NEXTera® ENERGY
POINT BEACH

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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

2014 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, 2014.

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 2014. 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 results (Appendix 1) and the 2014 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
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Office of Nuclear Material Safety and Safeguards, USNRC

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ENCLOSURE 1

ANNUAL MONITORING REPORT 2014

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, 2014 through December 31, 2014

ENCLOSURE 1

January 1, 2014 through December 31, 2014

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SUMMARY

The Annual Monitoring Report for the period from January 1, 2014, through December 31, 2014, 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 2014, the following Curies (Ci) of radioactive material were released via the liquid and atmospheric pathways:

	Liquid	Atmospheric
Tritium (Ci)	796	75.5
[1]Particulate (Ci)	0.0642	0.000066
Noble Gas (Ci)	(-)	1.44
C-14[2]	0.0115	11.86

(-)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	0.00738 mrem	6 mrem
Organ dose	0.00809 mrem	20 mrem

ATMOSPHERIC RELEASES

Dose Category	Calculated Dose	Appendix I Dose
Particulate organ dose	0.0297 mrem	30 mrem
Noble gas beta air dose	0.000130` mrad	40 mrad
Noble gas gamma ray air dose	0.000250 mrad	20 mrad
Noble gas dose to the skin	0.000361 mrem	30 mrem
Noble gas dose to the whole body	0.000236 mrem	10 mrem

The results show that during 2014, the doses from PBNP effluents were a small percentage (≤0.10%) of the Appendix I design objectives. Therefore, operation of the PBNP radwaste treatment system 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 2014 Radiological Environmental Monitoring Program (REMP) collected 778 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 818 samples. The ambient radiation measures in the vicinity of PBNP and the ISFSI was conducted using 152 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 2014. 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.

The environmental monitoring conducted during 2014 confirmed that the effluent control program at PBNP ensured a minimal impact on the environment.

One-hundred-fifty-nine (159) 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 associated with the subsurface drainage system (SSD) located under the plant foundation, four groundwater containment integrity monitoring wells located in the facades, and AC condensate samples. 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. Gamma scans of samples originating within the power block found no plant related gamma emitters.

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

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 2014 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)	0.00738	0.123 %
20 (any organ)	0.00809	0.0404 %

2.2 2014 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 semi-annual and annual totals (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.

2.3 2014 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 2014, the discharged volume of processed waste (Table 2-2) increased about 40% (6.08E+05 to 8.76E+05 gallons) from 2013. In addition to the increase in volume, the total isotopic curie distribution (gamma emitters plus hard-to-detects other that strontium) of 6.42E-02 Ci approximately doubled from the 2.99E-02 Ci in 2013. Similar increases were seen in Sn-113/117m (from 1.51E-03 to 3.11E-03 Ci) and in Sb-122/124/125 (from 2.23E-05 to 3.48E-03 Ci). The largest increases occurred in Co-58/60 (from 2.32E-03 Ci in 2013 to 2.82E-02 Ci in 2014) and in C-14 (from 1.22E-03 to 1.15E-02 Ci in 2014). The 2014 C-14 value is similar to the 1.43E-02 Ci observed in 2012. The monthly totals were higher in months impacted by outages. As in 2013, no Sr-89 or Sr-90 was detected in liquids during 2014. H-3 increased from 737 Ci in 2013 to 796 Ci which is slightly below the 2012 amount of 829 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. The quarterly results from the monthly beach drain samples 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. In 2014, no tritium was observed 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 AC 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. 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, 2014 through December 31, 2014

							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]	3.43E-04	2.42E-03	4.38E-03	1.84E-02	8.62E-03	2.48E-03	3.66E-02	2.12E-04	1.19E-03	1.72E-03	1.35E-02	8.72E-03	2.24E-03	6.42E-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	9.54E+01	4.54E+01	1.43E+02	2.96E+01	1.29E+02	6.41E+01	5.06E+02	8.51E+00	5.92E+01	1.58E+02	3.13E+01	1.66E+01	1.56E+01	7.96E+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	4.85E+04	3.85E+04	1.58E+05	1.06E+05	7.05E+04	2.84E+04	4.50E+05	2.55E+04	4.76E+04	9.42E+04	1.53E+05	8.26E+04	2.33E+04	8.76E+05
Waste Water Effluent[2]	1.29E+07	2.53E+06	2.78E+06	3.45E+06	2.87E+06	2.69E+06	2.72E+07	2.57E+06	2.47E+06	2.62E+06	3.28E+06	3.17E+06	3.16E+06	4.45E+07
U1 SG Blowdown	2.62E+06	2.36E+06	3.00E+06	2.43E+06	3.07E+06	2.58E+06	1.61E+07	2.52E+06	2.58E+06	1.73E+06	3.95E+05	3.59E+06	3.35E+06	3.02E+07
U2 SG Blowdown	1.76E+06	1.59E+06	9.69E+05	2.47E+06	3.19E+06	2.27E+06	1.22E+07	1.77E+06	2.03E+06	1.72E+06	1.78E+06	1.73E+06	1.78E+06	2.31E+07
Total Gallons	1.73E+07	6.52E+06	6.91E+06	8.46E+06	9.19E+06	7.57E+06	5.60E+07	6.88E+06	7.12E+06	6.17E+06	5.61E+06	8.58E+06	8.31E+06	9.86E+07
Total cc	6.56E+10	2.47E+10	2.61E+10	3.20E+10	3.48E+10	2.86E+10	2.12E+11	2.60E+10	2.70E+10	2.33E+10	2.12E+10	3.25E+10	3.15E+10	3.73E+11
Dilution vol(cc)[3]	8.18E+13	7.39E+13	6.47E+13	8.88E+13	1.26E+14	1.22E+14	5.57E+14	1.26E+14	1.25E+14	1.22E+14	7.92E+13	1.22E+14	1.01E+14	1.23E+15
Avg diluted discharge conc (μCi/cc)														
Gamma Scan (+HTDs)[1]	4.19E-12	3.27E-11	6.76E-11	2.07E-10	6.84E-11	2.04E-11		1.69E-12	9.54E-12	1.42E-11	1.70E-10	7.17E-11	2.21E-11	
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	1.17E-06	6.15E-07	2.21E-06	2.15E-07	1.02E-06	5.27E-07		6.77E-08	4.75E-07	1.30E-06	3.95E-07	1.37E-07	1.54E-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	3.60E-05	2.89E-05	2.85E-05	7.82E-06	4.07E-05	4.55E-05		5.66E-06	3.31E-05	4.20E-05	1.12E-05	4.00E-06	9.85E-06	
Gamma Scan	6.95E-11	1.24E-10	1.24E-08	1.28E-08	2.78E-09	1.03E-09		2.71E-11	3.62E-10	9.25E-10	5.43E-09	4.75E-09	1.44E-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

Table 2-3
Isotopic Composition of Circulating Water Discharges (Ci)
January, 2014 through December 31, 2014

Nuclide	Jan	Feb	Mar	Apr	May	Jun	Total Jan-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Jan-Dec
H-3	9.54E+01	4.54E+01	1.43E+02	2.96E+01	1.29E+02	6.41E+01	5.06E+02	8.51E+00	5.92E+01	1.58E+02	3.13E+01	1.66E+01	1.56E+01	7.96E+02
C-14	0.00E+00	2.04E-03	2.80E-03	0.00E+00	1.52E-04	8.72E-04	5.86E-03	0.00E+00	4.32E-04	1.93E-04	4.86E-03	9.69E-05	1.58E-05	1.15E-02
F-18	2.18E-04	1.88E-04	2.88E-04	2.56E-04	0.00E+00	2.20E-04	1.17E-03	1.86E-04	2.88E-04	9.39E-05	2.83E-04	4.87E-04	5.84E-04	3.09E-03
Cr-51	0.00E+00	0.00E+00	1.46E-05	5.19E-03	1.68E-03	1.54E-04	7.04E-03	0.00E+00	7.61E-06	0.00E+00	3.73E-04	4.01E-04	0.00E+00	7.82E-03
Mn-54	0.00E+00	0.00E+00	0.00E+00	2.44E-04	1.53E-04	2.58E-05	4.23E-04	0.00E+00	1.52E-05	4.09E-05	1.46E-04	8.87E-05	0.00E+00	7.14E-04
Fe-55	0.00E+00	0.00E+00	0.00E+00	4.80E-04	3.20E-04	0.00E+00	8.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.00E-04
Fe-59	0.00E+00	0.00E+00	0.00E+00	8.80E-05	2.22E-05	0.00E+00	1.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.10E-04
Co-57	0.00E+00	0.00E+00	0.00E+00	1.44E-05	4.85E-06	0.00E+00	1.92E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-05
Co-58	4.60E-06	4.38E-06	2.45E-05	2.26E-03	1.22E-03	2.12E-04	3.73E-03	3.28E-06	6.37E-05	9.42E-05	3.17E-03	4.78E-03	1.25E-03	1.31E-02
Co-60	3.36E-05	2.21E-05	1.30E-04	4.55E-03	2.90E-03	5.19E-04	8.16E-03	2.21E-05	2.02E-04	9.39E-04	3.55E-03	2.00E-03	1.84E-04	1.51E-02
Ni-63	0.00E+00	5.80E-05	1.19E-04	8.00E-05	9.33E-05	5.17E-05	4.02E-04	0.00E+00	3.42E-05	0.00E+00	0.00E+00	1.47E-04	6.51E-05	6.48E-04
Zn-65	0.00E+00	0.00E+00	0.00E+00	1.24E-04	8.49E-05	0.00E+00	2.09E-04	0.00E+00	0.00E+00	6.54E-06	0.00E+00	0.00E+00	0.00E+00	2.15E-04
As-76	0.00E+00	0.00E+00	2.15E-04	0.00E+00	0.00E+00	0.00E+00	2.15E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E-05	0.00E+00	2.31E-04
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	0.00E+00	0.00E+00	0.00E+00	1.27E-03	6.56E-04	1.04E-04	2.03E-03	0.00E+00	3.47E-05	7.22E-05	2.57E-04	1.93E-04	9.26E-06	2.60E-03
Nb-97	0.00E+00	0.00E+00	9.47E-06	0.00E+00	0.00E+00	0.00E+00	9.47E-06	0.00E+00	4.45E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.39E-05
Zr-95	0.00E+00	0.00E+00	0.00E+00	7.23E-04	3.63E-04	5.57E-05	1.14E-03	0.00E+00	1.37E-05	1.47E-05	1.23E-04	1.02E-04	0.00E+00	1.40E-03
Tc-99	1.19E-05	1.30E-05	2.21E-05	0.00E+00	1.20E-05	1.51E-05	7.41E-05	0.00E+00	7.20E-06	1.46E-05	9.26E-06	0.00E+00	1.85E-06	1.07E-04
Ag-110m	0.00E+00	0.00E+00	0.00E+00	1.93E-04	4.26E-05	5.55E-06	2.41E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.41E-04
Sn-113	0.00E+00	0.00E+00	0.00E+00	8.20E-05	1.44E-05	0.00E+00	9.64E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.64E-05
Sn-117m	2.71E-05	5.82E-06	4.36E-06	5.82E-04	6.82E-04	2.32E-04	1.53E-03	0.00E+00	7.31E-05	2.49E-04	6.74E-04	4.05E-04	7.10E-05	3.01E-03
Sb-122	0.00E+00	0.00E+00	7.21E-06	0.00E+00	0.00E+00	0.00E+00	7.21E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.21E-06
Sb-124	0.00E+00	1.87E-08	7.51E-06	1.07E-04	3.33E-05	0.00E+00	1.48E-04	0.00E+00	0.00E+00	0.00E+00	1.01E-05	0.00E+00	4.33E-05	2.01E-04
Sb-125	3.80E-05	1.39E-04	7.26E-04	2.14E-03	1.84E-04	1.42E-05	3.24E-03	0.00E+00	1.23E-05	5.09E-06	0.00E+00	0.00E+00	6.53E-06	3.27E-03
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	9.51E-06	2.95E-06	1.91E-06	0.00E+00	4.17E-06	1.51E-06	2.01E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.01E-05
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, 2014, through December 31, 2014

	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)	0.00E+00	0.00E+00	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)	1.75E+06	3.05E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.86E+04
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)	9.71E+05	2.20E+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)	5.17E+05	1.55E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.46E+04

2.6 Land Application of Sewage Sludge and Wastewater

In 1988, pursuant to 10 CFR 20.302(a), Point Beach received approval for the disposal of sewage sludge, which may contain trace amounts of radionuclides, by land application on acreage within the site.. Land application of sewage sludge is regulated by the Wisconsin Department of Natural Resources. Point Beach has not land applied sewage sludge for over a decade. Therefore, Point Beach has not renewed its WI DNR permit to dispose of sewage sludge in this manner.

There were no sludge disposals by land application during 2014. All disposals were done at the Manitowoc Sewage Treatment Plant. In February an effluent pump failed resulting in flooding of a holding pit and an adjacent underground vault associated with the PBNP sewage treatment plant. (Some ground water inleakage also may reach the vault.) The flows to the pit and the vault were secured. From February 13 – 16, roughly 75,000 gallons were sent to the Manitowoc POTW for disposal. This is the same facility where the PBNP sewage sludge is sent.

All of the shipments were analyzed using the LLDs applied to REMP lake water samples. Traces of Fe-59, Co-60, Zn-65, and Cs-137 showed up on gamma scans. All were below the calculated MDC and therefore concluded to be false positives. By contrast, K-40 (129.5 ± 20.7 to 270.9 ± 27.1 pCi/l) and Ra-226 (64.15 ± 51.3 to 205.2 ± 32.8 pCi/l) were higher than the typical concentrations (<100) seen in PBNP digester sludge.

The calculated amount of H-3 in the wastewater sent to the Manitowoc POTW was 2.14E-04 Ci. Assuming all of the liquid were at the maximum detected concentration of 1019 pCi/l and discharged in one day, the resulting discharge concentration would have been about 5 pCi/l prior to dilution in Lake Michigan. This is well below the drinking water standard of 20,000 pCi/l.

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 2014, the monthly and total C-14 (1.15E-02 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.

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 Appendix I calculations do not include the C-14 contribution because it is not an Appendix I radionuclide. The C-14 dose calculation has been required since 2010 (see Sections 3.4 through 3.6, below, for a more detailed description) and is treated separately. The comparison between airborne effluent doses with and without C-14 is shown in Table 3-4. The highest Appendix I dose is the child age group for the liver, thyroid, kidney, lung, and GI-LLI at 2.97E-02 mrem. Had C-14 been included, the child-bone dose would have been the highest at 2.44E-01 mrem. 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 2014 is summarized in Table 3-2. The increases in the total amount of particulates increased from 7.91E-06 Ci in 2013 to 6.60E-05 Ci in 2014. This is attributable to the two outages in 2014. Similarly, H-3 increased from 64.1 to 75.5 Ci. The impact of the 2014 fall outage is demonstrated by no particulates being discharged in October 2013, non-outage, compared to 4.63E-05 Ci in October 2014, outage month. Similarly, the October H-3 increased from 4.44 Ci in 2013 to 7.94 Ci in 2014.

3.3 Isotopic Airborne Releases

The monthly isotopic airborne releases for 2014, 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.

The outage impact of the isotopic mixture is demonstrated again in the comparison of the October 2013 and 2014 particulate releases. The difference is in that the particulates are released via the open hatch on the 66-foot elevation of containment. The convective flow through the open hatch during purge is unfiltered. Although the flow is into the façade, there are two circumferential gaps around the façade. It is assumed that the release into the façade is transferred to the outside and therefore is treated as a release to the environment. Of the total 4.63E-05 Ci of particulates released in October 2014, 4.59E-05 Ci were via the hatch at the 66-foot elevation.

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." In addition to neutron flux, the percent oxygen and nitrogen in the CVTs is used in the C-14 calculation as both gases contribute to the generation of C-14.

The Point Beach C-14 generation for 2014 was calculated using the EPRI guidance and the new core parameters resulting from the power uprate. The calculated amounts were 5.98 Ci for Unit 1 and 5.89 Ci for Unit 2 yielding a total of 11.86 Ci which is 0.12 Ci higher than 2013. It is noted that the nitrogen in the CVTs also was higher in 2014 than in 2013. The calculated total 11.86 Ci is roughly 1000 times higher than the 1.15E-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 is 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 11.86 Ci of the calculated C-14 for PBNP 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) and the Regulatory Guide 1.109, Table E-5 usage factors 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.

Carbon-14 is not an Appendix I radionuclide. Therefore, airborne C-14 is not summed with the other airborne radioactive effluents for comparison of airborne effluent dose to the Appendix I dose objectives. However, the C-14 doses are presented and compared to the other radionuclide doses in Table 3-4.

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).

Table 3-1
Comparison of 2014 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	0.0297 mrem	0.099
Noble gas	40 mrad (beta air)	0.000131 mrad	0.000326
Noble gas	20 mrad (gamma air)	0.000250 mrad	0.00125
Noble gas	30 mrem (skin)	0.000361 mrem	0.00120
Noble gas	10 mrem (whole body)	0.000236 mrem	0.00236

Table 3-2
Radioactive Airborne Effluent Release Summary
January 1, 2014, through December 31, 2014

	Jan	Feb	Mar	Apr	May	Jun	Total Jan-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total NG from Liq (Ci)	1.63E-02	6.33E-03	2.53E-02	7.37E-04	3.04E-03	3.38E-03	5.50E-02	0.00E+00	3.16E-03	9.68E-03	1.63E-03	1.19E-03	1.47E-03	7.22E-02
Total Noble Gas (Ci)[1]	4.99E-01	1.24E-01	2.86E-01	7.50E-02	5.20E-02	5.73E-02	1.09E+00	6.03E-02	6.97E-02	6.63E-02	4.94E-02	5.77E-02	4.65E-02	1.44E+00
Total Radioiodines (Ci)[2]	0.00E+00	0.00E+00	7.67E-06	0.00E+00	0.00E+00	0.00E+00	7.67E-06	0.00E+00	0.00E+00	0.00E+00	1.06E-07	0.00E+00	0.00E+00	7.77E-06
Total Particulate (Ci)[3]	2.07E-06	2.64E-09	6.62E-06	7.10E-06	5.08E-09	4.71E-09	1.58E-05	0.00E+00	0.00E+00	0.00E+00	4.63E-05	3.86E-06	1.39E-10	6.60E-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)	2.07E-06	2.64E-09	6.62E-06	7.10E-06	5.08E-09	4.71E-09	1.58E-05	0.00E+00	0.00E+00	0.00E+00	4.63E-05	3.86E-06	1.39E-10	6.60E-05
Total Tritium (Ci)	6.21E+00	5.69E+00	1.15E+01	8.03E+00	7.05E+00	4.50E+00	4.29E+01	3.99E+00	4.23E+00	5.27E+00	7.44E+00	5.46E+00	6.15E+00	7.55E+01
Max NG H'rly Rel.(Ci/sec)	1.80E-06	4.85E-08	3.25E-06	6.99E-07	5.52E-08	6.10E-08		6.57E-08	5.88E-08	6.73E-08	6.56E-08	6.87E-08	6.22E-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, 2014 through December 31, 2014

	Jan	Feb	Mar	Apr	May	Jun	Semi-	Jul	Aug	Sep	Oct	Nov	Dec	Total
Nuclide	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	**Annual**	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)
H-3	6.21E+00	5.69E+00	1.15E+01	8.03E+00	7.05E+00	4.50E+00	4.29E+01	3.99E+00	4.23E+00	5.27E+00	7.44E+00	5.46E+00	6.15E+00	7.55E+01
Ar-41	6.09E-02	5.71E-02	3.45E-02	2.78E-02	4.31E-02	4.58E-02	2.69E-01	5.01E-02	4.93E-02	4.93E-02	2.67E-02	4.46E-02	3.51E-02	5.24E-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	1.13E-04	0.00E+00	3.56E-04	7.40E-05	0.00E+00	0.00E+00	5.43E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.43E-04
Kr-87	1.90E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-07
Kr-88	4.40E-05	0.00E+00	1.42E-04	4.50E-05	0.00E+00	0.00E+00	2.31E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-04
Xe-131m	0.00E+00	4.13E-04	5.29E-04	0.00E+00	0.00E+00	0.00E+00	9.42E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.42E-04
Xe-133	4.27E-01	6.47E-02	2.24E-01	4.40E-02	8.93E-03	1.14E-02	7.80E-01	1.02E-02	2.03E-02	1.67E-02	2.27E-02	1.28E-02	1.13E-02	8.74E-01
Xe-133m	2.21E-03	1.02E-03	4.06E-03	4.81E-04	0.00E+00	2.83E-05	7.80E-03	0.00E+00	0.00E+00	7.25E-05	4.60E-06	0.00E+00	0.00E+00	7.88E-03
Xe-135	8.41E-03	1.22E-03	2.26E-02	2.62E-03	5.61E-06	6.25E-05	3.49E-02	0.00E+00	2.54E-05	2.05E-04	1.24E-05	3.06E-04	2.38E-05	3.55E-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	3.36E-06	0.00E+00	0.00E+00	0.00E+00	6.15E-06	0.00E+00	9.51E-06	2.00E-06	0.00E+00	0.00E+00	0.00E+00	3.86E-06	3.24E-06	1.86E-05
Cr-51	0.00E+00	0.00E+00	1.43E-06	5.55E-07	0.00E+00	0.00E+00	1.99E-06	0.00E+00	0.00E+00	0.00E+00	1.37E-06	0.00E+00	0.00E+00	3.35E-06
Mn-54	0.00E+00	0.00E+00	1.09E-07	1.95E-07	0.00E+00	0.00E+00	3.04E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.04E-07
Co-58	0.00E+00	0.00E+00	4.76E-07	1.16E-06	0.00E+00	0.00E+00	1.63E-06	0.00E+00	0.00E+00	0.00E+00	3.48E-05	0.00E+00	0.00E+00	3.65E-05
Co-60	0.00E+00	0.00E+00	2.20E-06	2.34E-06	0.00E+00	0.00E+00	4.54E-06	0.00E+00	0.00E+00	0.00E+00	3.92E-07	0.00E+00	0.00E+00	4.94E-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	0.00E+00	0.00E+00	0.00E+00
Nb-95	0.00E+00	0.00E+00	5.36E-07	6.44E-07	0.00E+00	0.00E+00	1.18E-06	0.00E+00	0.00E+00	0.00E+00	1.57E-06	0.00E+00	0.00E+00	2.75E-06
Zr-95	0.00E+00	0.00E+00	2.03E-07	3.69E-07	0.00E+00	0.00E+00	5.72E-07	0.00E+00	0.00E+00	0.00E+00	7.98E-07	0.00E+00	0.00E+00	1.37E-06
I-131	0.00E+00	0.00E+00	5.85E-08	0.00E+00	0.00E+00	0.00E+00	5.85E-08	0.00E+00	0.00E+00	0.00E+00	1.06E-07	0.00E+00	0.00E+00	1.64E-07
I-132	0.00E+00	0.00E+00	7.61E-06	0.00E+00	0.00E+00	0.00E+00	7.61E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.61E-06
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	2.25E-07	0.00E+00	0.00E+00	2.25E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-07
Sb-125	0.00E+00	0.00E+00	1.49E-07	9.40E-08	0.00E+00	0.00E+00	2.43E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.43E-07
Cs-137	0.00E+00	0.00E+00	1.12E-08	2.75E-09	0.00E+00	0.00E+00	1.39E-08	0.00E+00	0.00E+00	0.00E+00	1.85E-08	0.00E+00	0.00E+00	3.24E-08
Fe-55	2.03E-09	1.98E-09	8.76E-07	6.83E-07	3.63E-09	3.36E-09	1.57E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.57E-06
Ni-63	6.76E-10	6.61E-10	5.84E-07	2.73E-07	1.45E-09	1.35E-09	8.61E-07	0.00E+00	0.00E+00	0.00E+00	7.33E-06	2.36E-10	1.39E-10	8.20E-06
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
Sn-113	0.00E+00	0.00E+00	3.50E-08	0.00E+00	0.00E+00	0.00E+00	3.50E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E-08
Sn-117m	0.00E+00	0.00E+00	1.58E-08	0.00E+00	0.00E+00	0.00E+00	1.58E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.58E-08

Note: The Noble Gases listed above include the liquid contribution

Table 3-4
Comparison of Airborne Effluent Doses (Appendix I and C-14)

2014 Appendix I (Airborne Particulate + Tritium) Dose (mrem)

	Bone	Liver	T-WB	Thyroid	Kidney	Lung	GI-LLI	Skin
Adult	3.04E-04	1.77E-02	1.79E-02	1.77E-02	1.77E-02	1.77E-02	1.77E-02	2.04E-04
Teen	4.07E-04	2.03E-02	2.05E-02	2.03E-02	2.03E-02	2.03E-02	2.04E-02	2.04E-04
Child	6.41E-04	2.97E-02	2.99E-02	2.97E-02	2.97E-02	2.97E-02	2.97E-02	2.04E-04
Infant	1.74E-04	1.31E-02	1.32E-02	1.31E-02	1.31E-02	1.31E-02	1.31E-02	2.04E-04

2014 Carbon-14 Dose (mrem)

	Bone	Liver	T. Body	Thyroid	Kidney	Lungs	GI-LLI	Skin
Adult	6.72E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02	1.34E-02	0.00E+00
Teen	1.05E-01	2.10E-02	2.10E-02	2.10E-02	2.10E-02	2.10E-02	2.10E-02	0.00E+00
Child	2.44E-01	4.86E-02	4.86E-02	4.86E-02	4.86E-02	4.86E-02	4.86E-02	0.00E+00
Infant	1.24E-01	2.63E-02	2.63E-02	2.63E-02	2.63E-02	2.63E-02	2.63E-02	0.00E+00

2014 Total Airborne Non-Noble Gas Dose (Particulate + H-3 + C-14 (mrem)

	Bone	Liver	T-WB	Thyroid	Kidney	Lung	GI-LLI	Skin
Adult	6.75E-02	3.10E-02	3.12E-02	3.10E-02	3.10E-02	3.10E-02	3.11E-02	2.04E-04
Teen	1.06E-01	4.13E-02	4.15E-02	4.13E-02	4.13E-02	4.13E-02	4.13E-02	2.04E-04
Child	2.44E-01	7.83E-02	7.85E-02	7.82E-02	7.82E-02	7.82E-02	7.83E-02	2.04E-04
Infant	1.24E-01	3.94E-02	3.96E-02	3.94E-02	3.94E-02	3.94E-02	3.94E-02	2.04E-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	8.14E-01	2.61E-01		2.61E-01	2.61E-01	2.61E-01	2.61E-01	6.80E-04

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 2014. No Type C 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 2014

Type of Waste	Quantity	Activity
A. Spent resins, filter sludge, evaporator bottoms, etc.	7.8 m^3	84.880 Ci
	274.7 ft^3	
B. Dry compressible waste, contaminated equipment, etc	365.6 m^3	0.386 Ci
	12911.7 ft^3	
C. Irradiated components, control rods, etc.	0.00 m^3	N/A Ci
	ft^3	
D. Other	394.2 m^3	424.000 Ci
Steam generators: Unit 1 removed 1984; Unit 2 removed 1996	13920 ft^3	

4.2 Solid Waste Disposition

There were nine solid waste shipments from PBNP during 2014. The dates and destinations are shown in Table 4-2.

Table 4-2

2014 PBNP Radioactive Waste Shipments	
Date	**Destination**
03/26/14	Oak Ridge, TN
04/03/14	Oak Ridge, TN
04/15/14	Clive, Utah
04/16/14	Oak Ridge, TN
06/02/14	Andrews, TX
09/16/14	Andrews, TX
09/22/14	Clive, Utah
10/02/14	Oak Ridge, TN
10/17/14	Oak Ridge, TN

4.3 Major Nuclide Composition (by Type of Waste)

The major radionuclide content of the 2014 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 4-3. Only those radionuclides with detectable activity are listed.

Table 4-3
2014 Estimated Solid Waste Major Radionuclide Composition

TYPE A			TYPE B			TYPE D		
	Percent	Activity		Percent	Activity		Percent	Activity
Nuclide	Abundance	(mCi)	Nuclide	Abundance	(mCi)	Nuclide	Abundance	(mCi)
Ni-63	3.064E-01	1.74E+03	Co-60	3.846E-01	1.49E+02	Ni-63	6.884E-01	2.92E+05
Co-60	2.853E-01	1.62E+03	Fe-55	3.208E-01	1.24E+02	Cs-137	1.389E-01	5.89E+04
H-3	9.439E-02	5.36E+02	Co-58	6.487E-02	2.51E+01	Co-60	7.992E-02	3.39E+04
Cs-137	6.128E-02	3.48E+02	Cr-51	5.030E-02	1.94E+01	C-14	3.018E-02	1.28E+04
Sb-125	6.093E-02	3.46E+02	Ni-63	3.562E-02	1.38E+01	Pu-241	1.950E-02	8.27E+03
Co-58	4.402E-02	2.50E+02	Sb-125	2.575E-02	9.95E+00	H-3	1.389E-02	5.89E+03
Fe-55	3.628E-02	2.06E+02	Nb-95	2.146E-02	8.29E+00	Ni-59	1.301E-02	5.52E+03
Nb-95	2.641E-02	1.50E+02	Ru-106	1.273E-02	4.92E+00	Fe-55	1.051E-02	4.46E+03
Mn-54	2.465E-02	1.40E+02	Tc-99	1.163E-02	4.49E+00	Sr-90	2.273E-03	9.64E+02
Zr-95	1.271E-02	7.22E+01	Zr-95	1.121E-02	4.33E+00	Am-241	1.844E-03	7.82E+02
Sb-124	1.115E-02	6.33E+01	Sn-113	1.028E-02	3.97E+00	Pu-239	6.766E-04	2.87E+02
Sn-117m	8.594E-03	4.88E+01	Mn-54	9.853E-03	3.81E+00	Cm-243	4.574E-04	1.94E+02
Cr-51	8.506E-03	4.83E+01	Sb-124	7.917E-03	3.06E+00	Pu-238	4.031E-04	1.71E+02
Ag-110m	5.072E-03	2.88E+01	Ni-59	7.486E-03	2.89E+00	I-129	1.004E-04	4.26E+01
C-14	3.945E-03	2.24E+01	Zn-65	3.933E-03	1.52E+00	Cs-134	1.021E-07	4.33E-02
Zn-65	2.641E-03	1.50E+01	Sn-117m	3.744E-03	1.45E+00	U-234	2.523E-08	1.07E-02
Co-57	2.342E-03	1.33E+01	Fe-59	3.207E-03	1.24E+00	Mn-54	2.332E-08	9.89E-03
Ni-59	2.307E-03	1.31E+01	H-3	2.839E-03	1.10E+00	Np-237	9.760E-09	4.14E-03
Sn-113	1.747E-03	9.92E+00	Pu-241	2.651E-03	1.02E+00	Ce-144	1.539E-09	6.53E-04
Ce-144	8.664E-04	4.92E+00	Ag-110m	2.047E-03	7.91E-01	U-235	1.469E-11	6.23E-06
Sr-90	3.258E-04	1.85E+00	Co-57	1.562E-03	6.03E-01	Cm-242	2.381E-16	1.01E-10
Pu-241	5.301E-05	3.01E-01	Ce-144	1.356E-03	5.24E-01			
Pu-238	3.187E-05	1.81E-01	Cs-137	1.079E-03	4.17E-01			
Am-241	3.029E-05	1.72E-01	Pu-238	8.737E-04	3.37E-01			
Pu-239	1.164E-05	6.61E-02	Nb-94	8.127E-04	3.14E-01			
Cm-243	9.456E-06	5.37E-02	Pu-239	6.521E-04	2.52E-01			
Cm-242	6.745E-07	3.83E-03	Sr-90	4.080E-04	1.58E-01			
			Sr-89	1.320E-04	5.10E-02			
			Am-241	1.034E-04	3.99E-02			
			C-14	3.830E-05	1.48E-02			
			Cm-243	3.331E-05	1.29E-02			
			Pu-242	1.041E-05	4.02E-03			
			Cm-242	3.986E-06	1.54E-03			

5.0 NONRADIOACTIVE CHEMICAL RELEASES

5.1 Scheduled Chemical Waste Releases

Scheduled chemical waste releases to the circulating water system from January 1, 2014, to June 30, 2014, included 6.48E+03 gallons of neutralized wastewater. The wastewater contained 3.41E-01 lbs. of suspended solids and 3.41E-01 lbs. of dissolved solids.

Scheduled chemical waste releases to the circulating water system from July 1, 2014, to December 31, 2014, included 6.81E+03 gallons of neutralized wastewater. The wastewater contained 1.65E+01 lbs. of suspended solids and 1.49E+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, 2014, to June 30, 2014, included 1.74E+07 gallons of clarified effluent. The wastewater contained 1.88E+03 lbs. of suspended solids.

Miscellaneous chemical waste releases from the wastewater effluent (based on effluent analyses) to the circulating water for July 1, 2014, to December 31, 2014, included 1.80E+07 gallons of clarified effluent. The wastewater contained 2.09E+03 lbs. of suspended solids.

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from January 1, 2014, to June 30, 2014, included 3.24E+05 lbs. of sodium bisulfite solution (1.23E+05 lbs. sodium bisulfite), 4.11E+05 lbs. of Sodium Hypochlorite Solution (5.14E+04 lbs. sodium hypochlorite), and 3.04E+03 lbs. Acti-Brom 1338 (1.37E+03 lbs. sodium bromide).

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from July 1, 2014, to December 31, 2014, included 5.74E+05 lbs. of sodium bisulfite solution (2.18E+05 lbs. sodium bisulfite), 6.08E+05 lbs. Sodium Hypochlorite Solution (7.60E+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 for periods of plant operation is described in Table 6-1.

Table 6-1
Circulating Water System Operation for 2014

	UNIT	JAN	FEB	MAR	APR	MAY	JUN
Average Volume Cooling* Water Discharge [million gal/day]**	1	358.2	358.2	362.7	473.6	542.5	542.5
	2	358.2	358.2	196.0	330.9	548.3	548.3
Average Cooling Water Intake Temperature [°F]	1	38.5	38.3	38.5	40.3	47.1	51.1
	2	39.8	39.6	39.6	41.4	47.5	51.6
Average Cooling Water Discharge Temperature [°F]	1	70.3	69.9	67.9	61.4	65.5	70.2
	2	70.0	69.8	68.5	50.1	64.3	68.5
Average Ambient Lake Temperature [°F]		32.7	34.2	33.7	37.3	42.8	46.8

Table 6-1(continued)
Circulating Water System Operation for 2014

	UNIT	JUL	AUG	SEP	OCT	NOV	DEC
Average Volume Cooling*** Water Discharge [million gal/day]**	1	542.5	543.2	542.5	125.5	543.5	411.2
	2	548.3	539.4	548.3	566.9	549.0	469.4
Average Cooling Water Intake Temperature [°F]	1	48.2	63.2	51.4	54.0	43.8	38.3
	2	48.9	63.6	52.2	51.8	44.1	38.5
Average Cooling Water Discharge Temperature [°F]	1	67.0	82.2	70.2	59.5	61.5	63.8
	2	65.5	79.8	69.3	68.7	61.3	61.3
Average Ambient Lake Temperature [°F]		43.8	58.2	47.4	51.0	40.5	35.9

*U2 outage circ water shut down 3/19/14 - 4/12/14
** For days with cooling water discharge flow.
***U1 outage circ water shut down 10/5/14 – 10/28/14

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 2014. The Environmental Manual (EM) was revised in February 2014. A copy of the EM, Revision 25, February 11, 2014, 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 2014. 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 2014.

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, thermoluminescent dosimeters (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

Two temporary TLD sites were added to provide transition information prior to deleting nearby sites in 2015. Old and new sites running concurrently until 2015.

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, -16B, -17, -18, 20, -22, -23, -24, -25, -26, -26B, -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, 16B	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, -26B	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

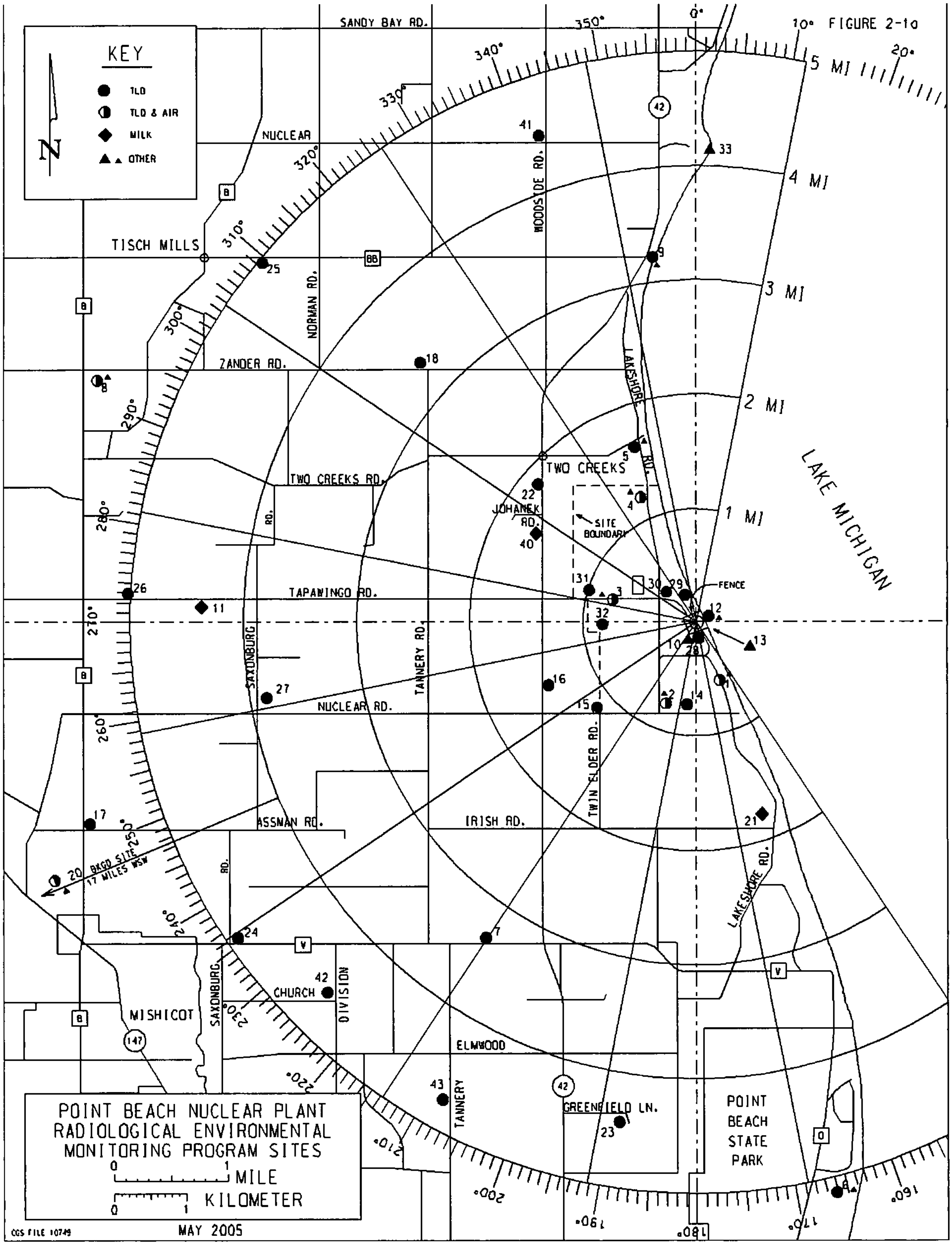


Figure 9-1
PBNP REMP Sampling Sites

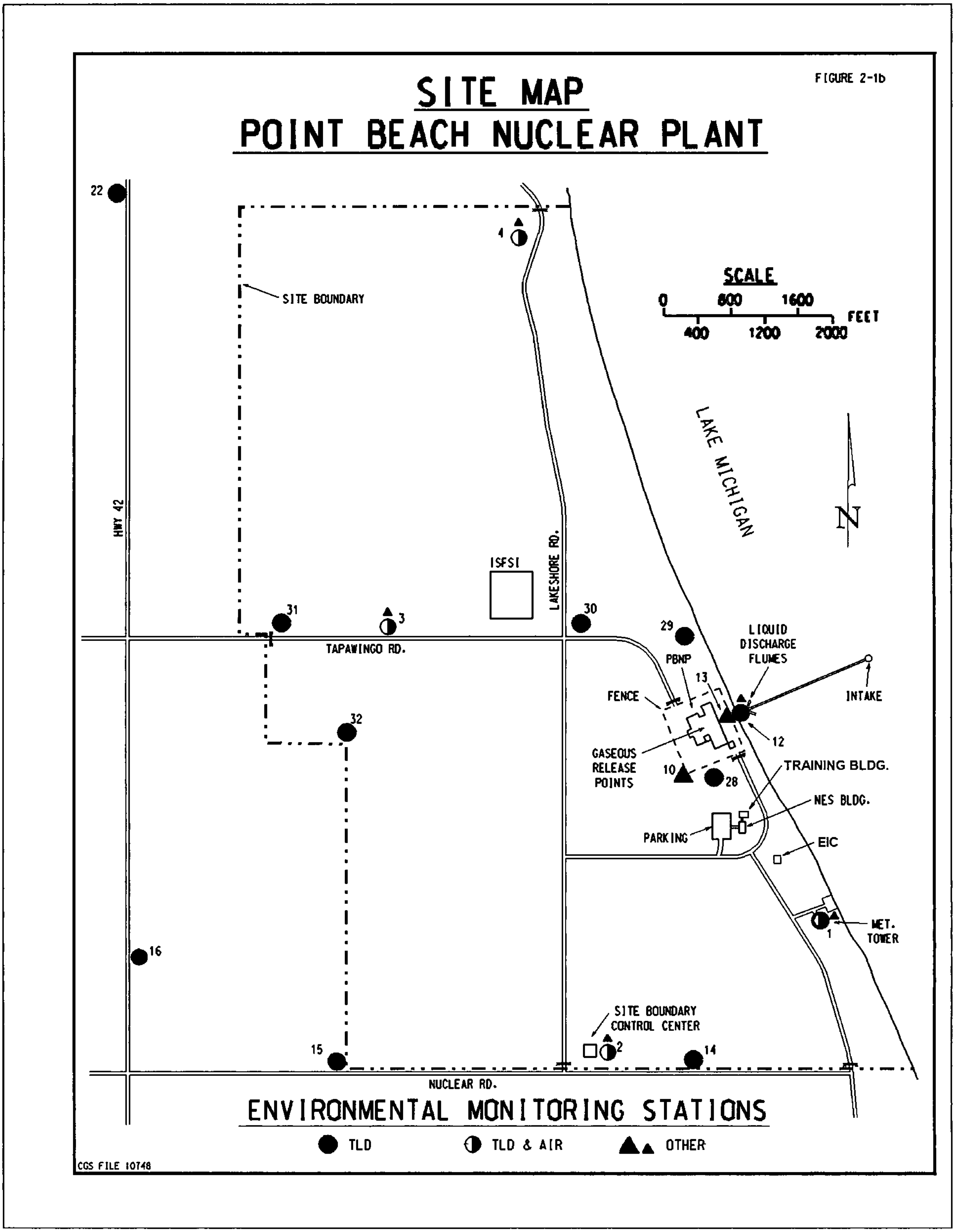


Figure 9-2
Map of REMP Sampling Sites Located Around PBNP

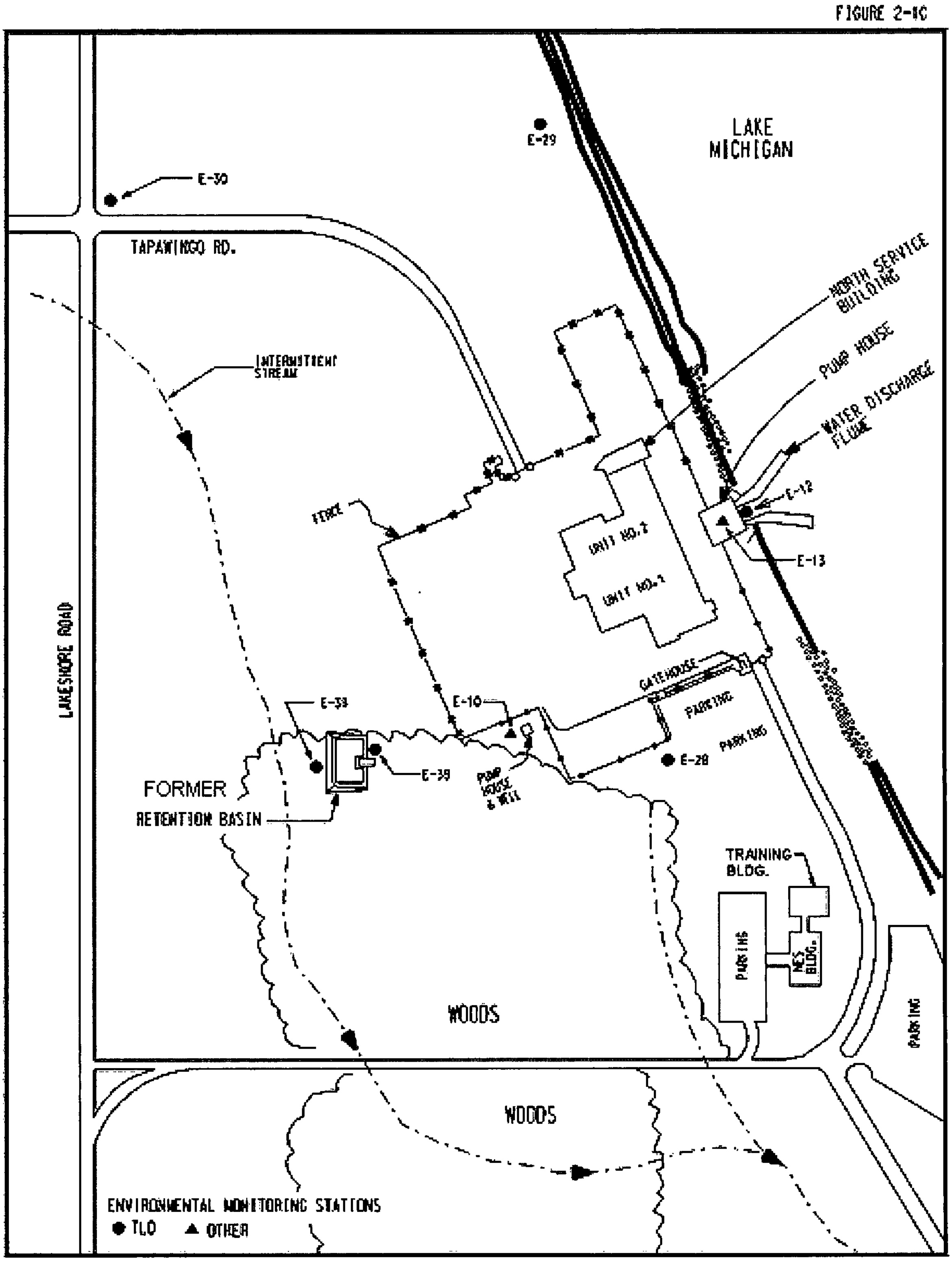


Figure 9-3
Enhanced Map Showing REMP Sampling Sites Closest to PBNP

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 2014

LW	E-01, E-05, E-06, E-33 E-06	1/17/13 2/13/14, 3/19/14	Icy conditions at the shore prevented getting close enough to the lake to get a water sample on all three dates.	Nautral occurrence
AP/I	E-02	3/5/14 5/28/14	No power to sampler	Unknown cause

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 2014 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 2014 REMP Results

Radiological environmental monitoring conducted at PBNP from January 1, 2014, through December 31, 2014, 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, averages and high values, 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 tech spec 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 Point Beach 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, Point Beach reports the results for soil analyses. There is no regulatory requirement for soil analyses in standard RETS (NUREG-0472 and NUREG-1301). Point Beach 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 2014

Sample	Description	N	LLD (a)	Average ± 1 Std. Deviation (b)	High ± 2 sigma	Units
TLD	Environmental Radiation	132	1 mrem	1.07 ± 0.19	1.51 ± 0.08	mR/7days
	Control (E-20)	4	1 mrem	1.15 ± 0.10	1.30 ± 0.14	mR/7days
Air	Gross Beta	258	0.01	0.022 ± 0.007	0.040 ± 0.004	pCi/m3
	Control (E-20) Gross beta	52	0.01	0.023 ± 0.006	0.038 ± 0.004	pCi/m3
	I-131	258	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)	0.0001 ± 0.0004	0.0014 ± 0.0007	pCi/m3
	Control (E-20) Cs-137	4	0.01(0.06)	ND	-	pCi/m3
	Other γ emitters (Co-60)	20	0.1	0.0000 ± 0.0004	0.0006 ± 0.0004	pCi/m3
	Control (E-20) Other (Co-60)	4	0.1	0.0002 ± 0.0003	0.0007 ± 0.0005	pCi/m3
	Natural Be-7	20	-	0.064 ± 0.013	0.079 ± 0.014	pCi/m3
	Control (E-20) Natural Be-7	4	-	0.055 ± 0.013	0.073 ± 0.018	pCi/m3
Milk	Sr-89	36	5	ND	-	pCi/L
	Sr-90	36	1	0.5 ± 0.3	1.3 ± 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)	0.3 ± 1.1	2.4 ± 1.9	pCi/L
	Ba-La-140	36	5 (15)	-0.1 ± 1.5	5.3 ± 1.6	pCi/L
	Other gamma emitters(Co-60)	36	15	ND	-	pCi/L
	Natural K-40	36	-	1370 ± 55	1526 ± 99	pCi/L
Well Water	Gross beta	4	4	1.2 ± 0.5	1.9 ± 0.7	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)	1.3 ± 1.5	3.4 ± 3.1	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	-1.9 ± 6.2	3.5 ± 2.5	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	ND	-	pCi/L
Algae	Gross beta	6	0.25	3.42 ± 1.67	6.43 ± 0.25	pCi/g
	Co-58	6	0.25	ND	-	pCi/g
	Co-60	6	0.25	0.001 ± 0.002	0.005 ± 0.003	pCi/g
	Cs-134	6	0.25	ND	-	pCi/g
	Cs-137	6	0.25	0.015 ± 0.006	0.023 ± 0.009	pCi/g
	Natural Be-7	6	-	0.49 ± 0.22	0.85 ± 0.07	pCi/g
	Natural K-40	6	-	3.12 ± 1.11	4.50 ± 0.10	pCi/g

Table 10-1 (continued)
Summary of Radiological Environmental Monitoring Results for 2014

Sample	Description	N	LLD (a)	Average ± 1 Std. Deviation (b)	High ± 2 sigma	Units
Lake Water	Gross beta	45	4	1.8 ± 0.8	4.0 ± 0.6	pCi/L
	I-131	45	0.5 (2)	ND	-	pCi/L
	Mn-54	45	10 (15)	-0.2 ± 0.9	1.2 ± 1.0	pCi/L
	Fe-59	45	30	-0.2 ± 1.6	3.4 ± 2.5	pCi/L
	Co-58	45	10(15)	-0.1 ± 0.9	1.6 ± 1.0	pCi/L
	Co-60	45	10(15)	0.0 ± 0.9	1.5 ± 1.3	pCi/L
	Zn-65	45	30	ND	-	pCi/L
	Zr-Nb-95	45	15	-0.6 ± 1.1	1.5 ± 1.3	pCi/L
	Cs-134	45	10 (15)	-0.2 ± 0.9	1.7 ± 1.5	pCi/L
	Cs-137	45	10 (18)	0.1 ± 0.9	2.0 ± 1.6	pCi/L
	Ba-La-140	45	15	-0.3 ± 1.8	3.4 ± 1.7	pCi/L
	Other gamma (Ru-103)	45	30	-0.5 ± 1.8	2.4 ± 2.1	pCi/L
	Sr-89	16	5(10)	0.23 ± 0.30	0.68 ± 0.62	pCi/L
	Sr-90	16	1 (2)	0.19 ± 0.19	0.66 ± 0.39	pCi/L
	H-3	16	200 (3000)	89 ± 118	413 ± 94	pCi/L
Fish	Gross beta	17	0.5	3.47 ± 0.60	4.10 ± 0.08	pCi/g
	Mn-54	17	0.13	ND	-	pCi/g
	Fe-59	17	0.26	-0.003 ± 0.021	0.022 ± 0.018	pCi/g
	Co-58	17	0.13	ND	-	pCi/g
	Co-60	17	0.13	ND	-	pCi/g
	Zn-65	17	0.26	-0.004 ± 0.013	0.019 ± 0.016	pCi/g
	Cs-134	17	0.13	-0.001 ± 0.005	0.010 ± 0.008	pCi/g
	Cs-137	17	0.15	0.031 ± 0.021	0.096 ± 0.027	pCi/g
	Other gamma (Ru-103)	17	0.5	0.001 ± 0.011	0.034 ± 0.008	pCi/g
	Natural K-40	17	-	2.79 ± 0.47	3.67 ± 0.41	pCi/g
Shoreline Sediment	Gross beta	10	2	8.65 ± 1.54	10.86 ± 0.91	pCi/g
	Cs-134	10	0.18	ND		pCi/g
	Cs-137	10	0.15	0.019 ± 0.009	0.033 ± 0.016	pCi/g
	Natural Be-7	10	-	0.041 ± 0.053	0.108 ± 0.054	pCi/g
	Natural K-40	10	-	5.98 ± 1.88	8.15 ± 0.49	pCi/g
	Natural Ra-226	10	-	0.38 ± 0.09	0.53 ± 0.15	pCi/g
Soil	Gross beta	16	2	22.80 ± 6.41	34.27 ± 1.77	pCi/g
	Cs-134	16	0.15	ND		pCi/g
	Cs-137	16	0.15	0.130 ± 0.074	0.350 ± 0.040	pCi/g
	Natural Be-7	16	-	0.031 ± 0.080	0.150 ± 0.110	pCi/g
	Natural K-40	16	-	14.94 ± 4.07	21.07 ± 0.89	pCi/g
	Natural Ra-226	16	-	0.89 ± 0.3	1.36 ± 0.33	pCi/g
Vegetation	Gross beta	24	0.25	5.98 ± 1.53	9.55 ± 0.21	pCi/g
	I-131	24	0.06	0.001 ± 0.007	0.02 ± 0.10	pCi/g
	Cs-134	24	0.06	0.000 ± 0.004	0.014 ± 0.009	pCi/g
	Cs-137	24	0.08	0.006 ± 0.008	0.037 ± 0.020	pCi/g
	Other gamma emitters (Co-60)	24	0.25	ND	-	pCi/g
	Natural Be-7	24	-	1.70 ± 1.89	6.01 ± 0.37	pCi/g
	Natural K-40	24	-	4.74 ± 1.06	6.19 ± 0.34	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 2014

Fence Location	Average	±	Standard Deviation	Units
North	2.45	±	0.17	mR/7 days
East	3.35	±	0.32	mR/7 days
South	1.14	±	0.17	mR/7 days
West	4.24	±	0.32	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 1.07 ± 0.19 mR/7-days compared to 1.15 ± 0.10 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 2013 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 – 2014

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
2014	1.07		0.19	mR/7 days

*St. Dev = Standard Deviation

There were no new dry fuel storage cask additions to the ISFSI in 2014. The west fence TLDs continue to record higher exposures. Although the east fence average TLDs (3.35± 0.63) are higher than the north fence TLDs (2.45± 0.35), they are statistically equal at the 95% confidence level. The south fence average continues to record the lowest exposures (Table 11-2).

