ± 0.15	< 0.26	0.17 ± 0.20	< 0.37	0.10 ± 0.11	< 0.19	0.5
K-40	1473 ± 88	-	1546 ± 95		1379 ± 119		
Cs-134	-1.3 ± 1.5	< 2.2	-0.2 ± 1.4	< 3.0	-0.6 ± 1.9	< 3.7	5.0
Cs-137	-1.9 ± 1.8	< 2.9	-0.9 ± 1.9	< 3.1	1.2 ± 2.2	< 3.8	5.0
Ba-La-140	-2.0 ± 1.7	< 4.9	1.6 ± 1.4	< 4.2	-2.9 ± 1.9	< 1.7	5.0
Other (Co-60)	-0.4 ± 1.9	< 2.7	-0.4 ± 2.1	< 3.0	0.7 ± 2.7	< 3.7	15.0

Collection Date	10-09-13		11-13-13		12-11-13		Required LLD
Lab Code	EMI- 6067		EMI- 7001		EMI- 7494		
Sr-89	-0.1 ± 0.6	< 0.6	-0.2 ± 0.7	< 0.8	-0.5 ± 0.6	< 0.6	5.0
Sr-90	0.5 ± 0.3	< 0.4	0.6 ± 0.3	< 0.5	0.7 ± 0.3	< 0.5	1.0
I-131	0.03 ± 0.20	< 0.35	-0.02 ± 0.17	< 0.30	0.08 ± 0.11	< 0.19	0.5
K-40	1421 ± 108		1428 ± 109	-	1352 ± 101	-	
Cs-134	-0.8 ± 2.2	< 3.3	0.7 ± 2.0	< 3.7	-0.1 ± 1.7	< 3.1	5.0
Cs-137	0.9 ± 2.1	< 3.7	-1.9 ± 2.3	< 2.1	0.1 ± 2.1	< 3.5	5.0
Ba-La-140	1.6 ± 1.5	< 3.1	-2.0 ± 1.6	< 1.3	0.5 ± 1.7	< 2.6	5.0
Other (Co-60)	0.9 ± 1.8	< 2.1	-1.9 ± 2.4	< 2.7	1.3 ± 2.1	< 3.2	15.0

Sr-89 Annual Mean + s.d.	**-0.1 ± 0.3**
Sr-90 Annual Mean + s.d.	**0.7 ± 0.3**
I-131 Annual Mean + s.d.	**0.03 ± 0.09**
K-40 Annual Mean + s.d.	**1436 ± 69**
Cs-134 Annual Mean + s.d.	**-0.3 ± 0.8**
Cs-137 Annual Mean + s.d.	**0.5 ± 1.3**
Ba-La Annual Mean + s.d.	**-0.9 ± 1.9**
Co-60 Annual Mean + s.d.	**0.2 ± 0.9**

POINT BEACH NUCLEAR PLANT

Table 4. Radioactivity in Well Water Samples, E-10
Collection: Quarterly
Units: pCi/L

	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Req. LLD	Annual Mean ±s.d
Collection Date	01-16-13	04-09-13	07-10-13	10-16-13	Req.	
Lab Code	EWW- 185	EWW- 1632	EWW- 3811	EWW- 6335	LLD	
Gross Beta	2.3 ± 0.9	2.6 ± 1.7	2.3 ± 0.6	1.8 ± 0.6	4.0	**2.3 ± 0.3**
H-3	-1.9 ± 72.4	28.3 ± 71.9	11.0 ± 75.1	71.0 ± 76.6	500	**27.1 ± 31.8**
Sr-89	-0.1 ± 0.4	0.0 ± 0.5	-0.3 ± 0.4	-0.1 ± 0.4	5.0	**-0.1 ± 0.1**
Sr-90	0.0 ± 0.2	0.0 ± 0.2	0.1 ± 0.2	0.0 ± 0.2	1.0	**0.0 ± 0.1**
I-131	0.07 ± 0.11	-0.10 ± 0.26	0.06 ± 0.17	-0.09 ± 0.22	0.5	**-0.02 ± 0.09**
Mn-54	1.0 ± 1.3	0.3 ± 1.9	-0.2 ± 0.7	1.7 ± 1.8	10	**0.7 ± 0.8**
Fe-59	0.1 ± 2.0	-1.7 ± 3.6	-1.8 ± 1.4	1.8 ± 3.5	30	**-0.4 ± 1.7**
Co-58	-0.4 ± 1.2	-1.1 ± 1.5	0.1 ± 0.8	-1.2 ± 1.8	10	**-0.6 ± 0.6**
Co-60	-0.2 ± 1.2	1.1 ± 1.7	-0.1 ± 1.0	-0.5 ± 1.9	10	**0.1 ± 0.7**
Zn-65	0.3 ± 2.3	3.4 ± 3.8	-1.5 ± 1.6	-1.7 ± 4.1	30	**0.1 ± 2.3**
Zr-Nb-95	-0.1 ± 1.1	-1.6 ± 2.0	-0.3 ± 0.8	-2.2 ± 2.0	15	**-1.1 ± 1.0**
Cs-134	0.2 ± 1.1	-0.2 ± 1.7	0.2 ± 0.7	-0.5 ± 1.9	10	**-0.1 ± 0.3**
Cs-137	0.1 ± 1.4	0.0 ± 2.2	0.3 ± 1.0	-0.4 ± 2.0	10	**0.0 ± 0.3**
Ba-La-140	0.2 ± 1.2	1.4 ± 1.7	-1.8 ± 1.0	0.2 ± 2.4	15	**0.0 ± 1.3**
Other (Ru-103)	-0.9 ± 1.1	-0.1 ± 1.6	0.0 ± 0.7	2.4 ± 2.2	30	**0.3 ± 1.4**

MDC Data

Collection Date	01-12-12	04-09-13	07-10-13	10-16-13	Req.	
Lab Code	EWW- 185	EWW- 1632	EWW- 3811	EWW- 6335	LLD	
Gross Beta	< 1.4	< 2.9	< 0.8	< 0.9	4.0	**< 1.5**
H-3	< 138.0	< 149.4	< 150.4	< 146.8	500	**< 146.2**
Sr-89	< 0.6	< 0.7	< 0.7	< 0.6	5.0	**< 0.7**
Sr-90	< 0.5	< 0.5	< 0.5	< 0.5	1.0	**< 0.5**
I-131	< 0.18	< 0.39	< 0.31	< 0.50	0.5	**< 0.34**
Mn-54	< 2.4	< 2.8	< 1.4	< 2.7	10	**< 2.3**
Fe-59	< 3.4	< 5.6	< 2.7	< 7.3	30	**< 4.8**
Co-58	< 2.1	< 2.4	< 1.2	< 3.0	10	**< 2.1**
Co-60	< 2.0	< 2.8	< 1.8	< 1.1	10	**< 1.9**
Zn-65	< 2.7	< 5.0	< 2.7	< 5.6	30	**< 4.0**
Zr-Nb-95	< 2.0	< 4.2	< 1.6	< 3.4	15	**< 2.8**
Cs-134	< 2.3	< 3.6	< 1.0	< 3.6	10	**< 2.6**
Cs-137	< 2.4	< 3.1	< 2.0	< 2.9	10	**< 2.6**
Ba-La-140	< 1.0	< 2.5	< 2.0	< 6.9	15	**< 3.1**
Other (Ru-103)	< 2.0	< 3.0	< 1.7	< 3.6	30	**< 2.6**

Table 5. Lake water, analyses for gross beta, iodine-131 and gamma emitting isotopes.
Location: E-01 (Meteorological Tower)
Collection: Monthly composites Units: pCi/L

		MDC		MDC		MDC		MDC	
Lab Code	ELW- 221		ELW- 624		ELW- 1122		ELW- 1628		
Date Collected	01-17-13		02-14-13		03-13-13		04-09-13		Req. LLD
Gross beta	1.8 ± 0.4	< 0.5	2.2 ± 0.5	< 0.6	2.1 ± 0.8	< 1.3	2.3 ± 0.8	< 1.3	4.0
I-131	0.13 ± 0.16	< 0.28	-0.02 ± 0.21	< 0.45	0.04 ± 0.17	< 0.31	0.07 ± 0.17	< 0.30	0.5
Be-7	-3.5 ± 10.4	< 26.6	12.8 ± 13.1	< 31.0	0.9 ± 16.6	< 30.3	-4.3 ± 11.5	< 19.9	
Mn-54	0.0 ± 1.2	< 1.8	0.3 ± 1.4	< 2.7	-0.3 ± 1.8	< 3.5	-0.7 ± 1.5	< 2.0	10
Fe-59	3.2 ± 2.5	< 5.0	-0.4 ± 3.3	< 4.5	0.3 ± 3.4	< 7.3	-1.7 ± 2.6	< 4.0	30
Co-58	0.2 ± 1.4	< 1.7	-2.2 ± 1.5	< 1.3	0.0 ± 1.6	< 3.3	0.3 ± 1.1	< 2.0	10
Co-60	-1.3 ± 1.1	< 1.4	-1.0 ± 1.8	< 2.7	-0.2 ± 1.6	< 2.2	0.2 ± 1.5	< 2.1	10
Zn-65	-2.1 ± 2.6	< 2.8	1.9 ± 2.9	< 4.0	-2.1 ± 3.9	< 5.4	0.8 ± 2.6	< 4.1	30
Zr-Nb-95	-1.0 ± 1.4	< 2.2	-1.3 ± 1.6	< 3.1	-0.4 ± 1.8	< 3.1	0.8 ± 1.4	< 3.4	15
Cs-134	-0.4 ± 1.2	< 2.5	-1.1 ± 1.6	< 2.9	-0.2 ± 1.6	< 2.7	0.1 ± 1.0	< 1.7	10
Cs-137	-0.4 ± 1.6	< 3.0	0.7 ± 1.8	< 3.7	-0.6 ± 2.0	< 3.4	-0.5 ± 1.5	< 2.6	10
Ba-La-140	-2.8 ± 1.7	< 3.2	-2.7 ± 2.0	< 6.4	-2.4 ± 2.0	< 3.9	-0.6 ± 1.6	< 2.4	15
Other (Ru-103)	-0.8 ± 1.3	< 3.2	0.6 ± 1.6	< 3.6	-1.8 ± 1.9	< 2.5	-0.5 ± 1.3	< 2.8	30
Lab Code	ELW- 2599		ELW- 3246		ELW- 4020		ELW- 4854		
Date Collected	05-16-13		06-13-13		07-17-13		08-15-13		Req. LLD
Gross beta	1.0 ± 0.4	< 0.6	1.3 ± 0.6	< 0.9	1.0 ± 0.4	< 0.6	0.8 ± 0.4	< 0.6	4.0
I-131	0.15 ± 0.20	< 0.35	-0.16 ± 0.14	< 0.22	-0.02 ± 0.15	< 0.22	0.06 ± 0.18	< 0.32	0.5
Be-7	14.1 ± 14.5	< 38.3	-13.5 ± 17.4	< 29.2	-0.2 ± 10.3	< 28.4	-0.3 ± 11.3	< 26.0	
Mn-54	1.5 ± 1.6	< 2.5	1.3 ± 1.7	< 2.9	0.2 ± 1.1	< 2.2	-0.8 ± 1.3	< 1.2	10
Fe-59	-3.2 ± 3.0	< 4.0	0.5 ± 3.2	< 5.9	-2.2 ± 2.0	< 2.8	0.8 ± 2.4	< 4.2	30
Co-58	-1.0 ± 1.7	< 2.1	-0.2 ± 1.7	< 2.8	0.7 ± 1.1	< 2.8	-0.5 ± 1.6	< 2.3	10
Co-60	0.5 ± 1.5	< 2.3	1.8 ± 1.8	< 2.9	1.2 ± 1.3	< 2.1	-0.1 ± 1.7	< 2.2	10
Zn-65	0.5 ± 2.8	< 3.7	0.8 ± 3.4	< 4.2	-1.5 ± 2.3	< 3.2	0.6 ± 2.5	< 4.4	30
Zr-Nb-95	0.5 ± 1.6	< 4.5	-0.7 ± 1.7	< 2.3	0.9 ± 1.2	< 3.8	0.9 ± 1.3	< 2.7	15
Cs-134	0.0 ± 1.7	< 3.3	-0.4 ± 1.7	< 3.4	-0.2 ± 1.0	< 1.6	-0.3 ± 1.4	< 2.3	10
Cs-137	0.5 ± 1.9	< 3.8	0.4 ± 1.9	< 3.0	-0.4 ± 1.3	< 2.2	-0.3 ± 1.6	< 2.0	10
Ba-La-140	2.6 ± 1.6	< 2.7	-3.2 ± 2.1	< 5.5	0.4 ± 1.5	< 6.0	0.4 ± 1.4	< 3.3	15
Other (Ru-103)	-0.6 ± 1.4	< 4.0	-2.2 ± 2.3	< 3.2	1.9 ± 1.3	< 3.1	-0.3 ± 1.4	< 3.1	30
Lab Code	ELW- 5397		ELW- 6329		ELW- 7014		ELW- 7343		
Date Collected	09-12-13		10-16-13		11-14-13		12-05-13		Req. LLD
Gross beta	2.1 ± 0.8	< 1.3	1.2 ± 0.4	< 0.6	2.3 ± 0.8	< 1.3	1.0 ± 0.5	< 0.9	4.0
I-131	-0.10 ± 0.13	< 0.24	0.04 ± 0.14	< 0.25	0.10 ± 0.14	< 0.24	0.04 ± 0.22	< 0.45	0.5
Be-7	12.4 ± 14.6	< 32.7	-7.6 ± 12.7	< 28.3	-7.7 ± 11.3	< 18.7	-2.0 ± 12.1	< 25.6	
Mn-54	0.5 ± 1.6	< 2.6	0.5 ± 1.4	< 2.3	-0.5 ± 1.6	< 2.5	1.4 ± 1.3	< 2.2	10
Fe-59	-0.7 ± 2.7	< 4.0	0.9 ± 2.8	< 5.4	-0.3 ± 2.4	< 3.2	0.6 ± 2.7	< 7.1	30
Co-58	0.4 ± 1.4	< 3.2	-0.8 ± 1.6	< 2.0	-0.3 ± 1.4	< 2.2	-0.3 ± 1.3	< 2.5	10
Co-60	1.3 ± 1.6	< 1.9	0.8 ± 1.3	< 1.2	0.3 ± 1.3	< 1.6	-0.6 ± 1.1	< 1.4	10
Zn-65	-3.4 ± 3.0	< 2.2	-0.4 ± 2.3	< 2.1	-0.7 ± 2.9	< 4.9	0.5 ± 2.6	< 3.7	30
Zr-Nb-95	-1.0 ± 1.6	< 3.2	1.9 ± 1.7	< 5.1	0.1 ± 1.5	< 2.3	-1.7 ± 1.6	< 2.7	15
Cs-134	-0.2 ± 1.5	< 2.3	0.8 ± 1.2	< 2.5	0.2 ± 1.2	< 2.4	-2.0 ± 1.5	< 2.9	10
Cs-137	0.0 ± 1.6	< 2.2	0.2 ± 1.7	< 2.7	1.2 ± 1.4	< 2.9	-0.2 ± 1.8	< 2.6	10
Ba-La-140	0.5 ± 1.5	< 5.6	-2.5 ± 1.9	< 7.2	-1.5 ± 1.6	< 2.5	-1.0 ± 1.7	< 3.1	15
Other (Ru-103)	-1.8 ± 1.6	< 2.9	-0.9 ± 1.5	< 4.5	-0.4 ± 1.3	< 2.8	0.3 ± 1.4	< 2.7	30

Table 5. Lake water, analyses for gross beta, iodine-131 and gamma emitting isotopes.
Location: E-05 (Two Creeks Park)
Collection: Monthly composites Units: pCi/L

		MDC		MDC		MDC		MDC	
Lab Code	ELW- 222		ELW- 625		ELW- 1123		ELW- 1629		
Date Collected	01-17-13		02-14-13		03-13-13		04-09-13		Req. LLD
Gross beta	1.2 ± 0.3	< 0.4	1.7 ± 0.4	< 0.6	1.8 ± 0.7	< 1.2	3.8 ± 0.8	< 1.2	4.0
I-131	0.10 ± 0.22	< 0.43	-0.10 ± 0.20	< 0.47	0.02 ± 0.17	< 0.30	0.14 ± 0.20	< 0.34	0.5
Be-7	-9.9 ± 14.4	< 30.5	3.4 ± 14.6	< 37.8	4.6 ± 12.4	< 31.2	2.3 ± 15.0	< 36.1	
Mn-54	0.9 ± 1.7	< 2.9	1.4 ± 1.5	< 2.6	1.4 ± 1.2	< 2.1	0.8 ± 1.7	< 2.4	10
Fe-59	2.2 ± 2.5	< 4.8	-4.7 ± 2.7	< 3.9	1.5 ± 2.6	< 4.7	0.7 ± 3.3	< 5.1	30
Co-58	0.6 ± 1.6	< 2.6	-1.0 ± 1.7	< 3.0	0.5 ± 1.3	< 2.2	-0.2 ± 1.5	< 3.2	10
Co-60	0.8 ± 1.9	< 3.3	-0.7 ± 1.6	< 2.1	-1.7 ± 1.5	< 2.1	-0.4 ± 2.1	< 3.3	10
Zn-65	2.4 ± 2.9	< 4.1	-0.9 ± 3.0	< 3.3	-1.0 ± 2.3	< 3.6	1.6 ± 3.3	< 5.1	30
Zr-Nb-95	-0.6 ± 1.7	< 1.9	1.5 ± 1.7	< 3.3	-0.7 ± 1.5	< 3.0	0.0 ± 1.8	< 2.4	15
Cs-134	0.3 ± 1.6	< 2.4	1.0 ± 1.5	< 2.6	0.5 ± 1.2	< 2.5	-0.9 ± 1.5	< 2.3	10
Cs-137	-2.2 ± 1.9	< 2.5	0.3 ± 1.8	< 3.5	-1.1 ± 1.7	< 1.8	1.2 ± 1.8	< 1.8	10
Ba-La-140	1.2 ± 1.9	< 5.6	-1.3 ± 1.7	< 2.3	-0.4 ± 1.8	< 2.3	-0.7 ± 1.8	< 4.3	15
Other (Ru-103)	0.8 ± 1.7	< 3.6	-0.3 ± 1.6	< 3.6	-1.1 ± 1.2	< 2.6	1.5 ± 2.0	< 4.8	30
Lab Code	ELW- 2600		ELW- 3247		ELW- 4021		ELW- 4855		
Date Collected	05-16-13		06-13-13		07-17-13		08-15-13		Req. LLD
Gross beta	1.0 ± 0.4	< 0.6	0.8 ± 0.5	< 0.8	0.9 ± 0.4	< 0.6	0.7 ± 0.4	< 0.6	4.0
I-131	0.10 ± 0.18	< 0.31	-0.01 ± 0.14	< 0.20	-0.04 ± 0.14	< 0.21	0.17 ± 0.23	< 0.44	0.5
Be-7	-7.5 ± 10.1	< 17.6	6.6 ± 11.9	< 28.9	-3.8 ± 13.0	< 32.6	6.1 ± 12.1	< 29.7	
Mn-54	0.0 ± 1.3	< 2.2	0.6 ± 1.6	< 2.7	-1.1 ± 1.4	< 2.5	0.3 ± 1.3	< 2.3	10
Fe-59	-1.6 ± 2.3	< 3.3	0.3 ± 2.3	< 4.8	0.4 ± 2.7	< 5.2	-0.2 ± 2.6	< 5.5	30
Co-58	0.4 ± 1.4	< 2.8	-1.7 ± 1.4	< 2.6	0.7 ± 1.4	< 2.2	0.5 ± 1.4	< 2.3	10
Co-60	-1.2 ± 1.6	< 1.8	0.2 ± 1.3	< 1.5	-0.6 ± 1.6	< 2.7	-0.1 ± 1.7	< 1.4	10
Zn-65	-2.3 ± 3.0	< 3.3	1.9 ± 2.6	< 4.6	0.9 ± 2.6	< 2.9	-2.0 ± 2.2	< 1.2	30
Zr-Nb-95	-0.1 ± 1.4	< 2.3	0.1 ± 1.6	< 2.9	2.3 ± 1.6	< 4.4	-0.9 ± 1.5	< 2.5	15
Cs-134	0.0 ± 1.1	< 2.4	-0.5 ± 1.5	< 2.2	0.3 ± 1.2	< 2.2	-0.3 ± 1.4	< 1.8	10
Cs-137	1.4 ± 1.5	< 2.7	1.5 ± 1.5	< 2.3	0.1 ± 2.1	< 4.0	1.5 ± 1.7	< 3.3	10
Ba-La-140	2.5 ± 1.6	< 4.6	-1.6 ± 1.4	< 1.6	0.6 ± 1.4	< 5.2	-0.7 ± 1.3	< 1.7	15
Other (Ru-103)	-0.6 ± 1.1	< 3.1	-2.0 ± 1.4	< 2.8	-0.2 ± 1.6	< 3.1	-0.1 ± 1.4	< 2.1	30
Lab Code	ELW- 5398		ELW- 6330		ELW- 7015		ELW- 7344		
Date Collected	09-12-13		10-17-13		11-14-13		12-05-13		Req. LLD
Gross beta	4.1 ± 0.8	< 1.9	0.5 ± 0.4	< 0.6	2.7 ± 0.8	< 1.2	1.0 ± 0.5	< 0.8	4.0
I-131	0.00 ± 0.14	< 0.24	0.07 ± 0.13	< 0.23	0.04 ± 0.12	< 0.22	-0.08 ± 0.14	< 0.27	0.5
Be-7	0.5 ± 10.8	< 25.7	-3.1 ± 10.7	< 19.7	-16.0 ± 15.1	< 26.3	-2.7 ± 11.7	< 20.5	
Mn-54	-0.4 ± 1.2	< 1.7	-0.5 ± 1.2	< 1.7	1.0 ± 1.4	< 2.3	0.1 ± 1.5	< 2.5	10
Fe-59	0.0 ± 2.2	< 3.7	-2.5 ± 2.0	< 4.1	0.7 ± 2.5	< 3.6	-0.6 ± 2.5	< 3.3	30
Co-58	-0.7 ± 1.2	< 1.8	-0.9 ± 1.1	< 1.5	1.1 ± 1.5	< 2.9	-0.6 ± 1.3	< 1.4	10
Co-60	0.1 ± 1.7	< 2.7	0.4 ± 1.2	< 1.9	1.0 ± 1.2	< 1.6	1.0 ± 1.4	< 1.8	10
Zn-65	-1.0 ± 2.9	< 3.1	-1.2 ± 1.9	< 2.2	-1.7 ± 3.3	< 3.8	1.2 ± 2.7	< 4.0	30
Zr-Nb-95	0.8 ± 1.5	< 4.4	-1.9 ± 1.2	< 1.9	1.0 ± 1.9	< 3.7	-1.4 ± 1.9	< 2.6	15
Cs-134	0.4 ± 1.1	< 2.3	0.9 ± 1.2	< 2.1	0.7 ± 1.6	< 2.9	0.2 ± 1.5	< 2.7	10
Cs-137	0.1 ± 1.4	< 2.2	-0.1 ± 1.3	< 1.9	-1.5 ± 1.7	< 2.6	0.3 ± 1.8	< 3.2	10
Ba-La-140	-3.8 ± 1.6	< 6.6	-4.2 ± 1.4	< 5.8	-2.5 ± 1.8	< 3.4	0.4 ± 1.5	< 2.6	15
Other (Ru-103)	-0.1 ± 1.2	< 3.4	-0.8 ± 1.3	< 2.6	-1.5 ± 1.5	< 2.6	0.6 ± 1.4	< 3.3	30

Table 5. Lake water, analyses for gross beta, iodine-131 and gamma emitting isotopes.
Location: E-06 (Coast Guard Station)
Collection: Monthly composites Units: pCi/L

		MDC		MDC		MDC		MDC	
Lab Code	NS[a]		NS[a]		ELW- 1124		ELW- 1630		
Date Collected	01-17-13		02-14-13		03-13-13		04-09-13		Req. LLD
Gross beta	-		-		6.6 ± 1.0	< 1.3	3.3 ± 0.8	< 1.3	4.0
I-131	-		-		0.05 ± 0.17	< 0.31	0.02 ± 0.17	< 0.31	0.5
Be-7	-		-		-4.2 ± 11.7	< 24.1	-1.2 ± 11.9	< 23.5	
Mn-54	-		-		0.3 ± 1.4	< 2.4	-0.4 ± 1.6	< 3.4	10
Fe-59	-		-		0.8 ± 2.4	< 3.9	1.8 ± 2.4	< 5.1	30
Co-58	-		-		0.9 ± 1.5	< 2.4	-0.2 ± 1.3	< 2.2	10
Co-60	-		-		-0.1 ± 1.6	< 2.4	0.5 ± 1.7	< 3.4	10
Zn-65	-		-		2.6 ± 2.5	< 4.6	2.6 ± 2.6	< 5.2	30
Zr-Nb-95	-		-		-0.1 ± 1.4	< 2.2	0.0 ± 1.5	< 2.3	15
Cs-134	-		-		-0.9 ± 1.5	< 2.2	1.2 ± 1.5	< 2.1	10
Cs-137	-		-		0.4 ± 1.7	< 2.9	0.0 ± 1.6	< 2.8	10
Ba-La-140	-		-		1.0 ± 1.1	< 2.5	-0.6 ± 1.5	< 4.4	15
Other (Ru-103)	-		-		0.0 ± 1.3	< 2.8	-1.0 ± 1.4	< 2.9	30
Lab Code	ELW- 2601		ELW- 3248		ELW- 4022		ELW- 4856		
Date Collected	05-16-13		06-13-13		07-17-13		08-15-13		Req. LLD
Gross beta	0.9 ± 0.4	< 0.6	1.4 ± 0.6	< 0.9	1.0 ± 0.4	< 0.6	1.0 ± 0.4	< 0.6	4.0
I-131	0.10 ± 0.15	< 0.26	0.09 ± 0.20	< 0.35	0.06 ± 0.15	< 0.22	0.13 ± 0.23	< 0.40	0.5
Be-7	-5.5 ± 12.0	< 23.5	-12.4 ± 12.5	< 19.6	2.9 ± 10.5	< 26.2	3.2 ± 16.4	< 31.3	
Mn-54	-0.2 ± 1.3	< 2.2	0.1 ± 1.4	< 1.9	0.8 ± 1.4	< 2.5	1.3 ± 1.6	< 2.9	10
Fe-59	-1.8 ± 2.7	< 3.1	-1.1 ± 2.8	< 3.0	-0.1 ± 2.4	< 5.3	0.8 ± 3.0	< 5.6	30
Co-58	-0.8 ± 1.4	< 2.0	-0.7 ± 1.2	< 2.0	-0.7 ± 1.2	< 2.4	0.6 ± 1.7	< 3.8	10
Co-60	-2.8 ± 1.9	< 2.2	-1.2 ± 1.7	< 2.4	0.2 ± 1.6	< 2.4	0.8 ± 1.8	< 3.0	10
Zn-65	1.3 ± 2.8	< 4.5	0.5 ± 2.9	< 4.3	1.5 ± 2.5	< 4.7	-3.1 ± 3.7	< 4.4	30
Zr-Nb-95	-0.1 ± 1.5	< 2.2	-1.6 ± 1.5	< 1.7	0.2 ± 1.3	< 2.4	0.4 ± 1.6	< 3.7	15
Cs-134	-0.7 ± 1.2	< 1.9	0.2 ± 1.2	< 2.0	0.2 ± 1.3	< 2.5	-0.8 ± 1.9	< 2.7	10
Cs-137	1.3 ± 1.6	< 2.9	-1.0 ± 1.6	< 2.5	-0.1 ± 1.5	< 2.7	-0.3 ± 1.9	< 2.7	10
Ba-La-140	-1.1 ± 1.5	< 2.5	-2.5 ± 1.4	< 1.7	0.4 ± 1.3	< 4.6	-0.1 ± 2.1	< 7.2	15
Other (Ru-103)	-1.3 ± 1.4	< 3.3	0.4 ± 1.4	< 3.4	-1.4 ± 1.2	< 2.1	-1.3 ± 2.0	< 2.3	30
Lab Code	ELW- 5399		ELW- 6331		ELW- 7016		ELW- 7345		
Date Collected	09-12-13		10-17-13		11-14-13		12-05-13		Req. LLD
Gross beta	2.0 ± 0.8	< 1.2	0.9 ± 0.4	< 0.6	1.6 ± 0.8	< 1.3	1.5 ± 0.6	< 0.9	4.0
I-131	0.06 ± 0.14	< 0.24	0.04 ± 0.14	< 0.25	-0.06 ± 0.11	< 0.21	-0.01 ± 0.19	< 0.38	0.5
Be-7	0.2 ± 10.8	< 26.6	-3.8 ± 9.1	< 17.6	10.1 ± 12.0	< 31.9	-9.0 ± 12.1	< 21.4	
Mn-54	1.1 ± 1.2	< 2.4	-0.9 ± 1.2	< 1.7	-0.3 ± 1.5	< 2.0	-0.5 ± 1.4	< 1.9	10
Fe-59	1.7 ± 2.4	< 6.3	-0.5 ± 2.1	< 4.4	-2.7 ± 2.9	< 3.8	0.1 ± 2.2	< 3.3	30
Co-58	-0.8 ± 1.2	< 1.5	0.1 ± 1.3	< 1.7	0.4 ± 1.5	< 1.6	1.4 ± 1.2	< 2.1	10
Co-60	1.3 ± 1.3	< 1.9	1.2 ± 1.2	< 1.7	-0.2 ± 1.6	< 2.1	0.3 ± 1.8	< 2.8	10
Zn-65	-0.4 ± 2.5	< 4.3	-0.9 ± 2.0	< 1.8	-0.1 ± 3.1	< 3.6	-2.6 ± 2.9	< 3.9	30
Zr-Nb-95	-2.6 ± 1.3	< 2.4	-0.5 ± 1.2	< 3.0	1.4 ± 1.6	< 3.0	-1.7 ± 1.5	< 2.0	15
Cs-134	-1.1 ± 1.4	< 2.2	-0.1 ± 1.1	< 2.3	-0.5 ± 1.7	< 3.1	1.0 ± 1.5	< 2.6	10
Cs-137	0.5 ± 1.3	< 2.4	0.8 ± 1.5	< 3.2	0.1 ± 1.8	< 2.2	-0.1 ± 1.8	< 2.8	10
Ba-La-140	2.2 ± 1.6	< 8.6	2.2 ± 1.4	< 5.4	-3.5 ± 2.0	< 3.9	0.3 ± 1.5	< 1.8	15
Other (Ru-103)	-0.5 ± 1.2	< 2.4	-0.3 ± 1.0	< 2.5	-0.9 ± 1.7	< 4.8	-0.3 ± 1.4	< 2.7	30

[a] "NS" = No sample; see Table 2.0, Listing of Missed Samples.

Table 5. Lake water, analyses for gross beta, iodine-131 and gamma emitting isotopes.
Location: E-33 (Kewaunee)
Collection: Monthly composites
Units: pCi/L

Lab Code	ELW- 223	MDC	ELW- 626	MDC	ELW- 1125	MDC	ELW- 1631	MDC	
Date Collected	01-17-13		02-14-13		03-13-13		04-09-13		Req. LLD
Gross beta	1.2 ± 0.3	< 0.4	1.2 ± 0.4	< 0.6	1.9 ± 0.8	< 1.3	1.7 ± 0.8	< 1.3	4.0
I-131	-0.08 ± 0.17	< 0.31	0.12 ± 0.19	< 0.36	-0.03 ± 0.22	< 0.45	0.14 ± 0.17	< 0.30	0.5
Be-7	3.9 ± 10.5	< 23.3	0.3 ± 10.6	< 30.3	13.7 ± 16.7	< 29.7	-5.2 ± 10.9	< 17.8	
Mn-54	0.3 ± 1.5	< 2.4	0.5 ± 1.2	< 2.0	-0.6 ± 1.6	< 2.6	-0.1 ± 1.4	< 2.6	10
Fe-59	-0.2 ± 2.6	< 3.1	-1.9 ± 2.3	< 4.5	-3.2 ± 3.3	< 4.2	0.4 ± 2.1	< 3.5	30
Co-58	-0.7 ± 1.5	< 1.6	0.9 ± 1.3	< 2.9	3.0 ± 1.5	< 2.6	-1.1 ± 1.5	< 2.6	10
Co-60	0.3 ± 1.2	< 2.1	-1.3 ± 1.3	< 1.8	0.5 ± 1.6	< 2.9	-1.0 ± 1.7	< 2.4	10
Zn-65	0.7 ± 3.3	< 5.7	2.5 ± 2.3	< 2.4	-5.0 ± 3.7	< 2.4	-0.4 ± 3.0	< 3.2	30
Zr-Nb-95	0.4 ± 1.6	< 2.8	0.2 ± 1.3	< 2.5	0.4 ± 1.4	< 3.0	-0.7 ± 1.6	< 3.5	15
Cs-134	-0.1 ± 1.6	< 2.5	-0.3 ± 1.3	< 2.2	-0.4 ± 1.8	< 2.5	-0.2 ± 1.1	< 2.0	10
Cs-137	1.3 ± 1.8	< 3.4	0.5 ± 1.6	< 2.8	-0.5 ± 1.9	< 2.5	-0.4 ± 1.8	< 2.6	10
Ba-La-140	0.3 ± 1.9	< 3.7	0.6 ± 1.3	< 3.5	-0.2 ± 1.4	< 3.2	-2.9 ± 1.8	< 2.2	15
Other (Ru-103)	0.8 ± 1.4	< 3.2	-0.3 ± 1.3	< 2.6	-1.5 ± 1.9	< 3.3	-1.1 ± 1.3	< 2.6	30

Lab Code	ELW- 2602	MDC	ELW- 3249	MDC	ELW- 4023	MDC	ELW- 4858	MDC	
Date Collected	05-16-13		06-13-13		07-18-13		08-15-13		Req. LLD
Gross beta	1.3 ± 0.4	< 0.6	0.8 ± 0.5	< 0.8	0.8 ± 0.4	< 0.6	0.7 ± 0.4	< 0.6	4.0
I-131	0.13 ± 0.18	< 0.31	-0.16 ± 0.13	< 0.20	0.04 ± 0.13	< 0.20	0.06 ± 0.18	< 0.31	0.5
Be-7	2.2 ± 8.0	< 13.5	7.5 ± 12.1	< 31.8	-0.1 ± 13.5	< 35.2	-18.0 ± 11.8	< 23.2	
Mn-54	0.5 ± 0.8	< 1.9	1.4 ± 1.1	< 2.2	0.3 ± 1.4	< 1.7	-1.3 ± 1.6	< 2.3	10
Fe-59	-2.7 ± 1.6	< 2.3	0.2 ± 2.5	< 5.0	-0.5 ± 2.6	< 4.8	-0.6 ± 2.7	< 4.5	30
Co-58	0.3 ± 0.7	< 1.7	0.2 ± 1.2	< 2.2	-1.8 ± 1.4	< 1.9	-0.5 ± 1.4	< 2.5	10
Co-60	0.9 ± 0.9	< 1.5	1.3 ± 1.3	< 2.3	-1.6 ± 1.7	< 1.3	-0.2 ± 2.1	< 2.6	10
Zn-65	-1.1 ± 1.8	< 3.0	1.4 ± 2.4	< 3.3	-0.4 ± 2.9	< 4.3	1.4 ± 2.9	< 3.3	30
Zr-Nb-95	0.0 ± 0.8	< 1.6	0.8 ± 1.3	< 3.1	-1.2 ± 1.8	< 4.0	1.4 ± 1.8	< 4.0	15
Cs-134	-0.3 ± 0.9	< 1.5	-0.2 ± 1.2	< 2.3	-0.4 ± 1.6	< 2.2	0.9 ± 1.4	< 2.4	10
Cs-137	0.3 ± 1.0	< 2.0	-0.1 ± 1.4	< 2.3	2.2 ± 1.7	< 2.9	1.3 ± 1.8	< 3.5	10
Ba-La-140	1.5 ± 1.0	< 7.2	1.1 ± 1.3	< 4.8	-7.5 ± 2.0	< 4.1	-2.1 ± 1.5	< 3.0	15
Other (Ru-103)	-1.2 ± 0.9	< 1.8	0.3 ± 1.3	< 2.8	-0.7 ± 1.5	< 3.2	-0.5 ± 1.6	< 3.1	30

Lab Code	ELW- 5400	MDC	ELW- 6332	MDC	ELW- 7017	MDC	ELW- 7346	MDC	
Date Collected	09-12-13		10-17-13		11-14-13		12-05-13		Req. LLD
Gross beta	1.8 ± 0.7	< 1.1	1.0 ± 0.6	< 0.6	2.8 ± 0.8	< 1.3	0.4 ± 0.5	< 0.9	4.0
I-131	-0.01 ± 0.11	< 0.21	-0.01 ± 0.13	< 0.24	0.06 ± 0.15	< 0.30	-0.06 ± 0.14	< 0.25	0.5
Be-7	-5.2 ± 10.4	< 30.9	3.8 ± 13.0	< 33.3	10.2 ± 12.1	< 31.3	7.5 ± 15.9	< 33.4	
Mn-54	-0.9 ± 1.2	< 2.2	0.4 ± 1.8	< 2.6	0.0 ± 1.7	< 3.1	2.1 ± 1.6	< 2.9	10
Fe-59	-1.0 ± 2.2	< 1.7	-0.4 ± 2.7	< 5.1	-2.1 ± 2.8	< 3.6	3.8 ± 2.4	< 3.5	30
Co-58	0.5 ± 1.2	< 2.0	0.2 ± 1.5	< 2.9	0.3 ± 1.4	< 2.4	0.2 ± 1.8	< 3.3	10
Co-60	-0.9 ± 1.4	< 2.0	0.9 ± 1.8	< 2.8	-1.3 ± 1.5	< 1.5	0.9 ± 1.6	< 3.0	10
Zn-65	-0.4 ± 2.0	< 2.3	-0.6 ± 2.9	< 4.7	-1.0 ± 3.1	< 4.5	3.6 ± 3.2	< 5.0	30
Zr-Nb-95	0.4 ± 1.4	< 3.5	-1.0 ± 1.7	< 3.8	-2.4 ± 1.6	< 2.2	1.8 ± 1.7	< 3.3	15
Cs-134	-0.2 ± 1.0	< 1.8	0.6 ± 1.6	< 3.2	0.1 ± 1.3	< 3.0	0.3 ± 1.7	< 3.3	10
Cs-137	-1.0 ± 1.5	< 1.9	1.1 ± 1.9	< 3.6	-0.1 ± 1.9	< 3.1	-0.6 ± 1.7	< 3.2	10
Ba-La-140	-0.8 ± 1.7	< 8.4	-5.2 ± 2.3	< 12.1	-0.6 ± 1.9	< 4.0	0.7 ± 1.9	< 5.4	15
Other (Ru-103)	-1.2 ± 1.2	< 2.6	0.1 ± 1.5	< 4.3	0.2 ± 1.6	< 3.5	-2.5 ± 2.1	< 3.5	30

Annual
All locations

	Mean ± s.d.		Mean ± s.d.		Mean ± s.d.
Gross Beta	**1.6 ± 1.1**				
I-131	**0.03 ± 0.08**	**Co-58**	**-0.1 ± 0.9**	**Cs-134**	**-0.1 ± 0.6**
Be-7	**-0.4 ± 7.7**	**Co-60**	**0.0 ± 1.0**	**Cs-137**	**0.2 ± 0.9**
Mn-54	**0.3 ± 0.8**	**Zn-65**	**-0.1 ± 1.8**	**Ba-La-140**	**-0.9 ± 2.1**
Fe-59	**-0.3 ± 1.7**	**Zr-Nb-95**	**-0.1 ± 1.1**	**Ru-103**	**-0.5 ± 0.9**

Table 6. Lake water, analyses for tritium, strontium-89 and strontium-90.
Collection: Quarterly composites of weekly grab samples
Units: pCi/L

Location	E-01 (Meteorological Tower)								
Period	1st Qtr.	MDC	2nd Qtr.	MDC	3rd Qtr.	MDC	4th Qtr.	MDC	
Lab Code	ELW- 1148		ELW- 3352		ELW- 5441		ELW- 7381		Req. LLDs
H-3	59 ± 73	< 146	24 ± 81	< 153	23 ± 72	< 143	-47 ± 77	< 151	500
Sr-89	0.44 ± 0.61	< 0.74	-0.29 ± 0.50	< 0.72	-0.36 ± 0.68	< 0.90	0.48 ± 0.60	< 0.81	5.0
Sr-90	0.19 ± 0.25	< 0.49	0.38 ± 0.24	< 0.43	0.17 ± 0.30	< 0.61	-0.03 ± 0.24	< 0.52	1.0

Location	E-05 (Two Creeks Park)								
Period	1st Qtr.		2nd Qtr.		3rd Qtr.		4th Qtr.		
Lab Code	ELW- 1149		ELW- 3353		ELW- 5442		ELW- 7382		Req. LLDs
H-3	348 ± 87 [a]	< 146	93 ± 85	< 153	9 ± 71	< 143	29 ± 81	< 151	500
Sr-89	0.10 ± 0.68	< 0.84	-0.14 ± 0.52	< 0.76	0.20 ± 0.60	< 0.83	0.09 ± 0.60	< 0.81	5.0
Sr-90	0.35 ± 0.28	< 0.53	0.36 ± 0.24	< 0.44	0.00 ± 0.25	< 0.53	0.16 ± 0.25	< 0.49	1.0

Location	E-06 (Coast Guard Station)								
Period	1st Qtr.		2nd Qtr.		3rd Qtr.		4th Qtr.		
Lab Code	ELW- 1150		ELW- 3354		ELW- 5443		ELW- 7383		Req. LLDs
H-3	45 ± 72	< 146	99 ± 85	< 153	33 ± 73	< 143	3 ± 79	< 151	500
Sr-89	0.54 ± 0.70	< 0.81	-0.50 ± 0.51	< 0.69	-0.39 ± 0.58	< 0.69	0.41 ± 0.64	< 0.75	5.0
Sr-90	0.23 ± 0.28	< 0.54	0.45 ± 0.26	< 0.44	0.44 ± 0.25	< 0.43	0.25 ± 0.26	< 0.48	1.0

Location	E-33 (Kewaunee)								
Period	1st Qtr.		2nd Qtr.		3rd Qtr.		4th Qtr.		
Lab Code	ELW- 1151		ELW- 3355		ELW- 5444		ELW- 7384		Req. LLDs
H-3	123 ± 76	< 146	121 ± 97	< 153	52 ± 74	< 143	37 ± 81	< 151	500
Sr-89	0.54 ± 0.60	< 0.70	0.03 ± 0.51	< 0.74	0.55 ± 0.60	< 0.69	0.00 ± 0.63	< 0.77	5.0
Sr-90	0.21 ± 0.24	< 0.46	0.20 ± 0.23	< 0.43	0.27 ± 0.24	< 0.44	0.31 ± 0.26	< 0.48	1.0

[a] Monthly results: Jan = <147, Feb = 882±109, March = <146 pCi/L.

