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

2010 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, 2010.

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, and miscellaneous monitoring activities which occurred in 2010. 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.

Enclosure 2 contains the PBNP Environmental Manual, which was revised in April 2010.

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

Very truly yours,

NextEra Energy Point Beach, LLC

James Costedio

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Licensing Manager

Enclosures

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ENCLOSURE 1

ANNUAL MONITORING REPORT 2010

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, 2010 through December 31, 2010

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Appendix 1: Environmental, Inc. Midwest Laboratory, "Final Report for Point Beach Nuclear Plant"

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SUMMARY

The Annual Monitoring Report for the period from January 1, 2010, through December 31, 2010, 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 2010, the following Curies (Ci) of radioactive material were released via the liquid and atmospheric pathways:

	Liquid	Atmospheric
Tritium (Ci)	559	63.5
[1]Particulate (Ci)	0.078	0.395
Noble Gas (Ci)	(-)	1.040
C-14[2]	0.00339	10.46

(-)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	0.0045 mrem	6 mrem
Organ dose	0.0182 mrem	20 mrem

ATMOSPHERIC RELEASES

Dose Category	Calculated Dose	Appendix I Dose
Organ dose	0.223 mrem	30 mrem
Noble gas beta air dose	0.000186 mrad	40 mrad
Noble gas gamma ray air dose	0.000436 mrad	20 mrad
Noble gas dose to the skin	0.000632 mrem	30 mrem
Noble gas dose to the whole body	0.000414 mrem	10 mrem

The results show that during 2010, the doses from PBNP effluents were a small percentage (0.68%) of the Appendix I design objectives. Therefore, operation of PBNP continues to be ALARA.

A survey of land use with respect to the location of dairy cattle was made pursuant to Section 2.5 of the PBNP Environmental Manual. As in previous years, no dairy cattle were found to be grazing at the site boundary. Therefore, the assumption that cattle graze at the site boundary used in the evaluation of doses from PBNP effluents remains conservative.

The 2010 Radiological Environmental Monitoring Program (REMP) collected 767 individual samples for radiological analyses and 128 sets of thermoluminescent dosimeters (TLDs) to measure ambient radiation in the vicinity of PBNP and the ISFSI. Quarterly composite of weekly air particulate filters generated an additional 24 samples and quarterly composites of monthly lake water samples resulted in a further 18 samples. This yields a total of 807 samples. Air monitoring from six different sites showed only background radioactivity from naturally occurring radionuclides. 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.

There were no new dry storage units added to the ISFSI in 2010. The total number remains at 30 dry storage casks: 16 ventilated, vertical storage casks (VSC-24) and 14 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 2010 confirmed that the effluent control program at PBNP ensured a minimal impact on the environment.

Approximately 500 samples were analyzed for H-3 a part of the groundwater monitoring program (GWP). These samples came from drinking water wells, monitoring wells, yard drain outfalls, yard manholes, and surface water on site. Also included in this number were a sump and manholes associated with the subsurface drainage system (SSD) located under the plant foundation and four groundwater containment integrity monitoring wells located in the facades. The results show no substantial change in H-3 from previous years. Low levels of tritium continue under the plant foundation. No drinking water wells (depth >100 feet) have any detectable H-3. Tritium continues to be confined to the upper soil layer where the flow is toward the lake. Groundwater samples from wells in the vicinity of the remediated, former earthen retention pond continue to show low levels of H-3 whereas none was detectable in the wells monitoring the potential offsite tritium movement. Precipitation sampling to evaluate the onsite recapture of discharged airborne H-3 found concentrations up to 440 pCi/l close to the plant and decreasing to less than detectable levels at the site boundary. In addition to H-3 measurements, some of the water samples were scanned for gamma emitters and analyzed for hard-to-detect (HTD) radionuclides. None were found. Soil obtained from the SSD manholes also were gamma scanned and analyzed for HTDs. Only Cs-137 and Sr-90, both long-lived radionuclides were found. No transuranics were found in these soil samples.

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 2010 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)	0.0045	0.075 %
20 (any organ)	0.0182	0.091 %

2.2 2010 Circulating Water Radionuclide Release Summary

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

2.3 2010 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.

The total isotopic distribution (gamma emitters plus hard-to-detects other that strontium) shows a slight increase from 2009, with increases in Co-58, Nb-95, Sb-124, and Ni-63. There was no Sr-89/90 in liquids in 2010. Tritium is lower by approximately 100 Curies from 2009. 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 the drains carry yard and roof drain runoff to the beach. A seventh drains a small portion of the grassy area on top of the bluff overlooking the lake. Each of the drains is sampled monthly. The quarterly results of monitoring the beach drains are presented in Table 2-4. The total monthly flow is calculated assuming that the flow rate at the time of sampling persists for the whole month. During 2010, no tritium was observed in any of the beach drains at the effluent LLDs used to detect and quantify tritium released from discreet volumes such as hold up tanks and waste distillate tanks.

Because these drains are subject to ground water inleakage, they also are sampled as part of the ground water monitoring program. These beach drain results and other groundwater monitoring results are presented in Part D of this Annual Monitoring Report. For seven months during 2010, beach drain S-1 received water from a groundwater sump under the plant. In August this sump was rerouted to the waste water effluent discharge point.

Table 2-2
Summary of Circulating Water Discharge
January 1, 2010 through December 31, 2010

	Jan	Feb	Mar	Apr	May	Jun	Total Jan-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
Total Activity Released (Ci)														
Gamma Scan(+HTDs)[1]	4.33E-03	2.36E-03	3.62E-02	2.07E-02	5.25E-03	1.20E-03	7.00E-02	2.00E-03	1.27E-03	1.27E-03	5.98E-04	3.23E-04	2.17E-03	7.77E-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	4.55E+01	5.31E+01	1.78E+01	1.27E+01	1.82E+01	1.14E+01	1.59E+02	7.03E+01	1.29E+02	1.17E+01	7.60E+01	1.17E+01	1.02E+02	5.59E+02
Strontium (89/90/92)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-06	0.00E+00	1.61E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-06
Total Vol Released (gal)														
Processed Waste	6.75E+04	1.06E+05	1.05E+05	7.38E+04	6.44E+04	2.62E+04	4.43E+05	5.55E+04	6.62E+04	2.54E+04	3.28E+04	1.52E+04	9.41E+04	7.32E+05
Waste Water Effluent[2]	4.15E+06	3.20E+06	3.57E+06	4.15E+06	3.03E+06	3.35E+06	2.15E+07	3.26E+06	3.71E+06	3.03E+06	2.92E+06	3.02E+06	3.40E+06	4.08E+07
U1 SG Blowdown	2.66E+06	2.20E+06	8.66E+04	3.81E+06	2.57E+06	2.52E+06	1.38E+07	2.51E+06	2.91E+06	2.60E+06	3.42E+07	2.59E+06	2.50E+06	6.12E+07
U2 SG Blowdown	3.22E+06	2.17E+06	2.35E+06	2.59E+06	2.52E+06	2.74E+06	1.56E+07	2.37E+06	2.59E+06	2.30E+06	3.42E+07	2.56E+06	2.51E+06	6.21E+07
Total Gallons	1.01E+07	7.68E+06	6.11E+06	1.06E+07	8.18E+06	8.64E+06	5.13E+07	8.20E+06	9.28E+06	7.96E+06	7.14E+07	8.19E+06	8.50E+06	1.65E+08
Total cc	3.82E+10	2.91E+10	2.31E+10	4.02E+10	3.10E+10	3.27E+10	1.94E+11	3.10E+10	3.51E+10	3.01E+10	2.70E+11	3.10E+10	3.22E+10	6.24E+11
Dilution vol(cc)[3]	6.62E+13	5.98E+13	5.39E+13	1.02E+14	1.08E+14	1.15E+14	5.05E+14	1.11E+14	1.15E+14	8.05E+13	1.15E+14	1.11E+14	7.59E+13	1.11E+15
Avg diluted discharge conc (µCi/cc)														
Gamma Scan (+HTDs)[1]	6.54E-11	3.95E-11	6.72E-10	2.03E-10	4.86E-11	1.04E-11		1.80E-11	1.10E-11	1.58E-11	5.20E-12	2.91E-12	2.86E-11	
Gross Alpha	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		1.76E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Tritium	6.87E-07	8.88E-07	3.30E-07	1.25E-07	1.69E-07	9.53E-07		6.33E-07	1.58E-07	7.06E-07	7.00E-07	1.05E-07	1.34E-06	
Strontium (89/90/92)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-14	0.00E+00		3.74E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Max Batch Discharge Conc (µCi/cc)														
Tritium	2.51E-05	1.81E-05	9.66E-06	3.36E-06	7.21E-06	6.83E-06		3.22E-05	4.04E-05	8.48E-06	4.19E-05	6.79E-06	3.23E-05	
Gamma Scan	2.87E-09	1.05E-08	3.37E-08	6.95E-09	1.22E-09	2.50E-10		1.86E-10	3.15E-10	6.44E-11	9.15E-11	2.07E-11	7.60E-10	

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, 2010 through December 31, 2010

Nuclide	Jan	Feb	Mar	Apr	May	Jun	Total Jan-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Jan-Dec
H-3	4.55E+01	5.31E+01	1.78E+01	1.27E+01	1.82E+01	1.14E+01	1.59E+02	7.03E+01	1.29E+02	1.17E+01	7.60E+01	1.17E+01	1.02E+02	5.59E+02
F-18	5.72E-04	9.86E-05	6.68E-05	7.11E-04	9.19E-04	6.05E-04	2.97E-03	5.45E-04	1.36E-04	1.13E-03	3.26E-04	2.80E-04	2.68E-04	5.66E-03
Cr-51	5.19E-05	3.17E-05	2.16E-03	2.29E-03	3.36E-04	0.00E+00	4.87E-03	0.00E+00	0.00E+00	0.00E+00	8.91E-06	0.00E+00	0.00E+00	4.88E-03
Mn-54	4.90E-06	2.33E-05	4.38E-05	5.23E-05	1.77E-05	0.00E+00	1.42E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-04
Fe-55	2.81E-04	0.00E+00	2.79E-03	1.14E-03	7.07E-04	0.00E+00	4.92E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.92E-03
Fe-59	0.00E+00	0.00E+00	1.67E-04	1.30E-04	6.85E-05	0.00E+00	3.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.66E-04
Co-57	0.00E+00	0.00E+00	4.52E-05	4.11E-06	3.56E-06	0.00E+00	5.29E-05	1.20E-06	1.92E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.60E-05
Co-58	4.39E-04	4.19E-04	2.65E-02	1.22E-02	1.97E-03	3.23E-04	4.19E-02	3.01E-04	4.42E-04	4.40E-05	5.69E-05	1.15E-05	5.09E-05	4.28E-02
Co-60	3.98E-04	6.28E-04	1.46E-03	8.75E-04	2.48E-04	3.53E-05	3.64E-03	7.78E-05	5.12E-05	1.85E-05	7.68E-05	7.50E-06	8.60E-05	3.96E-03
Zn-65	0.00E+00	0.00E+00	0.00E+00	9.33E-06	0.00E+00	0.00E+00	9.33E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.33E-06
Br-82	0.00E+00	0.00E+00	0.00E+00	8.59E-09	0.00E+00	0.00E+00	8.59E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.59E-09
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
Sr-92	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-06	0.00E+00	1.61E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E-06
Nb-95	8.98E-07	3.19E-05	2.20E-04	2.76E-04	7.85E-05	0.00E+00	6.07E-04	0.00E+00	0.00E+00	0.00E+00	1.26E-06	0.00E+00	0.00E+00	6.09E-04
Nb-97	5.88E-06	3.09E-06	0.00E+00	0.00E+00	2.35E-06	0.00E+00	1.13E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-05
Zr-95	0.00E+00	8.33E-06	1.18E-04	1.86E-04	2.54E-05	0.00E+00	3.38E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.38E-04
Zr-97	8.58E-07	0.00E+00	5.49E-06	0.00E+00	3.17E-07	0.00E+00	6.67E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.67E-06
Ag-110m	8.08E-04	2.81E-04	9.75E-04	7.05E-04	1.23E-04	1.45E-05	2.91E-03	2.20E-05	2.69E-06	0.00E+00	2.15E-06	0.00E+00	1.79E-05	2.95E-03
Sn-113	4.64E-06	0.00E+00	1.39E-04	1.04E-04	3.81E-05	0.00E+00	2.86E-04	0.00E+00	1.77E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.88E-04
Sn-117m	5.02E-05	1.33E-04	3.31E-04	5.43E-04	2.59E-04	1.05E-04	1.42E-03	1.05E-04	9.71E-05	0.00E+00	2.61E-05	0.00E+00	5.01E-05	1.70E-03
Sb-122	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-124	8.92E-05	5.23E-05	3.05E-04	4.69E-04	8.71E-05	1.62E-05	1.02E-03	1.74E-05	2.48E-05	2.20E-06	0.00E+00	0.00E+00	0.00E+00	1.06E-03
Sb-125	1.89E-04	8.77E-05	3.50E-04	4.59E-04	1.01E-04	6.71E-05	1.25E-03	9.75E-05	1.66E-04	4.63E-05	0.00E+00	8.96E-06	0.00E+00	1.57E-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	1.21E-05	1.21E-05
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	2.10E-05	2.10E-05
Cs-136	0.00E+00	0.00E+00	2.42E-06	0.00E+00	0.00E+00	0.00E+00	2.42E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.42E-06
Cs-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.04E-06	2.75E-06	0.00E+00	0.00E+00	5.88E-06	1.17E-05
Ru-103	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Na-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ni-63	5.88E-04	2.33E-04	5.17E-04	3.91E-04	1.19E-04	3.17E-05	1.88E-03	1.07E-04	9.02E-05	2.78E-05	8.80E-05	1.44E-05	5.34E-05	2.26E-03
Tc-99	2.12E-04	1.29E-04	2.07E-05	1.06E-04	1.83E-05	2.48E-06	4.88E-04	1.57E-04	1.33E-05	0.00E+00	1.36E-06	0.00E+00	0.00E+00	6.60E-04
C-14	6.39E-04	2.01E-04	0.00E+00	0.00E+00	1.29E-04	0.00E+00	9.69E-04	5.67E-04	2.43E-04	0.00E+00	9.80E-06	0.00E+00	1.60E-03	3.39E-03

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, 2010, through December 31, 2010

	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)	7.24E+05	2.87E+05	0.00E+00	0.00E+00	2.02E+04	0.00E+00	2.23E+04
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)	2.98E+06	3.41E+05	0.00E+00	0.00E+00	2.20E+04	0.00E+00	7.81E+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)	3.21E+05	1.88E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.93E+03
4th Qtr							
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	1.44E+05	8.85E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

2.6 Land Application of Sewage Sludge

The Wisconsin Department of Natural Resources has approved the disposal of PBNP sewage by land application on various NextEra Energy Point Beach, LLC (NextEra) properties surrounding the plant. This sewage sludge which may contain trace amounts of radionuclides, is to be applied in accordance with methodologies approved by the NRC, on January 13, 1988, pursuant to 10 CFR 20.302(a). The approved methodology required analyses prior to every disposal. Based upon an investigation of the source of the radionuclides, a combination of engineering modifications and administrative controls eliminated plant generated radiological inputs to the sewage. This was verified by sludge analyses using the environmental lower level of detection (LLD) criteria. No byproduct radionuclides were found in the sludge after the controls and modifications were completed. However, as a precaution, sludge is routinely monitored at the sensitivity level to achieve environmental LLDs.

There were no sludge disposals by land application during 2010. All disposals were done at the Manitowoc Sewage Treatment Plant.

2.7 Carbon-14

Carbon-14 (C-14) is a naturally occurring radionuclide. Nuclear weapons testing of the 1950s and 1960s significantly increased the amount of C-14 in the atmosphere. Small amounts of C-14 also are produced by nuclear reactors, but the amounts produced are less than C-14 produced by weapons testing or that occur naturally. NextEra 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.

For 2010, the NRC has requested that nuclear plants report C-14 emissions. Pursuant to NRC guidance in RG 1.21, 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, analyses 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 2010, the monthly and total C-14 (3.39E-03 Ci) in liquid discharges are documented in Table 2-3. The 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 calculated doses include the C-14 contribution. This is the first time C-14 has been required by the NRC (see Sections 3.4 through 3.6, below, for a more detailed description). The comparison between airborne effluent doses with and without C-14 are shown in Table 3-4. The highest dose is the child-bone category. The doses demonstrate that releases from PBNP to the atmosphere continue to be ALARA.

3.2 Radioactive Airborne Release Summary

Radioactivity released in airborne effluents for 2010 are summarized in Table 3-2. Noble gases are slightly higher than 2009 with the airborne tritium being twenty curies lower.

3.3 Isotopic Airborne Releases

The monthly isotopic airborne releases for 2010, 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 explained in the following sections.

3.4 Carbon-14

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

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

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

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

NextEra participated in the generation of the EPRI Technical Report by providing data to EPRI required to calculate C-14 generation. The C-14 generation rate calculated by EPRI for each PBNP Unit was 5.23 Ci/y for a total of 10.46 Ci (EPRI, Table 4-25, p. 4-26, Units W-D and W-E). This value is four orders of magnitude higher than the 3.39E-03 Ci of C-14 measured in the liquid waste batch discharges.

3.5 C-14 Airborne Effluent Dose Calculation

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

The amount of $^{14}CO_2$ present in the PBNP airborne effluent has not been measured. However, such measurements have been made at a comparable PWR sites similar to the PBNP design. The Ginna nuclear generating station (Ginna) is of similar design to PBNP. It is a Westinghouse 2-loop PWR of the same vintage as PBNP and approximately the same power. 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 10.46 Ci of C-14 calculated for PBNP by EPRI will be used in the ingestion dose calculations.

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

For the other pathways, milk, meat, produce, and leafy vegetables, the dose depends upon the amount incorporated into biomass consumed by cattle and people: forage for cattle or produce and vegetables 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 assumes that all pathways are applicable to a hypothetical person residing at the site boundary. Because C-14 is present as a gas, the assumed pathways are milk, meat, leafy vegetables 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 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 calculate. However, this MEI approach is used to maintain continuity between the C-14 and the other radionuclide dose calculation methodologies as described in the ODCM.

3.6 C-14 Measurements

Although no C-14 measurements were made of PBNP effluents, 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 in a background location about 17 miles SW of the plant. Based on the measurement error, there is 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 (Table 10-3). These results demonstrate 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.

Table 3-1
Comparison of 2010 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	0.223 mrem	0.742
Noble gas	40 mrad (beta air)	0.000186 mrad	0.00047
Noble gas	20 mrad (gamma air)	0.000436 mrad	0.0022
Noble gas	30 mrem/skin	0.000632 mrem	0.0021
Noble gas	10 mrem (whole body)	0.000414 mrem	0.0041

Table 3-2
Radioactive Airborne Effluent Release Summary
January 1, 2010, through December 31, 2010

	Jan	Feb	Mar	Apr	May	Jun	Total Jan-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total NG from Liq (Ci)	5.85E-05	2.71E-02	5.35E-03	1.60E-04	2.57E-04	0.00E+00	3.29E-02	8.16E-05	5.53E-06	0.00E+00	6.23E-05	2.85E-05	2.87E-04	3.34E-02
Total Noble Gas (Ci)1	3.39E-01	4.23E-01	4.79E-02	4.73E-02	3.71E-02	4.84E-02	9.43E-01	4.88E-02	3.50E-02	1.98E-01	4.65E-02	3.75E-02	3.74E-02	1.35E+00
Total Radioiodines (Ci)[2]	0.00E+00	0.00E+00	4.08E-09	1.11E-06	8.21E-06	1.53E-04	1.62E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-04
Total Particulate (Ci)3	6.12E-07	5.52E-07	2.99E-06	7.23E-05	8.39E-06	1.30E-07	8.50E-05	1.99E-07	4.21E-06	3.75E-07	2.99E-06	2.89E-06	2.99E-06	9.86E-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)	6.12E-07	5.52E-07	2.99E-06	7.23E-05	8.39E-06	1.30E-07	8.50E-05	1.99E-07	4.21E-06	3.75E-07	3.00E-06	2.89E-06	2.99E-06	9.86E-05
Total Tritium (Ci)	7.00E+00	5.58E+00	1.12E+01	4.33E+00	4.36E+00	2.65E+00	3.51E+01	2.30E+00	3.36E+00	3.17E+00	6.59E+00	6.12E+00	6.80E+00	6.35E+01
Max NG H'rly Rel.(Ci/sec)	1.14E-06	5.05E-07	2.06E-07	5.07E-08	3.73E-08	4.20E-07		4.13E-08	3.41E-08	4.43E-08	4.25E-08	7.03E-08	3.81E-08	

[1] Total noble gas (airborne + liquid releases).
[2] Airborne radioiodines only include I-131 and I-133.
[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, 2010 through December 31, 2010

Nuclide	Jan (Ci)	Feb (Ci)	Mar (Ci)	Apr (Ci)	May (Ci)	Jun (Ci)	Semi-Annual	Jul (Ci)	Aug (Ci)	Sep (Ci)	Oct (Ci)	Nov (Ci)	Dec (Ci)	Total (Ci)
H-3	7.00E+00	5.58E+00	1.12E+01	4.33E+00	4.36E+00	2.65E+00	3.51E+01	2.30E+00	3.36E+00	3.17E+00	6.59E+00	6.12E+00	6.80E+00	6.35E+01
Ar-41	2.00E-01	1.83E-01	3.45E-02	4.13E-02	3.46E-02	3.67E-02	5.30E-01	4.71E-02	3.50E-02	4.38E-02	4.40E-02	3.73E-02	3.67E-02	7.74E-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	4.54E-03	4.71E-03	1.76E-04	0.00E+00	1.10E-09	3.05E-04	9.73E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.73E-03
Kr-87	1.12E-02	1.11E-02	5.14E-04	0.00E+00	6.90E-08	6.87E-04	2.35E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-02
Kr-88	1.11E-02	1.10E-02	4.64E-04	0.00E+00	1.58E-07	7.16E-04	2.33E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.33E-02
Xe-131m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-133	9.77E-03	9.57E-02	7.47E-03	5.94E-03	2.46E-03	2.37E-03	1.24E-01	1.76E-03	1.63E-05	1.54E-01	2.46E-03	4.50E-05	6.75E-04	2.83E-01
Xe-133m	6.22E-05	1.97E-03	8.22E-05	0.00E+00	0.00E+00	0.00E+00	2.11E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.11E-03
Xe-135	2.43E-02	3.33E-02	1.18E-03	4.19E-05	0.00E+00	2.54E-03	6.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.85E-05	4.54E-06	6.14E-02
Xe-135m	2.49E-02	2.57E-02	1.35E-03	0.00E+00	3.32E-07	1.86E-03	5.38E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.38E-02
Xe-138	5.28E-02	5.64E-02	2.13E-03	1.05E-03	1.61E-09	3.27E-03	1.16E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-01
F-18	0.00E+00	0.00E+00	0.00E+00	7.11E-05	0.00E+00	0.00E+00	7.11E-05	0.00E+00	4.04E-06	0.00E+00	4.60E-09	0.00E+00	0.00E+00	7.51E-05
Mn-54	0.00E+00	0.00E+00	6.90E-09	0.00E+00	0.00E+00	0.00E+00	6.90E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.90E-09
Co-58	0.00E+00	0.00E+00	2.95E-06	0.00E+00	4.94E-08	0.00E+00	3.00E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-06
Co-60	0.00E+00	0.00E+00	1.92E-08	0.00E+00	0.00E+00	0.00E+00	1.92E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E-08
Ag-110m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-125	0.00E+00	0.00E+00	6.06E-09	0.00E+00	0.00E+00	0.00E+00	6.06E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.06E-09
I-131	0.00E+00	0.00E+00	4.08E-09	1.11E-06	0.00E+00	1.53E-04	1.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-04
I-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.21E-06	0.00E+00	8.21E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.21E-06
Cs-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sn-117m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ni-63	6.09E-07	5.50E-07	1.10E-13	1.30E-07	1.34E-07	1.30E-07	1.55E-06	1.53E-07	1.53E-07	1.48E-07	2.99E-06	2.89E-06	2.99E-06	1.09E-05
Fe-55	2.21E-09	2.02E-09	1.70E-13	0.00E+00	0.00E+00	0.00E+00	4.23E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.23E-09
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
Tc-99	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.60E-08	4.60E-08	2.27E-07	0.00E+00	0.00E+00	0.00E+00	3.19E-07

Note: The Noble Gases listed above include the liquid contribution

Table 3-4
Comparison of Airborne Effluent Doses

2010 Airborne Particulate + Tritium Dose (mrem)

	Bone	Liver	T-WB	Thyroid	Kidney	Lung	GI-LLI	Skin
Adult	4.16E-04	1.35E-02	1.34E-02	1.86E-02	1.34E-02	1.34E-02	1.34E-02	7.17E-06
Teen	5.52E-04	1.55E-02	1.54E-02	1.95E-02	1.54E-02	1.54E-02	1.54E-02	7.17E-06
Child	8.76E-04	2.26E-02	2.26E-02	2.99E-02	2.26E-02	2.25E-02	2.25E-02	7.17E-06
Infant	2.61E-04	9.96E-03	9.94E-03	2.21E-02	9.96E-03	9.91E-03	9.92E-03	7.17E-06

Carbon-14 Dose (mrem/yr)

	Bone	Liver	T. Body	Thyroid	Kidney	Lungs	GI-LLI	Skin
Adult	6.32E-02	1.26E-02	1.26E-02	1.26E-02	1.26E-02	1.26E-02	1.26E-02	0.00E+00
Teen	9.67E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02	0.00E+00
Child	2.22E-01	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	4.42E-02	0.00E+00
Infant	1.09E-01	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02	2.32E-02	0.00E+00

2010 Total Airborne Non-Noble Gas Dose (mrem)

	Bone	Liver	T-WB	Thyroid	Kidney	Lung	GI-LLI	Skin
Adult	6.36E-02	2.60E-02	2.60E-02	3.12E-02	2.60E-02	2.60E-02	2.60E-02	7.17E-06
Teen	9.72E-02	3.47E-02	3.47E-02	3.88E-02	3.47E-02	3.46E-02	3.47E-02	7.17E-06
Child	2.23E-01	6.68E-02	6.68E-02	7.41E-02	6.68E-02	6.67E-02	6.67E-02	7.17E-06
Infant	1.10E-01	3.32E-02	3.32E-02	4.53E-02	3.32E-02	3.31E-02	3.31E-02	7.17E-06
Ann.Limit	3.00E+01	3.00E+01		3.00E+01	3.00E+01	3.00E+01	3.00E+01	3.00E+01
% Limit	7.42E-01	2.23E-01		2.47E-01	2.23E-01	2.22E-01	2.22E-01	2.39E-05

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 2010. No Type C or D waste was shipped. No irradiated fuel was shipped offsite. The volume, activity and type of waste are listed in Table 4-1.