There is no significant change in the exposure on the TLD monitoring locations around the ISFSI (Table 11-3). The results at E-03, E-31, and E-32, which are W and SW of the ISFSI, are nearly identical (1.23, 1.25, and 1.25, respectively) and continue to be higher than the closest TLD site, E-30 (0.97). (See Figs. 9-1 and 9-2 for locations).

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
2014	2.45	3.35	1.14	4.24

Although the mR/7-day results for the three TLD locations nearest the site boundary (E-03 1.23 ± 0.26; E-31, 1.25 ± 0.24; E-32, 1.25 ± 0.26) are higher than at the background site E-20 (1.15 ± 0.21), they are 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 minimal impact of the ISFSI on the surrounding

Figure 11-1 ISFSI AREA TLD RESULTS

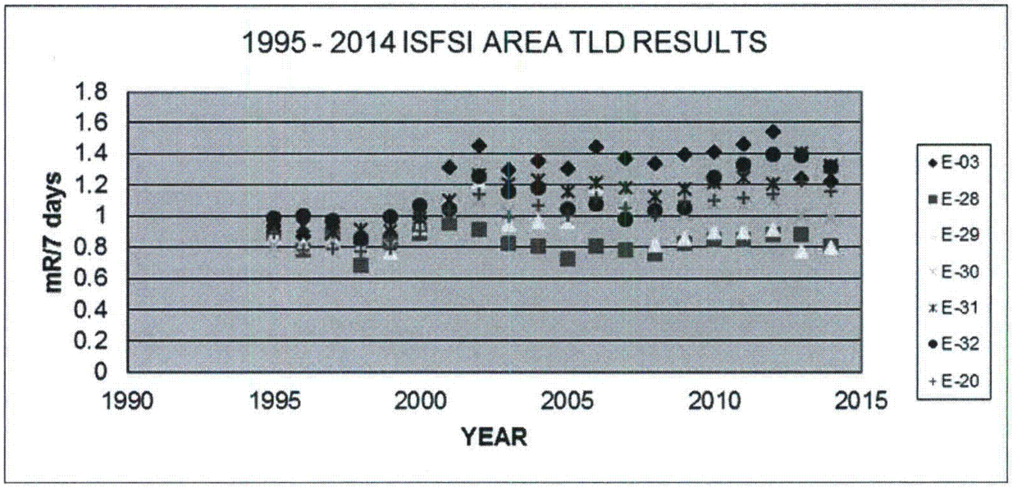


Table 11-3
Average TLD Results Surrounding the ISFSI (mR/7 days)

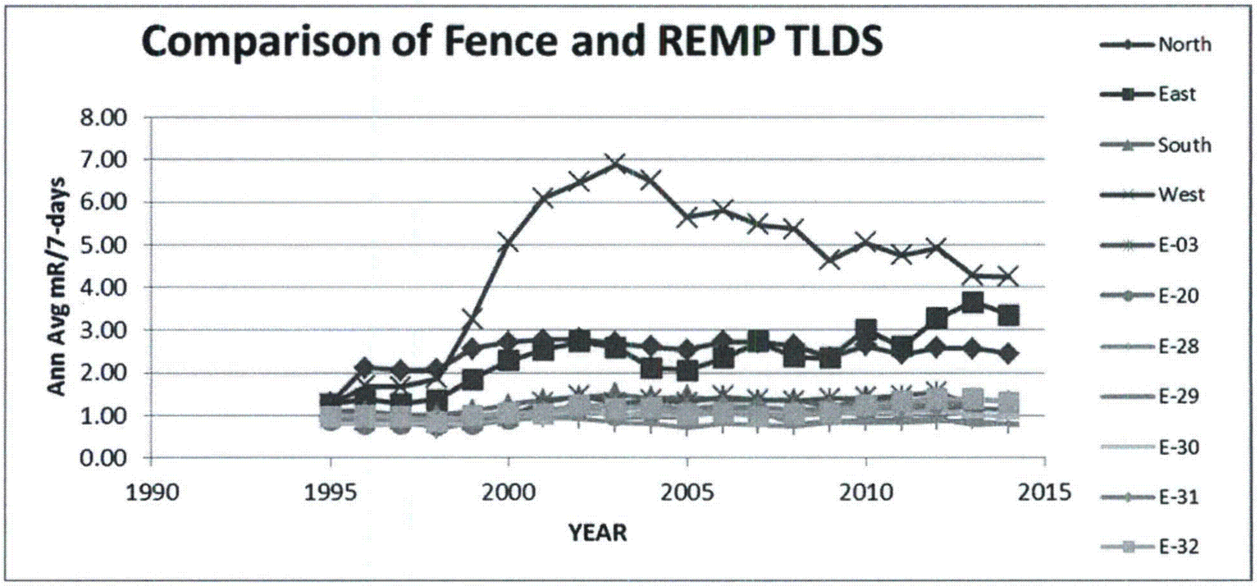
	Sampling Site						
	E-03	E-28	E-29	E-30	E-31**	E-32**	E-20***
Pre-Operation*	0.93	0.87	0.87	0.81	0.93	0.98	0.88
1996	0.87	0.78	0.81	0.79	0.93	1.00	0.78
1997	0.91	0.89	0.84	0.84	0.89	0.97	0.79
1998	0.82	0.68	0.80	0.82	0.91	0.85	0.77
1999	0.88	0.83	0.76	0.80	0.90	0.99	0.78
2000	0.98	0.88	0.92	0.99	0.98	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
2014	1.23	0.77	0.79	0.97	1.25	1.25	1.15

*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.

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



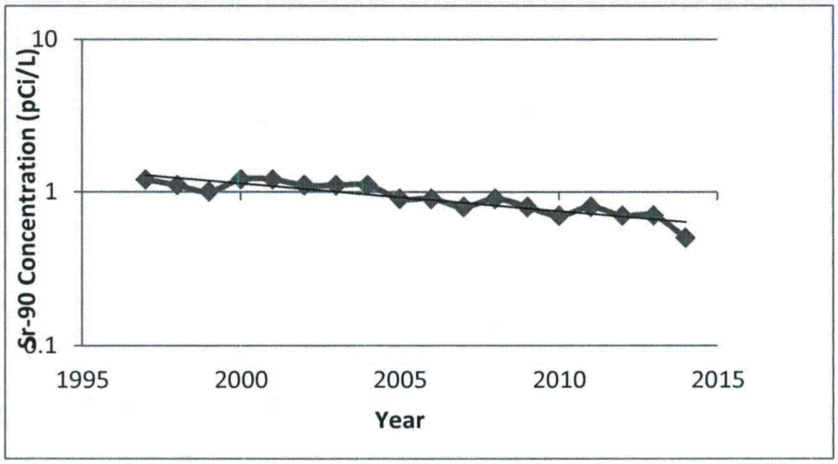
11.2 Milk

Naturally occurring potassium-40 (1370 ± 55 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 (0.5 ± 0.3 pCi/l), detected in milk. The annual average Sr-90 concentrations in milk continue to be similar to previous years. There were several positive Ba-La-140 results. However, no Ba-La-140 was detected in PBNP discharges during 2013 or 2014. Given the short half-life of Ba-La-140 (12.8 days), it is unlikely that these results represent a carry- over from previous years. Because the highest Ba-La-140 concentration is very near the detection limit, the positive values are considered to be false positives attributable to the statistical nature of radioactive decay. Some Cs-137 also was detected. Even though PBNP discharged airborne Cs-137 in March, April, and October, the Cs-137 values are near the detection limit and therefore may be false positive. Another possibility is residual Cs-137 recycling through the environment from the 1960's atmospheric weapons tests. No I-131, Co-60, or Cs-134 was detected. Given that Co-60 was discharged in much higher concentrations than Cs-137 (Table 3-3) but not detected in milk, supports the conclusion that the Cs-137 is not from PBNP effluent but either a false positive or the recycling of radioactive fallout from weapons testing and events such as Chernobyl and Fukushima.

Although the average Sr-90 concentrations have not changed much over the last sixteen (17) years, 1.2 ± 0.5 pCi/L in 1997 to 0.5 ± 0.3 pCi/L in 2014, 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 previously calculated Sr-90 decrease half-live over the years 1997 to 2013 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. The slightly lower 2014 value compared to the 2013 Sr-90 value for milk does not negate this conclusion.

Figure 11-3
Sr-90 Concentration in Milk (1997 – 2014)



The Sr-90 in milk persists due to its 28 year half-life and to cycling in the biosphere after the atmospheric weapons tests of the '50s, '60s, and '70s and later contributions from the Chernobyl accident in the late 1980s and from Fukushima. Over the time period of this graph (1997 – 2014), PBNP discharged airborne Sr-90 only in 3 years: 1998, 2.4E-08 Ci; 2004, 3.2E-08 Ci; and 2011, 1.6 E-08 Ci. These low discharges do not appear to impact the decreasing concentrations as they continue to decrease over time. It is concluded that the milk data for 2014 show no radiological effects of the plant operation.

11.3 Air

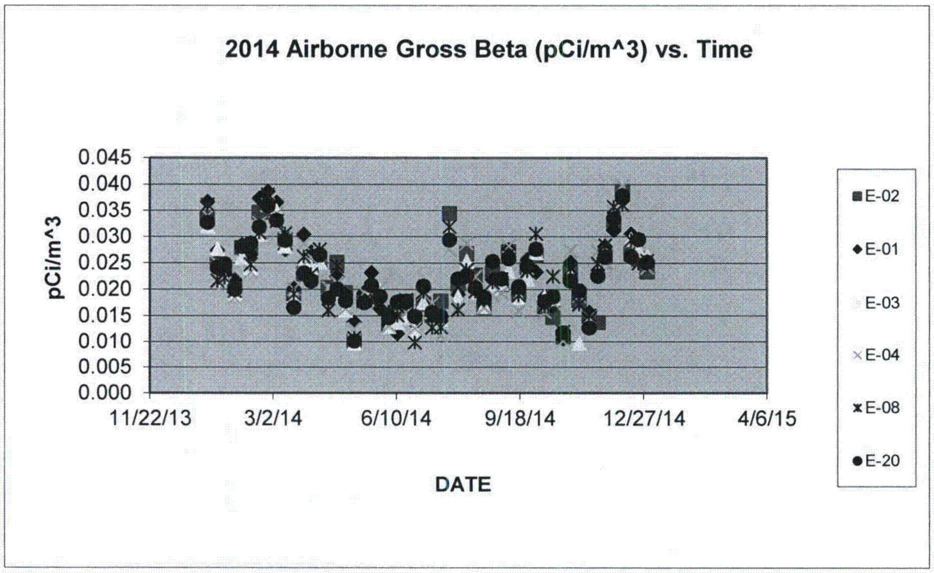
The average annual gross beta concentrations (plus/minus the two-sigma uncertainty) in weekly airborne particulates at the indicator and control locations were 0.022 ± 0.014 pCi/m^3 and 0.023 ± 0.012 pCi/m^3, respectively, and are similar to levels observed from 1993 through 2013 (Table 11-4).

The 2014 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 - 2013. .As in 2013, there is a slight peak in late summer followed by some lower values in October and early November. The cause for this variation is not known. However, the control and indicators are moving in concert. Therefore, a plant effect can be ruled out. Similarly, there is a decreasing trend in January before returning to the January highs in March. Again, the indicator and background sites move in concert ruling out a plant effect.

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
2014	0.022

Figure 11-4



No I-131 was detected during 2014. 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 Point Beach 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 2014 air data do 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 thirteen, slightly positive indications of gamma emitters during 2014. Five of these results occurred at one location 4.5 miles north of the plant. This location is considered to be upstream based on the north to south current flow on the west shore of Lake Michigan. Therefore these results are unlikely to be an indication of Point Beach effluent. Positive results for Cs-134 and Ba/La-140 are considered false positives for Point Beach effluents because, in addition to occurring at an upstream location, none of the radionuclides were discharged by Point Beach during 2014. Likewise, the positive Zr/Nb-95 also is considered to be a false positive because no Zr/Nb-95 was discharged until the month after detection.

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.

The one positive Cs-137 result at this upstream location could be a false positive or be the result of the recycling of radioactive fallout recycling in the Lake Michigan ecosystem. 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, but 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. PBNP discharged small amounts of Cs-137 in January – March and May – June. 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, Fe-59, Co-58, Ba/La-140, and Ru-103 and occur south of the plant. Again, no Ba/La-140 or Ru-103 was discharged in 2014. Positive results occurred in October (2500 feet) and in November (6 miles) south of the PBNP discharge. The last Fe-59 discharge was five months earlier. Given that Co-58 and Co-60 were discharged but only Co-58 was detected in November but not in October sheds doubt on the positive Mn-54, Fe-59, and Co-58 results being a true identification. Therefore, the small positive Mn-54, Fe-59 and Co-58 results are concluded to be a false positives resulting from the statistical variation in the radioactive decay detection process.

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. Small amounts of Sr-89/90 were detected. As in 2012 and 2013, Point Beach did not discharge any Sr-89 or Sr-90 in 2014. There were three lake water composites in which the Sr-90 concentrations were slightly positive. They occurred 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. Point Beach discharges on the order of 700 - 800 Ci per year.

Five of the seven positive H-3 indications occurred north, or upstream, from Point Beach. The highest, 431 ± 94 pCi/l, was from a second quarter composite sample about 1.6 miles north (E-05) of Point Beach. The next highest, 244 ± 85 pCi/l, occurred in the first quarter at E-33, some 4.5 miles north of the site. During the same quarter, the E-05 concentration was 149 ± 80 pCi/l.

Based on tritium and strontium analyses of Lake Michigan water, there is no measureable impact on the waters of Lake Michigan from Point Beach 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, typically 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. In 2014 the first sample was collected in July because there was not enough growth in June to obtain a sample. Cs-137 was detected in all six samples. The highest positive result (0.023 ± 0.009 pCi/g) occurred at E-12 near the PBNP discharge. The next highest (0.018 ± 0.004 pCi/g) occurred about 1.5 miles north of the site.

As previously discussed, fallout Cs-137 recycles in Lake Michigan and is attached to particles. 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 and Fukushima. There also may be a small contribution, but unknown, amount from past nuclear plant discharges.

Point Beach discharged both Co-60 and Co-58 every month in 2014. No Co-58 was found. However, there were two small positive indications of Co-60 with the highest, 0.005 ± 0.003 pCi/g, at E-05 about 1.5 miles north of the site. Because no Co-58 was detected even though comparable amounts of each were discharged, it is considered 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 0.21 ± 0.09 to 0.85 ± 0.7 pCi/g for Be-7. This is about half the concentration of 1.54 ± 0.51 pCi/g found in 2013. The K-40 ranged from 1.78 ± 0.11 to 4.50 ± 0.10, comparable to the 2013 results of 2.51 ± 0.10 to 3.78 ± 0.11 pCi/g. The better comparison for the K-40 is expected because the K-40 is incorporated into the alga during growth whereas Be-7 is not a natural component of the alga. The naturally occurring K-40 and Be-7 were at concentrations about 200 times higher than Cs-137. K-40 is primordial isotope of potassium with a billion year half-life. By contrast Be-7 with a 53 day half-life is produced 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 Point Beach, the algae monitoring results would indicate a minimal effect by PBNP upon the environs.

11.6 Fish

Seventeen fish were analyzed in 2014. Sixteen of the 17 fish had detectable amounts of Cs-137 with results ranging from 0.011 ± 0.010 to 0.096 ± 0.027 pCi/g. 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 Fe-59 (0.022± 0.018), Co-58 (0.011± 0.088), and Zn-65 (0.019 ± 0.016). These results could be false positives. For example, Fe-59 was found is a fish from 4/16/14. However, no Fe-59 was released until 4/27/14. Although all of these radionuclides were released by PBNP during the year, it is not possible to attribute these results to PBNP discharges because of the migratory behavior of fish. Given that the measured concentrations are an order of magnitude below their required LLDs, and assuming that the positive results originated from Point Beach effluents, the imputed impact is minimal. .

By comparison to the aforementioned radionuclides, the lowest concentration of naturally occurring K-40 (1.88– 3.81 pCi/g) is roughly twenty 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 2014, 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, 0.34 ± 0.04 pCi/g, as compared to other locations. At E-06, 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 2014 samples had low levels of Cs-137 with the highest level (0.34 ± 0.04 pCi/g) being found at E-06. The soil from E-20, the background location, had a Cs-137 concentration of 0.13 ± 0.04 pCi/g. E-20 is located 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 (7.08 ± 0.52 to 21.07 ± 0.89 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 Point Beach 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. Eight 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 six of the ten samples, the concentrations of naturally occurring 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 0.058 ± 0.045 to 6.01 ± 0.37 pCi/g. The concentrations were lower in May (0.24 ± 18 pCi/g) than in July (0.74 ± 0.21) and October (4.14 ± 1.15). 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 with averages of 4.81, 5.08, and 4.01 in May, Jul;u, and October, respectively.

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 2014 only six of the twenty-four vegetation samples had a positive indication for Cs-137 and only E-06 (0.037 ± 0.020) was significantly above background. Although this is slightly lower than the 2013 result at E-06 (0.056 ± 0.025), the difference is not statistically significant. 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 and small amount were discharge in March and April of 2014. It is unlikely that the six 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 release in March would be detectable in July. Likewise, the detection of I-131 in a 10/1/14 sample occurred prior to the release on 10/15/14 and therefore not a PBNP effluent. No Cs-134 was released in 2013 of 2014. 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 2014 vegetation sampling results, it is concluded that there little or no effect from PBNP effluents.

11.12 <u>Land Use Census</u>

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 201. 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 818 environmental samples, and from 144 sets of TLDs that comprised the PBNP REMP for 2014, 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 2014 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.

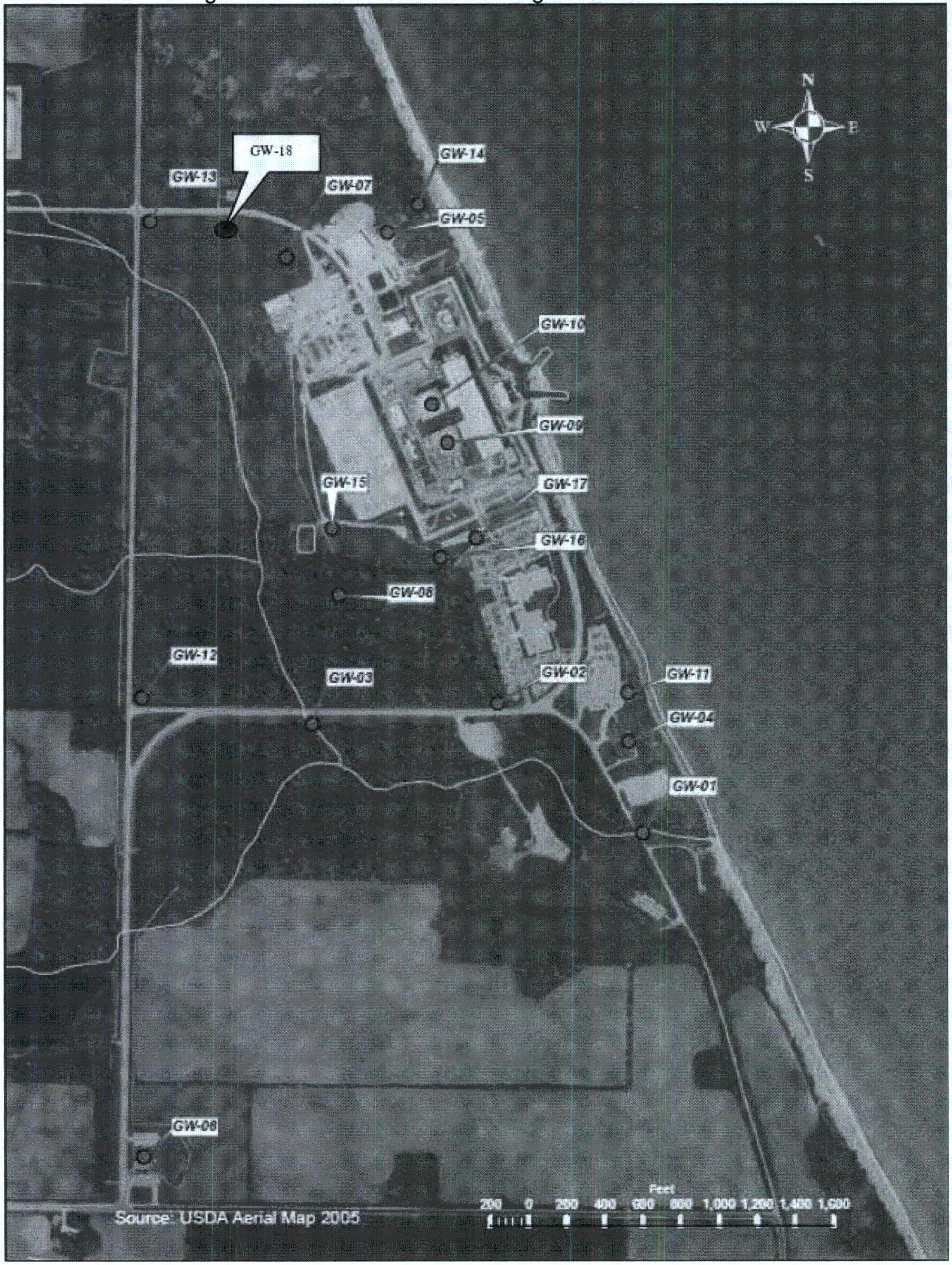
In addition to the main plant well, four other drinking water wells also are monitored. The Site Boundary Control Center well, located at the plant entrance, the Warehouse 6 well, on the north side of the plant, and the EIC well, located south of the plant. In 2012, a new building (Warehouse 7) was constructed 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 twelve times during 2014. .

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	NS ±	NS ±	NS ±	NS ±			145
Feb	NS ±	NS ±	NS ±	NS ±			144
Mar	ND ±	230 ± 86	NS ±	NS ±			148
Apr	117 ± 76	254 ± 83	154 ± 78	254 ± 83			183
May	101 ± 77	246 ± 84	ND ±	NS ±	ND ±	393 ± 89	146
Jun	86 ± 79	266 ± 88	105 ± 80	231 ± 87			156
Jul	98 ± 79	110 ± 78	ND ±	110 ± 78			161
Aug	230 ± 94	168 ± 91	98 ± 87	NS ±			149
Sep	119 ± 84	133 ± 85	ND ±	167 ± 87			143
Oct	ND ±	165 ± 93	ND ±	190 ± 94			150
Nov	NS ±	148 ± 106	ND ± 80	178 ± 108			150
Dec	95 ± 93	NS ±	102 ± 93	233 ± 98			

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 but one 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 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 GW-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, from the south. 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
2014 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	NF ±	NF ±	NF ±	NF ±	NF ±	NF ±	NF ±	137
Feb	NF ±	NF ±	NF ±	NF ±	NF ±	NF ±	NF ±	
Mar	NF ±	NF ±	NF ±	NF ±	NF ±	NF ±	NF ±	
Apr	339 ± 92	NF ±	NF ±	NF ±	NF ±	333 ± 91	310 ± 90	143
May	245 ± 82	NF ±	NF ±	NF ±	NF ±	261 ± 83	157 ± 78	144
Jun	207 ± 81	NF ±	NF ±	NF ±	NF ±	228 ± 82	98 ± 75	140
Jul	203 ± 81	NF ±	NF ±	NF ±	NF ±	287 ± 85	NF ±	142
Aug	256 ± 110	NF ±	NF ±	NF ±	NF ±	332 ± 114	NF ±	193
Sep	110 ± 86	NF ±	NF ±	NF ±	NF ±	235 ± 92	NF ±	152
Oct	ND ±	NF ±	NF ±	NF ±	NF ±	252 ± 92	NF ±	158
Nov	155 ± 117	NF ±	NF ±	NF ±	NF ±	255 ± 122	NF ±	179
Dec	195 ± 100	NF ±	NF ±	NF ±	NF ±	237 ± 102	NF ±	177
Avg =	214 ± 68.8					269 ± 40	188 ± 109	

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

The high H-3 concentrations (600 – 1000 pCi/l) seen in January – March of 2013 at S-1 and S-3 were not seen in 2014 because there was no flow due to freezing. 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.

Gamma scans were performed on the beach drain samples at the LLD used for lake water. Five indications of small, positive concentration values below the calculated MDC were found for Fe-59, Co-58, and Ba-La-140. There were no airborne releases of Fe-59 or Ba-La-140 in 2014. Therefore, these are considered to be false positives. The absence of Co-60 whose airborne releases were comparable to those of Co-58 suggest that the identification of Co-58 also is a false positive. Therefore, it is concluded that H-3 is the only PBNP radionuclide found in the beach drains.

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 14-3). 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
2014 East Yard Area Manhole Tritium (pCi/l)

MH	5/1/2014			11/19/2014		
Z-066A	331	±	86	133	±	101
Z-067A	253		83	272	±	109
Z-066B	ND			NS	±	
Z-067B	ND			NS	±	
Z-066C	ND	±		NS		
Z-067C	205	±	80	NS		
Z-066D	215	±	81	NS		
Z-067D	ND	±		NS		
Z-068	243		82	219		106
MDC	145			186		
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 2014 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 2014 H-3 concentration of 375 ± 106 pCi/L is in close agreement with the 2013 result of 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
2014 Facade Well Water Tritium (pCi/l)

	UNIT 1		UNIT 2		
Month	1Z-361A	1Z-361B	2Z-361A	2Z-361B	MDC
15-Mar	325 ± 91	143 ± 83	NS ±	119 ± 81	143
6-Apr	ND ±	131 ± 77	ND ±	270 ± 84	146
25-Jun	258 ± 84	328 ± 88	431 ± 92	202 ± 82	144
16-Jul	301 ± 83	224 ± 80	ND ±	87 ± 72	136
19-Aug	322 ± 96	ND ±	ND ±	145 ± 87	151
17-Nov	375 ± 106	219 ± 96	ND ±	ND ±	170

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

The SSD sump results are presented in Table 14-5. The 2014 average concentration of 725 ± 235 pCi/l is not much different from the 643 ± 201 and 513 ± 269 pCi/l seen in 2013 and 2012, respectively.

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. During 2014, work to mitigate the possibility of external flooding events uncovered the N and S external SSD outfalls. Only one sample was available. A H-3 concentration of 131± 86 pCi/l (MDA = 158 pCi/l). This is lower than the concentrations found in beach drains S-1 and S-3 (Table 14-2) and the east yard manholes (Table 14-3).

Table 14-5
2014 Unit 2 Facade SSD Sump H-3 (pCi/l)

Date	Avg		2σ	MDC
3-Feb	657	±	101	144
28-Feb	697	±	107	146
5-Apr	1029	±	112	136
6-May	688	±	103	145
15-May	466	±	94	142
23-Jun	1091	±	117	144
14-Jul	482	±	90	137
28-Aug	626	±	111	177
26-Sep	524	±	101	149
24-Oct	1120	±	124	176
20-Nov	518	±	114	172
26-Dec	789	±	133	173
Average	724	±	236	

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.

The isotopes in the façade wells were Be-7, Mn-54, Co-60, Zr-Nb-95, 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. The occurrence of Be-7, a short-lived isotope produced in the atmosphere coupled with that no Cs-134 and Ba-La-140 was detected in effluents suggests, as for lake water, that these results are false positives.

The SSD sump had small concentrations of Co-58, Zn-65, Zr-Nb-95, and Cs-137. Again, it is concluded that these results are false positives.

It should be noted that the gamma scans of the 6/25/14 façade well samples turned up anomalous results. The liquid portion had high concentrations of Be-7 (160 ± 46 to 507 ± 57 pCi/l), Mn-54 (3.2 ± 1.8 to 45.2 ± 5.5 pCi/l), Co-58 (2.0 ± 1.7 to 242 ± 9 pCi/l), and I-131 (18.4 ± 1.7 to 44.9 ± 21.2 pCi/l) with trace amounts of Bs-La-140. The samples were filter and the solids counted. With the exception of I-131, all of the activity was located on the solids. The I-131 was in the liquid phase. Confirmatory samples taken on 7/16/14 and 8/19/14 showed no unusual activity. Because the major source of Be-7 is the atmosphere and it had not previously been seen in these well, the presence of Be-7 suggests a contamination event. Also, the presence of Co-58 and the absence of Co-60 also suggests some contamination event. The cause of the contamination could not be determined at PBNP or at the contracted radioanalytical laboratory.

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 2013. The highest H-3 concentrations occur at GW-15, the well closest to the former unlined 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 2014 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	ND ±	ND ±	ND ±	96 ± 72	253 ± 80	206 ± 76	137
2	133 ± 72	ND ±	ND ±	83 ± 70	171 ± 75	234 ± 85	136
3	ND ±	ND ±	81 ± 77	112 ± 79	191 ± 82	195 ± 95	138
4	ND ±	NS ±	ND ±	148 ± 93	229 ± 96	NS ±	176

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 had no detectable H-3 (Table 14-7).

Table 14-7
2014 Potable Well Water Tritium Concentration (pCi/l)

Month	EIC WELL GW-04	EIC MDC	Warehouse 6 Well GW-05	SBCC Well GW-06	WH 7 GW-18	GW-05, 06, 18 MDC
Jan	ND	151	ND	ND	ND	153
Feb	ND	139				
Mar	ND	143				
Apr	ND	145	ND	ND	ND	144
May	ND	143				
Jun	ND	142				
Jul	ND	138	ND	ND	ND	143
Aug	ND	155				
Sep	ND	156				
Oct	ND	175	ND	ND	ND	158
Nov	ND	186				
Dec	ND	169				

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 and 2013. A comparison of 2012 through 2014 of AC condensate H-3 concentrations is presented in Table 14-8.

Table 14-8
Comparison of 2012 - 2014 AC Condensate

Location	2012 H-3 (pCi/l) ± 2σ	2013 H-3 (pCi/l) ± 2σ	2014 H-3 (pCi/l) ± 2σ
NSB (4th floor)	557 ± 102	478 ± 102	328 ± 101
Turbine Bldg 66'	998 ± 118	757 ± 112	527 ± 108
S Service Bldg Roof	5822 ± 231	2606 ± 166	2690 ± 166
South Gate Roof	473 ± 99	217 ± 91	173 ± 95
Turbine Bldg 8'	602 ± 104	1055 ± 123	874 ± 119
Training Bldg Roof	185 ± 86	203 ± 90	ND ±

ND = not detected

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.

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 can not 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 Point Beach 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.

APPENDIX 1

Environmental, Inc. Midwest Laboratory
Final Report for the Point Beach Nuclear Plant
and
Other Analyses
Reporting Period: January – December 2014

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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, 2014

Reviewed and
Approved by ______________________ Date 02-04-2015

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Distribution: K. Johansen, 1 hardcopy, 1 e-mail

POINT BEACH NUCLEAR PLANT

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POINT BEACH NUCLEAR PLANT

1.0 INTRODUCTION

The following constitutes the final 2014 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-001	01-13-14	No sample due to icy conditions.
LW	E-005	01-13-14	No sample due to icy conditions.
LW	E-006	01-13-14	No sample due to icy conditions.
LW	E-033	01-13-14	No sample due to icy conditions.
LW	E-006	02-13-14	No sample due to icy conditions.
AP/AI	E-02	03-05-14	No power to sampler.
LW	E-006	03-19-14	No sample due to icy conditions.
AP/AI	E-02	05-28-14	No power to sampler.

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
01-08-14	259	0.037 ± 0.004	< 0.011	07-09-14	295	0.015 ± 0.003	< 0.014
01-16-14	332	0.027 ± 0.003	< 0.006	07-16-14	302	0.014 ± 0.003	< 0.010
01-22-14	269	0.023 ± 0.004	< 0.006	07-23-14	306	0.030 ± 0.004	< 0.009
01-30-14	357	0.022 ± 0.003	< 0.007	07-30-14	301	0.019 ± 0.003	< 0.009
02-05-14	268	0.028 ± 0.004	< 0.008	08-06-14	297	0.023 ± 0.003	< 0.012
02-12-14	315	0.026 ± 0.003	< 0.010	08-13-14	302	0.020 ± 0.003	< 0.009
02-19-14	293	0.037 ± 0.004	< 0.006	08-20-14	332	0.018 ± 0.003	< 0.011
02-26-14	308	0.039 ± 0.004	< 0.007	08-27-14	314	0.022 ± 0.003	< 0.010
				09-03-14	294	0.021 ± 0.003	< 0.008
03-05-14	302	0.037 ± 0.004	< 0.005				
03-12-14	297	0.027 ± 0.004	< 0.008	09-09-14	277	0.027 ± 0.004	< 0.011
03-19-14	289	0.020 ± 0.003	< 0.017	09-17-14	337	0.019 ± 0.003	< 0.009
03-27-14	356	0.030 ± 0.003	< 0.007	09-24-14	303	0.026 ± 0.004	< 0.009
04-02-14	193	0.027 ± 0.005	< 0.009	10-01-14	291	0.023 ± 0.003	< 0.009
1st Quarter Mean ± s.d.		0.029 ± 0.006	< 0.008	3rd Quarter Mean ± s.d.		0.021 ± 0.005	< 0.010
04-09-14	286	0.027 ± 0.004	< 0.010	10-08-14	300	0.019 ± 0.003	< 0.011
04-16-14	302	0.019 ± 0.003	< 0.009	10-15-14	298	0.017 ± 0.003	< 0.007
04-23-14	302	0.022 ± 0.003	< 0.004	10-23-14	346	0.010 ± 0.003	< 0.011
04-30-14	300	0.019 ± 0.003	< 0.006	10-29-14	251	0.025 ± 0.004	< 0.008
05-07-14	300	0.014 ± 0.003	< 0.007	11-05-14	307	0.020 ± 0.003	< 0.013
05-15-14	300	0.019 ± 0.003	< 0.008	11-13-14	349	0.016 ± 0.003	< 0.009
05-21-14	300	0.023 ± 0.003	< 0.007	11-20-14	306	0.023 ± 0.003	< 0.007
05-28-14	312	0.016 ± 0.003	< 0.008	11-26-14	253	0.028 ± 0.004	< 0.016
				12-03-14	303	0.031 ± 0.004	< 0.008
06-04-14	317	0.013 ± 0.003	< 0.006				
06-11-14	329	0.011 ± 0.003	< 0.007	12-10-14	306	0.037 ± 0.004	< 0.010
06-18-14	299	0.016 ± 0.003	< 0.004	12-17-14	294	0.030 ± 0.004	< 0.009
06-25-14	299	0.014 ± 0.003	< 0.011	12-23-14	258	0.026 ± 0.004	< 0.009
07-02-14	291	0.018 ± 0.003	< 0.006	12-30-14	307	0.025 ± 0.003	< 0.011
2nd Quarter Mean ± s.d.		0.018 ± 0.004	< 0.007	4th Quarter Mean ± s.d.		0.024 ± 0.007	< 0.010
				Cumulative Average		0.023 ± 0.007	< 0.009

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	Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030	Required LLD		0.010	0.030
01-08-14	278	0.033 ± 0.004	< 0.010	07-09-14	298	0.015 ± 0.003	< 0.014
01-16-14	331	0.025 ± 0.003	< 0.006	07-16-14	306	0.018 ± 0.003	< 0.010
01-22-14	267	0.023 ± 0.004	< 0.006	07-23-14	311	0.034 ± 0.004	< 0.009
01-30-14	355	0.021 ± 0.003	< 0.007	07-30-14	302	0.021 ± 0.003	< 0.009
02-05-14	267	0.028 ± 0.004	< 0.008	08-06-14	296	0.027 ± 0.004	< 0.012
02-12-14	308	0.028 ± 0.003	< 0.010	08-13-14	302	0.023 ± 0.003	< 0.009
02-19-14	299	0.035 ± 0.004	< 0.006	08-20-14	301	0.017 ± 0.003	< 0.012
02-26-14	308	0.035 ± 0.004	< 0.007	08-27-14	310	0.023 ± 0.003	< 0.010
				09-03-14	312	0.021 ± 0.003	< 0.008
03-05-14		ND[a]					
03-12-14	284	0.029 ± 0.004	< 0.008	09-09-14	286	0.027 ± 0.004	< 0.010
03-19-14	296	0.019 ± 0.003	< 0.016	09-17-14	362	0.019 ± 0.003	< 0.009
03-27-14	358	0.023 ± 0.003	< 0.007	09-24-14	300	0.024 ± 0.004	< 0.009
04-02-14	261	0.023 ± 0.004	< 0.007	10-01-14	293	0.026 ± 0.004	< 0.009
1st Quarter Mean ± s.d.		0.027 ± 0.005	< 0.008	3rd Quarter Mean ± s.d.		0.023 ± 0.005	< 0.010
04-09-14	302	0.026 ± 0.004	< 0.010	10-08-14	293	0.017 ± 0.003	< 0.011
04-16-14	300	0.020 ± 0.003	< 0.009	10-15-14	300	0.015 ± 0.003	< 0.007
04-23-14	303	0.025 ± 0.004	< 0.004	10-23-14	353	0.011 ± 0.002	< 0.010
04-30-14	301	0.019 ± 0.003	< 0.006	10-29-14	252	0.023 ± 0.004	< 0.008
05-07-14	301	0.010 ± 0.003	< 0.007	11-05-14	311	0.018 ± 0.003	< 0.012
05-15-14	301	0.018 ± 0.003	< 0.008	11-13-14	357	0.015 ± 0.003	< 0.009
05-21-14	301	0.019 ± 0.003	< 0.007	11-20-14	321	0.014 ± 0.003	< 0.007
05-28-14		ND[a]		11-26-14	259	0.026 ± 0.004	< 0.016
				12-03-14	311	0.033 ± 0.004	< 0.008
06-04-14	315	0.013 ± 0.003	< 0.006				
06-11-14	282	0.016 ± 0.003	< 0.008	12-10-14	313	0.039 ± 0.004	< 0.010
06-18-14	300	0.018 ± 0.003	< 0.004	12-17-14	299	0.027 ± 0.004	< 0.009
06-25-14	303	0.015 ± 0.003	< 0.011	12-23-14	262	0.026 ± 0.004	< 0.009
07-02-14	293	0.017 ± 0.003	< 0.006	12-30-14	322	0.023 ± 0.003	< 0.011
2nd Quarter Mean ± s.d.		0.018 ± 0.004	< 0.007	4th Quarter Mean ± s.d.		0.022 ± 0.008	< 0.010
				Cumulative Average		0.022 ± 0.007	< 0.009

[a] "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-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
01-08-14	257	0.032 ± 0.004	< 0.010	07-09-14	297	0.016 ± 0.003	< 0.014
01-16-14	335	0.028 ± 0.003	< 0.006	07-16-14	302	0.014 ± 0.003	< 0.010
01-22-14	270	0.022 ± 0.004	< 0.006	07-23-14	301	0.030 ± 0.004	< 0.009
01-30-14	354	0.019 ± 0.003	< 0.007	07-30-14	297	0.019 ± 0.003	< 0.009
02-05-14	270	0.026 ± 0.004	< 0.008	08-06-14	287	0.025 ± 0.004	< 0.013
02-12-14	299	0.024 ± 0.003	< 0.010	08-13-14	302	0.020 ± 0.003	< 0.009
02-19-14	300	0.030 ± 0.004	< 0.006	08-20-14	298	0.017 ± 0.003	< 0.012
02-26-14	309	0.036 ± 0.004	< 0.007	08-27-14	321	0.020 ± 0.003	< 0.009
				09-03-14	312	0.021 ± 0.003	< 0.008
03-05-14	311	0.035 ± 0.004	< 0.005				
03-12-14	292	0.028 ± 0.004	< 0.008	09-09-14	280	0.023 ± 0.004	< 0.011
03-19-14	300	0.019 ± 0.003	< 0.016	09-17-14	344	0.018 ± 0.003	< 0.009
03-27-14	354	0.025 ± 0.003	< 0.007	09-24-14	294	0.022 ± 0.004	< 0.010
04-02-14	257	0.024 ± 0.004	< 0.007	10-01-14	294	0.027 ± 0.004	< 0.009
1st Quarter Mean ± s.d.		0.027 ± 0.005	< 0.008	3rd Quarter Mean ± s.d.		0.021 ± 0.005	< 0.010
04-09-14	294	0.025 ± 0.004	< 0.010	10-08-14	297	0.019 ± 0.003	< 0.011
04-16-14	308	0.020 ± 0.003	< 0.009	10-15-14	300	0.018 ± 0.003	< 0.007
04-23-14	297	0.020 ± 0.003	< 0.004	10-23-14	348	0.012 ± 0.003	< 0.011
04-30-14	298	0.016 ± 0.003	< 0.006	10-29-14	252	0.023 ± 0.004	< 0.008
05-07-14	298	0.010 ± 0.003	< 0.007	11-05-14	310	0.010 ± 0.003	< 0.013
05-15-14	298	0.018 ± 0.003	< 0.008	11-13-14	349	0.014 ± 0.003	< 0.009
05-21-14	298	0.020 ± 0.003	< 0.007	11-20-14	308	0.024 ± 0.003	< 0.007
05-28-14	286	0.020 ± 0.003	< 0.009	11-26-14	256	0.027 ± 0.004	< 0.016
				12-03-14	296	0.034 ± 0.004	< 0.008
06-04-14	289	0.013 ± 0.003	< 0.006				
06-11-14	290	0.014 ± 0.003	< 0.008	12-10-14	302	0.039 ± 0.004	< 0.010
06-18-14	298	0.015 ± 0.003	< 0.004	12-17-14	296	0.029 ± 0.004	< 0.009
06-25-14	301	0.012 ± 0.003	< 0.011	12-23-14	256	0.027 ± 0.004	< 0.009
07-02-14	291	0.018 ± 0.003	< 0.006	12-30-14	307	0.026 ± 0.003	< 0.011
2nd Quarter Mean ± s.d.		0.017 ± 0.004	< 0.007	4th Quarter Mean ± s.d.		0.023 ± 0.009	< 0.010
				Cumulative Average		0.022 ± 0.007	< 0.009