[b] February tritium requested on E-01 = <150 pCi/L and E-33 = <150 pCi/L.

Tritium Annual Mean ± s.d.	**66 ± 88**
Sr-89 Annual Mean ± s.d.	**0.11 ± 0.36**
Sr-90 Annual Mean ± s.d.	**0.25 ± 0.14**

Table 7. Fish, analyses for gross beta and gamma emitting isotopes.
Location: E-13
Collection: 2x / year Units: pCi/g wet

	Sample Description and Concentration	MDC		MDC		MDC	Req. LLD
Collection Date	01-28-13		03-05-13		04-25-13		
Lab Code	EF- 1126		EF- 1127		EF- 2231		
Type	Lake Trout		Rainbow Trout		Whitefish		
Ratio (wet/dry wt.)	4.88		5.39		3.64		
Gross Beta	2.90 ± 0.08	< 0.030	3.14 ± 0.09	< 0.040	3.53 ± 0.08	< 0.029	0.5
K-40	2.75 ± 0.41	-	2.83 ± 0.41	-	2.80 ± 0.38	-	
Mn-54	-0.011 ± 0.009	< 0.006	0.005 ± 0.008	< 0.011	0.000 ± 0.009	< 0.014	0.13
Fe-59	0.026 ± 0.020	< 0.037	0.005 ± 0.015	< 0.029	0.014 ± 0.016	< 0.034	0.26
Co-58	-0.001 ± 0.006	< 0.011	-0.002 ± 0.008	< 0.007	0.008 ± 0.008	< 0.012	0.13
Co-60	-0.010 ± 0.010	< 0.012	-0.005 ± 0.010	< 0.012	0.014 ± 0.007	< 0.005	0.13
Zn-65	-0.033 ± 0.021	< 0.009	-0.025 ± 0.024	< 0.009	0.043 ± 0.019	< 0.022	0.26
Cs-134	0.006 ± 0.009	< 0.016	0.008 ± 0.006	< 0.006	-0.008 ± 0.009	< 0.006	0.13
Cs-137	0.036 ± 0.019	< 0.010	0.032 ± 0.016	< 0.013	0.012 ± 0.012	< 0.015	0.15
Other (Ru-103)	0.014 ± 0.008	< 0.034	0.013 ± 0.007	< 0.015	0.005 ± 0.009	< 0.026	0.5
Collection Date	04-25-13		06-16-13		06-20-13		
Lab Code	EF- 2232		EF- 3776		EF- 3778		
Type	Whitefish		Salmon		Brown Trout		
Ratio (wet/dry wt.)	3.56		4.22		8.10		
Gross Beta	3.62 ± 0.08	< 0.027	4.52 ± 0.09	< 0.028	2.58 ± 0.06	< 0.021	0.5
K-40	2.75 ± 0.37	-	3.40 ± 0.41	-	2.31 ± 0.38	-	
Mn-54	0.006 ± 0.008	< 0.013	0.004 ± 0.008	< 0.017	0.008 ± 0.008	< 0.017	0.13
Fe-59	-0.008 ± 0.016	< 0.038	0.010 ± 0.014	< 0.054	-0.014 ± 0.016	< 0.037	0.26
Co-58	0.000 ± 0.008	< 0.009	-0.008 ± 0.008	< 0.013	-0.008 ± 0.008	< 0.015	0.13
Co-60	-0.012 ± 0.012	< 0.007	0.001 ± 0.008	< 0.005	-0.001 ± 0.011	< 0.012	0.13
Zn-65	-0.007 ± 0.023	< 0.022	-0.005 ± 0.018	< 0.030	0.001 ± 0.019	< 0.031	0.26
Cs-134	0.000 ± 0.008	< 0.007	0.003 ± 0.007	< 0.014	0.003 ± 0.008	< 0.015	0.13
Cs-137	0.009 ± 0.012	< 0.018	0.039 ± 0.015	< 0.015	0.013 ± 0.011	< 0.019	0.15
Other (Ru-103)	-0.026 ± 0.008	< 0.016	-0.009 ± 0.006	< 0.016	-0.005 ± 0.008	< 0.023	0.5

Table 7. Fish, analyses for gross beta and gamma emitting isotopes.
Location: E-13
Collection: 2x / year Units: pCi/g wet

	Sample Description and Concentration (pCi/g wet)	MDC		MDC		MDC	Req. LLD
Collection Date	07-22-13		07-09-13		09-09-13		
Lab Code	EF- 4565		EF- 4566		EF- 6274		
Type	Salmon		Perch		Perch		
Ratio (wet/dry wt.)	3.53		5.52		4.76		
Gross Beta	4.45 ± 0.09	< 0.030	2.41 ± 0.06	< 0.022	3.44 ± 0.07		0.5
K-40	3.22 ± 0.39	-	2.85 ± 0.80	-	2.56 ± 0.76	-	
Mn-54	0.002 ± 0.008	< 0.014	-0.002 ± 0.027	< 0.049	-0.016 ± 0.019	< 0.026	0.13
Fe-59	-0.012 ± 0.016	< 0.025	-0.015 ± 0.041	< 0.100	0.031 ± 0.044	< 0.135	0.26
Co-58	-0.013 ± 0.008	< 0.011	-0.032 ± 0.026	< 0.051	-0.008 ± 0.021	< 0.047	0.13
Co-60	0.003 ± 0.010	< 0.013	0.002 ± 0.024	< 0.031	-0.006 ± 0.021	< 0.028	0.13
Zn-65	-0.028 ± 0.017	< 0.031	-0.073 ± 0.057	< 0.101	-0.120 ± 0.056	< 0.075	0.26
Cs-134	-0.002 ± 0.008	< 0.014	-0.005 ± 0.030	< 0.061	-0.003 ± 0.022	< 0.042	0.13
Cs-137	0.009 ± 0.011	< 0.014	0.111 ± 0.054	< 0.061	0.029 ± 0.027	< 0.052	0.15
Other (Ru-103)	-0.014 ± 0.007	< 0.017	-0.004 ± 0.025	< 0.110	-0.006 ± 0.022	< 0.087	0.5
Collection Date	10-01-13		10-14-13		10-28-13		
Lab Code	EF- 6275		EF- 6276		EF- 6830		
Type	Lake Trout		Lake Trout		Salmom		
Ratio (wet/dry wt.)	3.53		4.36		4.79		
Gross Beta	3.00 ± 0.06	< 0.021	3.92 ± 0.08	< 0.025	4.25 ± 0.08	< 0.023	0.5
K-40	2.64 ± 0.35	-	3.04 ± 0.44	-	3.68 ± 0.39	-	
Mn-54	0.004 ± 0.009	< 0.013	-0.002 ± 0.010	< 0.013	0.003 ± 0.007	< 0.015	0.13
Fe-59	0.007 ± 0.019	< 0.039	-0.040 ± 0.024	< 0.031	0.001 ± 0.016	< 0.026	0.26
Co-58	-0.005 ± 0.008	< 0.013	-0.001 ± 0.010	< 0.018	0.010 ± 0.008	< 0.017	0.13
Co-60	-0.006 ± 0.011	< 0.011	0.005 ± 0.012	< 0.019	0.001 ± 0.007	< 0.006	0.13
Zn-65	0.002 ± 0.020	< 0.019	-0.004 ± 0.023	< 0.027	0.005 ± 0.017	< 0.019	0.26
Cs-134	0.000 ± 0.009	< 0.017	-0.002 ± 0.009	< 0.017	-0.001 ± 0.008	< 0.015	0.13
Cs-137	0.027 ± 0.011	< 0.018	0.016 ± 0.014	< 0.025	0.038 ± 0.020	< 0.019	0.15
Other (Ru-103)	-0.006 ± 0.009	< 0.019	0.001 ± 0.010	< 0.014	0.000 ± 0.006	< 0.010	0.5

Table 7. Fish, analyses for gross beta and gamma emitting isotopes.
Location: E-13
Collection: 2x / year Units: pCi/g wet

	Sample Description and Concentration (pCi/g wet)	**MDC**		**MDC**		**MDC**	Req. LLD
Collection Date	10-28-13		10-28-13				
Lab Code	EF- 6831		EF- 6832				
Type	Whitefish		Lake Trout				
Ratio (wet/dry wt.)	2.63		3.64				
Gross Beta	3.56 ± 0.07	< 0.024	3.86 ± 0.08	< 0.025			0.5
K-40	3.18 ± 0.42	-	2.44 ± 0.32	-			
Mn-54	0.002 ± 0.009	< 0.015	0.011 ± 0.009	< 0.016			0.13
Fe-59	-0.002 ± 0.015	< 0.029	-0.012 ± 0.015	< 0.033			0.26
Co-58	-0.002 ± 0.009	< 0.014	0.003 ± 0.007	< 0.014			0.13
Co-60	0.007 ± 0.009	< 0.013	0.007 ± 0.009	< 0.014			0.13
Zn-65	0.006 ± 0.019	< 0.016	0.007 ± 0.016	< 0.028			0.26
Cs-134	0.000 ± 0.008	< 0.014	0.006 ± 0.008	< 0.015			0.13
Cs-137	0.010 ± 0.010	< 0.020	0.013 ± 0.010	< 0.015			0.15
Other (Ru-103)	-0.004 ± 0.007	< 0.016	-0.006 ± 0.007	< 0.016			0.5

Annual
Mean ± s.d.
3.51 ± 0.66
2.89 ± 0.38
0.001 ± 0.007
-0.001 ± 0.018
-0.004 ± 0.010
0.000 ± 0.007
-0.016 ± 0.040
0.000 ± 0.005
0.028 ± 0.026
-0.003 ± 0.010

Table 8. Radioactivity in shoreline sediment samples

Collection: Semiannual

Sample Description and Concentration (pCi/g dry)

		MDC		MDC		MDC	
Collection Date	4/9/2013		4/9/2013		4/9/2013		
Lab Code	ESS- 1645		ESS- 1646		ESS- 1647		LLD
Location	E-01		E-05		E-06		
Gross Beta	12.38 ± 0.90	< 1.00	10.83 ± 0.86	< 0.97	12.12 ± 0.90	< 1.01	2.0
Be-7	0.064 ± 0.048	< 0.13	0.13 ± 0.050	< 0.14	0.093 ± 0.048	< 0.14	
K-40	2.90 ± 0.54	-	5.17 ± 0.74	-	8.00 ± 0.45	-	-
Cs-134	-0.002 ± 0.006	< 0.010	0.001 ± 0.005	< 0.011	-0.005 ± 0.007	< 0.010	0.15
Cs-137	0.032 ± 0.016	< 0.012	0.010 ± 0.007	< 0.011	0.029 ± 0.013	< 0.010	0.15
Tl-208	0.040 ± 0.012	-	0.032 ± 0.014	-	0.032 ± 0.017	-	-
Pb-212	0.12 ± 0.023	-	0.12 ± 0.026	-	0.15 ± 0.051	-	-
Bi-214	0.082 ± 0.026	-	0.077 ± 0.025	-	0.11 ± 0.024	-	-
Ra-226	0.19 ± 0.14	< 0.26	0.45 ± 0.13	< 0.26	0.36 ± 0.14	< 0.26	-
Ac-228	0.18 ± 0.059	-	0.16 ± 0.061	-	0.19 ± 0.054	-	-
Collection Date	4/9/2013		4/9/2013				
Lab Code	ESS- 1648		ESS- 1649				
Location	E-12		E-33				
Gross Beta	8.67 ± 0.81	< 0.95	11.38 ± 0.93	< 1.06			2.0
Be-7	0.074 ± 0.051	< 0.13	0.088 ± 0.056	< 0.13			
K-40	5.93 ± 0.38	-	7.86 ± 0.46	-			-
Cs-134	-0.008 ± 0.005	< 0.006	0.002 ± 0.006	< 0.008			0.15
Cs-137	0.027 ± 0.013	< 0.010	0.031 ± 0.015	< 0.013			0.15
Tl-208	0.043 ± 0.017	-	0.034 ± 0.016	-			-
Pb-212	0.15 ± 0.049	-	0.12 ± 0.041	< 0.090			-
Bi-214	0.10 ± 0.024	-	0.075 ± 0.024	-			-
Ra-226	0.38 ± 0.14	< 0.25	0.29 ± 0.16	-			-
Ac-228	0.15 ± 0.047	-	0.15 ± 0.057	-			-

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN SHORELINE SEDIMENT SAMPLES

(Semiannual Collections)

Sample Description and Concentration (pCi/g dry)

		MDC		MDC		MDC	
Collection Date	10/16/2013		10/17/2013		10/17/2013		Req.
Lab Code	ESS- 6461		ESS- 6462		ESS- 6463		LLD
Location	E-01		E-05		E-06		
Gross Beta	11.56 ± 1.01	< 1.20	10.08 ± 0.96	< 1.17	10.02 ± 0.92	< 1.10	2.0
Be-7	0.058 ± 0.053	< 0.12	-0.032 ± 0.050	< 0.09	0.042 ± 0.061	< 0.16	
K-40	8.26 ± 0.50	-	8.80 ± 0.50	-	6.95 ± 0.45	-	-
Cs-134	-0.005 ± 0.006	< 0.010	-0.004 ± 0.007	< 0.011	-0.003 ± 0.007	< 0.011	0.15
Cs-137	0.009 ± 0.009	< 0.013	0.006 ± 0.009	< 0.010	0.009 ± 0.009	< 0.017	0.15
Tl-208	0.054 ± 0.017	-	0.033 ± 0.016	-	0.038 ± 0.016	-	-
Pb-212	0.12 ± 0.045	-	0.15 ± 0.030	-	0.094 ± 0.019	-	-
Bi-214	0.13 ± 0.026	-	0.12 ± 0.026	-	0.086 ± 0.025	-	-
Ra-226	0.39 ± 0.18	-	0.49 ± 0.16	< 0.28	0.34 ± 0.18	-	-
Ac-228	0.21 ± 0.059	-	0.22 ± 0.055	-	0.15 ± 0.061	-	-

Collection Date	10/17/2013		10/17/2013			
Lab Code	ESS- 6464		ESS- 6465			**Annual**
Location	E-12		E-33			**Mean ±s.d.**
Gross Beta	9.31 ± 0.97	< 1.20	9.28 ± 0.91	< 1.08	2.0	**10.56 ± 1.28**
Be-7	0.005 ± 0.045	< 0.11	0.092 ± 0.053	< 0.12		**0.061 ± 0.046**
K-40	6.03 ± 0.39	-	5.89 ± 0.39	-	-	**6.58 ± 1.77**
Cs-134	0.001 ± 0.006	< 0.009	0.003 ± 0.005	< 0.010	0.15	**0.00 ± 0.00**
Cs-137	0.017 ± 0.008	< 0.013	0.030 ± 0.015	< 0.012	0.15	**0.020 ± 0.011**
Tl-208	0.041 ± 0.015	-	0.032 ± 0.016	-	-	**0.04 ± 0.01**
Pb-212	0.12 ± 0.050	-	0.15 ± 0.059	-	-	**0.13 ± 0.02**
Bi-214	0.10 ± 0.024	-	0.082 ± 0.022	-	-	**0.10 ± 0.02**
Ra-226	0.33 ± 0.13	< 0.24	0.32 ± 0.13	< 0.25	-	**0.35 ± 0.08**
Ac-228	0.12 ± 0.044	-	0.13 ± 0.047	-	-	**0.17 ± 0.03**

POINT BEACH NUCLEAR PLANT

Table 9. Radioactivity in soil samples

Collection: Semiannual

Sample Description and Concentration (pCi/g dry)

		MDC		MDC		MDC	
Collection Date	6/5/2013		6/5/2013		6/5/2013		Req.
Lab Code	ESO- 3041		ESO- 3042		ESO- 3043		LLD
Location	E-01		E-02		E-03		
Gross Beta	20.15 ± 1.13	< 1.18	16.49 ± 1.02	< 1.07	19.63 ± 1.11	< 1.15	2.0
Be-7	0.13 ± 0.072	< 0.29	0.19 ± 0.078	< 0.31	0.066 ± 0.091	< 0.35	
K-40	10.70 ± 0.65	-	12.06 ± 0.69	-	10.94 ± 0.83	-	-
Cs-134	-0.006 ± 0.008	< 0.014	-0.008 ± 0.010	< 0.016	-0.019 ± 0.012	< 0.019	0.15
Cs-137	0.075 ± 0.021	< 0.021	0.021 ± 0.014	< 0.022	0.048 ± 0.025	< 0.025	0.15
Tl-208	0.10 ± 0.028	-	0.13 ± 0.031	-	0.065 ± 0.028	-	-
Pb-212	0.24 ± 0.034	-	0.33 ± 0.033	-	0.20 ± 0.027	-	-
Bi-214	0.28 ± 0.043	-	0.35 ± 0.044	-	0.18 ± 0.040	-	-
Ra-226	0.62 ± 0.21	< 0.44	0.68 ± 0.28	-	0.40 ± 0.23	-	-
Ac-228	0.34 ± 0.10	-	0.39 ± 0.074	-	0.42 ± 0.14	-	-
Collection Date	6/5/2013		6/5/2013		6/5/2013		
Lab Code	ESO- 3044		ESO- 3045		ESO- 3046		
Location	E-04		E-06		E-08		
Gross Beta	21.77 ± 1.08	< 1.02	19.56 ± 1.11	< 1.16	20.45 ± 1.13	< 1.17	2.0
Be-7	0.084 ± 0.084	< 0.27	0.14 ± 0.079	< 0.25	0.033 ± 0.083	< 0.33	
K-40	14.08 ± 0.70	-	10.46 ± 0.59	-	12.12 ± 0.69	-	-
Cs-134	0.000 ± 0.010	< 0.017	0.001 ± 0.010	< 0.018	-0.007 ± 0.010	< 0.017	0.15
Cs-137	0.089 ± 0.023	< 0.021	0.088 ± 0.031	< 0.027	0.14 ± 0.032	< 0.028	0.15
Tl-208	0.16 ± 0.028	-	0.12 ± 0.027	-	0.14 ± 0.030	-	-
Pb-212	0.30 ± 0.037	-	0.31 ± 0.030	-	0.32 ± 0.033	-	-
Bi-214	0.33 ± 0.043	-	0.27 ± 0.038	-	0.31 ± 0.046	-	-
Ra-226	0.79 ± 0.29	-	0.55 ± 0.27	-	0.81 ± 0.30	-	-
Ac-228	0.47 ± 0.091	-	0.41 ± 0.094	-	0.39 ± 0.076	-	-
Collection Date	6/5/2013		6/5/2013				
Lab Code	ESO- 3047		ESO- 3048				
Location	E-09		E-20				
Gross Beta	29.39 ± 1.22	< 1.09	25.11 ± 1.20	< 1.17			2.0
Be-7	0.12 ± 0.085	< 0.30	0.78 ± 0.32	-			
K-40	17.59 ± 0.82	-	14.08 ± 0.72	-			-
Cs-134	-0.002 ± 0.009	< 0.016	0.002 ± 0.009	< 0.016			0.15
Cs-137	0.11 ± 0.023	< 0.022	0.14 ± 0.029	< 0.024			0.15
Tl-208	0.14 ± 0.031	-	0.13 ± 0.028	-			-
Pb-212	0.43 ± 0.034	-	0.34 ± 0.037	-			-
Bi-214	0.42 ± 0.060	-	0.28 ± 0.049	-			-
Ra-226	1.23 ± 0.27	-	0.87 ± 0.27	-			-
Ac-228	0.58 ± 0.10	-	0.42 ± 0.075	-			-

Table 9. Radioactivity in soil samples

Collection: Semiannual

	Sample Description and Concentration (pCi/g dry)						
		MDC		MDC		MDC	
Collection Date	10/30/2013		10/30/2013		10/30/2013		Req.
Lab Code	ESO- 6742		ESO- 6743		ESO- 6744		LLD
Location	E-01		E-02		E-03		
Gross Beta	16.25 ± 1.06	< 1.16	23.82 ± 1.20	< 1.20	27.40 ± 1.14	< 1.06	2.0
Be-7	-0.020 ± 0.086	< 0.16	-0.024 ± 0.094	< 0.13	0.004 ± 0.10	< 0.17	
K-40	8.31 ± 0.59	-	14.40 ± 0.80	-	14.93 ± 0.88	-	-
Cs-134	-0.006 ± 0.010	< 0.016	-0.001 ± 0.011	< 0.019	-0.010 ± 0.013	< 0.022	0.15
Cs-137	0.028 ± 0.013	< 0.024	0.088 ± 0.032	< 0.023	0.21 ± 0.038	< 0.033	0.15
Tl-208	0.091 ± 0.030	-	0.13 ± 0.028	-	0.16 ± 0.041	-	-
Pb-212	0.20 ± 0.028	-	0.39 ± 0.050	-	0.43 ± 0.041	-	-
Bi-214	0.19 ± 0.039	-	0.33 ± 0.051	-	0.48 ± 0.061	-	-
Ra-226	0.58 ± 0.27	-	0.94 ± 0.29	-	1.47 ± 0.35	-	-
Ac-228	0.32 ± 0.10	-	0.45 ± 0.096	-	0.46 ± 0.11	-	-
Collection Date	10/30/2013		10/31/2013		10/30/2013		
Lab Code	ESO- 6746		ESO- 6747		ESO- 6748		
Location	E-04		E-06		E-08		
Gross Beta	23.29 ± 1.18	< 1.19	16.91 ± 1.05	< 1.11	20.27 ± 1.15	< 1.21	2.0
Be-7	0.024 ± 0.086	< 0.17	0.33 ± 0.18	-	0.047 ± 0.079	< 0.16	
K-40	15.20 ± 0.76	-	10.40 ± 0.58	-	13.06 ± 0.73	-	-
Cs-134	-0.002 ± 0.010	< 0.016	0.003 ± 0.008	< 0.012	-0.007 ± 0.009	< 0.015	0.15
Cs-137	0.10 ± 0.025	< 0.020	0.073 ± 0.020	< 0.016	0.24 ± 0.032	< 0.019	0.15
Tl-208	0.16 ± 0.035	-	0.11 ± 0.021	-	0.10 ± 0.026	-	-
Pb-212	0.38 ± 0.035	-	0.31 ± 0.030	-	0.25 ± 0.035	-	-
Bi-214	0.26 ± 0.044	-	0.27 ± 0.037	-	0.20 ± 0.042	-	-
Ra-226	0.77 ± 0.28	-	0.52 ± 0.23	-	0.52 ± 0.26	-	-
Ac-228	0.48 ± 0.14	-	0.39 ± 0.087	-	0.33 ± 0.092	-	-
Collection Date	10/31/2013		10/30/2013				
Lab Code	ESO- 6749		ESO- 6750		**Annual**		
Location	E-09		E-20		**Mean ± s.d.**		
Gross Beta	29.65 ± 1.19	< 1.04	31.17 ± 1.27	< 1.14	**22.58 ± 4.80**		2.0
Be-7	0.079 ± 0.093	< 0.23	0.086 ± 0.13	< 0.28	**0.129 ± 0.20**		
K-40	17.48 ± 0.81	-	18.29 ± 0.97	-	**13.38 ± 2.90**		-
Cs-134	0.001 ± 0.010	< 0.021	0.003 ± 0.014	< 0.025	**0.002 ± 0.02**		0.15
Cs-137	0.11 ± 0.032	< 0.023	0.090 ± 0.039	< 0.037	**0.10 ± 0.06**		0.15
Tl-208	0.17 ± 0.033	-	0.24 ± 0.040	-	**0.13 ± 0.04**		-
Pb-212	0.52 ± 0.10	-	0.55 ± 0.045	-	**0.34 ± 0.10**		-
Bi-214	0.36 ± 0.047	-	0.38 ± 0.061	-	**0.31 ± 0.08**		-
Ra-226	0.94 ± 0.30	-	1.00 ± 0.40	-	**0.79 ± 0.28**		-
Ac-228	0.66 ± 0.13	-	0.74 ± 0.11	-	**0.45 ± 0.12**		-

Table 10. Radioactivity in vegetation samples
Collection: Tri-annual

Sample Description and Concentration (pCi/g wet)

		MDC		MDC		MDC	
Location	E-01		E-02		E-03		
Collection Date	6/5/2013		6/5/2013		6/5/2013		
Lab Code	EG- 3104		EG- 3105		EG- 2978		Req. LLD
Ratio (wet/dry)	6.16		6.22		6.84		-
Gross Beta	3.89 ± 0.08	< 0.025	6.00 ± 0.11	< 0.031	5.57 ± 0.11	< 0.036	0.25
Be-7	1.60 ± 0.18	-	0.83 ± 0.14	-	0.88 ± 0.14	± 0.14	-
K-40	4.80 ± 0.38	-	6.04 ± 0.36	-	5.59 ± 0.37	-	-
I-131	0.010 ± 0.007	< 0.028	0.012 ± 0.005	< 0.019	0.002 ± 0.006	< 0.018	0.060
Cs-134	0.004 ± 0.006	< 0.012	0.003 ± 0.005	< 0.009	0.000 ± 0.005	< 0.008	0.060
Cs-137	0.004 ± 0.007	< 0.013	0.004 ± 0.006	< 0.011	0.002 ± 0.007	< 0.009	0.080
Other (Co-60)	-0.002 ± 0.006	< 0.009	-0.001 ± 0.007	< 0.010	0.001 ± 0.007	< 0.011	0.060
Location	E-04		E-06		E-08		
Collection Date	6/5/2013		6/5/2013		6/5/2013		
Lab Code	EG- 2979		EG- 3106		EG- 3107		Req. LLD
Ratio (wet/dry)	5.67		4.71		5.85		-
Gross Beta	5.37 ± 0.11	< 0.034	4.44 ± 0.09	< 0.028	3.57 ± 0.08	< 0.026	0.25
Be-7	0.60 ± 0.14	-	2.02 ± 0.23	-	1.40 ± 0.20	-	-
K-40	4.72 ± 0.36	-	5.43 ± 0.49	-	4.35 ± 0.37	-	-
I-131	0.004 ± 0.006	< 0.020	0.008 ± 0.008	< 0.027	0.004 ± 0.006	< 0.021	0.060
Cs-134	0.003 ± 0.005	< 0.010	0.001 ± 0.007	< 0.013	0.000 ± 0.006	< 0.012	0.060
Cs-137	-0.003 ± 0.007	< 0.010	0.009 ± 0.010	< 0.017	0.001 ± 0.007	< 0.007	0.080
Other (Co-60)	0.000 ± 0.008	< 0.013	0.006 ± 0.009	< 0.012	-0.005 ± 0.007	< 0.008	0.060
Location	E-09		E-20				
Collection Date	6/5/2013		6/5/2013				
Lab Code	EG- 3108		EG- 3109				Req. LLD
Ratio (wet/dry)	4.93		5.26				-
Gross Beta	5.57 ± 0.16	< 0.053	5.10 ± 0.15	< 0.050			0.25
Be-7	0.72 ± 0.16	-	0.97 ± 0.16	-			-
K-40	5.60 ± 0.44	-	4.79 ± 0.41	-			-
I-131	-0.022 ± 0.009	< 0.027	0.003 ± 0.007	< 0.025			0.060
Cs-134	0.004 ± 0.007	< 0.012	0.002 ± 0.006	< 0.012			0.060
Cs-137	-0.002 ± 0.008	< 0.009	0.004 ± 0.008	< 0.017			0.080
Other (Co-60)	0.004 ± 0.008	< 0.011	-0.001 ± 0.007	< 0.007			0.060

Table 10. Radioactivity in vegetation samples
Collection: Tri-annual

Sample Description and Concentration (pCi/g wet)

		MDC		MDC		MDC	
Location	E-01		E-02		E-03		
Collection Date	08-01-13		08-01-13		08-01-13		
Lab Code	EG- 4454		EG- 4455		EG- 4456		Req. LLD
Ratio (wet/dry)	4.63		3.92		3.71		-
Gross Beta	6.35 ± 0.14	< 0.054	7.36 ± 0.16	< 0.056	9.32 ± 0.22	< 0.082	0.25
Be-7	1.09 ± 0.20	-	1.12 ± 0.19	-	1.16 ± 0.20	-	-
K-40	5.27 ± 0.43	-	6.02 ± 0.50	-	7.21 ± 0.52	-	-
I-131	-0.003 ± 0.007	< 0.021	0.007 ± 0.008	< 0.023	-0.013 ± 0.011	< 0.028	0.060
Cs-134	-0.002 ± 0.006	< 0.009	0.003 ± 0.006	< 0.013	-0.008 ± 0.008	< 0.012	0.060
Cs-137	-0.006 ± 0.008	< 0.009	0.003 ± 0.008	< 0.014	0.010 ± 0.009	< 0.016	0.080
Other (Co-60)	0.002 ± 0.007	< 0.010	0.001 ± 0.009	< 0.009	0.002 ± 0.009	< 0.007	0.060
Location	E-04		E-06		E-08		
Collection Date	08-01-13		08-01-13		08-01-13		
Lab Code	EG- 4457		EG- 4459		EG- 4460		Req. LLD
Ratio (wet/dry)	4.29		3.00		7.08		-
Gross Beta	6.15 ± 0.14	< 0.046	4.39 ± 0.10	< 0.037	2.69 ± 0.06	< 0.023	0.25
Be-7	0.78 ± 0.19	-	0.62 ± 0.19	-	1.14 ± 0.21	-	-
K-40	4.25 ± 0.36	-	3.33 ± 0.38	-	4.22 ± 0.37	-	-
I-131	-0.006 ± 0.008	< 0.027	0.001 ± 0.009	< 0.034	-0.005 ± 0.006	< 0.019	0.060
Cs-134	0.001 ± 0.006	< 0.012	0.001 ± 0.009	< 0.014	0.003 ± 0.005	< 0.009	0.060
Cs-137	-0.002 ± 0.008	< 0.011	0.008 ± 0.009	< 0.014	-0.004 ± 0.008	< 0.009	0.080
Other (Co-60)	0.003 ± 0.006	< 0.009	-0.007 ± 0.008	< 0.004	-0.005 ± 0.009	< 0.012	0.060
Location	E-09		E-20				
Collection Date	08-01-13		08-01-13				
Lab Code	EG- 4461		EG- 4462				Req. LLD
Ratio (wet/dry)	6.22		4.58				-
Gross Beta	3.61 ± 0.09	< 0.033	8.49 ± 0.19	< 0.071			0.25
Be-7	0.71 ± 0.17	-	0.55 ± 0.15	-			-
K-40	5.45 ± 0.49	-	7.14 ± 0.44	-			-
I-131	0.019 ± 0.009	< 0.038	-0.004 ± 0.007	< 0.027			0.060
Cs-134	0.006 ± 0.009	< 0.016	0.000 ± 0.006	< 0.011			0.060
Cs-137	0.000 ± 0.011	< 0.017	0.006 ± 0.007	< 0.012			0.080
Other (Co-60)	0.006 ± 0.009	< 0.013	0.000 ± 0.008	< 0.013			0.060

Table 10. Radioactivity in vegetation samples
Collection: Tri-annual

Sample Description and Concentration (pCi/g wet)

		MDC		MDC		MDC	
Location	E-01		E-02		E-03		
Collection Date	9/25/2013		9/25/2013		9/25/2013		
Lab Code	EG- 5671		EG- 5672		EG- 5673		Req. LLD
Ratio (wet/dry)	3.35		2.90		4.34		-
Gross Beta	3.89 ± 0.11	< 0.053	6.44 ± 0.17	< 0.068	6.63 ± 0.14	< 0.050	0.25
Be-7	2.19 ± 0.30	-	2.84 ± 0.30	-	1.45 ± 0.22	-	-
K-40	3.33 ± 0.39	-	5.78 ± 0.52	-	5.92 ± 0.52	-	-
I-131	-0.007 ± 0.009	< 0.027	0.012 ± 0.013	< 0.029	0.002 ± 0.010	< 0.027	0.060
Cs-134	0.001 ± 0.008	< 0.012	0.012 ± 0.011	< 0.019	-0.007 ± 0.010	< 0.014	0.060
Cs-137	0.006 ± 0.011	< 0.020	-0.002 ± 0.012	< 0.018	-0.001 ± 0.011	< 0.017	0.080
Other (Co-60)	0.003 ± 0.010	< 0.013	0.005 ± 0.010	< 0.014	-0.001 ± 0.010	< 0.012	0.060
Location	E-04		E-06		E-08		
Collection Date	9/25/2013		9/25/2013		9/25/2013		
Lab Code	EG- 5674		EG- 5675		EG- 5676		Req. LLD
Ratio (wet/dry)	2.76		2.52		2.14		-
Gross Beta	7.43 ± 0.19	< 0.074	4.56 ± 0.16	< 0.081	3.58 ± 0.13	< 0.076	0.25
Be-7	2.95 ± 0.34	-	1.49 ± 0.28	-	4.27 ± 0.30	-	-
K-40	7.21 ± 0.61	-	3.80 ± 0.43	-	2.93 ± 0.37	-	-
I-131	0.014 ± 0.010	< 0.038	-0.011 ± 0.009	< 0.030	0.002 ± 0.009	< 0.030	0.060
Cs-134	0.004 ± 0.010	< 0.018	0.007 ± 0.008	< 0.013	-0.007 ± 0.010	< 0.014	0.060
Cs-137	-0.002 ± 0.013	< 0.019	0.056 ± 0.025	< 0.024	0.015 ± 0.009	< 0.018	0.080
Other (Co-60)	-0.014 ± 0.015	< 0.016	0.002 ± 0.011	< 0.018	0.004 ± 0.008	< 0.008	0.060
Location	E-09		E-20				
Collection Date	9/25/2013		9/25/2013				
Lab Code	EG- 5677		EG- 5678				Req. LLD
Ratio (wet/dry)	1.99		5.09				-
Gross Beta	6.02 ± 0.21	< 0.115	6.92 ± 0.16	< 0.062			0.25
Be-7	2.54 ± 0.29	-	1.40 ± 0.24	-			-
K-40	4.38 ± 0.46	-	6.00 ± 0.48	-			-
I-131	0.004 ± 0.010	< 0.030	0.006 ± 0.009	< 0.034			0.060
Cs-134	-0.004 ± 0.009	< 0.015	0.000 ± 0.007	< 0.012			0.060
Cs-137	0.002 ± 0.012	< 0.018	-0.001 ± 0.011	< 0.015			0.080
Other (Co-60)	0.006 ± 0.009	< 0.014	-0.001 ± 0.009	< 0.017			0.060

Beta Annual Mean ± s.d. 5.56 ± 1.67
Be-7 Annual Mean ± s.d. 1.47 ± 0.92
K-40 Annual Mean ± s.d. 5.15 ± 1.20
I-131 Annual Mean ± s.d. 0.002 ± 0.009
Cs-134 Annual Mean ± s.d. 0.001 ± 0.005
Cs-137 Annual Mean ± s.d. 0.004 ± 0.012
Co-60 Annual Mean ± s.d. -0.001 ± 0.005

Table 11. Aquatic Vegetation, analyses for gross beta and gamma emitting isotopes.

Collection: Triannual
Units: pCi/g wet

Sample Description and Concentration

Collection Date	06-05-13	**MDC**	06-05-13	**MDC**	Req.	
Lab Code	ESL- 3054		ND[a]		LLD	
Location	E-05		E-12			
Ratio (wet wt./dry wt.)	4.31					
Gross Beta	3.97 ± 0.19	< 0.18			0.25	
Be-7	0.57 ± 0.06	-			-	
K-40	2.99 ± 0.09	-			-	
Co-58	0.000 ± 0.001	< 0.004			0.25	
Co-60	0.004 ± 0.002	< 0.004			0.25	
Cs-134	0.000 ± 0.001	< 0.002			0.25	
Cs-137	0.003 ± 0.002	< 0.004			0.25	
Collection Date	08-07-13		08-07-13		Req.	
Lab Code	ESL- 4567		ESL- 4568		LLD	
Location	E-05		E-12			
Ratio (wet wt./dry wt.)	4.49		4.54			
Gross Beta	3.87 ± 0.18	< 0.18	3.61 ± 0.20	< 0.20	0.25	
Be-7	1.54 ± 0.21	-	0.67 ± 0.15	-	-	
K-40	2.95 ± 0.26	-	3.46 ± 0.26	-	-	
Co-58	0.003 ± 0.005	< 0.012	-0.006 ± 0.004	< 0.010	0.25	
Co-60	0.013 ± 0.007	< 0.009	0.008 ± 0.006	< 0.010	0.25	
Cs-134	-0.003 ± 0.005	< 0.009	0.004 ± 0.005	< 0.007	0.25	
Cs-137	0.028 ± 0.012	< 0.011	0.010 ± 0.005	< 0.009	0.25	
Collection Date	10-10-13		10-10-13		Req.	
Lab Code	ESL- 6144		ESL- 6145		LLD	**Annual**
Location	E-05		E-12			**Mean ± s.d.**
Ratio (wet wt./dry wt.)	6.19		5.91			
Gross Beta	3.22 ± 0.10	< 0.08	2.71 ± 0.08	< 0.07	0.25	**3.48 ± 0.52**
Be-7	1.42 ± 0.09	-	0.59 ± 0.06	-	-	**0.96 ± 0.48**
K-40	2.51 ± 0.10	-	3.78 ± 0.11	-	-	**3.14 ± 0.49**
Co-58	0.001 ± 0.002	< 0.004	-0.002 ± 0.002	< 0.005	0.25	**-0.001 ± 0.003**
Co-60	0.002 ± 0.002	< 0.005	0.002 ± 0.002	< 0.004	0.25	**0.006 ± 0.005**
Cs-134	0.001 ± 0.002	< 0.003	-0.001 ± 0.002	< 0.003	0.25	**0.000 ± 0.003**
Cs-137	0.015 ± 0.005	< 0.005	0.010 ± 0.003	< 0.004	0.25	**0.013 ± 0.009**

[a] "ND" = No data; see Table 2.0, Listing of Missed Samples.