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

Type of Waste	Quantity	Activity
A. Spent resins, filter sludge, evaporator bottoms, etc.	9.100 m^3	153.661 Ci
	320.0 ft^3	
B. Dry compressible waste, contaminated equipment, etc	379.3 m^3	0.289 Ci
	13393.2 ft^3	
C. Irradiated components, control rods, etc.	N/A m^3	N/A Ci
	ft^3	
D. Other	N/A m^3	N/A Ci
	ft^3	

4.2 Major Nuclide Composition (by Type of Waste)

The major radionuclide content of the 2010 solid waste was determined by gamma isotopic analysis and the application of scaling factors for certain indicator radionuclides based on the measured isotopic content of representative waste stream samples. The estimated isotopic content is presented in Table 4-2. Only those radionuclides with detectable activity are listed.

Table 4-2
2010 Estimated Solid Waste Major Radionuclide Composition

TYPE A		TYPE B		TYPE C		TYPE D	
Nuclide	Percent Abundance	Nuclide	Percent Abundance	Nuclide	Percent Abundance	Nuclide	Percent Abundance
Co-60	45.2835%	Co-60	27.4031%				
Ni-63	26.9349%	Fe-55	27.0803%				
Co-58	22.8365%	Nb-95	17.3940%				
Fe-55	2.7270%	Ni-63	9.8661%				
Mn-54	1.7643%	Ag-110m	6.6514%				
Ni-59	0.2389%	Co-58	2.4226%				
Cs-137	0.1076%	Sb-125	2.3872%				
Ce-144	0.0437%	Cs-137	2.2994%				
Pu-241	0.0297%	Zr-95	1.7933%				
Ag-110m	0.0215%	Mn-54	1.0448%				
Tc-99	0.0076%	Tc-99	0.7782%				
Sr-90	0.0028%	H-3	0.2384%				
H-3	0.0013%	Zn-65	0.1637%				
Am-241	0.0002%	In-113m	0.1209%				
C-14	0.0001%	Sr-90	0.0820%				
Cm-243	0.0001%	Ce-144	0.0685%				
Cm-244	0.0001%	Sr-89	0.0461%				
Pu-238	0.0000%	Ag-108m	0.0420%				
		Pu-241	0.0386%				
		Co-57	0.0333%				
		Am-241	0.0231%				
		Pu-239	0.0077%				
		Pu-238	0.0059%				
		Cm-243	0.0038%				
		Nb-94	0.0031%				
		C-14	0.0019%				
		Cm-242	0.0005%				
		Po-210	0.0001%				
		Pu-240	0.0001%				

4.3 Solid Waste Disposition

There were ten solid waste shipments from PBNP during 2010. The dates and destinations are shown in Table 4-3.

Table 4-3
2010 PBNP Radioactive Waste Shipments

Date	Destination
02/26/10	Clive, UT
02/26/10	Clive, UT
03/08/10	Oak Ridge, TN
03/25/10	Oak Ridge, TN
04/06/10	Oak Ridge, TN
04/29/10	Oak Ridge, TN
10/06/10	Erwin, TN
11/04/10	Clive, UT
11/22/10	Oak Ridge, TN
11/30/10	Erwin, TN

5.0 NONRADIOACTIVE CHEMICAL RELEASES

5.1 Scheduled Chemical Waste Releases

Scheduled chemical waste releases to the circulating water system from January 1, 2010, to June 30, 2010, included 7.23E+05 gallons of neutralized wastewater. The wastewater contained 8.42E-01 pounds of suspended solids and 1.26E+03 pounds of dissolved solids.

Scheduled chemical waste releases to the circulating water system from July 1, 2010, to December 31, 2010, included 4.81E+05 gallons of neutralized wastewater. The wastewater contained 3.51E-03 pounds of suspended solids and 1.20E+03 pounds 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, 2010, to June 30, 2010, included 2.16E+07 gallons of clarified wastewater. The wastewater contained 1.98E+03 pounds of suspended solids.

Miscellaneous chemical waste releases from the wastewater effluent (based on effluent analyses) to the circulating water for July 1, 2010, to December 31, 2010, included 1.93E+07 gallons of clarified wastewater. The wastewater contained 2.62E+03 pounds of suspended solids.

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from January 1, 2010, to June 30, 2010, included 4.06E+05 pounds of sodium bisulfite solution (1.54E+05 lbs. sodium bisulfite) and 5.41E+05 lbs of Stabrex ST70 solution (3.44E+04 sodium hypochlorite and 4.99E+04 lbs sodium bromide). Stabrex ST70 is a liquid bromine biocide.

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from July 1, 2010, to December 31, 2010, included 4.87E+05 pounds of sodium bisulfite solution (1.85E+05 lbs sodium bisulfite) and 3.74E+05 pounds of Stabrex ST70 (2.38E+04 lb sodium hypochlorite and 3.45E+04 lbs sodium bromide), 1.53E+05 pounds Sodium Hypochlorite Solution (1.91E+04 pounds sodium hypochlorite), and 7.91E+02 pounds Acti-Brom 1338 (3.56+E02 pounds sodium bromide). Stabrex ST70 and Acti-Brom 1338 are liquid bromine biocides.

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 2010

	UNIT	JAN	FEB	MAR*	APR	MAY	JUN
Average Volume Cooling Water Discharge [million gal/day]**	1	282.2	282.2	10.5	417.5	489.6	499.3
	2	282.2	282.2	296.4	481.8	489.6	499.3
Average Cooling Water Intake Temperature [°F]	1	38.1	37.7	47.9	46.1	50.5	57.4
	2	38.8	38.6	39.5	46.3	50.8	60.6
Average Cooling Water Discharge Temperature [°F]	1	69.7	69.2	44.6	64.6	69.1	76.4
	2	71.3	70.8	69.5	64.5	68.4	73.5
Average Ambient Lake Temperature [°F]		33.6	33.3	48.7	43.1	46.5	53.9

*U1 outage 3/2/10 - 4/1/10
** For days with cooling water discharge flow.

Table 6-1(continued)
Circulating Water System Operation for 2010

	UNIT	JUL	AUG	SEP	OCT	NOV	DEC
Average Volume Cooling Water Discharge [million gal/day]**	1	499.6	499.3	498.7	498.4	499.3	332.5
	2	488.6	499.3	498.7	499.3	499.3	333.5
Average Cooling Water Intake Temperature [°F]	1	59.0	63.6	55.3	56.1	43.6	37.8
	2	59.8	64.6	55.6	56.7	43.8	37.8
Average Cooling Water Discharge Temperature [°F]	1	76.3	82.4	74.0	75.1	62.3	67.4
	2	76.7	82.8	73.5	74.5	61.3	58.3
Average Ambient Lake Temperature [°F]		53.4	59.7	50.7	53.4	40.8	33.6

** For days with cooling water discharge flow.

Part B
Miscellaneous Reporting Requirements

7.0 ADDITIONAL REPORTING REQUIREMENTS

7.1 Revisions to the PBNP Effluent and Environmental Programs

The ODCM was not revised in 2010. However, the Environmental Manual (EM) was revised. The EM is part of the ODCM. Copies of the revised manual are being submitted with this 2010 Annual Monitoring Report.

7.2 Interlaboratory Comparison Program

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 2010. 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 2010.

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 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.

Just because a result is statistically greater than zero, it does not necessarily indicate that the radionuclide is present in an environmental sample. False positives may be obtained by fluctuations in background during the counting process. This phenomenon is most prevalent for concentrations at or near the LLD. Therefore, other information such as PBNP emissions records and radionuclide half-life may be used to evaluate whether the result is real or a statistical artifact. Based on the actual measurement of the sample and its background, it is possible to calculate the minimum detectable concentration (MDC) of a sample in the same manner the *a priori* LLD is calculated. This is the most common method of determining whether or not a radionuclide is present in a sample.

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

9.2 Sampling Parameters

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

9.3 Deviations from Required Collection Frequency

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

9.4 Assistance to the State of Wisconsin

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

9.5 Program Modifications

No new monitoring sites were added in 2010.

Table 9-1
PBNP REMP Sample Analysis and Frequency

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

Table 9-2
PBNP REMP Sampling Locations

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

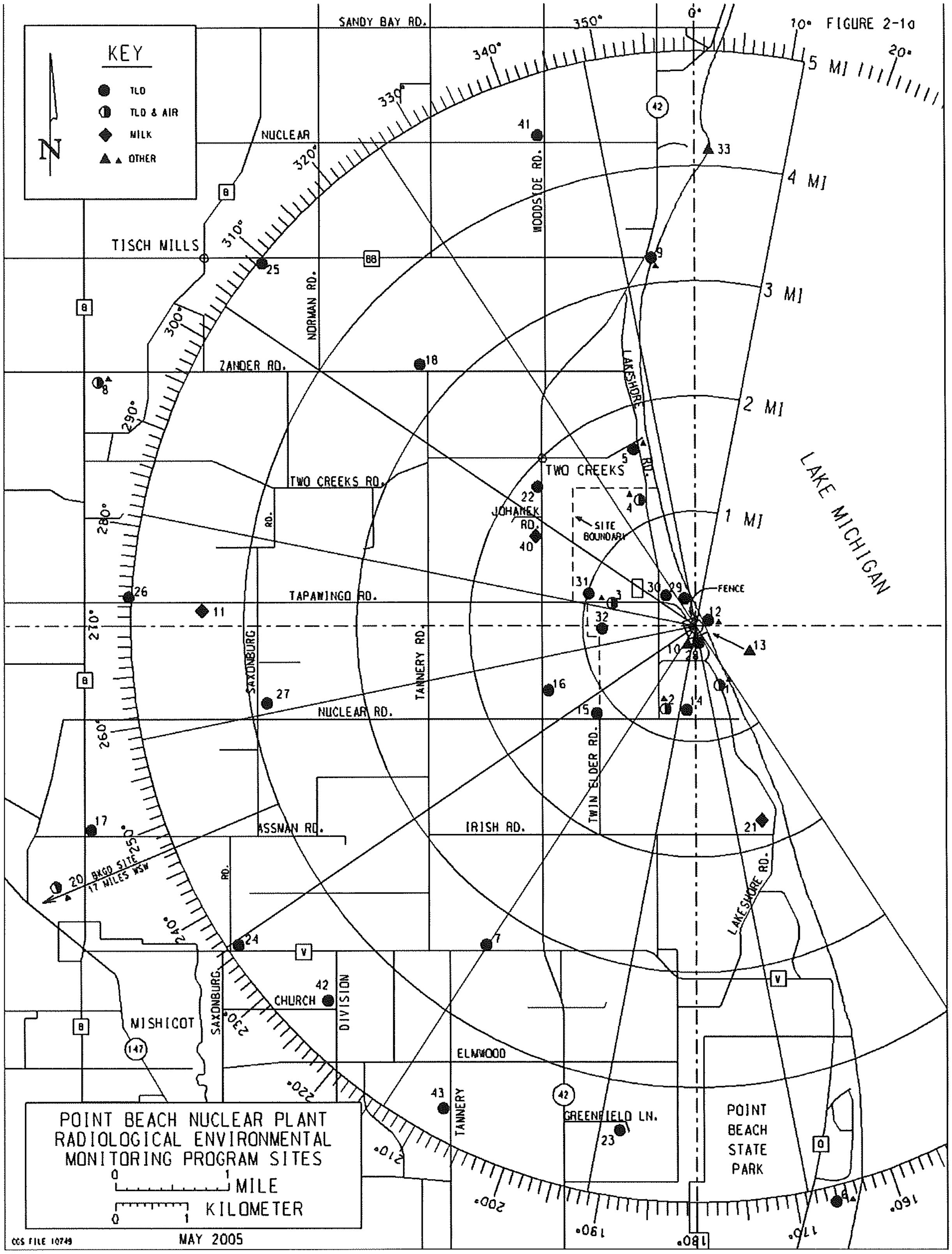


Figure 9-1
PBNP REMP Sampling Sites

FIGURE 2-1b

SITE MAP
POINT BEACH NUCLEAR PLANT

Figure Withheld Under 10 CFR 2.390

CGS FILE 10746

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

FIGURE 2-1C

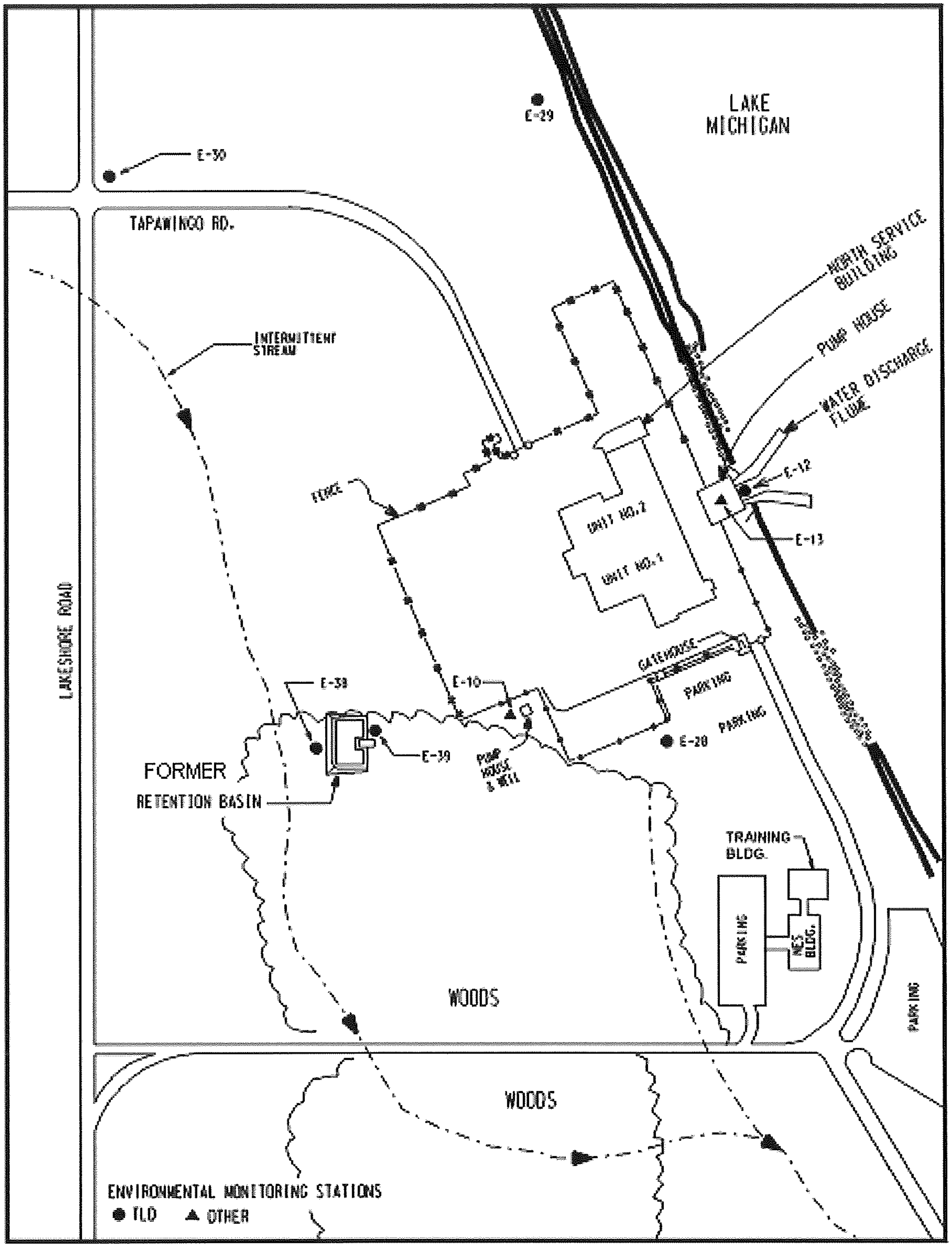


Figure 9-3
Enhanced Map Showing REMP Sampling Sites Closest to PBNP

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

Sample Type	Location	Collection Date	Reason for not conducting REMP as required	Plans for Preventing Recurrence
AP/AI	E-04 E-02 E-04 E-03	3/10/2010 4/0710 8/18/10 10/27/10	Power loss Power loss to sampler Power loss to sampler Power loss to sampler	New air samplers have been obtained and in the process of being issued for use. With the new samplers the loss of power will not result in an invalid sample.
Lake Water	E-06 E-06 E-01, E-05, E-06 E-33	1/13/2010 2/11/10 12/15/10	Due to ice along the lake shore, it was unsafe to obtain a sample on these dates.	Loss beyond plant's control, sampling resumed once ice disappeared

Table 9-6
Sample Collections for State of Wisconsin

Sample Type	Location	Frequency
Lake Water	E-01	Weekly, Composited 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 2010.

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.

For 2010, special vegetation samples were obtained for C-14 analyses. Samples of soybeans and feed corn were obtained from fields at the site boundary in the highest χ/Q section for comparison to the same crops obtained from the background site some 17 miles away.

9.7.6 Environmental Radiation Exposure

The 2010 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 were obtained using three lithium fluoride (LiF) TLD chips sealed in black plastic. The difference in material types can impact the amount of exposure measured. As seen in 2001, the Environmental Inc. TLD cards typically produce a slightly higher measured exposure value, although within the uncertainty of that value recorded by the TLD chips.

The reported field exposure is the arithmetic average of the four exposure values obtained minus the 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

Although the ISFSI fence TLDs are not considered part of the REMP because of their location directly on site, 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.

10.0 RESULTS

10.1 Summary of 2010 REMP Results

Radiological environmental monitoring conducted at PBNP from January 1, 2010, through December 31, 2010, consisted of analysis of air filters, milk, lake water, well water, soil, fish, shoreline sediments, algae, and vegetation as well as TLDs. The results are summarized in Table 10-1.

Table 10-1 contains 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 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.

Table 10-1 contains a summary of REMP results. No results are reported as less than LLD. All results reported to NextEra by the contracted radioanalytical laboratory "as measured" whether positive or negative. A Table 10-1 value reported as ND indicates that none of the results were detected based on a comparison to the minimum detectable concentration (MDC). The laboratory calculates the MDC based on results and background for the individual sample. If one result is greater than an MDC, all the values, whether positive or negative (and less than an MDC) are used to calculate the average and standard deviation reported in Table 10-1. Some of the reported averages may be negative because many of the measured concentrations for that sample category were negative. The highest positive value and its 2-sigma error are reported only when one or more measured values are statistically greater than zero and greater than an MDC based on counting statistics.

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."

Table 10-2 contains the ISFSI fence TLD results.

10.2 Correction to 2009 Annual Monitoring Report

The 2009 Annual Monitoring Report (AMR) contained one gross beta data point used to calculate the annual average and standard deviations reported in Table 10-1 and Table 11-4 which should not have been used. The sample from location E-02 for April 22, 2009, should not have been included in the calculations. Due to loss of power to the sampler prior to when the sample was collected, the correct volume required for calculating the concentration was unknown. The collected sample was sent to the contracted lab for analysis to see if there was any above normal activity. However, the cover letter did not specify that the analytical result should not be reported in the monthly REMP report. The inclusion of that sample result in the monthly REMP report was not caught during the review of April 2009 results. Subsequently the data point was used in the preparation of annual averages reported in Table 10-1 and 11-4 and in the discussions presented in the 2009 PBNP AMR.

There were 308 gross beta air particulate samples used in generating the reported averages. The reported gross beta average and its standard deviation based on the 308 samples as reported in Tables 10-1 and 11-4 was 0.025 pCi/m^3 ± 0.011 pCi/m^3. Removing the E-02 data point for April 22, 2009 yields 0.025 pCi/m^3 ± 0.011 pCi/m^3. The only difference between the two statistical calculations occurs in the 4th - 6th decimal places (not shown) which are used only in rounding off and have no other statistical validity because the results are reported using 2 significant figures.

Therefore, using the E-02 data from April 22, 2009, did not change the results reported on Table 10-1 and on Table 11-4. Conclusions derived from the inclusion of the data point are not changed.