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
01-08-14	268	0.034 ± 0.004	< 0.010	07-09-14	302	0.017 ± 0.003	< 0.013
01-16-14	326	0.025 ± 0.003	< 0.006	07-16-14	303	0.011 ± 0.003	< 0.010
01-22-14	273	0.021 ± 0.004	< 0.006	07-23-14	304	0.027 ± 0.004	< 0.009
01-30-14	358	0.018 ± 0.003	< 0.007	07-30-14	297	0.017 ± 0.003	< 0.009
02-05-14	277	0.028 ± 0.004	< 0.008	08-06-14	294	0.029 ± 0.004	< 0.012
02-12-14	316	0.023 ± 0.003	< 0.010	08-13-14	300	0.022 ± 0.003	< 0.009
02-19-14	291	0.033 ± 0.004	< 0.006	08-20-14	300	0.017 ± 0.003	< 0.012
02-26-14	306	0.036 ± 0.004	< 0.007	08-27-14	299	0.019 ± 0.003	< 0.010
				09-03-14	298	0.019 ± 0.003	< 0.008
03-05-14	315	0.034 ± 0.004	< 0.005				
03-12-14	296	0.030 ± 0.004	< 0.008	09-09-14	274	0.028 ± 0.004	< 0.011
03-19-14	302	0.020 ± 0.003	< 0.016	09-17-14	351	0.016 ± 0.003	< 0.009
03-27-14	349	0.028 ± 0.003	< 0.007	09-24-14	299	0.024 ± 0.004	< 0.010
04-02-14	251	0.026 ± 0.004	< 0.007	10-01-14	305	0.027 ± 0.004	< 0.009
1st Quarter Mean ± s.d.		0.027 ± 0.006	< 0.008	3rd Quarter Mean ± s.d.		0.021 ± 0.006	< 0.010
04-09-14	294	0.027 ± 0.004	< 0.010	10-08-14	296	0.016 ± 0.003	< 0.011
04-16-14	302	0.020 ± 0.003	< 0.009	10-15-14	304	0.018 ± 0.003	< 0.007
04-23-14	302	0.021 ± 0.003	< 0.004	10-23-14	350	0.010 ± 0.002	< 0.010
04-30-14	301	0.016 ± 0.003	< 0.006	10-29-14	253	0.027 ± 0.004	< 0.008
05-07-14	301	0.012 ± 0.003	< 0.007	11-05-14	306	0.019 ± 0.003	< 0.013
05-15-14	301	0.019 ± 0.003	< 0.008	11-13-14	345	0.015 ± 0.003	< 0.009
05-21-14	301	0.020 ± 0.003	< 0.007	11-20-14	317	0.027 ± 0.003	< 0.007
05-28-14	299	0.020 ± 0.003	< 0.008	11-26-14	256	0.025 ± 0.004	< 0.016
				12-03-14	305	0.035 ± 0.004	< 0.008
06-04-14	298	0.013 ± 0.003	< 0.006				
06-11-14	290	0.016 ± 0.003	< 0.008	12-10-14	307	0.040 ± 0.004	< 0.010
06-18-14	306	0.016 ± 0.003	< 0.004	12-17-14	296	0.029 ± 0.004	< 0.009
06-25-14	305	0.013 ± 0.003	< 0.011	12-23-14	258	0.029 ± 0.004	< 0.009
07-02-14	291	0.019 ± 0.003	< 0.006	12-30-14	314	0.024 ± 0.003	< 0.011
2nd Quarter Mean ± s.d.		0.018 ± 0.004	< 0.007	4th Quarter Mean ± s.d.		0.024 ± 0.008	< 0.010
				Cumulative Average		0.023 ± 0.007	< 0.009

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
Required LLD		0.010	0.030
01-08-14	265	0.036 ± 0.004	< 0.010
01-16-14	310	0.022 ± 0.003	< 0.007
01-22-14	278	0.022 ± 0.004	< 0.006
01-30-14	353	0.020 ± 0.003	< 0.007
02-05-14	278	0.028 ± 0.004	< 0.008
02-12-14	327	0.025 ± 0.003	< 0.010
02-19-14	278	0.031 ± 0.004	< 0.006
02-26-14	273	0.038 ± 0.004	< 0.008
03-05-14	312	0.033 ± 0.004	< 0.005
03-12-14	284	0.031 ± 0.004	< 0.008
03-19-14	291	0.019 ± 0.003	< 0.017
03-27-14	350	0.026 ± 0.003	< 0.007
04-02-14	257	0.023 ± 0.004	< 0.007
1st Quarter Mean ± s.d.		0.027 ± 0.006	< 0.008
04-09-14	296	0.028 ± 0.004	< 0.010
04-16-14	308	0.016 ± 0.003	< 0.009
04-23-14	303	0.024 ± 0.004	< 0.004
04-30-14	307	0.018 ± 0.003	< 0.006
05-07-14	307	0.011 ± 0.003	< 0.006
05-15-14	307	0.018 ± 0.003	< 0.007
05-21-14	307	0.018 ± 0.003	< 0.006
05-28-14	306	0.018 ± 0.003	< 0.008
06-04-14	312	0.016 ± 0.003	< 0.006
06-11-14	307	0.015 ± 0.003	< 0.007
06-18-14	305	0.018 ± 0.003	< 0.004
06-25-14	308	0.010 ± 0.003	< 0.011
07-02-14	299	0.019 ± 0.003	< 0.006
2nd Quarter Mean ± s.d.		0.018 ± 0.005	< 0.007

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
07-09-14	293	0.013 ± 0.003	< 0.014
07-16-14	300	0.013 ± 0.003	< 0.010
07-23-14	308	0.032 ± 0.004	< 0.009
07-30-14	295	0.016 ± 0.003	< 0.009
08-06-14	286	0.024 ± 0.004	< 0.013
08-13-14	300	0.020 ± 0.003	< 0.009
08-20-14	300	0.018 ± 0.003	< 0.012
08-27-14	306	0.021 ± 0.003	< 0.010
09-03-14	301	0.022 ± 0.003	< 0.008
09-09-14	277	0.027 ± 0.004	< 0.011
09-17-14	310	0.019 ± 0.003	< 0.010
09-24-14	301	0.023 ± 0.004	< 0.009
10-01-14	303	0.031 ± 0.004	< 0.009
3rd Quarter Mean ± s.d.		0.021 ± 0.006	< 0.010
10-08-14	305	0.017 ± 0.003	< 0.011
10-15-14	197	0.022 ± 0.004	< 0.011
10-23-14	351	0.012 ± 0.003	< 0.010
10-29-14	255	0.024 ± 0.004	< 0.008
11-05-14	307	0.017 ± 0.003	< 0.013
11-13-14	344	0.015 ± 0.003	< 0.009
11-20-14	327	0.025 ± 0.003	< 0.007
11-26-14	251	0.028 ± 0.004	< 0.016
12-03-14	287	0.036 ± 0.004	< 0.009
12-10-14	303	0.036 ± 0.004	< 0.010
12-17-14	298	0.029 ± 0.004	< 0.009
12-23-14	253	0.025 ± 0.004	< 0.009
12-30-14	316	0.025 ± 0.003	< 0.011
4th Quarter Mean ± s.d.		0.024 ± 0.007	< 0.010
Cumulative Average		0.022 ± 0.007	< 0.009
Indicator Locations Annual Mean ± s.d.		**0.022 ± 0.007**	**< 0.009**

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
Required LLD		0.010	0.030
01-08-14	267	0.033 ± 0.004	< 0.010
01-16-14	333	0.024 ± 0.003	< 0.006
01-22-14	274	0.025 ± 0.004	< 0.006
01-30-14	348	0.020 ± 0.003	< 0.007
02-05-14	281	0.028 ± 0.004	< 0.008
02-12-14	316	0.029 ± 0.003	< 0.010
02-19-14	280	0.032 ± 0.004	< 0.006
02-26-14	292	0.036 ± 0.004	< 0.008
03-05-14	321	0.033 ± 0.004	< 0.005
03-12-14	299	0.029 ± 0.004	< 0.008
03-19-14	298	0.017 ± 0.003	< 0.016
03-27-14	356	0.023 ± 0.003	< 0.007
04-02-14	260	0.022 ± 0.004	< 0.007
1st Quarter Mean ± s.d.		0.027 ± 0.006	< 0.008
04-09-14	288	0.026 ± 0.004	< 0.010
04-16-14	305	0.018 ± 0.003	< 0.009
04-23-14	304	0.020 ± 0.003	< 0.004
04-30-14	297	0.018 ± 0.003	< 0.006
05-07-14	297	0.010 ± 0.003	< 0.007
05-15-14	297	0.017 ± 0.003	< 0.008
05-21-14	297	0.021 ± 0.003	< 0.007
05-28-14	299	0.019 ± 0.003	< 0.008
06-04-14	302	0.015 ± 0.003	< 0.006
06-11-14	298	0.018 ± 0.003	< 0.007
06-18-14	307	0.018 ± 0.003	< 0.004
06-25-14	306	0.015 ± 0.003	< 0.011
07-02-14	299	0.021 ± 0.003	< 0.006
2nd Quarter Mean ± s.d.		0.018 ± 0.004	< 0.007

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
07-09-14	305	0.016 ± 0.003	< 0.013
07-16-14	300	0.015 ± 0.003	< 0.010
07-23-14	307	0.029 ± 0.004	< 0.009
07-30-14	296	0.022 ± 0.003	< 0.009
08-06-14	296	0.023 ± 0.004	< 0.012
08-13-14	296	0.020 ± 0.003	< 0.009
08-20-14	303	0.018 ± 0.003	< 0.012
08-27-14	314	0.025 ± 0.003	< 0.010
09-03-14	307	0.022 ± 0.003	< 0.008
09-09-14	273	0.026 ± 0.004	< 0.011
09-17-14	360	0.021 ± 0.003	< 0.009
09-24-14	304	0.024 ± 0.004	< 0.009
10-01-14	316	0.028 ± 0.003	< 0.008
3rd Quarter Mean ± s.d.		0.022 ± 0.004	< 0.010
10-08-14	303	0.018 ± 0.003	< 0.011
10-15-14	302	0.019 ± 0.003	< 0.007
10-23-14	350	0.012 ± 0.003	< 0.010
10-29-14	258	0.022 ± 0.004	< 0.008
11-05-14	306	0.020 ± 0.003	< 0.013
11-13-14	348	0.013 ± 0.003	< 0.009
11-20-14	312	0.023 ± 0.003	< 0.007
11-26-14	255	0.026 ± 0.004	< 0.016
12-03-14	308	0.033 ± 0.004	< 0.008
12-10-14	311	0.038 ± 0.004	< 0.010
12-17-14	294	0.026 ± 0.004	< 0.009
12-23-14	261	0.029 ± 0.004	< 0.009
12-30-14	316	0.025 ± 0.003	< 0.011
4th Quarter Mean ± s.d.		0.023 ± 0.008	< 0.010
Cumulative Average		0.023 ± 0.006	< 0.009
Control Annual Mean ± s.d.		0.023 ± 0.006	< 0.009

POINT BEACH NUCLEAR PLANT

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- 1768	0.069 ± 0.015	-	0.0002 ± 0.0006	< 0.0008	0.0000 ± 0.0006	< 0.0006	0.0004 ± 0.0005	< 0.0005	3836
E-02	- 1769	0.074 ± 0.014	-	-0.0005 ± 0.0006	< 0.0007	-0.0002 ± 0.0007	< 0.0006	-0.0001 ± 0.0006	< 0.0004	3612
E-03	- 1770	0.055 ± 0.013	-	0.0003 ± 0.0005	< 0.0008	-0.0002 ± 0.0007	< 0.0007	0.0005 ± 0.0006	< 0.0004	3907
E-04	- 1771	0.069 ± 0.017	-	-0.0003 ± 0.0005	< 0.0007	-0.0004 ± 0.0006	< 0.0005	-0.0003 ± 0.0006	< 0.0004	3928
E-08	- 1772	0.061 ± 0.015	-	-0.0008 ± 0.0006	< 0.0006	-0.0008 ± 0.0006	< 0.0005	0.0006 ± 0.0006	< 0.0004	3854
E-20	- 1773	0.054 ± 0.011	-	0.0000 ± 0.0003	< 0.0007	-0.0001 ± 0.0004	< 0.0004	0.0002 ± 0.0003	< 0.0003	3922
				2nd Quarter						
E-01	EAP- 3708	0.076 ± 0.017		0.0002 ± 0.0005	< 0.0009	0.0005 ± 0.0007	< 0.0011	-0.0002 ± 0.0006	< 0.0009	3937
E-02	- 3709	0.073 ± 0.015		-0.0001 ± 0.0005	< 0.0010	0.0004 ± 0.0007	< 0.0007	-0.0006 ± 0.0007	< 0.0007	3603
E-03	- 3710	0.075 ± 0.015		0.0001 ± 0.0005	< 0.0008	0.0014 ± 0.0007	< 0.0010	0.0006 ± 0.0004	< 0.0007	3847
E-04	- 3711	0.077 ± 0.016		-0.0002 ± 0.0004	< 0.0009	0.0001 ± 0.0005	< 0.0010	-0.0002 ± 0.0006	< 0.0007	3892
E-08	- 3712	0.067 ± 0.014		0.0001 ± 0.0005	< 0.0010	0.0003 ± 0.0005	< 0.0008	-0.0004 ± 0.0006	< 0.0008	3971
E-20	- 3713	0.073 ± 0.018		0.0000 ± 0.0005	< 0.0009	0.0004 ± 0.0007	< 0.0010	0.0001 ± 0.0004	< 0.0007	3894
				3rd Quarter						
E-01	EAP- 6006	0.079 ± 0.014		-0.0001 ± 0.0005	< 0.0009	0.0002 ± 0.0005	< 0.0008	-0.0002 ± 0.0006	< 0.0008	3953
E-02	- 6007	0.067 ± 0.015		0.0000 ± 0.0004	< 0.0008	-0.0003 ± 0.0004	< 0.0006	0.0002 ± 0.0003	< 0.0003	3978
E-03	- 6008	0.065 ± 0.012		0.0002 ± 0.0004	< 0.0007	-0.0001 ± 0.0005	< 0.0007	-0.0003 ± 0.0004	< 0.0005	3928
E-04	- 6009	0.068 ± 0.014		-0.0002 ± 0.0006	< 0.0010	0.0002 ± 0.0006	< 0.0006	-0.0001 ± 0.0007	< 0.0005	3926
E-08	- 6010	0.070 ± 0.014		-0.0006 ± 0.0005	< 0.0011	0.0004 ± 0.0005	< 0.0009	0.0003 ± 0.0006	< 0.0006	3881
E-20	- 6012	0.052 ± 0.013		-0.0002 ± 0.0004	< 0.0006	0.0000 ± 0.0005	< 0.0006	-0.0001 ± 0.0005	< 0.0008	3976
				4th Quarter						
E-01	EAP- 7460	0.039 ± 0.012		-0.0003 ± 0.0005	< 0.0008	0.0006 ± 0.0005	< 0.0008	0.0005 ± 0.0006	< 0.0008	3878
E-02	- 7461	0.049 ± 0.012		-0.0001 ± 0.0005	< 0.0010	0.0003 ± 0.0006	< 0.0010	0.0001 ± 0.0005	< 0.0008	3952
E-03	- 7462	0.047 ± 0.012		0.0003 ± 0.0005	< 0.0007	0.0002 ± 0.0005	< 0.0005	-0.0006 ± 0.0006	< 0.0007	3875
E-04	- 7463	0.053 ± 0.014		-0.0001 ± 0.0005	< 0.0008	-0.0005 ± 0.0004	< 0.0003	-0.0007 ± 0.0006	< 0.0006	3907
E-08	- 7464	0.043 ± 0.014		-0.0001 ± 0.0005	< 0.0008	-0.0002 ± 0.0006	< 0.0008	-0.0002 ± 0.0007	< 0.0006	3793
E-20	- 7465	0.042 ± 0.013		-0.0002 ± 0.0004	< 0.0007	0.0001 ± 0.0005	< 0.0003	0.0007 ± 0.0005	< 0.0006	3922
Annual Mean±s.d.		**0.062 ± 0.012**		**-0.0001 ± 0.0003**	**< 0.0008**	**0.0001 ± 0.0004**	**< 0.0007**	**0.0000 ± 0.0004**	**< 0.0006**	

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-11 Lambert Dairy Farm

Collection Date	01-08-14	MDC	02-12-14	MDC	03-12-14	MDC	Required LLD
Lab Code	EMI- 46		EMI- 506		EMI- 912		
Sr-89	0.0 ± 0.9	< 0.8	1.0 ± 1.1	< 1.0	-0.1 ± 0.6	< 0.7	5.0
Sr-90	1.3 ± 0.4	< 0.5	0.7 ± 0.4	< 0.6	0.8 ± 0.3	< 0.5	1.0
I-131	-0.01 ± 0.12	< 0.22	0.02 ± 0.15	< 0.26	-0.14 ± 0.14	< 0.27	0.5
K-40	1489 ± 101	-	1360 ± 97	-	1383 ± 94	-	
Cs-134	-0.8 ± 1.7	< 3.5	-0.1 ± 1.8	< 3.5	-2.3 ± 1.5	< 2.3	5.0
Cs-137	1.3 ± 1.9	< 3.6	-1.0 ± 2.0	< 2.2	-1.0 ± 1.6	< 2.8	5.0
Ba-La-140	-0.6 ± 1.2	< 2.5	-0.5 ± 1.7	< 2.2	-1.4 ± 1.7	< 2.1	5.0
Other (Co-60)	-0.9 ± 2.2	< 1.9	0.7 ± 2.1	< 3.4	1.0 ± 1.7	< 2.7	15.0

Collection Date	04-09-14		05-14-14		06-11-14		Required LLD
Lab Code	EMI- 1423		EMI- 2092		EMI- 2653		
Sr-89	0.5 ± 0.7	< 0.7	0.4 ± 0.9	< 0.9	-0.1 ± 0.8	< 0.7	5.0
Sr-90	0.7 ± 0.3	< 0.5	0.4 ± 0.4	< 0.8	0.7 ± 0.3	< 0.5	1.0
I-131	-0.03 ± 0.16	< 0.29	-0.02 ± 0.18	< 0.39	0.07 ± 0.12	< 0.20	0.5
K-40	1363 ± 89	-	1325 ± 100	-	1400 ± 95	-	
Cs-134	0.4 ± 1.5	< 2.9	-0.3 ± 1.6	< 2.9	-0.5 ± 1.9	< 4.0	5.0
Cs-137	1.1 ± 1.5	< 2.8	1.2 ± 2.0	< 4.0	-1.5 ± 1.8	< 2.5	5.0
Ba-La-140	0.2 ± 1.4	< 2.0	-1.2 ± 1.6	< 3.1	-1.4 ± 1.7	< 4.3	5.0
Other (Co-60)	0.8 ± 1.9	< 2.2	-0.2 ± 2.1	< 3.0	1.0 ± 1.9	< 1.8	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-11 Lambert Dairy Farm

Collection Date	07-09-14	MDC	08-13-14	MDC	09-10-14	MDC	Required LLD
Lab Code	EMI- 3251		EMI- 4159		EMI- 4750		
Sr-89	0.0 ± 0.7	< 0.8	-0.8 ± 0.9	< 0.8	0.5 ± 0.8	< 0.7	5.0
Sr-90	0.6 ± 0.3	< 0.5	1.1 ± 0.4	< 0.6	0.7 ± 0.3	< 0.5	1.0
I-131	0.11 ± 0.17	< 0.25	0.20 ± 0.20	< 0.35	-0.02 ± 0.19	< 0.41	0.5
K-40	1259 ± 96	-	1236 ± 115	-	1399 ± 108	-	
Cs-134	-1.4 ± 1.5	< 2.8	-1.8 ± 2.1	< 3.5	-1.2 ± 1.8	< 3.9	5.0
Cs-137	0.2 ± 1.8	< 2.6	-0.4 ± 2.1	< 2.1	-1.6 ± 2.2	< 3.2	5.0
Ba-La-140	-0.3 ± 1.4	< 1.4	0.6 ± 1.8	< 2.7	-1.4 ± 1.9	< 3.7	5.0
Other (Co-60)	-2.1 ± 2.2	< 2.3	-0.1 ± 2.4	< 3.0	-1.7 ± 2.5	< 2.1	15.0

Collection Date	10-08-14		11-12-14		12-10-14		Required LLD
Lab Code	EMI- 5400		EMI- 6420		EMI- 6977		
Sr-89	-0.1 ± 0.7	< 0.8	-0.3 ± 0.7	< 0.7	0.7 ± 0.8	< 0.7	5.0
Sr-90	0.5 ± 0.3	< 0.5	0.9 ± 0.3	< 0.5	0.8 ± 0.3	< 0.5	1.0
I-131	-0.02 ± 0.16	< 0.30	-0.01 ± 0.13	< 0.23	0.03 ± 0.14	< 0.24	0.5
K-40	1344 ± 77	-	1353 ± 87	-	1310 ± 86	-	
Cs-134	0.3 ± 1.4	< 2.2	-2.3 ± 1.5	< 2.6	0.7 ± 1.5	< 2.6	5.0
Cs-137	0.1 ± 1.5	< 2.4	0.4 ± 1.7	< 3.2	0.3 ± 1.7	< 2.8	5.0
Ba-La-140	1.9 ± 1.4	< 4.3	-0.1 ± 1.3	< 3.0	-1.6 ± 1.5	< 2.8	5.0
Other (Co-60)	-0.3 ± 1.6	< 2.7	0.6 ± 1.4	< 2.3	-0.7 ± 1.6	< 1.7	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-21 Strutz Dairy Farm

Collection Date	01-08-14	MDC	02-12-14	MDC	03-12-14	MDC	Required LLD
Lab Code	EMI- 47		EMI- 507		EMI- 913		
Sr-89	0.3 ± 0.6	< 0.8	0.2 ± 0.7	< 0.7	-0.5 ± 0.6	< 0.6	5.0
Sr-90	0.2 ± 0.2	< 0.5	0.8 ± 0.3	< 0.5	0.7 ± 0.3	< 0.5	1.0
I-131	-0.04 ± 0.13	< 0.23	0.16 ± 0.16	< 0.28	0.05 ± 0.15	< 0.26	0.5
K-40	1384 ± 93	-	1318 ± 91	-	1315 ± 95	-	
Cs-134	0.0 ± 1.7	< 2.8	0.4 ± 1.6	< 2.9	0.3 ± 1.4	< 2.7	5.0
Cs-137	-2.0 ± 1.7	< 2.1	0.7 ± 1.7	< 3.4	-0.4 ± 1.9	< 2.6	5.0
Ba-La-140	1.1 ± 1.4	< 1.7	-0.8 ± 1.6	< 1.8	-1.3 ± 1.5	< 1.3	5.0
Other (Co-60)	-0.1 ± 1.9	< 2.8	0.7 ± 1.6	< 2.6	0.6 ± 1.9	< 2.5	15.0

Collection Date	04-09-14		05-14-14		06-11-14		Required LLD
Lab Code	EMI- 1424		EMI- 2093		EMI- 2654		
Sr-89	0.0 ± 0.7	< 0.8	0.3 ± 0.6	< 0.7	-0.1 ± 0.7	< 0.8	5.0
Sr-90	0.2 ± 0.3	< 0.6	0.2 ± 0.3	< 0.5	0.4 ± 0.3	< 0.5	1.0
I-131	0.02 ± 0.19	< 0.34	0.11 ± 0.22	< 0.44	0.02 ± 0.12	< 0.22	0.5
K-40	1369 ± 99	-	1414 ± 112	-	1389 ± 107	-	
Cs-134	-1.0 ± 1.7	< 3.5	0.1 ± 1.7	< 3.3	1.7 ± 1.6	< 3.2	5.0
Cs-137	1.8 ± 2.1	< 4.2	1.4 ± 2.1	< 3.9	-0.4 ± 1.9	< 2.9	5.0
Ba-La-140	-1.4 ± 1.5	< 1.8	0.4 ± 1.4	< 4.1	2.2 ± 1.8	< 5.6	5.0
Other (Co-60)	-0.8 ± 2.1	< 2.7	0.3 ± 2.2	< 3.8	-1.0 ± 2.3	< 3.6	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-21 Strutz Dairy Farm

Collection Date	07-09-14	MDC	08-13-14	MDC	09-10-14	MDC	Required LLD
Lab Code	EMI- 3252		EMI- 4160		EMI- 4751		
Sr-89	-0.1 ± 0.6	< 0.8	0.1 ± 0.7	< 0.8	-0.3 ± 0.8	< 0.9	5.0
Sr-90	0.1 ± 0.3	< 0.5	0.2 ± 0.3	< 0.6	0.4 ± 0.3	< 0.7	1.0
I-131	-0.03 ± 0.16	< 0.23	-0.02 ± 0.17	< 0.32	0.09 ± 0.12	< 0.20	0.5
K-40	1347 ± 100	-	1401 ± 108	-	1406 ± 109	-	
Cs-134	0.7 ± 1.7	< 3.3	-1.0 ± 1.9	< 3.4	0.6 ± 1.9	< 3.5	5.0
Cs-137	-0.8 ± 1.9	< 2.2	0.2 ± 2.0	< 2.9	-0.6 ± 2.1	< 4.1	5.0
Ba-La-140	-0.6 ± 1.7	< 2.1	5.3 ± 1.6	< 4.5	-0.7 ± 1.6	< 3.8	5.0
Other (Co-60)	0.1 ± 2.0	< 3.5	1.7 ± 2.1	< 2.8	0.1 ± 1.8	< 3.3	15.0

Collection Date	10-08-14		11-12-14		12-10-14		Required LLD
Lab Code	EMI- 5401		EMI- 6421		EMI- 6978		
Sr-89	-0.8 ± 0.8	< 0.9	0.4 ± 0.6	< 0.6	-0.1 ± 0.7	< 0.8	5.0
Sr-90	0.8 ± 0.3	< 0.5	0.2 ± 0.2	< 0.4	0.5 ± 0.3	< 0.5	1.0
I-131	-0.04 ± 0.22	< 0.40	0.15 ± 0.20	< 0.37	-0.02 ± 0.11	< 0.20	0.5
K-40	1408 ± 79	-	1327 ± 90	-	1394 ± 90	-	
Cs-134	0.2 ± 1.4	< 2.3	-2.2 ± 1.6	< 2.7	-0.5 ± 1.5	< 2.4	5.0
Cs-137	1.0 ± 1.6	< 3.3	2.4 ± 1.9	< 3.3	0.4 ± 1.6	< 2.2	5.0
Ba-La-140	-0.2 ± 1.4	< 3.2	-0.3 ± 1.5	< 2.6	-0.2 ± 1.3	< 2.2	5.0
Other (Co-60)	-1.3 ± 1.6	< 1.6	1.7 ± 1.6	< 2.6	-0.7 ± 1.4	< 1.3	15.0

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Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-40 Barta

Collection Date	01-08-14	MDC	02-12-14	MDC	03-12-14	MDC	Required LLD
Lab Code	EMI- 48		EMI- 508		EMI- 914		
Sr-89	0.4 ± 0.7	< 0.8	-0.1 ± 0.6	< 0.6	0.5 ± 0.5	< 0.6	5.0
Sr-90	0.4 ± 0.3	< 0.5	0.7 ± 0.3	< 0.4	0.2 ± 0.2	< 0.4	1.0
I-131	0.02 ± 0.13	< 0.23	0.10 ± 0.15	< 0.26	-0.06 ± 0.14	< 0.26	0.5
K-40	1433 ± 92	-	1380 ± 89	-	1526 ± 99	-	
Cs-134	-1.0 ± 1.7	< 2.7	0.2 ± 1.5	< 2.7	-1.5 ± 1.6	< 2.9	5.0
Cs-137	0.3 ± 1.9	< 3.3	1.5 ± 1.7	< 2.5	-0.6 ± 1.8	< 1.8	5.0
Ba-La-140	0.2 ± 1.5	< 2.3	0.5 ± 1.5	< 2.3	0.5 ± 2.0	< 3.8	5.0
Other (Co-60)	0.1 ± 1.9	< 3.2	0.3 ± 1.7	< 2.2	1.1 ± 1.8	< 2.8	15.0
Collection Date	04-09-14		05-14-14		06-11-14		Required LLD
Lab Code	EMI- 1425		EMI- 2094		EMI- 2655		
Sr-89	0.1 ± 0.7	< 0.8	0.4 ± 0.6	< 0.6	0.1 ± 0.6	< 0.7	5.0
Sr-90	0.3 ± 0.3	< 0.5	0.2 ± 0.3	< 0.5	0.2 ± 0.3	< 0.5	1.0
I-131	-0.09 ± 0.22	< 0.40	-0.09 ± 0.18	< 0.42	-0.01 ± 0.11	< 0.20	0.5
K-40	1399 ± 94	-	1341 ± 107	-	1363 ± 88	-	
Cs-134	0.7 ± 1.5	< 2.9	-0.1 ± 1.9	< 3.5	1.5 ± 1.4	< 2.8	5.0
Cs-137	1.6 ± 1.8	< 3.0	1.7 ± 2.0	< 3.4	0.8 ± 1.6	< 2.8	5.0
Ba-La-140	1.9 ± 1.4	< 1.4	1.1 ± 1.2	< 3.3	2.7 ± 1.2	< 3.3	5.0
Other (Co-60)	0.1 ± 2.1	< 3.3	1.2 ± 2.2	< 3.2	0.6 ± 1.7	< 3.0	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-40 Barta

Collection Date	07-09-14	MDC	08-13-14	MDC	09-10-14	MDC	Required LLD
Lab Code	EMI- 3253		EMI- 4161		EMI- 4752		
Sr-89	-0.4 ± 0.5	< 0.6	-0.4 ± 0.6	< 0.6	-0.6 ± 0.6	< 0.7	5.0
Sr-90	0.4 ± 0.2	< 0.4	0.4 ± 0.3	< 0.5	0.4 ± 0.3	< 0.5	1.0
I-131	0.13 ± 0.18	< 0.26	0.07 ± 0.21	< 0.42	0.11 ± 0.11	< 0.20	0.5
K-40	1344 ± 109	-	1338 ± 111		1307 ± 110	-	
Cs-134	1.2 ± 1.8	< 3.3	0.1 ± 1.8	< 3.3	-0.6 ± 1.7	< 3.4	5.0
Cs-137	-1.4 ± 2.2	< 2.5	2.0 ± 2.2	< 4.5	0.9 ± 2.2	< 2.8	5.0
Ba-La-140	0.8 ± 1.3	< 2.0	-1.3 ± 1.6	< 4.2	-1.5 ± 2.0	< 2.8	5.0
Other (Co-60)	-1.0 ± 2.4	< 3.4	0.9 ± 2.1	< 3.3	1.3 ± 2.2	< 3.9	15.0

Collection Date	10-08-14		11-12-14		12-10-14		Required LLD
Lab Code	EMI- 5403		EMI- 6422		EMI- 6979		
Sr-89	0.4 ± 0.8	< 0.7	-0.5 ± 0.6	< 0.6	-0.3 ± 0.6	< 0.7	5.0
Sr-90	0.8 ± 0.3	< 0.4	0.7 ± 0.3	< 0.4	0.4 ± 0.3	< 0.4	1.0
I-131	-0.07 ± 0.16	< 0.30	0.06 ± 0.11	< 0.20	0.03 ± 0.11	< 0.20	0.5
K-40	1397 ± 91	-	1415 ± 95	-	1394 ± 94	-	
Cs-134	-0.1 ± 1.6	< 3.4	0.0 ± 1.6	< 3.1	-0.7 ± 1.5	< 2.2	5.0
Cs-137	-1.1 ± 1.8	< 3.4	1.1 ± 2.0	< 3.5	0.8 ± 1.6	< 2.8	5.0
Ba-La-140	-2.4 ± 1.7	< 2.8	-0.4 ± 1.6	< 3.3	-1.9 ± 1.4	< 1.8	5.0
Other (Co-60)	-0.4 ± 1.8	< 1.8	-0.5 ± 1.9	< 1.7	-1.3 ± 1.7	< 1.6	15.0

Sr-89 Annual Mean + s.d.	**0.0 ± 0.4**
Sr-90 Annual Mean + s.d.	**0.5 ± 0.3**
I-131 Annual Mean + s.d.	**0.02 ± 0.08**
K-40 Annual Mean + s.d.	**1370 ± 55**
Cs-134 Annual Mean + s.d.	**-0.3 ± 1.0**
Cs-137 Annual Mean + s.d.	**0.3 ± 1.1**
Ba-La Annual Mean + s.d.	**-0.1 ± 1.5**
Co-60 Annual Mean + s.d.	**0.0 ± 1.0**

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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	01-09-14	04-16-14	07-10-14	10-15-14		
Lab Code	EWW- 79	EWW- 1524	EWW- 3293	EWW- 5688		
Gross Beta	1.9 ± 0.7	0.7 ± 1.0	1.2 ± 0.7	1.1 ± 0.6	4.0	**1.2**
H-3	-88.5 ± 89.2	-48.4 ± 73.2	-18.5 ± 69.9	-85.9 ± 78.1	500	**-60.3**
Sr-89	-0.2 ± 0.4	0.1 ± 0.5	0.1 ± 0.4	0.2 ± 0.4	5.0	**0.1**
Sr-90	0.2 ± 0.2	-0.1 ± 0.3	-0.1 ± 0.2	0.0 ± 0.2	1.0	**0.0**
I-131	0.00 ± 0.13	-0.01 ± 0.17	0.04 ± 0.14	0.03 ± 0.16	0.5	**0.02**
Mn-54	3.4 ± 3.1	0.0 ± 1.9	0.6 ± 1.2	1.4 ± 1.3	10	**1.3**
Fe-59	-2.0 ± 5.6	2.4 ± 3.0	-2.8 ± 2.5	-0.3 ± 2.3	30	**-0.7**
Co-58	-3.1 ± 3.0	1.8 ± 1.8	1.1 ± 1.5	0.3 ± 1.2	10	**0.0**
Co-60	-0.4 ± 3.4	-0.7 ± 2.1	0.2 ± 1.3	1.0 ± 1.2	10	**0.0**
Zn-65	-10.9 ± 9.4	-0.1 ± 2.7	-0.4 ± 3.0	3.5 ± 2.5	30	**-1.9**
Zr-Nb-95	0.2 ± 3.3	-4.0 ± 2.0	-0.5 ± 1.4	-0.1 ± 1.3	15	**-1.1**
Cs-134	-2.7 ± 3.0	-2.1 ± 2.0	-0.7 ± 1.5	-0.6 ± 1.5	10	**-1.5**
Cs-137	0.5 ± 3.6	0.1 ± 2.0	-0.4 ± 1.5	-1.0 ± 1.6	10	**-0.2**
Ba-La-140	0.4 ± 4.0	-2.8 ± 2.7	0.2 ± 1.7	-2.5 ± 1.7	15	**-1.2**
Other (Ru-103)	1.1 ± 3.0	0.1 ± 1.6	-1.4 ± 1.3	-2.0 ± 1.3	30	**-0.5**

MDC Data

Collection Date	01-09-14	04-16-14	07-10-14	10-15-14		
Lab Code	EWW- 79	EWW- 1524	EWW- 3293	EWW- 5688		
Gross Beta	< 1.0	< 1.9	< 0.9	< 0.8	4.0	**< 1.2**
H-3	< 153.0	< 144.2	< 143.2	< 157.6	500	**< 149.5**
Sr-89	< 0.4	< 0.6	< 0.5	< 0.5	5.0	**< 0.5**
Sr-90	< 0.4	< 0.6	< 0.4	< 0.4	1.0	**< 0.5**
I-131	< 0.24	< 0.31	< 0.20	< 0.29	0.5	**< 0.26**
Mn-54	< 5.8	< 2.0	< 2.1	< 2.6	10	**< 3.1**
Fe-59	< 7.4	< 5.9	< 1.3	< 4.4	30	**< 4.8**
Co-58	< 2.5	< 3.2	< 3.3	< 1.7	10	**< 2.7**
Co-60	< 5.6	< 1.9	< 1.8	< 1.1	10	**< 2.6**
Zn-65	< 12.8	< 5.0	< 4.4	< 4.0	30	**< 6.5**
Zr-Nb-95	< 5.5	< 2.4	< 3.7	< 2.4	15	**< 3.5**
Cs-134	< 6.2	< 3.2	< 2.3	< 2.8	10	**< 3.6**
Cs-137	< 5.7	< 3.5	< 2.2	< 2.3	10	**< 3.4**
Ba-La-140	< 6.4	< 4.4	< 2.7	< 3.7	15	**< 4.3**
Other (Ru-103)	< 5.1	< 3.0	< 1.9	< 2.5	30	**< 3.1**

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	NS[a]		ELW- 517		ELW- 1064		ELW- 1542		
Date Collected	01-13-14		02-13-14		03-19-14		04-16-14		Req. LLD
Gross beta	-		1.2 ± 0.3	< 0.4	4.0 ± 0.6	< 0.7	1.2 ± 0.6	< 0.7	4.0
I-131	-		-0.03 ± 0.15	< 0.28	0.07 ± 0.15	< 0.27	-0.08 ± 0.16	< 0.30	0.5
Be-7	-		5.7 ± 15.8	< 29.3	2.3 ± 12.6	< 25.2	9.9 ± 11.8	< 20.9	
Mn-54	-		0.5 ± 1.4	< 1.8	0.6 ± 1.6	< 2.3	-0.7 ± 1.3	< 2.2	10
Fe-59	-		-0.8 ± 3.0	< 4.5	1.6 ± 2.5	< 3.9	-2.1 ± 2.5	< 2.2	30
Co-58	-		-1.1 ± 1.6	< 1.5	0.7 ± 1.5	< 2.4	0.1 ± 1.1	< 1.0	10
Co-60	-		-0.3 ± 1.6	< 2.1	0.7 ± 1.3	< 1.6	0.3 ± 1.3	< 2.1	10
Zn-65	-		-1.0 ± 3.2	< 3.1	2.6 ± 2.7	< 4.0	-0.2 ± 2.2	< 2.6	30
Zr-Nb-95	-		-0.1 ± 1.7	< 3.1	0.5 ± 1.9	< 3.7	0.9 ± 1.4	< 2.4	15
Cs-134	-		0.3 ± 1.7	< 3.4	-1.9 ± 1.7	< 2.8	-0.3 ± 1.3	< 2.3	10
Cs-137	-		-1.0 ± 1.9	< 1.8	1.2 ± 1.9	< 2.6	0.1 ± 1.5	< 2.0	10
Ba-La-140	-		-0.3 ± 1.5	< 3.0	-0.4 ± 2.0	< 4.2	-1.5 ± 1.6	< 3.0	15
Other (Ru-103)	-		0.4 ± 1.9	< 3.3	0.6 ± 1.6	< 2.9	0.0 ± 1.3	< 2.9	30
Lab Code	ELW- 2111		ELW- 2684		ELW- 3289		ELW- 4251		
Date Collected	05-14-14		06-12-14		07-10-14		08-14-14		Req. LLD
Gross beta	3.0 ± 0.8	< 1.2	0.9 ± 0.5	< 0.9	1.4 ± 0.6	< 0.9	1.2 ± 0.5	< 0.9	4.0
I-131	0.01 ± 0.16	< 0.29	-0.01 ± 0.23	< 0.50	0.09 ± 0.16	< 0.24	-0.03 ± 0.20	< 0.40	0.5
Be-7	-2.8 ± 17.3	< 31.9	2.3 ± 10.8	< 22.8	3.5 ± 11.7	< 23.8	0.8 ± 19.9	< 41.2	
Mn-54	-1.6 ± 1.7	< 2.8	-0.6 ± 1.3	< 2.1	-1.2 ± 1.3	< 1.1	-0.6 ± 2.2	< 3.0	10
Fe-59	1.4 ± 3.4	< 6.5	-2.8 ± 2.4	< 3.3	0.7 ± 2.3	< 4.0	-2.6 ± 4.2	< 4.6	30
Co-58	0.2 ± 1.6	< 2.7	0.8 ± 1.3	< 2.3	0.1 ± 1.3	< 1.5	1.4 ± 2.3	< 3.8	10
Co-60	0.3 ± 1.5	< 2.3	1.0 ± 1.1	< 2.3	-0.6 ± 1.8	< 2.6	-0.8 ± 2.0	< 1.3	10
Zn-65	-0.2 ± 2.5	< 1.7	-0.1 ± 2.5	< 3.6	-1.4 ± 2.5	< 2.9	-4.0 ± 6.0	< 5.1	30
Zr-Nb-95	-0.6 ± 1.6	< 2.4	-1.1 ± 1.3	< 2.3	-0.4 ± 1.5	< 2.5	-2.7 ± 2.3	< 2.5	15
Cs-134	0.8 ± 1.6	< 3.2	0.2 ± 1.2	< 2.5	-0.8 ± 1.4	< 2.7	-1.6 ± 2.2	< 4.6	10
Cs-137	0.3 ± 1.9	< 2.7	0.6 ± 1.5	< 2.7	-2.2 ± 1.8	< 1.7	0.5 ± 2.2	< 3.4	10
Ba-La-140	-0.8 ± 1.4	< 2.2	-0.3 ± 1.4	< 2.4	-2.1 ± 2.0	< 3.4	-2.3 ± 2.8	< 1.8	15
Other (Ru-103)	1.1 ± 2.1	< 4.5	-0.4 ± 1.1	< 2.5	-1.2 ± 1.2	< 2.1	0.0 ± 2.3	< 3.6	30
Lab Code	ELW- 4902		ELW- 6128		ELW- 6427		ELW- 7073		
Date Collected	09-17-14		10-26-14		11-12-14		12-17-14		Req. LLD
Gross beta	2.6 ± 0.6	< 0.7	1.7 ± 0.8	< 1.3	1.0 ± 0.5	< 0.9	2.6 ± 1.1	< 1.9	4.0
I-131	0.00 ± 0.19	< 0.38	0.04 ± 0.18	< 0.32	-0.07 ± 0.16	< 0.29	0.05 ± 0.12	< 0.17	0.5
Be-7	9.7 ± 15.3	< 31.0	25.8 ± 16.6	< 33.7	-9.9 ± 13.8	< 19.6	3.2 ± 14.7	< 27.8	
Mn-54	0.5 ± 1.6	< 2.3	-0.7 ± 1.6	< 2.1	0.4 ± 1.4	< 2.1	-0.2 ± 1.4	< 2.2	10
Fe-59	0.7 ± 2.7	< 3.5	3.4 ± 2.5	< 5.0	1.0 ± 2.6	< 5.3	0.6 ± 3.1	< 5.3	30
Co-58	-1.5 ± 1.5	< 1.3	0.2 ± 1.4	< 2.4	0.0 ± 1.6	< 2.6	0.1 ± 1.5	< 2.1	10
Co-60	-0.9 ± 1.6	< 1.5	1.1 ± 1.5	< 2.7	0.5 ± 1.5	< 2.3	-0.8 ± 1.5	< 2.3	10
Zn-65	-2.8 ± 3.6	< 3.3	-5.0 ± 4.1	< 2.9	-1.9 ± 3.0	< 3.5	-2.0 ± 3.2	< 3.6	30
Zr-Nb-95	-0.4 ± 1.6	< 2.3	-1.0 ± 1.5	< 2.9	-2.3 ± 1.8	< 3.3	-0.2 ± 1.7	< 3.5	15
Cs-134	0.3 ± 1.8	< 3.9	1.1 ± 1.6	< 3.4	-0.5 ± 1.7	< 2.9	-1.0 ± 1.5	< 2.9	10
Cs-137	-0.8 ± 1.9	< 2.7	0.8 ± 1.6	< 2.6	0.0 ± 1.8	< 3.2	-0.4 ± 1.6	< 2.6	10
Ba-La-140	-0.4 ± 1.6	< 1.6	3.4 ± 1.7	< 3.1	-6.3 ± 2.1	< 2.6	-0.2 ± 1.6	< 1.6	15
Other (Ru-103)	-0.3 ± 2.0	< 3.5	0.8 ± 1.9	< 3.4	-0.8 ± 1.3	< 2.8	-1.6 ± 1.9	< 4.0	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-05 (Two Creeks Park)
Collection: Monthly composites Units: pCi/L