POINT BEACH NUCLEAR PLANT

Table 12. Ambient Gamma Radiation [a]
LLD/7days: < 1mR/TLD

1st. Quarter, 2013

Date Annealed:	12-13-12	Days in the field	90
Date Placed:	01-03-13	Days from Annealing	
Date Removed:	04-03-13	to Readout:	117
Date Read:	04-09-13		

Location	Days in Field	Total mR	Net mR	mR/Stnd Qtr (91 days)	Net mR per 7 days
Indicator					
E-1	90	13.1 ± 0.5	8.9 ± 0.6	13.3 ± 0.6	0.69 ± 0.05
E-2	90	21.0 ± 0.8	16.8 ± 0.9	21.2 ± 0.8	1.31 ± 0.07
E-3	90	18.2 ± 1.5	14.0 ± 1.5	18.4 ± 1.5	1.09 ± 0.12
E-4	90	17.3 ± 1.7	13.1 ± 1.7	17.5 ± 1.8	1.02 ± 0.14
E-5	90	18.1 ± 1.2	13.9 ± 1.3	18.3 ± 1.2	1.08 ± 0.10
E-6	90	15.3 ± 0.4	11.1 ± 0.6	15.5 ± 0.4	0.86 ± 0.04
E-7	90	16.1 ± 0.9	11.9 ± 1.0	16.3 ± 0.9	0.93 ± 0.08
E-8	90	13.9 ± 0.6	9.7 ± 0.7	14.1 ± 0.6	0.75 ± 0.06
E-9	90	18.3 ± 0.2	14.1 ± 0.4	18.5 ± 0.2	1.10 ± 0.03
E-12	90	16.8 ± 0.6	12.6 ± 0.7	17.0 ± 0.6	0.98 ± 0.06
E-14	90	17.9 ± 0.5	13.7 ± 0.6	18.1 ± 0.5	1.07 ± 0.05
E-15	90	18.0 ± 0.1	13.8 ± 0.4	18.2 ± 0.1	1.07 ± 0.03
E-16	90	18.2 ± 0.5	14.0 ± 0.6	18.4 ± 0.6	1.09 ± 0.05
E-17	90	17.6 ± 0.8	13.4 ± 0.9	17.8 ± 0.8	1.04 ± 0.07
E-18	90	16.5 ± 0.8	12.3 ± 0.9	16.7 ± 0.8	0.96 ± 0.07
E-22	90	16.8 ± 1.2	12.6 ± 1.3	17.0 ± 1.2	0.98 ± 0.10
E-23	90	17.9 ± 0.4	13.7 ± 0.6	18.1 ± 0.4	1.07 ± 0.04
E-24	90	16.3 ± 0.8	12.1 ± 0.9	16.5 ± 0.8	0.94 ± 0.07
E-25	90	16.9 ± 0.3	12.7 ± 0.5	17.1 ± 0.3	0.99 ± 0.04
E-26	90	15.6 ± 0.7	11.4 ± 0.8	15.8 ± 0.7	0.89 ± 0.06
E-27	90	18.8 ± 0.5	14.6 ± 0.6	19.0 ± 0.5	1.14 ± 0.05
E-28	90	14.2 ± 0.6	10.0 ± 0.7	14.4 ± 0.6	0.78 ± 0.06
E-29	90	13.3 ± 0.9	9.1 ± 1.0	13.4 ± 0.9	0.71 ± 0.08
E-30	90	15.1 ± 0.8	10.9 ± 0.9	15.3 ± 0.8	0.85 ± 0.07
E-31	90	19.3 ± 0.7	15.1 ± 0.8	19.5 ± 0.7	1.17 ± 0.06
E-32	90	19.3 ± 0.7	15.1 ± 0.8	19.5 ± 0.7	1.17 ± 0.06
E-38	90	17.6 ± 1.3	13.4 ± 1.4	17.8 ± 1.3	1.04 ± 0.11
E-39	90	17.5 ± 1.0	13.3 ± 1.1	17.7 ± 1.0	1.03 ± 0.08
E-41	90	16.6 ± 0.7	12.4 ± 0.8	16.8 ± 0.7	0.96 ± 0.06
E-42	90	19.5 ± 0.6	15.3 ± 0.7	19.7 ± 0.6	1.19 ± 0.06
E-43	90	16.2 ± 1.0	12.0 ± 1.1	16.4 ± 1.0	0.93 ± 0.08
Control					
E-20	90	20.3 ± 1.6	16.1 ± 1.6	20.5 ± 1.6	1.25 ± 0.13
Mean±s.d.		17.1 ± 1.9	12.9 ± 1.9	17.3 ± 1.9	1.00 ± 0.13

In-Transit Exposure	Date Annealed	Date Read	ITC-1	ITC-2
	12-13-12	01-08-13	4.7 ± 0.3	4.7 ± 0.2
	03-18-13	04-10-13	3.6 ± 0.1	3.8 ± 0.1

[a] The $CaSO_4$:Dy dosimeter cards provide four separate readout areas. Values listed represent the mean and standard deviation of the average of the four readings.

POINT BEACH NUCLEAR PLANT

Table 12. Ambient Gamma Radiation [a]
LLD/7days: < 1mR/TLD

2nd Quarter, 2013

Date Annealed:	03-18-13	Days in the field	85
Date Placed:	04-03-13	Days from Annealing	
Date Removed:	06-27-13	to Readout:	106
Date Read:	07-02-13		

Location	Days in Field	Total mR	Net mR	mR/Stnd Qtr (91 days)	Net mR per 7 days
Indicator					
E-1	85	16.6 ± 1.1	13.1 ± 1.2	17.7 ± 1.2	1.08 ± 0.10
E-2	85	18.9 ± 1.2	15.4 ± 1.3	20.2 ± 1.3	1.27 ± 0.10
E-3	85	18.0 ± 1.0	14.5 ± 1.1	19.3 ± 1.0	1.19 ± 0.09
E-4	85	16.8 ± 1.3	13.3 ± 1.4	18.0 ± 1.4	1.09 ± 0.11
E-5	85	16.5 ± 1.1	13.0 ± 1.2	17.7 ± 1.2	1.07 ± 0.10
E-6	85	14.9 ± 0.4	11.4 ± 0.6	15.9 ± 0.4	0.94 ± 0.05
E-7	85	15.7 ± 0.4	12.2 ± 0.6	16.8 ± 0.4	1.00 ± 0.05
E-8	85	14.7 ± 0.5	11.2 ± 0.6	15.8 ± 0.6	0.92 ± 0.05
E-9	85	17.6 ± 0.7	14.1 ± 0.8	18.9 ± 0.7	1.16 ± 0.07
E-12	85	14.2 ± 1.1	10.7 ± 1.2	15.2 ± 1.2	0.88 ± 0.10
E-14	85	18.8 ± 1.3	15.3 ± 1.4	20.1 ± 1.4	1.26 ± 0.11
E-15	85	19.1 ± 0.8	15.6 ± 0.9	20.4 ± 0.8	1.28 ± 0.07
E-16	85	18.0 ± 0.5	14.5 ± 0.6	19.2 ± 0.5	1.19 ± 0.05
E-17	85	16.5 ± 1.1	13.0 ± 1.2	17.6 ± 1.2	1.07 ± 0.10
E-18	85	22.6 ± 0.6	19.1 ± 0.7	24.2 ± 0.6	1.57 ± 0.06
E-22	85	18.2 ± 0.6	14.7 ± 0.7	19.4 ± 0.6	1.21 ± 0.06
E-23	85	19.2 ± 0.4	15.7 ± 0.6	20.6 ± 0.5	1.29 ± 0.05
E-24	85	16.9 ± 0.3	13.4 ± 0.5	18.1 ± 0.4	1.10 ± 0.04
E-25	85	21.1 ± 0.2	17.6 ± 0.4	22.6 ± 0.2	1.45 ± 0.04
E-26	85	15.4 ± 0.7	11.9 ± 0.8	16.5 ± 0.8	0.98 ± 0.07
E-27	85	21.0 ± 1.0	17.5 ± 1.1	22.5 ± 1.1	1.44 ± 0.09
E-28	85	15.5 ± 0.2	12.0 ± 0.4	16.6 ± 0.2	0.99 ± 0.04
E-29	85	13.7 ± 0.5	10.2 ± 0.6	14.7 ± 0.5	0.84 ± 0.05
E-30	85	17.0 ± 0.4	13.5 ± 0.6	18.2 ± 0.4	1.11 ± 0.05
E-31	85	22.3 ± 1.8	18.8 ± 1.8	23.9 ± 1.9	1.55 ± 0.15
E-32	85	21.9 ± 0.8	18.4 ± 0.9	23.4 ± 0.8	1.51 ± 0.07
E-38	85	18.9 ± 0.3	15.4 ± 0.5	20.2 ± 0.4	1.27 ± 0.04
E-39	85	19.8 ± 1.0	16.3 ± 1.1	21.2 ± 1.1	1.34 ± 0.09
E-41	85	18.1 ± 0.5	14.6 ± 0.6	19.4 ± 0.5	1.20 ± 0.05
E-42	85	20.2 ± 1.0	16.7 ± 1.1	21.6 ± 1.1	1.37 ± 0.09
E-43	85	18.5 ± 0.9	15.0 ± 1.0	19.8 ± 1.0	1.23 ± 0.08
Control					
E-20	92	16.8 ± 0.7	13.3 ± 0.8	17.0 ± 0.7	1.01 ± 0.06
Mean±s.d.		17.9 ± 2.3	14.4 ± 2.3	19.1 ± 2.5	1.18 ± 0.20

In-Transit Exposure	Date Annealed	Date Read	ITC-1	ITC-2
	03-18-13	04-10-13	3.6 ± 0.1	3.8 ± 0.1
	06-13-13	07-02-13	3.2 ± 0.3	3.4 ± 0.2

[a] The $CaSO_4$:Dy dosimeter cards provide four separate readout areas. Values listed represent the mean and standard deviation of the average of the four readings.

POINT BEACH NUCLEAR PLANT

Table 12. Ambient Gamma Radiation [a]
LLD/7days: < 1mR/TLD

3rd Quarter, 2013

Date Annealed:	06-13-13	Days in the field	95
Date Placed:	06-27-13	Days from Annealing	
Date Removed:	09-30-13	to Readout:	116
Date Read:	10-07-13		

Location	Days in Field	Total mR	Net mR	mR/Stnd Qtr (91 days)	Net mR per 7 days
Indicator					
E-1	95	14.1 ± 0.2	11.4 ± 0.5	13.5 ± 0.2	0.84 ± 0.03
E-2	95	22.1 ± 0.5	19.4 ± 0.7	21.2 ± 0.5	1.43 ± 0.05
E-3	95	22.2 ± 1.7	19.5 ± 1.8	21.3 ± 1.7	1.44 ± 0.13
E-4	95	20.5 ± 0.1	17.8 ± 0.4	19.6 ± 0.1	1.31 ± 0.03
E-5	95	20.6 ± 1.0	17.9 ± 1.1	19.7 ± 1.0	1.32 ± 0.08
E-6	95	16.0 ± 0.8	13.3 ± 0.9	15.3 ± 0.7	0.98 ± 0.07
E-7	95	16.8 ± 0.8	14.1 ± 0.9	16.1 ± 0.8	1.04 ± 0.07
E-8	95	15.5 ± 1.1	12.8 ± 1.2	14.8 ± 1.0	0.94 ± 0.09
E-9	95	20.3 ± 0.4	17.6 ± 0.6	19.5 ± 0.4	1.30 ± 0.04
E-12	95	16.7 ± 0.5	14.0 ± 0.7	16.0 ± 0.5	1.03 ± 0.05
E-14	95	19.6 ± 0.4	16.9 ± 0.6	18.8 ± 0.4	1.24 ± 0.04
E-15	95	22.0 ± 0.1	19.3 ± 0.4	21.1 ± 0.1	1.42 ± 0.03
E-16	95	20.8 ± 0.2	18.1 ± 0.5	20.0 ± 0.2	1.33 ± 0.03
E-17	95	19.1 ± 0.8	16.4 ± 0.9	18.3 ± 0.8	1.21 ± 0.07
E-18	95	19.7 ± 0.9	17.0 ± 1.0	18.9 ± 0.9	1.25 ± 0.07
E-22	95	19.0 ± 1.3	16.3 ± 1.4	18.2 ± 1.2	1.20 ± 0.10
E-23	95	20.8 ± 0.6	18.1 ± 0.7	19.9 ± 0.6	1.33 ± 0.05
E-24	95	17.8 ± 0.6	15.1 ± 0.7	17.1 ± 0.6	1.11 ± 0.05
E-25	95	18.8 ± 0.5	16.1 ± 0.7	18.0 ± 0.5	1.19 ± 0.05
E-26	95	16.8 ± 1.0	14.1 ± 1.1	16.1 ± 0.9	1.04 ± 0.08
E-27	95	21.8 ± 0.4	19.1 ± 0.6	20.9 ± 0.4	1.41 ± 0.04
E-28	95	14.5 ± 0.4	11.8 ± 0.6	13.8 ± 0.4	0.87 ± 0.04
E-29	95	13.0 ± 0.8	10.3 ± 0.9	12.5 ± 0.8	0.76 ± 0.07
E-30	95	16.0 ± 0.6	13.3 ± 0.7	15.4 ± 0.6	0.98 ± 0.05
E-31	95	22.1 ± 0.9	19.4 ± 1.0	21.2 ± 0.9	1.43 ± 0.07
E-32	95	22.2 ± 0.7	19.5 ± 0.8	21.2 ± 0.6	1.44 ± 0.06
E-38	95	19.4 ± 1.1	16.7 ± 1.2	18.6 ± 1.1	1.23 ± 0.09
E-39	95	21.0 ± 0.9	18.3 ± 1.0	20.1 ± 0.8	1.35 ± 0.07
E-41	95	18.9 ± 0.7	16.2 ± 0.8	18.1 ± 0.7	1.19 ± 0.06
E-42	95	22.6 ± 0.8	19.9 ± 0.9	21.6 ± 0.8	1.47 ± 0.07
E-43	95	19.9 ± 0.9	17.2 ± 1.0	19.1 ± 0.8	1.27 ± 0.07
Control					
E-20	95	23.0 ± 1.5	20.3 ± 1.6	22.1 ± 1.4	1.50 ± 0.11
Mean±s.d.		19.2 ± 2.7	16.5 ± 2.7	18.4 ± 2.6	1.21 ± 0.19

In-Transit Exposure	Date Annealed	Date Read	ITC-1	ITC-2
	06-13-13	07-02-13	3.2 ± 0.3	3.4 ± 0.2
	09-23-13	10-07-13	2.1 ± 0.2	2.1 ± 0.1

[a] The $CaSO_4$:Dy dosimeter cards provide four separate readout areas. Values listed represent the mean and standard deviation of the average of the four readings.

Table 12. Ambient Gamma Radiation a
LLD/7days: < 1mR/TLD

4th Quarter, 2013

Date Annealed:	09-23-13	Days in the field	93
Date Placed:	10-01-13	Days from Annealing	
Date Removed:	01-02-14	to Readout:	114
Date Read:	01-15-14		

Location	Days in Field	Total mR	Net mR	mR/Stnd Qtr (91 days)	Net mR per 7 days
Indicator					
E-1	93	19.5 ± 0.9	15.1 ± 1.1	19.0 ± 0.9	1.14 ± 0.08
E-2	93	19.9 ± 0.9	15.5 ± 1.1	19.5 ± 0.9	1.17 ± 0.08
E-3	93	20.4 ± 1.4	16.0 ± 1.5	19.9 ± 1.4	1.21 ± 0.11
E-4	93	19.5 ± 1.1	15.1 ± 1.2	19.1 ± 1.1	1.14 ± 0.09
E-5	93	20.1 ± 0.4	15.7 ± 0.7	19.7 ± 0.4	1.18 ± 0.05
E-6	93	16.3 ± 0.3	11.9 ± 0.6	15.9 ± 0.3	0.90 ± 0.05
E-7	93	17.3 ± 0.5	12.9 ± 0.7	16.9 ± 0.5	0.97 ± 0.06
E-8	93	16.6 ± 0.8	12.2 ± 1.0	16.3 ± 0.8	0.92 ± 0.07
E-9	93	20.1 ± 0.7	15.7 ± 0.9	19.7 ± 0.7	1.18 ± 0.07
E-12	93	16.7 ± 1.1	12.3 ± 1.2	16.3 ± 1.1	0.93 ± 0.09
E-14	93	19.6 ± 1.2	15.2 ± 1.3	19.2 ± 1.2	1.15 ± 0.10
E-15	93	22.0 ± 0.5	17.6 ± 0.7	21.5 ± 0.5	1.33 ± 0.06
E-16	93	21.9 ± 0.6	17.5 ± 0.8	21.4 ± 0.6	1.32 ± 0.06
E-16B	93	19.2 ± 0.9	14.8 ± 1.1	18.8 ± 0.8	1.12 ± 0.08
E-17	93	18.2 ± 1.1	13.8 ± 1.2	17.8 ± 1.0	1.04 ± 0.09
E-18	93	24.7 ± 0.7	20.3 ± 0.9	24.2 ± 0.7	1.53 ± 0.07
E-22	93	21.5 ± 0.6	17.1 ± 0.8	21.1 ± 0.6	1.29 ± 0.06
E-23	93	23.3 ± 0.7	18.9 ± 0.9	22.8 ± 0.7	1.42 ± 0.07
E-24	93	18.5 ± 0.3	14.1 ± 0.6	18.1 ± 0.3	1.06 ± 0.05
E-25	93	23.1 ± 0.4	18.7 ± 0.7	22.6 ± 0.4	1.41 ± 0.05
E-26	93	17.4 ± 0.7	13.0 ± 0.9	17.0 ± 0.7	0.98 ± 0.07
E-26B	93	18.2 ± 0.6	13.8 ± 0.8	17.8 ± 0.6	1.04 ± 0.06
E-27	93	22.8 ± 0.9	18.4 ± 1.1	22.3 ± 0.9	1.39 ± 0.08
E-28	93	15.7 ± 0.1	11.3 ± 0.6	15.4 ± 0.1	0.85 ± 0.04
E-29	93	14.7 ± 0.6	10.3 ± 0.8	14.4 ± 0.5	0.78 ± 0.06
E-30	93	18.3 ± 0.5	13.9 ± 0.7	17.9 ± 0.5	1.05 ± 0.06
E-31	93	23.6 ± 2.1	19.2 ± 2.2	23.0 ± 2.0	1.45 ± 0.16
E-32	93	23.0 ± 0.5	18.6 ± 0.7	22.5 ± 0.5	1.40 ± 0.06
E-38	93	19.6 ± 0.3	15.2 ± 0.6	19.2 ± 0.3	1.15 ± 0.05
E-39	93	20.7 ± 0.4	16.3 ± 0.7	20.3 ± 0.4	1.23 ± 0.05
E-41	93	18.8 ± 0.7	14.4 ± 0.9	18.4 ± 0.6	1.09 ± 0.07
E-42	93	21.7 ± 0.6	17.3 ± 0.8	21.2 ± 0.6	1.30 ± 0.06
E-43	93	20.0 ± 1.0	15.6 ± 1.1	19.6 ± 1.0	1.18 ± 0.09
Control					
E-20	93	19.1 ± 1.3	14.7 ± 1.4	18.8 ± 1.3	1.11 ± 0.11
Mean±s.d.		20.1 ± 1.5	15.4 ± 2.4	19.7 ± 1.5	1.16 ± 0.19
In-Transit Exposure		Date Annealed	Date Read	ITC-1	ITC-2
		09-23-13	10-07-13	2.1 ± 0.2	2.1 ± 0.1
		12-10-13	01-15-14	6.6 ± 0.3	6.7 ± 0.4

[a] The CaSO4:Dy dosimeter cards provide four separate readout areas. Values listed represent the mean and standard deviation of the average of the four readings.

Annual Indicator Mean±s.d.	18.5 ± 2.6	14.8 ± 2.7	18.5 ± 2.5	1.1 ± 0.2
Annual Control Mean±s.d.	19.8 ± 2.6	16.1 ± 3.0	19.6 ± 2.2	1.2 ± 0.2
Annual Indicator/Control Mean±s.d.	18.5 ± 2.6	14.8 ± 2.7	18.5 ± 2.5	1.1 ± 0.2

Table 13. Groundwater Tritium Monitoring Program
(Monthly Collections)
Units = pCi/L

Intermittent Streams

Sample ID	GW-01				GW-02		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
01-31-13	EWW- 430	80 ± 75	< 143	01-31-13	EWW- 431	222 ± 82	< 143
02-28-13		NS[a]		02-28-13		NS[a]	
03-28-13	EWW- 1337	31 ± 75	< 148	03-28-13	EWW- 1338	290 ± 88	< 148
04-24-13	EWW- 2071	61 ± 99	< 183	04-24-13	EWW- 2072	246 ± 106	< 183
05-22-13	EWW- 2710	163 ± 84	< 146	05-22-13	EWW- 2711	201 ± 86	< 146
06-26-13	EWW- 3565	29 ± 83	< 156	06-26-13	EWW- 3566	86 ± 86	< 156
08-01-13	EWW- 4482	112 ± 116	< 184	08-01-13	EWW- 4483	91 ± 89	< 161
08-28-13	EWW- 5121	57 ± 77	< 149	08-28-13	EWW- 5122	63 ± 77	< 149
09-26-13	EWW- 5710	117 ± 81	< 143	09-26-13		NS[a]	
10-31-13	EWW- 6701	23 ± 80	< 150	10-31-13	EWW- 6702	-2 ± 79	< 150
11-19-13	EWW- 7097	35 ± 80	< 150	11-19-13	EWW- 7098	148 ± 86	< 150
12-18-13		NS[b]		12-18-13		NS[b]	
Mean ± s.d.		71 ± 47		Mean ± s.d.		149 ± 97	

Sample ID	GW-03				GW-17		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
01-31-13	EWW- 432	67 ± 74	< 143	01-31-13	EWW- 434	165 ± 79	< 143
02-28-13		NS[a]		02-28-13	EWW- 885	234 ± 87	< 144
03-28-13	EWW- 1339	25 ± 75	< 148	03-28-13	EWW- 1341	458 ± 95	< 148
04-24-13	EWW- 2073	-11 ± 97	< 183	04-24-13	EWW- 2075	160 ± 103	< 183
05-22-13	EWW- 2712	117 ± 82	< 146	05-22-13	EWW- 2715	211 ± 86	< 146
06-26-13	EWW- 3567	-29 ± 80	< 156	06-26-13	EWW- 3569	68 ± 85	< 156
08-01-13	EWW- 4484	65 ± 88	< 161	08-01-13	EWW- 4486	138 ± 91	< 161
08-28-13	EWW- 5123	16 ± 75	< 149	08-28-13	EWW- 5126	61 ± 77	< 149
09-26-13	EWW- 5711	89 ± 80	< 143	09-26-13	EWW- 5713	123 ± 81	< 143
10-31-13	EWW- 6704	23 ± 80	< 150	10-31-13	EWW- 6706	45 ± 81	< 150
11-19-13	EWW- 7099	15 ± 79	< 150	11-19-13	EWW- 7101	133 ± 85	< 150
12-18-13		NS[b]		12-18-13		NS[b]	
Mean ± s.d.		37 ± 46		Mean ± s.d.		163 ± 114	

Wells

Sample ID	GW-04 (EIC Well)		
Collection Date	Lab Code	Tritium	MDC
01-31-13	EWW- 433	-68 ± 67	< 143
02-28-13	EWW- 884	30 ± 77	< 144
03-28-13	EWW- 1340	-9 ± 73	< 148
04-24-13	EWW- 2074	77 ± 100	< 183
05-22-13	EWW- 2713	53 ± 79	< 146
06-26-13	EWW- 3568	-76 ± 78	< 156
08-01-13	EWW- 4485	-97 ± 80	< 161
08-28-13	EWW- 5124	31 ± 75	< 149
09-26-13	EWW- 5712	-4 ± 75	< 143
10-31-13	EWW- 6705	-58 ± 76	< 150
11-19-13	EWW- 7100	-46 ± 76	< 150
12-18-13	EWW- 7575	-23 ± 71	< 145
Mean ± s.d.		-15 ± 58	

[a] "NS" = no sample; not sent.

[b] Water frozen.

Table 13. Groundwater Tritium Monitoring Program
(Monthly Collections)
Units = pCi/L

Beach Drains

Sample ID	S-1				S-3		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
01-10-13	EW- 103	211 ± 83	< 137	01-10-13	EW- 104	322 ± 88	< 137
02-10-13		NS[a]		02-10-13		NS[a]	
03-28-13	EW- 1354	240 ± 85	< 148	03-28-13	EW- 1355	1481 ± 131	< 148
04-09-13	EW- 1637	118 ± 90	< 182	04-09-13	EW- 1638	1351 ± 130	< 182
05-08-13	EW- 2372	207 ± 82	< 144	05-08-13	EW- 2373	325 ± 87	< 144
06-05-13	EW- 3049	156 ± 79	< 146	06-05-13	EW- 3051	398 ± 91	< 146
07-10-13	EW- 3809	163 ± 83	< 150	07-10-13	EW- 3810	233 ± 86	< 150
08-08-13	EW- 4562	209 ± 106	< 184	08-08-13	EW- 4564	284 ± 109	< 184
09-05-13	EW- 5280	82 ± 75	< 151	09-05-13	EW- 5281	266 ± 85	< 151
10-01-13	EW- 5823	125 ± 82	< 152	10-01-13	EW- 5824	420 ± 95	< 152
11-05-13	EW- 6845	159 ± 85	< 147	11-05-13	EW- 6846	232 ± 89	< 147
12-04-13	EW- 7347	661 ± 101	< 148	12-04-13	EW- 7348	1210 ± 121	< 148
Mean ± s.d.		212 ± 156		Mean ± s.d.		593 ± 492	

Sample ID	S-7				S-8		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
01-10-13		NS[a]		01-10-13		NS[a]	
02-10-13		NS[a]		02-10-13		NS[a]	
03-28-13		NS[a]		03-28-13		NS[a]	
04-09-13	EW- 1640	-10 ± 85	< 182	04-09-13	EW- 1641	-14 ± 85	< 182
Mean ± s.d.				Mean ± s.d.			

Sample ID	S-9				S-10		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
01-10-13		NS[a]		01-10-13		NS[a]	
02-10-13		NS[a]		02-10-13		NS[a]	
03-28-13		NS[a]		03-28-13		NS[a]	
04-09-13	EW- 1642	-21 ± 84	< 182	04-09-13	EW- 1643	45 ± 87	< 182
				06-05-13	EW- 3052	115 ± 77	< 146
Mean ± s.d.				Mean ± s.d.		80 ± 50	

[a] "NS" = no sample; not sent.

Table 13. Groundwater Tritium Monitoring Program
(Monthly Collections)
Units = pCi/L

Beach Drains (cont.)

Sample ID: S-11

Collection Date	Lab Code	Tritium	MDC
01-10-13		NS[a]	
02-10-13		NS[a]	
03-28-13		NS[a]	
04-09-13	EW- 1644	97 ± 89	< 182
06-05-13	EW- 3053	191 ± 81	< 146
11-05-13	EW- 6847	131 ± 84	< 147
12-04-13	EW- 7349	-27 ± 68	< 148
Mean ± s.d.		98 ± 92	

Façade Wells

Sample ID	GW-09 1Z-361A				GW-09 1Z-361B		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
01-29-13	EWW- 977	288 ± 90	< 146	01-29-13	EWW- 979	308 ± 91	< 146
01-29-13	EWW- 978	257 ± 89	< 146 [b]	02-28-13	EWW- 982	259 ± 89	< 146
02-28-13	EWW- 981	308 ± 91	< 146	03-27-13	EWW- 1946	128 ± 85	< 149
03-27-13	EWW- 1945	324 ± 93	< 149	04-11-13	EWW- 1950	204 ± 88	< 149
04-11-13	EWW- 1949	255 ± 90	< 149	06-01-13	EWW- 3135	102 ± 78	< 148
06-01-13	EWW- 3133	278 ± 87	< 148	06-21-13	EWW- 3701	93 ± 89	< 161
06-21-13	EWW- 3700	189 ± 93	< 161	07-03-13	EWW- 4988	125 ± 84	< 148
07-03-13	EWW- 4987	223 ± 88	< 148	08-01-13	EWW- 4992	130 ± 85	< 150
08-01-13	EWW- 4991	214 ± 89	< 150	09-26-13	EWW- 6252	168 ± 101	< 155
09-26-13	EWW- 6251	99 ± 98	< 155	10-31-13	EWW- 7021	122 ± 84	< 148
10-31-13	EWW- 7020	257 ± 91	< 148	11-22-13	EWW- 7558	230 ± 84	< 145
11-22-13	EWW- 7557	240 ± 84	< 145	12-17-13	EWW- 7811	143 ± 76	< 142
12-17-13	EWW- 7810	169 ± 78	< 142				
Mean ± s.d.		244 ± 45		Mean ± s.d.		169 ± 74	

Sample ID	GW-10 2Z-361A				GW-10 2Z-361B		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
01-29-13		NS[a]		01-29-13	EWW- 980	108 ± 82	< 146
02-28-13	EWW- 983	-31 ± 75	< 146	02-28-13	EWW- 984	33 ± 78	< 146
03-27-13	EWW- 1947	52 ± 81	< 149	03-27-13	EWW- 1948	24 ± 80	< 149
04-11-13	EWW- 1951	48 ± 81	< 149	04-11-13	EWW- 1953	50 ± 81	< 149
06-01-13	EWW- 3136	102 ± 78	< 148	06-01-13	EWW- 3137	62 ± 76	< 148
06-24-13	EWW- 3702	-26 ± 84	< 161	06-24-13	EWW- 3703	19 ± 86	< 161
07-03-13	EWW- 4989	56 ± 80	< 148	07-03-13	EWW- 4990	119 ± 84	< 148
08-01-13	EWW- 4993	24 ± 80	< 150	08-01-13	EWW- 4994	-14 ± 78	< 150
09-26-13	EWW- 6253	-4 ± 94	< 155	09-26-13	EWW- 6254	20 ± 95	< 155
10-31-13	EWW- 7022	51 ± 81	< 148	10-31-13	EWW- 7023	89 ± 83	< 148
11-22-13	EWW- 7560	126 ± 79	< 145	11-22-13	EWW- 7561	76 ± 76	< 145
12-17-13		NS[c]		12-17-13	EWW- 7812	66 ± 72	< 142
Mean ± s.d.		40 ± 47		Mean ± s.d.		54 ± 40	

[a] "NS" = no sample; not sent. [b] Station duplicate. [c] Water frozen.

Table 13. Groundwater Tritium Monitoring Program
(Monthly Collections)
Units = pCi/L

Sample ID **U2 Façade Subsurface Drain Sump**

Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
					N-SSD		
01-28-13	EW- 985	686 ± 106	< 146	10-16-13	EW- 6740	98 ± 81	< 154
02-13-13	EW- 986	846 ± 112	< 146				
03-12-13	EW- 1943	730 ± 109	< 150		S-SSD		
04-01-13	EW- 1944	1021 ± 119	< 149	10-16-13	EW- 6741	237 ± 88	< 154
05-01-13	EW- 3250	335 ± 91	< 143				
06-10-13	EW- 3704	349 ± 100	< 162				
07-01-13	EW- 3705	609 ± 110	< 161				
07-31-13	EW- 4782	714 ± 110	< 152				
08-31-13	EW- 5282	543 ± 97	< 151				
09-30-13	EW- 6739	806 ± 112	< 154				
11-01-13	EW- 7018	593 ± 105	< 148				
12-02-13	EW- 7562	488 ± 95	< 145				
12-17-13	EW- 7813	501 ± 93	< 142				
Mean ± s.d.		643 ± 201					

POINT BEACH NUCLEAR PLANT

Beach Drains

Units: = pCi\L

Gamma isotopic analysis

Location	S-1		S-3		S-1	
Collection Date	03-28-13		03-28-13		04-09-13	
Lab Code	EW- 1354	MDC	EW- 1355	MDC	EW- 1637	MDC
Be-7	-2.4 ± 4.8	< 16.2	1.9 ± 7.8	< 20.5	9.3 ± 18.3	< 39.6
Mn-54	-0.5 ± 0.5	< 1.0	0.2 ± 0.9	< 1.6	-1.8 ± 1.6	< 2.2
Fe-59	0.5 ± 1.0	< 2.4	1.9 ± 1.8	< 5.8	2.8 ± 2.8	< 4.9
Co-58	-0.1 ± 0.5	< 1.0	0.0 ± 1.0	< 2.2	-0.3 ± 1.4	< 2.1
Co-60	-0.1 ± 0.6	< 1.0	-0.5 ± 1.1	< 1.7	-0.9 ± 2.0	< 3.2
Zn-65	0.2 ± 0.9	< 1.7	0.2 ± 1.9	< 2.0	-3.2 ± 4.5	< 3.1
Zr-Nb-95	-0.3 ± 0.6	< 1.8	-1.6 ± 1.0	< 2.0	0.5 ± 1.8	< 2.2
Cs-134	-0.3 ± 0.5	< 0.7	-0.3 ± 0.9	< 1.8	-1.1 ± 1.9	< 2.6
Cs-137	0.0 ± 0.6	< 1.2	0.7 ± 1.2	< 1.3	0.1 ± 1.8	< 3.2
Ba-La-140	-1.7 ± 0.7	< 3.9	-2.4 ± 1.2	< 6.2	-7.4 ± 1.9	< 3.4

Location	S-3		S-7		S-8	
Collection Date	04-09-13		04-09-13		04-09-13	
Lab Code	EW- 1638		EW- 1640		EW- 1641	
Be-7	14.1 ± 13.2	< 32.3	-1.7 ± 14.8	< 34.2	17.2 ± 11.8	< 21.0
Mn-54	-0.3 ± 1.5	< 2.2	0.9 ± 1.7	< 2.8	1.0 ± 1.2	< 2.2
Fe-59	3.4 ± 2.6	< 5.3	1.0 ± 2.8	< 3.8	-2.0 ± 2.4	< 3.8
Co-58	-1.7 ± 1.6	< 1.5	-0.4 ± 1.5	< 1.6	0.3 ± 1.2	< 2.2
Co-60	-0.2 ± 1.5	< 2.3	0.7 ± 1.6	< 2.9	-1.2 ± 1.2	< 1.8
Zn-65	-0.6 ± 2.8	< 3.3	1.0 ± 3.1	< 3.8	0.3 ± 2.3	< 3.7
Zr-Nb-95	2.1 ± 1.4	< 3.3	-0.6 ± 1.6	< 3.3	0.1 ± 1.3	< 1.8
Cs-134	1.2 ± 1.5	< 2.7	-1.0 ± 1.6	< 2.1	-0.5 ± 1.3	< 2.2
Cs-137	0.3 ± 1.9	< 3.2	-1.7 ± 2.0	< 2.7	0.9 ± 1.5	< 2.7
Ba-La-140	0.4 ± 1.8	< 3.7	-3.0 ± 2.1	< 4.1	1.2 ± 1.5	< 5.5

Location	S-9		S-10		S-11	
Collection Date	04-09-13		04-09-13		04-09-13	
Lab Code	EW- 1642		EW- 1643		EW- 1644	
Be-7	18.7 ± 10.3	< 24.2	40.3 ± 13.0	< 32.1	13.7 ± 11.0	< 21.0
Mn-54	-0.1 ± 1.2	< 2.3	0.8 ± 1.2	< 2.5	-0.2 ± 1.1	< 1.8
Fe-59	1.0 ± 2.2	< 4.3	-0.9 ± 2.0	< 4.6	-0.7 ± 1.8	< 2.1
Co-58	0.3 ± 1.1	< 1.4	-0.2 ± 1.2	< 1.8	-0.4 ± 1.1	< 1.9
Co-60	0.6 ± 1.2	< 1.9	-1.1 ± 1.2	< 1.6	0.3 ± 1.2	< 1.6
Zn-65	-2.3 ± 2.3	< 1.8	0.3 ± 2.4	< 4.0	1.3 ± 2.3	< 4.1
Zr-Nb-95	1.0 ± 1.2	< 3.0	-2.0 ± 1.3	< 2.3	0.9 ± 1.2	< 3.0
Cs-134	0.6 ± 0.9	< 1.7	0.1 ± 1.3	< 2.4	-0.8 ± 1.0	< 1.7
Cs-137	0.7 ± 1.4	< 2.7	-0.3 ± 1.3	< 2.3	-0.1 ± 1.4	< 2.5
Ba-La-140	-0.3 ± 1.4	< 3.0	2.1 ± 1.5	< 4.6	-1.9 ± 1.3	< 1.7

Beach Drains (cont.)