Table 10-1
Summary of Radiological Environmental Monitoring Results for 2010

Sample	Description	N	LLD (a)	Average ± Standard Deviation (b)	High ± 2 sigma	Units
TLD	Environmental Radiation	124	1 mrem	1.11 ± 0.15	1.44 ± 0.13	mR/7days
	Control (E-20)	4	1 mrem	1.10 ± 0.08	1.19 ± 0.13	mR/7days
Air	Gross Beta	256	0.01	0.022 ± 0.007	0.046 ± 0.004	pCi/m3
	Control (E-20) Gross beta	52	0.01	0.023 ± 0.007	0.046 ± 0.004	pCi/m3
	I-131	256	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)	0.0000 ± 0.0002	0.0006 ± 0.0004	pCi/m3
	Control (E-20) Cs-137	4	0.01(0.06)	ND	-	pCi/m3
	Other gamma emitters	20	0.1	ND	-	pCi/m3
	Control (E-20) Other	4	0.1	-	-	pCi/m3
Milk	Sr-89	36	5(10)	ND	-	pCi/L
	Sr-90	36	1(2)	0.7 ± 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)	ND	-	pCi/L
	Ba-La-140	36	5 (15)	ND	-	pCi/L
	Other gamma emitters	36	15	ND	-	pCi/L
Well Water	Gross beta	4	4	1.4 ± 1.7	3.6 ± 1.8	pCi/L
	H-3	4	500 (3000)	ND	-	pCi/L
	Sr-89	4	5(10)	ND	-	pCi/L
	Sr-90	4	1 (2)	ND	-	pCi/L
	I-131	4	0.5 (2)	ND	-	pCi/L
	Mn-54	4	10 (15)	ND	-	pCi/L
	Fe-59	4	30	ND	-	pCi/L
	Co-58	4	10(15)	ND	-	pCi/L
	Co-60	4	10(15)	ND	-	pCi/L
	Zn-65	4	30	ND	-	pCi/L
	Zr-Nb-95	4	15	ND	-	pCi/L
	Cs-134	4	10(15)	ND	-	pCi/L
	Cs-137	4	10(18)	ND	-	pCi/L
	Ba-La-140	4	15	ND	-	pCi/L
	Other gamma emitters	4	30	ND	-	pCi/L
Algae	Gross beta	6	0.25	3.54 ± 1.73	6.48 ± 0.33	pCi/g
	Co-58	6	0.25	ND	-	pCi/g
	Co-60	6	0.25	ND	-	pCi/g
	Cs-134	6	0.25	ND	-	pCi/g
	Cs-137	6	0.25	0.016 ± 0.008	0.025 ± 0.014	pCi/g

(a) The required LLD per the PBNP REMP is enclosed in the parentheses.
(b) "ND" indicates that the sample result is Not Detectable, i.e., sample concentrations were statistically equivalent to zero or less than the MDA.

Table 10-1 (continued)
Summary of Radiological Environmental Monitoring Results for 2010

Sample	Description	N	LLD (a)	Average ± Standard Deviation (b)	High ± 2 sigma	Units
Lake Water	Gross beta	42	4	1.8 ± 1.2	5.6 ± 2.1	pCi/L
	I-131	42	0.5 (2)	ND	-	pCi/L
	Mn-54	42	10 (15)	ND	-	pCi/L
	Fe-59	42	30	ND	-	pCi/L
	Co-58	42	10(15)	ND	-	pCi/L
	Co-60	42	10(15)	ND	-	pCi/L
	Zn-65	42	30	-0.3 ± 2.3	4.2 ± 3.9	pCi/L
	Zr-Nb-95	42	15	ND	-	pCi/L
	Cs-134	42	10 (15)	ND	-	pCi/L
	Cs-137	42	10 (18)	ND	-	pCi/L
	Ba-La-140	42	15	ND	-	pCi/L
	Ru-103 (Other gamma)	42	30	ND	-	pCi/L
	Sr-89	18	5(10)	ND	-	pCi/L
	Sr-90	18	1 (2)	ND	-	pCi/L
	H-3	18	500 (3000)	136 ± 168	642 ± 112	pCi/L
Fish	Gross beta	11	0.5	2.81 ± 1.48	5.86 ± 0.11	pCi/g
	Mn-54	11	0.13	ND	-	pCi/g
	Fe-59	11	0.26	ND	-	pCi/g
	Co-58	11	0.13	ND	-	pCi/g
	Co-60	11	0.13	ND	-	pCi/g
	Zn-65	11	0.26	ND	-	pCi/g
	Cs-134	11	0.13	ND	-	pCi/g
	Cs-137	11	0.15	0.031 ± 0.016	0.055 ± 0.026	pCi/g
	Other gamma emitters	11	0.5	ND	-	pCi/g
Shoreline Sediment	Gross beta	10	2	10.69 ± 2.53	14.52 ± 1.24	pCi/g
	Cs-137	10	0.15	0.032 ± 0.016	0.051 ± 0.021	pCi/g
Soil	Gross beta	16	2	31.30 ± 6.22	39.65 ± 2.15	pCi/g
	Cs-137	16	0.15	0.21 ± 0.13	0.53 ± 0.05	pCi/g
Vegetation	Gross beta	24	0.25	6.83 ± 1.21	9.48 ± 0.38	pCi/g
	I-131	26	0.06	ND	-	pCi/g
	Cs-134	26	0.06	ND	-	pCi/g
	Cs-137	26	0.08	0.004 ± 0.012	0.061 ± 0.021	pCi/g
	Other gamma emitters	26	0.06	ND	-	pCi/g

(a) The required LLD per the PBNP REMP is enclosed in the parentheses.
(b) "ND" indicates that the sample result is Not Detectable, i.e., sample concentrations were statistically equal to zero or <MDA.

Other gamma emitters typically refer to Co-60 if not specifically called out in the analyses. See explanation on page 1 of the Environmental Inc, report which is Appendix A

Table 10-2
ISFSI Fence TLD Results for 2010

Fence Location	Average	±	Standard Deviation	Units
North	2.64	±	0.39	mR/7 days
East	3.02	±	0.43	mR/7 days
South	1.41	±	0.21	mR/7 days
West	5.05	±	1.04	mR/7 days

10.3 2010 Special Sample Results

The results of the C-14 measurements on the corn and soybean special samples collected are shown in Table 10-3.

Table 10-3
C-14 IN CROPS

Sample	Activity (dpm/g carbon)		2σ error
E-02 Corn	14.4147	±	0.0840
E-02 Soybeans	14.1132	±	0.0822
E-20 Corn	14.2777	±	0.0866
E-20 Soybeans	14.0914	±	0.0836

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 of the indicator TLD cards is 1.11 mR/7-days and 1.10 mR/7-days at the control location. These results are not significantly different from each other nor from those observed from 2001 through 2009 (tabulated below in Table 11-1). The change in TLD types in 2001 accounts for the increase in average TLD readings (i.e., prior to third quarter 2001 TLD LiF chips were used versus the TLD cards, see Section 9.7.6 for additional information) from 2000 to 2001. Therefore, the operation of the plant has had no effect on the ambient gamma radiation.

There were no new dry fuel storage cask additions to the ISFSI in 2010. The higher ISFSI fence TLD averages, when compared to the 2009 averages, show that the current number of casks were not all present in 2009 (Table 11-2). The west fence TLDs continue to record higher exposures. The north and east fence TLDs are statistically equal (2.65± 0.38 *vs.* 3.03± 0.44). The south fence continues to record the lowest exposures (Table 11-2).

Table 11-1
Average Indicator TLD Results from 1993 – 2010

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

*St. Dev = Standard Deviation

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

There is no significant exposure impact on the TLD monitoring locations around the ISFSI (Table 11-3). The results continue to be higher at E-03 and E-31 which are west of the ISFSI corresponding to the higher exposure at the west fence. As expected, the values at E-03 are higher than those at E-31. E-03 is located halfway between the ISFSI and E-31 [see Figs. 9-1 and 9-2 for locations]. The results near the site boundary (E-31, 1.17 ± 0.19; E-32, 1.05 ± 0.27) are comparable to the background site E-20 (1.09 ± 0.20) within the associated measurement error, indicating no measurable increase in ambient gamma radiation at the site boundary due to the operation of the ISFSI.

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

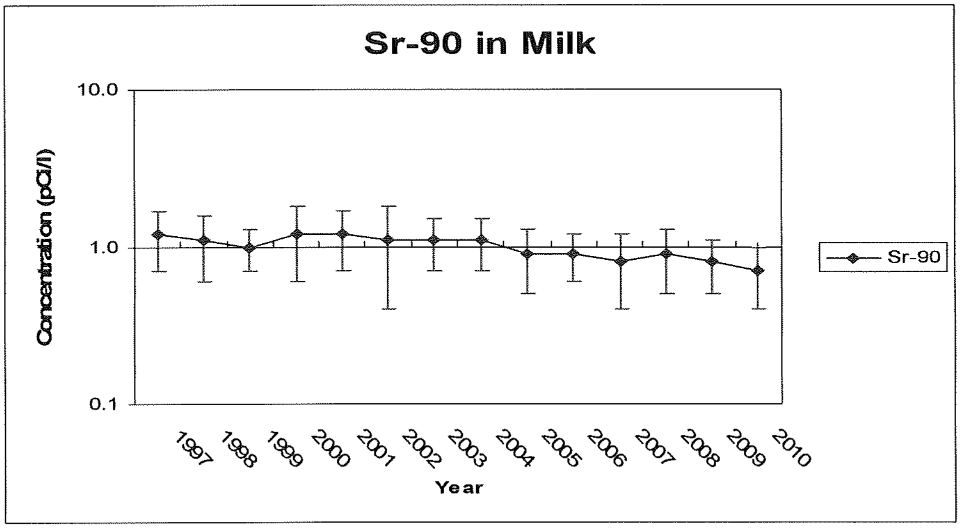
*Pre-Operational data are the averages of the years 1992 through 3rd quarter of 1995.
**Sites E-31 and E-32 are located at the Site Boundary to the West and South-West of the ISFSI.
***E-20 is located approximately 17 miles WSW of the ISFSI.

11.2 Milk

Naturally occurring potassium-40 (1421 ± 75 pCi/l) continues to be the most prevalent radionuclide measured in milk at concentrations roughly 2000 times higher than the only potential plant related radionuclide, Sr-90 (0.7 ± 0.3 pCi/l), detected in milk. The annual average Sr-90 concentrations in milk continue to be similar to previous years. None of the other required radionuclides in the milk analyses, I-131, Cs-134/137, Ba-La-140, and Co-60 were detected.

Strontium-90 results are similar to results from prior years. A plot of the annual averages starting with 1997 shows a logarithmic decrease over time (Figure 11-1). Using the annual average Sr-90 concentration in milk between 1997 and 2010, the environmental half-life can be calculated yielding a 16.7 year half-life. Because the radiological half-life is 28 years, the shorter removal half-life indicates that environmental factors as well as radioactive decay are working to decrease the concentration of Sr-90 in milk.

Figure 11-1
Sr-90 Concentration in Milk



The Sr-90 in milk persists due to cycling in the biosphere after the atmospheric weapons tests of the '50s, '60s, and '70s and the Chernobyl accident in the late 1980s. Therefore, it is concluded that the milk data for 2010 show no radiological effects of the plant operation.

11.3 <u>Air</u>

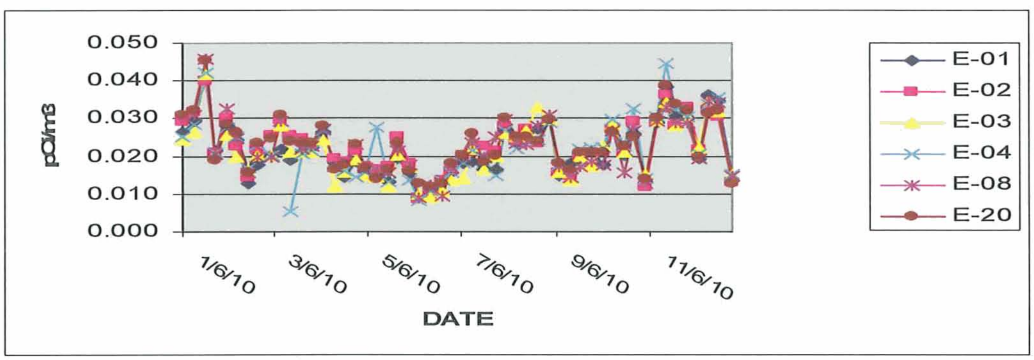
The average annual gross beta concentrations (plus/minus the one-sigma uncertainty) in weekly airborne particulates at the indicator and control locations were 0.022 ± 0.014 pCi/m^3 and 0.023 ± 0.014 pCi/m^3, respectively, and are similar to levels observed from 1993 through 2009 (Table 11-4).

Table 11-4
Average Gross Beta Measurements in Air

Year	Average (pCi/m3)
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

The 2010 weekly gross beta concentrations reveal higher winter values and lower summer values. This is a repeat of the patterns seen in 2006 - 2009. Again, as in previous years, another high period occurs during July-September (Figure 11-1). The cause for this scatter is not known but may be due to a shift in land use or weather patterns.

Figure 11-2
2010 Airborne Gross Beta Concentration (pCi/m^3) vs. Time



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 0.006 to 0.029 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, or in the range of 0.001 to 0.005 pCi/m^3. Therefore, because no I-131 was detected, it is concluded that the release of small amounts of radioiodine from March - June (Table 3-2) had no measurable impact on the environment.

Gamma spectroscopic analysis of quarterly composites of air particulate filters for radionuclides attributable to PBNP yielded similar results for indicator and control locations. All results for Cs-134 and Co-60 are less than the minimum detectable concentration (MDC). One Cs-137 result (0.0006 ± 0.0004 pCi/m^3) from collection site E-08 located greater than 5 miles to the WNW of PBNP) was greater that its MDC of 0.0005 pCi/m^3. Because PBNP released no airborne Cs-137 during 2010, this positive Cs-137 is either a false positive or, most likely, indicates the resuspension of soil containing Cs-137. Due to radioactive fallout from atmospheric weapons testing in the 1950s to 1970s, Cs-137 occurs in the soils around PBNP (see Section 11.8). By comparison, this Cs-137 is about 1% of the 2010 average concentration of the naturally radioisotope Be-7 was 0.077 ± 0.011 pCi/m^3.

In summary, the 2010 air data does not demonstrate an environmental impact from the operation of PBNP.

11.4 Lake Water

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

There were four slightly positive indications of gamma emitters during 2010. On April 15, 2010, Zn-65 was greater than the MDC. This occurred at site E-05, which is about 1.6 miles north of PBNP. This site is upstream based on the current flow in the area. On the same date, a slightly positive result but less than the MDC occurred south of PBNP at site E-01. On April 5, 2010, PBNP had a Zn-65 discharge. The discharge concentration was about 1000 times lower than the measured lake water concentration. Based on the sample locations, on the measured concentrations, and on the PBNP Zn-65 discharge history, it is unlikely that the small, positive Zn-65 results are the result of any PBNP discharge. Therefore, the Zn-65 results at E-05 and E-01 are determined to be a false positive.

Aliquots of the monthly samples are composted quarterly and analyzed for Sr-89/90 and for tritium. No Sr-89 was detected in any of the samples.

Sr-90, because of its long half-life, still persists in Lake Michigan from radioactive fallout in the1950s and 1960s. Therefore, it is not surprising that there were four slightly positive results for Sr-90. None of the results were above the MDC. Furthermore, PBNP had no Sr-89 or Sr-90 liquid discharges during 2010. Therefore, it is concluded that the small, positive results due to the statistical nature of radioactivity measurements.

Tritium, in addition to being produced by water-cooled reactors such as PBNP, also is a naturally occurring radionuclide. The quarterly composite lake water samples collected and analyzed for H-3 in 2010, ranged from less than MDC to 642 pCi/l. Although 7 of the 16 composites showed results above zero, only two of these results (E-05, 431 ± 104 pCi/l, 1.6 miles north of PBNP and E-06, 642 ± 112 pCi/l, about 6 miles south), both occurring in the fourth quarter, were above the MDC. Based on these results, the individual months used to make the composites were analyzed separately. The tritium concentrations at E-05 are unlikely to be the result of PBNP discharges because, as mentioned above, this site north of the plant is upstream with respect to the current flow on this side of Lake Michigan. Due to icy conditions, the fourth quarter E-06 composite consists of only two monthly samples, October and November. The October sample had 490 ± 97 pCi/l; November, 1139 ± 119 pCi/l. The H-3 concentrations could have resulted from PBNP effluents because, in both cases, H-3 discharges occurred one to two days prior to the sample collection. The concentrations are roughly 2.5% and 5%, respectively, of the EPA drinking water standard.

11.5 Algae

Filamentous algae attached to rocks along the Lake Michigan shoreline are known to concentrate radionuclides from the water. Co-60 or Cs-134 was not detected. However, low concentrations of Co-58 and Cs-137 were detected. Four of the samples had positive results but only two Cs-137 results were greater than the MDC: 0.023 ± 0.010 pCi/g (August 4, 2010 at the PBNP discharge area) and 0.025 ± 0.014 pCi/g (October 6, 2010, at E-05 north of PBNP). In 2010 PBNP did not discharge Cs-137 until August 10, 2010, six days after the algae samples were taken. Therefore, it is unlikely that the observed results are due to PBNP effluents. Because fallout Cs-137 from 1950s and 60s weapons testing is known to still persist in Lake Michigan, the Cs-137 results may be indicative of recycling of fallout Cs-137 in the lake. By contrast to the low level of Cs-137, the average concentrations of naturally occurring Be-7 and K-40 are higher: 1.12 ± 0.32 and 2.62 ± 1.23 pCi/g respectively. Therefore, the algae monitoring results do not indicate any effect by PBNP upon the environs.

11.6 Fish

The analyses of 11 fishes produced 7 positive Cs-137 results greater than the MDC. No other radionuclide was detected. The highest Cs-137 concentration 0.055 ± 0.026 is comparable to the results from 2005 - 2009. But this is lower than the high of 0.172 pCi/g in 2005 and considerably lower than the 2.8 pCi/g seen in PBNP in the mid-1970s during the Chinese weapons tests. It is not possible to determine whether this Cs-137 represents PBNP effluent or the recycling of fallout Cs-137 from the 1950s and 60s. However, based on the recycling of fallout Cs-137 in Lake Michigan, atmospheric weapons testing fallout is the most likely source of the observed Cs-137 in fish. This conclusion is supported by the absence of any other radionuclides present in PBNP effluents.

By comparison, the concentration of naturally occurring K-40 (1.11– 5.86 pCi/g) is about 20 -100 times higher than the highest Cs-137 concentration. Based on these results, it is concluded that fish do not indicate an effect of plant effluents.

11.7 Well Water

No plant related radionuclides were detected in well water during 2010, 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, and1970s and from the 1986 Chernobyl accident. 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. Erosion, radioactive decay, and human activities modify the Cs-137 concentrations. Evidence for the latter are the higher Cs-137 concentrations found at E-06, where trees growing and incorporating Cs-137 during the time of atmospheric fallout are now being burned in camp fires thereby releasing the incorporated Cs-137 to the surrounding area. All 2010 samples had low levels of Cs-137 with the highest levels being found at E-06. The results from the indicator sites, except for E-06, are comparable to those from the background site some 17 miles away in the low χ/Q sector. This is expected for the Cs-137 source being atmospheric fallout as discussed above. 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 about 1% of the levels of naturally occurring K-40.

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. Nine of the ten samples have Cs-137 concentrations statistically different from zero. The Cs-137 concentrations of the shoreline sediment are 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 100 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. This is supported by the fact that PBNP's first discharge of Cs-137 did not occur until August 2010 whereas four of the five shoreline sediment samples from April tested positive for 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 are 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.) In contrast, K-40 is a primordial radionuclide which is incorporated into vegetation from the soil during the growing process. Cs-137 can be present 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. The only location where Cs-137 was detected above the MDC was at E-06, a campground area in the Point Beach State Forest. The highest Cs-137 concentration of 0.061 pCi/g is approximately 2% of the average vegetation Be-7 concentration of 2.64 pCi/g and 1.3% of the average K-40 concentration of 3.88 pCi/g.

As has been demonstrated at other sites in the United States, which are far from any nuclear plants, 1950s and 60s fallout Cs-137 is present in the ash produced by burning the wood in fireplaces. Typically, campground fires are put out using water and the ashes are spread on the ground. The ash acts as a fertilizer, releasing the cesium and potassium in the ash into the soil where they are available for uptake by growing plants and trees. The campfires also create an airborne Cs-137 source which can spread to surrounding areas.

PBNP airborne effluents contained no Cs-137 during 2010. Also, no Cs-137 attributable to PBNP was found in the air samples from the area around the site. [See discussion on air samples in Section 11.3.] As mentioned in Section 2.6, NextEra previously disposed sewage by land application on certain fields on site. However, this practice has been discontinued. To check whether any radioactive material could have been incorporated into vegetation via ground uptake, corn and soybeans were obtained and analyzed from a field at the site boundary where the sewage used to be land applied. No licensed material was found during the analyses. However, the naturally occurring radionuclide Be-7 was found at concentrations comparable to those for the same crops obtained over 17 miles away at the REMP background site.

Based on the 2010 vegetation sampling results, it is concluded that no effect from PBNP effluents are indicated.

11.11 Vegetation C-14

For 2010, the NRC requested that nuclear plants report their C-14 emissions and to determine its impact and dose contribution. The amount of C-14 released was determined by a methodology developed by EPRI for the nuclear industry. Special sampling and analyses for C-14 were conducted as part of the REMP to assess the C-14 in vegetation, the principal pathway by which the C-14 dose is expressed. Samples of corn and soybeans were obtained from fields at the site boundary in the highest χ/Q sector. The same samples were obtained from fields at the REMP background location some 17 miles away. The results from the special vegetation samples collected for C-14 show slightly higher C-14 concentration in the samples collected at the site boundary as compared to the background site (Table 10-3). However, there is no statistical difference between the two locations at the 95% confidence limit.

11.12 Land Use Census

In accordance with the requirements of Section 2.5 of the Environmental Manual, a visual verification of animals grazing in the vicinity of the PBNP site boundary was completed in 2010. No significant change in the use of pasturelands or grazing herds was noted. Therefore, the existing milk-sampling program continues to be acceptable. It continues to be conservative for the purpose of calculating doses via the grass-cow-milk pathway to ensure that the milk sampling locations remain as conservative as practicable.

12.0 REMP CONCLUSION

Based on the analytical results from the 807 environmental samples, and from 128 sets of TLDs that comprised the PBNP REMP for 2010, PBNP effluents had no discernable, permanent effect on the surrounding environs. These results demonstrate that PBNP continues to have good controls on fuel integrity and on effluent releases. The control of effluents from PBNP continues to be acceptable pursuant to the ALARA criteria of 10 CFR 50.34a.

Part D
GROUNDWATER MONITORING

13.0 PROGRAM DESCRIPTION

PBNP monitors groundwater for tritium. During 2010 the sampling program consisted of seven beach drains, six intermittent stream and bog locations, four drinking water wells, four façade wells, twenty-two yard electrical manholes, six ground water monitoring wells, 27 subsurface drainage (SSD) system manholes, and the Unit 2 facade SSD system sump.

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.

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, three 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. 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 - 350 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 a minimum of once per month during 2010. Access to other parts of the SSD is obtained vial manholes located in the facades, turbine building, and other locations. The manholes were lifted in 2010 to check of the physical condition of the SSD. Many holes were dry. When water was found, a sample was obtained. Eight samples were obtained in the facades and 19 in the Turbine Building area.