		MDC		MDC		MDC		MDC	
Lab Code	NS[a]		ELW- 518		ELW- 1065		ELW- 1543		
Date Collected	01-13-14		02-13-14		03-19-14		04-17-14		Req. LLD
Gross beta	-		1.9 ± 0.3	< 0.4	1.7 ± 0.4	< 0.6	1.7 ± 0.5	< 0.7	4.0
I-131	-		-0.04 ± 0.22	< 0.46	0.03 ± 0.14	< 0.25	0.14 ± 0.22	< 0.41	0.5
Be-7	-		-3.9 ± 18.6	< 21.5	9.5 ± 10.0	< 21.5	16.0 ± 12.7	< 27.5	
Mn-54	-		-2.8 ± 1.7	< 2.0	0.4 ± 1.3	< 2.2	-0.5 ± 1.3	< 1.3	10
Fe-59	-		-1.1 ± 3.5	< 5.9	-1.8 ± 2.1	< 2.6	0.7 ± 2.7	< 4.8	30
Co-58	-		-2.0 ± 1.5	< 1.3	1.1 ± 1.2	< 2.2	0.1 ± 1.3	< 1.7	10
Co-60	-		1.1 ± 2.1	< 3.3	0.1 ± 1.3	< 1.9	-0.4 ± 1.5	< 1.5	10
Zn-65	-		-4.3 ± 4.8	< 5.1	-0.9 ± 2.6	< 3.2	0.2 ± 2.8	< 2.4	30
Zr-Nb-95	-		0.8 ± 1.8	< 4.3	-1.2 ± 1.3	< 1.9	-0.8 ± 1.6	< 2.1	15
Cs-134	-		0.9 ± 1.7	< 3.7	-0.1 ± 1.3	< 2.2	-0.7 ± 1.5	< 2.5	10
Cs-137	-		-0.6 ± 2.0	< 3.4	-1.4 ± 1.4	< 1.7	-0.8 ± 1.6	< 2.3	10
Ba-La-140	-		0.3 ± 1.8	< 3.8	-0.6 ± 1.5	< 3.0	-0.9 ± 1.6	< 2.3	15
Other (Ru-103)	-		0.6 ± 2.1	< 3.5	-0.8 ± 1.2	< 2.2	-0.3 ± 1.4	< 2.7	30
Lab Code	ELW- 2112		ELW- 2685		ELW- 3290		ELW- 4252		
Date Collected	05-14-14		06-12-14		07-10-14		08-14-14		Req. LLD
Gross beta	2.7 ± 0.8	< 1.3	1.4 ± 0.6	< 0.9	1.0 ± 0.5	< 0.9	1.1 ± 0.5	< 0.9	4.0
I-131	-0.03 ± 0.17	< 0.30	0.12 ± 0.16	< 0.28	0.17 ± 0.22	< 0.43	0.06 ± 0.17	< 0.30	0.5
Be-7	4.8 ± 13.0	< 17.4	-1.8 ± 9.7	< 20.9	-1.5 ± 10.8	< 20.6	4.4 ± 12.6	< 24.5	
Mn-54	-0.8 ± 1.5	< 2.5	0.1 ± 1.4	< 1.4	-0.2 ± 1.3	< 1.7	-0.8 ± 1.8	< 2.7	10
Fe-59	-3.4 ± 3.0	< 2.4	-1.2 ± 2.6	< 2.6	-0.3 ± 2.5	< 3.0	0.6 ± 2.9	< 3.1	30
Co-58	0.6 ± 1.7	< 3.1	-0.4 ± 1.2	< 1.8	-0.1 ± 1.2	< 1.6	0.5 ± 1.6	< 2.4	10
Co-60	0.9 ± 1.5	< 2.0	0.7 ± 1.3	< 2.5	-1.6 ± 1.6	< 1.5	-1.5 ± 1.9	< 2.3	10
Zn-65	1.6 ± 2.4	< 2.8	0.7 ± 2.7	< 3.8	-2.0 ± 2.5	< 2.9	1.9 ± 3.1	< 4.9	30
Zr-Nb-95	-2.1 ± 1.7	< 2.1	-0.8 ± 1.2	< 1.3	0.2 ± 1.5	< 2.4	0.1 ± 1.8	< 4.1	15
Cs-134	0.2 ± 1.4	< 2.5	-0.4 ± 1.3	< 2.4	0.2 ± 1.4	< 2.5	0.9 ± 1.6	< 2.6	10
Cs-137	0.4 ± 2.1	< 2.7	-0.7 ± 1.4	< 2.6	0.6 ± 1.7	< 2.5	-0.4 ± 1.7	< 1.9	10
Ba-La-140	-1.1 ± 1.7	< 2.0	-0.5 ± 1.3	< 2.4	-0.4 ± 1.5	< 2.9	0.5 ± 1.7	< 5.0	15
Other (Ru-103)	0.7 ± 1.6	< 3.6	0.1 ± 1.3	< 2.5	-1.1 ± 1.4	< 1.9	-1.0 ± 1.5	< 2.4	30
Lab Code	ELW- 4903		ELW- 6129		ELW- 6428		ELW- 7074		
Date Collected	09-17-14		10-26-14		11-12-14		12-17-14		Req. LLD
Gross beta	1.7 ± 0.6	< 0.8	3.0 ± 0.7	< 1.1	1.5 ± 0.5	< 0.8	2.6 ± 1.0	< 1.6	4.0
I-131	0.08 ± 0.14	< 0.24	-0.08 ± 0.18	< 0.33	-0.01 ± 0.16	< 0.28	0.04 ± 0.12	< 0.18	0.5
Be-7	-3.9 ± 17.9	< 28.8	-10.9 ± 11.4	< 19.6	-2.4 ± 9.5	< 18.6	7.9 ± 11.4	< 23.7	
Mn-54	-1.8 ± 1.7	< 1.2	0.0 ± 1.5	< 2.6	1.0 ± 1.1	< 2.2	0.7 ± 1.4	< 2.4	10
Fe-59	0.9 ± 3.1	< 3.7	1.2 ± 2.6	< 5.3	1.8 ± 2.4	< 5.6	-0.3 ± 2.6	< 2.8	30
Co-58	-0.5 ± 1.6	< 1.6	-0.3 ± 1.5	< 3.0	0.2 ± 1.1	< 1.9	0.1 ± 1.2	< 1.6	10
Co-60	0.6 ± 1.8	< 1.8	1.1 ± 1.1	< 1.4	1.0 ± 1.4	< 2.0	-0.3 ± 1.3	< 0.8	10
Zn-65	2.7 ± 3.4	< 4.7	-2.8 ± 3.4	< 3.4	-0.9 ± 2.5	< 2.9	-3.5 ± 3.2	< 1.4	30
Zr-Nb-95	0.8 ± 1.8	< 3.7	0.5 ± 1.5	< 3.5	-0.6 ± 1.2	< 2.2	0.2 ± 1.3	< 2.3	15
Cs-134	-0.7 ± 1.7	< 3.5	0.5 ± 1.3	< 2.5	0.6 ± 1.2	< 2.4	-1.5 ± 1.5	< 2.7	10
Cs-137	-0.8 ± 1.8	< 2.1	-0.6 ± 1.6	< 2.6	0.7 ± 1.6	< 3.0	-0.8 ± 1.7	< 1.8	10
Ba-La-140	-0.3 ± 2.5	< 3.1	-0.5 ± 1.4	< 3.3	-0.1 ± 1.4	< 3.1	0.6 ± 1.3	< 2.4	15
Other (Ru-103)	0.9 ± 2.1	< 3.5	0.4 ± 1.4	< 3.1	0.0 ± 1.2	< 2.9	0.0 ± 1.3	< 2.8	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-06 (Coast Guard Station)
Collection: Monthly composites Units: pCi/L

		MDC		MDC		MDC		MDC	
Lab Code	NS[a]		NS[a]		NS[a]		ELW- 1544		
Date Collected	01-13-14		02-13-14		03-19-14		04-17-14		Req. LLD
Gross beta	-		-		-		1.5 ± 0.6	< 0.8	4.0
I-131	-		-		-		-0.01 ± 0.14	< 0.26	0.5
Be-7	-		-		-		-1.2 ± 15.3	< 18.2	
Mn-54	-		-		-		-1.3 ± 1.7	< 2.5	10
Fe-59	-		-		-		-3.3 ± 3.0	< 3.0	30
Co-58	-		-		-		-2.4 ± 1.8	< 1.6	10
Co-60	-		-		-		-0.8 ± 1.7	< 1.9	10
Zn-65	-		-		-		-3.1 ± 3.4	< 2.7	30
Zr-Nb-95	-		-		-		-1.7 ± 2.0	< 2.4	15
Cs-134	-		-		-		1.0 ± 1.7	< 3.4	10
Cs-137	-		-		-		0.5 ± 2.2	< 3.4	10
Ba-La-140	-		-		-		-2.5 ± 1.9	< 3.0	15
Other (Ru-103)	-		-		-		-0.1 ± 2.1	< 4.4	30
Lab Code	ELW- 2113		ELW- 2686		ELW- 3291		ELW- 4253		
Date Collected	05-14-14		06-12-14		07-10-14		08-14-14		Req. LLD
Gross beta	2.3 ± 0.7	< 1.1	1.4 ± 0.6	< 0.8	0.5 ± 0.5	< 0.9	1.0 ± 0.5	< 0.9	4.0
I-131	0.14 ± 0.18	< 0.31	0.00 ± 0.18	< 0.33	0.08 ± 0.13	< 0.19	0.12 ± 0.18	< 0.32	0.5
Be-7	0.9 ± 11.7	< 24.3	-4.2 ± 17.0	< 36.1	-3.9 ± 11.6	< 16.1	-4.8 ± 12.1	< 25.7	
Mn-54	0.5 ± 1.7	< 2.7	1.3 ± 1.6	< 2.8	0.1 ± 1.2	< 2.0	0.4 ± 1.3	< 2.2	10
Fe-59	-0.7 ± 2.8	< 4.3	-1.0 ± 4.0	< 3.6	1.1 ± 3.0	< 6.8	-0.2 ± 2.7	< 2.7	30
Co-58	0.9 ± 1.5	< 2.6	-0.5 ± 1.9	< 2.4	-0.3 ± 1.2	< 1.7	-0.6 ± 1.6	< 2.5	10
Co-60	0.7 ± 1.8	< 2.5	0.1 ± 1.8	< 2.0	-0.6 ± 1.8	< 2.9	0.4 ± 1.4	< 1.7	10
Zn-65	0.4 ± 2.8	< 4.5	-1.4 ± 4.4	< 5.2	-0.2 ± 2.6	< 1.9	-0.3 ± 3.5	< 5.9	30
Zr-Nb-95	-0.9 ± 1.5	< 3.0	1.4 ± 1.8	< 3.5	-1.8 ± 1.4	< 2.5	-1.0 ± 1.7	< 2.8	15
Cs-134	-0.4 ± 1.4	< 2.7	-0.5 ± 2.1	< 4.7	-1.3 ± 1.5	< 2.8	0.4 ± 1.6	< 2.6	10
Cs-137	-0.7 ± 1.8	< 2.1	0.9 ± 1.9	< 3.2	-0.1 ± 1.5	< 2.0	0.6 ± 1.9	< 3.5	10
Ba-La-140	-1.1 ± 1.8	< 4.0	2.4 ± 2.3	< 3.8	-2.8 ± 1.5	< 3.2	-1.2 ± 2.2	< 2.7	15
Other (Ru-103)	-0.6 ± 1.4	< 2.0	2.4 ± 2.1	< 4.5	0.0 ± 1.4	< 3.6	1.9 ± 1.5	< 3.4	30
Lab Code	ELW- 4904		ELW- 6130		ELW- 6429		ELW- 7075		
Date Collected	09-17-14		10-26-14		11-12-14		12-17-14		Req. LLD
Gross beta	2.1 ± 0.5	< 0.7	2.6 ± 0.7	< 1.2	1.2 ± 0.5	< 0.9	3.0 ± 1.1	< 1.8	4.0
I-131	-0.11 ± 0.16	< 0.31	0.08 ± 0.18	< 0.31	0.00 ± 0.17	< 0.31	0.11 ± 0.14	< 0.20	0.5
Be-7	-7.3 ± 20.8	< 35.8	-0.4 ± 11.0	< 31.9	6.6 ± 9.1	< 24.8	-6.8 ± 21.8	< 23.1	
Mn-54	1.1 ± 2.1	< 3.6	0.9 ± 1.3	< 2.7	1.2 ± 1.0	< 2.0	0.9 ± 2.4	< 4.3	10
Fe-59	-0.9 ± 3.5	< 3.2	1.4 ± 2.6	< 4.8	2.2 ± 2.0	< 5.4	-2.5 ± 5.7	< 4.9	30
Co-58	1.0 ± 2.1	< 2.9	-0.5 ± 1.3	< 1.4	1.6 ± 1.0	< 2.1	-0.4 ± 2.7	< 3.6	10
Co-60	-1.4 ± 2.3	< 1.5	1.4 ± 1.6	< 2.0	-0.7 ± 1.1	< 1.4	-2.2 ± 2.9	< 5.1	10
Zn-65	-5.1 ± 4.5	< 3.5	1.5 ± 2.2	< 3.1	-1.6 ± 2.0	< 3.5	3.1 ± 5.2	< 4.5	30
Zr-Nb-95	-0.6 ± 2.1	< 3.1	-1.9 ± 1.5	< 2.5	-0.7 ± 1.2	< 3.3	-1.6 ± 2.8	< 5.1	15
Cs-134	-1.0 ± 2.2	< 4.4	-1.4 ± 1.5	< 2.3	-0.7 ± 1.1	< 1.8	-0.9 ± 2.5	< 4.8	10
Cs-137	1.2 ± 2.6	< 4.6	0.0 ± 1.6	< 2.7	0.8 ± 1.3	< 2.3	-0.3 ± 3.2	< 3.4	10
Ba-La-140	-0.4 ± 2.3	< 2.1	-0.6 ± 1.9	< 5.2	-0.3 ± 1.0	< 5.0	3.6 ± 2.5	< 6.8	15
Other (Ru-103)	-1.7 ± 2.3	< 2.6	0.7 ± 1.2	< 3.1	1.2 ± 1.0	< 2.9	-1.6 ± 2.4	< 4.7	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

		MDC		MDC		MDC		MDC	
Lab Code	NS[a]		ELW- 519		ELW- 1066		ELW- 1545		
Date Collected	01-13-14		02-13-14		03-19-14		04-17-14		Req. LLD
Gross beta	-		0.8 ± 0.3	< 0.4	1.3 ± 0.4	< 0.6	1.0 ± 0.6	< 0.8	4.0
I-131	-		0.17 ± 0.19	< 0.33	0.07 ± 0.14	< 0.24	0.10 ± 0.14	< 0.24	0.5
Be-7	-		-6.8 ± 13.6	< 27.8	-5.8 ± 10.7	< 19.2	-6.1 ± 12.3	< 29.8	
Mn-54	-		0.5 ± 1.5	< 2.1	-0.9 ± 1.3	< 1.6	0.1 ± 1.4	< 1.8	10
Fe-59	-		0.5 ± 2.7	< 3.2	0.6 ± 2.2	< 4.1	-0.7 ± 2.8	< 3.7	30
Co-58	-		-0.1 ± 1.6	< 2.2	-1.0 ± 1.3	< 1.7	-1.4 ± 1.4	< 1.4	10
Co-60	-		-1.1 ± 2.0	< 1.4	1.0 ± 1.1	< 1.7	0.2 ± 1.6	< 2.6	10
Zn-65	-		0.6 ± 3.6	< 6.2	-2.6 ± 2.7	< 4.3	-1.3 ± 3.1	< 2.5	30
Zr-Nb-95	-		-1.3 ± 1.9	< 3.8	1.5 ± 1.3	< 2.9	-0.1 ± 1.5	< 2.8	15
Cs-134	-		-0.1 ± 1.7	< 3.4	-1.5 ± 1.4	< 2.4	0.5 ± 1.6	< 2.8	10
Cs-137	-		0.9 ± 1.8	< 2.9	0.3 ± 1.7	< 3.2	1.4 ± 1.7	< 2.5	10
Ba-La-140	-		2.1 ± 2.1	< 4.3	-0.8 ± 1.4	< 2.8	2.4 ± 1.7	< 4.4	15
Other (Ru-103)	-		-1.2 ± 1.5	< 2.7	0.8 ± 1.2	< 2.5	-0.5 ± 1.4	< 2.6	30
Lab Code	ELW- 2114		ELW- 2687		ELW- 3292		ELW- 4254		
Date Collected	05-24-14		06-12-14		07-10-14		08-14-14		Req. LLD
Gross beta	2.8 ± 0.8	< 1.3	1.4 ± 0.6	< 0.9	0.9 ± 0.5	< 0.8	1.3 ± 0.5	< 0.8	4.0
I-131	-0.02 ± 0.17	< 0.31	-0.01 ± 0.22	< 0.40	0.19 ± 0.21	< 0.40	-0.02 ± 0.23	< 0.44	0.5
Be-7	-3.1 ± 10.8	< 16.1	-2.7 ± 11.6	< 22.7	-0.3 ± 11.9	< 22.9	2.5 ± 8.2	< 18.8	
Mn-54	-0.1 ± 1.6	< 2.8	-1.4 ± 1.5	< 2.3	0.7 ± 1.3	< 2.5	0.4 ± 1.0	< 1.6	10
Fe-59	1.7 ± 2.3	< 5.4	-1.5 ± 2.7	< 4.0	1.8 ± 2.2	< 2.8	0.6 ± 1.7	< 3.8	30
Co-58	0.5 ± 1.3	< 2.2	1.2 ± 1.5	< 2.6	-1.0 ± 1.4	< 1.4	-0.6 ± 0.9	< 1.6	10
Co-60	0.6 ± 1.5	< 2.4	0.2 ± 1.5	< 2.5	0.3 ± 1.7	< 2.2	0.5 ± 1.0	< 1.9	10
Zn-65	1.2 ± 2.8	< 4.9	0.3 ± 3.2	< 4.4	1.5 ± 3.0	< 4.3	-1.1 ± 1.8	< 2.3	30
Zr-Nb-95	-0.9 ± 1.7	< 3.2	-0.1 ± 1.2	< 1.4	0.4 ± 1.9	< 4.9	0.0 ± 1.1	< 2.6	15
Cs-134	-1.5 ± 1.8	< 3.4	-0.9 ± 1.3	< 2.6	-0.3 ± 1.6	< 2.6	0.8 ± 0.9	< 1.9	10
Cs-137	1.4 ± 1.7	< 3.0	2.0 ± 1.6	< 2.8	-2.0 ± 1.8	< 2.1	0.8 ± 1.2	< 2.1	10
Ba-La-140	0.2 ± 1.7	< 3.6	-0.7 ± 1.5	< 3.0	-0.5 ± 2.0	< 5.0	0.8 ± 1.0	< 4.1	15
Other (Ru-103)	-0.5 ± 1.5	< 3.3	0.4 ± 1.4	< 2.1	-1.0 ± 1.5	< 2.9	-1.1 ± 0.9	< 1.7	30
Lab Code	ELW- 4905		ELW- 6131		ELW- 6430		ELW- 7076		
Date Collected	09-17-14		10-26-14		11-12-14		12-17-14		Req. LLD
Gross beta	1.9 ± 0.6	< 0.8	1.0 ± 0.4	< 0.6	1.6 ± 0.6	< 0.8	3.0 ± 1.8	< 3.2	4.0
I-131	0.07 ± 0.19	< 0.38	0.02 ± 0.17	< 0.31	-0.09 ± 0.16	< 0.30	0.10 ± 0.13	< 0.19	0.5
Be-7	4.0 ± 17.7	< 29.3	-5.1 ± 10.9	< 17.0	-7.3 ± 7.7	< 16.5	-5.7 ± 11.6	< 26.7	
Mn-54	-0.7 ± 1.6	< 2.1	-0.8 ± 1.6	< 2.1	-0.6 ± 1.0	< 2.0	-0.6 ± 1.2	< 1.9	10
Fe-59	-0.9 ± 3.6	< 4.3	-2.3 ± 2.4	< 4.5	0.2 ± 2.1	< 5.2	-0.7 ± 2.0	< 3.3	30
Co-58	0.5 ± 1.4	< 1.6	-0.6 ± 1.3	< 2.6	0.8 ± 1.0	< 2.5	-0.4 ± 1.3	< 1.3	10
Co-60	-1.3 ± 1.8	< 1.2	-1.8 ± 1.6	< 1.0	0.1 ± 1.1	< 1.6	1.5 ± 1.3	< 2.2	10
Zn-65	-2.8 ± 4.0	< 4.1	1.3 ± 2.4	< 3.3	-0.3 ± 2.2	< 3.7	2.3 ± 2.6	< 4.7	30
Zr-Nb-95	-2.8 ± 1.7	< 2.4	-0.5 ± 1.4	< 3.5	1.0 ± 1.0	< 2.7	-1.5 ± 1.4	< 2.5	15
Cs-134	-0.3 ± 1.8	< 3.8	1.7 ± 1.5	< 3.0	-0.3 ± 1.1	< 2.0	-0.3 ± 1.3	< 2.2	10
Cs-137	-0.5 ± 1.9	< 2.6	1.5 ± 1.7	< 3.2	0.3 ± 1.3	< 2.8	1.2 ± 1.6	< 2.5	10
Ba-La-140	-1.5 ± 1.8	< 1.6	3.1 ± 1.8	< 4.8	0.3 ± 1.2	< 6.2	-0.4 ± 1.5	< 3.8	15
Other (Ru-103)	-1.0 ± 2.0	< 2.2	1.4 ± 1.3	< 3.3	-0.3 ± 1.0	< 3.4	-0.1 ± 1.3	< 2.1	30

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

Annual

All locations	**Mean ± s.d.**		**Mean ± s.d.**		**Mean ± s.d.**
Gross Beta	**1.8 ± 0.8**				
I-131	**0.04 ± 0.07**	**Co-58**	**-0.1 ± 0.9**	**Cs-134**	**-0.2 ± 0.9**
Be-7	**0.3 ± 7.2**	**Co-60**	**0.0 ± 0.9**	**Cs-137**	**0.1 ± 0.9**
Mn-54	**-0.2 ± 0.9**	**Zn-65**	**-0.7 ± 2.1**	**Ba-La-140**	**-0.3 ± 1.8**
Fe-59	**-0.2 ± 1.6**	**Zr-Nb-95**	**-0.6 ± 1.1**	**Ru-103**	**-0.1 ± 1.0**

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- 1110		ELW- 2708		ELW- 5029		ELW- 7163		Req. LLDs
H-3	46 ± 75	< 146	105 ± 80	< 142	79 ± 83	< 150	-19 ± 99	< 191	500
Sr-89	-0.37 ± 0.78	< 0.90	0.68 ± 0.62	< 0.73	0.17 ± 0.63	< 0.71	0.26 ± 0.63	< 0.73	5.0
Sr-90	0.66 ± 0.39	< 0.68	-0.10 ± 0.26	< 0.60	0.11 ± 0.29	< 0.60	0.22 ± 0.27	< 0.52	1.0

Location	E-05 (Two Creeks Park)								
Period	1st Qtr.		2nd Qtr.		3nd Qtr.		4th Qtr.		
Lab Code	ELW- 1111		ELW- 2079		ELW- 5030		ELW- 7164		Req. LLDs
H-3	149 ± 80	< 146	413 ± 94	< 142	31 ± 80	< 150	-62 ± 97	< 191	500
Sr-89	-0.03 ± 0.55	< 0.70	0.27 ± 0.66	< 0.63	0.55 ± 0.67	< 0.80	0.61 ± 0.68	< 0.84	5.0
Sr-90	0.36 ± 0.27	< 0.49	0.18 ± 0.30	< 0.60	-0.03 ± 0.30	< 0.65	0.13 ± 0.27	< 0.56	1.0

Location	E-06 (Coast Guard Station)								
Period	1st Qtr.		2nd Qtr.		3nd Qtr.		4th Qtr.		
Lab Code	ND[a]		ELW- 2710		ELW- 5031		ELW- 7165		Req. LLDs
H-3			89 ± 79	< 142	79 ± 83	< 150	-8 ± 100	< 191	500
Sr-89			0.21 ± 0.69	< 0.76	0.17 ± 0.65	< 0.72	0.06 ± 0.59	< 0.68	5.0
Sr-90			-0.04 ± 0.32	< 0.69	0.16 ± 0.29	< 0.59	0.24 ± 0.25	< 0.48	1.0

Location	E-33 (Kewaunee)								
Period	1st Qtr.		2nd Qtr.		3nd Qtr.		4th Qtr.		
Lab Code	ELW- 1112		ELW- 2711		ELW- 5032		ELW- 7166		Req. LLDs
H-3	244 ± 85	< 147	89 ± 79	< 142	113 ± 85	< 150	-17 ± 99	< 191	500
Sr-89	0.53 ± 0.58	< 0.67	-0.30 ± 0.80	< 0.84	0.33 ± 0.46	< 0.67	0.26 ± 0.61	< 0.70	5.0
Sr-90	0.29 ± 0.27	< 0.50	0.31 ± 0.37	< 0.71	0.10 ± 0.21	< 0.42	0.28 ± 0.25	< 0.47	1.0

Tritium Annual Mean ± s.d.	**89 ± 118**
Sr-89 Annual Mean ± s.d.	**0.23 ± 0.30**
Sr-90 Annual Mean ± s.d.	**0.19 ± 0.19**

[a] "ND" = No data; samples not collected due to icy conditions.

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	02-02-14		01-30-14		02-02-14		
Lab Code	EF- 409		EF- 411		EF- 412		
Type	Salmon		Lake Trout		Burbot		
Ratio (wet/dry wt.)	4.11		5.01		5.47		
Gross Beta	3.60 ± 0.07	< 0.023	3.57 ± 0.07	< 0.022	2.23 ± 0.05	< 0.017	0.5
K-40	1.88 ± 0.28	-	2.50 ± 0.28	-	2.94 ± 0.31	-	
Mn-54	0.005 ± 0.006	< 0.010	0.002 ± 0.007	< 0.007	-0.002 ± 0.008	< 0.009	0.13
Fe-59	0.012 ± 0.013	< 0.034	-0.007 ± 0.013	< 0.034	-0.011 ± 0.015	< 0.029	0.26
Co-58	0.005 ± 0.006	< 0.012	-0.001 ± 0.006	< 0.011	0.011 ± 0.008	< 0.018	0.13
Co-60	0.004 ± 0.007	< 0.011	-0.005 ± 0.009	< 0.012	0.005 ± 0.010	< 0.018	0.13
Zn-65	-0.010 ± 0.014	< 0.022	-0.005 ± 0.014	< 0.024	-0.014 ± 0.017	< 0.034	0.26
Cs-134	0.005 ± 0.007	< 0.013	0.004 ± 0.007	< 0.013	-0.005 ± 0.008	< 0.014	0.13
Cs-137	0.050 ± 0.017	< 0.017	0.023 ± 0.013	< 0.015	0.096 ± 0.027	< 0.023	0.15
Other (Ru-103)	0.000 ± 0.005	< 0.011	-0.005 ± 0.005	< 0.010	-0.003 ± 0.007	< 0.020	0.5
Collection Date	03-16-14		03-16-14		04-14-14		
Lab Code	EF- 1593		EF- 1594		EF- 1596		
Type	Largemouth Bass		Lake Trout		Brown Trout		
Ratio (wet/dry wt.)	4.94		4.36		3.50		
Gross Beta	3.78 ± 0.07	< 0.240	3.72 ± 0.08	< 0.025	3.95 ± 0.09	< 0.032	0.5
K-40	3.67 ± 0.41	-	2.77 ± 0.37	-	3.33 ± 0.38	-	
Mn-54	0.000 ± 0.011	< 0.015	-0.008 ± 0.006	< 0.008	0.002 ± 0.008	< 0.014	0.13
Fe-59	-0.025 ± 0.019	< 0.042	0.013 ± 0.016	< 0.056	-0.016 ± 0.017	< 0.016	0.26
Co-58	-0.006 ± 0.010	< 0.019	0.005 ± 0.008	< 0.019	-0.003 ± 0.009	< 0.010	0.13
Co-60	0.005 ± 0.010	< 0.015	0.001 ± 0.009	< 0.010	-0.008 ± 0.009	< 0.007	0.13
Zn-65	-0.009 ± 0.020	< 0.029	0.007 ± 0.017	< 0.018	-0.028 ± 0.023	< 0.014	0.26
Cs-134	0.000 ± 0.009	< 0.017	-0.004 ± 0.007	< 0.015	-0.001 ± 0.008	< 0.012	0.13
Cs-137	0.016 ± 0.012	< 0.018	0.025 ± 0.014	< 0.016	0.026 ± 0.015	< 0.013	0.15
Other (Ru-103)	0.007 ± 0.008	< 0.039	-0.003 ± 0.006	< 0.017	0.005 ± 0.006	< 0.013	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	04-14-14		04-16-14		04-17-14		
Lab Code	EF- 1597		EF- 1598		EF- 1599		
Type	Catfish		Burbot		Smallmouth Bass		
Ratio (wet/dry wt.)	5.60		5.97		5.29		
Gross Beta	3.31 ± 0.06	< 0.019	2.13 ± 0.05	< 0.016	3.82 ± 0.08	< 0.025	0.5
K-40	2.40 ± 0.32	-	2.09 ± 0.36	-	2.52 ± 2.52	-	
Mn-54	0.001 ± 0.007	< 0.008	-0.003 ± 0.009	< 0.020	0.003 ± 0.008	< 0.017	0.13
Fe-59	-0.019 ± 0.016	< 0.030	0.022 ± 0.018	< 0.042	-0.012 ± 0.017	< 0.022	0.26
Co-58	-0.007 ± 0.008	< 0.011	-0.004 ± 0.009	< 0.019	0.005 ± 0.008	< 0.012	0.13
Co-60	-0.006 ± 0.009	< 0.009	0.009 ± 0.011	< 0.015	-0.001 ± 0.011	< 0.005	0.13
Zn-65	0.010 ± 0.019	< 0.017	-0.025 ± 0.022	< 0.031	-0.006 ± 0.022	< 0.031	0.26
Cs-134	0.004 ± 0.007	< 0.015	0.002 ± 0.009	< 0.018	-0.003 ± 0.009	< 0.017	0.13
Cs-137	0.011 ± 0.010	< 0.018	0.039 ± 0.018	< 0.018	0.039 ± 0.016	< 0.012	0.15
Other (Ru-103)	0.008 ± 0.008	< 0.023	0.005 ± 0.009	< 0.029	0.004 ± 0.007	< 0.018	0.5
Collection Date	05-29-14		06-07-14		07-26-14		
Lab Code	EF- 3089		EF- 3090		EF- 4185		
Type	Rainbow Trout		Lake Trout		Salmon		
Ratio (wet/dry wt.)	6.07		4.47		3.87		
Gross Beta	3.33 ± 0.05	< 0.015	3.51 ± 0.05	< 0.014	4.08 ± 0.08	< 0.026	0.5
K-40	2.90 ± 0.37	-	2.55 ± 0.44	-	3.58 ± 0.42	-	
Mn-54	-0.005 ± 0.009	< 0.015	-0.006 ± 0.010	< 0.020	-0.006 ± 0.010	< 0.013	0.13
Fe-59	-0.016 ± 0.013	< 0.048	0.033 ± 0.021	< 0.086	-0.051 ± 0.020	< 0.030	0.26
Co-58	0.000 ± 0.007	< 0.017	-0.005 ± 0.008	< 0.018	0.000 ± 0.009	< 0.010	0.13
Co-60	-0.005 ± 0.007	< 0.012	0.001 ± 0.011	< 0.016	0.002 ± 0.010	< 0.012	0.13
Zn-65	-0.005 ± 0.017	< 0.035	0.003 ± 0.019	< 0.040	0.019 ± 0.016	< 0.009	0.26
Cs-134	0.010 ± 0.008	< 0.013	-0.012 ± 0.010	< 0.018	-0.004 ± 0.009	< 0.014	0.13
Cs-137	0.021 ± 0.012	< 0.016	0.015 ± 0.012	< 0.019	0.007 ± 0.013	< 0.017	0.15
Other (Ru-103)	-0.015 ± 0.006	< 0.026	0.013 ± 0.009	< 0.043	-0.003 ± 0.008	< 0.015	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	08-04-14		07-23-14		08-11-14		
Lab Code	EF- 4186		EF- 4187		EF- 4188		
Type	Brown Trout		Brown Trout		Lake Trout		
Ratio (wet/dry wt.)	3.83		4.00		4.84		
Gross Beta	4.10 ± 0.08	< 0.027	3.97 ± 0.08	< 0.026	3.43 ± 0.07	< 0.019	0.5
K-40	2.92 ± 0.14	-	3.05 ± 0.42	-	2.82 ± 0.38	-	
Mn-54	-0.005 ± 0.009	< 0.013	-0.003 ± 0.010	< 0.018	0.009 ± 0.009	< 0.014	0.13
Fe-59	-0.015 ± 0.017	< 0.025	0.004 ± 0.021	< 0.051	0.001 ± 0.015	< 0.021	0.26
Co-58	-0.001 ± 0.009	< 0.011	-0.003 ± 0.010	< 0.019	-0.007 ± 0.007	< 0.006	0.13
Co-60	0.008 ± 0.011	< 0.019	0.006 ± 0.012	< 0.021	0.003 ± 0.010	< 0.013	0.13
Zn-65	0.003 ± 0.022	< 0.020	-0.007 ± 0.027	< 0.022	0.014 ± 0.018	< 0.018	0.26
Cs-134	-0.004 ± 0.010	< 0.014	-0.003 ± 0.009	< 0.020	-0.003 ± 0.009	< 0.017	0.13
Cs-137	0.025 ± 0.012	< 0.018	0.021 ± 0.013	< 0.021	0.041 ± 0.018	< 0.014	0.15
Other (Ru-103)	-0.006 ± 0.008	< 0.014	-0.014 ± 0.010	< 0.024	-0.005 ± 0.008	< 0.011	0.5
Collection Date	08-11-14		08-16-14				
Lab Code	EF- 4189		EF- 6132		**Annual**		
Type	Burbot		Chinook Salmon				
Ratio (wet/dry wt.)	4.99		4.60		**Mean ± s.d.**		
Gross Beta	2.60 ± 0.06	< 0.018	3.81 ± 0.07	< 0.022	**3.47 ± 0.60**		0.5
K-40	2.57 ± 0.46	-	2.78 ± 0.38		**2.79 ± 0.47**		
Mn-54	0.010 ± 0.011	< 0.019	0.004 ± 0.008	< 0.019	**0.000 ± 0.005**		0.13
Fe-59	0.015 ± 0.023	< 0.023	0.016 ± 0.018	< 0.107	**-0.003 ± 0.021**		0.26
Co-58	0.006 ± 0.011	< 0.018	0.005 ± 0.006	< 0.020	**0.000 ± 0.005**		0.13
Co-60	0.007 ± 0.013	< 0.023	0.004 ± 0.009	< 0.014	**0.002 ± 0.005**		0.13
Zn-65	-0.003 ± 0.026	< 0.029	-0.019 ± 0.018	< 0.015	**-0.004 ± 0.013**		0.26
Cs-134	0.000 ± 0.011	< 0.021	-0.002 ± 0.006	< 0.014	**-0.001 ± 0.005**		0.13
Cs-137	0.018 ± 0.015	< 0.024	0.050 ± 0.020	< 0.019	**0.031 ± 0.021**		0.15
Other (Ru-103)	0.003 ± 0.012	< 0.026	0.034 ± 0.008	< 0.081	**0.001 ± 0.011**		0.5

Table 8. Radioactivity in shoreline sediment samples

Collection: Semiannual

Sample Description and Concentration (pCi/g dry)

		MDC		MDC		MDC	
Collection Date	4/16/2014		4/17/2014		4/17/2014		
Lab Code	ESS- 1558		ESS- 1559		ESS- 1560		LLD
Location	E-01		E-05		E-06		
Gross Beta	10.86 ± 0.91	< 1.04	8.33 ± 0.83	< 0.98	7.93 ± 0.88	< 1.06	2.0
Be-7	0.006 ± 0.054	< 0.09	0.061 ± 0.052	< 0.11	0.046 ± 0.056	< 0.10	
K-40	7.43 ± 0.46	-	6.23 ± 0.40	-	2.59 ± 0.42	-	-
Cs-134	0.000 ± 0.006	< 0.009	-0.002 ± 0.005	< 0.008	0.001 ± 0.006	< 0.011	0.15
Cs-137	0.024 ± 0.014	< 0.012	0.014 ± 0.008	< 0.010	0.033 ± 0.016	< 0.013	0.15
Tl-208	0.041 ± 0.023	-	0.040 ± 0.012	-	0.085 ± 0.017	-	-
Pb-212	0.18 ± 0.054	-	0.16 ± 0.051	-	0.30 ± 0.062	-	-
Bi-214	0.11 ± 0.024	-	0.11 ± 0.025	-	0.17 ± 0.029	-	-
Ra-226	0.36 ± 0.15	< 0.26	0.30 ± 0.14	< 0.26	0.42 ± 0.17	-	-
Ac-228	0.15 ± 0.054	-	0.12 ± 0.057	-	0.25 ± 0.053	-	-

Collection Date	4/17/2014		4/17/2014		
Lab Code	ESS- 1561		ESS- 1562		
Location	E-12		E-33		
Gross Beta	6.54 ± 0.78	< 0.94	9.04 ± 0.90	< 1.07	2.0
Be-7	0.077 ± 0.050	< 0.08	0.11 ± 0.054	< 0.10	
K-40	4.70 ± 0.36	-	6.03 ± 0.41	-	-
Cs-134	0.006 ± 0.005	< 0.009	-0.004 ± 0.006	< 0.009	0.15
Cs-137	0.031 ± 0.015	< 0.012	0.015 ± 0.009	< 0.013	0.15
Tl-208	0.045 ± 0.017	-	0.046 ± 0.019	-	-
Pb-212	0.10 ± 0.018	-	0.17 ± 0.055	-	-
Bi-214	0.079 ± 0.023	-	0.099 ± 0.025	-	-
Ra-226	0.32 ± 0.13	< 0.26	0.46 ± 0.15	< 0.27	-
Ac-228	0.15 ± 0.047	-	0.19 ± 0.062	-	-

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN SHORELINE SEDIMENT SAMPLES

(Semiannual Collections)

Sample Description and Concentration (pCi/g dry)

		MDC		**MDC**		**MDC**	
Collection Date	10/26/2014		10/26/2014		10/26/2014		Req.
Lab Code	ESS- 6187		ESS- 6188		ESS- 6189		LLD
Location	E-01		E-05		E-06		
Gross Beta	6.89 ± 1.07	< 1.50	8.96 ± 1.12	< 1.47	10.08 ± 1.25	< 1.67	2.0
Be-7	0.082 ± 0.047	< 0.11	-0.027 ± 0.054	< 0.14	0.026 ± 0.049	< 0.11	
K-40	4.59 ± 0.37	-	7.56 ± 0.47	-	8.14 ± 0.48	-	-
Cs-134	0.003 ± 0.006	< 0.011	0.001 ± 0.006	< 0.012	0.006 ± 0.006	< 0.012	0.15
Cs-137	0.007 ± 0.008	< 0.013	0.013 ± 0.009	< 0.015	0.022 ± 0.011	< 0.011	0.15
Tl-208	0.058 ± 0.014	-	0.047 ± 0.017	-	0.036 ± 0.010	-	-
Pb-212	0.19 ± 0.057	-	0.18 ± 0.058	-	0.12 ± 0.025	-	-
Bi-214	0.16 ± 0.027	-	0.13 ± 0.027	-	0.093 ± 0.026	-	-
Ra-226	0.29 ± 0.16	-	0.53 ± 0.15	< 0.28	0.48 ± 0.14	< 0.27	-
Ac-228	0.19 ± 0.055	-	0.20 ± 0.050	-	0.17 ± 0.050	-	-

Collection Date	10/31/2014		10/31/2014			
Lab Code	ESS- 6190		ESS- 6191			
Location	E-12		E-33			**Annual Mean ±s.d.**
Gross Beta	7.25 ± 1.17	< 1.68	10.63 ± 1.22	< 1.58	2.0	**8.65 ± 1.54**
Be-7	0.085 ± 0.049	< 0.10	-0.057 ± 0.058	< 0.10		**0.041 ± 0.053**
K-40	4.39 ± 0.35	-	8.15 ± 0.49	-	-	**5.98 ± 1.88**
Cs-134	0.001 ± 0.006	< 0.010	0.002 ± 0.007	< 0.014	0.15	**0.00 ± 0.00**
Cs-137	0.007 ± 0.008	< 0.010	0.024 ± 0.012	< 0.012	0.15	**0.019 ± 0.009**
Tl-208	0.041 ± 0.012	-	0.052 ± 0.014	-	-	**0.05 ± 0.01**
Pb-212	0.17 ± 0.052	-	0.091 ± 0.022	-	-	**0.17 ± 0.06**
Bi-214	0.11 ± 0.026	-	0.10 ± 0.026	-	-	**0.12 ± 0.03**
Ra-226	0.32 ± 0.13	< 0.23	0.28 ± 0.17	-	-	**0.38 ± 0.09**
Ac-228	0.14 ± 0.052	-	0.15 ± 0.059	-	-	**0.17 ± 0.04**

Table 9. Radioactivity in soil samples

Collection: Semiannual

Sample Description and Concentration (pCi/g dry)

		MDC		MDC		MDC	
Collection Date	5/29/2014		5/29/2014		5/29/2014		Req.
Lab Code	ESO- 2433		ESO- 2434		ESO- 2435		LLD
Location	E-01		E-02		E-03		
Gross Beta	26.48 ± 1.08	< 0.96	30.07 ± 1.17	< 1.06	23.00 ± 1.02	< 0.94	2.0
Be-7	0.091 ± 0.095	< 0.23	0.068 ± 0.099	< 0.18	-0.052 ± 0.096	< 0.14	
K-40	15.75 ± 0.84	-	19.32 ± 0.90	-	14.85 ± 0.82	-	-
Cs-134	-0.001 ± 0.012	< 0.023	-0.010 ± 0.012	< 0.017	-0.005 ± 0.012	< 0.023	0.15
Cs-137	0.18 ± 0.034	< 0.025	0.12 ± 0.035	< 0.028	0.087 ± 0.035	< 0.027	0.15
Tl-208	0.18 ± 0.037	-	0.23 ± 0.034	-	0.14 ± 0.037	-	-
Pb-212	0.48 ± 0.042	-	0.75 ± 0.12	-	0.42 ± 0.048	-	-
Bi-214	0.35 ± 0.054	-	0.37 ± 0.054	-	0.27 ± 0.049	-	-
Ra-226	1.25 ± 0.44	-	1.36 ± 0.33	-	0.67 ± 0.30	-	-
Ac-228	0.51 ± 0.091	< 0.22	0.67 ± 0.14	-	0.40 ± 0.097	-	-
Collection Date	5/29/2014		5/29/2014		5/29/2014		
Lab Code	ESO- 2436		ESO- 2438		ESO- 2439		
Location	E-04		E-06		E-08		
Gross Beta	13.23 ± 0.90	< 0.96	19.35 ± 0.98	< 0.95	23.40 ± 1.02	< 0.93	2.0
Be-7	-0.041 ± 0.070	< 0.094	0.090 ± 0.087	< 0.20	-0.094 ± 0.093	< 0.19	
K-40	7.08 ± 0.52	-	11.17 ± 0.67	-	14.79 ± 0.81	-	-
Cs-134	-0.001 ± 0.009	< 0.016	0.001 ± 0.009	< 0.013	0.010 ± 0.010	< 0.015	0.15
Cs-137	0.041 ± 0.017	< 0.016	0.35 ± 0.043	< 0.025	0.16 ± 0.028	< 0.016	0.15
Tl-208	0.10 ± 0.025	-	0.079 ± 0.026	-	0.10 ± 0.031	-	-
Pb-212	0.25 ± 0.077	-	0.22 ± 0.036	-	0.31 ± 0.097	-	-
Bi-214	0.17 ± 0.037	-	0.14 ± 0.038	-	0.25 ± 0.046	-	-
Ra-226	0.67 ± 0.20	< 0.38	0.66 ± 0.21	< 0.43	0.51 ± 0.28	-	-
Ac-228	0.21 ± 0.072	-	0.30 ± 0.081	-	0.35 ± 0.10	-	-
Collection Date	5/29/2014		5/29/2014				
Lab Code	ESO- 2440		ESO- 2441				
Location	E-09		E-20				
Gross Beta	30.63 ± 1.18	< 1.06	28.03 ± 1.15	< 1.07			2.0
Be-7	0.12 ± 0.12	< 0.30	0.03 ± 0.12	< 0.25			
K-40	20.12 ± 1.07	-	18.46 ± 0.92	-			-
Cs-134	-0.003 ± 0.013	< 0.024	-0.007 ± 0.012	< 0.018			0.15
Cs-137	0.074 ± 0.031	< 0.028	0.13 ± 0.037	< 0.028			0.15
Tl-208	0.22 ± 0.046	-	0.20 ± 0.037	-			-
Pb-212	0.70 ± 0.13	-	0.76 ± 0.13	-			-
Bi-214	0.49 ± 0.070	-	0.40 ± 0.063	-			-
Ra-226	0.95 ± 0.37	-	0.82 ± 0.35	-			-
Ac-228	0.61 ± 0.15	-	0.70 ± 0.14	-			-

Table 9. Radioactivity in soil samples

Collection: Semiannual

Sample Description and Concentration (pCi/g dry)

		MDC		MDC		MDC	
Collection Date	10/29/2014		10/29/2014		10/29/2014		Req.
Lab Code	ESO- 6178		ESO- 6179		ESO- 6180		LLD
Location	E-01		E-02		E-03		
Gross Beta	21.47 ± 1.30	< 1.39	19.16 ± 1.22	< 1.30	27.73 ± 1.41	< 1.37	2.0
Be-7	0.12 ± 0.084	< 0.18	-0.082 ± 0.096	< 0.18	0.006 ± 0.079	< 0.22	
K-40	16.21 ± 0.78	-	14.01 ± 0.79	-	18.60 ± 0.77	-	-
Cs-134	-0.017 ± 0.010	< 0.014	0.003 ± 0.012	< 0.018	-0.003 ± 0.010	< 0.016	0.15
Cs-137	0.18 ± 0.033	< 0.023	0.084 ± 0.028	< 0.022	0.10 ± 0.025	< 0.024	0.15
Tl-208	0.19 ± 0.034	-	0.16 ± 0.029	-	0.18 ± 0.031	-	-
Pb-212	0.55 ± 0.038	-	0.44 ± 0.040	-	0.48 ± 0.033	-	-
Bi-214	0.53 ± 0.051	-	0.45 ± 0.057	-	0.44 ± 0.046	-	-
Ra-226	1.21 ± 0.40	-	0.69 ± 0.31	-	1.29 ± 0.28	-	-
Ac-228	0.62 ± 0.10	-	0.57 ± 0.099	-	0.54 ± 0.074	-	-
Collection Date	10/29/2014		10/29/2014		10/29/2014		
Lab Code	ESO- 6181		ESO- 6182		ESO- 6183		
Location	E-04		E-06		E-08		
Gross Beta	16.86 ± 1.15	< 1.23	11.66 ± 1.03	< 1.22	17.59 ± 1.23	< 1.37	2.0
Be-7	0.067 ± 0.066	< 0.14	0.069 ± 0.061	< 0.16	0.050 ± 0.088	< 0.15	
K-40	12.82 ± 0.64	-	7.83 ± 0.47	-	12.80 ± 0.72	-	-
Cs-134	0.000 ± 0.009	< 0.013	0.006 ± 0.007	< 0.011	-0.004 ± 0.009	< 0.018	0.15
Cs-137	0.083 ± 0.019	< 0.018	0.14 ± 0.026	< 0.018	0.20 ± 0.029	< 0.019	0.15
Tl-208	0.13 ± 0.024	-	0.065 ± 0.021	-	0.10 ± 0.033	-	-
Pb-212	0.34 ± 0.028	-	0.25 ± 0.066	-	0.34 ± 0.094	-	-
Bi-214	0.26 ± 0.037	-	0.26 ± 0.037	-	0.28 ± 0.046	-	-
Ra-226	0.77 ± 0.24	-	0.39 ± 0.16	< 0.31	0.78 ± 0.25	< 0.46	-
Ac-228	0.37 ± 0.062	-	0.23 ± 0.067	-	0.29 ± 0.083	-	-
Collection Date	10/29/2014		10/29/2014				
Lab Code	ESO- 6184		ESO- 6186		**Annual**		
Location	E-09		E-20		**Mean ± s.d.**		
Gross Beta	34.27 ± 1.77	< 1.65	21.88 ± 1.54	< 1.67	**22.80 ± 6.41**		2.0
Be-7	0.15 ± 0.11	< 0.29	-0.092 ± 0.083	< 0.15	**0.031 ± 0.08**		
K-40	21.07 ± 0.89	-	14.19 ± 0.70	-	**14.94 ± 4.07**		-
Cs-134	-0.007 ± 0.012	< 0.017	-0.003 ± 0.009	< 0.015	**0.019 ± 0.09**		0.15
Cs-137	0.12 ± 0.035	< 0.032	0.083 ± 0.021	< 0.017	**0.13 ± 0.07**		0.15
Tl-208	0.16 ± 0.037	-	0.16 ± 0.028	-	**0.15 ± 0.05**		-
Pb-212	0.49 ± 0.040	-	0.46 ± 0.034	-	**0.45 ± 0.17**		-
Bi-214	0.51 ± 0.054	-	0.39 ± 0.042	-	**0.35 ± 0.12**		-
Ra-226	1.25 ± 0.37	-	0.93 ± 0.26	-	**0.89 ± 0.30**		-
Ac-228	0.58 ± 0.11	-	0.57 ± 0.11	-	**0.47 ± 0.16**		-