Units: = pCi\L

Gamma isotopic analysis

Location	S-1		S-3		S-10	
Collection Date	06-05-13		06-05-13		06-05-13	
Lab Code	EW- 3049	MDC	EW- 3051	MDC	EW- 3052	MDC
Be-7	5.0 ± 14.4	< 34.5	6.0 ± 13.7	< 35.5	29.2 ± 14.7	< 34.2
Mn-54	-0.1 ± 1.7	< 1.9	0.6 ± 1.6	< 3.2	-0.1 ± 1.6	< 2.7
Fe-59	0.2 ± 2.6	< 4.1	-1.0 ± 2.6	< 2.9	-1.1 ± 2.8	< 3.4
Co-58	-0.8 ± 1.4	< 2.0	0.3 ± 1.2	< 2.4	-0.9 ± 1.6	< 2.1
Co-60	1.8 ± 1.9	< 2.2	-0.2 ± 1.8	< 1.6	-2.1 ± 1.6	< 2.0
Zn-65	-1.1 ± 2.4	< 2.6	-4.1 ± 3.5	< 2.0	0.1 ± 2.3	< 3.0
Zr-Nb-95	-0.5 ± 1.5	< 1.9	0.0 ± 1.8	< 4.2	2.0 ± 1.4	< 2.5
Cs-134	0.2 ± 1.3	< 2.7	0.0 ± 1.7	< 2.9	0.5 ± 1.3	< 2.0
Cs-137	0.9 ± 1.6	< 1.9	-0.1 ± 1.7	< 3.2	0.4 ± 1.8	< 2.7
Ba-La-140	-3.8 ± 1.9	< 2.6	-0.2 ± 1.8	< 3.6	0.5 ± 1.6	< 2.6

Location	S-11		S-1		S-3	
Collection Date	06-05-13		07-10-13		07-10-13	
Lab Code	EW- 3053	MDC	EW- 3809	MDC	EW- 3810	MDC
Be-7	3.9 ± 11.3	< 30.8	-4.3 ± 11.6	< 35.0	11.8 ± 11.0	< 25.5
Mn-54	0.4 ± 1.3	< 2.4	0.4 ± 1.4	< 2.6	0.8 ± 1.3	< 2.1
Fe-59	1.3 ± 1.9	< 3.7	-1.7 ± 2.3	< 5.5	1.6 ± 2.8	< 6.8
Co-58	-0.2 ± 1.2	< 2.5	-1.3 ± 1.3	< 1.7	-0.7 ± 1.2	< 1.4
Co-60	-1.4 ± 1.3	< 1.5	0.9 ± 1.4	< 2.2	-0.1 ± 1.5	< 1.8
Zn-65	-0.7 ± 2.4	< 2.0	-1.0 ± 2.4	< 2.8	0.4 ± 2.4	< 2.4
Zr-Nb-95	-1.5 ± 1.4	< 3.0	-1.2 ± 1.3	< 2.4	2.5 ± 1.5	< 3.6
Cs-134	-0.7 ± 1.4	< 2.4	0.5 ± 1.4	< 2.1	0.2 ± 1.1	< 1.7
Cs-137	1.6 ± 1.5	< 2.7	0.3 ± 1.5	< 2.5	-0.7 ± 1.5	< 2.4
Ba-La-140	-1.2 ± 1.5	< 4.6	-1.8 ± 1.8	< 4.9	-1.0 ± 1.5	< 3.7

Location	S-1		S-3		S-1	
Collection Date	08-08-13		08-08-13		09-05-13	
Lab Code	EW- 4562	MDC	EW- 4564	MDC	EW- 5280	
Be-7	-1.4 ± 10.3	< 26.3	2.6 ± 10.5	< 26.5	-6.0 ± 14.2	< 23.4
Mn-54	1.4 ± 1.1	< 2.3	-0.2 ± 1.4	< 2.5	-0.8 ± 1.4	< 1.5
Fe-59	2.2 ± 1.8	< 3.8	-2.9 ± 2.5	< 3.5	-5.3 ± 3.1	< 3.2
Co-58	-0.7 ± 1.1	< 1.4	-1.2 ± 1.2	< 1.6	1.0 ± 1.7	< 2.2
Co-60	1.3 ± 1.3	< 2.2	-0.9 ± 1.5	< 2.4	1.3 ± 1.4	< 2.4
Zn-65	-1.6 ± 3.0	< 5.2	-2.2 ± 2.2	< 2.5	-1.9 ± 3.3	< 3.5
Zr-Nb-95	-0.8 ± 1.1	< 2.0	0.2 ± 1.4	< 3.0	-1.8 ± 1.7	< 3.1
Cs-134	0.1 ± 1.1	< 2.1	0.2 ± 0.9	< 2.1	0.8 ± 1.6	< 2.9
Cs-137	0.2 ± 1.5	< 2.9	1.0 ± 1.4	< 2.7	0.2 ± 1.6	< 3.2
Ba-La-140	-2.4 ± 1.2	< 2.7	-0.5 ± 1.3	< 4.6	0.6 ± 1.5	< 2.7

POINT BEACH NUCLEAR PLANT

Supplemental Analyses

Units: = pCi\L

Gamma isotopic analysis

Location	S-3		S-1		S-3	
Collection Date	09-05-13		10-01-13		10-01-13	
Lab Code	EW- 5281	MDC	EW- 5823		EW- 5824	
Be-7	3.0 ± 13.7	< 35.5	8.3 ± 16.5	< 40.8	3.5 ± 8.4	< 25.4
Mn-54	-0.9 ± 1.7	< 1.8	-0.7 ± 1.6	< 2.5	-1.2 ± 1.1	< 1.7
Fe-59	-2.9 ± 2.7	< 4.1	-2.5 ± 3.7	< 4.3	0.2 ± 1.9	< 4.9
Co-58	0.1 ± 1.8	< 2.5	0.3 ± 1.4	< 3.3	0.6 ± 1.1	< 2.2
Co-60	2.0 ± 1.9	< 2.3	1.3 ± 1.5	< 1.8	0.7 ± 1.2	< 1.6
Zn-65	0.5 ± 3.3	< 3.4	-3.7 ± 3.4	< 4.2	-1.9 ± 2.2	< 3.1
Zr-Nb-95	2.5 ± 1.8	< 4.0	-0.2 ± 1.9	< 6.1	-1.5 ± 1.2	< 3.0
Cs-134	-0.4 ± 1.7	< 2.4	-2.2 ± 1.8	< 3.6	-0.6 ± 1.1	< 2.2
Cs-137	0.1 ± 2.0	< 3.1	-0.4 ± 1.8	< 2.5	0.2 ± 1.4	< 2.4
Ba-La-140	0.5 ± 1.9	< 3.4	0.9 ± 1.5	< 2.8	2.0 ± 1.0	< 7.1
Location	S-1		S-3		S-11	
Collection Date	11-05-13		11-05-13		11-05-13	
Lab Code	EW- 6845		EW- 6846		EW- 6847	
Be-7	16.4 ± 21.5	< 41.9	3.0 ± 22.3	< 27.1	-13.3 ± 13.9	< 21.4
Mn-54	0.9 ± 2.5	< 3.4	-0.1 ± 2.0	< 3.0	0.3 ± 1.6	< 2.6
Fe-59	3.1 ± 3.8	< 7.6	-1.7 ± 4.1	< 5.4	-1.6 ± 3.2	< 5.3
Co-58	0.0 ± 2.3	< 2.5	-2.1 ± 2.3	< 2.6	-1.9 ± 1.8	< 2.1
Co-60	-1.4 ± 2.7	< 3.1	-0.6 ± 2.0	< 2.9	-1.2 ± 1.9	< 2.3
Zn-65	-1.4 ± 5.6	< 5.9	-1.8 ± 5.4	< 7.6	1.4 ± 3.0	< 5.2
Zr-Nb-95	-0.5 ± 2.5	< 3.0	1.3 ± 2.2	< 3.4	-3.3 ± 2.0	< 2.5
Cs-134	1.3 ± 2.4	< 4.6	-1.1 ± 2.4	< 4.5	0.3 ± 1.9	< 3.5
Cs-137	2.3 ± 2.4	< 3.9	0.3 ± 2.4	< 4.0	0.8 ± 1.7	< 2.7
Ba-La-140	-0.7 ± 2.8	< 3.1	-4.6 ± 3.0	< 3.1	-3.2 ± 2.1	< 3.1
Location	S-1		S-3		S-11	
Collection Date	12-04-13		12-04-13		12-04-13	
Lab Code	EW- 7347		EW- 7348		EW- 7349	
Be-7	4.3 ± 12.7	< 31.3	36.8 ± 17.4	< 38.2	15.4 ± 12.8	< 31.4
Mn-54	-0.2 ± 1.3	< 2.4	0.4 ± 1.4	< 2.4	2.3 ± 1.5	< 2.8
Fe-59	-1.2 ± 2.4	< 3.3	-1.2 ± 2.3	< 3.6	1.1 ± 2.0	< 2.4
Co-58	-1.1 ± 1.5	< 2.1	-0.8 ± 1.5	< 1.4	0.7 ± 1.3	< 2.6
Co-60	0.7 ± 1.4	< 2.5	1.4 ± 1.5	< 2.1	-0.8 ± 1.7	< 1.4
Zn-65	-3.8 ± 3.1	< 3.1	1.2 ± 3.3	< 5.1	-1.6 ± 2.4	< 2.3
Zr-Nb-95	-0.6 ± 1.4	< 3.1	-1.2 ± 1.4	< 1.6	-0.4 ± 1.7	< 3.1
Cs-134	-1.6 ± 1.4	< 2.7	0.8 ± 1.5	< 2.9	0.2 ± 1.4	< 2.4
Cs-137	-0.9 ± 1.7	< 2.5	0.4 ± 1.8	< 2.9	-0.7 ± 1.6	< 2.3
Ba-La-140	0.6 ± 1.8	< 4.4	-1.0 ± 1.8	< 3.9	-2.9 ± 1.9	< 2.4

Table 13. Groundwater Tritium Monitoring Program
(Quarterly Collections)
Units = pCi/L

Quarterly Wells

Sample ID	GW-05 (WH 6 Well)				GW-06 (SBCC Well)		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
01-16-13	EWW- 186	-10 ± 72	< 138	01-16-13	EWW- 187	52 ± 75	< 138
04-09-13	EWW- 1634	22 ± 86	< 182	04-09-13	EWW- 1635	-50 ± 83	< 182
07-10-13	EWW- 3812	1 ± 75	< 150	07-10-13	EWW- 3813	-1 ± 74	< 150
10-15-13	EWW- 6336	22 ± 74	< 147	10-15-13	EWW- 6337	14 ± 74	< 147
Mean ± s.d.		9 ± 16		Mean ± s.d.		4 ± 42	

Sample ID	GW-11 (MW-1)				GW-12 (MW-2)		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
02-18-13	EWW- 683	115 ± 77	< 143	02-18-13	EWW- 684	6 ± 71	< 143
05-21-13	EWW- 2731	128 ± 83	< 146	05-21-13	EWW- 2732	90 ± 81	< 146
08-01-13	EWW- 4775	82 ± 84	< 152	08-01-13	EWW- 4776	-22 ± 79	< 152
10-23-13	EWW- 6732	87 ± 78	< 149	10-23-13	EWW- 6733	-14 ± 73	< 149
Mean ± s.d.		103 ± 22		Mean ± s.d.		15 ± 51	

Sample ID	GW-13 (MW-6)				GW-14A (MW-05A)		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
02-18-13	EWW- 685	12 ± 71	< 143	02-18-13	EWW- 686	18 ± 72	< 143
05-21-13	EWW- 2733	84 ± 81	< 146	05-21-13	EWW- 2734	151 ± 84	< 146
08-01-13	EWW- 4777	106 ± 85	< 152	08-01-13	EWW- 4778	58 ± 83	< 152
10-23-13	EWW- 6734	-5 ± 73	< 149	10-23-13	EWW- 6735	81 ± 78	< 149
Mean ± s.d.		49 ± 54		Mean ± s.d.		77 ± 56	

Sample ID	GW-15 (MW-4)				GW-15A (MW-4)		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
02-18-13	EWW- 687	278 ± 84	< 143	02-18-13	EWW- 688	255 ± 83	< 143
05-21-13	EWW- 2736	277 ± 89	< 146	05-21-13	EWW- 2737	296 ± 90	< 146
08-01-13	EWW- 4779	252 ± 92	< 152				
10-23-13	EWW- 6737	255 ± 87	< 149				
Mean ± s.d.		265 ± 14		Mean ± s.d.		276 ± 29	

Sample ID	GW-16A (MW-3)				GW-16B (MW-3)		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
02-18-13		NS[a]		02-18-13		NS[a]	
05-21-13	EWW- 2738	232 ± 87	< 146				
08-01-13	EWW- 4780	210 ± 90	< 152				
10-23-13	EWW- 6738	169 ± 83	< 149				
Mean ± s.d.		204 ± 32		Mean ± s.d.			

[a] "NS" = no sample; not sent.

Table 13. Groundwater Tritium Monitoring Program
(Quarterly Collections)
Units = pCi/L

Quarterly Wells (cont.)

Sample ID	GW-18 (WH 7 Well)			Sample ID	GW-14B (MW-05B)		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
02-18-13		NS[a]		10-23-13	EWW- 6736	68 ± 77	< 149
04-09-13	EWW- 1636	-5 ± 85	< 182				
07-10-13	EWW- 3814	13 ± 75	< 150				
10-15-13	EWW- 6338	-20 ± 72	< 147				
Mean ± s.d.		-4 ± 17		Mean ± s.d.			

(Annual Collections)
Units = pCi/L

Bogs

Sample ID	GW-07 (North Bog)				GW-08 EIC Bog		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
05-08-13	EWW- 2370	105 ± 77	< 144	05-08-13	EWW- 2371	209 ± 82	< 144

[a] "NS" = no sample; not sent.

Table 13. Groundwater Tritium Monitoring Program

Units = pCi/L

Manholes

Sample ID		MH Z-065A				MH Z-065B	
Collection Date	Lab Code	Tritium	MDC (pCi/L)	Collection Date	Lab Code	Tritium	MDC (pCi/L)
04-30-13		NS[a]		04-30-13		NS[a]	
Mean ± s.d.				Mean ± s.d.			

Sample ID		MH Z-065C				MH Z-065D	
Collection Date	Lab Code	Tritium	MDC (pCi/L)	Collection Date	Lab Code	Tritium	MDC (pCi/L)
04-30-13		NS[a]		04-30-13		NS[a]	
Mean ± s.d.				Mean ± s.d.			

Sample ID		MH Z-066A				MH Z-066B	
Collection Date	Lab Code	Tritium	MDC (pCi/L)	Collection Date	Lab Code	Tritium	MDC (pCi/L)
05-02-13	EW- 2375	194 ± 81	< 144	05-02-13	EW- 2376	71 ± 75	< 144
10-15-13	EW- 6440	185 ± 82	< 147				
Mean ± s.d.		189 ± 7		Mean ± s.d.			

Sample ID		MH Z-066C				MH Z-066D	
Collection Date	Lab Code	Tritium	MDC (pCi/L)	Collection Date	Lab Code	Tritium	MDC (pCi/L)
04-30-13	EW- 2377	242 ± 83	< 144	04-30-13	EW- 2378	151 ± 79	< 144
Mean ± s.d.				Mean ± s.d.			

Sample ID		MH Z-067A				MH Z-067B	
Collection Date	Lab Code	Tritium	MDC (pCi/L)	Collection Date	Lab Code	Tritium	MDC (pCi/L)
05-02-13	EW- 2379	173 ± 80	< 144	05-02-13	EW- 2380	187 ± 81	< 144
10-15-13	EW- 6441	193 ± 83	< 147				
Mean ± s.d.		183 ± 14		Mean ± s.d.			

[a] "NS" = No sample; not sent.

Manholes (cont.)

Sample ID	MH Z-067C				MH Z-067D		
Collection Date	Lab Code	Tritium	MDC (pCi/L)	Collection Date	Lab Code	Tritium	MDC (pCi/L)
04-30-13	EW- 2381	170 ± 80	< 144	04-30-13	EW- 2382	173 ± 80	< 144
Mean ± s.d.				Mean ± s.d.			

Sample ID	MH Z-068				MH-1		
Collection Date	Lab Code	Tritium	MDC (pCi/L)	Collection Date	Lab Code	Tritium	MDC (pCi/L)
04-30-13	EW- 2383	225 ± 82	< 144	04-30-13		NS[a]	
10-15-13	EW- 6442	154 ± 81	< 147				
Mean ± s.d.		189 ± 50		Mean ± s.d.			

Sample ID	MH-4				MH-6		
Collection Date	Lab Code	Tritium	MDC (pCi/L)	Collection Date	Lab Code	Tritium	MDC (pCi/L)
04-30-13		NS[a]		04-30-13		NS[a]	
Mean ± s.d.				Mean ± s.d.			

Sample ID	MH-7				MH-8		
Collection Date	Lab Code	Tritium	MDC (pCi/L)	Collection Date	Lab Code	Tritium	MDC (pCi/L)
04-30-13		NS[a]		04-30-13		NS[a]	
Mean ± s.d.				Mean ± s.d.			

Sample ID	MH-16				MH-2		
Collection Date	Lab Code	Tritium	MDC (pCi/L)	Collection Date	Lab Code	Tritium	MDC (pCi/L)
04-30-13		NS[a]		04-30-13		NS[a]	
Mean ± s.d.				Mean ± s.d.			

Sample ID	MH-5A				MH-9		
Collection Date	Lab Code	Tritium	MDC (pCi/L)	Collection Date	Lab Code	Tritium	MDC (pCi/L)
04-30-13		NS[a]		04-30-13		NS[a]	
Mean ± s.d.				Mean ± s.d.			

[a] "NS" = No sample; not sent.

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APPENDIX A

INTERLABORATORY COMPARISON PROGRAM RESULTS

NOTE: Environmental Inc., Midwest Laboratory participates in intercomparison studies administered by Environmental Resources Associates, and serves as a replacement for studies conducted previously by the U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. Results are reported in Appendix A. TLD Intercomparison results, in-house spikes, blanks, duplicates and mixed analyte performance evaluation program results are also reported. Appendix A is updated four times a year; the complete Appendix is included in March, June, September and December monthly progress reports only.

January through December, 2013

Appendix A

Interlaboratory Comparison Program Results

Environmental, Inc., Midwest Laboratory has participated in interlaboratory comparison (crosscheck) programs since the formulation of it's quality control program in December 1971. These programs are operated by agencies which supply environmental type samples containing concentrations of radionuclides known to the issuing agency but not to participant laboratories. The purpose of such a program is to provide an independent check on a laboratory's analytical procedures and to alert it of any possible problems.

Participant laboratories measure the concentration of specified radionuclides and report them to the issuing agency. Several months later, the agency reports the known values to the participant laboratories and specifies control limits. Results consistently higher or lower than the known values or outside the control limits indicate a need to check the instruments or procedures used.

Results in Table A-1 were obtained through participation in the environmental sample crosscheck program administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada.

Table A-2 lists results for thermoluminescent dosimeters (TLDs), via International Intercomparison of Environmental Dosimeters, when available, and internal laboratory testing.

Table A-3 lists results of the analyses on in-house "spiked" samples for the past twelve months. All samples are prepared using NIST traceable sources. Data for previous years available upon request.

Table A-4 lists results of the analyses on in-house "blank" samples for the past twelve months. Data for previous years available upon request.

Table A-5 lists REMP specific analytical results from the in-house "duplicate" program for the past twelve months. Acceptance is based on the difference of the results being less than the sum of the errors. Complete analytical data for duplicate analyses is available upon request.

The results in Table A-6 were obtained through participation in the Mixed Analyte Performance Evaluation Program.

Results in Table A-7 were obtained through participation in the environmental sample crosscheck program administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the Environmental Measurement Laboratory Quality Assessment Program (EML).

Attachment A lists the laboratory precision at the 1 sigma level for various analyses. The acceptance criteria in Table A-3 is set at ± 2 sigma.

Out-of-limit results are explained directly below the result.

Attachment A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

LABORATORY PRECISION: ONE STANDARD DEVIATION VALUES FOR VARIOUS ANALYSES[a]

Analysis	Level	One standard deviation for single determination
Gamma Emitters	5 to 100 pCi/liter or kg > 100 pCi/liter or kg	5.0 pCi/liter 5% of known value
Strontium-89[b]	5 to 50 pCi/liter or kg > 50 pCi/liter or kg	5.0 pCi/liter 10% of known value
Strontium-90[b]	2 to 30 pCi/liter or kg > 30 pCi/liter or kg	5.0 pCi/liter 10% of known value
Potassium-40	≥ 0.1 g/liter or kg	5% of known value
Gross alpha	≤ 20 pCi/liter > 20 pCi/liter	5.0 pCi/liter 25% of known value
Gross beta	≤ 100 pCi/liter > 100 pCi/liter	5.0 pCi/liter 5% of known value
Tritium	≤ 4,000 pCi/liter > 4,000 pCi/liter	$\pm 1\sigma = 169.85 \times (\text{known})^{0.0933}$ 10% of known value
Radium-226,-228	≥ 0.1 pCi/liter	15% of known value
Plutonium	≥ 0.1 pCi/liter, gram, or sample	10% of known value
Iodine-131, Iodine-129[b]	≤ 55 pCi/liter > 55 pCi/liter	6 pCi/liter 10% of known value
Uranium-238, Nickel-63[b] Technetium-99[b]	≤ 35 pCi/liter > 35 pCi/liter	6 pCi/liter 15% of known value
Iron-55[b]	50 to 100 pCi/liter > 100 pCi/liter	10 pCi/liter 10% of known value
Other Analyses [b]	---	20% of known value

[a] From EPA publication, "Environmental Radioactivity Laboratory Intercomparison Studies Program, Fiscal Year, 1981-1982, EPA-600/4-81-004.

[b] Laboratory limit.

TABLE A-1. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)[a].

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result [b]	ERA Result [c]	Control Limits	Acceptance
ERW-76	01/07/13	Ra-226	10.04 ± 0.55	9.91	7.42 - 11.60	Pass
ERW-76	01/07/13	Ra-228	6.11 ± 1.29	5.22	3.14 - 6.96	Pass
ERW-76	01/07/13	Uranium	5.90 ± 0.58	5.96	4.47 - 7.13	Pass
ERW-1593	04/08/13	Sr-89	43.60 ± 4.32	41.30	31.60 - 48.40	Pass
ERW-1593	04/08/13	Sr-90	23.20 ± 1.70	23.90	17.20 - 28.00	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-1605	04/08/13	Ra-226	16.30 ± 0.70	15.40	11.50 - 17.70	Pass
ERW-1605	04/08/13	Ra-228	5.32 ± 1.30	4.36	2.54 - 5.98	Pass
ERW-1605	04/08/13	Uranium	57.30 ± 4.20	61.20	49.80 - 67.90	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	91.80 ± 114.00	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-6022	10/07/13	Ra-226	12.70 ± 1.62	12.10	9.04 ± 14.00	Pass
ERW-6022 [d]	10/07/13	Ra-228	5.70 ± 0.56	4.02	2.30 ± 5.59	Fail
ERW-6022	10/07/13	Uranium	6.59 ± 0.38	6.24	4.70 ± 7.44	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.

[d] The reported result was obtained in the first cycle of counting. It can be positively biased due to extra beta counts contributed by Pb-214 and Bi-214 daughters of Rn-222. Result of second cycle of counting 4.47 pCi/L.

TABLE A-2. Thermoluminescent Dosimetry, (TLD, $CaSO_4$: Dy Cards).

Lab Code	Date	Description	Known Value (mR)	Lab Result ± 2 sigma (mR)	Control Limits (mR)	Acceptance
Environmental, Inc.						
2013-1	5/6/2013	40 cm.	34.26	39.92 ± 2.67	23.98 - 44.54	Pass
2013-1	5/6/2013	50 cm.	21.93	25.44 ± 3.31	15.35 - 28.51	Pass
2013-1	5/6/2013	60 cm.	15.23	15.88 ± 1.12	10.66 - 19.80	Pass
2013-1	5/6/2013	70 cm.	11.19	10.89 ± 0.66	7.83 - 14.55	Pass
2013-1	5/6/2013	80 cm.	8.57	9.21 ± 0.41	6.00 - 11.14	Pass
2013-1	5/6/2013	90 cm.	6.77	6.52 ± 0.34	4.74 - 8.80	Pass
2013-1	5/6/2013	100 cm.	5.48	5.02 ± 0.53	3.84 - 7.12	Pass
2013-1	5/6/2013	110 cm.	4.53	4.51 ± 0.34	3.17 - 5.89	Pass
2013-1	5/6/2013	120 cm.	3.81	4.28 ± 0.35	2.67 - 4.95	Pass
2013-1	5/6/2013	135 cm.	3.01	2.64 ± 0.18	2.11 - 3.91	Pass
2013-1	5/6/2013	150 cm.	2.44	2.10 ± 0.25	1.71 - 3.17	Pass
2013-1	5/6/2013	180 cm.	1.69	1.78 ± 0.33	1.18 - 2.20	Pass
Environmental, Inc.						
2013-2	11/18/2013	50 cm.	19.93	22.75 ± 3.67	13.95 - 25.91	Pass
2013-2	11/18/2013	60 cm.	13.84	15.75 ± 1.94	9.69 - 17.99	Pass
2013-2	11/18/2013	70 cm.	10.17	11.24 ± 0.88	7.12 - 13.22	Pass
2013-2	11/18/2013	75 cm.	8.86	9.18 ± 1.23	6.20 - 11.52	Pass
2013-2	11/18/2013	80 cm.	7.79	7.81 ± 1.10	5.45 - 10.13	Pass
2013-2	11/18/2013	90 cm.	6.15	5.98 ± 0.90	4.31 - 8.00	Pass
2013-2	11/18/2013	100 cm.	4.98	5.13 ± 0.73	3.49 - 6.47	Pass
2013-2	11/18/2013	110 cm.	4.12	3.87 ± 0.32	2.88 - 5.36	Pass
2013-2	11/18/2013	120 cm.	3.46	3.11 ± 0.39	2.42 - 4.50	Pass
2013-2	11/18/2013	135 cm.	2.73	2.71 ± 0.83	1.91 - 3.55	Pass
2013-2	11/18/2013	150 cm.	2.21	2.11 ± 0.63	1.55 - 2.87	Pass
2013-2	11/18/2013	180 cm.	1.54	1.81 ± 0.10	1.08 - 2.00	Pass

TABLE A-3. In-House "Spiked" Samples

			Concentration (pCi/L)[a]			
Lab Code [b]	Date	Analysis	Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance
SPW-66	1/9/2013	Tc-99	1009 ± 5	1078	754.9 - 1402.0	Pass
SPW-1891	1/18/2013	Ra-228	35.60 ± 2.75	30.85	21.60 - 40.11	Pass
SPSO-12313S	1/23/2013	Tc-99	103.5 ± 2.2	107.8	75.46 - 140.14	Pass
SPMI-264	1/25/2013	Cs-134	110.9 ± 6.7	107.5	96.73 - 118.23	Pass
SPMI-264	1/25/2013	Cs-137	82.84 ± 7.47	77.48	67.48 - 87.48	Pass
SPMI-264	1/25/2013	Sr-90	38.19 ± 1.49	40.11	32.09 - 48.13	Pass
SPW-266	1/25/2013	Co-60	46.89 ± 4.68	44.48	34.48 - 54.48	Pass
SPW-266	1/25/2013	Cs-134	105.9 ± 8.0	107.5	96.73 - 118.23	Pass
SPW-266	1/25/2013	Cs-137	42.17 ± 5.65	39.49	29.49 - 49.49	Pass
SPW-266	1/25/2013	Sr-90	39.84 ± 1.65	40.11	32.09 - 48.13	Pass
SPAP-376	2/1/2013	Gr. Beta	44.20 ± 0.11	45.68	27.41 - 63.95	Pass
SPAP-378	2/1/2013	Cs-134	3.71 ± 0.65	3.87	2.32 - 5.42	Pass
SPAP-378	2/1/2013	Cs-137	97.47 ± 2.50	102.9	92.61 - 113.19	Pass
SPW-391	2/1/2013	H-3	63719 ± 703	65626	52501 - 78751	Pass
SPW-380	2/10/2013	Ni-63	217.0 ± 3.7	205.3	143.7 - 266.9	Pass
W-30413	3/4/2013	Gr. Alpha	19.77 ± 0.40	20.00	10.00 - 30.00	Pass
W-30413	3/4/2013	Gr. Beta	30.48 ± 0.34	30.90	20.90 - 40.90	Pass
W-30713	3/7/2013	Ra-226	18.06 ± 0.51	16.70	11.69 - 21.71	Pass
W-42713	4/27/2013	Gr. Alpha	20.67 ± 0.40	20.00	10.00 - 30.00	Pass
W-42713	4/27/2013	Gr. Beta	28.44 ± 0.32	30.90	20.90 - 40.90	Pass
WW-2870	5/7/2013	Co-60	166.1 ± 7.4	161.6	145.4 - 177.8	Pass
WW-2870	5/7/2013	Cs-137	161.2 ± 9.3	149.0	134.1 - 163.9	Pass
WW-2870	5/7/2013	H-3	6853 ± 250	6735	5388 - 8082	Pass
W-53113	5/31/2013	Ra-226	16.83 ± 0.41	16.70	11.69 - 21.71	Pass
SPAP-3332	6/19/2013	Am-241	4.60 ± 0.14	4.00	2.40 - 5.60	Pass
SPW-3334	6/19/2013	Th-230	4.36 ± 0.34	4.00	2.40 - 5.60	Pass
SPW-3458	6/24/2013	C-14	3825 ± 13	4736	2842 - 6630	Pass
SPAP-3529	6/27/2013	Cs-134	3.49 ± 1.26	3.30	1.98 - 4.62	Pass
SPAP-3529	6/27/2013	Cs-137	102.0 ± 2.9	101.1	90.99 - 111.21	Pass
SPAP-3531	6/27/2013	Gr. Beta	45.64 ± 0.11	45.42	27.25 - 63.59	Pass
SPF-3533	6/27/2013	Cs-134	1.31 ± 0.14	1.50	0.90 - 2.10	Pass
SPF-3533	6/27/2013	Cs-137	2.77 ± 0.27	2.43	1.46 - 3.40	Pass
SPW-3535	6/27/2013	Ni-63	204.3 ± 3.5	204.8	143.4 - 266.2	Pass
SPW-3537	6/27/2013	Tc-99	104.5 ± 1.7	107.8	75.46 - 140.14	Pass
SPW-3539	6/27/2013	Fe-55	97015 ± 860	90677	72542 - 108812	Pass
SPW-1893	6/28/2013	Ra-228	30.16 - 2.73	30.85	21.60 - 40.11	Pass

TABLE A-3. In-House "Spiked" Samples

Lab Code [b]	Date	Analysis	Concentration (pCi/L)[a] Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance
SPW-72913S	7/29/2013	Tc-99	126.6 ± 2.2	107.8	75.46 ± 140.14	Pass
SPW-4373	7/31/2013	Cs-134	91.71 ± 6.02	90.94	80.94 ± 100.94	Pass
SPW-4373	7/31/2013	Cs-137	83.05 ± 7.20	76.57	66.57 ± 86.57	Pass
SPW-4373	7/31/2013	Sr-90	39.28 ± 1.77	39.64	31.71 ± 47.57	Pass
SPW-4374	7/31/2013	Sr-90	42.17 ± 1.71	39.64	31.71 ± 47.57	Pass
SPMI-4376	7/31/2013	Cs-134	82.22 - 7.23	90.94	80.94 ± 100.94	Pass
SPMI-4376	7/31/2013	Cs-137	83.31 - 8.29	76.57	66.57 ± 86.57	Pass
SPMI-4376A	7/31/2013	Sr-90	35.00 ± 1.63	39.64	31.71 ± 47.57	Pass
W-73113	7/31/2013	Ra-226	17.61 ± 0.41	16.70	11.69 ± 21.71	Pass
SPS-4514	8/5/2013	Sr-90	78.63 ± 2.95	79.28	63.42 ± 95.14	Pass
W-82013	8/20/2013	Gr. Alpha	21.53 ± 0.45	20.00	10.00 ± 30.00	Pass
W-82013	8/20/2013	Gr. Beta	28.03 ± 0.32	30.90	20.90 ± 40.90	Pass
SPW-1894	8/28/2013	Ra-228	32.49 ± 3.00	30.85	21.60 ± 40.11	Pass
W-90913	9/9/2013	Gr. Alpha	19.08 ± 0.51	20.10	10.05 ± 30.15	Pass
W-90913	9/9/2013	Gr. Beta	32.12 ± 0.35	32.10	22.10 ± 42.10	Pass
WW-5623	10/3/2013	Co-60	157.0 ± 7.0	155.3	139.8 - 170.8	Pass
WW-5623	10/3/2013	Cs-137	156.0 ± 8.8	148.1	133.3 - 162.9	Pass
WW-5623	10/3/2013	H-3	6590 ± 245	6322	5058 - 7586	Pass
WW-5750	10/3/2013	Co-60	87.00 ± 7.80	77.40	77.00 ± 97.00	Pass
WW-5750	10/3/2013	Cs-137	82.30 ± 7.80	78.80	68.80 ± 88.80	Pass
WW-5750	10/3/2013	H-3	6181 ± 238	6322	5058 - 7586	Pass
W-102813	10/28/2013	Ra-226	15.69 ± 0.37	16.70	11.69 ± 21.71	Pass
SPW-1898	12/17/2013	Ra-228	28.15 ± 2.37	30.85	21.60 ± 40.11	Pass
W-122313	12/23/2013	Gr. Alpha	20.96 ± 0.47	20.10	10.05 ± 30.15	Pass
W-122313	12/23/2013	Gr. Beta	31.00 ± 0.34	32.10	22.10 ± 42.10	Pass

[a] Liquid sample results are reported in pCi/Liter, air filters(pCi/m^3), charcoal (pCi/charcoal canister), and solid samples (pCi/kg).

[b] Laboratory codes : W (Water), MI (milk), AP (air filter), SO (soil), VE (vegetation), CH (charcoal canister), F (fish), U (urine).

[c] Results are based on single determinations.

[d] Control limits are established from the precision values listed in Attachment A of this report, adjusted to ± 2s.

NOTE: For fish, Jello is used for the Spike matrix. For Vegetation, cabbage is used for the Spike matrix.

TABLE A-4. In-House "Blank" Samples

Lab Code	Sample Type	Date	Analysis[b]	Concentration (pCi/L)[a] Laboratory results (4.66σ) LLD	Activity[c]	Acceptance Criteria (4.66 σ)
SPW-67	Water	1/9/2013	Tc-99	1.10	0.69 ± 0.68	10
SPW-190	Water	1/18/2013	Ra-228	0.74	0.66 ± 0.43	2
SPW-1901	Water	1/18/2013	Ra-228	0.74	0.66 ± 0.43	2
SPMI-263	Milk	1/25/2013	Sr-90	0.64	0.31 ± 0.34	1
SPMI-263	Milk	1/25/2013	Sr-90	0.64	0.31 ± 0.34	1
SPW-265	Water	1/25/2013	Co-60	2.86	2.10 ± 1.72	10
SPW-265	Water	1/25/2013	Cs-134	2.98	2.25 ± 1.57	10
SPW-265	Water	1/25/2013	Cs-137	2.71	0.44 ± 1.61	10
SPW-266	Water	1/25/2013	Sr-90	0.72	-0.12 ± 0.32	1
SPAP-375	Air Filter	2/1/2013	Gr. Beta	0.003	0.016 ± 0.003	0.010
SPAP-377	Air Filter	2/1/2013	Co-60	2.31	-0.34 ± 1.75	100
SPAP-377	Air Filter	2/1/2013	Cs-134	2.72	1.22 ± 1.62	100
SPAP-377	Air Filter	2/1/2013	Cs-137	1.50	-0.52 ± 1.80	100
SPW-391	Water	2/1/2013	H-3	92.04	-29.44 ± 69.24	200
SPW-379	Water	2/10/2013	Ni-63	2.11	0.91 ± 1.30	20
W-30413	Water	3/4/2013	Gr. Alpha	0.35	0.08 ± 0.26	1
W-30413	Water	3/4/2013	Gr. Beta	0.73	0.10 ± 0.51	3.2
W-30713	Water	3/7/2013	Ra-226	0.031	0.032 ± 0.024	1
W-42713	Water	4/27/2013	Gr. Alpha	0.45	-0.14 ± 0.30	1
W-42713	Water	4/27/2013	Gr. Beta	0.72	-0.23 ± 0.50	3.2
W-53113	Water	5/31/2013	Ra-226	0.03	0.01 ± 0.02	1
SPW-3335	Water	6/19/2013	Th-230	0.01	0.01 ± 0.01	1
SPW-3459	Water	6/24/2013	C-14	10.89	10.44 ± 6.82	200
SPAP-3528	Air Filter	6/27/2013	Cs-134	2.10	-0.98 ± 1.11	100
SPAP-3528	Air Filter	6/27/2013	Cs-137	2.71	-0.24 ± 1.36	100
SPAP-3530	Air Filter	6/27/2013	Gr. Beta	0.004	0.018 ± 0.003	0.010
SPF-3532	Fish	6/27/2013	Cs-134	8.38	-1.39 ± 5.69	100
SPF-3532	Fish	6/27/2013	Cs-137	8.37	-1.88 ± 6.41	100
SPW-3534	Water	6/27/2013	Ni-63	2.47	-1.04 ± 1.48	20
SPW-3536	Water	6/27/2013	Tc-99	1.15	-1.11 ± 0.68	10
SPW-3538	water	6/27/2013	Fe-55	170.27	-17.50 ± 102.70	1000
SPW-1903	Water	6/28/2013	Ra-228	0.85	-0.02 ± 0.39	2

TABLE A-4. In-House "Blank" Samples

Lab Code	Sample Type	Date	Analysis[b]	Concentration (pCi/L)[a] Laboratory results (4.66σ) LLD	Activity[c]	Acceptance Criteria (4.66 σ)
SPW-72913B	Water	7/29/2013	Tc-99	1.44	-0.33 ± 0.87	10
SPW-4372	Water	7/31/2013	Co-60	1.41	-1.42 ± 3.00	10
SPW-4372	Water	7/31/2013	Cs-134	3.68	-2.66 ± 3.46	10
SPW-4372	Water	7/31/2013	Cs-137	3.53	0.29 ± 3.31	10
SPMI-4375	Milk	7/31/2013	Co-60	3.92	2.65 ± 2.26	10
SPMI-4375	Milk	7/31/2013	Cs-134	4.67	0.68 ± 2.54	10
SPMI-4375	Milk	7/31/2013	Cs-137	4.79	1.30 ± 2.68	10
SPMI-4375	Milk	7/31/2013	Sr-90	0.57	0.32 ± 0.30	1
W-73113	Water	7/31/2013	Ra-226	0.02	0.04 ± 0.02	1
SPS-4515	Powder	8/5/2013	Sr-90	0.09	-0.01 ± 0.04	1
W-82013	Water	8/20/2013	Gr. Alpha	0.42	-0.15 ± 0.28	1
W-82013	Water	8/20/2013	Gr. Beta	0.74	-0.24 ± 0.51	3.2
SPW-1904	Water	8/28/2013	Ra-228	0.96	0.85 ± 0.56	2
CHW-90913	Water	9/9/2013	Gr. Alpha	0.25	0.20 ± 0.29	1
CHW-90913	Water	9/9/2013	Gr. Beta	0.49	-0.18 ± 0.53	3.2
CHW-102013	Water	10/20/2013	Gr. Alpha	0.29	0.24 ± 0.33	1
CHW-102013	Water	10/20/2013	Gr. Beta	0.54	-0.32 ± 0.54	3.2
W-102813	Water	10/28/2013	Ra-226	0.02	0.02 ± 0.01	1
SPW-1908	Water	12/17/2013	Ra-228	0.69	0.55 ± 0.39	2
CHW-122313	Water	12/23/2013	Gr. Alpha	0.25	-0.09 ± 0.26	1
CHW-122313	Water	12/23/2013	Gr. Beta	0.48	0.05 ± 0.53	3.2
CHW-122713	Water	12/27/2013	Gr. Alpha	0.28	0.04 ± 0.31	1
CHW-122713	Water	12/27/2013	Gr. Beta	0.49	-0.33 ± 0.53	3.2

[a] Liquid sample results are reported in pCi/Liter, air filters(pCi/m^3), charcoal (pCi/charcoal canister), and solid samples (pCi/kg).

[b] I-131(G); iodine-131 as analyzed by gamma spectroscopy.

[c] Activity reported is a net activity result.