In the 1990s, two wells were sunk in each unit's façade to monitor the groundwater levels and look at 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. Beginning in 2007, samples for the groundwater program were drawn as well. 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

Figure Withheld Under 10 CFR 2.390

14.0 RESULTS

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. There are more positive values for the East Creek than for the West Creek or for the confluence of the two creeks south of the plant near Lake Michigan. GW-08 is a bog near the former retention pond.

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	±	±	±	135 ± 83			
Feb	±	±	±	±			
Mar	ND ±	202 ± 84	ND ±	179 ± 83	±	±	148
Apr	ND ±	ND ±	ND ±	190 ± 84	±	±	149
May	ND ±	228 ± 83	201 ± 82	238 ± 84	295 ± 86	548 ± 98	143
Jun	ND ±	ND ±	ND ±	272 ± 95	±	±	164
Jul	ND ±	ND ±	ND ±	ND ±	±	±	159
Aug	ND ±	ND ±	ND ±	ND ±	±	±	160
Sep	ND ±	173 ± 93	ND ±	167 ± 93	±	±	160
Oct	ND ±	ND ±	ND ±	ND ±	±	±	154
Nov	±	±	±	±	±	±	139
Dec	ND ±	ND ±	ND ±	151 ± 79	±	±	144

A blank indicates no sample was available. 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. None of the samples from the confluence of the two creeks (GW-01), ESE of the former retention pond, and only three of the West (GW-03) and East (G-02) Creek samples south of the former retention pond have results above the minimum detectable concentration (MDC). In contrast, seven of the results from the north (GW-17) section of the East Creek, near the sewage treatment plant, and from the one bog (E-08) SE of the former retention pond are >MDC. This indicates that the predominant H-3 flow in the top soil layer flow away from the area of the retention pond is more east to Lake Michigan than to the south. This is in agreement with site hydrological studies reported in the FSAR and the Site Conceptual Model. The East Creek concentrations are generally lower than the 300 - 350 pCi/l seen in the late 90s. The E-08 bog result is down from the 3000 pCi/l seen before the pond was remediated in 2002.

14.2 Beach Drains and SSD Sump

The 2010 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.] Beginning in September 2009, S-1 and S-3 were sampled more frequently than once per month. S-1 collects yard drainage from the north part of the site yard; S-3, from the south part of the site yard. Additionally, S-1 receives the output from the SSD sump located in the Unit 2 façade. [Note: In August 2010, a modification rerouted the SSD sump output to an effluent pathway with an in-line monitor.] 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 no longer connected to any yard drain system and mainly carries groundwater flow and runoff from a small lawn area south of the plant.

S-1 shows more variability than S-3 (Figure 14-1). Most S-1 H-3 concentrations are in the 300 - 700 pCi/l range with only four in the 1200 - 1400 range. At S-3, the H-3 concentrations are more uniform with one spike at 1334 and another at 1139 pCi/l with neither of the spikes exceeding 3600. Possible H-3 contributions to S-1 from groundwater inleakage upstream of this discharge were investigated. Tritium concentrations in groundwater from the electrical vaults immediately west of S-1 were not detectable to very low (Table 14-4). Therefore, the high concentration spikes found at S-1 may be attributable to receiving discharges from the SSD sump. The higher H-3 concentrations at S-1 during February, June and July occur during the time frame in which the SSD sump H-3 concentrations also are high (Figure 14-2).

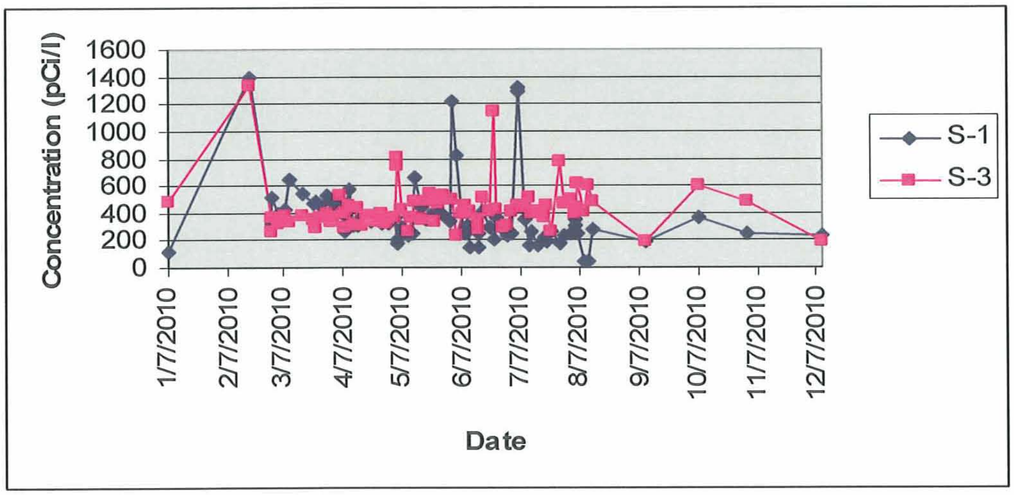
Table 14-2
2010 Beach Drain Tritium
Average H-3 Concentration (pCi/l)

Month	S-1	S-7	S-8	S-9	S-10	S-3	S-11
Jan	ND ±	NF ±	NF ±	NF ±	NF ±	479 ± 115	±
Feb	1402 ± 132	NF ±	NF ±	ND ±	NF ±	1334 ± 130	±
Mar	468 ± 176	NF ±	NF ±	NF ±	NF ±	349 ± 75	151 ± 95
Apr	377 ± 170	NF ±	NF ±	195 ± 83	NF ±	373 ± 130	165 ± 99
May	357 ± 260	NF ±	NF ±	554 ± 65	NF ±	472 ± 312	ND ±
Jun	367 ± 567	NF ±	NF ±	NF ±	NF ±	443 ± 420	155 ± 86
Jul	407 ± 845	NF ±	NF ±	NF ±	NF ±	451 ± 237	ND ±
Aug	219 ± 245	NF ±	NF ±	NF ±	NF ±	494 ± 176	NF ±
Sep	189 ± 101	NF ±	NF ±	NF ±	NF ±	187 ± 101	NF ±
Oct	366 ± 114	NF ±	NF ±	NF ±	NF ±	601 ± 122	NF ±
Nov	250 ± 98	NF ±	NF ±	NF ±	NF ±	490 ± 108	NF ±
Dec	239 ± 82	NF ±	NF ±	NF ±	NF ±	196 ± 80	NF ±
AVG	380 ± 254				AVG	435 ± 173	

ND = not detected, <MDC
NF = no sample due to no flow

Although the H-3 concentrations at S-1 are generally lower beginning in August corresponding to the time the discharge from the SSD sump was routed to another discharge path, the continued presence of H-3 indicates other sources, but unknown at this time. The reason for the two spikes at S-3 (1139 and 1334 pCi/l) is unknown. S-3 is located in the suspected drainage path from the former retention pond area to the lake but no other monitoring site along this path has had H-3 concentrations this high. The data from the remaining beach drains from the plant area (S-7 to S-11) are sparse in that there is no flow unless there is precipitation or some groundwater intrusion. In contrast, at S-11 the flow appears to be mainly from groundwater. Nine of the 14 analyses revealed low H-3 concentrations slightly above the MDC.

Figure 14-1
2010 H-3 Concentrations for S-1 and S-3
Tritium Concentrations (pCi/l)



The SSD sump is located in the Unit 2 façade. The monthly averages are presented in Table 14-3. These results are generally higher than those from S-1, the beach drain to which the sump is pumped. The source of the higher SSD sump tritium concentrations is under investigation. Results of gamma scans of composites for the months of January, February, March, April, and May were below the MDC.

Figure 14-2
2010 H-3 Concentrations SSD SUMP
Tritium Concentrations (pCi/l)

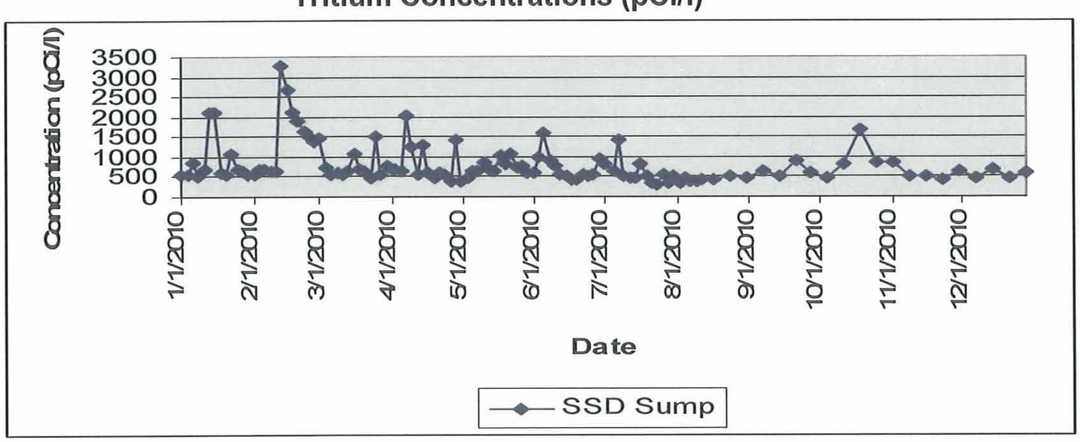


Table 14-3
2010 Unit 2 Facade Subsurface Drain Sump
Average H-3 Concentration (pCi/l)

Month	Avg		2σ
Jan	883	±	1133
Feb	1480	±	1715
Mar	733	±	587
Apr	841	±	1003
May	739	±	349
Jun	738	±	660
Jul	577	±	596
Aug	438	±	121
Sep	676	±	314
Oct	958	±	1018
Nov	604	±	357
Dec	565	±	226

14.3 Electrical Vaults and Other Manholes

Manholes for access to below ground electrical facilities are susceptible to groundwater in-leakage. The east side of the plant, between the Turbine building and Lake Michigan have low H-3 concentrations (Table 14-4) Z-065A/B are directly east of the midpoint of the Turbine Building. The Z-066 and Z-067 series manholes as well at Z-068 are located on the NE section of the yard beginning just north of the Z-065A/B manhole and run in parallel, side-by-side from the Unit 2 truck bay north to the EDG building. Based on being side-by-side, it is not unexpected that the each pair of manholes A/A, B/B, etc. would have nearly the same H-3 concentration.

Table 14-4
2010 East Yard Area Manhole Tritium
Average Activity (pCi/l)

Man Hole	pCi/l	±	2σ	MDC
MH Z-065A(MH-1)	ND	±		149
MH Z-065B(MH-2)	158	±	86	149
MH Z-066A	158	±	103	172
MH Z-066B	220	±	89	149
MH Z-066C	116	±	96	149
MH Z-066D	ND	±		149
MH Z-067A	170	±	86	161
MH Z-067B	201	±	88	149
MH Z-067C	ND	±		149
MH Z-067D	ND	±		149
MH Z-068	267	±	346	149
Average =	187	±	53	

Tritium results from manholes on the west side of the plant have higher H-3 concentrations (Table 14-5). On the west side of the plant there is a pocket of manholes MH-3, -4, and -6, that have higher H-3 concentrations that than those on the east side and the surrounding west side manholes. These H-3 concentrations are similar to the values seen in beach drain S-3. Why the H-3 concentrations in manholes 3, 4, and 6 are higher than the others is not known.

Table 14-5
2010 West Yard Area Manhole Tritium
Average Activity (pCi/l)

Man Hole	pCi/l	±	2σ	MDC
MH Z-065C(MH-3)	447	±	99	149
MH Z-065D(MH-4)	561	±	232	149
MH-6	464	±	109	147
MH-7	196	±	98	147
MH-8	173	±	97	147
MH-16	296	±	102	147

14.4 Façade Wells

Each unit's façade has two wells used to monitor the groundwater for conditions which could impact containment integrity. The samples from these wells are also analyzed for H-3 (Table 14-6). In Unit 2 there is one on each side of containment, approximately 180° apart. The Unit 1 façade wells are east of the containment in the SE (1Z-361A) and NE (1Z-361B) corners of the façade. Some samples could not be collected because the well cap could not be removed.

Table 14-6
2010 Facade Well Water Tritium
H-3 Concentration (pCi/l)

Month	UNIT 1		UNIT 2		MDC
	1Z-361A	1Z-361B	2Z-361A	2Z-361B	
Jan	393 ± 106	ND ±	ND ±	ND ±	147
Feb	462 ± 99	193 ± 87	NS ±	ND ±	147
Mar	404 ± 106	ND ±	ND ±	ND ±	145
Apr	359 ± 104	ND ±	ND ±	ND ±	144
May	333 ± 88	ND ±	ND ±	222 ± 83	143
Jun	NS ±	NS ±	NS ±	ND ±	
Jul	356 ± 99	ND ±	ND ±	279 ± 96	156
Aug	NS ±	NS ±	NS ±	NS ±	
Sep*	380 ± 175	ND ±	ND ±	281 ± 74	159
Oct	NS ±	NS ±	NS ±	NS ±	
Nov	402 ± 90	ND ±	ND ±	172 ± 79	141
Dec	274 ± 85	ND ±	NS ±	ND ±	144

ND = not detected * = average of 2 samples NS = sample not collected

The 2010 results are similar to those obtained in 2008 and 2009. The Unit 2 wells continue to have low H-3 concentrations, only a few of which are above the MDC (2Z-361B). Well 1Z-361A, in the SE corner of the Unit 1 façade, continues to have the highest H-3 concentrations, up to 462 pCi/l, although lower than the 1169 pCi/l seen in 2008.

Based on these results, the conclusion that H-3 is not evenly distributed under the plant remains valid.

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: three potable water wells, GW-04 (Energy Information Center or EIC), GW-05 (Warehouse 6), 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. Two of the monitoring wells, GW-15 and GW-16, are in the apparent groundwater flow path from the former retention pond. The other four of the surface layer wells are located at the periphery of the area which may be affected by diffusion from the former retention pond.

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

Table 14-7
2010 Potable Well Water Tritium
H-3 Concentration (pCi/l)

Month	EIC WELL GW-04	Warehouse 6 Well GW-05	SBCC Well GW-06	EIC MDC	GW-05,06 MDC
Jan	NS	ND	ND		154
Feb	ND			146	
Mar	ND			148	
Apr	ND	ND	ND	149	178
May	ND			143	
Jun	ND			164	
Jul	ND	ND	ND	159	105
Aug	ND			160	
Sep	ND			160	
Oct	ND	ND	ND	154	160
Nov	ND			139	
Dec	NS			144	

ND=Not Detected NS=No Sample

Two monitoring wells show consistent, detectable H-3 (GW-15, GW-16) in the flow path from the retention pond area to the lake (Table 14-8). The highest H-3 concentrations occur at GW-15, the well closest to the former retention pond.

Table 14-8
2010 Monitoring Well Water Tritium
H-3 Concentration (pCi/l)

Month	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**
Jan	ND	±		ND	±	ND	±		ND	±		422	±	96	NS	±		153
Feb	ND	±		ND	±	ND	±		ND	±		386	±	92	NS	±		146
Mar	ND	±		ND	±	ND	±		ND	±		374	±	108	NS	±		152
Apr	ND	±		ND	±	ND	±		ND	±		359	±	95	298	±	92	147
May	149	±	79	ND	±	212	±	82	ND	±		486	±	95	301	±	87	143
Jun	ND	±		ND	±	ND	±		ND	±		379	±	102	237	±	96	160
Jul	ND	±		ND	±	ND	±		ND	±		363	±	100	212	±	94	159
Aug	ND	±		ND	±	ND	±		ND	±		393	±	96	235	±	89	154
Sep	ND	±		ND	±	ND	±		ND	±		464	±	99	319	±	93	159
Oct	181	±	90	NS	±	NS	±		198	±	91	441	±	102	260	±	94	154
Nov	ND	±		ND	±	ND	±		ND	±		337	±	92	240	±	88	144
Dec	ND	±		ND	±	ND	±		ND	±		378	±	97	207	±	89	161

ND= <MDC NS=no sample, well frozen

14.6 Miscellaneous Sampling

In addition to groundwater, analyses have been made of precipitation, rainwater and snow, in order to obtain information on the recapture/washout of H-3 in airborne effluents.

Although there is one occurrence of a H-3 concentration greater than 100 pCi/l at both the south (E-03) and north (E-03) boundaries, most results do not indicate any significant concentrations H-3 at the site boundary (Table 14-9).

Measurements of tritium in the condensate from AC unit condensers for various buildings revealed higher concentrations than the values at the site boundary. (Table 14-10).

Table 14-9
2010 Precipitation H-3 at Boundary Locations

DATE	E-02 (S) pCi/l	E-03 (W) pCi/l	E-04 (N) pCi/l
Jan	55.1	117.6	66.7
Feb	49.6	70.9	49.6
Mar	118.5	49.6	48.6
Apr	49.0	67.6	44.8
May	64.7	58.9	40.6
June	ND	26.1	ND
July	35.1	ND	ND
August	ND	ND	ND
Sept	ND	ND	ND
Oct	59.3	62.5	56.4
Nov	ND	25.4	32.9
Dec	53.8	29.0	37.0

MDC = 19.3 pCi/l ND = <MDC

Table 14-10
AC CONDENSATE H-3 CONCENTRATIONS

Location	pCi/l		2σ	MDC
S. Service Bldg	4953	±	223	160
S. Side Trailers.	1004	±	126	160
N. Service Bldg	569	±	109	160

Based on these results, sampling at locations closer to the plant was initiated to determine the H-3 washout closed to the plant (Table 14-11). The lowest

Table 14-11
2010 H-3 Concentrations Close to Plant

Location	November pCi/l	December pCi/l	
1	146.6	312.6	*
2	147.8	436.6	*
3	93.4	88.8	*
4	400.7	265.6	*
5	230.3	NS	
6	128.2	50.9	
7	114.7	46.4	
8	111.8	31.6	
9	216.8	NS	
10	276.4	NS	
11	168.5	<MDC	
12	37.7	NS	

MDC = 19.2 pCi/l
* December = average of 2 samples

November H-3 results show the lowest concentrations occur along the Lake Michigan shoreline (7, 8, and 12) and about 600 yards to the NW (3). The locations closest to the plant (1, 2, 4, and 5) generally have higher H-3 concentrations. The reason for the H-3 concentrations in precipitation being lower than those found in the AC condensate are not known but may be related to collection method and the time of year which the samples were obtained. That being said, it is evident that the precipitation H-3 concentrations could account for the low H-3 concentrations in the water from the manholes on the east side of the plant (the Z-066, -067, and -068 series) and beach drain S-11.

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 and from AC condensate analyses show that airborne H-3 concentrations are higher close to the plant as compared to results at the site boundaries. Except for the monitoring wells downstream from the former retention pond, the monitoring well tritium concentrations are not different from zero.

Results will continue to be evaluated to determine whether additional groundwater monitoring sites are needed.

APPENDIX 1

Environmental, Inc. Midwest Laboratory
Final Report for the Point Beach Nuclear Plant
and
Other Analyses
Reporting Period: January – December 2010

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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, 2010

Reviewed and
Approved by ______________________ Date 04-27-2011
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POINT BEACH NUCLEAR PLANT

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POINT BEACH NUCLEAR PLANT

1.0 INTRODUCTION

The following constitutes the final 2010 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.

Duplicate analyses are reported in Appendix F unless otherwise noted.

All concentrations, except gross beta, are decay corrected to the time of collection.

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-06	01-13-10	Unsafe to obtain.
LW	E-06	02-11-10	Unsafe to obtain.
AP/I	E-04	03-11-10	No sample received.
AP/I	E-02	04-07-10	No power to sampler.
AP/I	E-04	08-18-10	Air sampler issues.
AP/I	E-03	10-27-10	Loss of power.
LW	E-01	12-15-10	Unsafe to obtain.
LW	E-05	12-15-10	Unsafe to obtain.
LW	E-06	12-15-10	Unsafe to obtain.
LW	E-33	12-15-10	Unsafe to obtain.

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
Required LLD		0.010	0.030
01-06-10	326	0.026 ± 0.003	< 0.012
01-13-10	322	0.029 ± 0.003	< 0.029
01-20-10	323	0.040 ± 0.004	< 0.010
01-27-10	324	0.021 ± 0.003	< 0.005
02-03-10	323	0.028 ± 0.003	< 0.008
02-10-10	324	0.024 ± 0.003	< 0.012
02-17-10	324	0.013 ± 0.003	< 0.013
02-24-10	326	0.018 ± 0.003	< 0.013
03-04-10	373	0.020 ± 0.003	< 0.017
03-11-10	318	0.022 ± 0.003	< 0.017
03-17-10	276	0.019 ± 0.003	< 0.014
03-24-10	329	0.021 ± 0.003	< 0.016
03-31-10	318	0.022 ± 0.003	< 0.014
1st Quarter Mean ± s.d.		0.024 ± 0.007	< 0.014
04-07-10	327	0.026 ± 0.003	< 0.008
04-14-10	251	0.018 ± 0.004	< 0.008
04-21-10	298	0.014 ± 0.003	< 0.009
04-28-10	306	0.018 ± 0.003	< 0.011
05-05-10	307	0.016 ± 0.003	< 0.008
05-12-10	313	0.017 ± 0.003	< 0.008
05-19-10	309	0.013 ± 0.003	< 0.011
05-26-10	322	0.019 ± 0.003	< 0.009
06-02-10	306	0.016 ± 0.003	< 0.010
06-09-10	312	0.009 ± 0.003	< 0.018
06-16-10	313	0.012 ± 0.003	< 0.021
06-23-10	315	0.013 ± 0.003	< 0.010
06-30-10	310	0.016 ± 0.003	< 0.010
2nd Quarter Mean ± s.d.		0.016 ± 0.004	< 0.011

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
07-07-10	313	0.018 ± 0.003	< 0.009
07-13-10	269	0.019 ± 0.003	< 0.013
07-21-10	358	0.016 ± 0.003	< 0.011
07-28-10	316	0.016 ± 0.003	< 0.007
08-04-10	312	0.027 ± 0.003	< 0.011
08-12-10	366	0.023 ± 0.003	< 0.015
08-18-10	251	0.026 ± 0.004	< 0.021
08-25-10	306	0.027 ± 0.003	< 0.013
09-01-10	299	0.030 ± 0.003	< 0.011
09-08-10	296	0.015 ± 0.003	< 0.019
09-15-10	277	0.018 ± 0.003	< 0.015
09-22-10	284	0.020 ± 0.003	< 0.012
09-29-10	282	0.022 ± 0.003	< 0.010
3rd Quarter Mean ± s.d.		0.021 ± 0.005	< 0.013
10-06-10	282	0.018 ± 0.003	< 0.010
10-13-10	283	0.029 ± 0.004	< 0.011
10-21-10	344	0.020 ± 0.003	< 0.008
10-27-10	260	0.026 ± 0.004	< 0.019
11-03-10	301	0.013 ± 0.003	< 0.012
11-10-10	309	0.029 ± 0.003	< 0.009
11-17-10	299	0.038 ± 0.004	< 0.013
11-23-10	259	0.031 ± 0.004	< 0.026
12-01-10	344	0.030 ± 0.003	< 0.010
12-08-10	306	0.019 ± 0.003	< 0.013
12-15-10	306	0.036 ± 0.004	< 0.016
12-21-10	253	0.035 ± 0.004	< 0.009
12-29-10	347	0.014 ± 0.003	< 0.006
4th Quarter Mean ± s.d.		0.027 ± 0.008	< 0.012
Cumulative Average		0.022 ± 0.007	< 0.013