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	5/27/2014		5/27/2014		5/27/2014		
Lab Code	EG- 2323		EG- 2303		EG- 2304		Req. LLD
Ratio (wet/dry)	6.24		4.49		5.33		-
Gross Beta	5.88 ± 0.11	< 0.032	5.65 ± 0.12	< 0.042	6.25 ± 0.12	< 0.036	0.25
Be-7	0.26 ± 0.14	-	0.53 ± 0.14	-	0.11 ± 0.06	< 0.12	-
K-40	5.18 ± 0.40	-	4.84 ± 0.41	-	5.44 ± 0.41	-	-
I-131	-0.007 ± 0.007	< 0.017	0.001 ± 0.007	< 0.016	0.007 ± 0.007	< 0.024	0.060
Cs-134	-0.005 ± 0.007	< 0.013	-0.001 ± 0.007	< 0.012	0.000 ± 0.007	< 0.014	0.060
Cs-137	0.001 ± 0.008	< 0.012	0.009 ± 0.008	< 0.014	0.001 ± 0.007	< 0.013	0.080
Other (Co-60)	0.001 ± 0.010	< 0.014	0.006 ± 0.008	< 0.012	0.000 ± 0.007	< 0.009	0.060
Location	E-04		E-06		E-08		
Collection Date	5/27/2014		5/27/2014		5/27/2014		
Lab Code	EG- 2305		EG- 2306		EG- 2307		Req. LLD
Ratio (wet/dry)	5.69		4.46		7.28		-
Gross Beta	5.70 ± 0.11	< 0.038	4.81 ± 0.10	< 0.031	5.57 ± 0.11	< 0.036	0.25
Be-7	0.14 ± 0.07	< 0.14	0.51 ± 0.56	-	0.058 ± 0.045	< 0.079	-
K-40	4.71 ± 0.39	-	4.91 ± 0.60	-	3.81 ± 0.27	-	-
I-131	0.003 ± 0.006	< 0.021	0.006 ± 0.019	< 0.050	-0.003 ± 0.005	< 0.015	0.060
Cs-134	-0.004 ± 0.007	< 0.011	0.008 ± 0.016	< 0.033	0.001 ± 0.005	< 0.009	0.060
Cs-137	0.001 ± 0.008	< 0.013	0.015 ± 0.019	< 0.030	0.006 ± 0.005	< 0.009	0.080
Other (Co-60)	-0.004 ± 0.009	< 0.013	0.010 ± 0.017	< 0.024	0.002 ± 0.005	< 0.006	0.060
Location	E-09		E-20				
Collection Date	5/27/2014		5/27/2014				
Lab Code	EG- 2308		EG- 2309				Req. LLD
Ratio (wet/dry)	4.95		7.95				-
Gross Beta	4.30 ± 0.11	< 0.043	3.74 ± 0.08	< 0.028			0.25
Be-7	0.17 ± 0.09	-	0.11 ± 0.06	< 0.11			-
K-40	5.96 ± 0.36	-	3.61 ± 0.30	-			-
I-131	0.002 ± 0.005	< 0.012	0.000 ± 0.005	< 0.013			0.060
Cs-134	0.002 ± 0.005	< 0.010	0.002 ± 0.006	< 0.010			0.060
Cs-137	-0.001 ± 0.006	< 0.008	0.005 ± 0.007	< 0.013			0.080
Other (Co-60)	-0.002 ± 0.007	< 0.010	0.006 ± 0.007	< 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	07-23-14		07-23-14		07-23-14		
Lab Code	EG- 3623		EG- 3624		EG- 3625		Req. LLD
Ratio (wet/dry)	3.67		3.97		4.13		-
Gross Beta	6.84 ± 0.18	< 0.075	6.57 ± 0.16	< 0.059	5.71 ± 0.14	< 0.058	0.25
Be-7	0.98 ± 0.15	-	0.64 ± 0.15	-	0.63 ± 0.11	-	-
K-40	4.73 ± 0.33	-	5.12 ± 0.39	-	6.08 ± 0.31	-	-
I-131	0.001 ± 0.005	< 0.020	0.004 ± 0.007	< 0.024	0.001 ± 0.006	< 0.019	0.060
Cs-134	0.002 ± 0.005	< 0.010	-0.004 ± 0.007	< 0.013	-0.002 ± 0.004	< 0.009	0.060
Cs-137	0.013 ± 0.007	< 0.012	0.008 ± 0.008	< 0.013	0.003 ± 0.005	< 0.009	0.080
Other (Co-60)	0.000 ± 0.007	< 0.011	-0.003 ± 0.007	< 0.012	0.000 ± 0.005	< 0.007	0.060
Location	E-04		E-06		E-08		
Collection Date	07-23-14		07-23-14		07-23-14		
Lab Code	EG- 3626		EG- 3627		EG- 3628		Req. LLD
Ratio (wet/dry)	4.21		3.16		3.34		-
Gross Beta	6.95 ± 0.16	< 0.053	4.95 ± 0.10	< 0.031	7.37 ± 0.15	< 0.050	0.25
Be-7	0.53 ± 0.11	-	0.59 ± 0.11	-	0.69 ± 0.11	-	-
K-40	5.17 ± 0.26	-	3.91 ± 0.30	-	4.02 ± 0.25	-	-
I-131	0.005 ± 0.005	< 0.022	-0.004 ± 0.005	< 0.015	0.009 ± 0.004	< 0.015	0.060
Cs-134	-0.007 ± 0.005	< 0.009	-0.003 ± 0.005	< 0.010	0.000 ± 0.004	< 0.008	0.060
Cs-137	0.015 ± 0.006	< 0.013	0.009 ± 0.007	< 0.012	0.001 ± 0.005	< 0.010	0.080
Other (Co-60)	-0.001 ± 0.006	< 0.013	0.001 ± 0.007	< 0.009	0.001 ± 0.005	< 0.008	0.060
Location	E-09		E-20				
Collection Date	07-23-14		07-23-14				
Lab Code	EG- 3629		EG- 3630				Req. LLD
Ratio (wet/dry)	3.43		3.56				-
Gross Beta	8.33 ± 0.18	< 0.064	8.24 ± 0.18	< 0.062			0.25
Be-7	0.67 ± 0.11	-	1.15 ± 0.15	-			-
K-40	5.45 ± 0.29	-	6.19 ± 0.34	-			-
I-131	-0.001 ± 0.004	< 0.018	0.000 ± 0.006	< 0.020			0.060
Cs-134	0.002 ± 0.004	< 0.008	-0.003 ± 0.006	< 0.010			0.060
Cs-137	0.001 ± 0.005	< 0.009	0.001 ± 0.006	< 0.010			0.080
Other (Co-60)	-0.001 ± 0.005	< 0.007	0.004 ± 0.007	< 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	10/1/2014		10/1/2014		10/1/2014		
Lab Code	EG- 5254		EG- 5255		EG- 5256		Req. LLD
Ratio (wet/dry)	3.00		3.46		2.80		-
Gross Beta	7.31 ± 0.19	< 0.085	4.51 ± 0.11	< 0.044	6.71 ± 0.20	< 0.097	0.25
Be-7	4.10 ± 0.32	-	3.33 ± 0.30	-	4.15 ± 0.36	-	-
K-40	5.67 ± 0.49	-	4.18 ± 0.43	-	5.40 ± 0.50	-	-
I-131	0.020 ± 0.010	< 0.040	-0.010 ± 0.008	< 0.026	0.005 ± 0.012	< 0.029	0.060
Cs-134	0.001 ± 0.010	< 0.019	-0.003 ± 0.007	< 0.014	0.014 ± 0.009	< 0.018	0.060
Cs-137	0.007 ± 0.011	< 0.020	-0.001 ± 0.009	< 0.015	0.000 ± 0.011	< 0.020	0.080
Other (Co-60)	0.006 ± 0.012	< 0.014	0.004 ± 0.010	< 0.015	-0.002 ± 0.010	< 0.012	0.060

		MDC		MDC		MDC	
Location	E-04		E-06		E-08		
Collection Date	10/1/2014		10/1/2014		10/1/2014		
Lab Code	EG- 5257		EG- 5259		EG- 5260		Req. LLD
Ratio (wet/dry)	3.49		2.72		2.95		-
Gross Beta	4.59 ± 0.15	< 0.070	4.43 ± 0.11	< 0.042	3.36 ± 0.11	< 0.063	0.25
Be-7	3.11 ± 0.23	-	3.04 ± 0.32	-	6.01 ± 0.37	-	-
K-40	3.25 ± 0.30	-	3.79 ± 0.46	-	1.77 ± 0.30	-	-
I-131	-0.015 ± 0.006	< 0.015	-0.006 ± 0.010	< 0.024	0.002 ± 0.009	< 0.032	0.060
Cs-134	-0.001 ± 0.006	< 0.010	-0.003 ± 0.010	< 0.019	0.001 ± 0.009	< 0.014	0.060
Cs-137	-0.003 ± 0.007	< 0.012	0.037 ± 0.020	< 0.021	0.002 ± 0.008	< 0.015	0.080
Other (Co-60)	0.006 ± 0.006	< 0.010	-0.001 ± 0.011	< 0.008	0.000 ± 0.010	< 0.013	0.060

		MDC		MDC	
Location	E-09		E-20		
Collection Date	10/1/2014		10/1/2014		
Lab Code	EG- 5261		EG- 5262		Req. LLD
Ratio (wet/dry)	2.46		3.02		-
Gross Beta	6.12 ± 0.20	< 0.098	9.55 ± 0.21	< 0.076	0.25
Be-7	5.75 ± 0.34	-	3.64 ± 0.29	-	-
K-40	4.53 ± 0.41	-	6.12 ± 0.47	-	-
I-131	0.011 ± 0.008	< 0.030	0.000 ± 0.008	< 0.032	0.060
Cs-134	0.000 ± 0.007	< 0.013	-0.005 ± 0.008	< 0.014	0.060
Cs-137	0.003 ± 0.009	< 0.016	0.002 ± 0.008	< 0.016	0.080
Other (Co-60)	0.007 ± 0.009	< 0.011	-0.001 ± 0.010	< 0.009	0.060

Beta Annual Mean ± s.d.	**5.98 ± 1.53**
Be-7 Annual Mean ± s.d.	**1.70 ± 1.89**
K-40 Annual Mean ± s.d.	**4.74 ± 1.06**
I-131 Annual Mean ± s.d.	**0.001 ± 0.007**
Cs-134 Annual Mean ± s.d.	**0.000 ± 0.004**
Cs-137 Annual Mean ± s.d.	**0.006 ± 0.008**
Co-60 Annual Mean ± s.d.	**-0.001 ± 0.004**

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

Collection: Triannual
Units: pCi/g wet

Sample Description and Concentration

Collection Date	07-24-14	**MDC**	07-24-14	**MDC**	Req.	
Lab Code	ESL- 3617		ESL- 3618		LLD	
Location	E-05		E-12			
Ratio (wet wt./dry wt.)	5.11		5.96			
Gross Beta	3.57 ± 0.13	< 0.11	3.73 ± 0.13	< 0.11	0.25	
Be-7	0.85 ± 0.07	-	0.57 ± 0.07	-	-	
K-40	3.44 ± 0.11	-	1.78 ± 0.11	-	-	
Co-58	0.002 ± 0.002	< 0.005	0.000 ± 0.002	< 0.006	0.25	
Co-60	0.005 ± 0.003	< 0.006	0.001 ± 0.003	< 0.007	0.25	
Cs-134	0.000 ± 0.002	< 0.004	-0.001 ± 0.003	< 0.005	0.25	
Cs-137	0.018 ± 0.004	< 0.009	0.010 ± 0.003	< 0.007	0.25	
Collection Date	08-05-14		08-06-14			
Lab Code	ESL- 4027		ESL- 4028			
Location	E-05		E-12			
Ratio (wet wt./dry wt.)	6.88		2.83			
Gross Beta	2.33 ± 0.11	< 0.11	6.43 ± 0.25	< 0.22	0.25	
Be-7	0.49 ± 0.09	-	0.34 ± 0.06	-	-	
K-40	1.98 ± 0.11	-	4.50 ± 0.10	-	-	
Co-58	0.001 ± 0.003	< 0.007	0.001 ± 0.002	< 0.004	0.25	
Co-60	0.000 ± 0.003	< 0.007	0.003 ± 0.002	< 0.004	0.25	
Cs-134	0.003 ± 0.003	< 0.005	-0.003 ± 0.002	< 0.003	0.25	
Cs-137	0.013 ± 0.006	< 0.007	0.021 ± 0.003	< 0.003	0.25	
Collection Date	10-08-14		10-08-14			
Lab Code	ESL- 5449		ESL- 5450			**Annual**
Location	E-05		E-12			**Mean ± s.d.**
Ratio (wet wt./dry wt.)	10.11		6.67			
Gross Beta	1.65 ± 0.05	< 0.04	2.79 ± 0.12	< 0.10	0.25	**3.42 ± 1.67**
Be-7	0.21 ± 0.09	-	0.52 ± 0.19	-	-	**0.49 ± 0.22**
K-40	4.13 ± 0.16	-	2.89 ± 0.28	-	-	**3.12 ± 1.11**
Co-58	-0.001 ± 0.003	< 0.007	-0.007 ± 0.007	< 0.017	0.25	**-0.001 ± 0.003**
Co-60	-0.001 ± 0.003	< 0.007	0.000 ± 0.008	< 0.012	0.25	**0.001 ± 0.002**
Cs-134	-0.007 ± 0.003	< 0.005	0.002 ± 0.008	< 0.015	0.25	**-0.001 ± 0.004**
Cs-137	0.007 ± 0.004	< 0.006	0.023 ± 0.009	< 0.018	0.25	**0.015 ± 0.006**

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

Po

1st. Quarter, 2014

Date Annealed:	12-10-13	Days in the field	88
Date Placed:	01-03-14	Days from Annealing	
Date Removed:	04-01-14	to Readout:	119
Date Read:	04-08-14		

Location	Days in Field	Total mR	Net mR	mR/Stnd Qtr (91 days)	Net mR per 7 days
Indicator					
E-1	88	14.8 ± 0.6	9.3 ± 0.9	9.6 ± 0.9	0.74 ± 0.07
E-2	88	21.7 ± 0.4	16.2 ± 0.6	16.8 ± 0.6	1.29 ± 0.04
E-3	88	20.1 ± 1.4	14.6 ± 1.4	15.1 ± 1.5	1.16 ± 0.11
E-4	88	17.7 ± 2.0	12.2 ± 2.0	12.6 ± 2.1	0.97 ± 0.16
E-5	88	18.2 ± 1.1	12.7 ± 1.2	13.1 ± 1.2	1.01 ± 0.09
E-6	88	16.6 ± 1.0	11.1 ± 1.1	11.5 ± 1.1	0.88 ± 0.09
E-7	88	15.8 ± 0.5	10.3 ± 0.6	10.6 ± 0.7	0.82 ± 0.05
E-8	88	21.6 ± 1.0	16.1 ± 1.1	16.7 ± 1.1	1.28 ± 0.09
E-9	88	21.5 ± 0.6	15.9 ± 0.7	16.5 ± 0.7	1.27 ± 0.05
E-12	88	18.2 ± 1.2	12.7 ± 1.3	13.1 ± 1.3	1.01 ± 0.10
E-14	88	18.4 ± 0.3	12.9 ± 0.5	13.3 ± 0.5	1.02 ± 0.04
E-15	88	18.5 ± 0.2	13.0 ± 0.4	13.4 ± 0.4	1.03 ± 0.03
E-16	88	18.5 ± 0.1	13.0 ± 0.4	13.4 ± 0.4	1.03 ± 0.03
E-16B	88	14.2 ± 0.5	8.7 ± 0.6	10.5 ± 0.7	0.81 ± 0.05 [b]
E-17	88	20.3 ± 0.5	14.8 ± 0.6	15.3 ± 0.6	1.18 ± 0.05
E-18	88	17.9 ± 1.0	12.4 ± 1.1	12.8 ± 1.1	0.99 ± 0.09
E-22	88	17.4 ± 1.4	11.9 ± 1.5	12.3 ± 1.5	0.95 ± 0.12
E-23	88	16.8 ± 0.7	11.3 ± 0.8	11.7 ± 0.8	0.90 ± 0.06
E-24	88	16.5 ± 0.7	10.9 ± 0.8	11.3 ± 0.8	0.87 ± 0.06
E-25	88	16.4 ± 0.8	10.9 ± 0.9	11.3 ± 0.9	0.87 ± 0.07
E-26	88	16.8 ± 1.1	11.2 ± 1.1	11.6 ± 1.2	0.89 ± 0.09
E-26B	88	13.1 ± 0.4	7.6 ± 0.5	9.2 ± 0.6	0.71 ± 0.05 [b]
E-27	88	20.3 ± 0.6	14.7 ± 0.7	15.2 ± 0.7	1.17 ± 0.06
E-28	88	14.8 ± 0.8	9.3 ± 0.9	9.6 ± 0.9	0.74 ± 0.07
E-29	88	15.5 ± 1.3	10.0 ± 1.4	10.3 ± 1.4	0.79 ± 0.11
E-30	88	17.4 ± 1.0	11.9 ± 1.1	12.3 ± 1.1	0.94 ± 0.08
E-31	88	19.2 ± 0.7	13.6 ± 0.8	14.1 ± 0.8	1.09 ± 0.06
E-32	88	18.8 ± 0.5	13.3 ± 0.6	13.8 ± 0.6	1.06 ± 0.05
E-38	88	16.4 ± 0.9	10.9 ± 1.0	11.3 ± 1.0	0.87 ± 0.08
E-39	88	17.9 ± 1.0	12.4 ± 1.1	12.8 ± 1.1	0.98 ± 0.09
E-41	88	14.6 ± 0.8	9.1 ± 0.9	9.4 ± 0.9	0.72 ± 0.07
E-42	88	18.9 ± 0.7	13.3 ± 0.8	13.8 ± 0.8	1.06 ± 0.06
E-43	88	14.8 ± 1.2	9.3 ± 1.2	9.6 ± 1.3	0.74 ± 0.10
Control					
E-20	88	21.8 ± 1.8	16.3 ± 1.8	16.8 ± 1.9	1.30 ± 0.14
Mean±s.d.		17.7 ± 2.3	12.2 ± 2.3	12.6 ± 2.4	0.97 ± 0.16

In-Transit Exposure	Date Annealed	Date Read	ITC-1	ITC-2
	12-10-13	01-15-14	6.6 ± 0.3	6.7 ± 0.4
	03-11-14	04-08-14	5.1 ± 0.3	4.5 ± 0.4

[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.

[b] TLDs in field 75 days; placed 01-16-14.

POINT BEACH NUCLEAR PLANT

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

2nd Quarter, 2014

Date Annealed:	03-11-14	Days in the field	93
Date Placed:	04-01-14	Days from Annealing	
Date Removed:	07-03-14	to Readout:	122
Date Read:	07-11-14		

Location	Days in Field	Total mR	Net mR	mR/Stnd Qtr (91 days)	Net mR per 7 days
Indicator					
E-1	93	15.9 ± 0.9	11.3 ± 1.1	11.1 ± 1.1	0.85 ± 0.08
E-2	93	19.1 ± 1.1	14.5 ± 1.3	14.2 ± 1.3	1.09 ± 0.10
E-3	93	19.3 ± 1.4	14.7 ± 1.5	14.4 ± 1.5	1.11 ± 0.12
E-4	93	18.4 ± 0.6	13.9 ± 0.9	13.6 ± 0.9	1.04 ± 0.07
E-5	93	19.4 ± 0.5	14.8 ± 0.9	14.5 ± 0.8	1.12 ± 0.06
E-6	93	16.0 ± 0.7	11.5 ± 1.0	11.2 ± 0.9	0.86 ± 0.07
E-7	93	17.1 ± 0.2	12.5 ± 0.7	12.2 ± 0.7	0.94 ± 0.05
E-8	93	15.8 ± 0.7	11.3 ± 0.9	11.0 ± 0.9	0.85 ± 0.07
E-9	93	19.3 ± 0.9	14.7 ± 1.1	14.4 ± 1.1	1.11 ± 0.08
E-12	93	16.2 ± 0.8	11.6 ± 1.0	11.4 ± 1.0	0.88 ± 0.08
E-14	93	19.9 ± 1.7	15.3 ± 1.8	14.9 ± 1.8	1.15 ± 0.14
E-15	93	22.5 ± 1.7	17.9 ± 1.8	17.5 ± 1.8	1.35 ± 0.14
E-16	93	21.4 ± 0.6	16.8 ± 0.9	16.5 ± 0.9	1.27 ± 0.07
E-16B	93	19.5 ± 0.9	14.9 ± 1.1	14.6 ± 1.1	1.12 ± 0.09
E-17	93	17.8 ± 1.1	13.2 ± 1.3	12.9 ± 1.3	0.99 ± 0.10
E-18	93	24.5 ± 0.8	19.9 ± 1.1	19.5 ± 1.0	1.50 ± 0.08
E-22	93	21.3 ± 0.9	16.7 ± 1.1	16.3 ± 1.1	1.26 ± 0.08
E-23	93	22.8 ± 0.6	18.2 ± 0.9	17.8 ± 0.9	1.37 ± 0.07
E-24	93	18.1 ± 0.5	13.5 ± 0.8	13.2 ± 0.8	1.02 ± 0.06
E-25	93	22.4 ± 0.5	17.8 ± 0.8	17.4 ± 0.8	1.34 ± 0.06
E-26	93	17.5 ± 1.3	12.9 ± 1.5	12.7 ± 1.4	0.97 ± 0.11
E-26B	93	17.2 ± 0.3	12.6 ± 0.7	12.3 ± 0.7	0.95 ± 0.05
E-27	93	22.2 ± 0.8	17.6 ± 1.0	17.2 ± 1.0	1.32 ± 0.08
E-28	93	15.7 ± 0.2	11.2 ± 0.7	10.9 ± 0.7	0.84 ± 0.05
E-29	93	15.1 ± 0.7	10.5 ± 1.0	10.3 ± 0.9	0.79 ± 0.07
E-30	93	17.7 ± 0.6	13.1 ± 0.9	12.8 ± 0.9	0.99 ± 0.07
E-31	93	22.8 ± 1.9	18.3 ± 2.0	17.9 ± 2.0	1.38 ± 0.15
E-32	93	22.3 ± 0.2	17.7 ± 0.7	17.3 ± 0.7	1.33 ± 0.05
E-38	93	19.3 ± 0.5	14.7 ± 0.8	14.4 ± 0.8	1.11 ± 0.06
E-39	93	19.4 ± 0.5	14.8 ± 0.8	14.5 ± 0.8	1.12 ± 0.06
E-41	93	18.0 ± 0.5	13.4 ± 0.8	13.1 ± 0.8	1.01 ± 0.06
E-42	93	21.2 ± 0.5	16.6 ± 0.9	16.2 ± 0.8	1.25 ± 0.06
E-43	93	20.0 ± 0.9	15.5 ± 1.1	15.1 ± 1.1	1.16 ± 0.08
Control					
E-20	92	19.8 ± 1.5	15.2 ± 1.6	15.0 ± 1.6	1.15 ± 0.12
Mean±s.d.		19.3 ± 2.4	14.7 ± 2.4	14.4 ± 2.4	1.11 ± 0.18

In-Transit Exposure	Date Annealed	Date Read	ITC-1	ITC-2
	03-11-14	04-08-14	5.1 ± 0.3	4.5 ± 0.4
	06-13-14	07-11-14	4.2 ± 0.3	4.5 ± 0.3

[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

3rd Quarter, 2014

Date Annealed:	06-13-14	Days in the field	93
Date Placed:	07-03-14	Days from Annealing	
Date Removed:	10-04-14	to Readout:	122
Date Read:	10-13-14		

Location	Days in Field	Total mR	Net mR	mR/Stnd Qtr (91 days)	Net mR per 7 days
Indicator					
E-1	93	16.8 ± 0.7	12.8 ± 0.9	12.5 ± 0.9	0.96 ± 0.07
E-2	93	21.0 ± 0.1	17.0 ± 0.6	16.6 ± 0.6	1.28 ± 0.04
E-3	93	22.7 ± 0.4	18.7 ± 0.7	18.3 ± 0.7	1.41 ± 0.05
E-4	93	17.6 ± 1.6	13.6 ± 1.7	13.3 ± 1.7	1.02 ± 0.13
E-5	93	19.1 ± 1.2	15.1 ± 1.4	14.8 ± 1.3	1.14 ± 0.10
E-6	93	16.3 ± 0.9	12.3 ± 1.0	12.0 ± 1.0	0.92 ± 0.08
E-7	93	17.1 ± 0.4	13.0 ± 0.7	12.7 ± 0.7	0.98 ± 0.05
E-8	93	18.4 ± 1.5	14.4 ± 1.6	14.1 ± 1.6	1.08 ± 0.12
E-9	93	22.5 ± 1.3	18.5 ± 1.4	18.1 ± 1.4	1.39 ± 0.10
E-12	93	15.3 ± 0.8	11.2 ± 1.0	11.0 ± 1.0	0.85 ± 0.07
E-14	93	19.4 ± 1.4	15.4 ± 1.5	15.0 ± 1.5	1.16 ± 0.11
E-15	93	21.6 ± 0.4	17.6 ± 0.7	17.2 ± 0.7	1.32 ± 0.05
E-16	93	19.9 ± 0.5	15.9 ± 0.7	15.5 ± 0.7	1.19 ± 0.05
E-16B	93	21.5 ± 0.3	17.5 ± 0.6	17.1 ± 0.6	1.31 ± 0.05
E-17	93	20.0 ± 1.1	16.0 ± 1.2	15.6 ± 1.2	1.20 ± 0.09
E-18	93	22.3 ± 1.1	18.3 ± 1.2	17.9 ± 1.2	1.38 ± 0.09
E-22	93	20.8 ± 1.5	16.8 ± 1.6	16.4 ± 1.6	1.26 ± 0.12
E-23	93	20.6 ± 0.7	16.6 ± 0.9	16.3 ± 0.9	1.25 ± 0.07
E-24	93	18.7 ± 0.6	14.7 ± 0.8	14.4 ± 0.8	1.10 ± 0.06
E-25	93	18.3 ± 0.4	14.3 ± 0.7	14.0 ± 0.7	1.07 ± 0.05
E-26	93	17.0 ± 0.9	13.0 ± 1.1	12.7 ± 1.1	0.98 ± 0.08
E-26B	93	19.4 ± 0.7	15.4 ± 0.9	15.0 ± 0.8	1.16 ± 0.07
E-27	93	21.4 ± 0.4	17.4 ± 0.7	17.0 ± 0.7	1.31 ± 0.05
E-28	93	13.5 ± 0.6	9.5 ± 0.8	9.3 ± 0.8	0.71 ± 0.06
E-29	93	14.5 ± 1.1	10.5 ± 1.2	10.3 ± 1.2	0.79 ± 0.09
E-30	93	17.3 ± 1.0	13.3 ± 1.2	13.0 ± 1.1	1.00 ± 0.09
E-31	93	20.8 ± 0.5	16.8 ± 0.7	16.4 ± 0.7	1.26 ± 0.05
E-32	93	21.9 ± 0.7	17.8 ± 0.9	17.5 ± 0.9	1.34 ± 0.07
E-38	93	18.3 ± 0.9	14.3 ± 1.0	13.9 ± 1.0	1.07 ± 0.08
E-39	93	19.9 ± 1.2	15.9 ± 1.3	15.5 ± 1.3	1.20 ± 0.10
E-41	93	19.1 ± 0.9	15.1 ± 1.1	14.8 ± 1.0	1.14 ± 0.08
E-42	93	24.1 ± 0.9	20.1 ± 1.1	19.6 ± 1.0	1.51 ± 0.08
E-43	93	20.8 ± 1.2	16.8 ± 1.4	16.4 ± 1.3	1.26 ± 0.10
Control					
E-20	93	18.6 ± 1.3	14.6 ± 1.4	14.3 ± 1.4	1.10 ± 0.11
Mean±s.d.		19.3 ± 2.4	15.3 ± 2.4	15.0 ± 2.4	1.15 ± 0.18

In-Transit Exposure	Date Annealed	Date Read	ITC-1	ITC-2
	06-13-14	07-11-14	4.2 ± 0.3	4.5 ± 0.3
	09-16-14	10-14-14	4.0 ± 0.2	3.4 ± 0.3

[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

4th Quarter, 2014

Date Annealed:	09-16-14	Days in the field	90
Date Placed:	10-04-14	Days from Annealing	
Date Removed:	01-02-15	to Readout:	113
Date Read:	01-07-15		

Location	Days in Field	Total mR	Net mR	mR/Stnd Qtr (91 days)	Net mR per 7 days
Indicator					
E-1	90	14.2 ± 1.1	9.9 ± 1.3	10.0 ± 1.3	0.77 ± 0.10
E-2	90	18.6 ± 0.9	14.4 ± 1.1	14.5 ± 1.1	1.12 ± 0.09
E-3	90	20.2 ± 1.0	16.0 ± 1.2	16.2 ± 1.2	1.24 ± 0.09
E-4	90	17.4 ± 0.7	13.1 ± 0.9	13.3 ± 1.0	1.02 ± 0.07
E-5	90	18.5 ± 0.5	14.3 ± 0.8	14.4 ± 0.8	1.11 ± 0.06
E-6	90	15.2 ± 0.5	11.0 ± 0.8	11.1 ± 0.8	0.85 ± 0.06
E-7	90	16.2 ± 0.2	12.0 ± 0.7	12.1 ± 0.7	0.93 ± 0.05
E-8	90	16.7 ± 0.8	12.5 ± 1.0	12.6 ± 1.1	0.97 ± 0.08
E-9	90	18.1 ± 0.8	13.9 ± 1.0	14.0 ± 1.0	1.08 ± 0.08
E-12	90	14.4 ± 0.6	10.1 ± 0.8	10.2 ± 0.8	0.79 ± 0.06
E-14	90	18.3 ± 1.2	14.1 ± 1.4	14.2 ± 1.4	1.09 ± 0.11
E-15	90	20.9 ± 1.6	16.7 ± 1.7	16.9 ± 1.7	1.30 ± 0.13
E-16	90	20.2 ± 0.6	16.0 ± 0.9	16.2 ± 0.9	1.24 ± 0.07
E-16B	90	17.1 ± 0.2	12.8 ± 0.6	13.0 ± 0.6	1.00 ± 0.05
E-17	90	19.6 ± 0.9	15.4 ± 1.1	15.5 ± 1.1	1.20 ± 0.08
E-18	90	22.3 ± 0.6	18.0 ± 0.9	18.2 ± 0.9	1.40 ± 0.07
E-22	90	19.3 ± 0.7	15.1 ± 0.9	15.2 ± 0.9	1.17 ± 0.07
E-23	90	21.3 ± 0.6	17.0 ± 0.9	17.2 ± 0.9	1.33 ± 0.07
E-24	90	17.0 ± 0.3	12.8 ± 0.7	12.9 ± 0.7	0.99 ± 0.05
E-25	90	20.5 ± 0.3	16.2 ± 0.7	16.4 ± 0.7	1.26 ± 0.05
E-26	90	15.1 ± 0.7	10.8 ± 0.9	10.9 ± 0.9	0.84 ± 0.07
E-26B	90	16.2 ± 0.2	12.0 ± 0.6	12.1 ± 0.7	0.93 ± 0.05
E-27	90	19.8 ± 0.7	15.6 ± 0.9	15.7 ± 0.9	1.21 ± 0.07
E-28	90	14.4 ± 0.3	10.1 ± 0.7	10.2 ± 0.7	0.79 ± 0.05
E-29	90	14.4 ± 0.7	10.1 ± 1.0	10.2 ± 1.0	0.79 ± 0.07
E-30	90	16.5 ± 0.4	12.3 ± 0.7	12.4 ± 0.7	0.95 ± 0.06
E-31	90	20.5 ± 1.6	16.2 ± 1.7	16.4 ± 1.7	1.26 ± 0.13
E-32	90	20.3 ± 0.3	16.0 ± 0.7	16.2 ± 0.7	1.24 ± 0.05
E-38	90	17.5 ± 0.1	13.3 ± 0.6	13.4 ± 0.6	1.03 ± 0.05
E-39	90	18.0 ± 0.7	13.7 ± 1.0	13.9 ± 1.0	1.07 ± 0.07
E-41	90	15.9 ± 0.2	11.6 ± 0.7	11.8 ± 0.7	0.91 ± 0.05
E-42	90	19.1 ± 0.4	14.9 ± 0.8	15.0 ± 0.8	1.16 ± 0.06
E-43	90	18.7 ± 0.7	14.5 ± 0.9	14.6 ± 0.9	1.13 ± 0.07
Control					
E-20	90	17.8 ± 1.2	13.6 ± 1.4	13.7 ± 1.4	1.06 ± 0.11
Mean±s.d.		20.1 ± 1.5	13.7 ± 2.2	19.7 ± 1.5	1.07 ± 0.17

In-Transit Exposure	Date Annealed	Date Read	ITC-1	ITC-2
	09-16-14	10-14-14	4.0 ± 0.2	3.4 ± 0.3
	12-11-14	01-07-15	4.6 ± 0.4	5.0 ± 0.3

[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.

Annual Indicator Mean±s.d.	18.5 ± 2.5	13.9 ± 2.6	13.9 ± 2.5	1.1 ± 0.2
Annual Control Mean±s.d.	19.5 ± 1.7	14.9 ± 1.1	15.0 ± 1.3	1.2 ± 0.1
Annual Indicator/Control Mean±s.d.	18.5 ± 2.5	13.9 ± 2.6	13.9 ± 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
01-22-14		NS[a]		01-22-14		NS[a]	
02-26-14		NS[a]		02-26-14		NS[a]	
03-27-14		NS[a]		03-27-14	EWW-1193	230 ± 86	< 143
04-30-14	EWW-1858	117 ± 76	< 145	04-30-14	EWW-1859	254 ± 83	< 145
05-29-14	EWW-2366	101 ± 77	< 143	05-29-14	EWW-2367	246 ± 84	< 143
06-26-14	EWW-2994	86 ± 79	< 142	06-26-14	EWW-2995	266 ± 88	< 142
07-24-14	EWW-3653	98 ± 78	< 138	07-24-14	EWW-3654	110 ± 78	< 138
08-28-14	EWW-4514	230 ± 94	< 155	08-28-14	EWW-4515	168 ± 91	< 155
10-01-14	EWW-5273	119 ± 84	< 156	10-01-14	EWW-5274	133 ± 85	< 156
10-26-14	EWW-6173	14 ± 88	< 176	10-26-14	EWW-6174	165 ± 93	< 176
11-25-14		NS[a]		11-25-14	EWW-6672	148 ± 106	< 186
12-30-14	EWW-7200	95 ± 93	< 169	12-30-14		NS[a]	
Mean ± s.d.		108 ± 59		Mean ± s.d.		191 ± 58	

Sample ID	GW-03				GW-17		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
01-22-14		NS[a]		01-22-14		NS[a]	
02-26-14		NS[a]		02-26-14		NS[a]	
03-27-14		NS[a]		03-27-14		NS[a]	
04-30-14	EWW-1860	154 ± 78	< 145	04-30-14	EWW-1862	254 ± 83	< 145
05-29-14	EWW-2368	65 ± 75	< 143	05-29-14		NS[b]	
06-26-14	EWW-2996	105 ± 80	< 142	06-26-14	EWW-2998	231 ± 87	< 142
07-24-14	EWW-3655	71 ± 77	< 138	07-24-14	EWW-3657	110 ± 78	< 138
08-28-14	EWW-4516	98 ± 87	< 155	08-28-14		NS[b]	
10-01-14	EWW-5275	29 ± 79	< 156	10-01-14	EWW-5277	167 ± 87	< 156
10-26-14	EWW-6175	49 ± 89	< 176	10-26-14	EWW-6177	190 ± 94	< 176
11-25-14	EWW-6673	18 ± 99	< 186	11-25-14	EWW-6675	178 ± 108	< 186
12-30-14	EWW-7201	102 ± 93	< 169	12-30-14	EWW-7203	233 ± 98	< 169
Mean ± s.d.		77 ± 42		Mean ± s.d.		195 ± 49	

Wells

Sample ID	GW-04 (EIC Well)		
Collection Date	Lab Code	Tritium	MDC
01-22-14	EWW-248	-19 ± 79	< 151
02-26-14	EWW-722	16 ± 74	< 139
03-27-14	EWW-1194	-30 ± 73	< 143
04-30-14	EWW-1861	17 ± 71	< 145
05-29-14	EWW-2369	45 ± 73	< 143
06-26-14	EWW-2997	68 ± 78	< 142
07-24-14	EWW-3656	55 ± 76	< 138
08-28-14	EWW-4517	48 ± 84	< 155
10-01-14	EWW-5276	-5 ± 77	< 156
10-26-14	EWW-6176	-39 ± 85	< 175
11-25-14	EWW-6674	-54 ± 94	< 186
12-30-14	EWW-7202	99 ± 93	< 169
Mean ± s.d.		17 ± 47	

[a] Water frozen.
[b] No sample received.

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
01-10-14		NF[a]		01-10-14		NF[a]	
02-10-14		NF[a]		02-10-14		NF[a]	
03-10-14		NF[a]		03-10-14		NF[a]	
04-09-14	EWW- 1440	339 ± 92	< 143	04-09-14	EWW- 1441	333 ± 91	< 143
05-08-14	EWW- 2033	245 ± 82	< 144	05-08-14	EWW- 2034	261 ± 83	< 144
06-05-14	EWW- 2588	207 ± 81	< 140	06-05-14	EWW- 2589	228 ± 82	< 140
06-30-14	EWW- 3110	203 ± 81	< 142	06-30-14	EWW- 3111	287 ± 85	< 142
08-05-14	EWW- 4025	256 ± 110	< 193	08-05-14	EWW- 4026	332 ± 114	< 193
09-11-14	EWW- 4798	110 ± 86	< 152	09-11-14	EWW- 4799	235 ± 92	< 152
10-08-14	EWW- 5446	73 ± 82	< 158	10-08-14	EWW- 5447	252 ± 92	< 158
11-05-14	EWW- 6337	155 ± 117	< 179	11-05-14	EWW- 6338	255 ± 122	< 179
12-11-14	EWW- 6983	195 ± 100	< 177	12-11-14	EWW- 6985	237 ± 102	< 177
Mean ± s.d.		198 ± 80		Mean ± s.d.		269 ± 40	

Sample ID		S-7				S-8	
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
01-10-14		NF[a]		01-10-14		NF[a]	
02-10-14		NF[a]		02-10-14		NF[a]	
03-10-14		NF[a]		03-10-14		NF[a]	
04-09-14		NF[a]		04-09-14		NF[a]	
05-08-14		NF[a]		05-08-14		NF[a]	
06-05-14		NF[a]		06-05-14		NF[a]	
06-30-14		NF[a]		06-30-14		NF[a]	
08-05-14		NF[a]		08-05-14		NF[a]	
09-11-14		NF[a]		09-11-14		NF[a]	
10-08-14		NF[a]		10-08-14		NF[a]	
11-05-14		NF[a]		11-05-14		NF[a]	
12-11-14		NF[a]		12-11-14		NF[a]	
Mean ± s.d.				Mean ± s.d.			

Sample ID		S-9				S-10	
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
01-10-14		NF[a]		01-10-14		NF[a]	
02-10-14		NF[a]		02-10-14		NF[a]	
03-10-14		NF[a]		03-10-14		NF[a]	
04-09-14		NF[a]		04-09-14		NF[a]	
05-08-14		NF[a]		05-08-14		NF[a]	
06-05-14		NF[a]		06-05-14		NF[a]	
06-30-14		NF[a]		06-30-14		NF[a]	
08-05-14		NF[a]		08-05-14		NF[a]	
09-11-14		NF[a]		09-11-14		NF[a]	
10-08-14		NF[a]		10-08-14		NF[a]	
11-05-14		NF[a]		11-05-14		NF[a]	
12-11-14		NF[a]		12-11-14		NF[a]	
Mean ± s.d.				Mean ± s.d.			

[a] "NF" = No flow.

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

Beach Drains (cont.)

Sample ID	S-11			EX-SSD-N			
Collection Date	Lab Code	Tritium	MDC				
01-10-14		NF[a]		10-08-14	EWW- 5448	131 ± 86	< 158
02-10-14		NF[a]					
03-10-14		NF[a]					
04-09-14	EWW- 1442	310 ± 90	< 143				
05-08-14	EWW- 2035	157 ± 78	< 140				
06-05-14	EWW- 2590	98 ± 75	< 140				
06-30-14		NF[a]					
08-05-14		NF[a]					
09-11-14		NF[a]					
10-08-14		NF[a]					
11-05-14		NF[a]					
12-11-14		NF[a]					
Mean ± s.d.		188 ± 110					

U2 Façade Subsurface Drain Sump

Sample ID							
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
02-03-14	EW- 420	657 ± 101	< 144				
02-28-14	EW- 863	697 ± 107	< 146				
04-05-14	EW- 3131	1029 ± 112	< 136				
05-06-14	EW- 3132	688 ± 103	< 145				
05-15-14	EW- 2892	466 ± 94	< 142				
06-23-14	EW- 3209	1091 ± 117	< 144				
07-14-14	EW- 3484	482 ± 90	< 137				
08-28-14	EW- 4598	626 ± 111	< 177				
09-26-14	EW- 5268	524 ± 101	< 149				
10-24-14	EW- 6142	1120 ± 124	< 176				
11-20-14	EW- 6932	518 ± 114	< 172				
12-26-14	EW- 7368	789 ± 133	< 173				
Mean ± s.d.		724 ± 236					

[a] "NF" = No flow.

Beach Drains

Units: = pCi\L Gamma isotopic analysis

Location	S-1		S-3		S-7		S-8	
Collection Date	01-10-14		01-10-14		01-10-14		01-10-14	
Lab Code	NF[a]	MDC	NF[a]	MDC	NF[a]	MDC	NF[a]	MDC
Be-7	-		-		-		-	
Mn-54	-		-		-		-	
Fe-59	-		-		-		-	
Co-58	-		-		-		-	
Co-60	-		-		-		-	
Zn-65	-		-		-		-	
Zr-Nb-95	-		-		-		-	
Cs-134	-		-		-		-	
Cs-137	-		-		-		-	
Ba-La-140	-		-		-		-	

Location	S-9		S-10		S-11		S-1	
Collection Date	01-10-14		01-10-14		01-10-14		02-10-14	
Lab Code	NF[a]		NF[a]		NF[a]		NF[a]	
Be-7	-		-		-		-	
Mn-54	-		-		-		-	
Fe-59	-		-		-		-	
Co-58	-		-		-		-	
Co-60	-		-		-		-	
Zn-65	-		-		-		-	
Zr-Nb-95	-		-		-		-	
Cs-134	-		-		-		-	
Cs-137	-		-		-		-	
Ba-La-140	-		-		-		-	

Location	S-3		S-7		S-8		S-9	
Collection Date	02-10-14		02-10-14		02-10-14		02-10-14	
Lab Code	NF[a]		NF[a]		NF[a]		NF[a]	
Be-7	-		-		-		-	
Mn-54	-		-		-		-	
Fe-59	-		-		-		-	
Co-58	-		-		-		-	
Co-60	-		-		-		-	
Zn-65	-		-		-		-	
Zr-Nb-95	-		-		-		-	
Cs-134	-		-		-		-	
Cs-137	-		-		-		-	
Ba-La-140	-		-		-		-	

[a] "NF" = No flow.

Beach Drains (cont.)

Units: = pCi\L Gamma isotopic analysis

Location	S-10		S-11		S-1		S-3	
Collection Date	02-10-14		02-10-14		03-10-14		03-10-14	
Lab Code	NF[a]	MDC	NF[a]	MDC	NF[a]	MDC	NF[a]	MDC
Be-7	-		-		-		-	
Mn-54	-		-		-		-	
Fe-59	-		-		-		-	
Co-58	-		-		-		-	
Co-60	-		-		-		-	
Zn-65	-		-		-		-	
Zr-Nb-95	-		-		-		-	
Cs-134	-		-		-		-	
Cs-137	-		-		-		-	
Ba-La-140	-		-		-		-	

Location	S-7	S-8	S-9	S-10
Collection Date	03-10-14	03-10-14	03-10-14	03-10-14
Lab Code	NF[a]	NF[a]	NF[a]	NF[a]
Be-7	-	-	-	-
Mn-54	-	-	-	-
Fe-59	-	-	-	-
Co-58	-	-	-	-
Co-60	-	-	-	-
Zn-65	-	-	-	-
Zr-Nb-95	-	-	-	-
Cs-134	-	-	-	-
Cs-137	-	-	-	-
Ba-La-140	-	-	-	-

Location	S-11	S-1		S-3		S-7
Collection Date	03-10-14	04-09-14		04-09-14		03-10-14
Lab Code	NF[a]	EW- 1440		EW- 1441		NF[a]
Be-7	-	2.0 ± 12.7	< 33.4	11.3 ± 12.6	< 30.2	-
Mn-54	-	-0.2 ± 1.6	< 2.8	-0.8 ± 1.6	< 2.0	-
Fe-59	-	-0.2 ± 2.7	< 2.9	-0.2 ± 2.6	< 3.0	-
Co-58	-	-0.1 ± 1.2	< 1.5	-0.2 ± 1.5	< 2.1	-
Co-60	-	0.2 ± 1.4	< 1.5	-0.6 ± 1.6	< 1.6	-
Zn-65	-	-1.0 ± 2.2	< 2.3	-1.1 ± 2.7	< 3.7	-
Zr-Nb-95	-	1.9 ± 1.5	< 3.0	0.1 ± 1.7	< 2.6	-
Cs-134	-	-0.4 ± 1.7	< 3.1	-1.7 ± 1.6	< 3.1	-
Cs-137	-	-0.3 ± 1.5	< 2.4	0.0 ± 1.9	< 2.8	-
Ba-La-140	-	-1.9 ± 2.0	< 2.9	-0.9 ± 2.1	< 3.0	-

[a] "NF" = No flow.

Beach Drains (cont.)

Units: = pCi\L | Gamma isotopic analysis

Location	S-8		S-9		S-10		S-11	MDC
Collection Date	04-09-14		04-09-14		04-09-14		04-09-14	
Lab Code	NF[a]	MDC	NF[a]	MDC	NF[a]	MDC	EW- 1442	MDC
Be-7	-		-		-		-2.0 ± 11.7	< 27.7
Mn-54	-		-		-		1.2 ± 1.4	< 2.6
Fe-59	-		-		-		0.6 ± 2.5	< 4.1
Co-58	-		-		-		1.1 ± 1.3	< 2.4
Co-60	-		-		-		0.2 ± 1.7	< 1.8
Zn-65	-		-		-		-2.8 ± 3.1	< 2.8
Zr-Nb-95	-		-		-		0.9 ± 1.5	< 2.8
Cs-134	-		-		-		0.7 ± 1.5	< 2.5
Cs-137	-		-		-		-0.2 ± 1.5	< 2.4
Ba-La-140	-		-		-		-0.9 ± 1.5	< 1.6

Location	S-1		S-3		S-7		S-8	
Collection Date	05-08-14		05-08-14		05-08-14		05-08-14	
Lab Code	EW- 2033		EW- 2034		NF[a]		NF[a]	
Be-7	16.4 ± 16.0	< 30.7	11.2 ± 9.7	< 20.3	-		-	
Mn-54	1.0 ± 1.6	< 3.1	0.3 ± 1.2	< 2.4	-		-	
Fe-59	0.5 ± 3.4	< 3.8	-1.6 ± 1.9	< 2.9	-		-	
Co-58	-1.4 ± 1.5	< 1.9	0.4 ± 1.2	< 2.0	-		-	
Co-60	0.3 ± 1.8	< 2.1	0.3 ± 1.2	< 2.2	-		-	
Zn-65	-1.1 ± 3.5	< 2.7	-0.4 ± 2.3	< 3.3	-		-	
Zr-Nb-95	0.4 ± 1.7	< 4.5	-0.1 ± 1.2	< 2.4	-		-	
Cs-134	-0.9 ± 1.6	< 3.4	0.2 ± 1.1	< 2.1	-		-	
Cs-137	0.1 ± 1.9	< 3.3	-0.2 ± 1.2	< 2.0	-		-	
Ba-La-140	-1.7 ± 2.2	< 3.6	-1.5 ± 1.1	< 3.0	-		-	

Location	S-9		S-10		S-11		S-1	
Collection Date	05-08-14		05-08-14		05-08-14		06-05-14	
Lab Code	NF[a]		NF[a]		EW- 2035		EW- 2588	
Be-7	-		-		11.5 ± 19.9	< 42.0	-3.6 ± 12.1	< 32.8
Mn-54	-		-		-0.4 ± 1.9	< 2.7	0.1 ± 1.3	< 1.8
Fe-59	-		-		3.3 ± 4.1	< 8.2	-0.9 ± 2.2	< 2.7
Co-58	-		-		0.1 ± 1.9	< 4.1	-1.7 ± 1.3	< 1.8
Co-60	-		-		-0.4 ± 1.9	< 1.3	1.1 ± 1.4	< 2.6
Zn-65	-		-		1.2 ± 4.5	< 7.0	-1.1 ± 2.5	< 2.2
Zr-Nb-95	-		-		0.4 ± 1.9	< 4.7	0.9 ± 1.5	< 2.1
Cs-134	-		-		0.6 ± 2.0	< 4.2	0.8 ± 1.4	< 2.9
Cs-137	-		-		-0.6 ± 2.3	< 3.2	-0.1 ± 1.4	< 2.3
Ba-La-140	-		-		-2.6 ± 2.1	< 2.1	-0.9 ± 1.4	< 4.4

[a] "NF" = No flow.

POINT BEACH NUCLEAR PLANT

Beach Drains (cont.)