TABLE A-5. In-House "Duplicate" Samples

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result	Acceptance
CF-41, 42	1/2/2013	Gr. Beta	8.45 ± 0.37	7.90 ± 0.35	8.17 ± 0.26	Pass
CF-41, 42	1/2/2013	Sr-90	0.030 ± 0.015	0.029 ± 0.014	0.030 ± 0.010	Pass
SWT-8243, 8244	1/2/2013	Gr. Beta	1.07 ± 0.54	0.98 ± 0.51	1.03 ± 0.37	Pass
AP-8454, 8455	1/2/2013	Be-7	0.053 ± 0.010	0.042 ± 0.010	0.048 ± 0.007	Pass
AP-8517, 8518	1/3/2013	Be-7	0.051 ± 0.015	0.049 ± 0.017	0.050 ± 0.011	Pass
MI-62, 63	1/8/2013	K-40	1317.70 ± 91.70	1351.90 ± 72.50	1334.80 ± 58.45	Pass
WW-151, 152	1/8/2013	H-3	222.70 ± 81.00	289.70 ± 84.10	256.20 ± 58.38	Pass
SG-107, 108	1/11/2013	Ra-226	55.20 ± 5.53	58.60 ± 5.94	56.90 ± 4.06	Pass
SG-107, 108	1/11/2013	Ra-228	71.60 ± 1.10	74.30 ± 1.70	72.95 ± 1.01	Pass
SG-130, 131	1/14/2013	Ra-226	3.91 ± 0.20	3.45 ± 0.27	3.68 ± 0.17	Pass
SG-130, 131	1/14/2013	Ra-228	2.40 ± 0.33	2.70 ± 0.39	2.55 ± 0.26	Pass
WW-277, 278	1/17/2013	H-3	159.71 ± 77.91	196.57 ± 79.72	178.14 ± 55.73	Pass
WW-256, 257	1/22/2013	H-3	502.70 ± 93.40	483.30 ± 92.60	493.00 ± 65.76	Pass
DW-40010, 40011	1/24/2013	Ra-226	2.55 ± 0.18	2.86 ± 0.20	2.71 ± 0.13	Pass
DW-40010, 40011	1/24/2013	Ra-228	1.78 ± 0.62	2.22 ± 0.62	2.00 ± 0.44	Pass
SWT-361, 362	1/29/2013	Gr. Beta	0.90 ± 0.40	1.01 ± 0.38	0.96 ± 0.28	Pass
DW-484, 485	1/29/2013	Gr. Beta	14.85 ± 1.93	14.81 ± 2.06	14.83 ± 1.41	Pass
S-945, 946	1/29/2013	Cs-137	14.50 ± 0.18	14.45 ± 0.19	14.48 ± 0.13	Pass
S-945, 946	1/29/2013	K-40	7.90 ± 0.74	8.00 ± 0.73	7.95 ± 0.52	Pass
S-340, 341	1/31/2013	Cs-137	0.16 ± 0.05	0.15 ± 0.06	0.15 ± 0.04	Pass
S-340, 341	1/31/2013	K-40	17.35 ± 1.34	19.75 ± 1.25	18.55 ± 0.92	Pass
AP-463, 464	1/31/2013	Be-7	0.27 ± 0.10	0.26 ± 0.10	0.26 ± 0.07	Pass
MI-631, 632	2/13/2013	K-40	1350.50 ± 105.20	1413.70 ± 85.94	1382.10 ± 67.92	Pass
WW-769, 770	2/25/2013	Gr. Beta	1.20 ± 0.33	1.35 ± 0.34	1.28 ± 0.24	Pass
DW-736, 737	2/26/2013	Gr. Beta	1.09 ± 0.54	1.57 ± 0.58	1.33 ± 0.40	Pass
SWU-790, 791	2/26/2013	Gr. Beta	2.68 ± 0.96	2.08 ± 0.95	2.38 ± 0.67	Pass
W-925, 926	2/27/2013	H-3	2265.00 ± 153.00	2329.00 ± 154.00	2297.00 ± 108.54	Pass
AP-1034, 1035	3/7/2013	Be-7	0.17 ± 0.08	0.16 ± 0.09	0.17 ± 0.06	Pass
MI-1076, 1077	3/13/2013	K-40	1347.70 ± 99.32	1396.10 ± 108.00	1371.90 ± 73.36	Pass
CH-1118, 1119	3/14/2013	I-131(G)	109.41 ± 5.69	103.88 ± 7.76	106.65 ± 4.81	Pass
WW-1221, 1222	3/14/2013	H-3	452.11 ± 97.43	403.29 ± 95.46	427.70 ± 68.20	Pass
P-1368, 1369	3/15/2013	H-3	735.24 ± 113.99	666.04 ± 111.41	700.64 ± 79.70	Pass
DW-40017, 40018	3/19/2013	Gr. Alpha	1.43 ± 0.94	1.61 ± 1.00	1.52 ± 0.69	Pass
MI-1473, 1474	4/1/2013	K-40	1618.00 ± 107.00	1767.00 ± 129.00	1692.50 ± 83.80	Pass
AP-2014, 2015	4/1/2013	Be-7	0.055 ± 0.008	0.057 ± 0.006	0.056 ± 0.005	Pass
DW-40023, 40024	4/1/2013	Ra-226	2.29 ± 0.18	2.54 ± 0.20	2.42 ± 0.13	Pass
DW-40023, 40024	4/1/2013	Ra-228	2.99 ± 0.69	2.96 ± 0.67	2.98 ± 0.48	Pass
SWU-736, 737	4/2/2013	Gr. Beta	4.80 ± 0.95	4.43 ± 0.86	4.62 ± 0.64	Pass
AP-2035, 2036	4/2/2013	Be-7	0.070 ± 0.013	0.065 ± 0.013	0.068 ± 0.009	Pass
BS-1680, 1681	4/8/2013	K-40	1995.30 ± 265.70	1992.00 ± 289.40	1993.65 ± 196.44	Pass
SW-1638, 1639	4/9/2013	H-3	1350.77 ± 130.08	1320.45 ± 129.25	1335.61 ± 91.69	Pass

TABLE A-5. In-House "Duplicate" Samples

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
WW-2394, 2395	4/9/2013	H-3	348.08 ± 88.40	302.43 ± 86.41	325.25 ± 61.81	Pass
DW-40035, 40036	4/12/2013	Ra-226	1.36 ± 0.15	1.29 ± 0.13	1.33 ± 0.10	Pass
DW-40035, 40036	4/12/2013	Ra-228	1.22 ± 0.49	1.38 ± 0.53	1.30 ± 0.36	Pass
MI-1825, 1826	4/15/2013	K-40	1290.20 ± 113.80	1378.60 ± 91.99	1334.40 ± 73.17	Pass
MI-1825, 1826	4/15/2013	Sr-90	0.68 ± 0.32	0.46 ± 0.31	0.57 ± 0.22	Pass
DW-40049, 40050	4/15/2013	Gr. Alpha	1.88 ± 0.69	2.51 ± 0.71	2.20 ± 0.50	Pass
WW-1909, 1910	4/16/2013	H-3	2145.68 ± 156.65	2108.32 ± 155.80	2127.00 ± 110.47	Pass
DW-40064, 40065	4/23/2013	Gr. Alpha	1.95 ± 0.79	1.80 ± 0.81	1.88 ± 0.57	Pass
DW-40066, 40067	4/23/2013	Ra-226	1.98 ± 0.17	1.66 ± 0.16	1.82 ± 0.12	Pass
DW-40066, 40067	4/23/2013	Ra-228	2.30 ± 0.59	2.32 ± 0.59	2.31 ± 0.42	Pass
F-2225, 2226	5/1/2013	K-40	2.81 ± 0.37	2.67 ± 0.39	2.74 ± 0.27	Pass
BS-2267, 2268	5/1/2013	K-40	13.46 ± 0.64	13.59 ± 0.62	13.52 ± 0.45	Pass
SG-2235, 2236	5/2/2013	Ac-228	18.30 ± 0.60	18.50 ± 0.60	18.40 ± 0.42	Pass
SG-2235, 2236	5/2/2013	Gr. Alpha	54.00 ± 3.70	51.90 ± 3.40	52.95 ± 2.51	Pass
SG-2235, 2236	5/2/2013	Pb-214	11.30 ± 0.30	11.20 ± 0.20	11.25 ± 0.18	Pass
AP-2288, 2289	5/2/2013	Be-7	0.19 ± 0.10	0.19 ± 0.08	0.19 ± 0.07	Pass
WW-3091, 3092	5/2/2013	H-3	1107.91 ± 153.49	1263.37 ± 157.43	1185.64 ± 109.94	Pass
SW-2373, 2374	5/8/2013	H-3	324.80 ± 86.81	364.61 ± 88.53	344.71 ± 62.00	Pass
W-2352, 2353	5/9/2013	Ra-226	0.91 ± 0.20	1.29 ± 0.22	1.10 ± 0.15	Pass
W-2352, 2353	5/9/2013	Ra-228	1.28 ± 0.87	1.03 ± 0.94	1.16 ± 0.64	Pass
CF-2499, 2500	5/13/2013	K-40	11.52 ± 0.45	12.55 ± 0.61	12.04 ± 0.38	Pass
F-3987, 3988	5/20/2013	K-40	3.07 ± 0.48	3.05 ± 0.43	3.06 ± 0.32	Pass
BS-4113, 4114	5/20/2013	K-40	8.06 ± 0.44	7.99 ± 0.44	8.02 ± 0.31	Pass
SO-2902, 2903	5/22/2013	Th-228	0.57 ± 0.07	0.51 ± 0.06	0.54 ± 0.05	Pass
SO-2902, 2903	5/22/2013	Th-230	0.39 ± 0.06	0.40 ± 0.05	0.40 ± 0.04	Pass
SO-2902, 2903	5/22/2013	Th-232	0.55 ± 0.07	0.62 ± 0.06	0.59 ± 0.05	Pass
WW-2776, 2777	5/23/2013	H-3	261.76 ± 100.85	283.17 ± 101.68	272.46 ± 71.61	Pass
WW-2818, 2819	5/23/2013	H-3	999.35 ± 126.15	880.63 ± 122.43	939.99 ± 87.90	Pass
S-7271, 7272	5/27/2013	Cs-137	2.82 ± 0.10	2.91 ± 0.09	2.86 ± 0.07	Pass
S-7271, 7272	5/27/2013	K-40	21.52 ± 0.97	21.13 ± 1.02	21.32 ± 0.70	Pass
P-2923, 2924	5/29/2013	H-3	441.31 ± 92.75	374.30 ± 89.94	407.80 ± 64.60	Pass
WW-3133, 3134	6/1/2013	H-3	278.42 ± 86.54	209.45 ± 83.44	243.93 ± 60.11	Pass
WW-3049, 3050	6/5/2013	H-3	156.08 ± 79.16	244.66 ± 83.86	200.37 ± 57.66	Pass
DW-40079, 40080	6/5/2013	Ra-226	6.67 ± 0.30	7.03 ± 0.35	6.85 ± 0.23	Pass
DW-40079, 40080	6/5/2013	Ra-228	5.55 ± 0.75	6.11 ± 0.77	5.83 ± 0.54	Pass
DW-40089, 40090	6/5/2013	Gr. Alpha	6.82 ± 0.90	5.64 ± 1.02	6.23 ± 0.68	Pass
DW-40091, 40092	6/5/2013	Ra-226	3.44 ± 0.19	3.66 ± 0.19	3.55 ± 0.13	Pass
DW-40091, 40092	6/5/2013	Ra-228	3.70 ± 0.68	4.69 ± 0.73	4.20 ± 0.50	Pass
DW-40103, 40104	6/5/2013	Ra-226	0.98 ± 0.22	0.62 ± 0.15	0.80 ± 0.13	Pass
MI-3154, 3155	6/12/2013	K-40	1513.00 ± 128.10	1456.70 ± 110.30	1484.85 ± 84.52	Pass
P-3385, 3386	6/14/2013	H-3	236.88 ± 87.87	242.87 ± 88.14	239.88 ± 62.23	Pass
F-3776, 3777	6/16/2013	Cs-137	0.039 ± 0.015	0.048 ± 0.019	0.044 ± 0.012	Pass
F-3776, 3777	6/16/2013	Gr. Beta	4.52 ± 0.09	4.63 ± 0.09	4.57 ± 0.06	Pass
F-3776, 3777	6/16/2013	K-40	3.40 ± 0.41	3.52 ± 0.39	3.46 ± 0.29	Pass

TABLE A-5. In-House "Duplicate" Samples

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
S-3238, 3239	6/17/2013	Be-7	1139.80 ± 215.00	1102.00 ± 194.70	1120.90 ± 145.03	Pass
S-3238, 3239	6/17/2013	Cs-134	26.23 ± 13.23	39.91 ± 11.73	33.07 ± 8.84	Pass
S-3238, 3239	6/17/2013	Cs-137	72.75 ± 25.99	85.91 ± 22.58	79.33 ± 17.21	Pass
S-3238, 3239	6/17/2013	K-40	21847.00 ± 656.50	22158.00 ± 622.80	22002.50 ± 452.46	Pass
SO-3343, 3344	6/17/2013	Cs-137	0.087 ± 0.022	0.084 ± 0.017	0.086 ± 0.014	Pass
SO-3343, 3344	6/17/2013	K-40	8.90 ± 0.53	9.47 ± 0.49	9.19 ± 0.36	Pass
DW-40118, 40119	6/26/2013	Gr. Alpha	3.56 ± 1.07	4.51 ± 0.96	4.04 ± 0.72	Pass
DW-40118, 40119	6/26/2013	Ra-226	2.52 ± 0.22	2.48 ± 0.19	2.50 ± 0.15	Pass
DW-40118, 40119	6/26/2013	Ra-228	2.75 ± 0.71	2.86 ± 0.75	2.81 ± 0.52	Pass
WW-3583, 3584	6/27/2013	H-3	6732.57 ± 246.74	6807.94 ± 247.98	6770.26 ± 174.91	Pass
AP-4092, 4093	6/28/2013	Be-7	0.078 ± 0.015	0.083 ± 0.017	0.080 ± 0.011	Pass
E-3608, 3609	7/1/2013	K-40	1.28 ± 0.13	1.29 ± 0.11	1.28 ± 0.09	Pass
MI-3629, 3630	7/1/2013	K-40	1840.70 ± 130.10	1804.90 ± 143.00	1822.80 ± 96.66	Pass
AP-4050, 4051	7/1/2013	Be-7	0.094 ± 0.009	0.093 ± 0.009	0.093 ± 0.006	Pass
DW-40134, 40135	7/1/2013	Ra-226	1.75 ± 0.15	1.56 ± 0.15	1.66 ± 0.11	Pass
DW-40134, 40135	7/1/2013	Ra-228	2.07 ± 0.60	1.61 ± 0.57	1.84 ± 0.41	Pass
AP-4071, 4072	7/3/2013	Be-7	0.066 ± 0.009	0.069 ± 0.011	0.067 ± 0.007	Pass
DW-40144, 40145	7/9/2013	Gr. Alpha	3.66 ± 0.85	2.85 ± 0.79	3.26 ± 0.58	Pass
DW-40146, 40147	7/9/2013	Ra-226	0.70 ± 0.11	0.72 ± 0.11	0.71 ± 0.08	Pass
DW-40146, 40147	7/9/2013	Ra-228	1.00 ± 0.58	0.70 ± 0.52	0.85 ± 0.39	Pass
VE-3818, 3819	7/9/2013	Be-7	0.41 ± 0.11	0.46 ± 0.18	0.43 ± 0.11	Pass
VE-3818, 3819	7/9/2013	K-40	4.67 ± 0.30	4.52 ± 0.43	4.60 ± 0.26	Pass
XW-4646, 4647	7/15/2013	H-3	465.00 ± 111.00	525.00 ± 114.00	495.00 ± 79.56	Pass
WW-4134, 4135	7/16/2013	H-3	315.86 ± 123.54	264.98 ± 121.78	290.42 ± 86.73	Pass
AP-4155, 4156	7/18/2013	Be-7	0.20 ± 0.11	0.16 ± 0.09	0.18 ± 0.07	Pass
MI-4218, 4219	7/22/2013	K-40	1426.80 ± 117.50	1335.70 ± 110.60	1381.25 ± 80.68	Pass
MI-4218, 4219	7/22/2013	Sr-90	0.62 ± 0.32	0.67 ± 0.32	0.65 ± 0.23	Pass
WW-4239, 4240	7/23/2013	H-3	223.71 ± 92.64	221.74 ± 92.56	222.73 ± 65.48	Pass
WW-4394, 4395	7/30/2013	Gr. Alpha	2.63 ± 1.49	2.57 ± 1.11	2.60 ± 0.93	Pass
WW-4394, 4395	7/30/2013	Gr. Beta	3.72 ± 1.17	2.63 ± 1.29	3.18 ± 0.87	Pass
WW-4394, 4395	7/30/2013	H-3	271.50 ± 91.30	297.60 ± 91.50	284.55 ± 64.63	Pass
SWU-4478, 4479	7/30/2013	Gr. Beta	2.07 ± 0.54	2.24 ± 0.55	2.16 ± 0.39	Pass
DW-40159, 40160	7/31/2013	Ra-226	3.39 ± 0.63	2.39 ± 0.45	2.89 ± 0.39	Pass
DW-40159, 40160	7/31/2013	Ra-228	3.29 ± 0.73	2.94 ± 0.68	3.12 ± 0.50	Pass
VE-4436, 4437	8/1/2013	Be-7	0.98 ± 0.21	0.89 ± 0.17	0.94 ± 0.14	Pass
VE-4436, 4437	8/1/2013	K-40	3.95 ± 0.39	3.75 ± 0.31	3.85 ± 0.25	Pass
G-4457, 4458	8/1/2013	Be-7	0.78 ± 0.19	0.67 ± 0.16	0.72 ± 0.12	Pass
G-4457, 4458	8/1/2013	Gr. Beta	6.15 ± 0.14	6.10 ± 0.14	6.13 ± 0.10	Pass
G-4457, 4458	8/1/2013	K-40	4.25 ± 0.36	4.60 ± 0.41	4.42 ± 0.27	Pass
VE-4520, 4521	8/1/2013	K-40	2.20 ± 0.16	2.09 ± 0.17	2.15 ± 0.12	Pass
WW-4772, 4773	8/6/2013	H-3	143.80 ± 86.70	157.80 ± 87.30	150.80 ± 61.52	Pass

TABLE A-5. In-House "Duplicate" Samples

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
VE-4709, 4710	8/8/2013	Gr. Beta	31.40 ± 1.00	30.70 ± 1.00	31.05 ± 0.71	Pass
VE-4709, 4710	8/8/2013	H-3	1504.00 ± 132.00	1468.00 ± 131.00	1486.00 ± 92.99	Pass
VE-4709, 4710	8/8/2013	U-233/4	0.009 ± 0.002	0.005 ± 0.002	0.007 ± 0.001	Pass
VE-4709, 4710	8/8/2013	U-238	0.005 ± 0.002	0.004 ± 0.001	0.005 ± 0.001	Pass
WW-4562, 4563	8/8/2013	H-3	208.82 ± 105.55	213.13 ± 105.73	210.97 ± 74.70	Pass
SG-4651, 4652	8/13/2013	Gr. Alpha	29.00 ± 3.10	28.80 ± 3.20	28.90 ± 2.23	Pass
SG-4651, 4652	8/13/2013	Gr. Beta	34.10 ± 1.80	34.00 ± 1.80	34.05 ± 1.27	Pass
SG-4651, 4652	8/13/2013	Ra-226	9.00 ± 0.20	8.70 ± 0.20	8.85 ± 0.14	Pass
VE-4835, 4836	8/13/2013	K-40	3.01 ± 0.24	3.08 ± 0.28	3.04 ± 0.19	Pass
WW-4877, 4878	8/14/2013	H-3	217.35 ± 87.57	276.63 ± 90.20	246.99 ± 62.86	Pass
LW-4856, 4857	8/15/2013	Gr. Beta	0.96 ± 0.40	0.94 ± 0.38	0.95 ± 0.28	Pass
W-4982, 4983	8/16/2013	H-3	757.43 ± 112.40	767.56 ± 112.76	762.50 ± 79.60	Pass
VE-4919, 4920	8/19/2013	K-40	4891.90 ± 407.90	4907.40 ± 350.40	4899.65 ± 268.87	Pass
VE-4919, 4920	8/19/2013	Be-7	470.50 ± 159.60	325.10 ± 104.10	397.80 ± 95.27	Pass
DW-40184, 40185	8/19/2013	Ra-228	2.35 ± 0.72	2.53 ± 0.70	2.44 ± 0.50	Pass
DW-40184, 40185	8/19/2013	Ra-228	1.44 ± 0.35	2.30 ± 0.56	1.87 ± 0.33	Pass
AP-5003, 5004	8/22/2013	Be-7	0.23 ± 0.10	0.21 ± 0.10	0.22 ± 0.07	Pass
LW-5229, 5230	8/29/2013	Gr. Beta	1.09 ± 0.86	2.28 ± 0.96	1.69 ± 0.64	Pass
SS-5333, 5334	9/3/2013	Cs-137	89.20 ± 41.60	97.80 ± 34.60	93.50 ± 27.05	Pass
SS-5333, 5334	9/3/2013	K-40	11893.00 ± 681.30	12353.00 ± 778.90	12123.00 ± 517.41	Pass
VE-5313, 5314	9/3/2013	K-40	1.84 ± 0.20	1.85 ± 0.20	1.85 ± 0.14	Pass
VE-5313, 5314	9/3/2013	Gr. Beta	2.38 ± 0.04	2.43 ± 0.04	2.41 ± 0.03	Pass
WW-5617, 5618	9/5/2013	H-3	1987.00 ± 147.00	2094.00 ± 150.00	2040.50 ± 105.01	Pass
AP-5355, 5356	9/5/2013	Be-7	0.22 ± 0.12	0.27 ± 0.14	0.25 ± 0.09	Pass
XW-5694, 5695	9/8/2013	C-14	0.94 ± 0.09	0.78 ± 0.10	0.86 ± 0.07	Pass
VE-5409, 5410	9/9/2013	K-40	3.60 ± 0.26	3.33 ± 0.29	3.46 ± 0.19	Pass
AP-5430, 5431	9/12/2013	Be-7	0.26 ± 0.10	0.26 ± 0.10	0.26 ± 0.07	Pass
MI-5401, 5402	9/12/2013	K-40	1404.60 ± 114.10	1356.10 ± 128.60	1380.35 ± 85.96	Pass
WW-5451, 5452	9/12/2013	H-3	196.66 ± 84.44	200.78 ± 84.64	198.72 ± 59.78	Pass
MI-5484, 5485	9/16/2013	K-40	1398.50 ± 88.93	1364.60 ± 113.30	1381.55 ± 72.02	Pass
WW-5568, 5569	9/17/2013	H-3	274.69 ± 87.95	203.72 ± 84.71	239.20 ± 61.05	Pass
BS-5764, 5765	9/20/2013	Cs-137	0.40 ± 0.03	0.37 ± 0.02	0.39 ± 0.02	Pass
BS-5764, 5765	9/20/2013	K-40	17.97 ± 0.59	17.54 ± 0.55	17.76 ± 0.40	Pass
VE-5638, 5639	9/23/2013	K-40	4.15 ± 0.33	4.46 ± 0.38	4.31 ± 0.25	Pass
WW-5596, 5597	9/23/2013	Gr. Beta	5.97 ± 1.39	5.95 ± 1.45	5.96 ± 1.01	Pass
G-5680, 5681	9/25/2013	Be-7	0.36 ± 0.13	0.35 ± 0.09	0.35 ± 0.08	Pass
G-5680, 5681	9/25/2013	Gr. Beta	3.81 ± 0.11	3.77 ± 0.11	3.79 ± 0.08	Pass
G-5680, 5681	9/25/2013	K-40	3.23 ± 0.32	2.99 ± 0.24	3.11 ± 0.20	Pass
S-5659, 5660	9/26/2013	Ac-228	1.19 ± 0.21	1.06 ± 0.21	1.13 ± 0.15	Pass
S-5659, 5660	9/26/2013	Cs-137	0.13 ± 0.04	0.14 ± 0.05	0.14 ± 0.03	Pass
S-5659, 5660	9/26/2013	K-40	16.08 ± 1.39	16.65 ± 1.46	16.37 ± 1.01	Pass
S-5659, 5660	9/26/2013	Pb-214	0.97 ± 0.15	1.10 ± 0.16	1.04 ± 0.11	Pass
AP-6345, 6346	9/30/2013	Be-7	0.077 ± 0.010	0.081 ± 0.008	0.079 ± 0.006	Pass
AP-6366, 6367	9/30/2013	Be-7	0.078 ± 0.012	0.083 ± 0.014	0.081 ± 0.009	Pass

TABLE A-5. In-House "Duplicate" Samples

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
DW-5701, 5702	9/30/2013	Gr. Beta	14.48 ± 2.04	13.32 ± 1.84	13.90 ± 1.37	Pass
SG-5722, 5723	9/30/2013	Ra-226	12.41 ± 0.47	11.98 ± 0.59	12.20 ± 0.38	Pass
SG-5722, 5723	9/30/2013	Ra-228	7.84 ± 0.71	8.13 ± 0.97	7.99 ± 0.60	Pass
G-5806, 5807	10/1/2013	Be-7	3.26 ± 0.30	3.11 ± 0.13	3.19 ± 0.16	Pass
G-5806, 5807	10/1/2013	K-40	6.65 ± 0.21	6.68 ± 0.50	6.67 ± 0.27	Pass
SG-5827, 5828	10/1/2013	Ac-228	4.08 ± 0.33	3.92 ± 0.40	4.00 ± 0.26	Pass
SG-5827, 5828	10/1/2013	K-40	2.55 ± 0.65	2.37 ± 0.63	2.46 ± 0.45	Pass
SG-5827, 5828	10/1/2013	Pb-214	3.82 ± 0.17	3.93 ± 0.20	3.88 ± 0.13	Pass
VE-5848, 5849	10/1/2013	K-40	1.62 ± 0.16	1.57 ± 0.14	1.60 ± 0.11	Pass
AP-6408, 6409	10/3/2013	Be-7	0.072 ± 0.015	0.063 ± 0.012	0.068 ± 0.010	Pass
f-5954, 5955	10/3/2013	K-40	2.74 ± 0.36	3.02 ± 0.34	2.88 ± 0.25	Pass
P-6035, 6036	10/7/2013	H-3	198.41 ± 85.00	288.60 ± 89.15	243.51 ± 61.59	Pass
SG-6115, 6116	10/8/2013	Ac-228	5.22 ± 0.50	4.87 ± 0.48	5.05 ± 0.35	Pass
SG-6115, 6116	10/8/2013	K-40	5.61 ± 1.08	6.61 ± 1.04	6.11 ± 0.75	Pass
SG-6115, 6116	10/8/2013	Pb-214	4.29 ± 0.24	4.24 ± 0.20	4.27 ± 0.16	Pass
VE-6136, 6137	10/8/2013	Be-7	0.55 ± 0.18	0.60 ± 0.15	0.58 ± 0.12	Pass
VE-6136, 6137	10/8/2013	K-40	2.78 ± 0.35	2.61 ± 0.33	2.69 ± 0.24	Pass
WW-6198, 6199	10/8/2013	H-3	12973.70 ± 332.60	12757.80 ± 330.00	12865.75 ± 234.27	Pass
VE-6240, 6241	10/9/2013	K-40	14.29 ± 0.29	14.95 ± 0.54	14.62 ± 0.31	Pass
W-5996, 5997	10/9/2013	Gr. Alpha	3.87 ± 1.18	4.07 ± 1.08	3.97 ± 0.80	Pass
W-5996, 5997	10/9/2013	Gr. Beta	9.82 ± 0.85	8.53 ± 0.82	9.18 ± 0.59	Pass
W-5996, 5997	10/9/2013	Ra-228	3.42 ± 1.02	3.39 ± 1.01	3.41 ± 0.72	Pass
DW-40224, 40225	10/11/2013	Ra-226	0.62 ± 0.10	0.76 ± 0.10	0.69 ± 0.07	Pass
DW-40224, 40225	10/11/2013	Ra-228	0.87 ± 0.55	1.00 ± 0.54	0.94 ± 0.39	Pass
WW-6219, 6220	10/11/2013	H-3	455.41 ± 111.54	354.66 ± 107.84	405.03 ± 77.57	Pass
CF-6261, 6262	10/14/2013	Be-7	1.97 ± 0.24	2.06 ± 0.22	2.01 ± 0.16	Pass
CF-6261, 6262	10/14/2013	K-40	11.55 ± 0.56	12.06 ± 0.61	11.80 ± 0.41	Pass
MI-6303, 6304	10/14/2013	K-40	1507.30 ± 110.80	1482.40 ± 110.00	1494.85 ± 78.07	Pass
VE-6534, 6535	10/17/2013	K-40	15.96 ± 0.17	16.16 ± 0.36	16.06 ± 0.20	Pass
S-6471, 6472	10/18/2013	Ac-228	0.94 ± 0.19	0.78 ± 0.18	0.86 ± 0.13	Pass
S-6471, 6472	10/18/2013	K-40	12.82 ± 1.05	12.90 ± 1.17	12.86 ± 0.79	Pass
S-6471, 6472	10/18/2013	Pb-214	0.88 ± 0.11	0.72 ± 0.12	0.80 ± 0.08	Pass
VE-6597, 6598	10/22/2013	K-40	2.46 ± 0.22	2.58 ± 0.20	2.52 ± 0.15	Pass
WW-6576, 6577	10/22/2013	H-3	745.60 ± 110.70	663.30 ± 107.60	704.45 ± 77.19	Pass
LW-6681, 6682	10/29/2013	Gr. Beta	2.00 ± 0.92	2.17 ± 0.98	2.09 ± 0.67	Pass
SWU-6765, 6766	10/29/2013	Gr. Beta	3.07 ± 0.61	2.90 ± 0.65	2.99 ± 0.45	Pass
WW-6849, 6850	10/29/2013	H-3	863.00 ± 113.80	826.60 ± 112.50	844.80 ± 80.01	Pass
MI-6786, 6787	10/30/2013	K-40	1370.60 ± 109.60	1449.20 ± 105.50	1409.90 ± 76.06	Pass
SO-6744, 6745	10/30/2013	Ac-228	0.46 ± 0.11	0.51 ± 0.11	0.48 ± 0.08	Pass
SO-6744, 6745	10/30/2013	Bi-214	0.48 ± 0.10	0.30 ± 0.10	0.39 ± 0.07	Pass
SO-6744, 6745	10/30/2013	Cs-137	0.21 ± 0.04	0.24 ± 0.04	0.23 ± 0.03	Pass
SO-6744, 6745	10/30/2013	Gr. Beta	27.40 ± 1.14	27.44 ± 1.11	27.42 ± 0.80	Pass
SO-6744, 6745	10/30/2013	K-40	14.93 ± 0.88	15.20 ± 0.90	15.07 ± 0.63	Pass
SO-6744, 6745	10/30/2013	Pb-212	0.43 ± 0.04	0.40 ± 0.05	0.42 ± 0.03	Pass
SO-6744, 6745	10/30/2013	Ra-226	1.47 ± 0.35	1.31 ± 0.36	1.39 ± 0.25	Pass
SO-6744, 6745	10/30/2013	Tl-208	0.16 ± 0.04	0.16 ± 0.04	0.16 ± 0.03	Pass

TABLE A-5. In-House "Duplicate" Samples

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
DW-40238, 40239	10/31/2013	Ra-228	0.94 ± 0.41	1.60 ± 0.55	1.27 ± 0.34	Pass
WW-7018, 7019	11/1/2013	H-3	593.09 ± 104.72	648.69 ± 106.89	620.89 ± 74.82	Pass
CF-6870, 6871	11/4/2013	K-40	12.67 ± 0.49	13.30 ± 0.47	12.98 ± 0.34	Pass
XW-6828, 6829	11/4/2013	K-40	97.99 ± 55.33	160.21 ± 74.99	129.10 ± 46.60	Pass
BS-6891, 6892	11/5/2013	Cs-137	0.018 ± 0.010	0.018 ± 0.009	0.018 ± 0.007	Pass
BS-6891, 6892	11/5/2013	Gr. Beta	12.41 ± 1.74	9.97 ± 1.57	11.19 ± 1.17	Pass
BS-6891, 6892	11/5/2013	K-40	6.49 ± 0.33	6.28 ± 0.40	6.39 ± 0.26	Pass
WW-6912, 6913	11/5/2013	Gr. Alpha	2.87 ± 1.30	4.46 ± 1.47	3.67 ± 0.98	Pass
WW-6912, 6913	11/5/2013	Gr. Beta	3.18 ± 0.87	3.18 ± 0.87	3.18 ± 0.62	Pass
WW-6912, 6913	11/5/2013	H-3	349.01 ± 101.42	430.14 ± 98.06	389.58 ± 70.54	Pass
SO-6954, 6955	11/6/2013	Cs-137	0.14 ± 0.03	0.12 ± 0.02	0.13 ± 0.02	Pass
SO-6954, 6955	11/6/2013	K-40	15.16 ± 0.72	14.11 ± 0.64	14.64 ± 0.48	Pass
S-6976, 6977	11/13/2013	K-40	22.36 ± 0.69	22.62 ± 0.72	22.49 ± 0.50	Pass
DW-40246, 40247	11/15/2013	Gr. Alpha	15.00 ± 3.41	20.31 ± 4.00	17.65 ± 2.63	Pass
CF-7102, 7103	11/18/2013	Be-7	17.79 ± 0.51	18.09 ± 0.80	17.94 ± 0.48	Pass
DW-40250, 40251	11/18/2013	Ra-226	27.77 ± 2.84	26.15 ± 2.67	26.96 ± 1.95	Pass
DW-40250, 40251	11/18/2013	Ra-228	7.91 ± 0.94	6.32 ± 0.84	7.12 ± 0.63	Pass
WW-7164, 7165	11/19/2013	H-3	266.90 ± 91.10	268.90 ± 91.20	267.90 ± 64.45	Pass
SS-7334, 7335	11/20/2013	K-40	15.51 ± 0.72	14.14 ± 0.80	14.83 ± 0.54	Pass
WW-7558, 7559	11/22/2013	H-3	229.86 ± 83.89	191.77 ± 82.05	210.82 ± 58.67	Pass
LW-7292, 7293	11/26/2013	Gr. Beta	1.92 ± 0.75	2.38 ± 0.77	2.15 ± 0.54	Pass
W-7229, 7230	12/1/2013	Ra-226	0.87 ± 0.23	0.88 ± 0.25	0.88 ± 0.17	Pass
W-7229, 7230	12/1/2013	Ra-228	3.00 ± 0.98	3.27 ± 1.16	3.14 ± 0.76	Pass
SG-7313, 7314	12/2/2013	Ac-228	6.33 ± 0.23	6.69 ± 0.30	6.51 ± 0.19	Pass
SG-7313, 7314	12/2/2013	K-40	5.47 ± 0.61	6.24 ± 0.74	5.86 ± 0.48	Pass
SG-7313, 7314	12/2/2013	Pb-214	5.60 ± 0.14	5.37 ± 0.16	5.49 ± 0.11	Pass
W-7432, 7433	12/4/2013	Gr. Beta	5.35 ± 1.20	3.89 ± 1.23	4.62 ± 0.86	Pass
WW-7516, 7517	12/10/2013	H-3	369.30 ± 95.64	269.22 ± 91.35	319.26 ± 66.13	Pass
SG-7579, 7580	12/20/2013	Ra-226	3.72 ± 0.11	3.85 ± 0.30	3.79 ± 0.16	Pass
SG-7579, 7580	12/20/2013	Ra-228	2.38 ± 0.18	2.77 ± 0.44	2.58 ± 0.24	Pass
LW-7684, 7685	12/23/2013	Gr. Beta	0.84 ± 0.51	1.96 ± 0.61	1.40 ± 0.40	Pass
DW-40261, 40262	12/27/2013	Ra-226	0.54 ± 0.10	0.67 ± 0.10	0.61 ± 0.07	Pass
DW-40261, 40262	12/27/2013	Ra-228	1.09 ± 0.51	1.12 ± 0.43	1.11 ± 0.33	Pass
SWU-7663, 7664	12/30/2013	Gr. Beta	2.85 ± 0.71	3.88 ± 0.77	3.37 ± 0.52	Pass

Note: Duplicate analyses are performed on every twentieth sample received in-house. Results are not listed for those analyses with activities that measure below the LLD.

[a] Results are reported in units of pCi/L, except for air filters (pCi/Filter), food products, vegetation, soil, sediment (pCi/g).

TABLE A-6. Department of Energy's Mixed Analyte PerforMAnce Evaluation Program (MAPEP).

			Concentration [a]			
Lab Code [b]	Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MAAP-738	02/01/13	Am-241	0.10 ± 0.02	0.10	0.07 - 0.14	Pass
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	Pu-238	0.12 ± 0.02	0.13	0.09 - 0.17	Pass
MAAP-738	02/01/13	Pu-239/40	0.11 ± 0.02	0.12	0.09 - 0.16	Pass
MAAP-738	02/01/13	Sr-90	1.39 ± 0.14	1.49	1.04 - 1.94	Pass
MAAP-738	02/01/13	U-233/4	0.03 ± 0.01	0.03	0.02 - 0.04	Pass
MAAP-738	02/01/13	U-238	0.23 ± 0.03	0.23	0.16 - 0.30	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
MAAP-738	02/01/13	Gr. Beta	0.93 ± 0.06	0.85	0.43 - 1.28	Pass
MAW-806	02/01/13	Am-241	0.71 ± 0.08	0.69	0.48 - 0.90	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	Ni-63	34.30 ± 2.80	33.40	23.40 - 43.40	Pass
MAW-806	02/01/13	Pu-238	0.83 ± 0.10	0.88	0.62 - 1.15	Pass
MAW-806	02/01/13	Pu-239/40	0.02 ± 0.02	0.01	0.00 - 1.00	Pass
MAW-806	02/01/13	Sr-90	9.30 ± 0.80	10.50	7.40 - 13.70	Pass
MAW-806	02/01/13	Tc-99	10.25 ± 0.40	13.10	9.20 - 17.00	Pass
MAW-806	02/01/13	U-233/4	0.31 ± 0.05	0.32	0.22 - 0.41	Pass
MAW-806	02/01/13	U-238	1.91 ± 0.13	1.95	1.37 - 2.54	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
MAW-811	02/01/13	I-129	4.60 ± 0.19	6.06	4.24 - 7.88	Pass

TABLE A-6. Department of Energy's Mixed Analyte PerforMAnce Evaluation Program (MAPEP).

			Concentration [a]			
Lab Code [b]	Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MASO-739	02/01/13	Am-241	106.90 ± 11.40	113.00	79.00 - 147.00	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	02/01/13	Ni-63	682.60 ± 16.80	670.00	469.00 - 871.00	Pass
MASO-744	02/01/13	Pu-238	0.20 ± 0.90	0.00	0.00 - 1.00	Pass
MASO-744	02/01/13	Pu-239/40	88.30 ± 9.00	79.50	55.70 - 103.40	Pass
MASO-744 [e]	02/01/13	Sr-90	408.40 ± 14.00	628.00	440.00 - 816.00	Fail
MASO-744	02/01/13	Tc-99	380.50 ± 16.80	444.00	311.00 - 577.00	Pass
MASO-744	02/01/13	U-233/4	53.20 ± 4.80	62.50	43.80 - 81.30	Pass
MASO-744	02/01/13	U-238	242.10 ± 10.20	281.00	197.00 - 365.00	Pass
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	08/01/13	Am-241	1.40 ± 1.70	0.00	0.00 - 5.00	Pass
MASO-5043 [f]	08/01/13	Co-57	699.60 ± 3.90	0.00	0.00 - 5.00	Fail
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	472.00 - 876.00	Pass
MASO-5043	08/01/13	Ni-63	560.00 ± 23.70	571.00	400.00 - 742.00	Pass
MASO-5043	08/01/13	Pu-238	68.40 ± 7.50	61.50	43.10 - 80.00	Pass
MASO-5043	08/01/13	Pu-239/40	0.40 ± 0.80	0.36	0.00 - 1.00	Pass
MASO-5043	08/01/13	Sr-90	383.90 ± 14.50	460.00	322.00 - 598.00	Pass
MASO-5043	08/01/13	Tc-99	-1.00 ± 10.50	0.00	0.00 - 5.00	Pass
MASO-5043	08/01/13	U-233/4	23.80 ± 3.30	30.00	21.00 - 39.00	Pass
MASO-5043	08/01/13	U-238	26.80 ± 3.50	34.00	23.80 - 44.20	Pass
MASO-5043	08/01/13	Zn-65	-351.50 ± 5.50	0.00	0.00 - 0.00	Pass

TABLE A-6. Department of Energy's Mixed Analyte PerforMAnce Evaluation Program (MAPEP).

			Concentration [a]			
Lab Code [b]	Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MAW-5052	08/01/13	I-129	2.75 ± 0.20	3.79	2.65 - 4.93	Pass
MAW-5094	08/01/13	Am-241	0.00 ± 0.01	0.00	0.00 - 5.00	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	Ni-63	21.80 ± 3.30	26.40	18.50 - 34.30	Pass
MAW-5094	08/01/13	Pu-238	1.30 ± 0.11	1.22	0.85 - 1.58	Pass
MAW-5094	08/01/13	Pu-239/40	0.98 ± 0.09	1.00	0.70 - 1.30	Pass
MAW-5094	08/01/13	Sr-90	6.40 ± 0.60	7.22	5.05 - 9.39	Pass
MAW-5094	08/01/13	Tc-99	13.10 ± 0.70	16.20	11.30 - 21.10	Pass
MAW-5094	08/01/13	U-233/4	0.080 ± 0.019	0.07	0.00 - 1.00	Pass
MAW-5094	08/01/13	U-238	0.032 ± 0.012	0.03	0.00 - 1.00	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

TABLE A-6. Department of Energy's Mixed Analyte PerforMAnce Evaluation Program (MAPEP).

			Concentration [a]			
Lab Code [b]	Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MAAP-5046	08/01/13	Am-241	0.01 ± 0.02	0.00	0.02 - 0.04	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	Pu-238	0.14 ± 0.028	0.12	0.087 - 0.16	Pass
MAAP-5046	08/01/13	Pu-239/40	0.10 ± 0.022	0.092	0.064 - 0.12	Pass
MAAP-5046	08/01/13	Sr-90	1.69 ± 4.10	1.81	1.27 - 2.35	Pass
MAAP-5046 [g]	08/01/13	U-233/4	0.044 ± 0.012	0.029	0.020 - 0.038	Fail
MAAP-5046	08/01/13	U-238	0.19 ± 0.027	0.21	0.14 - 0.27	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.

[d] The filter was recounted overnight, no significant alpha activity could be detected.

[e] The sample was reanalyzed using additional fuming nitric separations. Result of reanalysis: 574.4 ± 35.2 Bq/kg.

[f] Interference from Eu-152 resulted in misidentification of Co-57.

[g] Result of repeat analysis: 0.031 ± 0.013 pCi/filter.

TABLE A-7. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)[a].