[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-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
01-06-10	297	0.029 ± 0.003	< 0.013	07-07-10	303	0.020 ± 0.003	< 0.010
01-13-10	288	0.032 ± 0.004	< 0.023	07-13-10	260	0.021 ± 0.003	< 0.013
01-20-10	292	0.040 ± 0.004	< 0.011	07-21-10	346	0.023 ± 0.003	< 0.011
01-27-10	293	0.021 ± 0.003	< 0.006	07-28-10	305	0.022 ± 0.003	< 0.007
02-03-10	292	0.030 ± 0.004	< 0.009				
				08-04-10	302	0.028 ± 0.003	< 0.011
02-10-10	293	0.023 ± 0.003	< 0.013	08-12-10	342	0.024 ± 0.003	< 0.016
02-17-10	293	0.015 ± 0.003	< 0.015	08-18-10	261	0.027 ± 0.004	< 0.020
02-24-10	295	0.022 ± 0.003	< 0.015	08-25-10	299	0.024 ± 0.003	< 0.013
03-04-10	337	0.026 ± 0.003	< 0.019	09-01-10	304	0.029 ± 0.003	< 0.010
03-11-10	288	0.030 ± 0.004	< 0.019	09-08-10	306	0.016 ± 0.003	< 0.019
03-17-10	248	0.026 ± 0.004	< 0.016	09-15-10	297	0.015 ± 0.003	< 0.014
03-24-10	297	0.025 ± 0.003	< 0.018	09-22-10	305	0.020 ± 0.003	< 0.011
03-31-10	287	0.023 ± 0.003	< 0.016	09-29-10	302	0.021 ± 0.003	< 0.009
1st Quarter Mean ± s.d.		0.026 ± 0.006	< 0.015	3rd Quarter Mean ± s.d.		0.022 ± 0.004	< 0.013
04-07-10		ND[a]		10-06-10	301	0.021 ± 0.003	< 0.010
04-14-10	280	0.019 ± 0.003	< 0.024	10-13-10	304	0.027 ± 0.003	< 0.011
04-21-10	290	0.018 ± 0.003	< 0.009	10-21-10	344	0.021 ± 0.003	< 0.008
04-28-10	295	0.021 ± 0.003	< 0.011	10-27-10	259	0.029 ± 0.004	< 0.020
				11-03-10	302	0.012 ± 0.003	< 0.012
05-05-10	297	0.017 ± 0.003	< 0.008				
05-12-10	303	0.017 ± 0.003	< 0.008	11-10-10	309	0.029 ± 0.003	< 0.009
05-19-10	299	0.017 ± 0.003	< 0.013	11-17-10	293	0.036 ± 0.004	< 0.013
05-26-10	303	0.025 ± 0.003	< 0.010	11-23-10	250	0.028 ± 0.004	< 0.027
06-02-10	303	0.018 ± 0.003	< 0.010	12-01-10	334	0.033 ± 0.003	< 0.010
06-09-10	301	0.009 ± 0.003	< 0.018	12-08-10	296	0.022 ± 0.003	< 0.013
06-16-10	303	0.010 ± 0.003	< 0.022	12-15-10	293	0.032 ± 0.004	< 0.017
06-23-10	305	0.014 ± 0.003	< 0.010	12-21-10	256	0.031 ± 0.004	< 0.009
06-30-10	300	0.016 ± 0.003	< 0.010	12-29-10	351	0.013 ± 0.002	< 0.006
2nd Quarter Mean ± s.d.		0.017 ± 0.005	< 0.013	4th Quarter Mean ± s.d.		0.026 ± 0.007	< 0.013
				Cumulative Average		0.023 ± 0.007	< 0.013

[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
Required LLD		0.010	0.030
01-06-10	307	0.025 ± 0.003	< 0.013
01-13-10	299	0.026 ± 0.003	< 0.023
01-20-10	301	0.042 ± 0.004	< 0.011
01-27-10	303	0.021 ± 0.003	< 0.006
02-03-10	302	0.026 ± 0.003	< 0.009
02-10-10	303	0.020 ± 0.003	< 0.013
02-17-10	303	0.017 ± 0.003	< 0.014
02-24-10	305	0.020 ± 0.003	< 0.014
03-04-10	349	0.020 ± 0.003	< 0.018
03-11-10	301	0.028 ± 0.003	< 0.018
03-17-10	254	0.021 ± 0.003	< 0.015
03-24-10	308	0.021 ± 0.003	< 0.018
03-31-10	297	0.021 ± 0.003	< 0.015
1st Quarter Mean ± s.d.		0.024 ± 0.006	< 0.014
04-07-10	305	0.024 ± 0.003	< 0.009
04-14-10	293	0.012 ± 0.003	< 0.023
04-21-10	279	0.016 ± 0.003	< 0.009
04-28-10	286	0.019 ± 0.003	< 0.012
05-05-10	286	0.015 ± 0.003	< 0.008
05-12-10	291	0.014 ± 0.003	< 0.009
05-19-10	291	0.012 ± 0.003	< 0.015
05-26-10	294	0.020 ± 0.003	< 0.010
06-02-10	293	0.017 ± 0.003	< 0.011
06-09-10	292	0.010 ± 0.003	< 0.019
06-16-10	293	0.009 ± 0.003	< 0.022
06-23-10	294	0.011 ± 0.003	< 0.010
06-30-10	290	0.014 ± 0.003	< 0.011
2nd Quarter Mean ± s.d.		0.015 ± 0.004	< 0.013

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
07-07-10	293	0.014 ± 0.003	< 0.010
07-13-10	251	0.022 ± 0.003	< 0.014
07-21-10	335	0.016 ± 0.003	< 0.011
07-28-10	299	0.020 ± 0.003	< 0.007
08-04-10	287	0.026 ± 0.003	< 0.012
08-12-10	334	0.025 ± 0.003	< 0.016
08-18-10	247	0.027 ± 0.004	< 0.021
08-25-10	277	0.033 ± 0.004	< 0.014
09-01-10	283	0.030 ± 0.004	< 0.011
09-08-10	285	0.016 ± 0.003	< 0.020
09-15-10	276	0.014 ± 0.003	< 0.015
09-22-10	283	0.020 ± 0.003	< 0.012
09-29-10	281	0.017 ± 0.003	< 0.010
3rd Quarter Mean ± s.d.		0.022 ± 0.006	< 0.013
10-06-10	280	0.023 ± 0.003	< 0.010
10-13-10	282	0.029 ± 0.004	< 0.011
10-21-10	320	0.021 ± 0.003	< 0.008
10-27-10		ND[a]	
11-03-10	239	0.015 ± 0.004	< 0.016
11-10-10	288	0.029 ± 0.004	< 0.010
11-17-10	276	0.034 ± 0.004	< 0.014
11-23-10	241	0.028 ± 0.004	< 0.028
12-01-10	321	0.031 ± 0.003	< 0.011
12-08-10	284	0.022 ± 0.003	< 0.014
12-15-10	277	0.035 ± 0.004	< 0.018
12-21-10	241	0.032 ± 0.004	< 0.010
12-29-10	323	0.015 ± 0.003	< 0.007
4th Quarter Mean ± s.d.		0.026 ± 0.007	< 0.013
Cumulative Average		0.022 ± 0.007	< 0.013

[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-04, North Boundary
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
01-06-10	315	0.025 ± 0.003	< 0.012
01-13-10	306	0.028 ± 0.003	< 0.021
01-20-10	309	0.042 ± 0.004	< 0.011
01-27-10	311	0.021 ± 0.003	< 0.005
02-03-10	310	0.028 ± 0.003	< 0.008
02-10-10	311	0.025 ± 0.003	< 0.012
02-17-10	311	0.017 ± 0.003	< 0.014
02-24-10	313	0.023 ± 0.003	< 0.014
03-04-10	358	0.020 ± 0.003	< 0.018
03-11-10		ND[a]	
03-17-10	262	0.005 ± 0.003	< 0.015
03-24-10	315	0.021 ± 0.003	< 0.017
03-31-10	305	0.022 ± 0.003	< 0.015
1st Quarter Mean ± s.d.		0.023 ± 0.008	< 0.014
04-07-10	314	0.027 ± 0.003	< 0.008
04-14-10	311	0.017 ± 0.003	< 0.022
04-21-10	307	0.016 ± 0.003	< 0.009
04-28-10	314	0.014 ± 0.003	< 0.011
05-05-10	316	0.016 ± 0.003	< 0.008
05-12-10	322	0.028 ± 0.003	< 0.008
05-19-10	318	0.013 ± 0.003	< 0.013
05-26-10	323	0.021 ± 0.003	< 0.009
06-02-10	322	0.014 ± 0.003	< 0.010
06-09-10	321	0.008 ± 0.002	< 0.017
06-16-10	322	0.011 ± 0.003	< 0.020
06-23-10	323	0.014 ± 0.003	< 0.010
06-30-10	319	0.016 ± 0.003	< 0.010
2nd Quarter Mean ± s.d.		0.017 ± 0.006	< 0.012

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
07-07-10	322	0.018 ± 0.003	< 0.009
07-13-10	276	0.021 ± 0.003	< 0.012
07-21-10	368	0.019 ± 0.003	< 0.010
07-28-10	329	0.015 ± 0.003	< 0.006
08-04-10	316	0.027 ± 0.003	< 0.011
08-12-10	364	0.022 ± 0.003	< 0.015
08-18-10		ND[a]	
08-25-10	302	0.024 ± 0.003	< 0.013
09-01-10	304	0.029 ± 0.003	< 0.010
09-08-10	307	0.018 ± 0.003	< 0.019
09-15-10	291	0.016 ± 0.003	< 0.014
09-22-10	294	0.022 ± 0.003	< 0.012
09-29-10	293	0.022 ± 0.003	< 0.010
3rd Quarter Mean ± s.d.		0.021 ± 0.004	< 0.012
10-06-10	291	0.022 ± 0.003	< 0.010
10-13-10	297	0.030 ± 0.004	< 0.011
10-21-10	344	0.023 ± 0.003	< 0.008
10-27-10	260	0.033 ± 0.004	< 0.019
11-03-10	302	0.014 ± 0.003	< 0.012
11-10-10	309	0.031 ± 0.004	< 0.009
11-17-10	299	0.045 ± 0.004	< 0.013
11-23-10	259	0.032 ± 0.004	< 0.026
12-01-10	344	0.031 ± 0.003	< 0.010
12-08-10	306	0.021 ± 0.003	< 0.013
12-15-10	298	0.034 ± 0.004	< 0.017
12-21-10	247	0.036 ± 0.004	< 0.010
12-29-10	333	0.015 ± 0.003	< 0.006
4th Quarter Mean ± s.d.		0.028 ± 0.009	< 0.013
Cumulative Average		0.022 ± 0.008	< 0.012

[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-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
01-06-10	308	0.031 ± 0.003	< 0.013
01-13-10	298	0.031 ± 0.004	< 0.030
01-20-10	302	0.046 ± 0.004	< 0.011
01-27-10	302	0.021 ± 0.003	< 0.006
02-03-10	303	0.033 ± 0.004	< 0.009
02-10-10	303	0.025 ± 0.003	< 0.013
02-17-10	302	0.016 ± 0.003	< 0.014
02-24-10	304	0.020 ± 0.003	< 0.014
03-04-10	349	0.020 ± 0.003	< 0.018
03-11-10	300	0.030 ± 0.003	< 0.018
03-17-10	255	0.024 ± 0.004	< 0.015
03-24-10	307	0.022 ± 0.003	< 0.018
03-31-10	297	0.023 ± 0.003	< 0.015
1st Quarter Mean ± s.d.		0.026 ± 0.008	< 0.015
04-07-10	306	0.027 ± 0.003	< 0.009
04-14-10	303	0.018 ± 0.003	< 0.022
04-21-10	299	0.019 ± 0.003	< 0.009
04-28-10	305	0.023 ± 0.003	< 0.011
05-05-10	302	0.017 ± 0.003	< 0.008
05-12-10	302	0.017 ± 0.003	< 0.008
05-19-10	299	0.016 ± 0.003	< 0.010
05-26-10	305	0.022 ± 0.003	< 0.010
06-02-10	302	0.018 ± 0.003	< 0.010
06-09-10	302	0.009 ± 0.003	< 0.018
06-16-10	303	0.012 ± 0.003	< 0.022
06-23-10	304	0.010 ± 0.003	< 0.010
06-30-10	299	0.017 ± 0.003	< 0.010
2nd Quarter Mean ± s.d.		0.017 ± 0.005	< 0.012

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
07-07-10	303	0.020 ± 0.003	< 0.010
07-13-10	260	0.023 ± 0.003	< 0.013
07-21-10	347	0.020 ± 0.003	< 0.011
07-28-10	309	0.025 ± 0.003	< 0.007
08-04-10	297	0.030 ± 0.003	< 0.011
08-12-10	347	0.024 ± 0.003	< 0.016
08-18-10	257	0.023 ± 0.003	< 0.020
08-25-10	298	0.028 ± 0.003	< 0.013
09-01-10	303	0.031 ± 0.003	< 0.010
09-08-10	310	0.017 ± 0.003	< 0.018
09-15-10	293	0.014 ± 0.003	< 0.014
09-22-10	304	0.018 ± 0.003	< 0.011
09-29-10	303	0.019 ± 0.003	< 0.009
3rd Quarter Mean ± s.d.		0.022 ± 0.005	< 0.013
10-06-10	303	0.018 ± 0.003	< 0.010
10-13-10	301	0.027 ± 0.003	< 0.011
10-21-10	344	0.016 ± 0.003	< 0.008
10-27-10	260	0.027 ± 0.004	< 0.019
11-03-10	301	0.013 ± 0.003	< 0.012
11-10-10	309	0.029 ± 0.004	< 0.009
11-17-10	299	0.033 ± 0.004	< 0.013
11-23-10	259	0.029 ± 0.004	< 0.026
12-01-10	344	0.029 ± 0.003	< 0.010
12-08-10	306	0.020 ± 0.003	< 0.013
12-15-10	299	0.035 ± 0.004	< 0.017
12-21-10	255	0.034 ± 0.004	< 0.009
12-29-10	351	0.015 ± 0.003	< 0.006
4th Quarter Mean ± s.d.		0.025 ± 0.008	< 0.013
Cumulative Average		0.023 ± 0.007	< 0.013

POINT BEACH NUCLEAR PLANT

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

Date Collected	Vol. (m^3)	Gross Beta	I-131	Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030	Required LLD		0.010	0.030
01-06-10	309	0.031 ± 0.003	< 0.012	07-07-10	306	0.020 ± 0.003	< 0.010
01-13-10	300	0.032 ± 0.004	< 0.014	07-13-10	257	0.026 ± 0.004	< 0.013
01-20-10	300	0.046 ± 0.004	< 0.011	07-21-10	347	0.019 ± 0.003	< 0.011
01-27-10	301	0.019 ± 0.003	< 0.006	07-28-10	304	0.020 ± 0.003	< 0.007
02-03-10	305	0.028 ± 0.003	< 0.009				
				08-04-10	302	0.030 ± 0.003	< 0.011
02-10-10	302	0.027 ± 0.003	< 0.013	08-12-10	347	0.025 ± 0.003	< 0.016
02-17-10	301	0.016 ± 0.003	< 0.014	08-18-10	259	0.025 ± 0.004	< 0.020
02-24-10	306	0.023 ± 0.003	< 0.014	08-25-10	298	0.024 ± 0.003	< 0.013
03-04-10	348	0.025 ± 0.003	< 0.019	09-01-10	305	0.030 ± 0.003	< 0.010
03-11-10	299	0.031 ± 0.004	< 0.018	09-08-10	307	0.018 ± 0.003	< 0.019
03-17-10	255	0.024 ± 0.004	< 0.015	09-15-10	296	0.017 ± 0.003	< 0.014
03-24-10	307	0.024 ± 0.003	< 0.018	09-22-10	304	0.021 ± 0.003	< 0.011
03-31-10	298	0.024 ± 0.003	< 0.015	09-29-10	302	0.021 ± 0.003	< 0.010
1st Quarter Mean ± s.d.		0.027 ± 0.007	< 0.014	3rd Quarter Mean ± s.d.		0.023 ± 0.004	< 0.013
04-07-10	305	0.028 ± 0.003	< 0.009	10-06-10	304	0.021 ± 0.003	< 0.010
04-14-10	304	0.017 ± 0.003	< 0.022	10-13-10	302	0.026 ± 0.003	< 0.011
04-21-10	299	0.018 ± 0.003	< 0.009	10-21-10	342	0.023 ± 0.003	< 0.008
04-28-10	304	0.023 ± 0.003	< 0.011	10-27-10	261	0.025 ± 0.004	< 0.019
				11-03-10	301	0.014 ± 0.003	< 0.012
05-05-10	302	0.017 ± 0.003	< 0.008				
05-12-10	302	0.014 ± 0.003	< 0.008	11-10-10	310	0.030 ± 0.004	< 0.009
05-19-10	299	0.017 ± 0.003	< 0.019	11-17-10	293	0.039 ± 0.004	< 0.013
05-26-10	305	0.023 ± 0.003	< 0.010	11-23-10	251	0.034 ± 0.004	< 0.027
06-02-10	301	0.016 ± 0.003	< 0.010	12-01-10	333	0.032 ± 0.003	< 0.010
06-09-10	305	0.013 ± 0.003	< 0.018	12-08-10	296	0.020 ± 0.003	< 0.013
06-16-10	300	0.012 ± 0.003	< 0.022	12-15-10	295	0.031 ± 0.004	< 0.017
06-23-10	305	0.013 ± 0.003	< 0.010	12-21-10	249	0.032 ± 0.004	< 0.010
06-30-10	299	0.018 ± 0.003	< 0.010	12-29-10	330	0.013 ± 0.003	< 0.007
2nd Quarter Mean ± s.d.		0.018 ± 0.005	< 0.013	4th Quarter Mean ± s.d.		0.026 ± 0.008	< 0.013
				Cumulative Average		0.023 ± 0.007	< 0.013
				All Locations Annual Mean ± s.d.		**0.022 ± 0.007**	**< 0.013**

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- 1719	0.070 ± 0.011	-	-0.0001 ± 0.000	< 0.0003	-0.0001 ± 0.000	< 0.0004	0.0002 ± 0.000	< 0.0003	4206
E-02	- 1720	0.104 ± 0.015	-	-0.0001 ± 0.000	< 0.0007	0.0002 ± 0.001	< 0.0009	0.0004 ± 0.001	< 0.0008	3799
E-03	- 1721	0.083 ± 0.015	-	-0.0001 ± 0.000	< 0.0006	-0.0001 ± 0.000	< 0.0006	0.0002 ± 0.000	< 0.0006	3930
E-04	- 1722	0.074 ± 0.013	-	0.0001 ± 0.000	< 0.0005	0.0001 ± 0.000	< 0.0004	0.0002 ± 0.000	< 0.0008	3726
E-08	- 1723	0.078 ± 0.015	-	0.0000 ± 0.001	< 0.0008	0.0000 ± 0.001	< 0.0006	0.0004 ± 0.001	< 0.0004	3929
E-20	- 1724	0.091 ± 0.016	-	-0.0005 ± 0.000	< 0.0006	-0.0002 ± 0.001	< 0.0007	0.0000 ± 0.000	< 0.0006	3931
					2nd Quarter					
E-01	EAP- 3672	0.074 ± 0.013	-	0.0001 ± 0.000	< 0.0006	-0.0003 ± 0.001	< 0.0006	-0.0007 ± 0.001	< 0.0007	3987
E-02	- 3673	0.075 ± 0.018	-	0.0008 ± 0.001	< 0.0011	0.0000 ± 0.001	< 0.0007	-0.0005 ± 0.001	< 0.0010	3579
E-03	- 3674	0.088 ± 0.018	-	-0.0004 ± 0.001	< 0.0008	-0.0002 ± 0.001	< 0.0006	-0.0001 ± 0.001	< 0.0010	3785
E-04	- 3675	0.079 ± 0.015	-	-0.0005 ± 0.000	< 0.0007	-0.0003 ± 0.001	< 0.0008	0.0003 ± 0.001	< 0.0008	4130
E-08	- 3676	0.081 ± 0.017	-	-0.0003 ± 0.000	< 0.0004	-0.0001 ± 0.001	< 0.0010	0.0001 ± 0.001	< 0.0005	3931
E-20	- 3677	0.079 ± 0.014	-	0.0000 ± 0.001	< 0.0007	0.0003 ± 0.001	< 0.0007	-0.0001 ± 0.001	< 0.0008	3930
					3rd Quarter					
E-01	EAP- 6128	0.077 ± 0.017	-	-0.0005 ± 0.001	< 0.0009	0.0000 ± 0.001	< 0.0010	0.0002 ± 0.001	< 0.0008	3928
E-02	- 6129	0.080 ± 0.015	-	0.0003 ± 0.001	< 0.0009	0.0000 ± 0.001	< 0.0004	0.0004 ± 0.001	< 0.0008	3931
E-03	- 6130	0.084 ± 0.018	-	0.0002 ± 0.000	< 0.0008	0.0002 ± 0.001	< 0.0007	0.0006 ± 0.001	< 0.0010	3731
E-04	- 6131	0.070 ± 0.013	-	0.0001 ± 0.000	< 0.0007	0.0000 ± 0.000	< 0.0006	0.0003 ± 0.001	< 0.0008	3765
E-08	- 6132	0.087 ± 0.016	-	0.0004 ± 0.001	< 0.0009	-0.0002 ± 0.001	< 0.0005	0.0005 ± 0.001	< 0.0009	3931
E-20	- 6133	0.084 ± 0.014	-	-0.0004 ± 0.001	< 0.0007	-0.0006 ± 0.001	< 0.0005	0.0001 ± 0.001	< 0.0008	3933
					4th Quarter					
E-01	EAP- 7665	0.069 ± 0.016	-	0.0004 ± 0.001	< 0.0010	0.0000 ± 0.001	< 0.0010	0.0009 ± 0.001	< 0.0009	3891
E-02	- 7666	0.062 ± 0.013	-	-0.0001 ± 0.000	< 0.0007	-0.0001 ± 0.000	< 0.0006	0.0001 ± 0.001	< 0.0007	3891
E-03	- 7667	0.059 ± 0.016	-	-0.0004 ± 0.001	< 0.0007	0.0000 ± 0.001	< 0.0005	-0.0007 ± 0.001	< 0.0004	3373
E-04	- 7668	0.062 ± 0.015	-	0.0002 ± 0.000	< 0.0007	-0.0003 ± 0.000	< 0.0005	-0.0001 ± 0.000	< 0.0006	3890
E-08	- 7669	0.059 ± 0.012	-	-0.0003 ± 0.000	< 0.0003	0.0006 ± 0.000	< 0.0005	0.0001 ± 0.000	< 0.0006	3931
E-20	- 7670	0.068 ± 0.015	-	-0.0003 ± 0.001	< 0.0008	-0.0001 ± 0.001	< 0.0005	0.0001 ± 0.001	< 0.0009	3865
Annual Mean±s.d.		**0.077 ± 0.011**		**-0.0001 ± 0.0003**	**< 0.0007**	**0.0000 ± 0.0002**	**< 0.0006**	**0.0001 ± 0.0004**	**< 0.0007**	