Units: = pCi\L — Gamma isotopic analysis

Location	S-3		S-7		S-8		S-9	
Collection Date	06-05-14		06-05-14		06-05-14		06-05-14	
Lab Code	EW- 2589	MDC	NF[a]	MDC	NF[a]	MDC	NF[a]	MDC
Be-7	-3.3 ± 9.1	< 18.7	-		-		-	
Mn-54	-0.1 ± 1.1	< 1.8	-		-		-	
Fe-59	1.1 ± 2.0	< 4.5	-		-		-	
Co-58	-0.4 ± 1.1	< 2.4	-		-		-	
Co-60	1.2 ± 1.2	< 2.2	-		-		-	
Zn-65	-0.8 ± 2.1	< 3.7	-		-		-	
Zr-Nb-95	-1.1 ± 1.1	< 2.0	-		-		-	
Cs-134	0.0 ± 1.1	< 2.3	-		-		-	
Cs-137	-0.1 ± 1.3	< 2.0	-		-		-	
Ba-La-140	-2.9 ± 1.2	< 3.8	-		-		-	

Location	S-10		S-11		S-1		S-3	
Collection Date	06-05-14		06-05-14		06-30-14		06-30-14	
Lab Code	NF[a]		EW- 2590		EW- 3110		EW- 3111	
Be-7	-		-3.7 ± 8.8	< 18.2	-2.0 ± 13.0	< 26.1	2.3 ± 11.7	< 28.2
Mn-54	-		0.8 ± 1.2	< 2.1	0.1 ± 1.5	< 2.8	0.2 ± 1.8	< 2.5
Fe-59	-		1.6 ± 2.1	< 5.1	1.1 ± 2.8	< 4.5	-1.0 ± 2.8	< 4.4
Co-58	-		-1.3 ± 1.2	< 1.6	-0.5 ± 1.5	< 2.3	-0.3 ± 1.5	< 2.4
Co-60	-		0.3 ± 1.0	< 1.9	1.3 ± 1.9	< 2.6	-0.6 ± 1.5	< 2.5
Zn-65	-		0.2 ± 2.2	< 2.2	-2.0 ± 3.2	< 4.6	0.1 ± 3.3	< 5.5
Zr-Nb-95	-		-0.1 ± 1.2	< 2.4	-0.7 ± 1.6	< 2.1	1.7 ± 1.7	< 3.8
Cs-134	-		-0.9 ± 1.1	< 2.2	-1.6 ± 1.8	< 3.4	1.0 ± 1.6	< 3.0
Cs-137	-		-0.2 ± 1.3	< 1.9	0.5 ± 1.9	< 2.9	1.5 ± 1.9	< 3.5
Ba-La-140	-		-1.4 ± 1.1	< 4.4	-0.7 ± 1.7	< 3.4	-0.2 ± 2.1	< 4.7

Location	S-7	S-8	S-9	S-10
Collection Date	06-30-14	06-30-14	06-30-14	06-30-14
Lab Code	NF[a]	NF[a]	NF[a]	NF[a]
Be-7	-	-	-	-
Mn-54	-	-	-	-
Fe-59	-	-	-	-
Co-58	-	-	-	-
Co-60	-	-	-	-
Zn-65	-	-	-	-
Zr-Nb-95	-	-	-	-
Cs-134	-	-	-	-
Cs-137	-	-	-	-
Ba-La-140	-	-	-	-

[a] "NF" = No flow.

Beach Drains (cont.)

Units: = pCi\L — Gamma isotopic analysis

Location	S-11		S-1		S-3		S-7	
Collection Date	06-30-14		08-05-14		08-05-14		08-05-14	
Lab Code	NF[a]	MDC	EW- 4025	MDC	EW- 4026	MDC	NF[a]	MDC
Be-7	-		-7.3 ± 18.8	< 41.1	14.1 ± 19.6	< 54.3	-	
Mn-54	-		0.2 ± 2.0	< 2.9	-1.1 ± 2.0	< 2.7	-	
Fe-59	-		4.1 ± 3.5	< 5.9	-6.3 ± 3.8	< 2.1	-	
Co-58	-		-1.6 ± 2.2	< 2.3	0.0 ± 2.2	< 3.6	-	
Co-60	-		0.2 ± 2.2	< 2.7	0.7 ± 2.0	< 1.4	-	
Zn-65	-		-3.5 ± 5.0	< 7.2	2.0 ± 4.8	< 6.3	-	
Zr-Nb-95	-		-2.4 ± 2.2	< 4.5	1.7 ± 2.1	< 5.1	-	
Cs-134	-		0.8 ± 1.9	< 3.9	1.1 ± 2.0	< 4.6	-	
Cs-137	-		0.0 ± 2.2	< 3.8	-0.4 ± 2.7	< 3.0	-	
Ba-La-140	-		1.2 ± 1.7	< 3.1	-3.2 ± 2.5	< 3.1	-	

Location	S-8	S-9	S-10	S-11
Collection Date	08-05-14	08-05-14	08-05-14	08-05-14
Lab Code	NF[a]	NF[a]	NF[a]	NF[a]
Be-7	-	-	-	-
Mn-54	-	-	-	-
Fe-59	-	-	-	-
Co-58	-	-	-	-
Co-60	-	-	-	-
Zn-65	-	-	-	-
Zr-Nb-95	-	-	-	-
Cs-134	-	-	-	-
Cs-137	-	-	-	-
Ba-La-140	-	-	-	-

Location	S-1		S-3		S-7	S-8
Collection Date	09-11-14		09-11-14		09-11-14	09-11-14
Lab Code	EW- 4798		EW- 4799		NF[a]	NF[a]
Be-7	-5.3 ± 16.3	< 31.2	-3.5 ± 16.8	< 32.6	-	-
Mn-54	0.3 ± 1.7	< 3.2	-0.5 ± 1.6	< 2.3	-	-
Fe-59	-3.0 ± 3.6	< 4.6	1.4 ± 3.5	< 4.3	-	-
Co-58	-1.2 ± 1.8	< 2.7	1.2 ± 1.6	< 1.6	-	-
Co-60	-0.1 ± 1.8	< 2.1	-1.6 ± 1.9	< 2.4	-	-
Zn-65	-3.3 ± 3.9	< 4.9	-3.2 ± 4.1	< 6.4	-	-
Zr-Nb-95	0.1 ± 1.7	< 3.8	1.2 ± 1.7	< 3.7	-	-
Cs-134	0.3 ± 1.9	< 3.7	0.3 ± 1.8	< 3.5	-	-
Cs-137	-0.7 ± 2.0	< 2.8	1.0 ± 2.1	< 4.5	-	-
Ba-La-140	-1.3 ± 1.7	< 2.9	3.4 ± 1.9	< 5.2	-	-

[a] "NF" = No flow.

Beach Drains (cont.)

Units: = pCi\L — Gamma isotopic analysis

Location	S-9		S-10		S-11		S-1	
Collection Date	09-11-14		09-11-14		09-11-14		10-08-14	
Lab Code	NF[a]	MDC	NF[a]	MDC	NF[a]	MDC	EW- 5446	MDC
Be-7	-		-		-		2.3 ± 4.4	< 12.7
Mn-54	-		-		-		-0.3 ± 0.6	< 0.9
Fe-59	-		-		-		-0.4 ± 1.0	< 2.8
Co-58	-		-		-		0.7 ± 0.5	< 1.3
Co-60	-		-		-		-0.2 ± 0.6	< 1.1
Zn-65	-		-		-		0.1 ± 1.1	< 1.8
Zr-Nb-95	-		-		-		-0.7 ± 0.6	< 1.6
Cs-134	-		-		-		-0.3 ± 0.6	< 1.1
Cs-137	-		-		-		0.1 ± 0.7	< 1.1
Ba-La-140	-		-		-		0.1 ± 0.6	< 4.0

Location	S-3		S-7		S-8		S-9	
Collection Date	10-08-14		10-08-14		10-08-14		10-08-14	
Lab Code	EW- 5447		NF[a]		NF[a]		NF[a]	
Be-7	1.2 ± 4.6	< 11.5	-		-		-	
Mn-54	-0.5 ± 0.6	< 0.8	-		-		-	
Fe-59	-0.6 ± 0.9	< 2.4	-		-		-	
Co-58	0.6 ± 0.5	< 1.5	-		-		-	
Co-60	0.0 ± 0.6	< 0.9	-		-		-	
Zn-65	0.1 ± 1.1	< 2.1	-		-		-	
Zr-Nb-95	-0.3 ± 0.6	< 2.0	-		-		-	
Cs-134	0.4 ± 0.6	< 1.1	-		-		-	
Cs-137	0.3 ± 0.7	< 1.3	-		-		-	
Ba-La-140	-1.8 ± 0.7	< 2.7	-		-		-	

Location	S-10		S-11		EX-SSD-N		S-1	
Collection Date	10-08-14		10-08-14		10-08-14		11-05-14	
Lab Code	NF[a]		NF[a]		EW- 5448		EW- 6337	
Be-7	-		-		-4.1 ± 10.6	< 27.5	-8.7 ± 16.3	< 16.0
Mn-54	-		-		0.1 ± 1.3	< 1.6	-0.7 ± 1.4	< 1.9
Fe-59	-		-		-0.7 ± 2.6	< 3.6	-1.2 ± 3.5	< 5.6
Co-58	-		-		0.6 ± 1.3	< 2.5	0.4 ± 1.6	< 2.6
Co-60	-		-		1.2 ± 1.1	< 1.9	-0.3 ± 1.7	< 1.8
Zn-65	-		-		-1.0 ± 2.8	< 4.5	-0.6 ± 4.1	< 5.1
Zr-Nb-95	-		-		-1.2 ± 1.3	< 3.3	-1.2 ± 1.8	< 3.2
Cs-134	-		-		0.6 ± 1.2	< 2.2	0.6 ± 1.7	< 3.4
Cs-137	-		-		0.1 ± 1.6	< 2.7	1.0 ± 1.7	< 2.7
Ba-La-140	-		-		-4.0 ± 1.6	< 6.8	-1.4 ± 1.5	< 1.3

[a] "NF" = No flow.

Beach Drains (cont.)

Units: = pCi\L — Gamma isotopic analysis

Location	S-3		S-7	S-8	S-9
Collection Date	11-05-14		11-05-14	11-05-14	11-05-14
Lab Code	EW- 6338	MDC	NF[a]	NF[a]	NF[a]
Be-7	8.4 ± 13.4	< 29.7	-	-	-
Mn-54	-0.1 ± 1.8	< 3.2	-	-	-
Fe-59	-0.3 ± 3.1	< 5.7	-	-	-
Co-58	0.2 ± 1.7	< 2.2	-	-	-
Co-60	0.5 ± 1.7	< 2.4	-	-	-
Zn-65	-1.4 ± 3.4	< 4.6	-	-	-
Zr-Nb-95	-2.5 ± 1.9	< 2.1	-	-	-
Cs-134	-0.4 ± 1.6	< 2.8	-	-	-
Cs-137	-0.2 ± 1.9	< 3.0	-	-	-
Ba-La-140	-0.6 ± 1.9	< 1.8	-	-	-

Location	S-10	S-11	S-1		S-3	
Collection Date	11-05-14	11-05-14	12-11-14		12-11-14	
Lab Code	NF[a]	NF[a]	EW- 6983	MDC	EW- 6985	MDC
Be-7	-	-	-3.6 ± 12.3	< 24.3	11.4 ± 14.3	< 28.9
Mn-54	-	-	-0.2 ± 1.3	< 1.3	-1.3 ± 1.6	< 2.1
Fe-59	-	-	0.6 ± 2.2	< 2.9	4.0 ± 3.0	< 6.7
Co-58	-	-	-0.5 ± 1.0	< 1.9	0.3 ± 1.4	< 2.1
Co-60	-	-	-0.6 ± 1.4	< 0.8	0.9 ± 1.1	< 1.8
Zn-65	-	-	-1.4 ± 2.4	< 1.4	-1.7 ± 3.5	< 3.3
Zr-Nb-95	-	-	-0.4 ± 1.5	< 3.1	0.3 ± 1.5	< 3.6
Cs-134	-	-	-0.9 ± 1.3	< 2.0	0.1 ± 1.6	< 3.1
Cs-137	-	-	-0.1 ± 1.7	< 2.2	0.0 ± 1.8	< 3.5
Ba-La-140	-	-	-0.5 ± 1.3	< 3.4	0.5 ± 1.6	< 3.7

Location	S-7	S-8	S-9	S-10
Collection Date	12-11-14	12-11-14	12-11-14	12-11-14
Lab Code	NF[a]	NF[a]	NF[a]	NF[a]
Be-7	-	-	-	-
Mn-54	-	-	-	-
Fe-59	-	-	-	-
Co-58	-	-	-	-
Co-60	-	-	-	-
Zn-65	-	-	-	-
Zr-Nb-95	-	-	-	-
Cs-134	-	-	-	-
Cs-137	-	-	-	-
Ba-La-140	-	-	-	-

[a] "NF" = No flow.

Beach Drains (cont.)

Units: = pCi\L — Gamma isotopic analysis

Location	S-11
Collection Date	12-11-14
Lab Code	NF[a]
Be-7	-
Mn-54	-
Fe-59	-
Co-58	-
Co-60	-
Zn-65	-
Zr-Nb-95	-
Cs-134	-
Cs-137	-
Ba-La-140	-

Annual

All locations	**Mean ± s.d.**		**Mean ± s.d.**		**Mean ± s.d.**		**Mean ± s.d.**
Be-7	**2.3 ± 7.7**	**Co-58**	**-0.2 ± 0.9**	**Zr/Nb-95**	**0.0 ± 1.2**	**Ba/La-140**	**-0.9 ± 1.5**
Mn-54	**-0.1 ± 0.6**	**Co-60**	**0.1 ± 0.7**	**Cs-134**	**0.0 ± -0.8**		
Fe-59	**0.1 ± 2.2**	**Zn-65**	**-1.0 ± 1.4**	**Cs-137**	**0.1 ± 0.5**		

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
01-09-14	EWW- 80	14 ± 94	< 153	01-09-14	EWW- 81	30 ± 94	< 153
04-16-14	EWW- 1525	-36 ± 74	< 144	04-16-14	EWW- 1526	-6 ± 75	< 144
07-10-14	EWW- 3294	-17 ± 70	< 143	07-10-14	EWW- 3295	-21 ± 70	< 143
10-15-14	EWW- 5689	-21 ± 82	< 158	10-15-14	EWW- 5690	-28 ± 81	< 158
Mean ± s.d.		-15 ± 21		Mean ± s.d.		-6 ± 26	

Sample ID	GW-11 (MW-1)				GW-12 (MW-2)		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
02-04-14	EWW- 3134	66 ± 70	< 137	04-08-14	EWW- 3140	-8 ± 65	< 136
06-30-14	EWW- 3139	133 ± 72	< 134	07-22-14	EWW- 3660	-61 ± 69	< 138
07-22-14	EWW- 3659	61 ± 76	< 138	10-21-14	EWW- 6167	49 ± 89	< 176
10-21-14	EWW- 6166	66 ± 90	< 176				
Mean ± s.d.		82 ± 34		Mean ± s.d.		-7 ± 55	

Sample ID	GW-13 (MW-6)				GW-14A (MW-05A)		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
02-04-14	EWW- 3135	32 ± 68	< 137	02-04-14	EWW- 3136	96 ± 72	< 137
04-08-14	EWW- 3141	69 ± 69	< 136	04-08-14	EWW- 3142	83 ± 70	< 136
07-22-14	EWW- 3661	81 ± 77	< 138	07-22-14	EWW- 3662	112 ± 79	< 138
10-21-14	EWW- 6168	38 ± 89	< 176	10-21-14	EWW- 6169	148 ± 93	< 176
Mean ± s.d.		55 ± 24		Mean ± s.d.		110 ± 28	

Sample ID	GW-15 (MW-4)				GW-15A (MW-4)		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
02-04-14	EWW- 3137	253 ± 80	< 137	02-04-14	EWW- 3138	243 ± 79	< 137
04-08-14	EWW- 3143	171 ± 75	< 136	04-08-14	EWW- 3144	250 ± 79	< 136
07-22-14	EWW- 3663	191 ± 82	< 138	10-21-14	EWW- 6170	208 ± 95	< 176
10-21-14	EWW- 6171	229 ± 96	< 176 (15B)				
Mean ± s.d.		211 ± 37		Mean ± s.d.		234 ± 23	

Sample ID	GW-16A (MW-3)				GW-16B (MW-3)		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
06-30-14	EWW- 3145	206 ± 76	< 134	07-22-14	EWW- 3665	222 ± 84	< 138
07-22-14	EWW- 3664	234 ± 85	< 138				
10-21-14	EWW- 6172	195 ± 95	< 176				
Mean ± s.d.		212 ± 20		Mean ± s.d.			

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
01-09-14	EWW- 82	38 ± 95	< 153				
04-16-14	EWW- 1527	-30 ± 74	< 144				
07-10-14	EWW- 3296	19 ± 72	< 143				
10-15-14	EWW- 5691	-61 ± 79	< 158				
Mean ± s.d.		-9 ± 46		Mean ± s.d.			

Façade Wells

Sample ID	GW-09 1Z-361A				GW-09 1Z-361B		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
03-15-14	EWW- 1253	325 ± 91	< 143	03-15-14	EWW- 1254	143 ± 83	< 143
04-06-14	EWW- 1568	28 ± 72	< 146	04-06-14	EWW- 1569	131 ± 77	< 146
06-25-14	EWW- 3210	258 ± 84	< 144	06-25-14	EWW- 3211	328 ± 88	< 144
07-16-14	EWW- 3480	301 ± 83	< 136	07-16-14	EWW- 3481	224 ± 80	< 136
08-19-14	EWW- 4519	322 ± 96	< 151	08-19-14	EWW- 4520	82 ± 84	< 151
11-17-14	EWW- 6644	375 ± 106	< 170	11-17-14	EWW- 6645	219 ± 96	< 170
Mean ± s.d.		268 ± 124		Mean ± s.d.		188 ± 88	

Sample ID	GW-10 2Z-361A				GW-10 2Z-361B		
Collection Date	Lab Code	Tritium	MDC	Collection Date	Lab Code	Tritium	MDC
03-15-14		NS[a]		03-15-14	EWW- 1255	119 ± 81	< 143
04-06-14	EWW- 1570	-14 ± 69	< 146	04-06-14	EWW- 1571	270 ± 84	< 146
06-25-14	EWW- 3212	431 ± 92	< 144	06-25-14	EWW- 3213	202 ± 82	< 144
07-16-14	EWW- 3482	8 ± 68	< 136	07-16-14	EWW- 3483	87 ± 72	< 136
08-19-14	EWW- 4521	-14 ± 78	< 151	08-19-14	EWW- 4523	145 ± 87	< 151
11-17-14	EWW- 6646	-51 ± 78	< 170	11-17-14	EWW- 6647	87 ± 88	< 170
Mean ± s.d.		72 ± 219		Mean ± s.d.		152 ± 72	

(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
05-08-14	EWW- 2041	73 ± 73	< 144	05-08-14	EWW- 2042	393 ± 89	< 144

[a] Water frozen.

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)
05-01-14		NS[a]		05-01-14		NS[a]	
11-19-14		NS[a]		11-19-14		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)
05-01-14		NS[a]		05-01-14		NS[a]	
11-19-14		NS[a]		11-19-14		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)
05-01-14	EW- 2047	331 ± 86	< 145	05-01-14	EW- 2048	29 ± 71	< 145
11-19-14	EW- 7478	133 ± 101	< 186	11-19-14		NS[a]	
Mean ± s.d.		232 ± 140		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)
05-01-14	EW- 2049	25 ± 71	< 145	05-01-14	EW- 2050	215 ± 81	< 145
11-19-14		NS[a]		11-19-14		NS[a]	
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)
05-01-14	EW- 2051	253 ± 83	< 145	05-01-14	EW- 2052	37 ± 72	< 145
11-19-14	EW- 7479	272 ± 109	< 186	11-19-14		NS[a]	
Mean ± s.d.		263 ± 13		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)
05-01-14	EW- 2053	205 ± 80	< 145	05-01-14	EW- 2054	51 ± 72	< 145
11-19-14		NS[a]		11-19-14		NS[a]	
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)
05-01-14	EW- 2055	243 ± 82	< 145	05-01-14		NS[a]	
11-19-14	EW- 7480	219 ± 106	< 186	11-19-14		NS[a]	
Mean ± s.d.		231 ± 17		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)
05-01-14		NS[a]		05-01-14		NS[a]	
11-19-14		NS[a]		11-19-14		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)
05-01-14		NS[a]		05-01-14		NS[a]	
11-19-14		NS[a]		11-19-14		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)
05-01-14		NS[a]		05-01-14		NS[a]	
11-19-14		NS[a]		11-19-14		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)
05-01-14		NS[a]		05-01-14		NS[a]	
11-19-14		NS[a]		11-19-14		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, 2014 through December, 2014

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	5.0 pCi/liter
	> 100 pCi/liter or kg	5% of known value
Strontium-89[b]	5 to 50 pCi/liter or kg	5.0 pCi/liter
	> 50 pCi/liter or kg	10% of known value
Strontium-90[b]	2 to 30 pCi/liter or kg	5.0 pCi/liter
	> 30 pCi/liter or kg	10% of known value
Potassium-40	≥ 0.1 g/liter or kg	5% of known value
Gross alpha	≤ 20 pCi/liter	5.0 pCi/liter
	> 20 pCi/liter	25% of known value
Gross beta	≤ 100 pCi/liter	5.0 pCi/liter
	> 100 pCi/liter	5% of known value
Tritium	≤ 4,000 pCi/liter	$\pm 1\sigma = 169.85 \times (\text{known})^{0.0933}$
	> 4,000 pCi/liter	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	6 pCi/liter
	> 55 pCi/liter	10% of known value
Uranium-238, Nickel-63[b] Technetium-99[b]	≤ 35 pCi/liter	6 pCi/liter
	> 35 pCi/liter	15% of known value
Iron-55[b]	50 to 100 pCi/liter	10 pCi/liter
	> 100 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-1384	4/7/2014	Sr-89	40.29 ± 5.76	36.70	27.50 ± 43.60	Pass
ERW-1384	4/7/2014	Sr-90	24.08 ± 2.35	26.50	19.20 ± 30.90	Pass
ERW-1385	4/7/2014	Ba-133	78.23 ± 3.93	87.90	74.00 ± 96.70	Pass
ERW-1385	4/7/2014	Co-60	62.75 ± 3.53	64.20	57.80 ± 73.10	Pass
ERW-1385	4/7/2014	Cs-134	44.97 ± 3.99	44.30	35.50 ± 48.70	Pass
ERW-1385	4/7/2014	Cs-137	88.54 ± 4.93	89.10	80.20 ± 101.00	Pass
ERW-1385	4/7/2014	Zn-65	249.1 ± 10.4	235.0	212.0 - 275.0	Pass
ERW-1388	4/7/2014	Gr. Alpha	56.70 ± 2.47	61.00	31.90 ± 75.80	Pass
ERW-1388	4/7/2014	Gr. Beta	32.10 ± 1.20	33.00	21.40 ± 40.70	Pass
ERW-1391	4/7/2014	I-131	25.52 ± 1.12	25.70	21.30 ± 30.30	Pass
ERW-1394	4/7/2014	Ra-226	12.30 ± 0.61	12.40	9.26 ± 14.30	Pass
ERW-1394	4/7/2014	Ra-228	5.08 ± 1.16	4.26	2.46 ± 5.86	Pass
ERW-1394	4/7/2014	Uranium	10.76 ± 0.74	10.20	7.95 ± 11.80	Pass
ERW-1397	4/7/2014	H-3	8982 ± 279	8770	7610 - 9650	Pass
ERW-5382	10/6/2014	Sr-89	29.40 ± 5.32	31.40	22.80 ± 38.10	Pass
ERW-5382	10/6/2014	Sr-90	19.19 ± 1.85	21.80	15.60 ± 25.70	Pass
ERW-5385	10/6/2014	Ba-133	43.54 ± 4.54	49.10	40.30 ± 54.50	Pass
ERW-5385	10/6/2014	Cs-134	81.95 ± 7.49	89.80	73.70 ± 98.80	Pass
ERW-5385	10/6/2014	Cs-137	95.76 ± 5.50	98.80	88.90 ± 111.00	Pass
ERW-5385	10/6/2014	Co-60	90.25 ± 2.77	92.10	82.90 ± 104.00	Pass
ERW-5385	10/6/2014	Zn-65	327.4 ± 23.3	310.0	279.0 - 362.0	Pass
ERW-5388	10/6/2014	Gr. Alpha	30.88 ± 8.05	37.60	19.40 ± 46.10	Pass
ERW-5388	10/6/2014	G. Beta	20.47 ± 4.75	27.40	17.30 ± 35.30	Pass
ERW-5392	10/6/2014	I-131	19.58 ± 2.35	20.30	16.80 ± 24.40	Pass
ERW-5394	10/6/2014	Ra-226	15.10 ± 1.81	14.70	11.00 ± 16.90	Pass
ERW-5394	10/6/2014	Ra-228	4.42 ± 0.86	4.31	2.50 ± 5.92	Pass
ERW-5394	10/6/2014	Uranium	5.51 ± 0.37	5.80	4.34 ± 6.96	Pass
ERW-5397	10/6/2014	H-3	6876 ± 383	6880	5940 - 7570	Pass

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

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

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

TABLE 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.						
2014-1	5/15/2014	50 cm.	26.83	34.43 ± 3.76	18.78 - 34.88	Pass
2014-1	5/15/2014	60 cm.	18.63	22.20 ± 1.16	13.04 - 24.22	Pass
2014-1	5/15/2014	70 cm.	13.69	14.74 ± 0.80	9.58 - 17.80	Pass
2014-1	5/15/2014	75 cm.	11.93	12.68 ± 1.05	8.35 - 15.51	Pass
2014-1	5/15/2014	80 cm.	10.48	11.81 ± 0.91	7.34 - 13.62	Pass
2014-1	5/15/2014	90 cm.	8.28	7.72 ± 0.71	5.80 - 10.76	Pass
2014-1	5/15/2014	100 cm.	6.71	6.46 ± 0.71	4.70 - 8.72	Pass
2014-1	5/15/2014	110 cm.	5.54	5.25 ± 1.03	3.88 - 7.20	Pass
2014-1	5/15/2014	120 cm.	4.66	4.76 ± 0.48	3.26 - 6.06	Pass
2014-1	5/15/2014	135 cm.	3.68	2.87 ± 0.46	2.58 - 4.78	Pass
2014-1	5/15/2014	150 cm.	2.98	2.30 ± 0.15	2.09 - 3.87	Pass
2014-1	5/15/2014	165 cm.	2.46	2.09 ± 0.28	1.72 - 3.20	Pass
2014-1	5/15/2014	180 cm.	2.07	1.75 ± 0.21	1.45 - 2.69	Pass
Environmental, Inc.						
2014-2	12/9/2014	30 cm.	77.04	84.03 ± 8.47	53.90 - 100.20	Pass
2014-2	12/9/2014	30 cm.	77.04	83.74 ± 12.02	53.90 - 100.20	Pass
2014-2	12/9/2014	60 cm.	19.26	20.39 ± 2.37	13.50 - 25.00	Pass
2014-2	12/9/2014	60 cm.	19.26	20.33 ± 1.19	13.50 - 25.00	Pass
2014-2	12/9/2014	120 cm.	4.82	5.15 ± 0.20	3.40 - 6.30	Pass
2014-2	12/9/2014	120 cm.	4.82	5.20 ± 0.45	3.40 - 6.30	Pass
2014-2	12/9/2014	150 cm.	3.08	3.84 ± 0.61	2.20 - 4.00	Pass
2014-2	12/9/2014	150 cm.	3.08	3.17 ± 0.38	2.20 - 4.00	Pass
2014-2	12/9/2014	150 cm.	3.08	3.31 ± 0.32	2.00 - 4.00	Pass
2014-2	12/9/2014	180 cm.	2.14	2.27 ± 0.51	1.50 - 2.80	Pass
2014-2	12/9/2014	180 cm.	2.14	2.23 ± 0.12	1.50 - 2.80	Pass
2014-2	12/9/2014	180 cm.	2.14	2.74 ± 0.48	1.50 - 2.80	Pass
2014-2	12/9/2014	180 cm.	2.14	1.97 ± 0.41	1.50 - 2.80	Pass

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

Lab Code [b]	Date	Concentration (pCi/L)[a]				
		Analysis	Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance
SPW-1011	1/13/2014	Ra-228	35.47 ± 2.55	30.85	21.60 - 40.11	Pass
SPAP-103	1/13/2014	Gr. Beta	43.91 ± 0.34	44.82	26.89 - 62.75	Pass
SPAP-105	1/13/2014	Cs-134	2.46 ± 0.67	2.82	1.69 - 3.95	Pass
SPAP-105	1/13/2014	Cs-137	102.4 ± 2.7	99.9	89.9 - 109.9	Pass
SPW-107	1/13/2014	H-3	62,380 ± 707	62,246	49,797 - 74,695	Pass
SPW-129	1/15/2014	Cs-134	69.90 ± 3.71	78.00	68.00 - 88.00	Pass
SPW-129	1/15/2014	Cs-137	84.36 ± 7.06	75.77	65.77 - 85.77	Pass
SPW-129	1/15/2014	Sr-90	39.48 ± 1.52	39.20	31.36 - 47.04	Pass
SPW-130	1/15/2014	Ni-63	255.8 ± 3.8	204.0	142.8 - 265.2	Pass
SPW-133	1/15/2014	C-14	3153 ± 15	4737	2842 - 6632	Pass
SPMI-135	1/15/2014	Cs-134	76.80 ± 4.04	78.00	68.00 - 88.00	Pass
SPMI-135	1/15/2014	Cs-137	80.44 ± 6.63	75.80	65.80 - 85.80	Pass
W-12014	1/20/2014	Gr. Alpha	19.69 ± 0.41	20.00	10.00 - 30.00	Pass
W-12014	1/20/2014	Gr. Beta	30.35 ± 0.33	30.90	20.90 - 40.90	Pass
SPW-297	1/29/2014	Tc-99	104.2 ± 1.7	107.8	75.5 - 140.2	Pass
SPW-657	2/25/2014	Ra-226	15.84 ± 0.45	16.70	11.69 - 21.71	Pass
SPW-1127	3/26/2014	U-238	43.28 ± 2.56	41.72	29.20 - 54.24	Pass
SPW-1917	3/28/2014	Pu-238	27.37 ± 2.13	23.80	14.28 - 33.32	Pass
SPW-1786	4/25/2014	Tc-99	531.1 ± 8.7	539.15	377.41 - 700.90	Pass
SPW-2168	5/21/2014	Cs-134	70.90 ± 5.81	69.50	59.50 - 79.50	Pass
SPW-2168	5/21/2014	Cs-137	79.72 ± 6.49	75.17	65.17 - 85.17	Pass
SPW-2168	5/21/2014	Sr-89	83.35 ± 5.05	72.85	58.28 - 87.42	Pass
SPW-2168	5/21/2014	Sr-90	33.37 ± 1.52	38.87	31.10 - 46.64	Pass
SPMI-2170	5/21/2014	Cs-134	64.15 ± 4.93	69.50	59.50 - 79.50	Pass
SPMI-2170	5/21/2014	Cs-137	76.21 ± 6.91	75.17	65.17 - 85.17	Pass
SPMI-2170	5/21/2014	Sr-89	65.82 ± 4.89	72.85	58.28 - 87.42	Pass
SPMI-2170	5/21/2014	Sr-90	40.90 ± 1.59	38.87	31.10 - 46.64	Pass
SPW-2792	6/18/2014	U-238	44.80 ± 1.54	41.70	29.19 - 54.21	Pass
SPW-2796	6/18/2014	C-14	3495 ± 9	4,737	2,842 - 6632	Pass
WW-2836	6/30/2014	Co-60	131.8 ± 6.9	140.90	126.81 - 154.99	Pass
WW-2836	6/30/2014	Cs-137	143.8 ± 9.1	145.60	131.04 - 160.16	Pass
WW-2836	6/30/2014	H-3	6220 ± 238	6,361	5,089 - 7633	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-3486	7/17/2014	Fe-55	2211 ± 72	2319	1855 - 2783	Pass
SPW-080714	8/7/2014	Gr. Alpha	18.42 ± 0.40	20.10	10.05 - 30.15	Pass
SPW-080714	8/7/2014	Gr. Beta	31.70 ± 0.40	32.40	22.40 - 42.40	Pass
SPW-081214	8/12/2014	Pu-238	22.59 ± 2.15	22.70	18.16 - 27.24	Pass
SPW-4093	8/13/2014	I-131(G)	59.95 ± 6.17	59.62	49.62 - 69.62	Pass
SPW-4093	8/13/2014	Sr-90	39.46 ± 1.55	38.65	28.65 - 48.65	Pass
SPW-4093	8/13/2014	Sr-89	105.5 ± 4.9	115.0	92.0 - 149.5	Pass
SPMI-4095	8/13/2014	I-131(G)	59.92 ± 6.17	59.62	49.62 - 69.62	Pass
SPMI-4095	8/13/2014	I-131	60.05 ± 0.72	59.62	47.70 - 71.54	Pass
SPW-4104	8/13/2014	Ni-63	200.1 ± 3.4	203.2	142.2 - 264.1	Pass
SPW-4106	8/13/2014	H-3	59,597 ± 695	60,261	48209 - 72313	Pass
SPW-4108	8/13/2014	Cs-134	2.45 ± 0.81	2.32	0.00 - 12.32	Pass
SPW-4108	8/13/2014	Cs-137	90.20 ± 3.74	98.56	88.56 - 108.56	Pass
SPAP-4110	8/13/2014	Gr. Beta	43.65 ± 0.11	44.19	34.19 - 54.19	Pass
SPF-4112	8/13/2014	I-131	2.64 ± 0.38	2.86	0.00 - 12.86	Pass
SPF-4112	8/13/2014	Cs-134	0.91 ± 0.03	1.03	0.00 - 11.03	Pass
SPF-4112	8/13/2014	Cs-137	2.61 ± 0.06	2.39	0.00 - 12.39	Pass
SPW-081414	8/14/2014	H-3	14,663 ± 788	17,700	14160 - 21240	Pass
W081614	8/16/2014	Ra-226	14.30 ± 0.37	16.70	11.69 - 21.71	Pass
W082614	8/26/2014	Ra-228	27.18 ± 2.13	30.49	20.49 - 40.49	Pass
SPW-090414	9/4/2014	Gr. Alpha	17.85 ± 0.39	20.10	10.05 - 30.15	Pass
SPW-090414	9/4/2014	Gr. Beta	30.03 ± 0.33	30.90	20.90 - 40.90	Pass
SPW-5124	9/29/2014	Ra-228	32.93 ± 2.38	31.94	21.94 - 41.94	Pass
W100714	10/7/2014	Gr. Alpha	18.56 ± 0.40	20.10	10.05 - 30.15	Pass
W100714	10/7/2014	Gr. Beta	27.71 ± 0.32	30.90	20.90 - 40.90	Pass
W111014	11/10/2014	Gr. Alpha	17.84 ± 0.38	20.10	10.05 - 30.15	Pass
W111014	11/10/2014	Gr. Beta	30.12 ± 0.33	30.90	20.90 - 40.90	Pass
W112514	11/25/2014	Ra-226	16.63 ± 0.41	16.70	11.69 - 21.71	Pass
W120814	12/8/2014	Gr. Alpha	19.29 ± 0.41	20.10	10.05 - 30.15	Pass
W120814	12/8/2014	Gr. Beta	27.93 ± 0.32	30.90	20.90 - 40.90	Pass
SPW-7149	12/26/2014	Ni-63	217.53 ± 3.25	203.10	142.17 - 264.03	Pass

[a] Liquid sample results are reported in pCi/Liter, air filters(pCi/m3), 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-1001	Water	1/13/2014	Ra-228	0.74	0.39 ± 0.39	2
SPAP-102	Air Particulate	1/13/2014	Gr. Beta	0.003	0.015 ± 0.003	0.01
SPAP-104	Air Particulate	1/13/2014	Cs-134	0.006	0.005 ± 0.005	0.05
SPAP-104	Air Particulate	1/13/2014	Cs-137	0.004	-0.002 ± 0.005	0.05
SPW-106	Water	1/13/2014	H-3	151.0	115.0 ± 97.0	200
SPW-128	Water	1/15/2014	Cs-134	2.85	0.59 ± 1.46	10
SPW-128	Water	1/15/2014	Cs-137	2.52	0.68 ± 1.64	10
SPW-128	Water	1/15/2014	Sr-90	0.61	0.74 ± 0.36	1
SPW-130	Water	1/15/2014	Ni-63	10.85	1.57 ± 6.60	20
SPW-133	Water	1/15/2014	C-14	13.51	3.10 ± 8.27	200
SPMI-134	Milk	1/15/2014	Cs-134	4.43	0.14 ± 2.46	10
SPMI-134	Milk	1/15/2014	Cs-137	1.92	-2.07 ± 2.48	10
W-12014	Water	1/20/2014	Gr. Alpha	0.48	-0.31 ± 0.31	2
W-12014	Water	1/20/2014	Gr. Beta	0.78	-0.24 ± 0.54	4
SPW-297	Water	1/29/2014	Tc-99	5.63	-4.42 ± 3.34	10
SPW-656	Water	2/25/2014	Ra-226	0.03	0.01 ± 0.02	1
SPW-1126	Water	3/26/2014	U-238	0.13	0.08 ± 0.12	1
SPW-1127	Water	3/26/2014	U-233/234	0.13	0.11 ± 0.13	1
SPW-1127	Water	3/26/2014	U-238	0.00	0.08 ± 0.12	1
SPW-1917	Water	3/28/2014	Pu-238	0.02	0.01 ± 0.01	1
SPW-1785	Water	4/25/2014	Tc-99	5.61	-4.33 ± 3.33	10
SPW-1831	Water	4/30/2014	I-131	0.21	0.07 ± 0.12	0.5
SPW-2167	Water	5/21/2014	Cs-134	2.29	-0.79 ± 1.35	10
SPW-2167	Water	5/21/2014	Cs-137	2.46	0.36 ± 1.48	10
SPW-2167	Water	5/21/2014	I-131(G)	2.77	0.25 ± 1.53	20
SPW-2167	Water	5/21/2014	Sr-89	0.81	0.01 ± 0.62	5
SPW-2167	Water	5/21/2014	Sr-90	0.52	0.03 ± 0.24	1
SPMI-2169	Milk	5/21/2014	Cs-134	4.45	-0.55 ± 2.39	10
SPMI-2169	Milk	5/21/2014	Cs-137	3.91	-0.52 ± 2.60	10
SPMI-2169	Milk	5/21/2014	I-131(G)	4.31	2.57 ± 2.21	20
SPMI-2169	Milk	5/21/2014	Sr-89	0.98	-0.02 ± 0.83	5
SPMI-2169	Milk	5/21/2014	Sr-90	0.61	0.35 ± 0.32	1
SPW-2793	Water	6/18/2014	U-238	0.08	0.02 ± 0.06	1

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-3485	Water	7/17/2014	Fe-55	597.6	10.3 ± 363.3	1000
SPW-4092	Water	8/13/2014	I-131(G)	3.59	0.91 ± 1.95	20
SPW-4092	Water	8/13/2014	Cs-134	3.71	-0.31 ± 1.77	10
SPW-4092	Water	8/13/2014	Cs-137	2.71	-2.20 ± 1.98	10
SPW-4092	Water	8/13/2014	Sr-89	0.89	0.11 ± 0.63	5
SPW-4092	Water	8/13/2014	Sr-90	0.52	-0.05 ± 0.23	1
SPMI-4094	Milk	8/13/2014	I-131	0.35	0.03 ± 0.20	0.5
SPMI-4094	Milk	8/13/2014	I-131(G)	4.50	-0.41 ± 2.44	20
SPMI-4094	Milk	8/13/2014	Cs-134	4.30	-0.84 ± 2.02	10
SPMI-4094	Milk	8/13/2014	Cs-137	3.45	0.96 ± 2.51	10
SPMI-4094	Milk	8/13/2014	Sr-89	0.80	-0.19 ± 0.79	5
SPMI-4094	Milk	8/13/2014	Sr-90	0.47	0.71 ± 0.30	1
SPW-4103	Water	8/13/2014	Ni-63	0.12	0.02 ± 0.07	20
SPW-4105	Water	8/13/2014	H-3	138.1	104.1 ± 78.1	200
SPW-4107	Water	8/13/2014	I-131(G)	3.21	-3.68 ± 1.33	20
SPW-4107	Water	8/13/2014	Cs-134	2.72	-0.62 ± 1.49	10
SPW-4107	Water	8/13/2014	Cs-137	2.56	0.75 ± 1.62	10
SPAP-4109	Air Particulate	8/13/2014	Gr. Beta	0.004	-0.003 ± 0.00	0.01
SPF-4111	Fish	8/13/2014	Cs-134	0.01	0.00 ± 0.01	100
SPF-4111	Fish	8/13/2014	Cs-137	0.01	-0.01 ± 0.01	100
SPF-4111	Fish	8/13/2014	Co-60	0.01	0.00 ± 0.01	100
W-081614	Water	8/16/2014	Ra-226	0.04	0.05 ± 0.03	1
W-082614	Water	8/16/2014	Ra-228	0.62	0.29 ± 0.40	2
W-092314	Water	9/23/2014	Ra-226	0.02	0.04 ± 0.02	1
W-5123	Water	9/29/2014	Ra-228	0.70	0.43 ± 0.38	2
W-100714	Water	10/7/2014	Gr. Alpha	0.39	0.04 ± 0.28	2
W-100714	Water	10/7/2014	Gr. Beta	0.76	-0.06 ± 0.53	4
W-111014	Water	11/10/2014	Gr. Alpha	0.39	0.01 ± 0.28	2
W-111014	Water	11/10/2014	Gr. Beta	0.75	-0.25 ± 0.52	4
W-112514	Water	11/25/2014	Ra-226	0.05	0.02 ± 0.03	2
W-120814	Water	12/8/2014	Gr. Alpha	0.42	0.04 ± 0.30	2
W-120814	Water	12/8/2014	Gr. Beta	0.74	-0.42 ± 0.51	4
SPW-7148	Water	12/26/2014	Ni-63	10.80	-1.80 ± 6.50	20

[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

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
AP-7829, 7830	1/2/2014	Be-7	0.08 ± 0.02	0.06 ± 0.01	0.07 ± 0.01	Pass
AP-7913, 7914	1/2/2014	Be-7	0.07 ± 0.01	0.06 ± 0.01	0.06 ± 0.01	Pass
AP-7871, 7872	1/3/2014	Be-7	0.05 ± 0.02	0.06 ± 0.01	0.06 ± 0.01	Pass
S-43, 44	1/9/2014	K-40	19.28 ± 0.57	19.24 ± 0.57	19.26 ± 0.40	Pass
SG-64, 65	1/9/2014	Gr. Alpha	686.08 ± 69.97	642.46 ± 65.59	664.27 ± 47.95	Pass
SG-64, 65	1/9/2014	Ra-226	97.30 ± 9.78	92.20 ± 9.27	94.75 ± 6.74	Pass
SG-64, 65	1/9/2014	Ra-228	91.90 ± 9.30	97.10 ± 9.87	94.50 ± 6.78	Pass
S-136, 137	1/13/2014	Be-7	14.90 ± 0.39	14.88 ± 0.38	14.89 ± 0.27	Pass
S-136, 137	1/13/2014	K-40	3.29 ± 0.36	3.93 ± 0.36	3.61 ± 0.25	Pass
WW-220, 221	1/13/2014	H-3	231.85 ± 80.45	273.46 ± 82.47	252.66 ± 57.60	Pass
WW-262, 263	1/21/2014	H-3	294.80 ± 89.80	265.00 ± 88.47	279.90 ± 63.03	Pass
WW-346, 347	1/24/2014	H-3	934.97 ± 118.47	965.59 ± 119.52	950.28 ± 84.14	Pass
SWU-367, 368	1/29/2014	Gr. Beta	0.74 ± 0.38	1.31 ± 0.42	1.02 ± 0.28	Pass
F-409, 410	2/2/2014	Cs-137	0.05 ± 0.02	0.05 ± 0.02	0.05 ± 0.01	Pass
F-409, 410	2/2/2014	Gr. Beta	3.60 ± 0.07	3.72 ± 0.07	3.66 ± 0.05	Pass
AP-7829, 7830	1/2/2014	Be-7	0.08 ± 0.02	0.06 ± 0.01	0.07 ± 0.01	Pass
AP-7913, 7914	1/2/2014	Be-7	0.07 ± 0.01	0.06 ± 0.01	0.06 ± 0.01	Pass
AP-7871, 7872	1/3/2014	Be-7	0.05 ± 0.02	0.06 ± 0.01	0.06 ± 0.01	Pass
S-43, 44	1/9/2014	K-40	19.28 ± 0.57	19.24 ± 0.57	19.26 ± 0.40	Pass
SG-64, 65	1/9/2014	Gr. Alpha	686.08 ± 69.97	642.46 ± 65.59	664.27 ± 47.95	Pass
SG-64, 65	1/9/2014	Ra-226	97.30 ± 9.78	92.20 ± 9.27	94.75 ± 6.74	Pass
SG-64, 65	1/9/2014	Ra-228	91.90 ± 9.30	97.10 ± 9.87	94.50 ± 6.78	Pass
S-136, 137	1/13/2014	Be-7	14.90 ± 0.39	14.88 ± 0.38	14.89 ± 0.27	Pass
S-136, 137	1/13/2014	K-40	3.29 ± 0.36	3.93 ± 0.36	3.61 ± 0.25	Pass
WW-220, 221	1/13/2014	H-3	231.85 ± 80.45	273.46 ± 82.47	252.66 ± 57.60	Pass
WW-262, 263	1/21/2014	H-3	294.80 ± 89.80	265.00 ± 88.47	279.90 ± 63.03	Pass
WW-346, 347	1/24/2014	H-3	934.97 ± 118.47	965.59 ± 119.52	950.28 ± 84.14	Pass
SWU-367, 368	1/29/2014	Gr. Beta	0.74 ± 0.38	1.31 ± 0.42	1.02 ± 0.28	Pass
F-409, 410	2/2/2014	Cs-137	0.05 ± 0.02	0.05 ± 0.02	0.05 ± 0.01	Pass
F-409, 410	2/2/2014	Gr. Beta	3.60 ± 0.07	3.72 ± 0.07	3.66 ± 0.05	Pass
WW-491, 492	2/6/2014	H-3	474.00 ± 101.10	583.10 ± 105.30	528.55 ± 72.99	Pass
WW-575, 576	2/13/2014	H-3	196.69 ± 82.94	154.68 ± 80.89	175.69 ± 57.93	Pass
W-617, 618	2/14/2014	H-3	526.29 ± 97.65	579.51 ± 99.77	552.90 ± 69.80	Pass
SWU-743, 744	2/25/2014	Gr. Beta	1.61 ± 0.65	1.73 ± 0.71	1.67 ± 0.48	Pass
S-700, 701	2/26/2014	K-40	21.32 ± 0.64	21.15 ± 0.59	21.24 ± 0.44	Pass
S-806, 807	3/4/2014	K-40	24.79 ± 0.57	24.17 ± 0.59	24.48 ± 0.41	Pass
SG-928, 929	3/11/2014	Ac-228	6.78 ± 0.34	6.94 ± 0.35	6.86 ± 0.24	Pass
SG-928, 929	3/11/2014	Bi-214	5.32 ± 0.20	5.34 ± 0.22	5.33 ± 0.15	Pass
SG-928, 929	3/11/2014	K-40	4.79 ± 0.80	6.24 ± 1.01	5.52 ± 0.64	Pass
SG-928, 929	3/11/2014	Pb-212	2.70 ± 0.09	2.75 ± 0.09	2.73 ± 0.06	Pass
SG-928, 929	3/11/2014	Pb-214	5.39 ± 0.17	5.53 ± 0.17	5.46 ± 0.12	Pass
SG-928, 929	3/11/2014	Th-228	6.10 ± 2.07	4.76 ± 1.93	5.43 ± 1.42	Pass
SG-928, 929	3/11/2014	Tl-208	0.92 ± 0.06	0.91 ± 0.06	0.92 ± 0.04	Pass