			Concentration (pCi/L) [b]			
Lab Code [b]	Date	Analysis	Laboratory Result [c]	ERA Result [d]	Control Limits	Acceptance
ERAP-1174	03/18/13	Am-241	65.2 ± 4.4	66.8	41.2 - 90.4	Pass
ERAP-1174	03/18/13	Co-60	226.5 ± 4.1	214.0	166.0 - 267.0	Pass
ERAP-1174	03/18/13	Cs-134	1101.2 ± 23.6	1110.0	706.0 - 1380.0	Pass
ERAP-1174	03/18/13	Cs-137	1065.6 ± 21.4	940.0	706.0 - 1230.0	Pass
ERAP-1174	03/18/13	Fe-55	178.8 ± 88.0	225.0	69.8 - 440.0	Pass
ERAP-1174	03/18/13	Mn-54	< 3.1	0.0	0.0 - 50.0	Pass
ERAP-1174	03/18/13	Pu-238	50.0 ± 3.0	51.1	34.3 - 65.9	Pass
ERAP-1174	03/18/13	Pu-239/40	65.7 ± 2.6	65.2	47.2 - 85.2	Pass
ERAP-1174	03/18/13	U-233/4	54.0 ± 2.5	59.4	36.8 - 89.6	Pass
ERAP-1174	03/18/13	U-238	55.6 ± 2.6	58.9	38.1 - 81.4	Pass
ERAP-1174	03/18/13	Uranium	112.0 ± 5.6	121.0	67.0 - 184.0	Pass
ERAP-1174	03/18/13	Zn-65	236.6 ± 13.8	199.0	142.0 - 275.0	Pass
ERAP-1175	03/18/13	Gr. Alpha	52.3 ± 2.8	42.3	14.2 - 65.7	Pass
ERAP-1175	03/18/13	Gr. Beta	36.2 ± 2.0	25.1	15.9 - 36.6	Pass
ERSO-1176	03/18/13	Am-241	293.1 ± 97.4	229.0	134.0 - 297.0	Pass
ERSO-1176	03/18/13	Pu-238	909.0 ± 180.0	788.0	474.0 - 1090.0	Pass
ERSO-1176	03/18/13	Pu-239/40	432.0 ± 120.0	366.0	239.0 - 506.0	Pass
ERSO-1176	03/18/13	Sr-90	8050.8 ± 376.0	8530.0	3250.0 - 13500.0	Pass
ERSO-1176	03/18/13	U-233/4	1662.6 ± 150.0	1920.0	1170.0 - 2460.0	Pass
ERSO-1176	03/18/13	U-238	1682.8 ± 160.0	1900.0	1180.0 - 2410.0	Pass
ERSO-1176	03/18/13	Uranium	3404.0 ± 330.5	3920.0	2130.0 - 5170.0	Pass
ERSO-1176	03/18/13	Ac-228	1335.0 ± 132.0	1240.0	795.0 - 1720.0	Pass
ERSO-1176	03/18/13	Bi-212	1420.0 ± 311.0	1240.0	330.0 - 1820.0	Pass
ERSO-1176	03/18/13	Bi-214	2626.0 ± 60.0	3660.0	2200.0 - 5270.0	Pass
ERSO-1176	03/18/13	Co-60	7951.0 ± 45.4	7920.0	5360.0 - 10900.0	Pass
ERSO-1176	03/18/13	Cs-134	5785.0 ± 51.0	6370.0	4160.0 - 7650.0	Pass
ERSO-1176	03/18/13	Cs-137	6106.0 ± 47.9	6120.0	4690.0 - 7870.0	Pass
ERSO-1176	03/18/13	K-40	11756.0 ± 284.3	10300.0	7520.0 - 13800.0	Pass
ERSO-1176	03/18/13	Mn-54	< 28.0	0.0	0.0 - 1000.0	Pass
ERSO-1176	03/18/13	Pb-212	1096.0 ± 29.1	1240.0	812.0 - 1730.0	Pass
ERSO-1176	03/18/13	Pb-214	2875.0 ± 60.0	3660.0	2140.0 - 5460.0	Pass
ERSO-1176	03/18/13	Th-234	2404.0 ± 218.3	1900.0	601.0 - 3570.0	Pass
ERSO-1176	03/18/13	Zn-65	1542.0 ± 56.4	1400.0	1110.0 - 1860.0	Pass

TABLE A-7. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)[a].

Lab Code [b]	Date	Analysis	Concentration (pCi/L) [b] Laboratory Result [c]	ERA Result [d]	Control Limits	Acceptance
ERVE-1180	03/18/13	Am-241	569.8 ± 81.7	553.0	338.0 - 735.0	Pass
ERVE-1180	03/18/13	Cm-244	1260.9 ± 107.3	1340.0	657.0 - 2090.0	Pass
ERVE-1180	03/18/13	Co-60	2130.5 ± 48.0	1920.0	1320.0 - 2680.0	Pass
ERVE-1180	03/18/13	Cs-134	1296.5 ± 68.0	1240.0	797.0 - 1610.0	Pass
ERVE-1180	03/18/13	Cs-137	600.1 ± 34.3	544.0	394.0 - 757.0	Pass
ERVE-1180	03/18/13	K-40	34078.0 ± 787.0	31900.0	23000.0 - 44800.0	Pass
ERVE-1180	03/18/13	Mn-54	< 28.7	0.0	0.0 - 300.0	Pass
ERVE-1180	03/18/13	Pu-238	2476.5 ± 259.4	1980.0	1180.0 - 2710.0	Pass
ERVE-1180	03/18/13	Pu-239/40	2659.3 ± 273.2	2260.0	1390.0 - 3110.0	Pass
ERVE-1180	03/18/13	Sr-90	3809.7 ± 420.5	3840.0	2190.0 - 5090.0	Pass
ERVE-1180	03/18/13	U-233/4	2460.6 ± 205.0	2460.0	1620.0 - 3160.0	Pass
ERVE-1180	03/18/13	U-238	2319.1 ± 189.6	2440.0	1630.0 - 3100.0	Pass
ERVE-1180	03/18/13	Uranium	4866.3 ± 375.6	5010.0	3390.0 - 6230.0	Pass
ERVE-1180	03/18/13	Zn-65	1052.5 ± 82.1	878.0	633.0 - 1230.0	Pass
ERW-1184	03/18/13	Am-241	114.5 ± 8.1	118.0	79.5 - 158.0	Pass
ERW-1184	03/18/13	Co-60	2221.8 ± 17.0	2270.0	1970.0 - 2660.0	Pass
ERW-1184	03/18/13	Cs-134	1309.4 ± 58.4	1400.0	1030.0 - 1610.0	Pass
ERW-1184	03/18/13	Cs-137	1865.9 ± 22.0	1880.0	1600.0 - 2250.0	Pass
ERW-1184	03/18/13	Fe-55	503.1 ± 105.0	712.0	424.0 - 966.0	Pass
ERW-1184	03/18/13	Mn-54	< 9.4	0.0	0.0 - 100.0	Pass
ERW-1184	03/18/13	Pu-238	98.4 ± 5.6	98.8	73.1 - 123.0	Pass
ERW-1184	03/18/13	Pu-239/40	184.5 ± 7.7	185.0	144.0 - 233.0	Pass
ERW-1184	03/18/13	Sr-90	125.7 ± 6.0	137.0	89.2 - 181.0	Pass
ERW-1184	03/18/13	U-233/4	44.9 ± 3.4	48.8	36.7 - 62.9	Pass
ERW-1184	03/18/13	U-238	46.5 ± 3.5	48.4	36.9 - 59.4	Pass
ERW-1184	03/18/13	Uranium	93.3 ± 7.1	99.5	73.1 - 129.0	Pass
ERW-1184	03/18/13	Zn-65	412.8 ± 32.0	384.0	320.0 - 484.0	Pass
ERW-1186	03/18/13	Gr. Alpha	109.1 ± 5.7	130.0	46.2 - 201.0	Pass
ERW-1186	03/18/13	Gr. Beta	74.5 ± 6.4	78.9	45.2 - 117.0	Pass
ERW-1188	03/18/13	H-3	12279.0 ± 319.0	12300.0	8240.0 - 17500.0	Pass

[a] Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the crosscheck program for proficiency testing administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the Environmental Measurements Laboratory Quality Assessment Program (EML).

[b] Laboratory codes as follows: ERW (water), ERAP (air filter), ERSO (soil), ERVE (vegetation). Results are reported in units of pCi/L, except for air filters (pCi/Filter), vegetation and soil (pCi/kg).

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

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

APPENDIX B

DATA REPORTING CONVENTIONS

Data Reporting Conventions

1.0. All activities, except gross alpha and gross beta, are decay corrected to collection time or the end of the collection period.

2.0. Single Measurements

Each single measurement is reported as follows: $x \pm s$

where: x = value of the measurement;

s = 2σ counting uncertainty (corresponding to the 95% confidence level).

In cases where the activity is less than the lower limit of detection L, it is reported as: < L, where L = the lower limit of detection based on 4.66σ uncertainty for a background sample.

3.0. Duplicate analyses

If duplicate analyses are reported, the convention is as follows. :

3.1 Individual results: For two analysis results; $x_1 \pm s_1$ and $x_2 \pm s_2$

Reported result: $x \pm s$; where $x = (1/2)(x_1 + x_2)$ and $s = (1/2)\sqrt{s_1^2 + s_2^2}$

3.2. Individual results: $< L_1$, $< L_2$ Reported result: < L, where L = lower of L_1 and L_2

3.3. Individual results: $x \pm s$, < L Reported result: $x \pm s$ if $x \geq L$; < L otherwise.

4.0. Computation of Averages and Standard Deviations

4.1 Averages and standard deviations listed in the tables are computed from all of the individual measurements over the period averaged; for example, an annual standard deviation would not be the average of quarterly standard deviations. The average $\bar{x}$ and standard deviation "s" of a set of n numbers $x_1, x_2 \ldots x_n$ are defined as follows:

$$\bar{x} = \frac{1}{n} \sum x \qquad s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$$

4.2 Values below the highest lower limit of detection are not included in the average.

4.3 If all values in the averaging group are less than the highest LLD, the highest LLD is reported.

4.4 If all but one of the values are less than the highest LLD, the single value x and associated two sigma error is reported.

4.5 In rounding off, the following rules are followed:

4.5.1. If the number following those to be retained is less than 5, the number is dropped, and the retained numbers are kept unchanged. As an example, 11.443 is rounded off to 11.44.

4.5.2. If the number following those to be retained is equal to or greater than 5, the number is dropped and the last retained number is raised by 1. As an example, 11.445 is rounded off to 11.45.

APPENDIX C

Sampling Program and Locations

Sample Type	Locations No.	Locations Codes (and Type)[a]	Collection Type (and Frequency)[b]	Analysis (and Frequency)[b]
Airborne Filters	6	E-1-4, 8, 20	Weekly	GB, GS, on QC for each location
Airborne Iodine	6	E-1-4, 8, 20	Weekly	I-131
Ambient Radiation (TLD's)	22	E-1-9, 12, 14-18, 20, 22-32, 34-36, 38,39	Quarterly	Ambient Gamma
Lake Water	5	E-1, 5, 6, 33	Monthly	GB, GS, I-131 on MC H-3, Sr-89-90 on QC
Well Water	1	E-10	Quarterly	GB, GS, H-3, Sr-89-90, I-131
Vegetation	8	E-1-4, 6, 9, 20	3x / year as available	GB, GS
Shoreline Silt	5	E-1, 5, 6, 12, 33	2x / year	GB, GS
Soil	8	E-1-4, 6, 8, 9, 20	2x / year	GB, GS
Milk	3	E-11, 40, 21	Monthly	GS, I-131, Sr-89-90
Algae	2	E-5, 12	3x / year as available	GB, GS
Fish	1	E-13	2x / year as available	GB, GS (in edible portions)

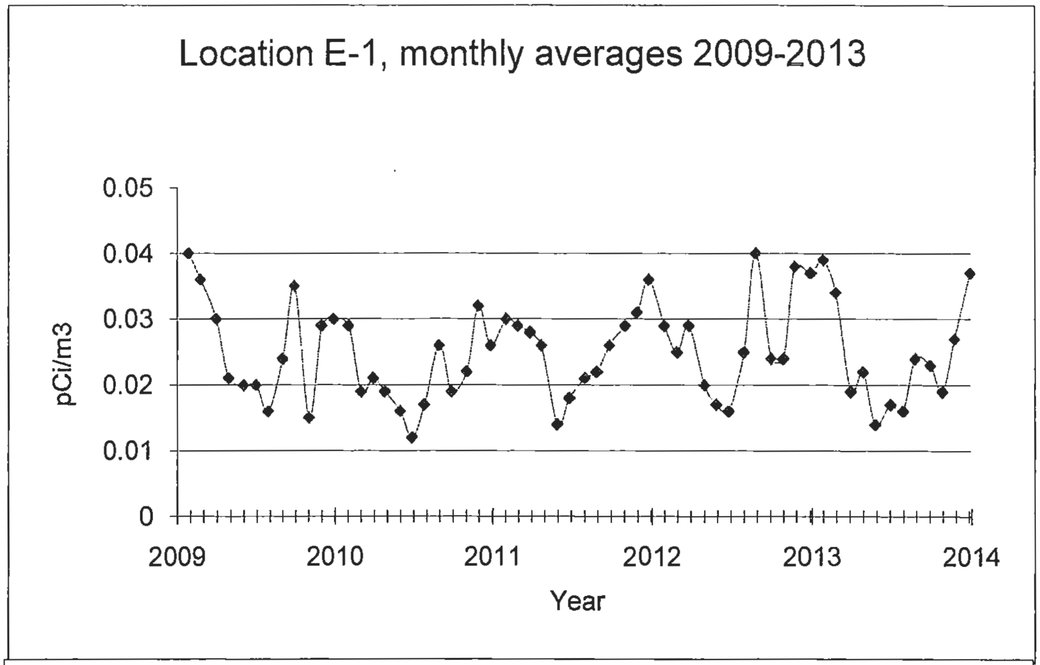
[a] Locations codes are defined in Table 2. Control Stations are indicated by (C). All other stations are indicators.

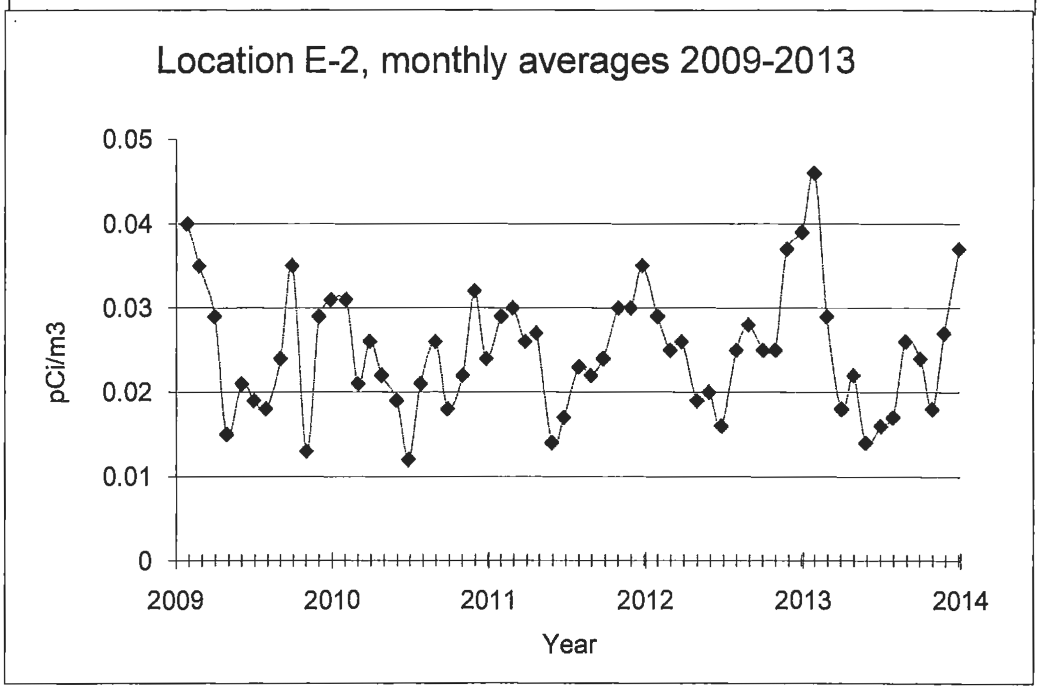
[b] Analysis type is coded as follows: GB = gross beta, GA = gross alpha, GS = gamma spectroscopy, H-3 = tritium, Sr-89 = strontium-89, Sr-90 = strontium-90, I-131 = iodine-131. Analysis frequency is coded as follows: MC = monthly composite, QC = quarterly composite.

APPENDIX D

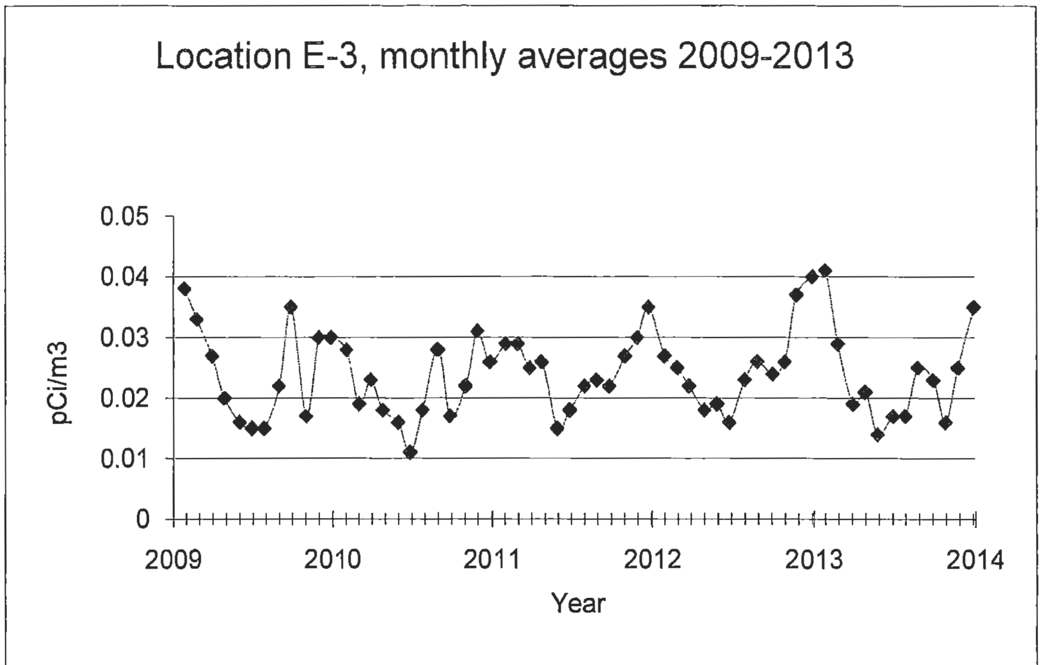
Graphs of Data Trends

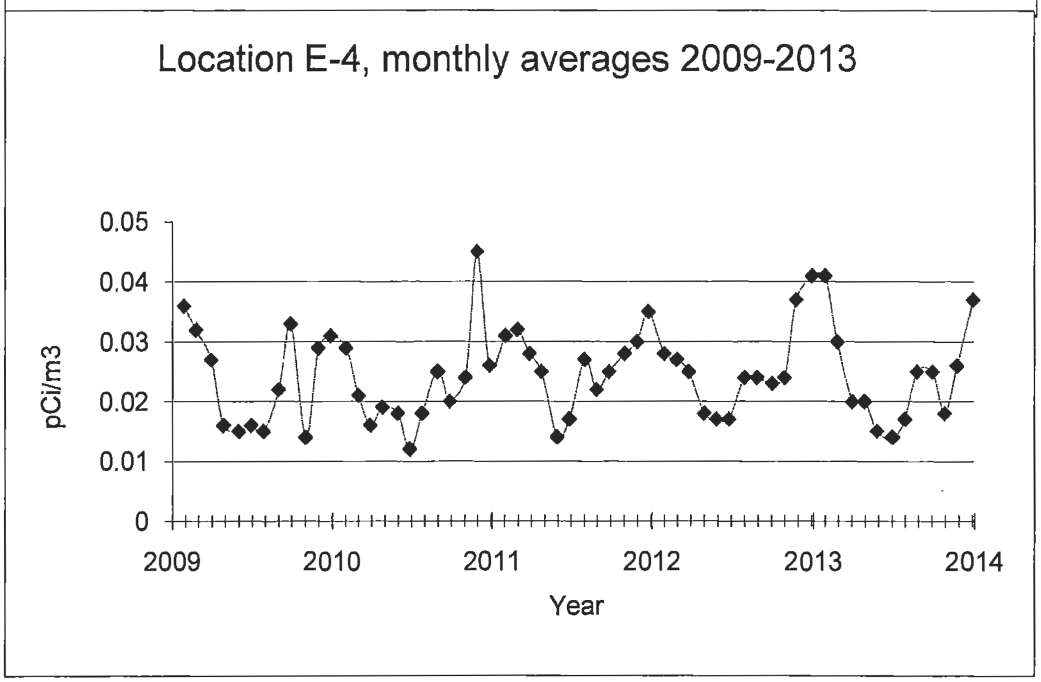
Air Particulates - Gross Beta



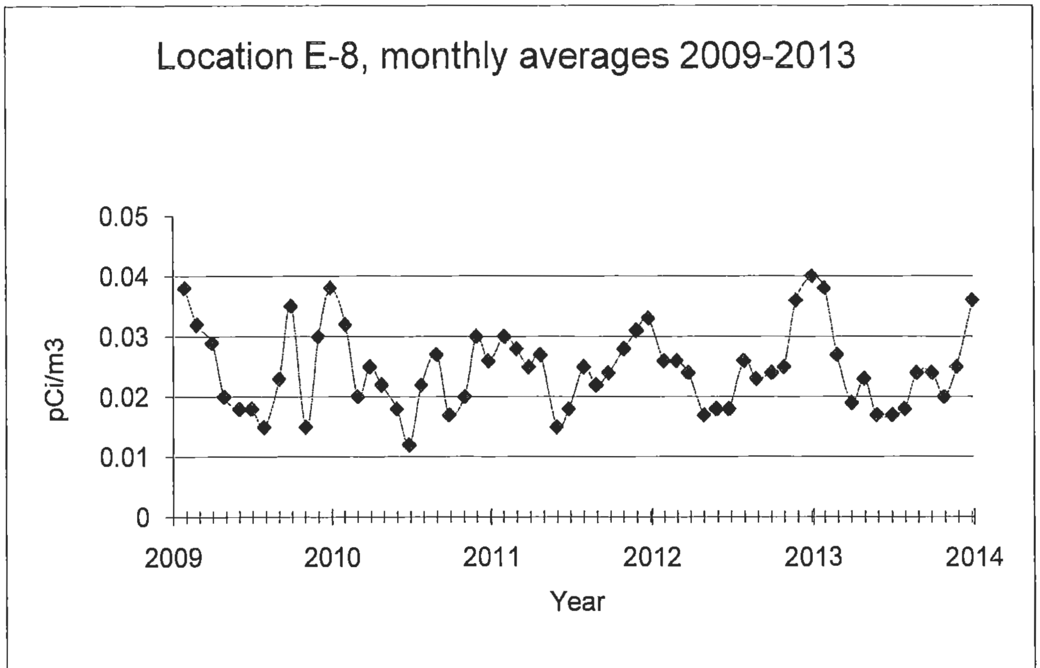


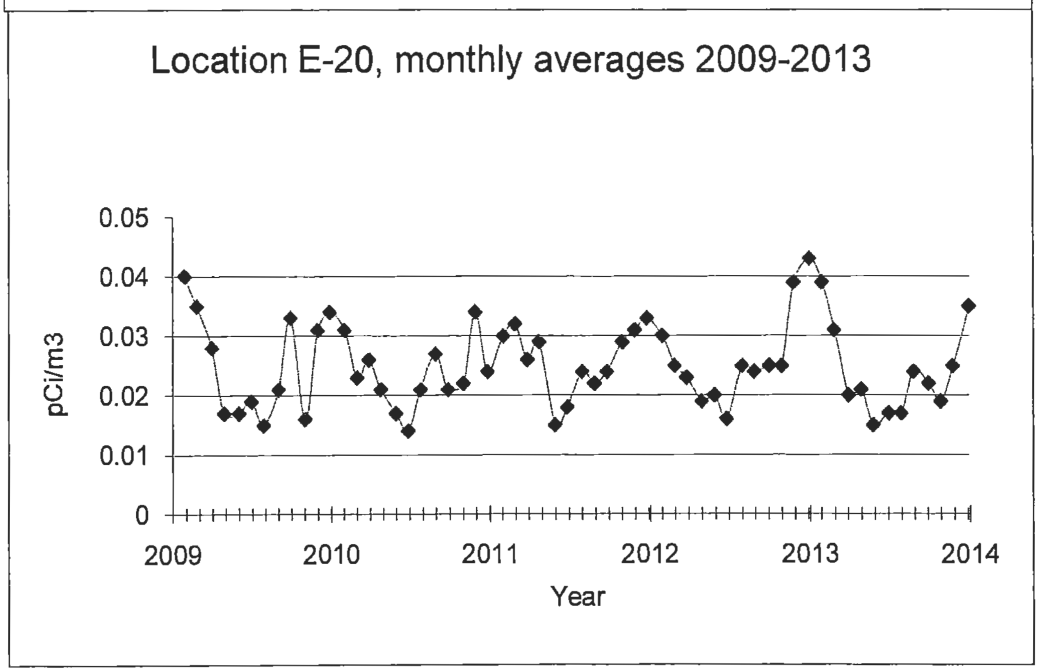
Air Particulates - Gross Beta





Air Particulates - Gross Beta





APPENDIX E

Supplemental Analyses

POINT BEACH NUCLEAR PLANT

Supplemental Analyses

Units: = pCi\L

Gamma isotopic analysis

Location	GW-09 1Z-361A		U2FSSDS		U2FSSDS	
Collection Date	09-01-12		2nd Qtr. 2012		3rd Qtr. 2012	
Lab Code	EWW- 5947 [a]	MDC	EW- 2969 [a]	MDC	EW- 2970 [a]	MDC
Be-7	-196.1 ± 17.5	< 629.4	326.1 ± 9.6	< 2418.8	-94.3 ± 12.8	< 549.5
Mn-54	5.3 ± 2.2	< 6.8	1.2 ± 1.2	< 5.7	2.5 ± 1.4	< 6.5
Fe-59	-70.7 ± 3.8	< 182.3	23.2 ± 2.1	< 629.7	90.2 ± 2.5	< 336.9
Co-58	0.1 ± 2.1	< 42.3	-19.3 ± 1.2	< 49.2	9.8 ± 1.4	< 32.0
Co-60	1.0 ± 2.3	< 4.0	0.5 ± 1.1	< 2.5	-0.4 ± 1.4	< 1.3
Zn-65	-7.4 ± 4.3	< 14.7	-0.4 ± 2.4	< 10.8	-0.8 ± 3.0	< 8.7
Zr-Nb-95	-123.5 ± 2.4	< 272.1	-923.9 ± 1.3	< 3167.7	131.2 ± 1.5	< 593.4
Cs-134	-0.6 ± 1.9	< 3.4	-0.2 ± 1.2	< 2.2	1.2 ± 1.3	< 2.5
Cs-137	1.5 ± 2.5	< 4.9	0.3 ± 1.4	< 1.9	1.5 ± 1.6	< 2.9
Ba-La-140	0.0 ± 0.0 [b]	< 0.0	0.0 ± 0.0 [b]	< 0.0	0.0 ± 0.0 [b]	< 0.0

Location	U2FSSDS		U2FSSDS		U2FSSD	
Collection Date	4th Qtr. 2012		1st Qtr. 2013		04-01-13	
Lab Code	EW- 2971 [a]	MDC	EW- 2972 [a]	MDC	EW- 1944 [a]	MDC
Be-7	-47.3 ± 12.0	< 213.0	-4.3 ± 12.4	< 76.2	-41.6 ± 16.0	< 178.2
Mn-54	1.3 ± 1.4	< 4.5	1.8 ± 1.4	< 3.6	0.0 ± 2.1	< 6.2
Fe-59	-39.6 ± 2.5	< 68.2	1.3 ± 2.9	< 22.8	-13.3 ± 4.0	< 50.9
Co-58	-8.9 ± 1.4	< 12.2	-1.1 ± 1.3	< 3.7	4.1 ± 2.0	< 11.6
Co-60	0.7 ± 1.5	< 2.1	0.9 ± 1.5	< 1.7	-1.6 ± 2.3	< 4.1
Zn-65	-0.9 ± 3.1	< 7.7	-0.3 ± 2.8	< 4.1	3.9 ± 4.1	< 11.5
Zr-Nb-95	-61.0 ± 1.4	< 66.6	-4.0 ± 1.5	< 14.2	-7.2 ± 2.2	< 35.9
Cs-134	0.4 ± 1.4	< 3.0	0.7 ± 1.4	< 2.7	-0.2 ± 2.2	< 3.6
Cs-137	0.4 ± 1.5	< 2.5	0.0 ± 1.5	< 2.2	-1.2 ± 2.5	< 3.8
Ba-La-140	0.0 ± 0.0 [b]	< 0.0	-311.3 ± 2.0	< 192.8	-691.7 ± 2.4	< 2298.3

Location	U2FSSD		U2FSSD		GW-09 1Z-361A	
Collection Date	05-01-13		06-10-13		06-21-13	
Lab Code	EW- 3250 [a]	MDC	EW- 3704	MDC	EWW- 3700	MDC
Be-7	1.1 ± 11.2	< 65.9	7.5 ± 12.8	< 36.2	-3.6 ± 17.4	< 37.1
Mn-54	2.0 ± 1.5	< 3.5	2.0 ± 1.7	< 3.6	0.4 ± 1.8	< 3.5
Fe-59	4.7 ± 2.7	< 19.2	-2.3 ± 3.1	< 6.9	-2.5 ± 3.6	< 4.2
Co-58	1.7 ± 1.3	< 5.9	-0.9 ± 1.5	< 3.2	1.8 ± 1.8	< 4.2
Co-60	0.9 ± 1.5	< 2.3	1.8 ± 1.8	< 3.8	0.9 ± 1.8	< 3.3
Zn-65	2.5 ± 2.9	< 7.0	-0.2 ± 3.2	< 5.5	-3.9 ± 4.3	< 7.7
Zr-Nb-95	1.3 ± 1.6	< 15.8	0.4 ± 1.7	< 5.3	-1.1 ± 2.0	< 5.0
Cs-134	1.4 ± 1.2	< 2.3	-0.3 ± 1.4	< 2.4	-0.7 ± 1.9	< 3.5
Cs-137	0.1 ± 1.7	< 2.8	0.7 ± 1.9	< 3.3	0.8 ± 2.1	< 4.7
Ba-La-140	13.4 ± 1.8	< 352.9	2.8 ± 1.9	< 23.0	0.4 ± 2.1	< 12.7

[a] Sample counted 04-24-2013; several LLDs not reached due to age of sample.

[b] Ba-La-140 = >12 halflives.

POINT BEACH NUCLEAR PLANT

Supplemental Analyses

Units: = pCi\L

Gamma isotopic analysis

Location	GW-09 1Z-361B		GW-10 2Z-361A		GW-10 2Z-361B	
Collection Date	06-21-13		06-24-13		06-24-13	
Lab Code	EWW- 3701	MDC	EWW- 3702	MDC	EWW- 3703	MDC
Be-7	5.1 ± 13.1	< 36.8	7.5 ± 13.3	< 41.6	-5.8 ± 13.1	< 26.8
Mn-54	2.3 ± 1.6	< 3.5	0.0 ± 1.8	< 3.7	2.3 ± 1.6	< 3.6
Fe-59	1.1 ± 2.9	< 7.1	2.1 ± 3.1	< 8.5	-2.3 ± 2.9	< 7.4
Co-58	0.5 ± 1.5	< 3.5	-1.6 ± 1.6	< 3.8	-2.6 ± 1.6	< 2.6
Co-60	-1.0 ± 1.7	< 3.2	1.9 ± 1.9	< 4.0	-0.2 ± 1.8	< 2.8
Zn-65	-3.6 ± 3.2	< 5.6	0.4 ± 3.3	< 6.0	-0.9 ± 3.2	< 5.6
Zr-Nb-95	-2.1 ± 1.8	< 5.9	-3.2 ± 1.8	< 5.8	-2.8 ± 1.8	< 4.2
Cs-134	-0.1 ± 1.4	< 2.5	-0.1 ± 1.7	< 2.4	-0.8 ± 1.4	< 3.1
Cs-137	0.4 ± 1.9	< 3.2	1.6 ± 2.0	< 3.2	-1.5 ± 1.9	< 2.5
Ba-La-140	-1.4 ± 2.0	< 8.5	0.6 ± 2.1	< 12.2	-6.3 ± 1.9	< 9.9

Location	U2FSSD		P-118 SSD Sump		U2FSSD	
Collection Date	07-01-13		07-01-13		07-31-13	
Lab Code	EWW- 3705	MDC	EWW- 3719	MDC	EW- 4782	MDC
Be-7	-11.0 ± 13.4	< 31.5	-8.4 ± 12.7	< 26.4	10.6 ± 9.6	< 28.1
Mn-54	-0.3 ± 1.6	< 2.0	0.7 ± 1.6	< 2.9	1.0 ± 1.1	< 2.0
Fe-59	2.6 ± 3.0	< 5.6	0.3 ± 3.1	< 5.1	1.4 ± 2.1	< 4.5
Co-58	0.0 ± 1.6	< 3.4	-0.5 ± 1.5	< 2.5	0.5 ± 1.0	< 2.3
Co-60	0.5 ± 1.8	< 3.9	-2.0 ± 1.6	< 1.7	-0.5 ± 1.2	< 2.1
Zn-65	2.3 ± 3.2	< 5.9	-1.0 ± 3.2	< 2.5	-0.1 ± 2.3	< 3.9
Zr-Nb-95	-5.3 ± 1.8	< 5.4	0.3 ± 1.7	< 3.6	0.1 ± 1.3	< 3.3
Cs-134	-0.2 ± 1.7	< 3.2	-0.5 ± 1.6	< 3.1	-1.0 ± 1.0	< 1.9
Cs-137	0.7 ± 1.9	< 3.1	0.5 ± 1.7	< 2.6	-0.3 ± 1.4	< 1.8
Ba-La-140	-3.6 ± 2.0	< 6.5	2.2 ± 1.8	< 3.8	0.7 ± 1.4	< 4.3

Location	GW-09 1Z-361A		GW-09 1Z-361B		GW-10 2Z-361A	
Collection Date	07-03-13		07-03-13		07-03-13	
Lab Code	EWW- 4987 [a]	MDC	EWW- 4988 [a]	MDC	EWW- 4989 [a]	MDC
Be-7	29.0 ± 17.4	< 76.1	2.9 ± 13.7	< 61.8	-8.2 ± 13.6	< 47.0
Mn-54	0.3 ± 1.8	< 3.9	1.5 ± 1.7	< 3.1	0.5 ± 1.6	< 3.7
Fe-59	-4.4 ± 3.7	< 14.1	0.4 ± 2.9	< 10.4	1.6 ± 3.1	< 9.5
Co-58	-0.8 ± 1.8	< 4.7	-1.7 ± 1.6	< 2.9	-1.2 ± 1.6	< 3.6
Co-60	0.2 ± 1.9	< 3.6	1.5 ± 1.7	< 3.5	-0.3 ± 2.0	< 3.2
Zn-65	-2.3 ± 4.2	< 8.9	-1.7 ± 3.3	< 6.1	0.0 ± 3.4	< 8.2
Zr-Nb-95	0.9 ± 1.9	< 9.5	-0.8 ± 1.9	< 6.6	-5.8 ± 1.8	< 8.2
Cs-134	-2.3 ± 1.9	< 3.9	0.1 ± 1.4	< 2.7	-2.0 ± 1.7	< 3.0
Cs-137	1.7 ± 2.0	< 3.6	-0.6 ± 2.0	< 2.6	-0.2 ± 1.9	< 3.0
Ba-La-140	-23.7 ± 2.1	< 60.9	-26.7 ± 1.8	< 43.6	-28.0 ± 2.1	< 68.2

[a] Certain LLDs not reached due to age of sample. All samples counted for 60,000 seconds.

POINT BEACH NUCLEAR PLANT

Supplemental Analyses

Units: = pCi\L

Gamma isotopic analysis

Location	GW-10 2Z-361B		GW-09 1Z-361A		GW-09 1Z-361B	
Collection Date	07-03-13		08-01-13		08-01-13	
Lab Code	EWW- 4990 [a]	MDC	EW- 4991	MDC	EW- 4992	MDC
Be-7	2.4 ± 13.5	< 49.7	-8.8 ± 16.3	< 40.4	3.8 ± 14.2	< 48.2
Mn-54	-0.6 ± 1.6	< 3.4	1.5 ± 1.7	< 3.6	0.9 ± 1.9	< 3.6
Fe-59	-1.7 ± 3.0	< 14.3	2.2 ± 3.2	< 10.9	-1.6 ± 3.6	< 8.6
Co-58	-1.5 ± 1.6	< 4.6	1.3 ± 1.6	< 4.4	-2.4 ± 1.8	< 3.6
Co-60	-1.6 ± 1.7	< 1.9	0.2 ± 2.0	< 3.1	2.4 ± 2.1	< 3.7
Zn-65	-2.4 ± 3.3	< 6.9	-2.6 ± 3.4	< 5.2	6.5 ± 3.8	< 8.0
Zr-Nb-95	2.0 ± 1.7	< 10.7	-1.0 ± 1.8	< 6.0	-9.3 ± 2.2	< 8.0
Cs-134	0.0 ± 1.7	< 2.6	-0.8 ± 1.7	< 3.2	-0.3 ± 2.0	< 3.1
Cs-137	2.6 ± 1.8	< 3.8	1.6 ± 1.9	< 3.2	1.7 ± 2.2	< 4.1
Ba-La-140	1.7 ± 2.0	< 51.8	-9.2 ± 2.2	< 18.7	0.3 ± 2.1	< 20.5

Location	GW-10 2Z-361A	MDC	GW-10 2Z-361B	MDC	U2FSSD	MDC
Collection Date	08-01-13		08-01-13		08-31-13	
Lab Code	EWW- 4993		EWW- 4994		EWW- 5282	
Be-7	-1.2 ± 16.6	< 50.2	14.9 ± 14.3	< 45.1	-5.3 ± 14.9	< 20.9
Mn-54	1.6 ± 1.7	< 3.8	-0.5 ± 1.7	< 3.4	0.9 ± 1.6	< 3.1
Fe-59	-2.3 ± 3.0	< 5.9	-5.2 ± 3.1	< 8.8	1.0 ± 3.2	< 5.7
Co-58	-3.2 ± 1.6	< 2.9	0.0 ± 1.8	< 4.0	0.3 ± 1.6	< 2.8
Co-60	-0.4 ± 1.9	< 2.4	1.3 ± 1.7	< 2.9	0.3 ± 1.6	< 2.9
Zn-65	-3.5 ± 3.1	< 5.3	-1.5 ± 3.8	< 6.7	-2.5 ± 3.8	< 6.3
Zr-Nb-95	-3.8 ± 1.8	< 6.0	-6.9 ± 2.0	< 7.7	-0.1 ± 1.7	< 4.1
Cs-134	-1.3 ± 1.7	< 2.6	0.5 ± 1.8	< 3.2	-0.4 ± 1.6	< 2.3
Cs-137	0.2 ± 1.8	< 3.4	-0.8 ± 2.0	< 3.0	-0.4 ± 1.9	< 2.9
Ba-La-140	1.0 ± 2.0	< 17.3	-7.9 ± 2.2	< 26.3	-3.9 ± 2.1	< 4.8

Location	E-02 Corn		E-02 Soybeans	
Collection Date	09-25-13		09-25-13	
Lab Code	EVE- 5679		EVE- 5680	
Gross Beta	2.11 ± 0.04	< 0.014	3.81 ± 0.11	< 0.047
Be-7	-0.012 ± 0.041	< 0.080	0.36 ± 0.13	-
K-40	1.64 ± 0.19	-	3.23 ± 0.32	-
Mn-54	-0.001 ± 0.004	< 0.003	0.003 ± 0.006	< 0.011
Fe-59	0.003 ± 0.008	< 0.015	0.008 ± 0.012	< 0.012
Co-58	0.001 ± 0.004	< 0.007	0.004 ± 0.006	< 0.008
Co-60	0.000 ± 0.003	< 0.003	0.000 ± 0.007	< 0.009
Zn-65	-0.001 ± 0.010	< 0.015	0.002 ± 0.016	< 0.021
Zr-Nb-95	-0.004 ± 0.004	< 0.010	0.005 ± 0.006	< 0.013
Cs-134	0.001 ± 0.004	< 0.007	0.003 ± 0.006	< 0.010
Cs-137	0.005 ± 0.004	< 0.006	0.004 ± 0.007	< 0.010
Ba-La-140	-0.002 ± 0.003	< 0.004	-0.001 ± 0.006	< 0.007

[a] Certain LLDs not reached due to age of sample. Samples counted for 60,000 seconds.