POINT BEACH NUCLEAR PLANT

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-11 Lambert Dairy Farm

Collection Date	01-13-10	MDC	02-10-10	MDC	03-11-10	MDC	Required LLD
Lab Code	EMI- 119		EMI- 512		EMI- 988		
Sr-89	0.1 ± 1.2	< 1.0	0.5 ± 0.8	< 0.7	0.7 ± 1.0	< 0.8	5.0
Sr-90	1.0 ± 0.4	< 0.7	0.8 ± 0.3	< 0.5	1.0 ± 0.3	< 0.5	1.0
I-131	-0.02 ± 0.16	< 0.30	0.06 ± 0.14	< 0.21	0.05 ± 0.16	< 0.28	0.5
K-40	1348 ± 107	-	1442 ± 107	-	1427 ± 114	-	
Cs-134	-0.1 ± 1.8	< 2.8	-0.3 ± 1.9	< 2.9	-1.5 ± 2.0	< 3.0	5.0
Cs-137	-0.3 ± 2.3	< 3.8	-0.8 ± 2.0	< 2.7	0.5 ± 2.0	< 3.7	5.0
Ba-La-140	0.5 ± 1.8	< 4.9	-0.1 ± 1.9	< 4.9	-1.1 ± 1.5	< 1.4	5.0
Other (Co-60)	-0.4 ± 2.1	< 3.0	0.3 ± 2.1	< 3.9	2.0 ± 2.0	< 2.6	15.0

Collection Date	04-14-10	MDC	05-12-10	MDC	06-09-10	MDC	Required LLD
Lab Code	EMI- 1590		EMI- 2337		EMI- 2966		
Sr-89	0.2 ± 0.9	< 0.7	0.8 ± 1.3	< 1.0	-0.5 ± 0.9	< 0.7	5.0
Sr-90	1.1 ± 0.4	< 0.6	1.1 ± 0.5	< 0.8	1.2 ± 0.4	< 0.6	1.0
I-131	0.02 ± 0.14	< 0.24	0.00 ± 0.14	< 0.24	0.04 ± 0.14	< 0.25	0.5
K-40	1316 ± 101	-	1360 ± 111	-	1392 ± 101	-	
Cs-134	-0.2 ± 1.6	< 2.5	-1.7 ± 1.7	< 1.5	0.2 ± 1.7	< 2.7	5.0
Cs-137	1.2 ± 1.7	< 3.5	1.7 ± 2.3	< 4.3	1.2 ± 1.7	< 2.9	5.0
Ba-La-140	-0.2 ± 1.8	< 2.5	-1.8 ± 1.6	< 1.1	-1.0 ± 1.8	< 5.0	5.0
Other (Co-60)	-1.9 ± 2.2	< 1.8	1.7 ± 2.1	< 4.4	-0.2 ± 1.9	< 2.4	15.0

POINT BEACH NUCLEAR PLANT

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-11 Lambert Dairy Farm

		MDC		MDC		MDC	Required
Collection Date	07-14-10		08-11-10		09-08-10		LLD
Lab Code	EMI- 3803		EMI- 4464		EMI- 5004		
Sr-89	0.1 ± 1.1	< 1.0	0.4 ± 0.9	< 0.8	-0.2 ± 0.8	< 0.7	5.0
Sr-90	0.9 ± 0.3	< 0.5	1.1 ± 0.3	< 0.5	1.0 ± 0.3	< 0.4	1.0
I-131	0.12 ± 0.34	< 0.39	-0.03 ± 0.20	< 0.29	0.12 ± 0.19	< 0.35	0.5
K-40	1384 ± 108	-	1267 ± 95	-	1359 ± 112	-	
Cs-134	-0.4 ± 2.1	< 3.5	1.1 ± 1.3	< 2.7	0.3 ± 1.6	< 3.3	5.0
Cs-137	-1.6 ± 2.2	< 2.8	2.2 ± 1.6	< 2.8	-1.1 ± 1.6	< 2.3	5.0
Ba-La-140	-4.0 ± 1.9	< 1.9	-0.2 ± 1.3	< 1.9	-0.8 ± 2.0	< 2.9	5.0
Other (Co-60)	1.9 ± 2.0	< 3.2	1.4 ± 1.3	< 3.0	0.8 ± 2.0	< 3.8	15.0

		MDC		MDC		MDC	Required
Collection Date	10-13-10		11-10-10		12-08-10		LLD
Lab Code	EMI- 5722		EMI- 6693		EMI- 7185		
Sr-89	0.0 ± 0.8	< 0.7	-0.6 ± 0.7	< 0.6	0.0 ± 0.9	< 0.9	5.0
Sr-90	1.3 ± 0.4	< 0.5	1.0 ± 0.4	< 0.5	0.8 ± 0.3	< 0.5	1.0
I-131	0.03 ± 0.16	< 0.32	0.10 ± 0.13	< 0.19	-0.11 ± 0.17	< 0.32	0.5
K-40	1393 ± 111	-	1444 ± 118	-	1370 ± 105	-	
Cs-134	-0.5 ± 2.5	< 4.8	-1.7 ± 2.2	< 3.1	0.5 ± 1.4	< 2.6	5.0
Cs-137	1.2 ± 2.6	< 4.9	-1.9 ± 2.7	< 3.0	0.7 ± 2.0	< 4.1	5.0
Ba-La-140	-0.3 ± 1.9	< 1.7	1.6 ± 2.2	< 3.6	1.9 ± 1.6	< 2.4	5.0
Other (Co-60)	-2.4 ± 2.3	< 3.5	0.4 ± 2.9	< 6.2	-0.8 ± 1.9	< 2.3	15.0

POINT BEACH NUCLEAR PLANT

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-21 Strutz Dairy Farm

Collection Date	01-13-10	MDC	02-10-10	MDC	03-10-10	MDC	Required LLD
Lab Code	EMI- 120		EMI- 513		EMI- 989		
Sr-89	-0.6 ± 0.9	< 0.8	0.4 ± 0.6	< 0.7	0.3 ± 0.9	< 0.9	5.0
Sr-90	0.6 ± 0.3	< 0.6	0.2 ± 0.2	< 0.5	0.4 ± 0.3	< 0.6	1.0
I-131	-0.08 ± 0.15	< 0.27	0.15 ± 0.19	< 0.33	-0.01 ± 0.16	< 0.29	0.5
K-40	1456 ± 104	-	1525 ± 104	-	1393 ± 111	-	
Cs-134	-0.4 ± 1.6	< 2.9	-1.6 ± 2.1	< 3.0	0.4 ± 1.6	< 3.3	5.0
Cs-137	0.7 ± 1.6	< 3.0	0.4 ± 2.3	< 3.4	1.5 ± 2.1	< 4.5	5.0
Ba-La-140	1.0 ± 1.3	< 1.8	-2.7 ± 2.3	< 4.1	1.1 ± 1.9	< 2.4	5.0
Other (Co-60)	-1.0 ± 1.6	< 2.5	2.2 ± 2.2	< 2.9	-1.5 ± 2.2	< 3.3	15.0

Collection Date	04-14-10	MDC	05-12-10	MDC	06-09-10	MDC	Required LLD
Lab Code	EMI- 1591		EMI- 2338		EMI- 2967		
Sr-89	0.3 ± 0.8	< 0.9	0.3 ± 0.7	< 0.8	0.3 ± 0.7	< 0.8	5.0
Sr-90	0.1 ± 0.3	< 0.6	0.1 ± 0.3	< 0.6	0.2 ± 0.3	< 0.5	1.0
I-131	0.07 ± 0.19	< 0.38	0.09 ± 0.16	< 0.29	0.13 ± 0.14	< 0.25	0.5
K-40	1402 ± 97		1415 ± 104	-	1411 ± 112	-	
Cs-134	-0.4 ± 1.4	< 2.7	0.0 ± 1.9	< 3.4	-1.1 ± 1.4	< 2.0	5.0
Cs-137	1.1 ± 1.6	< 2.7	-0.3 ± 2.1	< 3.7	1.8 ± 1.8	< 2.9	5.0
Ba-La-140	-2.1 ± 1.8	< 2.0	0.5 ± 1.8	< 2.1	0.6 ± 1.7	< 3.2	5.0
Other (Co-60)	-2.1 ± 1.8	< 2.6	-0.6 ± 2.1	< 4.2	-0.6 ± 1.9	< 2.8	15.0

POINT BEACH NUCLEAR PLANT

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-21 Strutz Dairy Farm

Collection Date	07-14-10	MDC	08-11-10	MDC	09-08-10	MDC	Required LLD
Lab Code	EMI- 3804		EMI- 4465		EMI- 5005		
Sr-89	-0.5 ± 1.0	< 1.1	-0.1 ± 0.8	< 1.3	0.2 ± 0.7	< 0.7	5.0
Sr-90	0.6 ± 0.4	< 0.7	0.2 ± 0.3	< 0.5	0.4 ± 0.3	< 0.5	1.0
I-131	0.05 ± 0.14	< 0.25	0.04 ± 0.21	< 0.34	-0.03 ± 0.15	< 0.28	0.5
K-40	1461 ± 117	-	1498 ± 94	-	1464 ± 102	-	
Cs-134	-0.8 ± 2.0	< 3.7	0.3 ± 1.6	< 3.0	-1.8 ± 1.8	< 2.3	5.0
Cs-137	0.2 ± 2.3	< 2.7	0.3 ± 1.6	< 2.7	2.1 ± 1.9	< 3.2	5.0
Ba-La-140	-2.9 ± 1.7	< 2.0	-0.7 ± 1.5	< 4.5	0.2 ± 1.6	< 4.6	5.0
Other (Co-60)	1.0 ± 2.1	< 3.1	1.8 ± 1.7	< 3.0	-1.3 ± 2.1	< 2.9	15.0

Collection Date	10-13-10	MDC	11-10-10	MDC	12-08-10	MDC	Required LLD
Lab Code	EMI- 5723		EMI- 6694		EMI- 7186		
Sr-89	0.3 ± 0.7	< 0.7	-0.4 ± 0.7	< 0.6	-0.2 ± 0.7	< 0.7	5.0
Sr-90	0.3 ± 0.3	< 0.5	0.5 ± 0.4	< 0.7	0.4 ± 0.3	< 0.5	1.0
I-131	0.09 ± 0.12	< 0.22	0.05 ± 0.16	< 0.28	-0.12 ± 0.19	< 0.35	0.5
K-40	1401 ± 118	-	1273 ± 107	-	1339 ± 117	-	
Cs-134	2.2 ± 2.0	< 3.6	-1.7 ± 2.0	< 3.2	1.5 ± 1.7	< 3.5	5.0
Cs-137	2.3 ± 2.4	< 4.4	1.4 ± 1.9	< 3.7	0.1 ± 2.0	< 3.7	5.0
Ba-La-140	1.0 ± 2.0	< 3.2	1.2 ± 1.6	< 3.8	-0.4 ± 2.1	< 2.6	5.0
Other (Co-60)	2.5 ± 2.2	< 3.3	-1.4 ± 2.5	< 3.9	0.8 ± 1.9	< 3.5	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	01-13-10	MDC	02-10-10	MDC	03-10-10	MDC	Required LLD
Lab Code	EMI- 121		EMI- 514		EMI- 990		
Sr-89	0.5 ± 1.0	< 0.9	0.3 ± 0.7	< 0.7	-0.1 ± 0.8	< 0.7	5.0
Sr-90	0.4 ± 0.4	< 0.7	0.4 ± 0.3	< 0.5	0.9 ± 0.3	< 0.4	1.0
I-131	0.11 ± 0.17	< 0.30	0.15 ± 0.20	< 0.35	0.16 ± 0.18	< 0.31	0.5
K-40	1339 ± 107	-	1419 ± 115	-	1575 ± 106	-	
Cs-134	-1.0 ± 1.6	< 2.7	-0.4 ± 1.8	< 3.9	0.0 ± 1.9	< 3.3	5.0
Cs-137	0.0 ± 2.1	< 3.7	-0.6 ± 1.8	< 2.7	0.7 ± 1.9	< 3.4	5.0
Ba-La-140	0.7 ± 1.7	< 4.2	3.0 ± 2.2	< 2.9	-0.1 ± 1.7	< 4.0	5.0
Other (Co-60)	-0.4 ± 2.1	< 2.5	-0.2 ± 2.0	< 4.2	1.6 ± 2.1	< 3.5	15.0

Collection Date	04-14-10	MDC	05-12-10	MDC	06-09-10	MDC	Required LLD
Lab Code	EMI- 1592		EMI- 2339		EMI- 2968		
Sr-89	-0.2 ± 0.8	< 0.7	0.6 ± 0.6	< 0.7	-0.5 ± 0.7	< 0.7	5.0
Sr-90	0.9 ± 0.3	< 0.5	0.3 ± 0.2	< 0.5	0.7 ± 0.3	< 0.5	1.0
I-131	0.06 ± 0.12	< 0.22	0.06 ± 0.12	< 0.18	-0.09 ± 0.17	< 0.32	0.5
K-40	1462 ± 97	-	1422 ± 105	-	1560 ± 105	-	
Cs-134	0.9 ± 1.5	< 2.7	-0.2 ± 1.4	< 2.8	-0.5 ± 1.4	< 2.4	5.0
Cs-137	1.2 ± 1.7	< 3.2	-0.8 ± 1.7	< 3.2	0.6 ± 1.7	< 2.3	5.0
Ba-La-140	-1.1 ± 1.4	< 2.6	-3.3 ± 2.2	< 2.5	0.7 ± 1.7	< 4.4	5.0
Other (Co-60)	-0.9 ± 2.2	< 1.8	1.4 ± 2.0	< 3.8	-1.3 ± 1.8	< 2.6	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-40 Barta

Collection Date	07-14-10	MDC	08-11-10	MDC	09-08-10	MDC	Required LLD
Lab Code	EMI- 3805		EMI- 4467		EMI- 5006		
Sr-89	-0.4 ± 0.8	< 0.7	0.0 ± 0.7	< 0.7	0.7 ± 0.9	< 1.0	5.0
Sr-90	0.8 ± 0.3	< 0.5	0.5 ± 0.3	< 0.4	0.5 ± 0.3	< 0.4	1.0
I-131	0.02 ± 0.12	< 0.17	0.07 ± 0.19	< 0.27	0.03 ± 0.16	< 0.29	0.5
K-40	1489 ± 117	-	1559 ± 105	-	1428 ± 113	-	
Cs-134	1.1 ± 1.6	< 3.1	1.1 ± 1.8	< 3.5	-1.0 ± 1.5	< 2.6	5.0
Cs-137	1.3 ± 1.9	< 3.8	-0.7 ± 2.2	< 2.1	-0.2 ± 1.8	< 2.2	5.0
Ba-La-140	1.6 ± 1.6	< 4.0	-4.4 ± 1.8	< 3.1	-1.0 ± 1.4	< 2.5	5.0
Other (Co-60)	0.8 ± 1.9	< 3.0	1.4 ± 2.1	< 3.8	-1.2 ± 1.8	< 3.0	15.0

Collection Date	10-13-10	MDC	11-10-10	MDC	12-08-10	MDC	Required LLD
Lab Code	EMI- 5724		EMI- 6695		EMI- 7187		
Sr-89	-0.3 ± 0.8	< 0.7	-0.3 ± 0.7	< 0.6	-0.1 ± 0.8	< 0.8	5.0
Sr-90	0.6 ± 0.3	< 0.5	0.8 ± 0.3	< 0.6	0.6 ± 0.3	< 0.5	1.0
I-131	0.05 ± 0.09	< 0.14	0.03 ± 0.15	< 0.27	0.20 ± 0.20	< 0.35	0.5
K-40	1496 ± 108		1361 ± 90		1495 ± 129		
Cs-134	1.6 ± 1.9	< 3.2	-0.1 ± 1.6	< 2.4	-1.5 ± 2.2	< 4.2	5.0
Cs-137	-0.5 ± 2.2	< 2.9	-0.9 ± 1.8	< 2.5	-0.3 ± 2.6	< 4.1	5.0
Ba-La-140	-1.3 ± 1.7	< 4.6	-0.3 ± 1.7	< 4.0	2.0 ± 2.3	< 3.8	5.0
Other (Co-60)	-0.9 ± 2.0	< 2.9	0.1 ± 1.9	< 3.9	1.2 ± 2.4	< 3.7	15.0

Sr-89 Annual Mean + s.d.	**0.1 ± 0.4**
Sr-90 Annual Mean + s.d.	**0.7 ± 0.3**
I-131 Annual Mean + s.d.	**0.05 ± 0.08**
K-40 Annual Mean + s.d.	**1421 ± 75**
Cs-134 Annual Mean + s.d.	**-0.2 ± 1.0**
Cs-137 Annual Mean + s.d.	**0.4 ± 1.1**
Ba-La Annual Mean + s.d.	**-0.3 ± 1.7**
Co-60 Annual Mean + s.d.	**0.1 ± 1.4**

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	Annual s.d
Collection Date	01-13-10	04-15-10	07-15-10	10-15-10	Req.		
Lab Code	EWW- 258	EWW- 1639	EWW- 3817	EWW- 5882	LLD		
Gross Beta	-0.4 ± 0.7	0.7 ± 0.7	1.5 ± 0.4	3.6 ± 1.8	4.0	**1.4**	
H-3	26.5 ± 73.4	27.4 ± 89.2	29.2 ± 56.0	56.0 ± 82.2	500	**34.8**	
Sr-89	0.1 ± 0.7	0.6 ± 0.5	0.1 ± 0.5	0.4 ± 0.5	5.0	**0.3**	
Sr-90	0.0 ± 0.4	-0.2 ± 0.2	0.1 ± 0.2	-0.3 ± 0.2	1.0	**-0.1**	
I-131	0.20 ± 0.33	0.03 ± 0.14	0.12 ± 0.15	0.04 ± 0.14	0.5	**0.10**	
Mn-54	-0.5 ± 1.2	-0.2 ± 1.7	-1.2 ± 2.3	0.7 ± 2.3	10	**-0.3**	
Fe-59	2.3 ± 2.2	0.0 ± 2.4	-5.9 ± 4.3	0.2 ± 4.3	30	**-0.8**	
Co-58	-0.2 ± 1.1	-1.0 ± 1.5	0.8 ± 1.8	1.4 ± 2.0	10	**0.2**	
Co-60	-0.1 ± 1.3	0.7 ± 1.5	1.0 ± 2.0	0.6 ± 2.4	10	**0.5**	
Zn-65	-1.7 ± 2.5	0.5 ± 3.3	-5.0 ± 4.8	-6.5 ± 5.2	30	**-3.2**	
Zr-Nb-95	-1.3 ± 1.3	-2.9 ± 2.0	0.4 ± 2.0	-2.5 ± 2.6	15	**-1.6**	
Cs-134	0.4 ± 1.2	0.7 ± 1.9	-0.4 ± 2.3	0.4 ± 2.4	10	**0.2**	
Cs-137	0.3 ± 1.4	0.2 ± 2.0	0.2 ± 2.5	-1.0 ± 2.8	10	**-0.1**	
Ba-La-140	0.1 ± 1.4	-2.9 ± 1.9	-0.5 ± 3.2	-0.8 ± 3.0	15	**-1.0**	
Other (Ru-103)	0.6 ± 1.2	0.4 ± 1.6	-0.5 ± 2.6	0.2 ± 2.4	30	**0.2**	

MDC Data

Collection Date	01-13-10	04-15-10	07-15-10	10-15-10	Req.
Lab Code	EWW- 258	EWW- 1639	EWW- 3817	EWW- 5882	LLD
Gross Beta	< 1.6	< 1.2	< 0.5	< 3.0	4.0
H-3	< 149.9	< 144.8	< 104.6	< 159.7	500
Sr-89	< 0.7	< 0.7	< 0.6	< 0.6	5.0
Sr-90	< 0.8	< 0.5	< 0.5	< 0.6	1.0
I-131	< 0.49	< 0.21	< 0.21	< 0.25	0.5
Mn-54	< 1.9	< 2.9	< 3.2	< 3.9	10
Fe-59	< 4.0	< 3.9	< 3.9	< 4.2	30
Co-58	< 2.0	< 1.4	< 1.7	< 3.9	10
Co-60	< 1.5	< 2.1	< 1.9	< 4.3	10
Zn-65	< 3.8	< 4.7	< 5.2	< 5.8	30
Zr-Nb-95	< 2.4	< 3.2	< 3.8	< 4.7	15
Cs-134	< 2.0	< 3.1	< 4.6	< 3.1	10
Cs-137	< 2.6	< 3.4	< 4.3	< 3.7	10
Ba-La-140	< 6.2	< 3.6	< 3.2	< 4.9	15
Other (Ru-103)	< 2.3	< 3.1	< 4.4	< 3.7	30