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

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
S-2119, 2120	3/12/2014	Ac-228	0.76 ± 0.20	0.73 ± 0.21	0.75 ± 0.15	Pass
S-2119, 2120	3/12/2014	Cs-137	0.13 ± 0.05	0.11 ± 0.05	0.12 ± 0.04	Pass
S-2119, 2120	3/12/2014	K-40	17.48 ± 1.48	18.39 ± 1.53	17.94 ± 1.06	Pass
S-2119, 2120	3/12/2014	Pb-214	0.73 ± 0.18	0.63 ± 0.12	0.68 ± 0.11	Pass
F-1594, 1595	3/16/2014	Cs-137	0.02 ± 0.01	0.03 ± 0.02	0.03 ± 0.01	Pass
SO-1115, 1116	3/18/2014	Cs-137	0.06 ± 0.01	0.06 ± 0.00	0.06 ± 0.00	Pass
SO-1115, 1116	3/18/2014	Gr. Beta	23.30 ± 2.10	24.40 ± 2.20	23.85 ± 1.52	Pass
SO-1115, 1116	3/18/2014	K-40	12.63 ± 0.18	12.84 ± 0.15	12.74 ± 0.12	Pass
SO-1115, 1116	3/18/2014	U-233/4	0.11 ± 0.02	0.12 ± 0.02	0.12 ± 0.01	Pass
SO-1115, 1116	3/18/2014	U-238	0.13 ± 0.02	0.14 ± 0.02	0.14 ± 0.01	Pass
S-1033, 1034	3/19/2014	Ac-228	0.99 ± 0.20	1.13 ± 0.26	1.06 ± 0.16	Pass
S-1033, 1034	3/19/2014	Bi-214	1.02 ± 0.18	0.98 ± 0.16	1.00 ± 0.12	Pass
S-1033, 1034	3/19/2014	Cs-137	0.15 ± 0.04	0.14 ± 0.04	0.15 ± 0.03	Pass
S-1033, 1034	3/19/2014	K-40	15.39 ± 1.19	15.13 ± 1.19	15.26 ± 0.84	Pass
S-1033, 1034	3/19/2014	Pb-214	1.09 ± 0.13	0.88 ± 0.17	0.99 ± 0.11	Pass
S-1033, 1034	3/19/2014	Tl-208	0.36 ± 0.05	0.31 ± 0.05	0.34 ± 0.04	Pass
W-1094, 1095	3/23/2014	Ra-226	0.30 ± 0.20	0.70 ± 0.20	0.50 ± 0.14	Pass
W-1094, 1095	3/23/2014	Ra-228	1.10 ± 0.79	1.13 ± 0.86	1.12 ± 0.58	Pass
AP-1197, 1198	3/27/2014	Be-7	0.17 ± 0.08	0.14 ± 0.08	0.15 ± 0.05	Pass
AP-1698, 1699	3/31/2014	Be-7	0.06 ± 0.02	0.07 ± 0.02	0.07 ± 0.01	Pass
E-1218, 1219	4/1/2014	Gr. Beta	1.57 ± 0.04	1.57 ± 0.04	1.57 ± 0.03	Pass
E-1218, 1219	4/1/2014	K-40	1.26 ± 0.14	1.31 ± 0.18	1.29 ± 0.11	Pass
SWU-1260, 1261	4/1/2014	Gr. Beta	2.81 ± 0.51	2.94 ± 0.50	2.88 ± 0.36	Pass
AP-1615, 1616	4/1/2014	Be-7	0.07 ± 0.01	0.07 ± 0.02	0.07 ± 0.01	Pass
AP-1657, 1658	4/2/2014	Be-7	0.07 ± 0.01	0.08 ± 0.01	0.07 ± 0.01	Pass
AP-1804, 1805	4/3/2014	Be-7	0.05 ± 0.02	0.06 ± 0.01	0.06 ± 0.01	Pass
P-1489, 1490	4/7/2014	H-3	582.31 ± 101.85	505.07 ± 98.72	543.69 ± 70.92	Pass
BS-1531, 1532	4/16/2014	K-40	0.51 ± 0.19	0.58 ± 0.23	0.54 ± 0.15	Pass
S-1909, 1910	4/22/2014	K-40	14.71 ± 0.54	14.78 ± 0.53	14.75 ± 0.38	Pass
SWU-1867, 1868	4/29/2014	Gr. Beta	2.28 ± 0.40	1.67 ± 0.35	1.98 ± 0.27	Pass
AP-1930, 1931	5/1/2014	Be-7	0.16 ± 0.09	0.19 ± 0.11	0.17 ± 0.07	Pass
SL-1888, 1889	5/1/2014	Be-7	0.80 ± 0.04	0.76 ± 0.08	0.78 ± 0.05	Pass
SL-1888, 1889	5/1/2014	Cs-137	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	Pass
SL-1888, 1889	5/1/2014	Gr. Beta	11.57 ± 0.72	12.67 ± 0.78	12.12 ± 0.53	Pass
SL-1888, 1889	5/1/2014	K-40	1.04 ± 0.05	1.00 ± 0.09	1.02 ± 0.05	Pass
SO-1972, 1973	5/1/2014	Cs-137	0.12 ± 0.03	0.10 ± 0.02	0.11 ± 0.02	Pass
SO-1972, 1973	5/1/2014	Gr. Alpha	7.51 ± 3.24	9.09 ± 3.63	8.30 ± 2.43	Pass
SO-1972, 1973	5/1/2014	Gr. Beta	29.89 ± 3.25	31.42 ± 3.04	30.66 ± 2.23	Pass
SO-1972, 1973	5/1/2014	K-40	20.45 ± 0.85	20.88 ± 0.76	20.66 ± 0.57	Pass
W-617, 618	5/8/2014	H-3	175.13 ± 83.82	177.17 ± 83.92	176.15 ± 59.31	Pass
AP-2077, 2078	5/8/2014	Be-7	0.23 ± 0.11	0.18 ± 0.11	0.20 ± 0.08	Pass

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

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
S-2205, 2206	5/15/2014	Be-7	0.50 ± 0.19	0.70 ± 0.18	0.60 ± 0.13	Pass
S-2205, 2206	5/15/2014	K-40	33.60 ± 0.79	33.52 ± 0.70	33.56 ± 0.53	Pass
VE-2184, 2185	5/19/2014	Be-7	0.62 ± 0.18	0.53 ± 0.17	0.58 ± 0.12	Pass
VE-2184, 2185	5/19/2014	K-40	5.30 ± 0.44	5.14 ± 0.44	5.22 ± 0.31	Pass
DW-50102, 50103	5/20/2014	Ra-226	7.07 ± 0.76	8.31 ± 0.90	7.69 ± 0.59	Pass
DW-50102, 50103	5/20/2014	Ra-228	5.44 ± 0.85	6.02 ± 0.67	5.73 ± 0.54	Pass
SW-2226, 2227	5/21/2014	H-3	14318.00 ± 347.00	14350.00 ± 347.00	14334.00 ± 245.37	Pass
DW-50087, 50088	5/21/2014	Gr. Alpha	1.76 ± 1.09	2.67 ± 1.01	2.22 ± 0.74	Pass
DW-50090, 50091	5/21/2014	Ra-226	0.61 ± 0.09	0.47 ± 0.09	0.54 ± 0.06	Pass
DW-50090, 50091	5/21/2014	Ra-228	0.97 ± 0.41	1.26 ± 0.52	1.12 ± 0.33	Pass
DW-50098, 50099	5/21/2014	Gr. Alpha	13.04 ± 1.36	10.76 ± 1.26	11.90 ± 0.93	Pass
AP-2289, 2290	5/22/2014	Be-7	0.14 ± 0.08	0.24 ± 0.10	0.19 ± 0.06	Pass
PM-3174, 3175	5/28/2014	K-40	30.68 ± 1.30	32.64 ± 1.24	31.66 ± 0.90	Pass
G-2415, 2416	6/2/2014	Be-7	0.73 ± 0.16	0.62 ± 0.28	0.68 ± 0.16	Pass
G-2415, 2416	6/2/2014	Gr. Beta	5.89 ± 0.09	5.90 ± 0.09	5.89 ± 0.06	Pass
G-2415, 2416	6/2/2014	K-40	5.30 ± 0.49	5.19 ± 0.65	5.25 ± 0.41	Pass
WW-2541, 2542	6/4/2014	H-3	5107.00 ± 223.00	5029.00 ± 222.00	5068.00 ± 157.33	Pass
SW-2817, 2818	6/16/2014	H-3	13303.00 ± 336.00	13130.00 ± 334.00	13216.50 ± 236.88	Pass
SS-2943, 2944	6/24/2014	K-40	11.49 ± 0.79	11.81 ± 0.70	11.65 ± 0.53	Pass
S-3048, 3049	6/27/2014	K-40	42.51 ± 1.31	40.04 ± 1.39	41.28 ± 0.95	Pass
SWT-3216, 3217	7/1/2014	Gr. Beta	2.27 ± 0.94	2.53 ± 1.05	2.40 ± 0.70	Pass
AP-3699,3700	7/3/2014	Be-7	0.06 ± 0.01	0.07 ± 0.02	0.07 ± 0.01	Pass
S-3300, 3301	7/8/2014	K-40	4.85 ± 0.97	5.91 ± 1.17	5.38 ± 0.76	Pass
S-3300, 3301	7/8/2014	Ac-228	10.23 ± 0.43	10.18 ± 0.32	10.21 ± 0.27	Pass
S-3300, 3301	7/8/2014	Ra-226	70.14 ± 2.37	72.01 ± 2.38	71.08 ± 1.68	Pass
VE-3237,3238	7/8/2014	K-40	2.54 ± 0.27	2.63 ± 0.24	2.59 ± 0.18	Pass
CF-3384,3385	7/14/2014	K-40	11.10 ± 0.58	10.69 ± 0.60	10.90 ± 0.42	Pass
S-3447,3448	7/16/2014	K-40	19.63 ± 0.64	21.03 ± 0.96	20.33 ± 0.58	Pass
WW-3573,3574	7/18/2014	H-3	381.58 ± 85.76	401.30 ± 86.67	391.44 ± 60.96	Pass
VE-3594,3595	7/22/2014	K-40	3.04 ± 0.19	3.21 ± 0.15	3.13 ± 0.12	Pass
WW-3762,3763	7/25/2014	H-3	315.47 ± 87.02	327.30 ± 87.56	321.39 ± 61.72	Pass
SWT-3867, 3868	7/29/2014	Gr. Beta	1.10 ± 0.53	1.51 ± 0.58	1.31 ± 0.39	Pass
S-3804, 3805	7/30/2014	Ac-228	0.67 ± 0.11	0.61 ± 0.10	0.64 ± 0.07	Pass
S-3804, 3805	7/30/2014	Pb-214	0.56 ± 0.05	0.51 ± 0.04	0.54 ± 0.03	Pass
LW-3931, 3932	7/31/2014	Gr. Beta	1.04 ± 0.40	0.95 ± 0.41	1.00 ± 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
G-3952,3953	8/4/2014	K-40	5.42 ± 0.42	5.35 ± 0.34	5.38 ± 0.27	Pass
G-3952,3953	8/4/2014	Be-7	1.29 ± 0.19	1.24 ± 0.16	1.27 ± 0.13	Pass
G-3952,3953	8/4/2014	Gr. Beta	8.53 ± 0.20	8.63 ± 0.20	8.58 ± 0.14	Pass
G-3952,3953	8/4/2014	H-3	140.16 ± 93.50	127.25 ± 92.99	133.70 ± 65.94	Pass
WW-4036, 4037	8/5/2014	H-3	190.60 ± 82.60	164.70 ± 81.30	177.65 ± 57.95	Pass
VE-4204,4205	8/11/2014	K-40	6.28 ± 0.38	6.60 ± 0.37	6.44 ± 0.27	Pass
WW-4394,4395	8/13/2014	H-3	1540.26 ± 136.52	1499.15 ± 135.43	1519.71 ± 96.15	Pass
VE-4183,4184	8/14/2014	K-40	5.70 ± 0.41	5.73 ± 0.34	5.72 ± 0.27	Pass
AV-4455, 4456	8/22/2014	Be-7	286.67 ± 102.30	251.99 ± 98.94	269.33 ± 71.16	Pass
AV-4455, 4456	8/22/2014	K-40	2547.90 ± 255.70	2201.40 ± 203.90	2374.65 ± 163.52	Pass
WW-4500, 4501	8/26/2014	H-3	347.00 ± 100.00	321.00 ± 98.00	334.00 ± 70.01	Pass
AP-090214A/B	9/2/2014	Gr. Beta	0.03 ± 0.04	0.03 ± 0.04	0.03 ± 0.00	Pass
SG-5089, 5090	9/19/2014	Ac-228	8.26 ± 0.63	9.48 ± 0.68	8.87 ± 0.46	Pass
SG-5089, 5090	9/19/2014	Bi-214	4.71 ± 0.29	4.41 ± 0.31	4.56 ± 0.21	Pass
SG-5194,5	10/1/2014	Gr. Alpha	276.20 ± 9.51	258.60 ± 9.26	267.40 ± 6.64	Pass
SG-5194,5	10/1/2014	Pb-214	43.56 ± 0.73	43.94 ± 0.78	43.75 ± 0.53	Pass
SG-5194,5	10/1/2014	Ac-228	59.90 ± 1.37	62.80 ± 1.73	61.35 ± 1.10	Pass
S-5632,3	10/8/2014	K-40	19.28 ± 0.88	17.94 ± 0.89	18.61 ± 0.63	Pass
S-5632,3	10/8/2014	Cs-137	0.15 ± 0.03	0.13 ± 0.03	0.14 ± 0.02	Pass
S-5632,3	10/8/2014	Tl-208	0.32 ± 0.03	0.34 ± 0.03	0.33 ± 0.02	Pass
S-5632,3	10/8/2014	Pb-212	0.92 ± 0.05	0.92 ± 0.05	0.92 ± 0.03	Pass
S-5632,3	10/8/2014	Pb-214	1.25 ± 0.08	1.09 ± 0.09	1.17 ± 0.06	Pass
S-5632,3	10/8/2014	Bi-212	1.25 ± 0.29	1.34 ± 0.47	1.29 ± 0.27	Pass
S-5632,3	10/8/2014	Ac-228	1.08 ± 0.14	1.10 ± 0.14	1.09 ± 0.10	Pass
DW-50243,4	10/13/2014	Gr. Alpha	2.99 ± 0.94	4.98 ± 1.17	3.99 ± 0.75	Pass
AP-101414A/B	10/14/2014	Gr. Beta	0.02 ± 0.00	0.02 ± 0.00	0.02 ± 0.00	Pass
SG-5590,1	10/15/2014	Pb-214	80.30 ± 8.08	73.40 ± 7.51	76.85 ± 5.52	Pass
SG-5590,1	10/15/2014	Ac-228	64.50 ± 1.87	62.80 ± 1.15	63.65 ± 1.10	Pass
DW-50251,2	10/16/2014	Ra-226	0.55 ± 0.13	0.32 ± 0.10	0.44 ± 0.08	Pass
U-5842,3	10/20/2014	H-3	7376 ± 949	7342 ± 947	7359 ± 670	Pass
CF-6074,5	10/21/2014	H-3	7509 ± 283	7969 ± 291	7739 ± 203	Pass
CF-6074,5	10/21/2014	K-40	3.09 ± 0.31	3.30 ± 0.38	3.20 ± 0.25	Pass

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

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
VE-6269,70	11/3/2014	K-40	6.25 ± 0.54	6.56 ± 0.49	6.41 ± 0.36	Pass
VE-6269,70	11/3/2014	Be-7	0.81 ± 0.28	0.74 ± 0.18	0.77 ± 0.17	Pass
SO-6500,1	11/5/2014	Sr-90	0.07 ± 0.03	0.07 ± 0.02	0.07 ± 0.02	Pass
SO-6500,1	11/5/2014	Gr. Alpha	11.77 ± 1.73	12.18 ± 1.62	11.98 ± 1.19	Pass
SO-6500,1	11/5/2014	Gr. Beta	26.69 ± 1.62	24.19 ± 1.13	25.44 ± 0.99	Pass
SO-6500,1	11/5/2014	U-233/4	0.14 ± 0.04	0.14 ± 0.05	0.14 ± 0.03	Pass
SO-6500,1	11/5/2014	U-238	0.18 ± 0.05	0.13 ± 0.04	0.15 ± 0.03	Pass
SO-6500,1	11/5/2014	Th-228	0.47 ± 0.11	0.34 ± 0.06	0.41 ± 0.06	Pass
SO-6500,1	11/5/2014	Th-230	0.38 ± 0.07	0.29 ± 0.05	0.34 ± 0.04	Pass
SO-6500,1	11/5/2014	Th-232	0.41 ± 0.08	0.41 ± 0.06	0.41 ± 0.05	Pass
SO-6500,1	11/5/2014	Bi-214	0.75 ± 0.02	0.78 ± 0.02	0.77 ± 0.01	Pass
SO-6500,1	11/5/2014	Pb-214	0.78 ± 0.08	0.86 ± 0.09	0.82 ± 0.06	Pass
SO-6500,1	11/5/2014	Ac-228	1.02 ± 0.11	1.13 ± 0.13	1.08 ± 0.09	Pass
SO-6500,1	11/5/2014	Cs-137	0.40 ± 0.01	0.39 ± 0.01	0.39 ± 0.01	Pass
DW-50262,3	11/10/2014	Gr. Alpha	8.95 ± 1.26	7.84 ± 1.24	8.40 ± 0.88	Pass
DW-50264,5	11/10/2014	Ra-226	3.89 ± 0.24	3.71 ± 0.20	3.80 ± 0.16	Pass
DW-50264,5	11/10/2014	Ra-228	2.96 ± 0.63	2.33 ± 0.59	2.65 ± 0.43	Pass
AP-120214A/B	12/2/2014	Gr. Beta	0.03 ± 0.00	0.03 ± 0.00	0.03 ± 0.00	Pass
AP-120814A/B	12/8/2014	Gr. Beta	0.03 ± 0.01	0.03 ± 0.01	0.03 ± 0.00	Pass
SG-7068,9	12/19/2014	Pb-214	4.27 ± 0.23	4.38 ± 0.33	4.33 ± 0.20	Pass
SG-7068,9	12/19/2014	Ac-228	2.72 ± 0.36	3.27 ± 0.49	3.00 ± 0.30	Pass
S-7152,3	12/25/2014	K-40	20.83 ± 0.88	20.16 ± 0.62	20.49 ± 0.54	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-1140	2/1/2014	Gr. Alpha	0.77 ± 0.06	0.85	0.26 - 1.44	Pass
MAW-1140	2/1/2014	Gr. Beta	4.31 ± 0.08	4.19	2.10 - 6.29	Pass
MAW-1142	2/1/2014	I-129	-0.01 ± 8.00	0.00	NA	Pass
MAW-1184	2/1/2014	Fe-55	0.40 ± 3.20	0.00	-0.01 - 2.00	Pass
MAW-1184	2/1/2014	H-3	345.10 ± 10.60	321.00	225.00 - 417.00	Pass
MAW-1184	2/1/2014	Ni-63	32.40 ± 3.20	34.00	23.80 - 44.20	Pass
MAW-1184 [e]	2/1/2014	Pu-238	1.28 ± 0.12	0.83	0.58 - 1.08	Fail
MAW-1184 [e]	2/1/2014	Pu-239/240	0.91 ± 0.10	0.68	0.47 - 0.88	Fail
MAW-1184	2/1/2014	Sr-90	7.00 ± 0.70	8.51	5.96 - 11.06	Pass
MAW-1184	2/1/2014	Tc-99	8.10 ± 0.60	10.30	7.20 - 13.40	Pass
MAW-1184	2/1/2014	U-233/234	0.20 ± 0.07	0.23	0.16 - 0.29	Pass
MAW-1184	2/1/2014	U-238	1.25 ± 0.18	1.45	1.02 - 1.89	Pass
MAW-1184	2/1/2014	Co-57	27.86 ± 0.38	27.50	19.30 - 35.80	Pass
MAW-1184	2/1/2014	Co-60	15.99 ± 0.27	16.00	11.20 - 20.80	Pass
MAW-1184	2/1/2014	Cs-134	21.85 ± 0.54	23.10	16.20 - 30.00	Pass
MAW-1184	2/1/2014	Cs-137	28.74 ± 0.49	28.90	20.20 - 37.60	Pass
MAW-1184	2/1/2014	K-40	1.80 ± 2.00	0.00	0.00 - 10.00	Pass
MAW-1184	2/1/2014	Mn-54	14.06 ± 0.40	13.90	9.70 - 18.10	Pass
MAW-1184	2/1/2014	Zn-65	0.00 ± 0.19	0.00	-0.01 - 0.00	Pass
MAVE-1148	2/1/2014	Co-57	11.63 ± 0.19	10.10	7.10 - 13.10	Pass
MAVE-1148	2/1/2014	Co-60	7.28 ± 0.18	6.93	4.85 - 9.01	Pass
MAVE-1148	2/1/2014	Cs-134	6.29 ± 0.29	6.04	4.23 - 7.85	Pass
MAVE-1148	2/1/2014	Cs-137	5.18 ± 0.20	4.74	3.32 - 6.16	Pass
MAVE-1148	2/1/2014	Mn-54	9.22 ± 0.26	8.62	6.03 - 11.21	Pass
MAVE-1148	2/1/2014	Zn-65	8.59 ± 0.40	7.86	5.50 - 10.22	Pass
MAAP-1151	2/1/2014	Am-241	0.09 ± 0.02	0.09	0.06 - 0.12	Pass
MAAP-1151 [d]	2/1/2014	Co-57	1.60 ± 0.05	0.00	NA	Fail
MAAP-1151	2/1/2014	Co-60	1.38 ± 0.08	1.39	0.97 - 1.81	Pass
MAAP-1151	2/1/2014	Cs-134	1.75 ± 0.11	1.91	1.34 - 2.48	Pass
MAAP-1151	2/1/2014	Cs-137	1.81 ± 0.10	1.76	1.23 - 2.29	Pass
MAAP-1151	2/1/2014	Mn-54	0.01 ± 0.03	0.00	NA	Pass
MAAP-1151 [e]	2/1/2014	Pu-238	0.08 ± 0.02	0.00	NA	Fail
MAAP-1151	2/1/2014	Pu-239/240	0.10 ± 0.02	0.08	0.05 - 0.10	Pass
MAAP-1151	2/1/2014	Zn-65	-0.24 ± 0.09	0.00	-0.50 - 1.00	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
MAAP-1151	2/1/2014	U-233/234	0.03 ± 0.01	0.02	0.01 - 0.03	Pass
MAAP-1151	2/1/2014	U-238	0.13 ± 0.02	0.13	0.09 - 0.17	Pass
MAAP-1151	2/1/2014	Sr-90	1.11 ± 0.14	1.18	0.83 - 1.53	Pass
MAAP-1154	2/1/2014	Gr. Alpha	0.56 ± 0.06	1.77	0.53 - 3.01	Pass
MAAP-1154	2/1/2014	Gr. Beta	0.98 ± 0.06	0.77	0.39 - 1.16	Pass
MASO-1146	2/1/2014	Co-57	1064.50 ± 3.60	966.00	676.00 - 1256.00	Pass
MASO-1146	2/1/2014	Co-60	1.70 ± 0.50	1.22	NA [d]	Pass
MASO-1146 [f]	2/1/2014	Cs-134	6.10 ± 1.80	0.00	NA	Fail
MASO-1146	2/1/2014	Cs-137	1364.30 ± 5.30	1238.00	867.00 - 1609.00	Pass
MASO-1146	2/1/2014	K-40	728.90 ± 15.90	622.00	435.00 - 809.00	Pass
MASO-1146	2/1/2014	Mn-54	1588.00 ± 6.00	1430.00	1001.00 - 1859.00	Pass
MASO-1146	2/1/2014	Zn-65	763.50 ± 6.80	695.00	487.00 - 904.00	Pass
MASO-1146	2/1/2014	Am-241	68.20 ± 9.00	68.00	47.60 - 88.40	Pass
MASO-1146	2/1/2014	Ni-63	4.80 ± 15.30	0.00	NA	Pass
MASO-1146 [e]	2/1/2014	Pu-238	140.60 ± 15.50	96.00	67.00 - 125.00	Fail
MASO-1146 [e]	2/1/2014	Pu-239/240	102.00 ± 13.10	76.80	53.80 - 99.80	Fail
MASO-1146	2/1/2014	Sr-90	1.23 ± 1.37	0.00	NA	Pass
MASO-1146	2/1/2014	Tc-99	-0.30 ± 12.00	0.00	NA	Pass
MASO-1146 [g]	2/1/2014	U-233/234	22.90 ± 3.00	81.00	57.00 - 105.00	Fail
MASO-1146 [g]	2/1/2014	U-238	32.00 ± 3.60	83.00	58.00 - 108.00	Fail
MASO-4439	8/1/2014	Am-241	65.90 ± 6.70	85.50	59.90 - 111.20	Pass
MASO-4439	8/1/2014	Ni-63	771.62 ± 23.29	980.00	686.00 - 1274.00	Pass
MASO-4439	8/1/2014	Pu-239/240	55.63 ± 5.81	58.60	41.00 - 76.20	Pass
MASO-4439	8/1/2014	Sr-90	778.34 ± 17.82	858.00	601.00 - 1115.00	Pass
MASO-4439	8/1/2014	Tc-99	458.20 ± 9.20	589.00	412.00 - 766.00	Pass
MASO-4439	8/1/2014	Cs-134	520.60 ± 7.09	622.00	435.00 - 809.00	Pass
MASO-4439	8/1/2014	Co-57	1135.00 ± 7.40	1116.00	781.00 - 1451.00	Pass
MASO-4439	8/1/2014	Co-60	768.20 ± 7.70	779.00	545.00 - 1013.00	Pass
MASO-4439	8/1/2014	Mn-54	1050.70 ± 12.60	1009.00	706.00 - 1312.00	Pass
MASO-4439	8/1/2014	Zn-65	407.89 ± 15.03	541.00	379.00 - 703.00	Pass
MAW-4431	8/1/2014	Am-241	0.79 ± 0.08	0.88	0.62 - 1.14	Pass
MAW-4431	8/1/2014	Cs-137	18.62 ± 0.54	18.40	12.90 - 23.90	Pass
MAW-4431	8/1/2014	Co-57	24.85 ± 0.42	24.70	17.30 - 32.10	Pass
MAW-4431	8/1/2014	Co-60	12.27 ± 0.38	12.40	8.70 - 16.10	Pass
MAW-4431	8/1/2014	H-3	207.20 ± 10.60	208.00	146.00 - 270.00	Pass
MAW-4431 [h]	8/1/2014	Fe-55	55.10 ± 14.80	31.50	22.10 - 41.00	Fail
MAW-4431	8/1/2014	Mn-54	14.36 ± 0.53	14.00	9.80 - 18.20	Pass
MAW-4431	8/1/2014	Zn-65	11.46 ± 0.78	10.90	7.60 - 14.20	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-4431	8/1/2014	Tc-99	6.10 ± 0.50	6.99	4.89 - 9.09	Pass
MAW-4431	8/1/2014	Pu-238	0.59 ± 0.07	0.62	0.43 - 0.80	Pass
MAW-4431	8/1/2014	U-233/234	0.22 ± 0.04	0.21	0.14 - 0.27	Pass
MAW-4431	8/1/2014	U-238	1.25 ± 0.10	1.42	0.99 - 1.85	Pass
MAW-4493	8/1/2014	Gr. Alpha	0.93 ± 0.07	1.40	0.42 - 2.38	Pass
MAW-4493	8/1/2014	Gr. Beta	6.31 ± 1.35	6.50	3.25 - 9.75	Pass
MAAP-4433	8/1/2014	Am-241	0.06 ± 0.02	0.07	0.05 - 0.09	Pass
MAAP-4433	8/1/2014	Pu-238	0.10 ± 0.03	0.11	0.08 - 0.14	Pass
MAAP-4433	8/1/2014	Pu-239/240	0.04 ± 0.02	0.05	0.03 - 0.06	Pass
MAAP-4433	8/1/2014	Sr-90	0.74 ± 0.10	0.70	0.49 - 0.91	Pass
MAAP-4433	8/1/2014	U-233/234	0.03 ± 0.01	0.04	0.03 - 0.05	Pass
MAAP-4433	8/1/2014	U-238	0.21 ± 0.03	0.25	0.18 - 0.33	Pass
MAAP-4444	8/1/2014	Sr-89	7.82 ± 0.52	9.40	6.60 - 12.20	Pass
MAAP-4444	8/1/2014	Sr-90	0.76 ± 0.10	0.76	0.53 - 0.99	Pass
MAVE-4436	8/1/2014	Cs-134	7.49 ± 0.18	7.38	5.17 - 9.59	Pass
MAVE-4436	8/1/2014	Co-57	11.20 ± 0.19	9.20	6.40 - 12.00	Pass
MAVE-4436	8/1/2014	Co-60	6.84 ± 0.17	6.11	4.28 - 7.94	Pass
MAVE-4436	8/1/2014	Mn-54	8.11 ± 0.26	7.11	4.97 - 9.23	Pass
MAVE-4436	8/1/2014	Zn-65	7.76 ± 0.43	6.42	4.49 - 8.35	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] Interference from Eu-152 resulted in misidentification of Co-57.

[e] The high bias on the plutonium crosscheck samples was traced to contamination from a newly purchased standard.

The results of reanalysis with replacement tracer purchased from NIST:

MAW-1184	Pu-238	0.68 ± 0.10	Bq / L
MAW-1184	Pu-239/240	0.66 ± 0.10	Bq / L
MASO-1146	Pu-238	95.15 ± 8.98	Bq / kg
MASO-1146	Pu-239/240	67.21 ± 7.54	Bq / kg

Insufficient sample remained to reanalyze the Air filter sample(MAAP-1151). High bias results due to same contaminated tracer

[f] Cs-134 was positively identified in both library peaks, calculation on the second peak; 2.78 ± 0.93 Bq/kg.

[g] 80% of participating laboratories were outside the acceptable range.

Parallel reanalysis was run on ERA spiked sample with acceptable results.

[h] Result of reanalysis Fe-55 32.63 ± 16.30 Bq / L

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
ERAP-1044	3/17/2014	Am-241	54.2 ± 3.0	59.7	36.8 - 80.8	Pass
ERAP-1044	3/17/2014	Co-60	1177.9 ± 14.3	1120.0	867.0 - 1400.0	Pass
ERAP-1044	3/17/2014	Cs-134	1010.5 ± 15.8	1010.0	643.0 - 1250.0	Pass
ERAP-1044	3/17/2014	Cs-137	938.3 ± 45.7	828.0	622.0 - 1090.0	Pass
ERAP-1044	3/17/2014	Fe-55	142.3 ± 87.3	240.0	74.4 - 469.0	Pass
ERAP-1044	3/17/2014	Gr. Alpha	52.3 ± 0.5	46.0	15.4 - 71.4	Pass
ERAP-1044	3/17/2014	Gr. Beta	64.4 ± 2.6	53.8	34.0 - 78.4	Pass
ERAP-1044	3/17/2014	Mn-54	< 4.9	0.0	NA	Pass
ERAP-1044	3/17/2014	Pu-238	63.0 ± 2.6	56.3	38.6 - 74.0	Pass
ERAP-1044	3/17/2014	Pu-239/240	52.8 ± 1.9	48.6	35.2 - 63.5	Pass
ERAP-1044	3/17/2014	Sr-90	81.4 ± 1.6	78.9	38.6 - 118.0	Pass
ERAP-1044	3/17/2014	U-233/234	30.4 ± 1.7	36.4	22.6 - 54.9	Pass
ERAP-1044	3/17/2014	U-238	30.4 ± 1.4	36.1	23.3 - 49.9	Pass
ERAP-1044	3/17/2014	Uranium	62.0 ± 3.5	74.3	41.1 - 113.0	Pass
ERAP-1044	3/17/2014	Zn-65	852.2 ± 26.1	667.0	478.0 - 921.0	Pass
ERSO-1050	3/17/2014	Am-241	426.6 ± 155.5	399.0	233.0 - 518.0	Pass
ERSO-1050	3/17/2014	Ac-228	1260.0 ± 107.0	1240.0	795.0 - 1720.0	Pass
ERSO-1050	3/17/2014	Bi-212	1331.9 ± 309.7	1240.0	330.0 - 1820.0	Pass
ERSO-1050	3/17/2014	Bi-214	1804.5 ± 50.4	1960.0	1180.0 - 2820.0	Pass
ERSO-1050	3/17/2014	Co-60	6738.8 ± 167.6	6830.0	4620.0 - 9400.0	Pass
ERSO-1050	3/17/2014	Cs-134	3262.9 ± 108.8	3390.0	2220.0 - 4070.0	Pass
ERSO-1050	3/17/2014	Cs-137	8538.6 ± 55.0	8490.0	6510.0 - 10900.0	Pass
ERSO-1050	3/17/2014	K-40	11241.3 ± 296.6	10500.0	7660.0 - 14100.0	Pass
ERSO-1050	3/17/2014	Mn-54	< 21.6	0.0	NA	Pass
ERSO-1050	3/17/2014	Pb-212	1119.6 ± 26.1	1240.0	812.0 - 1730.0	Pass
ERSO-1050	3/17/2014	Pb-214	1861.7 ± 54.9	2070.0	1210.0 - 3090.0	Pass
ERSO-1050 [e]	3/17/2014	Pu-238	1085.5 ± 167.7	578.0	348.0 - 797.0	Fail
ERSO-1050 [e]	3/17/2014	Pu-239/240	681.6 ± 128.6	471.0	308.0 - 651.0	Fail
ERSO-1050	3/17/2014	Sr-90	2338.0 ± 144.0	2780.0	1060.0 - 4390.0	Pass
ERSO-1050	3/17/2014	Th-234	3474.9 ± 226.0	3360.0	1060.0 - 6320.0	Pass
ERSO-1050	3/17/2014	U-233/234	3319.5 ± 250.2	2780.0	1060.0 - 4390.0	Pass
ERSO-1050	3/17/2014	U-238	3375.6 ± 252.6	3360.0	2080.0 - 4260.0	Pass
ERSO-1050	3/17/2014	Uranium	6810.6 ± 551.1	6910.0	3750.0 - 9120.0	Pass
ERSO-1050	3/17/2014	Zn-65	5968.0 ± 226.1	5400.0	4300.0 - 7180.0	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-1051	3/17/2014	Am-241	1532.0 ± 149.5	1490.0	911.0 - 1980.0	Pass
ERVE-1051	3/17/2014	Cm-244	519.8 ± 94.6	516.0	253.0 - 804.0	Pass
ERVE-1051	3/17/2014	Co-60	981.2 ± 41.8	926.0	639.0 - 1290.0	Pass
ERVE-1051	3/17/2014	Cs-134	701.4 ± 58.6	646.0	415.0 - 839.0	Pass
ERVE-1051	3/17/2014	Cs-137	961.9 ± 46.3	880.0	638.0 - 1220.0	Pass
ERVE-1051	3/17/2014	K-40	32789.7 ± 758.2	31900.0	23000.0 - 44800.0	Pass
ERVE-1051	3/17/2014	Mn-54	< 25.9	0.0	NA	Pass
ERVE-1051	3/17/2014	Pu-238	2724.1 ± 259.4	2110.0	1260.0 - 2890.0	Pass
ERVE-1051	3/17/2014	Pu-239/240	4361.4 ± 323.4	3740.0	2300.0 - 5150.0	Pass
ERVE-1051	3/17/2014	Sr-90	2405.7 ± 263.2	2580.0	1470.0 - 3420.0	Pass
ERVE-1051	3/17/2014	U-233/234	1612.2 ± 162.0	1760.0	1160.0 - 2260.0	Pass
ERVE-1051	3/17/2014	U-238	1574.3 ± 159.6	1750.0	1170.0 - 2220.0	Pass
ERVE-1051	3/17/2014	Uranium	3255.4 ± 356.7	3580.0	2430.0 - 4460.0	Pass
ERVE-1051	3/17/2014	Zn-65	1124.1 ± 101.2	919.0	663.0 - 1290.0	Pass
ERW-1054	3/17/2014	Am-241	104.6 ± 3.4	114.0	76.8 - 153.0	Pass
ERW-1054	3/17/2014	Co-60	1195.2 ± 18.9	1270.0	1100.0 - 1490.0	Pass
ERW-1054	3/17/2014	Cs-134	1474.9 ± 47.5	1660.0	1220.0 - 1910.0	Pass
ERW-1054	3/17/2014	Cs-137	2591.0 ± 23.4	2690.0	2280.0 - 3220.0	Pass
ERW-1054	3/17/2014	Mn-54	< 4.3	0.0	NA	Pass
ERW-1054	3/17/2014	Pu-238	54.1 ± 3.6	44.1	32.6 - 54.9	Pass
ERW-1054	3/17/2014	Pu-239/240	185.9 ± 17.6	160.0	124.0 - 202.0	Pass
ERW-1054	3/17/2014	U-233/234	74.8 ± 6.3	82.4	61.9 - 106.0	Pass
ERW-1054	3/17/2014	U-238	76.4 ± 7.8	81.8	62.4 - 100.0	Pass
ERW-1054	3/17/2014	Uranium	154.3 ± 14.6	168.0	123.0 - 217.0	Pass
ERW-1054	3/17/2014	Zn-65	1818.5 ± 56.4	1800.0	1500.0 - 2270.0	Pass
ERW-1055 [f]	3/17/2014	Fe-55	636.3 ± 176.0	1200.0	716.0 - 1630.0	Fail
ERW-1055	3/17/2014	Gr. Alpha	120.9 ± 3.5	133.0	47.2 - 206.0	Pass
ERW-1055	3/17/2014	Gr. Beta	141.6 ± 2.3	174.0	99.6 - 258.0	Pass
ERW-1055	3/17/2014	Sr-90	873.9 ± 56.9	890.0	580.0 - 1180.0	Pass
ERW-1060	3/17/2014	H-3	5818.0 ± 230.0	5580.0	3740.0 - 7960.0	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.

[e] The high bias on the plutonium crosscheck samples was traced to contamination from a newly purchased standard. The results of reanalysis with replacement tracer purchased from NIST:

ERSO-1050	Pu-238	634.7 ± 98.50	Bq / kg
ERSO-1050	Pu-239/240	451.8 ± 82.80	Bq / kg

[f] An error in the efficiency calculation was found. The result of recalculation was 932 pCi/L. The sample was repeated, result of reanalysis, 1066 pCi/L.

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;

$s = 2\sigma$ 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	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)

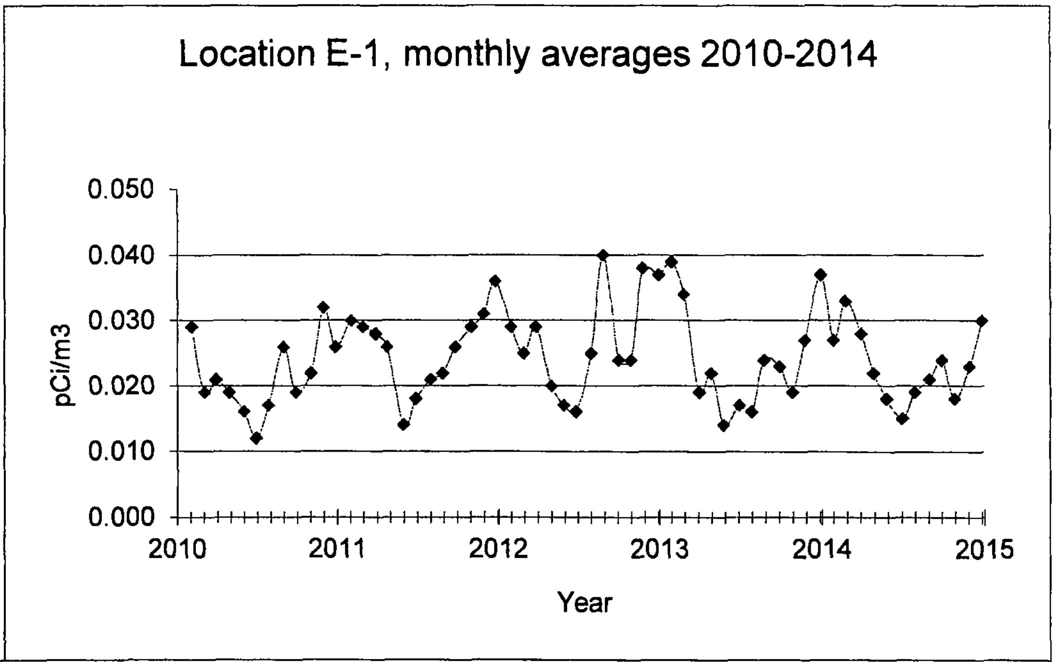
[a] Locations codes are defined in Table 2. Control Stations are indicated by (C). All other stations are indicators.

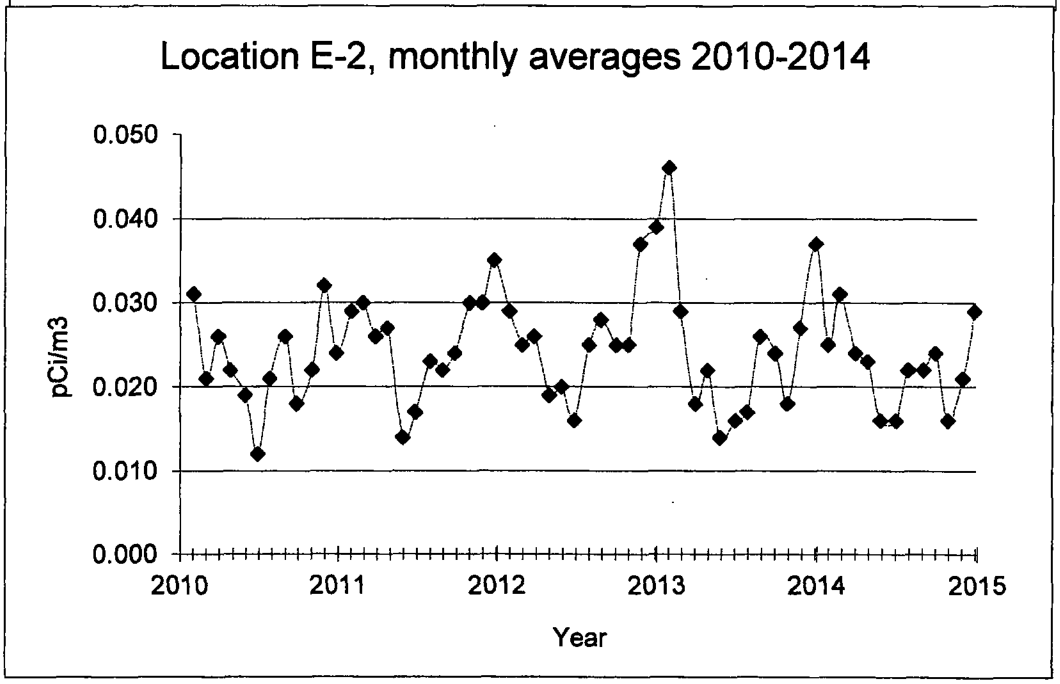
[b] Analysis type is coded as follows: GB = gross beta, GA = gross alpha, GS = gamma spectroscopy, H-3 = tritium, Sr-89 = strontium-89, Sr-90 = strontium-90, I-131 = iodine-131. Analysis frequency is coded as follows: MC = monthly composite, QC = quarterly composite.