POINT BEACH NUCLEAR PLANT

Supplemental Analyses

Units: = pCi\L

Gamma isotopic analysis

Location	GW-09 1Z-361A		GW-09 1Z-361B		GW-10 2Z-361A	
Collection Date	09-26-13		09-26-13		09-26-13	
Lab Code	EW- 6251	MDC	EW- 6252	MDC	EW- 6253	MDC
Be-7	3.9 ± 15.3	< 31.2	10.7 ± 16.6	< 37.4	0.4 ± 15.6	< 34.3
Mn-54	2.3 ± 1.7	< 3.3	1.6 ± 1.7	< 3.7	-1.0 ± 1.6	< 2.7
Fe-59	2.0 ± 3.5	< 8.1	-0.1 ± 3.4	< 3.8	0.2 ± 2.6	< 5.3
Co-58	-0.1 ± 1.6	< 2.5	0.0 ± 1.8	< 4.3	0.9 ± 1.4	< 3.0
Co-60	0.8 ± 2.1	< 3.7	1.6 ± 1.8	< 3.7	0.0 ± 1.7	< 2.5
Zn-65	0.9 ± 4.1	< 6.1	-2.6 ± 4.0	< 6.4	-0.2 ± 3.1	< 5.3
Zr-Nb-95	-0.1 ± 1.8	< 3.5	0.2 ± 1.9	< 5.4	0.1 ± 1.7	< 5.1
Cs-134	-0.7 ± 1.7	< 2.8	-0.1 ± 1.9	< 3.6	-0.1 ± 1.6	< 2.8
Cs-137	1.6 ± 2.0	< 2.4	0.7 ± 2.0	< 4.1	0.0 ± 1.8	< 2.8
Ba-La-140	-5.2 ± 2.0	< 3.7	1.4 ± 2.1	< 8.9	1.0 ± 1.8	< 8.0

Location	GW-10 2Z-361B		U2FSSD		N-SSD	
Collection Date	09-26-13		09-30-13		10-16-13	
Lab Code	EWW- 6254	MDC	EWW- 6739		EWW- 6740	
Be-7	7.2 ± 13.4	< 37.7	-5.4 ± 9.5	< 31.9	-5.2 ± 9.5	< 24.8
Mn-54	0.6 ± 1.7	< 3.6	1.0 ± 1.2	< 2.4	-0.5 ± 1.2	< 1.9
Fe-59	-0.7 ± 3.0	< 6.8	1.4 ± 2.3	< 7.8	-0.8 ± 2.0	< 5.2
Co-58	-0.4 ± 1.7	< 3.7	-1.2 ± 1.2	< 2.9	0.0 ± 1.1	< 1.9
Co-60	-2.1 ± 1.8	< 2.3	1.0 ± 1.3	< 2.6	-0.5 ± 1.3	< 2.0
Zn-65	1.8 ± 3.2	< 7.0	-0.7 ± 2.7	< 6.1	-0.3 ± 2.2	< 3.7
Zr-Nb-95	-1.8 ± 1.8	< 4.6	-2.8 ± 1.3	< 4.6	-2.7 ± 1.3	< 3.4
Cs-134	-1.9 ± 1.7	< 2.8	-0.2 ± 1.2	< 2.5	0.5 ± 1.0	< 2.1
Cs-137	-0.2 ± 2.0	< 3.1	0.6 ± 1.4	< 2.3	-1.1 ± 1.4	< 2.4
Ba-La-140	-3.0 ± 1.8	< 9.6	-12.1 ± 1.4	< 13.2	0.2 ± 1.5	< 9.4

Location	S-SSD		GW-09 1Z-361A		GW-09 1Z-361B	
Collection Date	10-16-13		10-31-13		10-31-13	
Lab Code	EWW- 6741		EWW- 7020		EWW- 7021	
Be-7	-4.8 ± 13.2	< 25.1	-4.7 ± 13.6	< 38.0	1.2 ± 12.3	< 22.6
Mn-54	0.7 ± 1.7	< 3.0	2.4 ± 1.6	< 3.5	1.7 ± 1.7	< 3.3
Fe-59	-0.4 ± 2.9	< 6.9	3.5 ± 3.0	< 7.1	0.2 ± 2.8	< 7.3
Co-58	0.1 ± 1.6	< 4.0	-0.9 ± 1.7	< 3.5	1.7 ± 1.6	< 3.9
Co-60	-0.3 ± 1.9	< 3.5	-0.3 ± 1.8	< 2.3	-0.8 ± 1.7	< 2.9
Zn-65	-0.8 ± 3.4	< 6.9	-1.8 ± 3.6	< 6.4	-0.2 ± 3.5	< 7.1
Zr-Nb-95	-1.9 ± 1.7	< 4.7	-0.7 ± 1.9	< 4.3	0.8 ± 1.8	< 3.9
Cs-134	-0.1 ± 1.7	< 3.2	-1.7 ± 1.8	< 3.4	-0.2 ± 1.7	< 3.0
Cs-137	1.7 ± 1.8	< 3.3	0.6 ± 2.0	< 3.6	0.9 ± 2.0	< 3.9
Ba-La-140	-4.8 ± 1.9	< 10.1	4.5 ± 1.6	< 7.5	-0.2 ± 2.0	< 4.5

POINT BEACH NUCLEAR PLANT

Supplemental Analyses

Units: = pCi\L

Gamma isotopic analysis

Location	GW-10 2Z-361A		GW-10 2Z-361B		U2FSSD	
Collection Date	10-31-13		10-31-13		11-01-13	
Lab Code	EW- 7022	MDC	EW- 7023	MDC	EW- 7018	MDC
Be-7	11.7 ± 12.5	< 22.7	-7.1 ± 12.8	< 37.1	-0.7 ± 13.9	< 29.2
Mn-54	0.8 ± 1.5	< 2.9	0.8 ± 1.6	< 3.1	0.3 ± 1.5	< 2.9
Fe-59	-1.7 ± 2.8	< 7.5	0.7 ± 2.9	< 4.1	-1.7 ± 2.8	< 4.8
Co-58	-0.3 ± 1.6	< 2.8	1.0 ± 1.7	< 3.9	0.0 ± 1.3	< 2.6
Co-60	0.3 ± 1.7	< 3.3	0.5 ± 1.9	< 3.0	-0.2 ± 1.5	< 2.7
Zn-65	0.1 ± 3.2	< 6.7	-2.1 ± 3.2	< 6.6	-3.9 ± 3.3	< 3.9
Zr-Nb-95	-0.3 ± 1.7	< 3.5	-1.4 ± 1.8	< 4.3	0.3 ± 1.5	< 3.3
Cs-134	0.9 ± 1.7	< 3.1	-2.1 ± 1.7	< 3.3	0.1 ± 1.5	< 2.9
Cs-137	1.5 ± 1.9	< 3.9	0.4 ± 2.0	< 3.3	0.0 ± 1.7	< 3.2
Ba-La-140	-7.7 ± 2.0	< 3.9	-1.6 ± 2.0	< 7.6	-1.4 ± 1.6	< 5.7

Location	GW-09 1Z-361A		GW-09 1Z-361B		GW-10 2Z-361A	
Collection Date	11-22-13		11-22-13		11-22-13	
Lab Code	EWW- 7557 [a]		EWW- 7558		EW- 7560 [a]	MDC
Be-7	-6.2 ± 17.1	< 46.4	9.3 ± 15.4	< 34.9	-14.5 ± 17.3	< 28.5
Mn-54	1.0 ± 1.8	< 3.6	0.7 ± 1.8	< 3.5	2.0 ± 1.7	< 3.8
Fe-59	4.6 ± 3.3	< 9.8	-4.5 ± 4.0	< 7.2	-0.1 ± 3.6	< 9.2
Co-58	1.7 ± 1.7	< 4.5	-1.9 ± 1.8	< 3.7	0.3 ± 1.8	< 4.6
Co-60	-1.0 ± 2.0	< 3.5	0.1 ± 2.2	< 3.6	0.0 ± 2.0	< 3.4
Zn-65	-1.9 ± 3.5	< 6.1	1.3 ± 3.9	< 2.7	4.1 ± 4.2	< 8.5
Zr-Nb-95	-2.5 ± 1.8	< 4.2	-1.2 ± 1.9	< 4.5	0.7 ± 1.9	< 6.1
Cs-134	-0.3 ± 1.8	< 3.6	0.7 ± 1.9	< 4.2	0.1 ± 2.0	< 3.8
Cs-137	0.9 ± 1.9	< 3.9	2.9 ± 2.1	< 3.8	1.9 ± 2.1	< 4.7
Ba-La-140	-7.2 ± 2.1	< 19.0	-4.1 ± 2.0	< 8.3	-4.7 ± 1.9	< 15.9

Location	GW-10 2Z-361B		U2FSSD		GW-09 1Z-361A	
Collection Date	11-22-13		12-02-13		12-17-13	
Lab Code	EW- 7561	MDC	EW- 7562	MDC	EW- 7810 [a]	MDC
Be-7	3.9 ± 12.9	< 40.4	-10.0 ± 9.8	< 25.1	-0.4 ± 14.1	< 51.7
Mn-54	0.6 ± 1.6	< 3.2	1.3 ± 1.3	< 2.9	1.0 ± 1.7	< 3.7
Fe-59	1.2 ± 2.8	< 8.1	-0.3 ± 2.3	< 6.2	5.3 ± 3.1	< 9.8
Co-58	-0.7 ± 1.5	< 3.1	-1.2 ± 1.2	< 2.5	0.2 ± 1.7	< 4.9
Co-60	0.2 ± 1.7	< 3.0	0.0 ± 1.4	< 2.1	-0.3 ± 1.8	< 2.5
Zn-65	-0.8 ± 3.4	< 5.8	0.3 ± 2.5	< 4.5	0.4 ± 3.5	< 7.4
Zr-Nb-95	-1.3 ± 1.7	< 3.1	-2.1 ± 1.4	< 3.4	-7.0 ± 2.1	< 6.6
Cs-134	-1.2 ± 1.7	< 3.1	-0.2 ± 1.3	< 2.6	-2.2 ± 1.9	< 3.6
Cs-137	0.7 ± 2.0	< 3.6	1.4 ± 1.5	< 2.1	-0.5 ± 2.0	< 2.8
Ba-La-140	-0.7 ± 2.0	< 8.2	1.0 ± 1.4	< 5.1	-14.1 ± 2.4	< 15.8

[a] Certain LLDs not reached due to age of sample. Samples counted for 60,000 seconds.

POINT BEACH NUCLEAR PLANT

Supplemental Analyses

Units: = pCi\L

Gamma isotopic analysis

Location	GW-09 1Z-361B		GW-10 2Z-361B		U2FSSD	
Collection Date	12-17-13		12-17-13		12-17-13	
Lab Code	EW- 7811 [a]		EW- 7812		EW- 7813	
Be-7	15.9 ± 15.2	< 40.4	-3.3 ± 13.2	< 33.1	8.1 ± 11.8	< 23.0
Mn-54	1.1 ± 1.7	< 3.6	0.4 ± 1.7	< 3.5	0.0 ± 1.4	< 2.2
Fe-59	0.0 ± 2.7	< 7.1	-1.1 ± 3.0	< 8.1	2.4 ± 2.5	< 4.0
Co-58	-3.1 ± 1.6	< 2.8	-0.4 ± 1.6	< 3.3	0.3 ± 1.4	< 1.7
Co-60	0.7 ± 1.7	< 3.1	1.2 ± 1.9	< 3.4	0.1 ± 1.6	< 1.5
Zn-65	-0.4 ± 3.5	< 7.2	3.5 ± 3.6	< 7.6	-0.4 ± 2.8	< 1.4
Zr-Nb-95	-4.7 ± 1.8	< 5.5	-2.3 ± 1.9	< 6.2	0.4 ± 1.4	< 2.5
Cs-134	-0.7 ± 1.7	< 3.6	-0.5 ± 1.8	< 3.1	-0.1 ± 1.3	< 2.7
Cs-137	1.2 ± 1.8	< 3.3	2.3 ± 1.8	< 3.6	1.3 ± 1.6	< 2.9
Ba-La-140	-7.8 ± 2.3	< 23.1	4.1 ± 2.1	< 9.6	-8.0 ± 1.8	< 3.6

[a] Certain LLDs not reached due to age of sample. Samples counted for 60,000 seconds.

APPENDIX F

Special Analyses

ATI Environmental, Inc.
Midwest Laboratory
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Mr. Richard Welty		LABORATORY REPORT NO.:	8006-100-1055
Radiation Protection Mgr.		DATE:	04-29-13
Point Beach Nuclear Plant		SAMPLES RECEIVED:	04-05-13
NextEraEnergy		PURCHASE ORDER NO.:	
6610 Nuclear Road			
Two Rivers, WI 54241			

Below are the results of the readout of supplemental TLDs deployed during the first quarter, 2013.

Period:	1st Quarter, 2013
Date Annealed:	12/13/12
Date Placed:	01/03/13
Date Removed:	04/03/13
Date Read:	04/10/13
Days in the Field:	90
Days from Annealing to Readout:	118
In-transit exposure:	5.10 ± 0.31

Location	Total mR	Net mR	Net mR Std Qtr	Net mR per 7 days
SGSF-North	18.4 ± 1.2	13.3 ± 1.2	13.4 ± 1.2	1.03 ± 0.09
SGSF-East	15.7 ± 0.6	10.6 ± 0.7	10.8 ± 0.7	0.83 ± 0.05
SGSF-South	16.7 ± 0.4	11.6 ± 0.5	11.7 ± 0.5	0.90 ± 0.04
SGSF-West	17.1 ± 0.4	12.0 ± 0.5	12.2 ± 0.5	0.94 ± 0.04
ISFSI-North	33.6 ± 0.8	28.5 ± 0.9	28.8 ± 0.9	2.22 ± 0.07
ISFSI-East	51.6 ± 1.2	46.5 ± 1.2	47.0 ± 1.3	3.62 ± 0.10
ISFSI-South	18.7 ± 0.6	13.6 ± 0.7	13.7 ± 0.7	1.06 ± 0.06
ISFSI-West	57.7 ± 2.5	52.6 ± 2.5	53.2 ± 2.5	4.09 ± 0.19
Control	20.3 ± 1.0	15.2 ± 1.0	15.4 ± 1.0	1.18 ± 0.08

SA Coorlim,
Quality Assurance

APPROVED 4/29/13
Bronia Grob
Laboratory Manager

cc: K. Johansen

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Mr. Richard Welty		LABORATORY REPORT NO.:	8006-100-1068
Radiation Protection Mgr.		DATE:	08-07-13
Point Beach Nuclear Plant		SAMPLES RECEIVED:	07-01-13
NextEraEnergy		PURCHASE ORDER NO.:	
6610 Nuclear Road			
Two Rivers, WI 54241			

Below are the results of the readout of supplemental TLDs deployed during the second quarter, 2013.

Period:	2nd Quarter, 2013
Date Annealed:	03/18/13
Date Placed:	04/03/13
Date Removed:	06/26/13
Date Read:	07/03/13
Days in the Field:	84
Days from Annealing to Readout:	107
In-transit exposure:	4.11 ± 0.26

Location	Total mR	Net mR	Net mR Std Qtr	Net mR per 7 days
SGSF-North	17.6 ± 0.6	13.5 ± 0.7	14.6 ± 0.7	1.13 ± 0.06
SGSF-East	16.3 ± 0.6	12.2 ± 0.6	13.2 ± 0.7	1.01 ± 0.05
SGSF-South	16.5 ± 0.8	12.4 ± 0.8	13.4 ± 0.9	1.03 ± 0.07
SGSF-West	16.3 ± 0.8	12.1 ± 0.8	13.2 ± 0.9	1.01 ± 0.07
ISFSI-North	38.8 ± 2.0	34.7 ± 2.0	37.6 ± 2.1	2.89 ± 0.16
ISFSI-East	46.6 ± 1.5	42.4 ± 1.6	46.0 ± 1.7	3.54 ± 0.13
ISFSI-South	18.4 ± 0.9	14.3 ± 1.0	15.4 ± 1.1	1.19 ± 0.08
ISFSI-West	55.3 ± 2.8	51.2 ± 2.8	55.4 ± 3.1	4.26 ± 0.24
Control	19.1 ± 0.8	14.9 ± 0.9	16.2 ± 1.0	1.25 ± 0.07

SA Coorlim,
Quality Assurance

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Mr. Richard Welty
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NextEraEnergy
6610 Nuclear Road
Two Rivers, WI 54241

LABORATORY REPORT NO.:	8006-100-1077
DATE:	11-01-13
SAMPLES RECEIVED:	10-03-13
PURCHASE ORDER NO.:	

Below are the results of the readout of supplemental TLDs deployed during the third quarter, 2013.

Period:	3rd Quarter, 2013
Date Annealed:	06/13/13
Date Placed:	06/26/13
Date Removed:	10/01/13
Date Read:	10/08/13
Days in the Field:	97
Days from Annealing to Readout:	117
In-transit exposure:	3.33 ± 0.26

Location	Total mR	Net mR	Net mR Std Qtr	Net mR per 7 days
SGSF-North	18.8 ± 1.2	15.5 ± 1.3	14.5 ± 1.2	1.12 ± 0.09
SGSF-East	16.4 ± 0.7	13.1 ± 0.8	12.3 ± 0.7	0.95 ± 0.05
SGSF-South	17.8 ± 0.8	14.5 ± 0.8	13.6 ± 0.8	1.05 ± 0.06
SGSF-West	18.1 ± 0.6	14.8 ± 0.7	13.8 ± 0.6	1.06 ± 0.05
ISFSI-North	35.5 ± 1.1	32.2 ± 1.2	30.2 ± 1.1	2.32 ± 0.08
ISFSI-East	55.4 ± 1.1	52.0 ± 1.1	48.8 ± 1.1	3.76 ± 0.08
ISFSI-South	18.9 ± 0.7	15.6 ± 0.8	14.6 ± 0.7	1.12 ± 0.05
ISFSI-West	64.7 ± 3.2	61.3 ± 3.2	57.5 ± 3.0	4.43 ± 0.23
Control	20.9 ± 1.0	17.6 ± 1.0	16.5 ± 0.9	1.27 ± 0.07

SA Coorlim,
Quality Assurance

APPROVED
for Bronia Grob 11/01/13
Laboratory Manager

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Mr. Richard Welty	LABORATORY REPORT NO.:	8006-100-1087
Radiation Protection Mgr.	DATE:	02-03-14
Point Beach Nuclear Plant	SAMPLES RECEIVED:	01-08-14
NextEraEnergy	PURCHASE ORDER NO.:	
6610 Nuclear Road		
Two Rivers, WI 54241		

Below are the results of the readout of supplemental TLDs deployed during the fourth quarter, 2013.

Period:	4th Quarter, 2013
Date Annealed:	09/23/13
Date Placed:	10/01/13
Date Removed:	01/03/14
Date Read:	01/15/14
Days in the Field:	94
Days from Annealing to Readout:	114
In-transit exposure:	3.42 ± 0.23

Location	Total mR	Net mR	Net mR Std Qtr	Net mR per 7 days
SGSF-North	18.8 ± 0.4	15.3 ± 0.4	14.9 ± 0.4	1.14 ± 0.03
SGSF-East	15.4 ± 0.2	12.0 ± 0.3	11.6 ± 0.3	0.89 ± 0.02
SGSF-South	16.3 ± 0.4	12.9 ± 0.5	12.4 ± 0.5	0.96 ± 0.04
SGSF-West	16.4 ± 0.5	12.9 ± 0.6	12.5 ± 0.6	0.96 ± 0.04
ISFSI-North	44.5 ± 2.7	41.1 ± 2.7	39.7 ± 2.6	3.06 ± 0.20
ISFSI-East	53.1 ± 1.6	49.7 ± 1.6	48.1 ± 1.5	3.70 ± 0.12
ISFSI-South	19.7 ± 0.8	16.3 ± 0.9	15.8 ± 0.8	1.22 ± 0.06
ISFSI-West	61.4 ± 1.8	58.0 ± 1.8	56.1 ± 1.8	4.32 ± 0.13
Control	18.2 ± 0.8	14.8 ± 0.9	14.3 ± 0.8	1.10 ± 0.06

SA Coorlim,
Quality Assurance

APPROVED 2/3/14
Bronia Grob
Laboratory Manager

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Dr. Kjell Johansen
NextEra Energy
Point Beach Nuclear Plant
6610 Nuclear Road
Two Rivers, Wisconsin 54241

LABORATORY REPORT NO.:	8006-100-1052
DATE:	03-18-2013
SAMPLES RECEIVED:	03-04-2013
PURCHASE ORDER NO.:	

Below are the results of the analyses for tritium in six snow samples collected February 25, 2013

Sample Description	Lab Code	Concentration / MDC (pCi/L) H-3
# 1 East Side North of Pumphouse	EW-877	186 ± 82 / < 137
# 2 North Side NW of EDG Bldg	EW-878	512 ± 96 / < 137
# 3 West Side W of G-05 Bldg	EW-879	120 ± 78 / < 137
# 4 South Side 100ft W of Southgate	EW-880	106 ± 81 / < 144
# 5 South of Southgate on BFRs	EW-882	350 ± 92 / < 144
# 6 By flags E end of parking lot	EW-883	127 ± 82 / < 144

The error given is the probable counting error at the 95% confidence level. The less than (<) value, is based on 4.66 sigma counting error for the background sample.

E-mail: kjell.johansen@NextERAEnergy.com

Sincerely,

Bronia Grob,
Laboratory Manager

APPROVED BY: 3/18/13
Tony Coorlim,
Quality Assurance

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LABORATORY REPORT NO.:	8006-100-1070
DATE:	08-27-2013
SAMPLES RECEIVED:	08-23-2013
PURCHASE ORDER NO.:	

Below are the results of the analyses for tritium in six air condensate samples collected August 16, 2013

Sample Description	Lab Code	Concentration / MDC (pCi/L) H-3
NSB	EW-4980	478 ± 102 / < 153
SSB	EW-4981	2,606 ± 166 / < 153
Control Room	EW-4982	757 ± 112 / < 153
Training Bldg	EW-4984	203 ± 90 / < 153
South Gatehouse	EW-4985	217 ± 91 / < 153
OPS Office Area	EW-4986	1,055 ± 123 / < 153

The error given is the probable counting error at the 95% confidence level. The less than (<) value, is based on 4.66 sigma counting error for the background sample.

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Sincerely,

Bronia Grob,
Laboratory Manager

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Tony Coorlim,
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LABORATORY REPORT NO.:	8006-100-1071
DATE:	09-16-2013
SAMPLES RECEIVED:	09-06-2013
PURCHASE ORDER NO.:	

Below are the results of the analyses for tritium in eight air condensate samples collected August 26, 2013.

Sample Description	Lab Code	Concentration / MDC (pCi/L) H-3
U1 TB Office Area-AC	EW-5283	-19 ± 70 / < 151
U1 TB 1HX-24	EW-5284	80 ± 75 / < 151
U1 TB 1HX-24 West Side	EW-5285	105 ± 77 / < 151
U2 TB 2XJ-3571	EW-5286	-19 ± 70 / < 151
U2 TB Cond Pump 2 Discharge Header	EW-5287	-37 ± 82 / < 179
U2 TB 2HX-24	EW-5288	-57 ± 68 / < 151
U2 TB Control Room-AC	EW-5289	234 ± 83 / < 151
U2 TB Gen Bus SW Return Drain Line	EW-5290	-27 ± 70 / < 151

The error given is the probable counting error at the 95% confidence level. The less than (<) value, is based on 4.66 sigma counting error for the background sample.

E-mail: kjell.johansen@NextERAEnergy.com

Sincerely,

Bronia Grob,
Laboratory Manager

APPROVED BY: 9/16/13
Tony Coorlim,
Quality Assurance

APPENDIX 2

Environmental Manual
Revision 24
October 1, 2013

EM

ENVIRONMENTAL MANUAL

DOCUMENT TYPE:	Controlled Reference
CLASSIFICATION:	N/A
REVISION:	24
EFFECTIVE DATE:	October 1, 2013
REVIEWER:	Plant Operations Review Committee (PORC)
APPROVAL AUTHORITY:	Plant Manager (PORC Chair)
PROCEDURE OWNER (title):	Group Head
OWNER GROUP:	Chemistry

TABLE OF CONTENTS

1.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ADMINISTRATION

1.1 Definition and Basis

1.1.1 Definition

Radiological environmental monitoring is the measurement of radioactivity in samples collected from the atmospheric, aquatic and terrestrial environment around the Point Beach Nuclear Plant (PBNP). Monitoring radioactivity in effluent streams at or prior to the point of discharge to the environment is not part of the Radiological Environmental Monitoring Program (REMP).

1.1.2 Basis

The REMP is designed to fulfill the requirements of 10 CFR 20.1302, PBNP GDC 17, and Sections IV.B.2 and IV.B.3 of Appendix I to 10 CFR 50. Technical Specification 5.5.1.b requires the Offsite Dose Calculation Manual (ODCM) to contain the radiological environmental monitoring activities. A complete description of the PBNP radiological environmental monitoring program, including procedures and responsibilities, is contained in the Environmental Manual (EM). The EM is incorporated into the ODCM by reference (ODCM, Section 6.0).

No significant radionuclide concentrations of plant origin are expected in the plant environs because radioactivity in plant effluent is continuously monitored to ensure that releases are well below levels which are considered safe upper limits. The REMP is conducted to demonstrate compliance with applicable standards, to assess the radiological environmental impact of PBNP operations, and to monitor the efficacy of in plant effluent controls. The REMP, as outlined in Tables 2-2 through 2-4 is designed to provide sufficient sample types and locations to detect and to evaluate changes in environmental radioactivity.

Radioactivity is released in liquid and gaseous effluents. Air samplers and thermoluminescent dosimeters placed at various locations provide means of detecting changes in environmental radioactivity as a result of plant releases to the atmosphere. Because the land area around PBNP is used primarily for farming and dairy operations, sampling of vegetation is conducted to detect changes in radiological conditions at the base of the food chain. Sampling of area-produced milk is conducted because dairy farming is a major industry in the area.

Water, periphyton, and fish are analyzed to monitor radionuclide levels in Lake Michigan in the vicinity of PBNP. Periphyton, attached algae, along with lake water samples, provide a means of detecting changes which may have a potential impact on the radionuclide concentrations in Lake Michigan fish. Because of the migratory behavior of fish, fish sampling is of minimal value for determining radiological impact specifically related to the operation of the Point Beach Nuclear Plant. However, fish sampling is carried out as a conservative measure with emphasis on species which are of intermediate trophic level and which exhibit minimal migration in order to monitor the status of radioactivity in fish.

Vegetation, algae, and fish sampling frequencies are qualified on an "as available" basis recognizing that certain biological samples may occasionally be unavailable due to environmental conditions.

1.2 Responsibilities for Program Implementation

1.2.1 Chemistry Functions

Chemistry together with Regulatory Affairs (RA) provides the Plant Manager with the technical, regulatory, licensing, and administrative support necessary for the implementation of the program. The Chemistry administrative functions relating to the REMP fall into the six broad areas outlined below.

a. Program scope

The scope of the REMP is determined by the cognizant Chemist based on radiological principles for the fulfillment of PBNP Technical Specifications (TS) and the applicable Federal Regulations. Based on the scope, the Environmental Manual (EM) is written to accomplish the collection and analyses of the necessary environmental samples. The EM is revised as necessary to conform to changes in procedures and scope. Chemistry monitors the REMP effectiveness and compliance with TS and with the procedures and directives in the EM. In order to verify compliance with TS, Nuclear Oversight arranges for program audits and Supplier Assessments of the contracted radioanalytical laboratory. Chemistry reviews the EM annually via the Annual Monitoring Report.

b. Record keeping

The monthly radioanalytical results from the contracted laboratory are reviewed by Chemistry and one copy of the monthly radioanalytical results from the contracted laboratory is kept for the lifetime of the plant. The vendors monthly reports are cumulative (e.g. The September report contains all the results from January-September). The cognizant Chemist reviews the current months results, signs and dates the cover page, and sends the reviewed report to plants records for retention.

c. Data monitoring

Chemistry reviews the monthly analytical results from the vendor. Trends, if any, are noted. Any resulting corrections, modifications and additions to the data are made by Chemistry. The review is documented and sent to records, as noted in Section 1.2.1.b. Inconsistencies are investigated by Chemistry with the cooperation of Radiation Protection (RP) and contractor personnel, as required. Radioactivity levels in excess of administrative notification levels would be evaluated and notifications made, as appropriate, in accordance with applicable site and fleet policies and procedures.

d. Data summary

REMP results shall be summarized annually for inclusion in the PBNP Annual Monitoring Report. This summary advises the Plant Manager of the radiological status of the environment in the vicinity of PBNP. The summary shall include the numbers and types of samples as well as the averages, statistical confidence limits and the ranges of analytical results. Methods used in summarizing data are at the discretion of Chemistry.

e. Contractor communications

Communication with the contractor regarding data, analytical procedures, lower limits of detection, notification levels and contractual matters are normally conducted by Chemistry. Communication regarding sample shipment may be done by either RP or Chemistry as appropriate.

f. Reportable items

1. Chemistry shall generate reports related to the operation of the REMP. The material included shall be sufficient to fulfill the objectives outlined in Sections IV.B.2 and IV.B.3 of Appendix I to 10 CFR 50. The following items and occurrences, are required to be reported in the PBNP Annual Monitoring Report:

   (a) Summary and discussion of monitoring results including number and type of samples and measurements, and all detected radionuclides, except for naturally occurring radionuclides;

   (b) Unavailable, missing, and lost samples and plans to prevent recurrence and comments on any significant portion of the REMP not conducted as indicated in Tables 2-3 through 2-4.

   (c) New or relocated sampling locations and reason for change;

(d) LLDs that are higher than specified in Table 2-2 and factors contributing to inability to achieve specified LLDs;

(e) Notification that the analytical laboratory does not participate in an interlaboratory comparison program and corrective action taken to preclude a recurrence; and

(f) Results of the annual milk sampling program land use census "milk survey" to visually verify that the location of grazing animals in the vicinity of the PBNP site boundary so as to ensure that the milk sampling program remains as conservative as practicable.

(g) The annual results from the contracted REMP analytical laboratory as well as the laboratory's analytical QA/QC results, in-house blanks, interlaboratory comparisons, etc., shall be submitted to the NRC, via the Annual Monitoring Report.

(h) The Annual Monitoring Report for the previous 12 month period, or fraction thereof, ending December 31, shall be submitted to the NRC by April 30 of the following year.

1.2.2 Non-Chemistry Functions

The primary responsibility for the implementation of the PBNP REMP and for any actions to be taken at PBNP, based on the results of the program, resides with the Plant Manager.

a. Manual control and distribution

The distribution of the PBNP Environmental Manual is the responsibility of Document Control.

b. Program coordination

The daily operation of the program is conducted by PBNP Radiation Protection personnel, and other qualified personnel as required, under the supervision of an RP staff member who consults, as needed, with Chemistry. The daily administrative functions of the RP Management Employee address those functions required for the effective operation of the PBNP Radiological Environmental Monitoring Program. These administrative functions include the following:

1. Ensuring that samples are obtained in accordance with the type and frequency in Table 2-4 following procedures outlined in this manual;

2. Ensuring adequate sampling supplies and calibrated, operable equipment are available at all times;

3. Ensuring that air sampling pumps are maintained, repaired and calibrated as required and that an adequate number of backup pumps are readily available at all times;

4. Reporting lost or unavailable samples as well as other potential deviations from the sampling regime in Table 2-4 via the Corrective Action Program (CAP) and notifying the cognizant Chemist.

5. Assisting the State of Wisconsin in obtaining samples at co-located and other sampling sites based upon a yearly, renewable agreement; and

6. Assisting Chemistry, as necessary, with investigations into elevated radioactivity levels in environmental samples.

1.3 Quality Assurance/Quality Control

Quality assurance considerations are an integral part of PBNP's Radiological Environmental Monitoring Program. The program involves the interaction of Chemistry, site quality assurance and the contracted analytical vendor. The contracted vendor shall participate in an interlaboratory comparison program. The laboratory is audited periodically, either by PBNP or by an independent third party.

Quality control for the PBNP portion of the Radiological Environmental Monitoring Program is achieved by following the procedures contained in this manual. Radiation Protection Technologists (RPTs) collect, package and ship environmental samples under the supervision of Radiation Protection supervisors. They are advised by Radiation Protection Management who has immediate responsibility for the overall technical operation of the environmental sampling functions. The RPTs receive classroom training as well as on-the-job training in carrying out these procedures.

An audit of the PBNP Radiological Environmental Monitoring Program and its results shall be completed periodically as a means of monitoring program effectiveness and assuring compliance with program directives. The audit shall be performed in accordance with Section 1.4 of the ODCM.

1.4 Program Revisions

This manual describes the current scope of the PBNP Radiological Environmental Monitoring Program. Program items or procedures periodically may be updated or changed, consistent with good radiologically monitoring practices, either to reflect new conditions or to improve program effectiveness. Technical and program features described in this manual shall be reviewed by PORC pursuant to the requirements stated in the ODCM.

2.0 RADIOLOGICAL ENVIRONMENTAL MONITORING

2.1 Program Overview

2.1.1 Purpose

No significant or unexpected radionuclide concentrations of plant origin are expected because each normal effluent pathway at PBNP is monitored at or before the release point. However, the REMP is conducted to verify that plant operations produce no significant radiological impact on the environment and to demonstrate compliance with applicable standards.

2.1.2 Samples

Samples for the REMP are obtained from the aquatic, terrestrial and atmospheric environment. The sample types represent key indicators or critical pathways which have been identified by applying radiological principles from NRC and other guidance documents to the PBNP environment.

2.1.3 Monitoring sensitivity

The effectiveness of the REMP in fulfilling its purpose depends upon the ability to accurately determine the nature and origins of fluctuations in low levels of environmental radioactivity. This requires a high degree of sensitivity so that it is possible to correctly discriminate between fluctuations in background radiation levels and levels of radioactivity that may be attributable to the operation of PBNP. Therefore, personnel actively participating in the monitoring program should make every effort to minimize the possibility of contaminating environmental samples and to obtain samples of the appropriate size.

2.2 Program Parameters

2.2.1 Contamination avoidance

Contamination prevents the accurate quantification of environmental radioactivity and the correct differentiation between fluctuating background radioactivity and levels of radioactivity attributable to the operation of PBNP. Therefore, it is necessary that all personnel associated with collecting and handling radiological environmental samples take the appropriate precautions to minimize the possibility of contaminating the samples. Some of the precautions that should be taken and which will help to minimize contamination are listed below:

a. Equipment which has been on the controlled side, even if released clean, should not normally be used in conjunction with radiological environmental monitoring. An exception to this is the Health Physics Test Instrument (HPTI) equipment used to calibrate the air flow calibrator.

b. Store sampling equipment in radiologically clean areas only;

c. Store radiological environmental samples only in radiologically clean areas when samples cannot be shipped to the contractor on the same day they are collected;

d. Treat each sample as a possible source of contamination for other samples so as to minimize the possibility of cross-contamination;

e. Radiological environmental monitoring equipment should be repaired in clean-side shops;

f. Contamination avoidance for environmental TLDs is covered in Section 2.4.2; and

g. Avoid entering contaminated areas prior to collecting environmental samples.

2.2.2 Sample size

Sample size affects the sensitivity achievable in quantifying low levels of environmental radioactivity. Therefore, sampling personnel must attempt to attain the quantities of sample specified in Table 2-1. When a range is given, every effort should be made to obtain a quantity at the upper part of the range.

2.2.3 Lower limit of detection

The sensitivity required for a specific analysis of an environmental sample is defined in terms of the lower limit of detection (LLD). The LLD is the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with a 95% probability and have only a 5% probability of falsely concluding that a blank observation represents a real signal. Mathematically, the LLD is defined by the formula

$$LLD = \frac{4.66\, S_b}{E \times V \times 2.22 \times Y \times EXP(-\lambda \Delta T)}$$

Where

LLD	=	the a priori lower limit of detection in picocuries per unit volume or mass, as applicable;
S_b	=	the standard deviation of the background counting rate or the counting rate of a blank sample, as appropriate, in counts per minutes;
E	=	counting efficiency in counts per disintegration;
V	=	sample size in units of volume or mass, as applicable;
2.22	=	number of disintegrations per minute per picocurie;
Y	=	the fractional chemical yield as applicable;
λ	=	the radioactive decay constant for the particular radionuclide; and
ΔT	=	the elapsed time between sample collection, or the end of the collection period, and the time of counting.

Typical values of E, V, Y, and ΔT are used to calculate the LLD. As defined, the LLD is an a priori limit representing the capability of a measuring system and not an a posteriori limit for a particular measurement.

The required analysis for each environmental sample and the highest acceptable LLD associated with each analysis are listed in Table 2-2. Whenever LLD values lower than those specified in Table 2-2 are reasonably achievable, the analytical contractor for the radiological environmental samples will do so. When the LLDs listed in Table 2-2 are not achieved, a description of the factors contributing to the higher LLD shall be reported in the next PBNP Annual Monitoring Report.

2.2.4 Notification levels

The Notification Level (NL) is that measured quantity of radioactivity in an environmental sample which, when exceeded, requires a notification of such an occurrence be made to the appropriate party. Regulatory and administrative notification levels are listed in Table 2-2.

a. Regulatory notification levels

The regulatory notification levels listed in Table 2-2 represent the concentration levels at which NRC notification is required. If a measured level of radioactivity in any radiological environmental monitoring program sample exceeds the regulatory notification level listed in Table 2-2, resampling and/or reanalysis for confirmation shall be completed within 30 days of the determination of the anomalous result. If the confirmed measured level of radioactivity remains above the notification level, a written report shall be submitted to the NRC. If more than one of the radionuclides listed in Table 2-2 are detected in any environmental medium, a weighted sum calculation shall be performed if the measured concentration of a detected radionuclide is greater than 25% of the notification levels. For those radionuclides with LLDs in excess of 25% of the notification level, a weighted sum calculation needs to be performed only if the reported value exceeds the LLD. Radionuclide concentration levels, called Weighted Sum Action Levels, which trigger a weighted sum calculation are listed in Table 2-2.

The weighted sum is calculated as follows:

$$\frac{\text{concentration (1)}}{\text{notification level (1)}} + \frac{\text{concentration (2)}}{\text{notification level (2)}} + \ldots = \text{weighted sum}$$

If the calculated weighted sum is equal to or greater than 1, resampling and/or reanalysis for confirmation shall be completed within 30 days of the determination of the anomalous result. If the confirmed calculated weighted sum remains equal to or greater than 1, see Section 1.2.1.c for notification guidance. This calculation requirement and report is not required if the measured level of radioactivity was not the result of plant effluents.

b. Administrative notification levels

The administrative notification levels are the concentration levels at which the contracted analytical laboratory promptly notifies the cognizant Chemistry Specialist by phone, followed by a formal written communication. The administrative notification levels are lower than the NRC regulatory notification levels and lower than, or equal to, the weighted sum action levels so the nature and origin of the increased level of environmental radioactivity may be ascertained and corrective actions taken, if required.

2.2.5 Sampling locations

A list of sampling locations and the corresponding location codes appear in Table 2-3. The locations also are shown in Figures 2-1a, 2-1b, and 2-1c. It is conceivable that samples may become unavailable from specified sample locations. If this were to occur, new locations for obtaining replacement samples shall be identified and added to the Radiological Environmental Monitoring Program. If milk or vegetation samples become unavailable from the specified sampling locations, new sampling locations will be identified within 30 days. The specific locations where samples were unavailable may be deleted from the monitoring program in accordance with established provisions for assessing changes. Any significant changes in existing sampling location and the criteria for the change shall be reported in the Annual Monitoring Report for the period in which the change occurred. Additional sampling locations may be designated if deemed necessary by cognizant company personnel. Figures and tables in this manual shall be revised to reflect the changes.

2.2.6 Sampling media and frequency

The sampling frequency for the environmental media required by the PBNP REMP is found in Table 2-4. In addition to samples required by the former Technical Specifications, the Radiological Environmental Monitoring Program also includes the sampling of soil and shoreline sediment. To ensure that all samples are obtained at the appropriate times, a checklist is used. The checklist provides a month-by-month indication of all samples, to be obtained at each sampling location (PBF-4121a through 4121l). These checklists also identify the schedule for the annual milk survey and provides space for recording the date samples were shipped offsite for analysis. In addition, the checklist lists each sampling location to identify all samples, to be obtained and the collection date. Because the weekly air samples require additional information, a separate checklist is used for each individual air sampling location for calculations and other information as shown in PBF-4078.

It is recognized that on occasions samples will be lost or that samples cannot be collected at the specified frequency because of hazardous conditions, seasonable unavailability, automatic sampling equipment malfunctions and other legitimate reasons. Reasonable efforts will be made to recover lost or missed samples if warranted and appropriate. If samples are not obtained at the indicated frequency or location, the reasons or explanations for deviations from the sampling frequency specified in Table 2-4 shall be documented in a CAP.

2.2.7 Sample labeling

All samples must be properly labeled to ensure that the necessary information is conveyed to the analytical contractor and that the results are associated with the correct geographical location. Each label (PBF-4026) must contain the following:

a. Sample type;

b. Sample location from Table 2-3;

c. Date and time (as appropriate) collected;

d. Air samples must show the total volume in m^3; volumes for water and milk are in gallons; vegetation, sediment, soil, and algae are indicated as $\leq$1000 grams; and fish $\geq$1000 grams;

e. Analyses for routine samples are indicated as "per contract." For special samples, the Radiation Protection manager or another Radiation Protection Management Employee will designate the analyses required; and

f. Name of person collecting the sample.

A permanent or indelible ink type felt-tip marker shall be used.

A separate sample label is needed for each sample type and location. Labels are securely attached to each sample container. In addition to sample labels, other identifying markings may be placed on sample containers as appropriate.