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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	
Lab Code	ELW- 255		ELW- 507		ELW- 1037		ELW- 1635		
Date Collected	01-13-10		02-11-10		03-12-10		04-15-10		Req. LLD
Gross beta	1.2 ± 1.0	< 1.8	1.8 ± 1.0	< 1.9	3.3 ± 0.7	< 0.9	1.6 ± 0.6	< 0.9	4.0
I-131	0.15 ± 0.31	< 0.48	0.10 ± 0.12	< 0.17	0.05 ± 0.14	< 0.20	0.05 ± 0.13	< 0.23	0.5
Be-7	-2.4 ± 11.0	< 27.8	4.4 ± 10.5	< 20.2	-3.1 ± 16.0	< 28.9	-9.9 ± 15.3	< 26.7	
Mn-54	-1.2 ± 1.3	< 1.9	1.1 ± 1.1	< 1.8	-0.9 ± 1.6	< 2.7	0.1 ± 1.8	< 3.4	10
Fe-59	-1.6 ± 2.6	< 4.3	-1.3 ± 2.7	< 2.8	1.0 ± 3.2	< 4.9	1.0 ± 2.9	< 4.8	30
Co-58	-1.0 ± 1.2	< 2.1	-0.8 ± 1.1	< 1.2	-0.6 ± 1.4	< 1.5	2.2 ± 1.5	< 2.7	10
Co-60	-0.6 ± 1.2	< 1.8	0.5 ± 1.3	< 1.1	0.5 ± 1.6	< 2.5	0.4 ± 1.6	< 1.8	10
Zn-65	-1.1 ± 2.5	< 3.4	-1.0 ± 2.5	< 2.0	-3.0 ± 4.0	< 4.8	-1.0 ± 3.2	< 1.4	30
Zr-Nb-95	1.5 ± 1.3	< 2.5	0.2 ± 1.3	< 2.5	-0.8 ± 1.7	< 2.4	0.0 ± 1.5	< 2.6	15
Cs-134	0.8 ± 1.1	< 2.1	-0.3 ± 1.2	< 1.8	-0.5 ± 1.7	< 3.1	-1.2 ± 1.8	< 2.7	10
Cs-137	0.9 ± 1.4	< 3.0	0.8 ± 1.5	< 2.8	0.0 ± 1.7	< 2.6	0.6 ± 1.8	< 2.4	10
Ba-La-140	0.8 ± 1.5	< 3.6	-0.4 ± 1.3	< 1.9	-0.7 ± 1.6	< 3.1	1.6 ± 2.0	< 4.4	15
Other (Ru-103)	-0.1 ± 1.2	< 2.6	0.3 ± 1.3	< 2.0	-1.0 ± 1.8	< 2.3	0.4 ± 2.2	< 3.8	30
Lab Code	ELW- 2373		ELW- 3096		ELW- 3812		ELW- 4468		
Date Collected	05-13-10		06-16-10		07-13-10		08-11-10		Req. LLD
Gross beta	3.3 ± 2.0	< 3.6	3.3 ± 1.8	< 3.2	1.3 ± 0.3	< 0.4	0.8 ± 0.9	< 1.8	4.0
I-131	0.11 ± 0.16	< 0.31	0.12 ± 0.18	< 0.31	0.12 ± 0.26	< 0.45	0.07 ± 0.18	< 0.33	0.5
Be-7	8.3 ± 10.9	< 16.2	21.5 ± 16.7	< 31.3	7.3 ± 19.4	< 38.6	10.3 ± 20.0	< 35.2	
Mn-54	-0.1 ± 1.4	< 1.3	0.2 ± 1.6	< 2.3	1.5 ± 2.0	< 3.1	0.0 ± 1.7	< 2.3	10
Fe-59	0.2 ± 2.6	< 4.2	1.1 ± 3.3	< 4.8	1.0 ± 4.1	< 6.2	2.2 ± 3.9	< 6.6	30
Co-58	-1.7 ± 1.2	< 1.3	-0.5 ± 1.7	< 3.2	0.0 ± 2.1	< 3.7	0.5 ± 1.9	< 1.6	10
Co-60	1.0 ± 1.2	< 2.1	0.1 ± 2.1	< 3.3	-2.3 ± 2.5	< 2.1	0.8 ± 2.1	< 3.1	10
Zn-65	-1.1 ± 2.1	< 3.5	1.4 ± 3.1	< 3.8	-4.3 ± 4.3	< 3.2	0.9 ± 4.4	< 6.1	30
Zr-Nb-95	-0.3 ± 1.3	< 1.7	0.0 ± 1.5	< 2.0	-1.5 ± 2.0	< 2.6	0.6 ± 1.9	< 2.5	15
Cs-134	-0.5 ± 1.3	< 1.8	0.3 ± 1.8	< 3.3	1.2 ± 2.2	< 4.2	0.6 ± 2.0	< 3.2	10
Cs-137	1.5 ± 1.5	< 3.0	-0.6 ± 2.0	< 3.5	0.9 ± 2.4	< 4.5	-0.1 ± 2.3	< 4.0	10
Ba-La-140	-0.8 ± 1.4	< 1.6	0.8 ± 1.8	< 4.4	-1.5 ± 2.7	< 1.9	0.6 ± 2.5	< 3.2	15
Other (Ru-103)	0.1 ± 1.2	< 2.4	0.2 ± 1.8	< 3.5	-0.4 ± 2.4	< 4.2	-0.6 ± 2.2	< 2.3	30
Lab Code	ELW- 5197		ELW- 5786		ELW- 6839		NS[a]		
Date Collected	09-15-10		10-14-10		11-17-10		12-15-10		Req. LLD
Gross beta	0.3 ± 0.9	< 1.8	1.3 ± 0.8	< 1.3	3.8 ± 0.9	< 1.3	-		4.0
I-131	0.03 ± 0.22	< 0.45	0.05 ± 0.16	< 0.28	0.03 ± 0.16	< 0.28	-		0.5
Be-7	6.7 ± 12.5	< 21.6	-3.2 ± 16.7	< 25.2	-4.0 ± 17.2	< 34.3	-		
Mn-54	0.8 ± 1.4	< 1.7	-0.2 ± 1.5	< 2.3	-1.2 ± 1.6	< 1.7	-		10
Fe-59	1.6 ± 2.7	< 4.6	0.2 ± 2.8	< 3.7	-0.6 ± 2.5	< 4.3	-		30
Co-58	2.1 ± 1.4	< 2.7	-1.1 ± 1.6	< 2.0	1.1 ± 1.4	< 2.5	-		10
Co-60	-0.2 ± 1.3	< 2.7	-0.4 ± 2.4	< 3.8	0.2 ± 2.0	< 4.0	-		10
Zn-65	0.1 ± 2.6	< 2.7	2.2 ± 3.5	< 4.5	4.2 ± 3.3	< 4.6	-		30
Zr-Nb-95	-0.5 ± 1.6	< 2.1	-1.0 ± 2.0	< 2.2	-1.6 ± 1.5	< 3.1	-		15
Cs-134	-0.7 ± 1.1	< 2.2	0.2 ± 2.0	< 3.8	-0.5 ± 1.8	< 2.7	-		10
Cs-137	-1.1 ± 1.4	< 1.9	2.0 ± 2.0	< 3.6	1.2 ± 1.9	< 3.6	-		10
Ba-La-140	1.8 ± 1.7	< 2.8	-1.1 ± 2.2	< 2.2	-1.1 ± 1.8	< 3.7	-		15
Other (Ru-103)	0.2 ± 1.3	< 3.5	0.9 ± 2.0	< 3.4	-3.2 ± 2.0	< 2.1	-		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	ELW- 256		ELW- 508		ELW- 1038		ELW- 1636		
Date Collected	01-13-10		02-11-10		03-12-10		04-15-10		Req. LLD
Gross beta	0.9 ± 0.9	< 1.7	2.7 ± 1.0	< 1.9	2.5 ± 0.7	< 0.9	1.2 ± 0.6	< 0.9	4.0
I-131	-0.03 ± 0.30	< 0.44	0.08 ± 0.14	< 0.25	0.05 ± 0.13	< 0.25	-0.05 ± 0.13	< 0.23	0.5
Be-7	-2.4 ± 10.5	< 16.0	-4.4 ± 9.5	< 16.5	-7.7 ± 14.0	< 24.7	16.5 ± 17.9	< 34.3	
Mn-54	0.1 ± 1.2	< 1.9	-0.2 ± 1.2	< 2.3	0.1 ± 1.5	< 1.2	2.8 ± 1.7	< 3.1	10
Fe-59	1.1 ± 2.8	< 4.8	1.2 ± 2.2	< 3.1	-0.4 ± 2.8	< 3.8	-2.7 ± 3.8	< 5.2	30
Co-58	-0.1 ± 1.3	< 2.8	-1.0 ± 1.2	< 1.5	-0.4 ± 1.2	< 1.7	-0.1 ± 2.1	< 4.0	10
Co-60	-0.4 ± 1.3	< 1.4	-0.1 ± 1.4	< 1.9	-0.6 ± 1.3	< 1.2	0.8 ± 1.7	< 1.6	10
Zn-65	-0.3 ± 2.6	< 1.9	-3.2 ± 2.2	< 2.8	0.9 ± 3.6	< 4.4	4.2 ± 3.9	< 3.4	30
Zr-Nb-95	-0.8 ± 1.2	< 2.9	0.2 ± 1.3	< 2.0	0.3 ± 1.3	< 2.7	0.9 ± 1.7	< 3.8	15
Cs-134	-1.2 ± 1.3	< 1.9	0.5 ± 1.2	< 2.2	-0.7 ± 1.5	< 2.7	-0.6 ± 1.9	< 3.1	10
Cs-137	1.0 ± 1.3	< 2.0	-0.7 ± 1.4	< 1.6	1.1 ± 1.6	< 2.9	-1.3 ± 2.1	< 2.3	10
Ba-La-140	-0.7 ± 1.3	< 4.7	1.8 ± 1.5	< 3.1	-1.6 ± 1.7	< 3.1	1.3 ± 2.0	< 2.4	15
Other (Ru-103)	-0.9 ± 1.5	< 2.3	-1.0 ± 1.1	< 1.5	0.0 ± 1.5	< 2.6	0.2 ± 2.2	< 3.7	30
Lab Code	ELW- 2374		ELW- 3097		ELW- 3814		ELW- 4469		
Date Collected	05-13-10		06-16-10		07-14-10		08-12-10		Req. LLD
Gross beta	3.5 ± 1.8	< 3.1	5.6 ± 2.1	< 3.6	1.0 ± 0.3	< 0.4	-0.7 ± 0.8	< 1.7	4.0
I-131	0.03 ± 0.12	< 0.22	-0.11 ± 0.16	< 0.30	0.03 ± 0.22	< 0.40	0.12 ± 0.13	< 0.18	0.5
Be-7	-1.6 ± 18.5	< 33.3	9.3 ± 12.7	< 26.1	-0.2 ± 18.3	< 32.9	12.5 ± 15.3	< 27.1	
Mn-54	1.3 ± 2.0	< 3.3	-0.6 ± 1.7	< 2.0	0.5 ± 2.2	< 3.4	0.8 ± 1.6	< 2.7	10
Fe-59	0.2 ± 4.1	< 3.9	-1.0 ± 2.8	< 5.2	-2.0 ± 3.9	< 5.4	0.4 ± 3.3	< 5.2	30
Co-58	0.3 ± 1.9	< 2.8	-0.5 ± 1.7	< 2.3	0.6 ± 2.1	< 3.7	0.1 ± 1.5	< 2.8	10
Co-60	0.1 ± 2.2	< 2.3	0.2 ± 1.0	< 1.0	1.1 ± 2.1	< 1.8	-0.2 ± 1.7	< 3.6	10
Zn-65	1.8 ± 4.0	< 3.7	3.7 ± 2.8	< 4.5	0.5 ± 4.5	< 5.0	-0.8 ± 3.5	< 2.7	30
Zr-Nb-95	-1.5 ± 2.3	< 4.0	-1.3 ± 1.7	< 2.7	-2.7 ± 1.9	< 2.7	0.4 ± 1.5	< 2.9	15
Cs-134	1.7 ± 1.9	< 3.5	0.6 ± 1.5	< 2.8	0.0 ± 2.3	< 4.0	-0.1 ± 1.7	< 3.2	10
Cs-137	1.0 ± 2.2	< 3.8	0.3 ± 1.8	< 2.7	1.7 ± 2.3	< 4.1	0.0 ± 1.8	< 3.7	10
Ba-La-140	-1.1 ± 2.1	< 2.5	0.5 ± 1.6	< 2.9	-0.3 ± 2.5	< 2.9	0.2 ± 1.9	< 2.8	15
Other (Ru-103)	0.3 ± 2.2	< 2.7	-0.3 ± 1.3	< 2.2	-0.7 ± 2.2	< 3.6	-0.9 ± 1.7	< 1.9	30
Lab Code	ELW- 5198		ELW- 5787		ELW- 6840		NS[a]		
Date Collected	09-15-10		10-14-10		11-18-10		12-15-10		Req. LLD
Gross beta	1.4 ± 1.0	< 1.7	2.2 ± 0.7	< 1.2	1.7 ± 0.4	< 0.6	-		4.0
I-131	0.05 ± 0.22	< 0.38	0.16 ± 0.20	< 0.34	0.08 ± 0.15	< 0.27	-		0.5
Be-7	5.9 ± 23.6	< 46.4	-7.8 ± 17.5	< 33.7	-4.9 ± 11.2	< 22.0	-		
Mn-54	2.0 ± 3.1	< 4.0	0.7 ± 1.6	< 2.5	1.6 ± 1.6	< 2.5	-		10
Fe-59	1.8 ± 4.3	< 7.7	-0.9 ± 2.9	< 5.4	0.6 ± 2.7	< 3.8	-		30
Co-58	1.4 ± 2.7	< 3.3	0.9 ± 1.7	< 2.2	0.4 ± 1.4	< 2.3	-		10
Co-60	2.3 ± 3.1	< 5.3	1.1 ± 2.0	< 3.7	0.7 ± 1.4	< 2.9	-		10
Zn-65	-7.9 ± 6.2	< 2.4	1.4 ± 3.7	< 2.8	-0.5 ± 2.6	< 3.5	-		30
Zr-Nb-95	-1.8 ± 2.7	< 4.9	0.3 ± 1.8	< 2.4	1.4 ± 1.8	< 3.4	-		15
Cs-134	-1.7 ± 2.6	< 4.5	-1.4 ± 1.8	< 3.0	-0.9 ± 1.5	< 2.6	-		10
Cs-137	0.2 ± 3.3	< 3.0	-1.0 ± 2.0	< 2.2	0.1 ± 1.5	< 2.7	-		10
Ba-La-140	-0.5 ± 3.8	< 6.5	1.7 ± 1.8	< 3.4	-1.5 ± 2.0	< 2.3	-		15
Other (Ru-103)	-1.7 ± 3.1	< 6.8	-0.4 ± 1.9	< 2.5	-0.3 ± 1.5	< 2.2	-		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]		ELW- 1039		ELW- 1637		
Date Collected	01-13-10		02-11-10		03-12-10		04-15-10		Req. LLD
Gross beta	-		-		1.8 ± 0.6	< 0.9	2.5 ± 0.7	< 0.9	4.0
I-131	-		-		0.09 ± 0.18	< 0.31	0.14 ± 0.19	< 0.36	0.5
Be-7	-		-		-2.8 ± 11.4	< 22.7	-16.6 ± 16.1	< 24.4	
Mn-54	-		-		-0.2 ± 1.6	< 2.5	1.1 ± 1.7	< 3.4	10
Fe-59	-		-		1.4 ± 2.7	< 5.2	-2.7 ± 3.7	< 2.4	30
Co-58	-		-		0.0 ± 1.3	< 1.7	-1.3 ± 1.6	< 2.1	10
Co-60	-		-		1.3 ± 1.5	< 2.7	0.1 ± 1.9	< 3.5	10
Zn-65	-		-		-0.8 ± 2.7	< 4.3	-3.6 ± 3.9	< 3.3	30
Zr-Nb-95	-		-		-2.3 ± 1.5	< 1.8	-0.4 ± 1.4	< 1.9	15
Cs-134	-		-		-0.4 ± 1.2	< 2.7	0.8 ± 1.6	< 2.9	10
Cs-137	-		-		-0.3 ± 1.5	< 2.9	-0.5 ± 1.9	< 2.4	10
Ba-La-140	-		-		2.4 ± 1.6	< 2.1	-4.0 ± 1.6	< 1.5	15
Other (Ru-103)	-		-		1.0 ± 1.2	< 2.8	-0.4 ± 1.9	< 2.8	30
Lab Code	ELW- 2375		ELW- 3098		ELW- 3815		ELW- 4470		
Date Collected	05-13-10		06-16-10		07-13-10		08-11-10		Req. LLD
Gross beta	2.6 ± 1.9	< 3.5	4.7 ± 1.9	< 3.2	0.9 ± 0.3	< 0.4	1.0 ± 1.0	< 1.8	4.0
I-131	-0.02 ± 0.12	< 0.22	0.04 ± 0.14	< 0.24	0.17 ± 0.18	< 0.25	0.10 ± 0.13	< 0.18	0.5
Be-7	1.6 ± 16.1	< 23.1	-3.5 ± 13.6	< 23.5	-0.2 ± 18.2	< 29.5	-13.0 ± 12.5	< 29.9	
Mn-54	1.0 ± 1.6	< 2.4	0.5 ± 1.6	< 2.6	0.6 ± 1.7	< 2.3	1.0 ± 1.4	< 2.6	10
Fe-59	0.1 ± 3.4	< 6.1	-1.6 ± 2.4	< 2.9	1.5 ± 3.1	< 6.3	1.0 ± 2.4	< 5.9	30
Co-58	1.1 ± 1.6	< 2.4	0.2 ± 1.5	< 2.6	-0.5 ± 1.8	< 3.1	0.3 ± 1.3	< 2.6	10
Co-60	0.3 ± 1.5	< 2.2	-0.7 ± 1.7	< 2.0	2.0 ± 2.4	< 3.5	-0.3 ± 1.8	< 3.0	10
Zn-65	1.7 ± 4.0	< 7.2	0.7 ± 3.0	< 3.7	1.2 ± 3.7	< 5.2	0.8 ± 2.7	< 3.5	30
Zr-Nb-95	0.4 ± 1.6	< 1.8	-1.5 ± 1.7	< 2.7	-0.9 ± 1.8	< 2.4	-1.4 ± 1.6	< 2.8	15
Cs-134	0.7 ± 1.6	< 2.9	-0.6 ± 1.3	< 2.6	-0.5 ± 1.9	< 2.9	-0.4 ± 1.5	< 2.5	10
Cs-137	0.2 ± 1.8	< 3.4	-0.2 ± 1.7	< 2.8	-0.2 ± 2.1	< 2.6	1.0 ± 1.6	< 2.6	10
Ba-La-140	1.1 ± 1.3	< 1.3	2.0 ± 2.0	< 4.7	0.6 ± 2.2	< 3.4	-4.3 ± 1.5	< 6.6	15
Other (Ru-103)	-0.9 ± 1.8	< 2.7	-0.4 ± 1.4	< 2.6	-1.3 ± 2.1	< 3.8	0.9 ± 1.3	< 3.9	30
Lab Code	ELW- 5200		ELW- 5788		ELW- 6841		NS[a]		
Date Collected	09-15-10		10-14-10		11-18-10		12-15-10		Req. LLD
Gross beta	2.4 ± 1.0	< 1.6	1.7 ± 0.8	< 1.3	1.7 ± 0.5	< 0.6	-		4.0
I-131	0.13 ± 0.16	< 0.28	0.02 ± 0.17	< 0.31	-0.01 ± 0.17	< 0.31	-		0.5
Be-7	20.5 ± 13.3	< 28.8	-14.9 ± 24.0	< 35.0	7.8 ± 23.7	< 50.1	-		
Mn-54	1.0 ± 1.5	< 2.3	0.5 ± 2.3	< 3.4	-0.7 ± 3.3	< 5.3	-		10
Fe-59	-2.8 ± 3.0	< 4.1	0.6 ± 4.7	< 7.4	2.9 ± 5.9	< 6.8	-		30
Co-58	-1.6 ± 1.6	< 1.7	-0.8 ± 2.3	< 4.2	0.2 ± 2.9	< 4.8	-		10
Co-60	0.7 ± 1.3	< 3.2	1.6 ± 2.5	< 3.6	1.5 ± 3.1	< 5.2	-		10
Zn-65	2.5 ± 3.4	< 4.8	-1.9 ± 5.2	< 3.9	-4.1 ± 8.0	< 7.7	-		30
Zr-Nb-95	1.5 ± 1.8	< 4.0	0.2 ± 2.0	< 3.8	1.3 ± 3.2	< 6.4	-		15
Cs-134	-0.9 ± 1.5	< 3.4	0.1 ± 2.4	< 3.9	-1.8 ± 3.2	< 5.0	-		10
Cs-137	-0.8 ± 1.5	< 2.4	1.3 ± 2.3	< 4.3	2.8 ± 3.1	< 4.6	-		10
Ba-La-140	0.8 ± 1.6	< 2.5	1.8 ± 2.8	< 4.2	-5.2 ± 4.0	< 5.2	-		15
Other (Ru-103)	0.0 ± 1.6	< 4.1	-0.6 ± 2.2	< 2.8	-1.4 ± 2.8	< 4.6	-		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 (Nature Conservancy)
Collection: Monthly composites Units: pCi/L

		MDC		MDC		MDC		MDC	
Lab Code	ELW- 257		ELW- 509		ELW- 1040		ELW- 1638		
Date Collected	01-13-10		02-11-10		03-12-10		04-15-10		Req. LLD
Gross beta	1.6 ± 1.0	< 1.8	2.5 ± 1.0	< 1.8	0.7 ± 0.5	< 0.9	1.0 ± 0.5	< 0.8	4.0
I-131	0.46 ± 0.34	< 0.49	-0.03 ± 0.14	< 0.25	0.12 ± 0.17	< 0.30	0.11 ± 0.15	< 0.25	0.5
Be-7	-16.6 ± 13.1	< 16.6	-4.3 ± 9.2	< 10.8	-12.9 ± 11.8	< 20.2	21.0 ± 14.0	< 29.6	
Mn-54	-1.6 ± 1.5	< 1.8	0.6 ± 1.3	< 2.4	0.7 ± 1.3	< 2.5	0.2 ± 1.5	< 2.5	10
Fe-59	1.9 ± 2.8	< 5.8	0.4 ± 2.1	< 3.2	-3.0 ± 2.4	< 2.8	-0.2 ± 2.5	< 3.8	30
Co-58	-0.2 ± 1.3	< 1.7	-0.3 ± 1.1	< 1.4	0.4 ± 1.5	< 2.6	0.4 ± 1.5	< 1.9	10
Co-60	1.3 ± 1.6	< 2.5	0.3 ± 1.0	< 2.0	1.1 ± 1.8	< 2.5	-1.5 ± 1.7	< 1.3	10
Zn-65	-2.0 ± 2.6	< 3.9	0.2 ± 2.1	< 2.9	-0.4 ± 2.2	< 2.6	0.5 ± 2.4	< 2.5	30
Zr-Nb-95	0.3 ± 1.4	< 2.9	0.0 ± 1.3	< 1.7	-2.0 ± 1.6	< 2.0	-3.3 ± 1.7	< 1.8	15
Cs-134	-0.6 ± 1.4	< 2.1	0.3 ± 1.1	< 1.9	-0.1 ± 1.3	< 1.8	-0.6 ± 1.6	< 2.4	10
Cs-137	0.5 ± 1.5	< 2.2	0.4 ± 1.3	< 2.5	0.0 ± 1.7	< 2.6	0.0 ± 1.7	< 2.0	10
Ba-La-140	-2.9 ± 1.6	< 4.7	0.7 ± 1.7	< 2.1	-0.9 ± 1.6	< 4.0	-1.7 ± 1.5	< 2.1	15
Other (Ru-103)	0.9 ± 1.4	< 2.6	-0.9 ± 1.1	< 1.4	-0.1 ± 1.1	< 2.1	0.8 ± 1.3	< 2.7	30

Lab Code	ELW- 2376		ELW- 3099		ELW- 3816		ELW- 4471		
Date Collected	05-13-10		06-16-10		07-14-10		08-12-10		Req. LLD
Gross beta	0.5 ± 1.9	< 3.8	1.7 ± 1.0	< 1.9	1.2 ± 0.3	< 0.4	0.2 ± 0.8	< 1.7	4.0
I-131	0.09 ± 0.14	< 0.20	-0.05 ± 0.13	< 0.24	0.12 ± 0.23	< 0.45	-0.01 ± 0.11	< 0.17	0.5
Be-7	-2.1 ± 14.6	< 23.0	-6.3 ± 12.8	< 22.5	-3.5 ± 19.8	< 39.9	-12.4 ± 13.8	< 33.9	
Mn-54	0.4 ± 1.6	< 2.7	-0.2 ± 1.5	< 1.8	1.7 ± 2.0	< 3.2	1.6 ± 1.6	< 3.0	10
Fe-59	0.8 ± 3.3	< 3.2	-1.5 ± 2.7	< 3.3	3.6 ± 3.8	< 4.4	0.3 ± 2.3	< 4.0	30
Co-58	-1.7 ± 1.6	< 1.8	0.3 ± 1.4	< 1.2	1.8 ± 2.0	< 3.2	-0.6 ± 1.5	< 2.8	10
Co-60	-1.1 ± 1.9	< 2.3	0.5 ± 1.7	< 1.8	0.3 ± 2.5	< 3.8	0.0 ± 1.2	< 2.6	10
Zn-65	-2.8 ± 4.3	< 4.9	-1.4 ± 3.3	< 5.6	0.4 ± 4.0	< 4.9	0.1 ± 3.0	< 4.9	30
Zr-Nb-95	0.5 ± 1.6	< 1.7	-1.9 ± 1.8	< 2.8	-0.6 ± 2.2	< 3.8	-1.1 ± 1.6	< 2.7	15
Cs-134	0.7 ± 1.6	< 2.6	1.4 ± 1.7	< 2.5	1.1 ± 2.0	< 3.7	-0.4 ± 1.2	< 2.1	10
Cs-137	-0.4 ± 1.9	< 2.7	0.1 ± 1.8	< 1.9	0.6 ± 2.2	< 4.2	0.1 ± 1.4	< 3.1	10
Ba-La-140	-1.3 ± 2.1	< 4.0	1.4 ± 1.5	< 3.0	2.2 ± 2.6	< 2.6	-3.6 ± 1.9	< 4.4	15
Other (Ru-103)	-0.2 ± 1.9	< 3.4	1.1 ± 1.5	< 3.7	1.6 ± 2.2	< 5.2	-2.2 ± 1.4	< 2.2	30