APPENDIX D

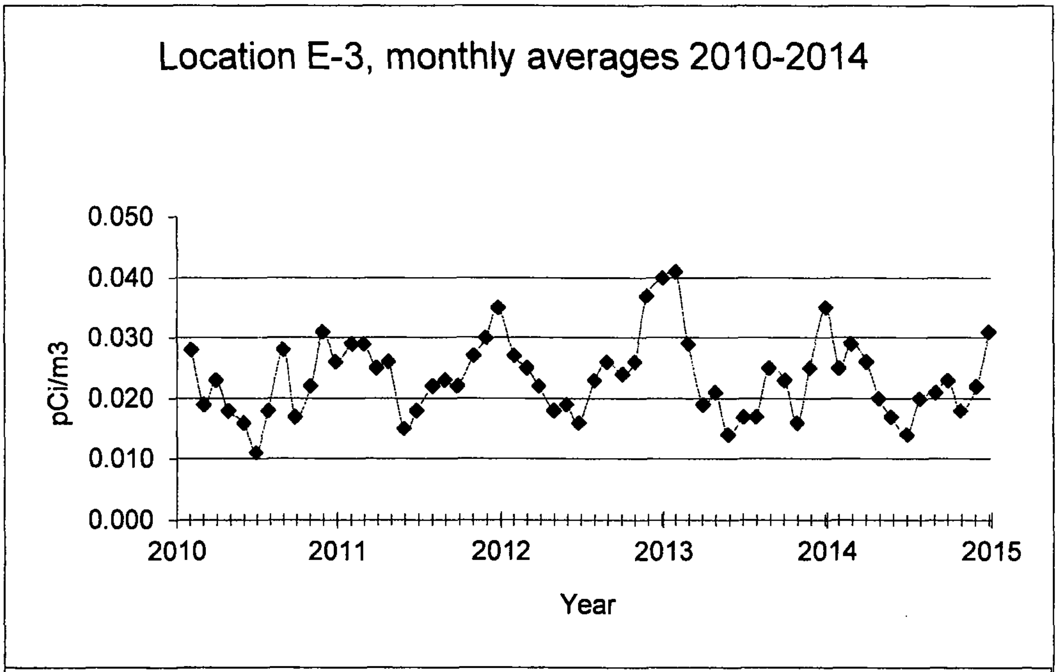
Graphs of Data Trends

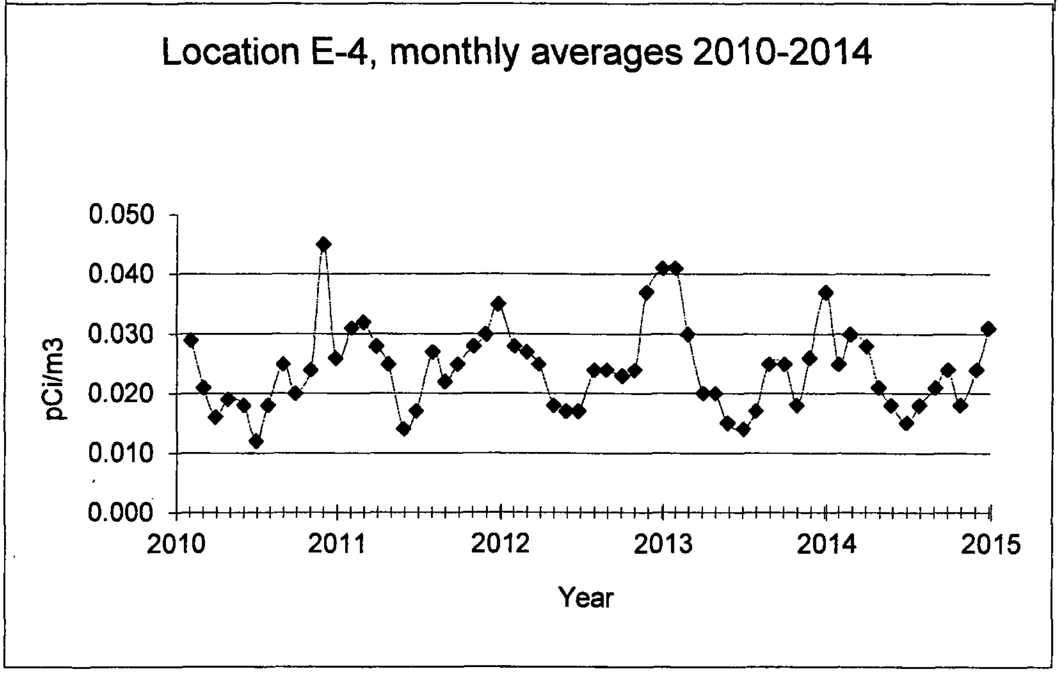
Air Particulates - Gross Beta



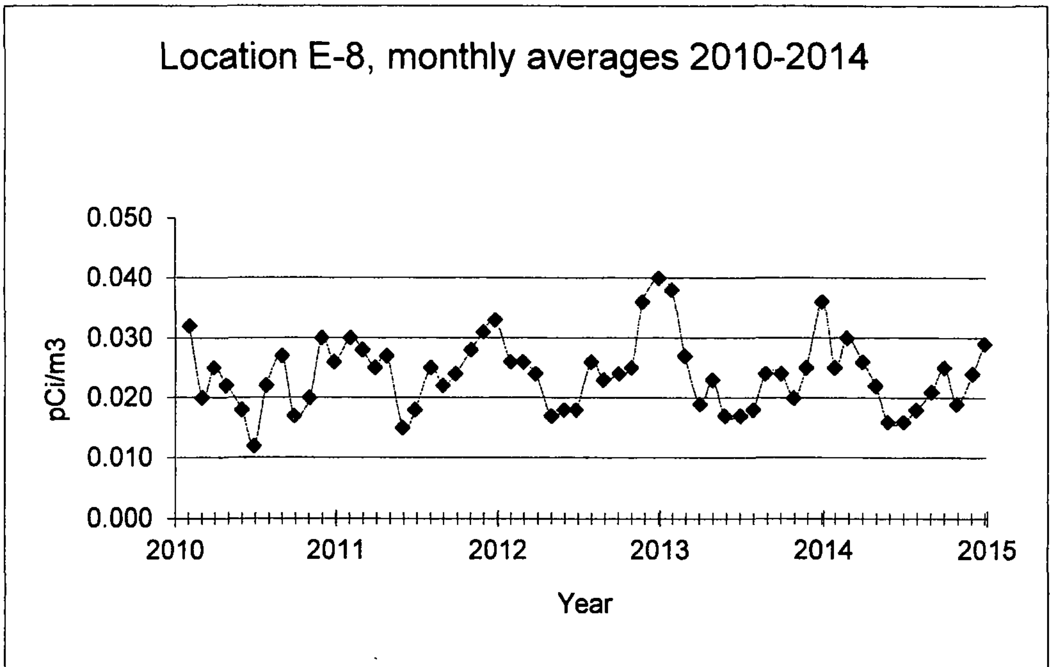


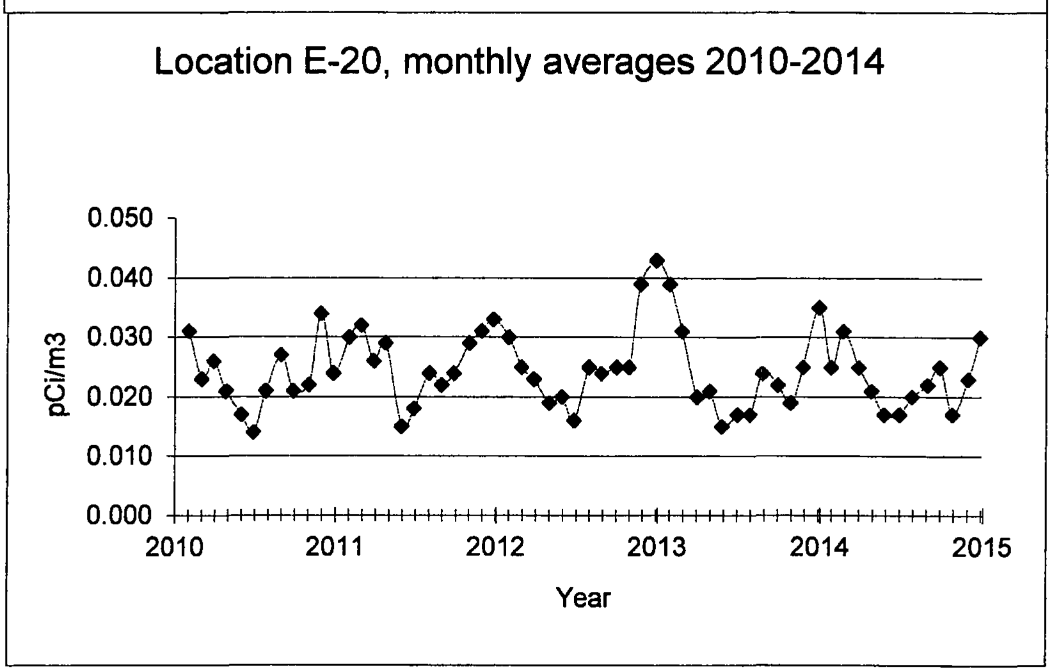
Air Particulates - Gross Beta





Air Particulates - Gross Beta





APPENDIX E

Supplemental Analyses

Supplemental Analyses

Units: = pCi\L

Gamma isotopic analysis

Location	U2FSSDS		U2FSSDS		U2FSSDS	
Collection Date	02-03-14		02-28-14		04-05-14	
Lab Code	EWW- 420	MDC	EW- 863	MDC	EW- 3131	MDC
Be-7	3.8 ± 9.3	< 19.3	17.6 ± 12.5	< 27.5	5.5 ± 9.7	< 66.3
Mn-54	1.5 ± 1.1	< 2.1	-0.1 ± 1.5	< 2.6	-0.6 ± 1.3	< 2.0
Fe-59	0.6 ± 1.9	< 3.7	0.6 ± 2.5	< 3.9	-1.2 ± 2.1	< 11.9
Co-58	-1.1 ± 1.0	< 1.7	0.1 ± 1.4	< 2.4	-1.1 ± 1.2	< 6.2
Co-60	0.4 ± 1.3	< 2.5	2.2 ± 1.5	< 2.3	1.1 ± 1.3	< 2.9
Zn-65	-0.3 ± 2.2	< 3.8	2.4 ± 3.0	< 5.0	1.0 ± 2.2	< 5.8
Zr-Nb-95	0.9 ± 1.3	< 2.4	-1.4 ± 1.5	< 3.0	-3.0 ± 1.3	< 16.7 [a]
Cs-134	0.2 ± 1.1	< 2.1	0.1 ± 1.3	< 2.1	-0.1 ± 1.2	< 2.5
Cs-137	2.2 ± 1.3	< 2.9	1.2 ± 1.5	< 2.6	0.7 ± 1.4	< 2.8
Ba-La-140	-2.4 ± 1.5	< 3.0	-1.3 ± 1.8	< 3.1	-184.7 ± 1.4	< 313.0 [a]

Location	U2FSSDS		U2FSSDS		U2FSSDS	
Collection Date	05-06-14		05-15-14		06-23-14	
Lab Code	EW- 3132		EW- 2892		EW- 3209	
Be-7	-9.8 ± 10.3	< 50.8	8.4 ± 8.4	< 30.8	2.4 ± 8.6	< 20.8
Mn-54	0.9 ± 1.2	< 2.7	0.2 ± 1.0	< 2.1	0.2 ± 1.2	< 2.2
Fe-59	1.8 ± 2.4	< 11.6	-1.2 ± 1.8	< 5.5	0.4 ± 2.2	< 4.3
Co-58	1.3 ± 1.2	< 4.6	2.1 ± 1.0	< 2.5	-0.7 ± 1.1	< 1.9
Co-60	0.1 ± 1.3	< 2.2	0.0 ± 1.1	< 2.2	-1.1 ± 1.2	< 2.2
Zn-65	3.6 ± 2.3	< 5.4	-1.0 ± 2.0	< 4.6	-1.4 ± 2.0	< 3.6
Zr-Nb-95	2.3 ± 1.4	< 10.1	-0.6 ± 1.2	< 4.1	1.1 ± 1.2	< 3.7
Cs-134	-0.3 ± 1.3	< 2.3	-0.7 ± 1.1	< 2.0	-0.4 ± 1.2	< 2.1
Cs-137	1.1 ± 1.5	< 3.3	2.2 ± 1.3	< 2.6	0.9 ± 1.4	< 2.7
Ba-La-140	-34.9 ± 1.4	< 39.2 [a]	-3.7 ± 1.3	< 12.2	1.9 ± 1.5	< 7.4

Location	U2FSSDS		U2FSSDS		U2FSSDS	
Collection Date	07-14-14		08-28-14		09-26-14	
Lab Code	EW- 3484		EW- 4598		EWW- 5268	
Be-7	7.4 ± 11.8	< 23.7	7.3 ± 13.5	< 26.7	1.9 ± 9.8	< 24.0
Mn-54	-0.2 ± 1.5	< 3.0	0.2 ± 1.6	< 2.9	-0.6 ± 1.3	< 2.0
Fe-59	-1.0 ± 2.7	< 4.1	0.4 ± 3.1	< 5.7	-0.6 ± 2.3	< 3.4
Co-58	-0.1 ± 1.4	< 1.8	0.0 ± 1.5	< 3.0	1.9 ± 1.3	< 2.4
Co-60	0.5 ± 1.5	< 2.5	-0.8 ± 1.7	< 3.0	0.5 ± 1.4	< 2.5
Zn-65	-6.2 ± 3.2	< 5.0	3.5 ± 3.2	< 5.4	-1.4 ± 2.4	< 5.1
Zr-Nb-95	-0.2 ± 1.5	< 1.8	-2.5 ± 1.7	< 2.8	-1.8 ± 1.3	< 3.0
Cs-134	0.4 ± 1.4	< 2.8	0.5 ± 1.5	< 3.0	-1.3 ± 1.3	< 2.3
Cs-137	2.2 ± 1.4	< 3.0	0.2 ± 1.7	< 3.1	0.3 ± 1.5	< 2.8
Ba-La-140	-0.7 ± 1.7	< 1.9	-1.5 ± 1.8	< 2.5	-0.7 ± 1.3	< 2.7

[a] LLDs not reached due to age of sample; sample counted 07-09-14.

POINT BEACH NUCLEAR PLANT

Supplemental Analyses

Units: = pCi\L

Gamma isotopic analysis

Location	U2FSSDS		U2FSSDS		U2FSSDS	
Collection Date	10-24-14		11-20-14		12-26-14	
Lab Code	EWW- 6142	MDC	EWW- 6932		EWW- 7368	
Be-7	12.9 ± 13.2	< 24.8	-2.4 ± 9.7	< 22.5	1.1 ± 11.4	< 24.1
Mn-54	1.1 ± 1.6	< 2.5	1.1 ± 1.2	< 2.4	1.7 ± 1.4	< 3.3
Fe-59	-3.5 ± 3.2	< 5.7	-3.5 ± 2.2	< 4.0	-1.1 ± 2.5	< 3.7
Co-58	1.2 ± 1.5	< 2.9	0.2 ± 1.2	< 2.6	-1.1 ± 1.4	< 2.7
Co-60	0.1 ± 1.8	< 2.6	-0.6 ± 1.3	< 1.7	-0.1 ± 1.5	< 2.1
Zn-65	1.7 ± 3.2	< 3.5	-1.7 ± 2.3	< 4.2	0.1 ± 2.8	< 4.1
Zr-Nb-95	0.6 ± 1.5	< 2.5	-0.2 ± 1.4	< 4.1	-0.5 ± 1.5	< 4.7
Cs-134	0.8 ± 1.6	< 3.1	-0.6 ± 1.3	< 2.4	-0.2 ± 1.4	< 2.7
Cs-137	1.5 ± 1.6	< 3.4	0.4 ± 1.5	< 2.4	1.4 ± 1.6	< 3.5
Ba-La-140	-1.1 ± 1.8	< 4.8	-9.0 ± 1.4	< 4.6	-3.6 ± 1.8	< 7.6

POINT BEACH NUCLEAR PLANT

Facade Wells

Units: = pCi\L — Gamma isotopic analysis

Location	GW-09 1Z-361A		GW-09 1Z-361B		GW-10 2Z-361A		GW-10 2Z-361B	
Collection Date	03-15-14		03-15-14		03-15-14		03-15-14	
Lab Code	EWW- 1253 [a]	MDC	EWW- 1254 [a]	MDC	ND[b]	MDC	EWW- 1255 [a]	MDC
Be-7	20.0 ± 16.6	< 58.4	-11.9 ± 14.2	< 40.3	-		16.8 ± 13.7	< 58.0
Mn-54	0.0 ± 1.7	< 3.0	2.0 ± 1.8	< 3.8	-		0.7 ± 1.7	< 3.4
Fe-59	-0.4 ± 3.0	< 7.8	3.7 ± 3.4	< 15.0	-		-4.1 ± 3.2	< 11.2
Co-58	1.1 ± 1.7	< 5.2	-1.7 ± 1.8	< 4.3	-		3.3 ± 1.7	< 5.5
Co-60	0.2 ± 2.0	< 2.7	-0.2 ± 1.9	< 2.5	-		0.4 ± 2.0	< 3.9
Zn-65	0.6 ± 3.3	< 7.1	0.8 ± 3.5	< 6.1	-		4.3 ± 3.4	< 7.4
Zr-Nb-95	-2.7 ± 1.8	< 7.3	-5.3 ± 2.0	< 9.3	-		-3.0 ± 1.9	< 5.2
Cs-134	-0.7 ± 1.7	< 3.5	-3.2 ± 1.8	< 3.4	-		1.6 ± 1.8	< 3.5
Cs-137	1.3 ± 2.0	< 3.5	-0.1 ± 2.1	< 3.1	-		2.4 ± 2.0	< 3.9
Ba-La-140	-12.6 ± 1.9	< 28.2	5.7 ± 1.9	< 24.2	-		-20.4 ± 2.2	< 41.3
Location	GW-09 1Z-361A		GW-09 1Z-361B		GW-10 2Z-361A		GW-10 2Z-361B	
Collection Date	04-06-14		04-06-14		04-06-14		04-06-14	
Lab Code	EWW- 1568		EWW- 1569		EWW- 1570		EWW- 1571	
Be-7	-28.6 ± 17.6	< 34.1	11.0 ± 14.8	< 30.1	-4.6 ± 12.5	< 27.6	2.8 ± 12.5	< 29.7
Mn-54	-0.4 ± 1.8	< 3.5	2.1 ± 1.6	< 3.4	-0.9 ± 1.6	< 3.2	1.7 ± 1.6	< 2.3
Fe-59	-1.7 ± 3.7	< 8.1	-0.5 ± 2.9	< 4.2	0.6 ± 2.8	< 8.0	2.0 ± 3.0	< 8.0
Co-58	0.3 ± 1.7	< 3.4	0.1 ± 1.5	< 2.9	-2.7 ± 1.6	< 2.2	-0.6 ± 1.5	< 2.9
Co-60	1.7 ± 2.0	< 3.9	3.4 ± 1.9	< 3.4	0.8 ± 1.9	< 3.3	-0.5 ± 1.7	< 3.0
Zn-65	-6.8 ± 3.9	< 6.5	0.5 ± 3.2	< 5.7	-2.7 ± 3.2	< 6.6	-2.6 ± 3.1	< 6.0
Zr-Nb-95	-1.7 ± 1.9	< 4.7	0.4 ± 1.6	< 4.0	2.1 ± 1.7	< 4.3	0.9 ± 1.8	< 5.3
Cs-134	0.7 ± 1.8	< 3.8	-0.5 ± 1.7	< 3.4	-0.2 ± 1.7	< 3.0	0.3 ± 1.7	< 3.0
Cs-137	0.0 ± 2.1	< 4.1	2.7 ± 1.7	< 3.5	1.4 ± 1.9	< 3.3	1.4 ± 1.9	< 3.9
Ba-La-140	-7.8 ± 2.3	< 5.1	0.4 ± 2.0	< 5.2	1.2 ± 1.9	< 9.5	3.5 ± 1.7	< 3.8
Location	GW-09 1Z-361A		GW-09 1Z-361B		GW-10 2Z-361A		GW-10 2Z-361B	
Collection Date	07-16-14		07-16-14		07-16-14		07-16-14	
Lab Code	EWW- 3480 [c]		EWW- 3481 [c]		EWW- 3482 [c]		EWW- 3483 [c]	
Be-7	-1.9 ± 9.2	< 13.4	-2.3 ± 9.6	< 25.7	-1.7 ± 12.1	< 23.4	1.0 ± 8.5	< 21.2
Mn-54	0.0 ± 1.2	< 2.3	-0.6 ± 1.2	< 1.6	-0.1 ± 1.3	< 2.5	0.8 ± 1.2	< 2.4
Fe-59	-0.2 ± 2.0	< 3.5	0.3 ± 2.1	< 4.2	-1.2 ± 2.7	< 2.7	1.5 ± 2.2	< 4.9
Co-58	-0.1 ± 1.1	< 1.6	-0.2 ± 1.1	< 1.5	1.0 ± 1.2	< 2.4	-0.3 ± 1.0	< 1.4
Co-60	-0.4 ± 1.2	< 2.1	0.4 ± 1.3	< 2.9	-0.1 ± 1.3	< 2.0	1.6 ± 1.1	< 2.7
Zn-65	-2.4 ± 2.2	< 3.8	1.0 ± 2.2	< 3.9	-0.6 ± 3.0	< 4.5	-0.9 ± 2.1	< 3.3
Zr-Nb-95	-0.4 ± 1.2	< 2.0	0.1 ± 1.3	< 2.6	-0.8 ± 1.3	< 2.0	-0.9 ± 1.2	< 2.6
Cs-134	-1.0 ± 1.2	< 2.1	-0.7 ± 1.2	< 2.2	-0.8 ± 1.3	< 2.6	0.3 ± 1.1	< 2.1
Cs-137	0.2 ± 1.4	< 2.7	1.2 ± 1.4	< 2.6	-0.3 ± 1.5	< 2.6	0.6 ± 1.4	< 2.6
Ba-La-140	1.5 ± 1.4	< 2.7	-0.7 ± 1.5	< 2.5	0.0 ± 1.5	< 2.7	-1.0 ± 1.5	< 2.7

[a] Sample counted 04-26-2014; Ba/La LLD not reached due to age of sample.

[b] "ND" = No data; water frozen.

[c] Results of confirmatory sampling. See Appendix F for explanation.

POINT BEACH NUCLEAR PLANT

Facade Wells

Units: = pCi\L | Gamma isotopic analysis

Location	GW-09 1Z-361A		GW-09 1Z-361B		GW-10 2Z-361A		GW-10 2Z-361B	
Collection Date	08-19-14		08-19-14		08-19-14		08-19-14	
Lab Code	EWW- 4519	MDC	EWW- 4520	MDC	EWW- 4521	MDC	EWW- 4523	MDC
Be-7	-3.9 ± 12.5	< 26.3	-4.9 ± 9.9	< 23.7	10.4 ± 8.9	< 23.6	11.1 ± 12.8	< 34.7
Mn-54	0.3 ± 1.3	< 2.7	0.2 ± 1.3	< 2.5	-0.9 ± 1.2	< 2.3	0.7 ± 1.3	< 2.7
Fe-59	-2.3 ± 2.6	< 3.1	-2.3 ± 2.3	< 3.7	-3.5 ± 2.1	< 4.9	-3.8 ± 2.7	< 2.8
Co-58	-0.6 ± 1.2	< 2.6	0.9 ± 1.2	< 2.2	0.3 ± 1.2	< 2.0	-0.2 ± 1.3	< 2.5
Co-60	0.1 ± 1.3	< 2.2	1.2 ± 1.4	< 2.5	0.4 ± 1.2	< 2.4	0.9 ± 1.4	< 2.8
Zn-65	-4.3 ± 3.1	< 5.7	-0.8 ± 2.4	< 4.9	-0.5 ± 2.2	< 4.6	-4.3 ± 2.9	< 4.6
Zr-Nb-95	-1.2 ± 1.4	< 1.9	-2.1 ± 1.4	< 2.9	0.8 ± 1.2	< 2.7	-1.0 ± 1.4	< 3.2
Cs-134	0.1 ± 1.4	< 2.7	-1.9 ± 1.3	< 2.4	-0.9 ± 1.1	< 2.1	0.3 ± 1.3	< 2.7
Cs-137	-0.3 ± 1.5	< 2.3	0.3 ± 1.4	< 2.7	1.3 ± 1.4	< 2.9	1.1 ± 1.5	< 3.2
Ba-La-140	-1.9 ± 1.4	< 4.9	-2.9 ± 1.4	< 2.5	-2.5 ± 1.4	< 3.1	1.9 ± 1.5	< 5.2

Location	GW-09 1Z-361A		GW-09 1Z-361B		GW-10 2Z-361A		GW-10 2Z-361B	
Collection Date	11-17-14		11-17-14		11-17-14		11-17-14	
Lab Code	EWW- 6644		EWW- 6645		EWW- 6646		EWW- 6647	
Be-7	-6.9 ± 13.7	< 34.8	-3.8 ± 12.8	< 29.9	-10.6 ± 13.5	< 35.7	-0.5 ± 15.6	< 23.6
Mn-54	1.0 ± 1.7	< 3.5	-0.7 ± 1.7	< 3.0	1.1 ± 1.7	< 3.7	-0.5 ± 1.7	< 3.3
Fe-59	-0.8 ± 3.2	< 9.6	0.3 ± 3.0	< 5.9	-3.0 ± 2.9	< 6.1	-0.5 ± 3.6	< 6.0
Co-58	-0.9 ± 1.6	< 2.5	0.3 ± 1.6	< 3.2	0.5 ± 1.7	< 3.9	-0.9 ± 1.6	< 2.7
Co-60	-0.5 ± 2.0	< 3.2	-1.1 ± 1.8	< 3.1	0.1 ± 1.7	< 2.4	1.1 ± 1.8	< 3.6
Zn-65	-0.1 ± 3.4	< 6.6	-1.7 ± 3.3	< 6.3	-1.8 ± 3.2	< 4.8	-1.1 ± 3.7	< 5.5
Zr-Nb-95	1.7 ± 1.9	< 5.1	0.9 ± 1.7	< 4.5	-2.0 ± 1.8	< 4.2	1.5 ± 1.7	< 4.1
Cs-134	0.9 ± 1.7	< 3.2	0.6 ± 1.7	< 3.0	-1.3 ± 1.7	< 2.9	-0.8 ± 1.6	< 3.3
Cs-137	2.1 ± 2.0	< 3.6	1.6 ± 2.0	< 4.1	-1.2 ± 2.0	< 3.2	1.1 ± 1.9	< 3.7
Ba-La-140	-3.5 ± 1.9	< 4.7	-4.8 ± 2.0	< 4.6	-5.0 ± 1.9	< 4.3	0.6 ± 1.8	< 5.2

APPENDIX F

Special Analyses

ATI Environmental, Inc.
Midwest Laboratory
700 Landwehr Road • Northbrook, IL 60062-2310
phone (847) 564-0700 • fax (847) 564-4517

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

LABORATORY REPORT NO.:	8006-100-1118
DATE:	09-12-2014
SAMPLES RECEIVED:	09-04-2014
PURCHASE ORDER NO.:	

Below are the results of the analyses for tritium in six air condensate samples collected September 3, 2014.

Sample Description	Lab Code	Concentration / MDC (pCi/L) H-3
NSB	EW-4592	328 ± 101 / < 177
SSB	EW-4593	2690 ± 166 / < 177
Control Room	EW-4594	527 ± 108 / < 177
Training Bldg	EW-4595	57 ± 90 / < 177
South Gatehouse	EW-4596	173 ± 95 / < 177
Ops Office Area	EW-4597	874 ± 119 / < 177

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: 9/12/14
Forrest G. Shaw III,
Quality Assurance

ATI Environmental, Inc.
Midwest Laboratory
700 Landwehr Road • Northbrook, IL 60062-2310
phone (847) 564-0700 • fax (847) 564-4517

Mr. Jeremy Keltner - Chemistry Manager		LABORATORY REPORT NO.	8006-100-1108
NextEra Energy - Point Beach Plant		DATE:	11/3/2014
6610 Nuclear Road		SAMPLES RECEIVED:	7/7/2014
Two Rivers, WI 54241		PURCHASE ORDER NO.:	

Enclosed are the results of the analyses for tritium and gamma emitting isotopes in four façade samples collected June 25, 2014.

The sample GW-09-2Z-361A was filtered through a membrane filter as requested.

Enclosed are the results of the gamma scan of the filter and the results of the analyses for iron-55, nickel-63 and strontium -90 on both the filter and the filtrate.

cc: Kjell Johansen

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

11/3/14
Forrest G. Shaw III,
Quality Assurance

Table 1. Results of the analyses for gross tritium and gamma emitting isotopes.

Location	GW-09-1Z-361A		GW-09-1Z-361B		GW-09-2Z-361B	
Collection Date	6/25/2014		6/25/2014		6/25/2014	
Lab Code	EWW-3210	MDC	EWW-3211	MDC	EWW-3213	MDC
Isotope			Units = pCi/L			
H-3	258 ± 84	< 144	328 ± 88	< 144	202 ± 82	< 144
Be-7	507.0 ± 56.6	------	208.2 ± 50.2	------	160.3 ± 45.6	------
Mn-54	0.9 ± 1.8	< 3.1	3.2 ± 1.8	< 3.7	12.7 ± 4.4	------
Fe-59	-0.2 ± 3.5	< 3.9	1.8 ± 2.9	< 7.6	1.0 ± 2.8	< 6.7
Co-58	2.0 ± 1.7	< 4.3	10.5 ± 4.2	------	40.4 ± 5.6	------
Co-60	-0.1 ± 1.9	< 3.9	3.0 ± 1.5	< 3.3	0.1 ± 1.9	< 3.8
Zn-65	-7.7 ± 4.2	< 5.6	1.4 ± 3.2	< 5.6	0.5 ± 3.3	< 5.0
Zr-Nb-95	-2.0 ± 2.0	< 4.8	0.5 ± 1.8	< 5.3	-1.8 ± 1.7	< 4.1
I-131	24.5 ± 2.6	< 19.9	43.3 ± 16.7	------	18.4 ± 1.7	< 12.2
Cs-134	-1.7 ± 2.0	< 3.7	-0.9 ± 1.7	< 3.2	-1.2 ± 1.8	< 3.3
Cs-137	-1.1 ± 2.1	< 3.9	0.4 ± 2.0	< 3.8	2.5 ± 1.9	< 4.0
Ba-La-140	-5.6 ± 2.4	< 9.3	7.6 ± 2.0	< 9.0	0.8 ± 1.9	< 9.3

The error given is the probable counting error at the 95% confidence level.
Less than (<), value is based on a 4.66 sigma counting error for the background sample and represents MDC for this measurement.

Table 1. Results of the analyses for gross tritium and gamma emitting isotopes.

Location	GW-09-2Z-361A		GW-09-2Z-361A	
Collection Date	6/25/2014		6/25/2014	
Lab Code	EWW-3212	MDC	EWW-3212F [a]	MDC
Isotope		Units = pCi/L		
H-3	431 ± 92	< 144		
Be-7	745.8 ± 48.9	------	701.6 ± 41.4	------
Mn-54	45.2 ± 5.5	------	43.5 ± 2.5	------
Fe-59	1.0 ± 2.8	< 6.7	-1.8 ± 1.9	< 4.9
Co-58	241.6 ± 9.3	------	166.7 ± 5.3	------
Co-60	3.3 ± 2.1	< 3.2	4.0 ± 1.3	< 2.6
Zn-65	0.5 ± 3.3	< 5.0	-2.5 ± 2.3	< 3.5
Zr-Nb-95	-1.8 ± 1.7	< 4.1	-1.1 ± 1.0	< 2.2
I-131	44.9 ± 21.2	------	-1.1 ± 1.1	< 11.8
Cs-134	-1.2 ± 2.1	< 3.9	-6 ± 1.2	< 2.4
Cs-137	0.9 ± 2.2	< 3.9	1.4 ± 1.2	< 2.6
Ba-La-140	0.8 ± 1.9	< 9.3	3.3 ± 1.2	< 6.4
Fe-55	148 ± 429.9	< 695.4	-120.4 ± 230.7	< 390.8
Ni-63	22.3 ± 72.1	< 118.2	12.8 ± 14.9	< 24.2
Sr-90	0.2 ± 0.8	< 1.8	1.1 ± 3.2	< 6.6

[a] 450mL of sample was filtered through 0.8μm membrane filter. The filter was gamma scanned for 60,000 sec.
The error given is the probable counting error at the 95% confidence level.
Less than (<), value is based on a 4.66 sigma counting error for the background sample and represents MDC for this measurement.

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Mr. Richard Welty
Radiation Protection Mgr.
Point Beach Nuclear Plant
NextEraEnergy
6610 Nuclear Road
Two Rivers, WI 54241

LABORATORY REPORT NO.: 8006-100-1099
DATE: 04-16-14
SAMPLES RECEIVED: 04-03-14
PURCHASE ORDER NO.:

Below are the results of the readout of supplemental TLDs deployed during the first quarter, 2014.

Period:	1st Quarter, 2014
Date Annealed:	12/10/13
Date Placed:	01/03/14
Date Removed:	04/01/14
Date Read:	04/08/14
Days in the Field:	88
Days from Annealing to Readout:	119
In-transit exposure:	5.75 ± 0.32

Location	Total mR	Net mR	Net mR Std Qtr	Net mR per 7 days
SGSF-North	18.6 ± 0.8	12.8 ± 0.9	13.2 ± 0.9	1.02 ± 0.07
SGSF-East	16.5 ± 1.0	10.7 ± 1.0	11.1 ± 1.1	0.85 ± 0.08
SGSF-South	20.0 ± 0.5	14.3 ± 0.6	14.7 ± 0.6	1.13 ± 0.05
SGSF-West	19.3 ± 1.1	13.5 ± 1.1	14.0 ± 1.1	1.08 ± 0.09
ISFSI-North	33.8 ± 0.8	28.0 ± 0.9	29.0 ± 0.9	2.23 ± 0.07
ISFSI-East	53.3 ± 1.1	47.5 ± 1.1	49.1 ± 1.2	3.78 ± 0.09
ISFSI-South	23.1 ± 0.9	17.4 ± 0.9	18.0 ± 1.0	1.38 ± 0.07
ISFSI-West	63.3 ± 3.7	57.5 ± 3.8	59.5 ± 3.9	4.58 ± 0.30
Control	20.8 ± 0.9	15.1 ± 1.0	15.6 ± 1.0	1.20 ± 0.08

SA Coorlim,
Quality Assurance

APPROVED 04/16/14
Bronia Grob
Laboratory Manager

cc: K. Johansen

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Mr. Richard Welty	LABORATORY REPORT NO.: 8006-100-1110
Radiation Protection Mgr.	DATE: 07-23-14
Point Beach Nuclear Plant	SAMPLES RECEIVED: 07-07-14
NextEraEnergy	PURCHASE ORDER NO.:
6610 Nuclear Road	
Two Rivers, WI 54241	

Below are the results of the readout of supplemental TLDs deployed during the second quarter, 2014.

Period:	2nd Quarter, 2014
Date Annealed:	03/11/14
Date Placed:	04/01/14
Date Removed:	07/02/14
Date Read:	07/14/14
Days in the Field:	92
Days from Annealing to Readout:	125
In-transit exposure:	5.57 ± 0.32

Location	Total mR	Net mR	Net mR Std Qtr	Net mR per 7 days
SGSF-North	19.7 ± 0.8	14.1 ± 0.8	14.0 ± 0.8	1.08 ± 0.06
SGSF-East	15.8 ± 0.5	10.3 ± 0.6	10.2 ± 0.6	0.78 ± 0.04
SGSF-South	17.6 ± 0.6	12.1 ± 0.6	11.9 ± 0.6	0.92 ± 0.05
SGSF-West	23.0 ± 1.0	17.4 ± 1.1	17.2 ± 1.1	1.32 ± 0.08
ISFSI-North	40.4 ± 2.2	34.8 ± 2.2	34.4 ± 2.2	2.65 ± 0.17
ISFSI-East	47.7 ± 1.4	42.2 ± 1.4	41.7 ± 1.4	3.21 ± 0.11
ISFSI-South	19.1 ± 1.0	13.6 ± 1.1	13.4 ± 1.1	1.03 ± 0.08
ISFSI-West	56.2 ± 2.0	50.7 ± 2.0	50.1 ± 2.0	3.85 ± 0.15
Control	18.5 ± 1.0	12.9 ± 1.1	12.8 ± 1.0	0.98 ± 0.08

SA Coorlim,
Quality Assurance

APPROVED 07/23/14
Bronia Grob
Laboratory Manager

cc: K. Johansen

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Mr. Richard Welty
Radiation Protection Mgr.
Point Beach Nuclear Plant
NextEraEnergy
6610 Nuclear Road
Two Rivers, WI 54241

LABORATORY REPORT NO.: 8006-100-1127
DATE: 11-03-14
SAMPLES RECEIVED: 10-09-14
PURCHASE ORDER NO.:

Below are the results of the readout of supplemental TLDs deployed during the third quarter, 2014.

Period:	3rd Quarter, 2014
Date Annealed:	06/13/14
Date Placed:	07/02/14
Date Removed:	10/04/14
Date Read:	10/13/14
Days in the Field:	94
Days from Annealing to Readout:	122
In-transit exposure:	4.13 ± 0.28

Location	Total mR	Net mR	Net mR Std Qtr	Net mR per 7 days
SGSF-North	18.4 ± 1.0	14.3 ± 1.0	13.8 ± 1.0	1.06 ± 0.07
SGSF-East	15.3 ± 0.8	11.2 ± 0.9	10.8 ± 0.8	0.83 ± 0.06
SGSF-South	16.9 ± 0.5	12.8 ± 0.6	12.3 ± 0.6	0.95 ± 0.05
SGSF-West	16.4 ± 0.6	12.3 ± 0.7	11.9 ± 0.7	0.92 ± 0.05
ISFSI-North	36.8 ± 0.8	32.7 ± 0.9	31.6 ± 0.8	2.43 ± 0.06
ISFSI-East	49.5 ± 1.1	45.4 ± 1.1	43.9 ± 1.1	3.38 ± 0.08
ISFSI-South	19.1 ± 0.9	15.0 ± 0.9	14.5 ± 0.9	1.12 ± 0.07
ISFSI-West	59.3 ± 3.2	55.2 ± 3.2	53.4 ± 3.1	4.11 ± 0.24
Control	22.6 ± 1.2	18.4 ± 1.3	17.8 ± 1.2	1.37 ± 0.09

Forrest G. Shaw III
Quality Assurance

APPROVED 11/3/14
Bronia Grob
Laboratory Manager

cc: K. Johansen

ATI Environmental, Inc.
Midwest Laboratory
700 Landwehr Road • Northbrook, IL 60062-2310
phone (847) 564-0700 • fax (847) 564-4517

Mr. Richard Welty		LABORATORY REPORT NO.:	8006-100-1135
Radiation Protection Mgr.		DATE:	01-29-15
Point Beach Nuclear Plant		SAMPLES RECEIVED:	01-06-15
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, 2014.

Period:	4th Quarter, 2014
Date Annealed:	09/16/14
Date Placed:	10/04/14
Date Removed:	01/02/15
Date Read:	01/07/15
Days in the Field:	90
Days from Annealing to Readout:	113
In-transit exposure:	3.78 ± 0.20

Location	Total mR	Net mR	Net mR Std Qtr	Net mR per 7 days
SGSF-North	16.1 ± 0.3	12.3 ± 0.4	12.4 ± 0.4	0.96 ± 0.03
SGSF-East	13.7 ± 0.3	10.0 ± 0.4	10.1 ± 0.4	0.77 ± 0.03
SGSF-South	14.4 ± 0.3	10.6 ± 0.3	10.7 ± 0.3	0.82 ± 0.03
SGSF-West	15.6 ± 0.8	11.8 ± 0.8	11.9 ± 0.8	0.92 ± 0.06
ISFSI-North	35.9 ± 1.7	32.1 ± 1.7	32.5 ± 1.7	2.50 ± 0.13
ISFSI-East	42.8 ± 1.1	39.1 ± 1.1	39.5 ± 1.1	3.04 ± 0.08
ISFSI-South	17.0 ± 0.7	13.2 ± 0.8	13.3 ± 0.8	1.03 ± 0.06
ISFSI-West	57.0 ± 2.0	53.2 ± 2.0	53.8 ± 2.0	4.14 ± 0.15
Control	15.8 ± 0.6	12.0 ± 0.6	12.2 ± 0.6	0.94 ± 0.05

Forrest G. Shaw III
Quality Assurance

APPROVED 1/29/15
Bronia Grob
Laboratory Manager

cc: K. Johansen

APPENDIX 2

Environmental Manual
Revision 25
February 11, 2014

EM

ENVIRONMENTAL MANUAL

DOCUMENT TYPE:	Controlled Reference
CLASSIFICATION:	N/A
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APPROVAL AUTHORITY:	Plant Manager (PORC Chair)
PROCEDURE OWNER (title):	Group Head
OWNER GROUP:	Chemistry

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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 LI-AA-102-1001, Regulatory Reporting, and applicable 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 ≤1000 grams; and fish ≥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 NOT 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[f]	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 (sed.) and Soil[f]	pCi/g dry	Gross Beta	2.0	---	100	---
		Cs-134 (sed.)	0.15 (sed.)	---	20 (sed.)	---
		Cs-137	0.15	---	20	---
		Other[c]	0.15	---	20	---
Algae[f]	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[f]	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	---
	pCi/L	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	1 (0.5)	2	2	---
		Other[c]	30	---	100	---
		H-3 (Lakewater)	3,000 (200)	30,000	3,000	7,500
		H-3 (Well Water)	2,000 (200)	20,000	2,000	7,500
		Sr-89[f]	10 (5)	---	50	---
		Sr-90[f]	2 (1)	---	20	---
Milk	pCi/L	Sr-89[f]	5	---	100	---
		Sr-90[f]	1	---	100	---
		I-131	0.5[g]	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, applies only to Gross Beta, all others to gamma scan of liquid.
(e) No drinking water
(f) These items or analyses are not in NUREG-1301
(g) Lower than NUREG-1301 value of 1 pCi/L to support PBNP's sampling frequency.

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

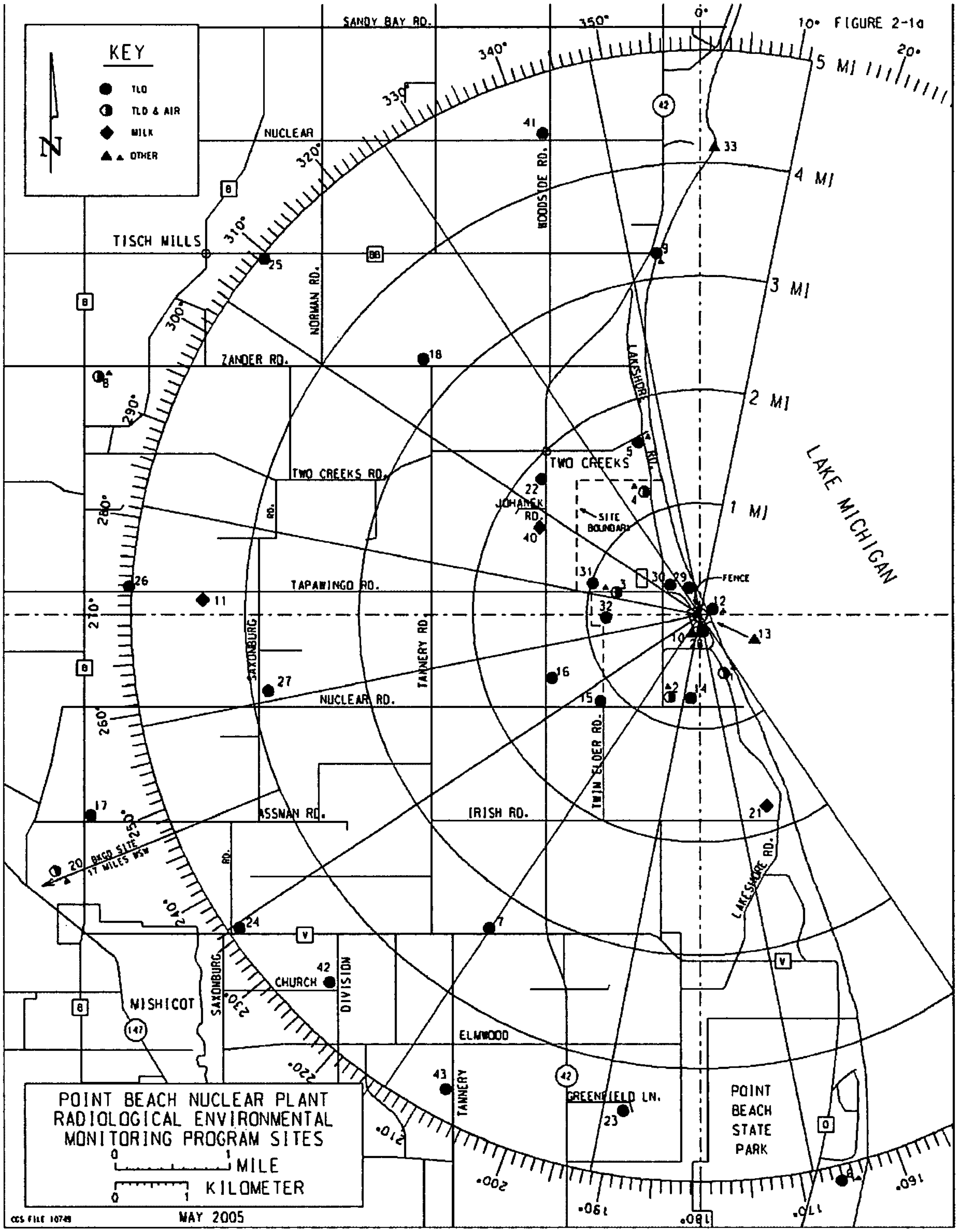


FIGURE 2-1b
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

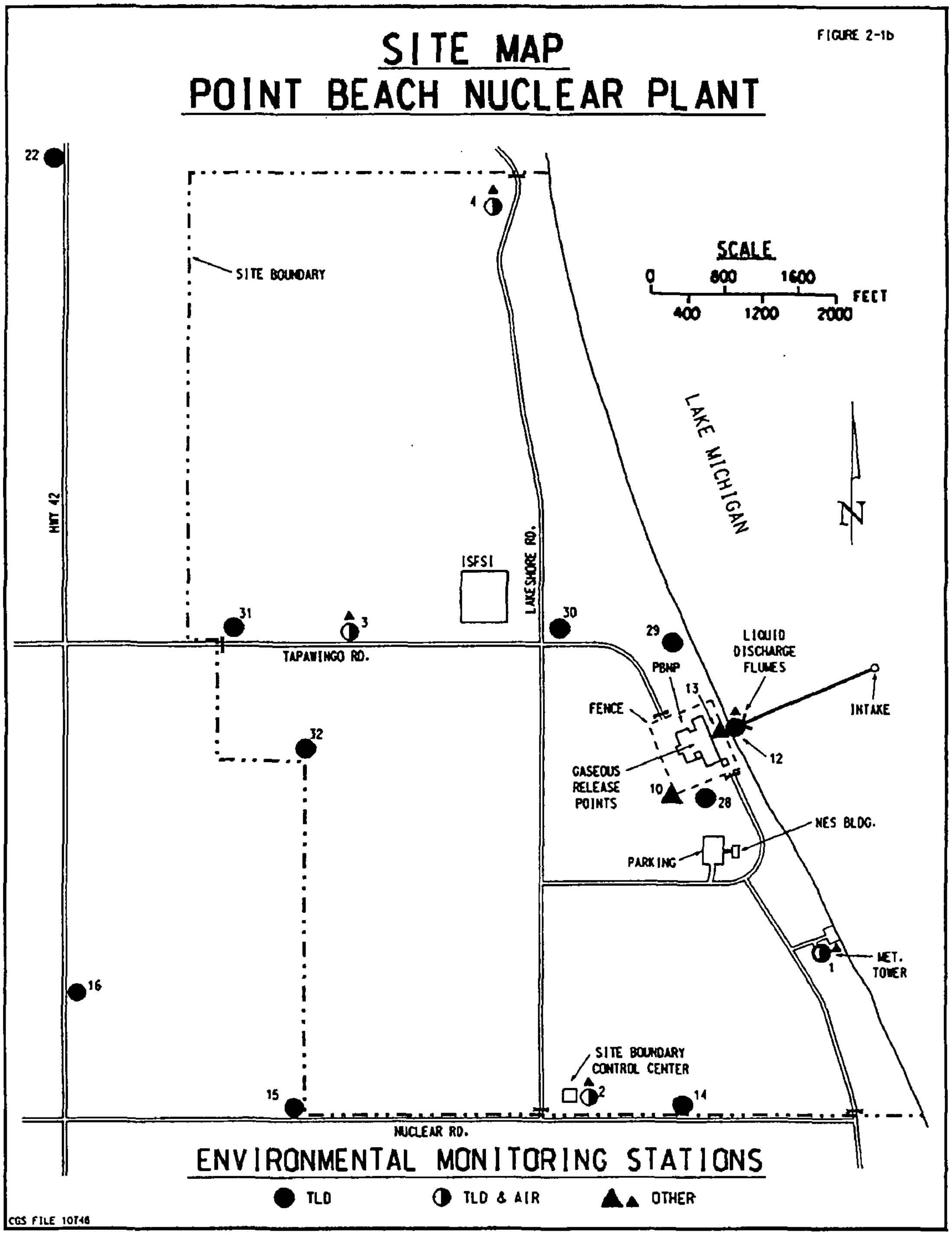
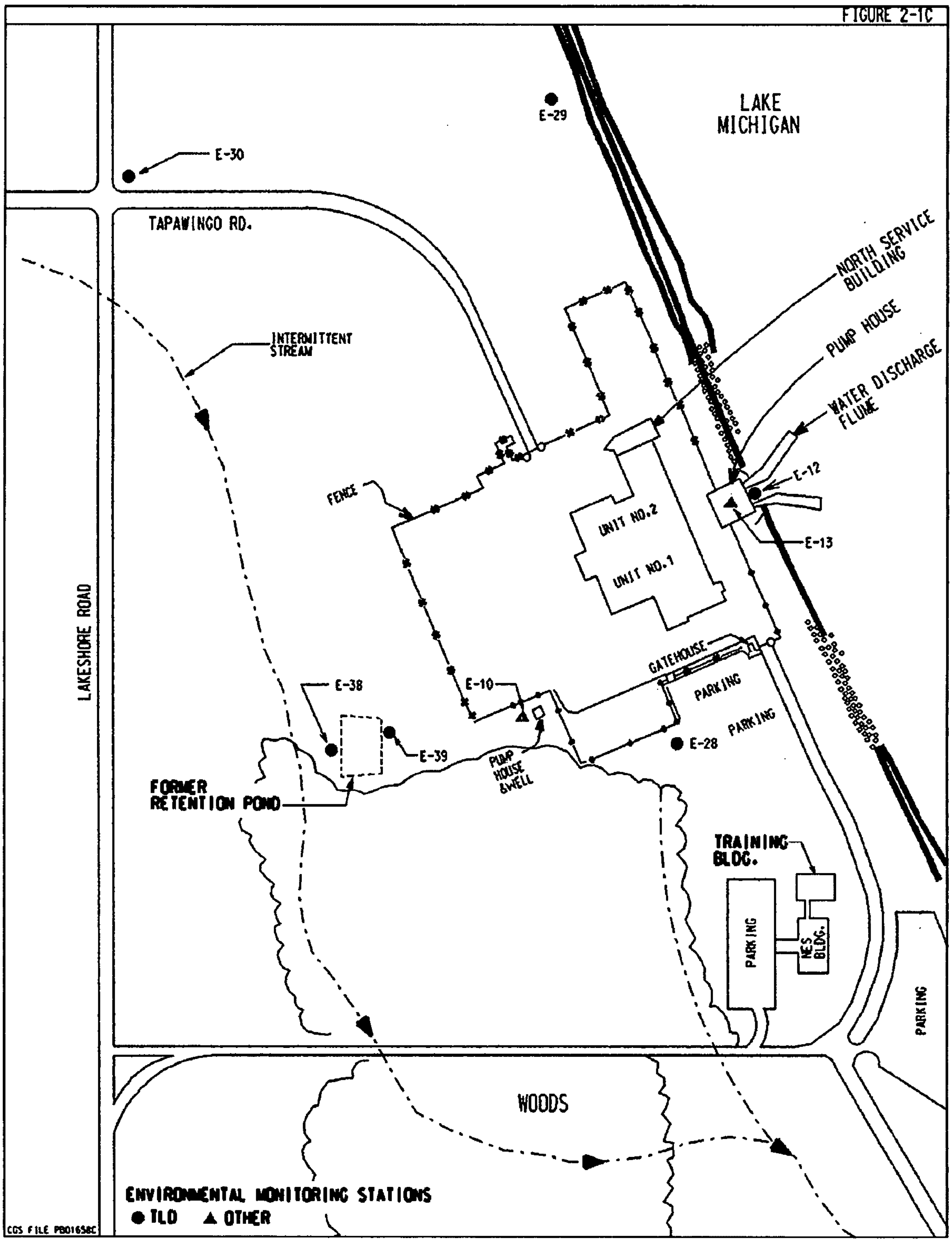


FIGURE 2-1c
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS



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