2.2.8 Sample shipping

All environmental samples are shipped to a contractor for analysis. The samples shall be packaged and shipped in such a way as to minimize the possibility of cross-contamination, loss, spoilage and leakage. Each sample shipment shall have a typed cover letter and, when appropriate, a contractor data collection sheet. Included in the letter shall be the same information required for the sample labels as well as the specific analyses required. The original cover letter and data collection sheet shall be sent to the contractor under separate cover; one copy of each is to be used as a packing list and a copy of each shall be kept in the appropriate PBNP file. The data collection sheet (PBF-4140a) also serves as the Chain of Custody form, so it is required that the collector, packer, and shipper sign the form.

2.2.9 Sample analyses and frequency

The PBNP REMP samples shall be analyzed for designated parameters at the frequency listed in Table 2-4. Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to effluents from PBNP. Typically, this entails the scanning of the spectrum from 80 to 2048 keV and decay correcting identified radionuclides to the time of collection. The analysis specifically includes, but is not limited to, Mn-54, Fe-59, Zn-65, Co-58, Co-60, Zr-Nb-95, Ru-103, I-131, Cs-134, Cs-137, Ba-La-140, Ce-141, and Ce-144.

2.2.10 Analytical laboratory

The analyses shall be performed by a laboratory that participates in an interlaboratory crosscheck program. If the laboratory is not participating in such a program, a report shall be made pursuant to 1.2.1.f.1.(e). The current laboratory is:

Environmental Incorporated Midwest Laboratory
700 Landwehr Road
Northbrook, IL 60062-4517
(847) 564-0700

This laboratory performs the analyses in such a manner as to attain the desired LLDs. The contracted laboratory participates in an inter-laboratory comparison crosscheck program.

The contractor is responsible for providing prompt notification to the cognizant Chemist regarding any samples found to exceed the administrative notification levels as identified in Table 2-2.

2.3 <u>Assistance to the State of Wisconsin</u>

As a courtesy and convenience, PBNP personnel obtain certain environmental samples for the Section of Radiation Protection, Department of Health and Family Services of the State of Wisconsin as listed in Table 2-5. A checklist is used. In addition, a State of Wisconsin air sampling data sheet is submitted with each sample obtained at Wisconsin air sampling locations serviced by PBNP personnel.

State of Wisconsin precipitation samples collected twice a month (or as available) require a state sample tag to be placed in a box with the quart cubitainer. State supplied labels for air particulate filters require start and stop time, date and beginning and ending volume. Fish sent to the state identify only the quarter and the year using a PBNP label (PBF-4026). The monthly lake water sample may be picked up by state personnel and in which case these samples require only that the date and location be written on the box for the cubitainer. The well water samples, 2 times/year, may be picked similar to lake water samples.

Samples obtained for the State of Wisconsin are either given directly to state personnel or shipped as required. The department address is:

State Lab of Hygiene
Radiochemistry Unit
2601 Agriculture Dr.
PO Box 7996
Madison, Wisconsin 53707-7996

2.4 Specification of Sampling Procedures

General radiological environmental sampling procedures follow the directives presented in Sections 2.1 and 2.2. Specific information for handling individual sample types follow.

2.4.1 Vegetation

Vegetation samples consist of green, growing grasses and weeds and are obtained three times per year, as available, from specified locations. New growth, not dead vegetation, should be used because these samples are indicators of recent atmospheric deposition. Use a scissors or other sharp cutting tool to cut the grasses and weeds off as close to the ground as possible. Do not include plant roots and take care not to contaminate the sample with soil. Total sample collected should exceed 500 grams and ideally should be 1000 grams. Place entire sample in an appropriate container, such as a plastic bag (tape the bag shut) and label the container as described in Section 2.2.7.

2.4.2 Thermoluminescent dosimeters (TLDs)

TLDs capable of multiple, independent measurements of the same exposure are posted at locations specified in Table 2-4 and are changed quarterly. The utmost care in handling is required to minimize unnecessary exposure during transit, storage and posting because the TLDs begin recording all radiation from the moment they are annealed (heated to rezero) at the contractor's laboratory. Packages of TLDs in transit should be marked "DO NOT X-RAY."

Transportation control (TLDs) shall accompany the new batch in transit from the contractor's laboratory to the plant. The control TLDs shall accompany the batch during brief storage and subsequent posting. The same control TLDs shall accompany the "old" or exposed batch on its way back to the contractor. Therefore, each control represents the sum of approximately half the in-transit exposure of the two batches. This control system is able to identify any unusual in-transit exposure.

Environmental TLDs should never be brought into the plant RCA or any other area with elevated radiation, but may be stored for brief periods in a shielded enclosure in the RP Office Area or other low background area, such as the Energy Information Center or the Site Boundary Control Center. The contractor is to time shipments to coincide as closely as possible with the beginning of a calendar quarter. TLDs should be shipped back to the contractor immediately or within 24 hours of removal. The contractor is instructed to process the samples immediately upon receipt. The contractor shall report removal data and cumulative readings in mR for all locations and control, correct for in-transit exposure and express results in net mR/7 days. Labels of the exposed set for shipment to contractor should show both posting and removal dates.

2.4.3 Lake water

Lake water samples are obtained monthly at specified locations. The contractor is responsible for the compositing for quarterly analyses. Collect approximately 8000 ml (2 gallons) of lake water in the required number of cubitainers, or other appropriate containers, at each location and label as directed in Section 2.2.7.

Also, lake water is collected for the State of Wisconsin pursuant to Table 2-5. The sample is collected, labeled, and forwarded to the appropriate State agency.

2.4.4 Well water

Well water samples are obtained quarterly from the single onsite well.

Sample should be obtained from PW-80, T-90 Hydro-pneumatic Tank Drain.

After purging 8 gallons, collect approximately 8000 ml (2 gallons) of well water using the required number of cubitainers or other appropriate containers. Label as directed in Section 2.2.7.

2.4.5 Air

a. Sample collection

Air filters are changed weekly at specified locations and placed in glassine envelopes for shipment to the vendor for analyses. Take precautions to avoid loss of collected material and to avoid contamination when handling filters. Washing hands before leaving the plant to change filters is a recommended practice.

Both particulate filters and charcoal cartridges are employed at each sampling location. Particulate filters are analyzed for gross beta activity after waiting for at least 24 hours to allow for the decay of short-lived radon and thoron daughter products. The contractor makes quarterly composites of the weekly particulate samples for gamma isotopic analyses.

A regulated pump (Eberline Model RAS-1 or equivalent) is used at each air sampling location. Because of the automatic flow regulation, flow meter readings at the beginning and ending of the sampling period should be nearly identical. Substantial differences in readings usually require some investigation to determine the cause. The flow meter attached to the pumps are calibrated in liters per minute. When new filters are installed, flow rate should be about 28-30 lpm. Flow rates less than 26 lpm or greater than 32 lpm require that the pump regulator be readjusted.

Pertinent air sampling data for each location is recorded on PBF-4078, Air Sampling Data Sheet. At a normal filter change, the following procedure will apply:

NOTE: Environmental flow rates should be approximately 30 lpm.

NOTE: The correction factor for the digital flow meter is always 1.0 similar to that of a Hi Vol air sampler.

1. Ensure unit is in flow mode.

2. Read and record the current flow rate (R_2).

3. Press the RESET button while the pump is operating. This turns the pump OFF and preserves the elapsed time and total time values.

4. Record Date Off and time off (t_2).

5. Press the UNITS button to read elapsed time (T) and total volume (m^3) and record.

NOTE: Always write data on the envelope before inserting the particulate filter in the envelope.

6. Label the sample envelope as directed in Section 2.2.7. Also enter any other pertinent information at this time.

NOTE: Do <u>NOT</u> fold filter. Folding and unfolding may dislodge material from the filter and make a reproducible geometry impossible to achieve.

7. Remove particulate filter being careful to handle it only by the edges and place in the glassine envelope.

8. Remove charcoal cartridge, place in plastic bag, and label as directed in Section 2.2.7.

NOTE: Check the charcoal cartridge for breaks and the particulate filter for holes in the filter surface prior to installation. Discard unacceptable filter media.

9. Install new charcoal cartridge and particulate filter.

10. Press the UNITS button until the time is displayed and time indicator is lit up.

11. Press the RESET button to zero the time.

12. Press the UNITS button until the total volume is displayed and total volume indicator is lit up.

13. Press the RESET button to zero the total volume.

14. Press the UNITS button until the flow is displayed and the flow indicator is lit up.

15. Press the RESET button to start the sample pump.

16. Record Date On and time on (t_1).

17. Perform the weekly gross check by blocking the air flow with a large rubber stopper and verifying the displayed flow reads zero. Record test result.

18. Read and record the current flow rate (R_1).

19. Compare current flow rate (R_1) to previous ending flow rate (R_2).

    NOTE: The regulator will generally maintain a constant flow regardless of filter loading.

    (a) If a substantial difference is found, investigate and identify cause. If condition can not be resolved, take the unit out of service and replace.

20. Calculate total volume for the sampling period and record, if required.

21. Record any unusual conditions or observations in the space provided at the bottom of the form.

Air samples are collected for the State of Wisconsin at two locations, one of which is co-located with a PBNP air sampling site. The State of Wisconsin samples are handled in a manner similar to the PBNP samples except that no charcoal cartridges are involved. State of Wisconsin samplers are equipped with volume integrating meters. Therefore, clock time must be recorded in addition to the ending and beginning volumes. Label and forward all applicable air samples to the State of Wisconsin.

b. Air sampling system description

The air monitoring equipment for the PBNP air sampling program consists of a Regulated Rate Control System. The Regulated Rate Control System is used at PBNP because of its simplicity and reliability. It is designed to minimize both calibration difficulties and the potential for leaks. The regulated rate control system includes a pump, a flow regulator, the appropriate filter holders and a minimum of tubing. Also, it may include an elapsed time meter. In this system, the total volume sampled can be calculated simply and accurately from the elapsed time and the flow rate which is kept constant by the regulator regardless of filter loading.

The air samplers are Eberline Model RAS-1 (or equivalent) and have built-in flow meters which read in liters per minute. The systems also include an Eberline WPH-1 (or equivalent) weatherproof housing and an iodine cartridge holder and mounting kit and may include an electric hour meter. Glass fiber, 47 mm diameter, particulate filters capable of collecting 95% of 1 micron diameter particles and iodine impregnated charcoal cartridges (Scott or equivalent) constitute the filter media.

c. Calibration

Calibrate the pump flow meters at initial installation and at yearly intervals thereafter by connecting a laboratory-quality reference flow meter with NIST traceable calibration to the filter face with the particulate filter and charcoal cartridge in position. Upon completion, a calibration sticker is affixed to, or near, the flow meter. The results are recorded on Form PBF-4020.

d. Inspection and maintenance

Weekly gross leak checks shall be accomplished as indicated in the appropriate PBNP procedure.

For normal operation, the regulators should be adjusted to maintain a true flow rate of 28-30 liters per minute. Adjustments are made by turning the screw marked FLOW ADJ located on the side of the regulator body: counterclockwise increases flow, clockwise decreases flow. Flow rates should be observed at all filter changes. Flow rates less than 26 lpm or more than 32 lpm require readjustment of the regulator. Particular attention should be paid to flow rate readings with the "old," loaded filter and with new, unused filters in position. Because of the regulator, the difference in flow should be barely perceptible, perhaps no more than one lpm. Significant differences in flow rates require further investigation to determine the cause.

Preventive maintenance shall be performed as indicated in the appropriate PBNP procedure on all environmental air samplers and the results recorded on Form PBF-4020.

e. Pump repair and replacement

The pumps can operate for long periods of time with minimal or no maintenance. The vane assembly of the pump is most susceptible to failure, indicated by excessive noise or inability to maintain sufficient flow across loaded filters. At least one standby pump should be available for temporary service during the repair period. In the event of motor failures due to causes other than defective connections, complete replacement of the unit may be necessary. All pump repairs should be done in a clean-side shop with clean tools.

2.4.6 Milk

Because of iodine decay and protein binding of iodine in aging milk samples, speed is imperative in processing and samples must be kept cool to avoid degradation and spoilage of the samples. Milk samples are obtained monthly in conjunction with the State of Wisconsin Milk Sampling Program from three individual dairy farmers located north, south, and west of the site. Milk sampling data can also be obtained from the Kewaunee Power Station (KPS), whose radiological environmental monitoring program includes samples taken from a dairy in Green Bay, WI. This location could act as a control location.

Because two of the three sites are co-located, the PBNP pickup is coordinated to coincide with the State arranged schedule. The pickup usually will be the second Wednesday of the month.

The following sequence should be followed:

a. After verifying the State milk pickup date with the Manitowoc Public Health Department (Mr. Mark Chatenka, phone number 683-4454), notify dairies of pickup date.

b. Because the milk must be kept cool, but not frozen, fill enough cubitainers, or other appropriate containers, with water and freeze to be able to put one in each shipping container. Fill the containers with water and freeze the day preceding the pickup or use ice packs.

c. The milk from the Strutz farm (E-21) must be picked up before 0900 because that is the time the Strutz milk is shipped. A late arrival may mean a missed sample. Milk from sites E-11 and E-40 may be picked up any time after the Strutz pickup.

d. Identify yourself and the nature of your business at each milk pickup site. Collect two one-gallon samples from each site, using a funnel if necessary. If shipment cannot occur on the collection day, store the milk in the environmental refrigerator at the SBCC overnight. DO NOT FREEZE.

e. Complete a PBNP sample tag according to Section 2.2.7 for each gallon sample and place in the box with the sample and ice or ice packs. Do not seal the box. Place the samples in insulated containers and turn them over to Ready Stores personnel for shipment. Make sure that the cover letter and, as appropriate, the contractor data collection sheets are sent according to Section 2.2.8 of this manual.

2.4.7 Algae

Filamentous algae are collected from pilings or rocks three times per year, as available, from two locations. The long, grassy, dark green algae can normally be cut with scissors. The shorter, light green algae normally must be scraped from rocks or pilings. When scraping algae, be careful not to include pieces of rock in the sample. The sample can be lightly rinsed in the same medium in which it is growing. This rinse will help rid the sample of pieces of rock and gravel that may have been inadvertently collected with the sample. Because rocks and sediment contain naturally occurring radioactive materials, their inclusion may give false sample results. Collect between 100 and 1000 gm of algae. A sample greater than 500 gm is preferred. Place the algae in a wide-mouth poly bottle or other appropriate container and label the container as director in Section 2.2.7. The algae must be kept cool to prevent spoilage.

2.4.8 Fish

The fish for the Point Beach REMP are obtained from either the traveling screens as washed into the fish baskets or by other methods, as required. The two-fold objective of fish sampling is to obtain commercially and recreationally important fish (game fish) that occur in the vicinity of the plant and to determine if there is evidence of PBNP released radionuclides in the fish.

There are three confounding factors affecting this objective. The first is the recycling of non-PBNP sources such as fallout from atmospheric weapons testing in the 1950s and 1960s and subsequent Chinese tests, fallout from the Chernobyl accident, and release from other plants on Lake Michigan. Due to the long residence time of water in Lake Michigan (about 200 years), radionuclides entering Lake Michigan remain in the lake for a long time. This means that a long half life radionuclide such as Cs-137 is still present in the lake and in the fish.

The second confounding factor is the migratory behavior of the fish. In addition to moving around the lake, fish move from deep water to the shallower, inshore areas. It is only when the fish are in the inshore area that they are susceptible to being drawn into the PBNP water intake. Therefore, the radioactivity in the fish so caught may not originate from PBNP but from any of the above named sources.

In addition to the migratory behavior of fish, fish sampling also is effected by the fish deterrent system used at the PBNP water intake. The purpose of this system is to prevent schools of fish from being sucked into the cooling water intake.

As a result of all these factors, the availability of fish is not uniform throughout the year. Based on experience, the period from late Spring to early Fall appears to be the best period for obtaining game fish. Therefore, fish for the PBNP REMP will be sent for analysis at least twice a year based on seasonal availability. Fish also are supplied to the State of Wisconsin at the same frequency. (Fish may be sent more frequently if available.)

Operations removes the fish from the fish basket pursuant to OI 38 Attachment D. Each game fish is identified, placed in a clear plastic bag and the bag sealed, and the collection date and fish name written on the bag. The fish are placed in the game fish freezer in the pump house. Trash fish, such as carp are bagged and placed in the trash fish freezer.

Because individual fish are analyzed, emphasis is placed on large fish which will yield at least 1000 grams (2.2 lbs.) of fillets in order to easily achieve the required LLD. Because of the aforementioned factors, it may not be possible to have enough large fish to fulfill the 1000 gram requirement. When this occurs, the lab will adjust count time on the available fish in order to achieve the required LLD.

1. Obtain the game fish from the freezer and package for shipment to the PBNP contracted radioanalytical lab and to the State. (If no game fish are available, trash fish from the larger freezer in the pump house may be used.)

2. Pack fish in an insulated container with ice or other similar cold media, as necessary, to prevent spoilage of the fish during transit. To aid in preventing the fish from thawing during transit, fish should be shipped so that they will arrive on or before Friday. If this is not possible, include enough cooling material so that the fish will not spoil if sitting on a loading dock over the weekend.

3. Send fish at the end of May and the end of August.

4. Divide the available fish approximately in half for shipment with PBNP contracted radioanalytical lab receiving the larger portion when an odd number of fish are available. If additional game fish are available later in the year, they will be sent during the fourth quarter.

5. The cognizant Chemist will make the final decision should fish sampling questions arise.

2.4.9 Soil

Soil integrates atmospheric deposition and acts as a reservoir for long-lived radionuclides. Although soil sampling is a poor technique for assessing small incremental releases and for monitoring routine releases, it does provide a means of monitoring long-term trends in atmospheric deposition in the vicinity of PBNP. Therefore, soil samples are obtained two times per year from specified locations.

Clear the vegetation from a 6" x 6" area, being careful to leave the top layer of soil relatively intact. Remove root bound soil by shaking the soil onto the cleared area or into the sample container before discarding the roots. When necessary, it is preferable to leave some roots in the soil rather than to lose the top layer of soil.

Remove the soil to a depth of three inches. If necessary, expand the area, instead of digging deeper, to obtain the required amount of sample. If an area larger than 6" x 6" is used, notify Chemistry of the area used. The minimum acceptable quantity is 500 grams. Place the entire soil sample in a wide-mouth poly bottle or another appropriate container. If a plastic bag is used, seal the bag with tape. Label the sample as directed in Section 2.2.7.

This procedure assumes that the samples are obtained from undisturbed land; land that has not been plowed within approximately the last 25 years. If the land has been plowed, the soil should be sampled to the plow depth which typically is eight inches. Place the soil in a clean bucket or appropriate size plastic bag, homogenize the soil and place 1000 grams of the well mixed soil sample in a plastic bag, or other appropriate container, and label as described above.

2.4.10 Shoreline Sediment

Shoreline sediment consisting of sand and smaller grain size material is sampled two times per year from specified locations. The 1000 gram sample is collected, from beach areas near the water ridge. At each location collect representative samples of sediment types roughly in proportion to their occurrence. For example, at E-06 avoid collecting a sample which consists exclusively of the dark-brown to black sediments which occur in layers up to several inches thick. Package the sample in a wide-mouth poly bottle or other appropriate container and label as described in Section 2.2.7.

2.5 Milk Survey

The milk sampling program is reviewed annually, including a visual verification of animal grazing in the vicinity of the site boundary, to ensure that sampling locations remain as conservative as practicable. The verification is conducted each summer by cognizant PBNP personnel. Because it is already assumed that milk animals may graze up to the site boundary, it is only necessary to verify that these animals have not moved onto the site. No animal census is required. Upon completion of the visual check, a memo will be generated to document the review and the memo sent to file. To ensure performance of the annual verification, "milk review" is identified on the sampling checklist (i.e., the PBF-4121a-l series).

TABLE 2-1
RECOMMENDED MINIMUM SAMPLE SIZES

Sample Type	Size
Vegetation	100 -1000 gm
Lake Water	8 liters (2 gal)
Air Filters	250 m^3
Well Water	8 liters (2 gal)
Milk	8 liters (2 gal)
Algae	100-1000 gm
Fish (edible portions)	1000 gm
Soil	500-1000 gm
Shoreline Sediment	500-1000 gm

TABLE 2-2
SAMPLE TYPES AND ASSOCIATED LOWER LEVEL OF DETECTION (LLD) AND NOTIFICATION LEVEL VALUES

SAMPLE TYPE	REPORTING UNIT	PARAMETER	LLD[(a)]	NOTIFICATION LEVELS NRC (Regulatory)	NOTIFICATION LEVELS PBNP[(b)] (Admin.)	WEIGHTED SUM ACTION LEVEL
Vegetation	pCi/g wet	Gross Beta	0.25	---	60	---
		Cs-137	0.08	2	0.40	0.50
		Cs-134	0.06	1	0.20	0.25
		I-131	0.06	0.1	0.06	0.06
		Other[(c)]	0.25	---	2.0	---
Shoreline Sediment and Soil	pCi/g dry	Gross Beta	2.0	---	100	---
		Cs-137	0.15	---	20	---
		Other[(c)]	0.15	---	20	---
Algae	pCi/g wet	Gross Beta	0.25	---	12	---
		Cs-137	0.25	10	1	2.5
		Cs-134	0.25	10	1	2.5
		Co-58	0.25	10	1	2.5
		Co-60	0.25	10	1	2.5
		Other[(c)]	0.25	---	1	---
Fish	pCi/g wet	Gross Beta	0.5	---	125	---
		Cs-137	0.15	2	0.40	0.50
		Cs-134	0.13	1	0.20	0.25
		Co-58	0.13	30	3	7.5
		Co-60	0.13	10	1	2.5
		Mn-54	0.13	30	3	7.5
		Fe-59	0.26	10	1	2.5
		Zn-65	0.26	20	2	5.0
		Other[(c)]	0.5	---	6	---
TLDs	mR/7 days	Gamma Exposure	1mR/TLD	---	5mR/7 days	---
Lakewater[(e)] and Well Water	pCi/L-T.S.[(d)]	Gross Beta	4	---	100	---
		Cs-134	15 (10)	30	15	15
		Cs-137	18 (10)	50	18	18
		Fe-59	30	400	40	100
		Zn-65	30	300	30	75
		Zr-Nb-95	15	400	40	100
		Ba-La-140	15	200	20	50
		Co-58	15 (10)	1,000	100	250
		Co-60	15 (10)	300	30	75

TABLE 2-2
SAMPLE TYPES AND ASSOCIATED LOWER LEVEL OF DETECTION (LLD) AND NOTIFICATION LEVEL VALUES

Lakewater and Well Water (Continued)	pCi/L-T.S.[d]	Mn-54	15 (10)	1,000	100	250
		I-131	2 (0.5)	---	2	---
		Other	30	---	100	---
		H-3 (Lakewater)	3,000 (200)	30,000	3,000	7,500
		H-3 (Well Water)	3,000 (200)	20,000	3,000	7,500
		Sr-89	10 (5)	---	50	---
		Sr-90	2 (1)	---	20	---
Milk	pCi/L	Sr-89	5	---	100	---
		Sr-90	1	---	100	---
		I-131	0.5	3	0.5	0.75
		Cs-134	15 (5)	60	15	15
		Cs-137	18 (5)	70	18	18
		Ba-La-140	15 (5)	300	30	75
		Other[c]	15	---	30	---
Air Filter	pCi/m^3	Gross Beta	0.01	---	1.0	---
		I-131	0.07 (0.03)	0.9	0.09	0.2
		Cs-137	0.06	20	2.0	5.0
		Cs-134	0.05	10	1.0	2.5
		Other[c]	0.1	---	1.0	---

(a) The LLDs in this column are the maximum acceptable values. The values in parentheses are the LLDs currently used (see Section 2.2.3)
(b) The values in this column are not technical specifications.
(c) Other refers to non-specified identifiable gamma emitters, resulting from the operation of PBNP. Naturally occurring radionuclides are not included.
(d) T.S. = total solids.
(e) No drinking water

TABLE 2-3
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

Location Code	Location Description
E-01	Primary Meteorological Tower, South of the plant
E-02	Site Boundary Control Center - East Side of Building
E-03	Tapawingo Road, about 0.4 Miles West of Lakeshore Road
E-04	North Boundary
E-05	Two Creeks Park, the TLD is on South side of Two Creeks Road, West of Lakeshore Road on first pole West of Lakeshore.
E-06	Point Beach State Park - Water and shoreline sediment samples at the Coast Guard Station; soil and vegetation from the Point Beach State Park campground area N of the Coast Guard Station and on the West side of County Road O; TLD located South of lighthouse on telephone pole.
E-07	WPSC Substation on County Rt. V, about 0.5 Miles West of Hwy. 42
E-08	G. J. Francar Property, at the SE Corner of the Intersection of Cty. B and Zander Road
E-09	Nature Conservancy, East side of Hwy 42. Corner of Hwy 42 and Cty. BB. On pole North side of Entrance.
E-10	PBNP Site Well
E-11	Lambert Dairy Farm, 1523 Tapawingo Road, 0.5 miles West of Saxonburg Road
E-12	Discharge Flume / Pier, U-1 side
E-13	Pumphouse
E-14	South Boundary, about 0.2 miles East of Site Boundary Control Center
E-15	SW Corner of Site, N side of Nuclear Rd at junction with Twin Elder Rd.
E-16	WSW, Hwy. 42, Residence, about 0.25 miles North of Nuclear Road
E-17	North of Mishicot, Cty. B and Assman Road, NE Corner of Intersection
E-18	NW of Two Creeks at Zander and Tannery Roads
	.
E-20	Reference Location, 17 miles SW, at Silver Lake College
E-21	Local Dairy Farm just South of Site (R. Strutz) on Lakeshore and Irish Roads
E-22	West Side of Hwy. 42, about 0.25 miles North of Johanek Road
E-23	Greenfield Lane, about 4.5 Miles South of Site, 0.5 Miles East of Hwy. 42
E-24	North Side of County Rt. V, near intersection of Saxonburg Road
E-25	South Side of County Rt. BB, about 0.5 miles West of Norman/Saxonberg Road
E-26	804 Tapawingo Road, about 0.4 miles East of Cty. B. North Side of Road
E-27	NE corner of Saxonburg and Nuclear Roads, about 4 Miles WSW
E-28	TLD on westernmost pole between the 2nd and 3rd parking lots,
E-29	On microwave tower fence
E-30	NE corner at Intersection of Tapawingo and Lakeshore Roads.
E-31	On utility pole North side of Tapawingo Road closest to the gate at the West property line

TABLE 2-3
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

E-32	On a conduit/pole located near the junction of property lines, about 500 feet east of the west gate in line with first designated treeline on Tapawingo Road and about 1200 feet south of Tapawingo Road. The location is almost under the power lines between the blue and gray transmission towers. (The conduit/pole is about 6 feet high).
E-33	Lake Michigan shoreline accessed from area just S of KPS discharge.
E-38	On tree West of former Retention Pond site
E-39	On tree East of former Retention Pond site
E-40	Local Dairy Farm (Barta), about 1.8 miles north of intersection of Highway 42 and Nuclear Road (Manitowoc County), on West side of Highway 42.
E-41	NW corner of Woodside and Nuclear Roads (Kewaunee Co.)
E-42	NW corner of Church and Division, East of Mishicot
E-43	West Side of Tannery Road South of Elmwood (7th pole South of Elmwood)
E-TC	Transportation Control; Reserved for TLDs

TABLE 2-4
PBNP RADIOLOGICAL ENVIRONMENTAL SAMPLE COLLECTION AND ANALYSIS FREQUENCY

Sample Type	Sample Codes	Analyses	Frequency
Environmental Radiation Exposure	E-01, -02, -03, -04, -05, -06, -07, -08, -09, -12, -14, -15, -16, -17, -18, -20, -22, -23, -24, -25, -26, -27, -28, -29, -30, -31, -32, -38, -39, -41, -42, -43, -TC	TLD	Quarterly
Vegetation	E-01, -02, -03, -04, -06, -08, -09, -20,	Gross Beta Gamma Isotopic Analysis	3x/yr as available
Algae	E-05, -12	Gross Beta Gamma Isotopic Analysis	3x/yr as available
Fish	E-13	Gross Beta Gamma Isotopic Analysis (Analysis of edible portions only)	2x/yr as available
Well Water	E-10	Gross Beta, H-3 Sr-89, 90, I-131 Gamma Isotopic Analysis (on total solids)	Quarterly
Lake Water	E-01, -05, -06, -33	Gross Beta H-3, Sr-89, 90 I-131 Gamma Isotopic Analysis (on total solids)	Monthly Quarterly composite of monthly collections Monthly Monthly
Milk	E-11, -21, -40	Sr-89, 90 I-131 Gamma Isotopic Analysis	Monthly
Air Filters	E-01, -02, -03, -04, -08, -20	Gross Beta I-131 Gamma Isotopic Analysis	Weekly (particulate) Weekly (charcoal) Quarterly (on composite particulate filters)
Soil	E-01, -02, -03, -04, -06, -08, -09, -20,	Gross Beta Gamma Isotopic Analysis	2x/yr
Shoreline Sediment	E-01, -05, -06, -12, -33	Gross Beta Gamma Isotopic Analysis	2x/yr

TABLE 2-5
SAMPLES COLLECTED FOR STATE OF WISCONSIN

	Sample Type	Location	Frequency
1.	Lake Water	E-01	Monthly
2.	Air Filters	E-07 E-08	Weekly
3.	Fish	E-13	Semiannually, As Available
4.	Precipitation	E-04 E-08	Twice a month, As Available
5.	Milk	E-21 E-40	Monthly
6.	Well Water	E-10	2 times/year

FIGURE 2-1a
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

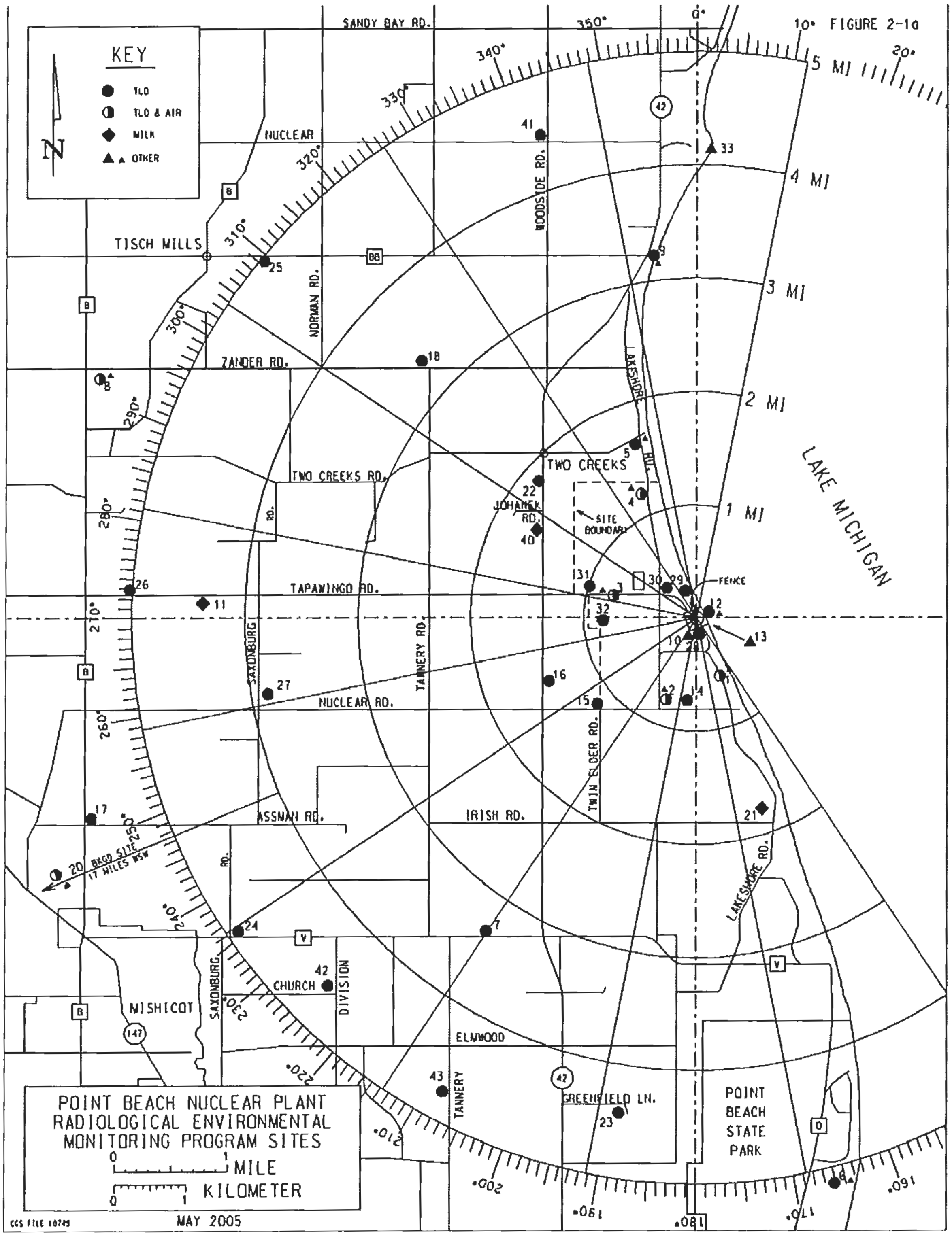


FIGURE 2-1b
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

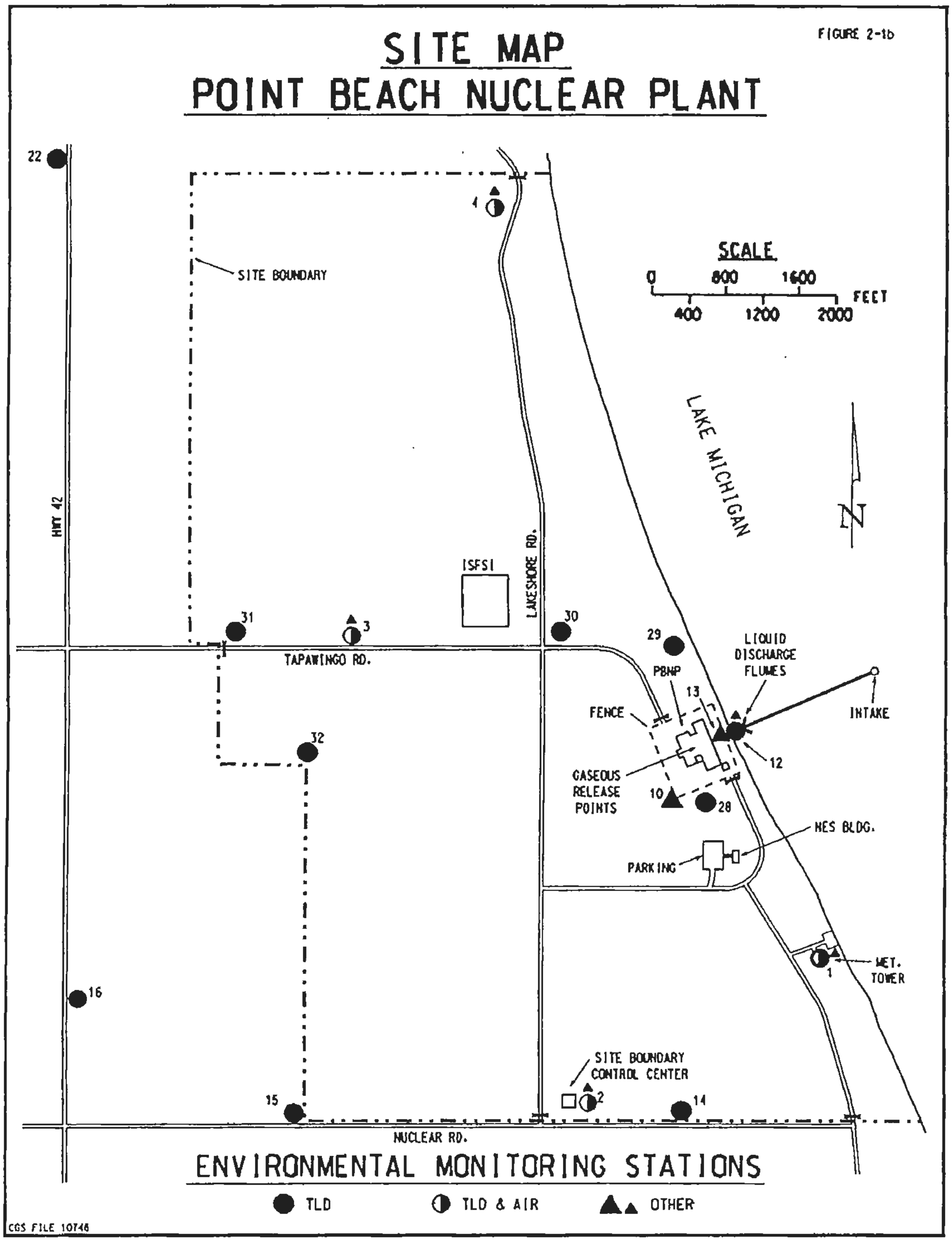
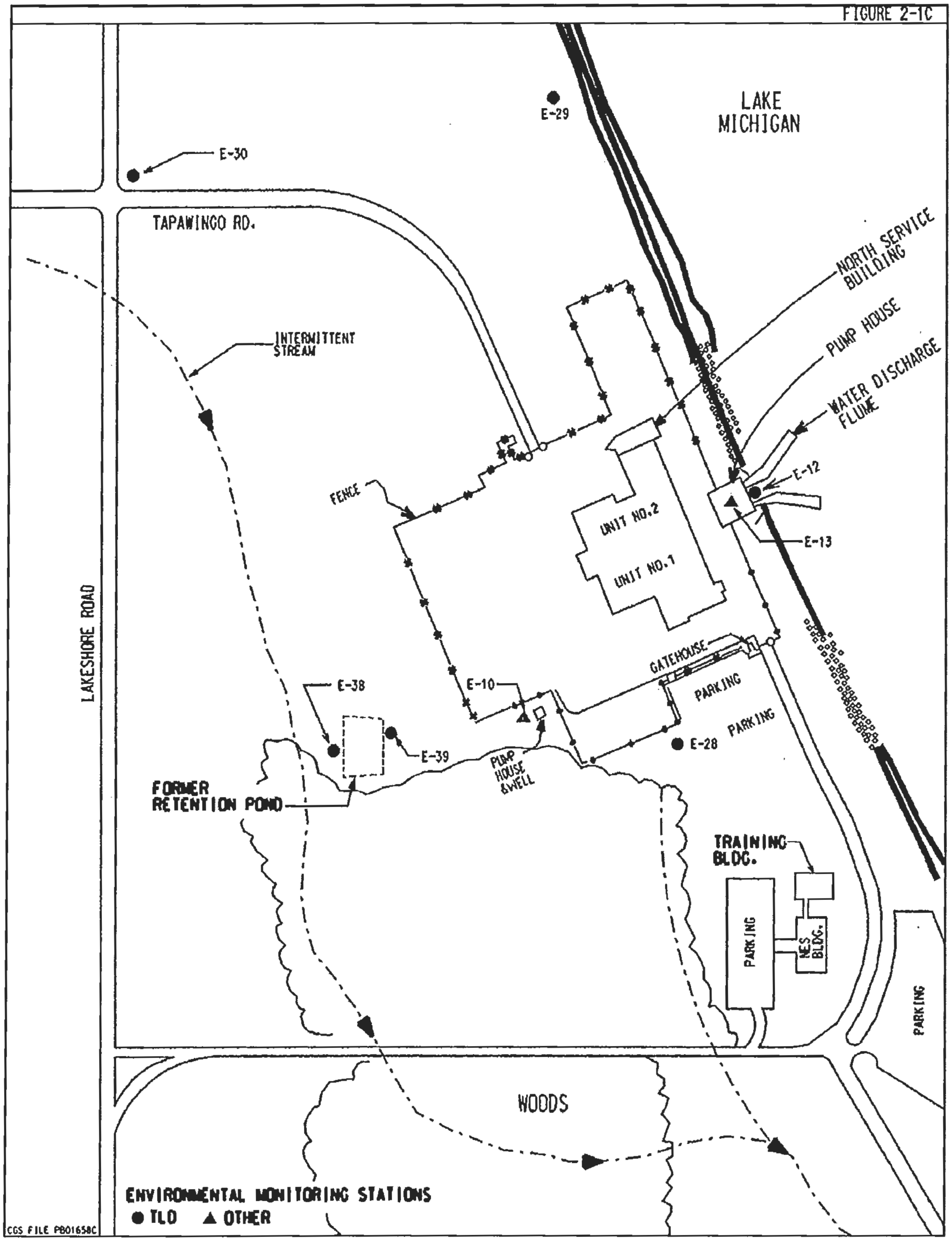


FIGURE 2-1c
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS



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