										All locations
Lab Code	ELW- 5201		ELW- 5789		ELW- 6842		NS[a]			Annual
Date Collected	09-15-10		10-14-10		11-18-10		12-15-10		Req. LLD	**Mean s.d.**
Gross beta	1.0 ± 1.0	< 1.8	1.9 ± 0.8	< 1.3	1.1 ± 0.4	< 0.6	-		4.0	**1.8 ± 1.2**
I-131	0.10 ± 0.12	< 0.17	0.08 ± 0.16	< 0.29	0.08 ± 0.13	< 0.19	-		0.5	**0.07 ± 0.09**
Be-7	3.0 ± 12.6	< 30.3	7.2 ± 20.7	< 40.0	2.0 ± 11.7	< 29.1	-			**0.1 ± 9.8**
Mn-54	0.9 ± 1.5	< 2.3	-0.6 ± 2.1	< 3.3	0.9 ± 1.2	< 2.3	-		10	**0.4 ± 0.9**
Fe-59	-0.7 ± 2.6	< 3.5	0.4 ± 4.3	< 6.2	-0.1 ± 2.8	< 3.7	-		30	**0.1 ± 1.5**
Co-58	1.6 ± 1.3	< 2.7	1.1 ± 2.1	< 4.5	0.9 ± 1.3	< 1.5	-		10	**0.1 ± 1.0**
Co-60	-1.2 ± 1.7	< 2.6	-0.6 ± 2.2	< 3.8	0.5 ± 1.3	< 2.4	-		10	**0.3 ± 0.9**
Zn-65	-2.0 ± 2.8	< 2.2	1.9 ± 4.3	< 4.6	-2.3 ± 2.6	< 2.7	-		30	**-0.3 ± 2.4**
Zr-Nb-95	0.9 ± 1.5	< 3.1	0.6 ± 1.9	< 3.8	-2.1 ± 1.5	< 1.9	-		15	**-0.5 ± 1.2**
Cs-134	0.0 ± 1.6	< 3.0	-0.3 ± 2.4	< 4.1	-0.9 ± 1.4	< 1.9	-		10	**-0.2 ± 0.8**
Cs-137	-0.2 ± 1.6	< 2.3	-0.4 ± 2.3	< 3.9	0.1 ± 1.5	< 2.1	-		10	**0.3 ± 0.9**
Ba-La-140	-0.4 ± 1.6	< 4.4	-0.3 ± 2.5	< 3.2	-0.9 ± 1.7	< 3.1	-		15	**-0.3 ± 1.8**
Other (Ru-103)	1.3 ± 1.4	< 2.7	-2.0 ± 2.2	< 3.2	0.0 ± 1.2	< 2.0	-		30	**-0.3 ± 1.0**

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

POINT BEACH NUCLEAR PLANT

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- 1070		ELW- 3145		ELW- 5668		ELW- 7585		Req. LLDs
H-3	68 ± 80	< 145	176 ± 102	< 152	119 ± 102	< 159	52 ± 88	< 141	500
Sr-89	-0.42 ± 0.67	< 0.75	0.57 ± 0.69	< 0.80	0.28 ± 1.14	< 1.15	-0.16 ± 1.43	< 1.60	5.0
Sr-90	0.44 ± 0.30	< 0.55	0.19 ± 0.29	< 0.57	0.30 ± 0.29	< 0.55	0.26 ± 0.31	< 0.60	1.0

Location	E-05 (Two Creeks Park)								
Period	1st Qtr.		2nd Qtr.		3rd Qtr.		4th Qtr.		
Lab Code	ELW- 1071		ELW- 3146		ELW- 5669		ELW- 7586		Req. LLDs
H-3	23 ± 78	< 145	117 ± 98	< 152	97 ± 101	< 159	431 ± 104 [a]	< 141	500
Sr-89	-0.05 ± 0.60	< 0.75	0.51 ± 0.71	< 0.74	0.00 ± 1.18	< 1.39	-0.08 ± 1.40	< 1.41	5.0
Sr-90	0.18 ± 0.27	< 0.53	0.23 ± 0.30	< 0.59	0.15 ± 0.31	< 0.62	0.29 ± 0.30	< 0.57	1.0

Location	E-06 (Coast Guard Station)								
Period	1st Qtr.		2nd Qtr.		3rd Qtr.		4th Qtr.		
Lab Code	ELW- 1072		ELW- 3147		ELW- 5670		ELW- 7587		Req. LLDs
H-3	62 ± 80	< 145	117 ± 102	< 159	78 ± 100	< 159	642 ± 112 [b]	< 141	500
Sr-89	0.20 ± 0.54	< 0.66	0.32 ± 0.60	< 0.68	-0.14 ± 1.29	< 1.35	-0.07 ± 1.25	< 1.43	5.0
Sr-90	0.11 ± 0.24	< 0.48	0.15 ± 0.25	< 0.50	0.26 ± 0.34	< 0.66	0.16 ± 0.27	< 0.53	1.0

Location	E-33 (Nature Conservancy)								
Period	1st Qtr.		2nd Qtr.		3rd Qtr.		4th Qtr.		
Lab Code	ELW- 1073		ELW- 3148		ELW- 5671		ELW- 7588		Req. LLDs
H-3	-52 ± 73	< 145	104 ± 97	< 152	99 ± 101	< 159	50 ± 88	< 141	500
Sr-89	0.75 ± 0.83	< 0.72	-0.28 ± 0.65	< 0.65	0.13 ± 1.02	< 1.08	-0.01 ± 1.30	< 1.41	5.0
Sr-90	0.22 ± 0.38	< 0.75	0.48 ± 0.29	< 0.51	0.31 ± 0.26	< 0.48	0.21 ± 0.28	< 0.54	1.0

[a] Tritium reanalyzed with a result of 391±97 pCi/L. October sample tritium = 828±109 pCi/L; November = 20±75 pCi/L.

[b] Tritium reanalyzed with a result of 797±118 pCi/L. October sample tritium = 490±97 pCi/L; November = 1139±119 pCi/L.

Tritium Annual Mean + s.d.	**136 ± 168**
Sr-89 Annual Mean + s.d.	**0.10 ± 0.32**
Sr-90 Annual Mean + s.d.	**0.25 ± 0.10**

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			Req. LLD
Collection Date	01-28-10		02-08-10		08-25-10		
Lab Code	EF- 1032		EF- 1033		EF- 4756		
Type	Burbot		King Salmon		Lake Trout		
Ratio (wet/dry wt.)	2.72		6.23		3.68		
Gross Beta	1.49 ± 0.07	< 0.041	2.50 ± 0.06	< 0.022	2.37 ± 0.06	< 0.020	0.5
K-40	1.17 ± 0.56	-	2.29 ± 0.33	-	2.66 ± 0.36	-	
Mn-54	0.010 ± 0.017	< 0.029	0.001 ± 0.007	< 0.013	-0.003 ± 0.008	< 0.010	0.13
Fe-59	-0.003 ± 0.038	< 0.138	0.010 ± 0.014	< 0.050	-0.008 ± 0.016	< 0.025	0.26
Co-58	-0.005 ± 0.018	< 0.058	0.013 ± 0.008	< 0.017	0.003 ± 0.007	< 0.010	0.13
Co-60	-0.008 ± 0.020	< 0.027	0.009 ± 0.009	< 0.011	-0.001 ± 0.011	< 0.012	0.13
Zn-65	-0.060 ± 0.048	< 0.081	-0.011 ± 0.016	< 0.029	-0.018 ± 0.020	< 0.007	0.26
Cs-134	-0.044 ± 0.022	< 0.031	-0.002 ± 0.008	< 0.011	0.003 ± 0.008	< 0.007	0.13
Cs-137	0.055 ± 0.026	< 0.043	0.045 ± 0.017	< 0.016	0.031 ± 0.017	< 0.015	0.15
Other (Ru-103)	0.022 ± 0.021	< 0.092	0.004 ± 0.006	< 0.024	0.009 ± 0.007	< 0.007	0.5
Collection Date	08-25-10		11-04-10		11-04-10		
Lab Code	EF- 4757		EF- 6564		EF- 6565		
Type	Unknown[a]		Lake Trout		Lake Trout		
Ratio (wet/dry wt.)	6.58		3.35		3.43		
Gross Beta	1.11 ± 0.05	< 0.027	5.86 ± 0.11	< 0.031	3.87 ± 0.08	< 0.031	
K-40	1.53 ± 0.71	-	2.51 ± 0.36	-	2.63 ± 0.45	-	
Mn-54	0.013 ± 0.030	< 0.063	-0.003 ± 0.008	< 0.008	0.013 ± 0.013	< 0.025	
Fe-59	-0.044 ± 0.052	< 0.057	0.001 ± 0.019	< 0.032	-0.011 ± 0.028	< 0.040	
Co-58	-0.017 ± 0.021	< 0.027	0.007 ± 0.006	< 0.012	0.003 ± 0.013	< 0.021	
Co-60	-0.001 ± 0.027	< 0.040	0.001 ± 0.009	< 0.012	-0.020 ± 0.018	< 0.020	
Zn-65	-0.018 ± 0.062	< 0.081	0.017 ± 0.017	< 0.016	-0.042 ± 0.033	< 0.023	
Cs-134	0.001 ± 0.027	< 0.051	0.001 ± 0.009	< 0.008	-0.005 ± 0.011	< 0.015	
Cs-137	0.033 ± 0.034	< 0.059	0.018 ± 0.011	< 0.017	0.055 ± 0.032	< 0.023	
Other (Ru-103)	-0.007 ± 0.028	< 0.051	0.003 ± 0.007	< 0.020	0.001 ± 0.009	< 0.014	

[a] Small sample size; specimen yielded only 63 gr of flesh.

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	11-04-10		11-04-10		11-04-10		
Lab Code	EF- 6567		EF- 6568		EF- 6569		
Type	Lake Trout		Salmon		Salmon		
Ratio (wet/dry wt.)	4.31		4.68		4.94		
Gross Beta	3.67 ± 0.08	< 0.025	4.16 ± 0.09	< 0.027	1.12 ± 0.06	< 0.037	0.5
K-40	2.11 ± 0.33	-	3.17 ± 0.40	-	1.35 ± 0.43	< 0.96	
Mn-54	0.004 ± 0.008	< 0.014	0.002 ± 0.007	< 0.014	-0.005 ± 0.021	< 0.032	0.13
Fe-59	-0.013 ± 0.022	< 0.034	-0.006 ± 0.019	< 0.043	-0.003 ± 0.044	< 0.029	0.26
Co-58	-0.011 ± 0.009	< 0.016	0.005 ± 0.007	< 0.012	-0.020 ± 0.022	< 0.034	0.13
Co-60	-0.003 ± 0.009	< 0.005	0.013 ± 0.008	< 0.007	-0.010 ± 0.026	< 0.040	0.13
Zn-65	-0.019 ± 0.019	< 0.009	-0.015 ± 0.019	< 0.009	-0.025 ± 0.050	< 0.037	0.26
Cs-134	-0.002 ± 0.007	< 0.008	-0.007 ± 0.008	< 0.009	-0.011 ± 0.022	< 0.035	0.13
Cs-137	0.021 ± 0.012	< 0.011	0.035 ± 0.017	< 0.014	0.001 ± 0.022	< 0.033	0.15
Other (Ru-103)	0.002 ± 0.007	< 0.015	-0.003 ± 0.007	< 0.017	-0.007 ± 0.020	< 0.040	0.5
Collection Date	11-04-10		11-04-10				
Lab Code	EF- 6570		EF- 6571		**Annual**		
Type	Brook Trout		Rainbow Trout				
Ratio (wet/dry wt.)	7.77		6.98		**Mean s.d.**		
Gross Beta	1.82 ± 0.05	< 0.023	2.96 ± 0.07	< 0.025	**2.81 ± 1.48**		0.5
K-40	2.37 ± 1.03	-	2.19 ± 0.38	-	**2.18 ± 0.61**		
Mn-54	0.000 ± 0.032	< 0.034	-0.003 ± 0.009	< 0.009	**0.003 ± 0.007**		0.13
Fe-59	0.011 ± 0.063	< 0.091	0.011 ± 0.022	< 0.029	**-0.005 ± 0.015**		0.26
Co-58	-0.014 ± 0.029	< 0.048	-0.001 ± 0.009	< 0.014	**-0.003 ± 0.011**		0.13
Co-60	0.007 ± 0.036	< 0.063	0.004 ± 0.009	< 0.017	**-0.001 ± 0.009**		0.13
Zn-65	-0.064 ± 0.085	< 0.108	-0.009 ± 0.025	< 0.024	**-0.024 ± 0.023**		0.26
Cs-134	-0.016 ± 0.034	< 0.064	0.007 ± 0.009	< 0.017	**-0.007 ± 0.014**		0.13
Cs-137	0.026 ± 0.034	< 0.047	0.023 ± 0.014	< 0.024	**0.031 ± 0.016**		0.15
Other (Ru-103)	-0.028 ± 0.031	< 0.055	0.012 ± 0.009	< 0.024	**0.001 ± 0.013**		0.5

Table 8. Radioactivity in shoreline sediment samples

Collection: Semiannual

Sample Description and Concentration (pCi/g dry)

		MDC		MDC		MDC	
Collection Date	4/15/2010		4/15/2010		4/15/2010		Req.
Lab Code	ESS- 1839		ESS- 1840		ESS- 1841		LLD
Location	E-01		E-05		E-06		
Gross Beta	14.52 ± 1.24	< 1.38	9.32 ± 1.04	< 1.24	10.00 ± 1.02	< 1.19	2.0
Be-7	0.065 ± 0.074	< 0.13	0.005 ± 0.057	< 0.11	0.049 ± 0.063	< 0.11	
K-40	3.83 ± 0.32	-	6.27 ± 0.42	-	4.85 ± 0.39	-	-
Cs-137	0.050 ± 0.020	< 0.016	0.003 ± 0.008	< 0.011	0.051 ± 0.021	< 0.016	0.15
Tl-208	0.25 ± 0.026	-	0.035 ± 0.018	-	0.17 ± 0.023	-	-
Pb-212	0.54 ± 0.065	< 0.16	0.13 ± 0.042	< 0.10	0.46 ± 0.028	-	-
Bi-214	0.60 ± 0.055	-	0.12 ± 0.034	-	0.46 ± 0.053	-	-
Ra-226	0.70 ± 0.24	-	0.21 ± 0.14	< 0.33	0.84 ± 0.21	-	-
Ac-228	0.76 ± 0.091	-	0.16 ± 0.064	-	0.47 ± 0.068	-	-
Collection Date	4/15/2010		4/15/2010				
Lab Code	ESS- 1842		ESS- 1843				
Location	E-12		E-33				
Gross Beta	9.24 ± 1.13	< 1.35	11.44 ± 1.08	< 1.25			2.0
Be-7	0.016 ± 0.055	< 0.06	0.14 ± 0.063	< 0.11			
K-40	3.33 ± 0.31	-	5.11 ± 0.36	-			-
Cs-137	0.032 ± 0.016	< 0.014	0.048 ± 0.021	< 0.016			0.15
Tl-208	0.15 ± 0.026	-	0.14 ± 0.022	-			-
Pb-212	0.29 ± 0.057	< 0.13	0.52 ± 0.071	-			-
Bi-214	0.30 ± 0.046	-	0.44 ± 0.048	-			-
Ra-226	0.16 ± 0.17	< 0.37	0.77 ± 0.19	-			-
Ac-228	0.43 ± 0.085	-	0.46 ± 0.063	-			-

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RADIOACTIVITY IN SHORELINE SEDIMENT SAMPLES

(Semiannual Collections)

Sample Description and Concentration (pCi/g dry)

		MDC		MDC		MDC	
Collection Date	10/14/2010		10/14/2010		10/14/2010		Req.
Lab Code	ESS- 5892		ESS- 5893		ESS- 5894		LLD
Location	E-01		E-05		E-06		
Gross Beta	8.96 ± 1.26	< 1.77	6.78 ± 1.08	< 1.54	12.72 ± 1.35	< 1.75	2.0
Be-7	0.11 ± 0.045	< 0.081	0.17 ± 0.090	-	0.13 ± 0.061	< 0.17	
K-40	4.75 ± 0.37	-	6.60 ± 0.43	-	8.41 ± 0.51	-	-
Cs-137	0.026 ± 0.013	< 0.011	0.016 ± 0.009	< 0.010	0.019 ± 0.009	< 0.015	0.15
Tl-208	0.052 ± 0.017	-	0.053 ± 0.017	-	0.058 ± 0.021	-	-
Pb-212	0.16 ± 0.051	-	0.15 ± 0.054	-	0.14 ± 0.032	-	-
Bi-214	0.15 ± 0.028	-	0.08 ± 0.027	-	0.092 ± 0.027	-	-
Ra-226	0.32 ± 0.14	-	0.34 ± 0.14	-	0.36 ± 0.15	< 0.29	-
Ac-228	0.27 ± 0.077	-	0.17 ± 0.054	-	0.22 ± 0.059		-

Collection Date	10/14/2010		10/14/2010			
Lab Code	ESS- 5895		ESS- 5896			**Annual**
Location	E-12		E-33			**Mean s.d.**
Gross Beta	9.46 ± 1.16	< 1.53	14.45 ± 1.39	< 1.73	2.0	**10.69 ± 2.53**
Be-7	0.12 ± 0.070	< 0.21	0.13 ± 0.052	< 0.14		**0.093 ± 0.056**
K-40	6.74 ± 0.48	-	6.32 ± 0.42	-	-	**5.62 ± 1.53**
Cs-137	0.041 ± 0.021	< 0.017	0.030 ± 0.017	< 0.014	0.15	**0.032 ± 0.016**
Tl-208	0.081 ± 0.021	-	0.064 ± 0.020	-	-	**0.11 ± 0.07**
Pb-212	0.18 ± 0.027	-	0.15 ± 0.025	-	-	**0.27 ± 0.17**
Bi-214	0.16 ± 0.036	-	0.13 ± 0.033	-	-	**0.25 ± 0.18**
Ra-226	0.48 ± 0.19	-	0.43 ± 0.15	< 0.28	-	**0.46 ± 0.23**
Ac-228	0.28 ± 0.079	-	0.25 ± 0.051	-	-	**0.35 ± 0.19**

Table 9. Radioactivity in soil samples

Collection: Semiannual

Sample Description and Concentration (pCi/g dry)							
		MDC		MDC		MDC	
Collection Date	5/26/2010		5/26/2010		5/26/2010		Req.
Lab Code	ESO- 2727		ESO- 2728		ESO- 2729		LLD
Location	E-01		E-02		E-03		
Gross Beta	31.18 ± 1.33	< 1.26	29.38 ± 1.22	< 1.09	39.23 ± 1.38	< 1.17	2.0
Be-7	0.10 ± 0.095	< 0.18	0.19 ± 0.10	< 0.17	0.16 ± 0.10	< 0.22	
K-40	9.23 ± 9.23	-	15.61 ± 0.79	-	18.98 ± 1.03	-	-
Cs-137	0.18 ± 0.029	<0.020	0.11 ± 0.024	<0.020	0.23 ± 0.034	<0.024	0.15
Tl-208	0.20 ± 0.035	-	0.13 ± 0.020	<0.023	0.21 ± 0.034	-	-
Pb-212	0.50 ± 0.087	<0.20	0.42 ± 0.082	<0.019	0.50 ± 0.044	-	-
Bi-214	0.38 ± 0.078	-	0.34 ± 0.055	-	0.48 ± 0.087	-	-
Ra-226	0.84 ± 0.25	<0.60	0.43 ± 0.23	<0.46	1.48 ± 0.37	-	-
Ac-228	0.64 ± 0.11	-	0.54 ± 0.12	-	0.88 ± 0.14	-	-
Collection Date	5/26/2010		5/26/2010		5/26/2010		
Lab Code	ESO- 2731		ESO- 2732		ESO- 2733		
Location	E-04		E-06		E-08		
Gross Beta	33.11 ± 1.35	< 1.24	30.06 ± 1.59	< 1.51	26.01 ± 1.39	< 1.38	2.0
Be-7	0.045 ± 0.08	< 0.18	-0.022 ± 0.09	< 0.11	0.037 ± 0.081	< 0.16	
K-40	14.95 ± 0.77	-	11.87 ± 0.72	-	14.58 ± 0.79	-	-
Cs-137	0.13 ± 0.027	<0.021	0.53 ± 0.048	<0.025	0.17 ± 0.027	<0.021	0.15
Tl-208	0.10 ± 0.028	-	0.08 ± 0.080	-	0.10 ± 0.018	<0.042	-
Pb-212	0.26 ± 0.039	-	0.24 ± 0.24	-	0.27 ± 0.031	-	-
Bi-214	0.28 ± 0.067	-	0.12 ± 0.124	-	0.19 ± 0.047	-	-
Ra-226	0.47 ± 0.27	-	0.40 ± 0.23	-	0.46 ± 0.22	< 0.44	-
Ac-228	0.52 ± 0.13	-	0.35 ± 0.08	-	0.32 ± 0.083	-	-
Collection Date	5/26/2010		5/26/2010				
Lab Code	ESO- 2734		ESO- 2735				
Location	E-09		E-20				
Gross Beta	39.65 ± 2.15	< 1.96	37.81 ± 2.12	< 1.89			2.0
Be-7	-0.05 ± 0.10	< 0.21	0.063 ± 0.10	< 0.22			
K-40	19.89 ± 0.94	-	17.88 ± 0.90	-			-
Cs-137	0.16 ± 0.035	<0.025	0.19 ± 0.037	<0.050			0.15
Tl-208	0.18 ± 0.032	-	0.20 ± 0.033	-			-
Pb-212	0.46 ± 0.47	-	0.42 ± 0.43	-			-
Bi-214	0.38 ± 0.069	-	0.36 ± 0.072	-			-
Ra-226	0.80 ± 0.32	-	0.91 ± 0.25	-			-
Ac-228	0.62 ± 0.12	-	0.58 ± 0.13	-			-

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Table 9. Radioactivity in soil samples

Collection: Semiannual

	Sample Description and Concentration (pCi/g dry)	MDC		MDC		MDC	
Collection Date	10/27/2010		10/28/2010		10/28/2010		Req.
Lab Code	ESO- 6331		ESO- 6332		ESO- 6333		LLD
Location	E-01		E-02		E-03		
Gross Beta	28.86 ± 1.71	< 1.74	28.41 ± 1.60	< 1.51	36.31 ± 1.85	< 1.72	2.0
Be-7	0.044 ± 0.091	< 0.17	0.13 ± 0.10	< 0.27	0.12 ± 0.11	< 0.22	
K-40	16.24 ± 0.79	-	13.57 ± 0.75	-	18.15 ± 0.93	-	-
Cs-137	0.13 ± 0.027	< 0.02	0.09 ± 0.034	< 0.03	0.20 ± 0.043	< 0.030	0.15
Tl-208	0.14 ± 0.027	-	0.15 ± 0.031	-	0.23 ± 0.046	-	-
Pb-212	0.52 ± 0.097	-	0.47 ± 0.10	-	0.68 ± 0.12	-	-
Bi-214	0.30 ± 0.046	-	0.25 ± 0.047	-	0.43 ± 0.062	-	-
Ra-226	0.79 ± 0.27	-	0.85 ± 0.29	-	0.96 ± 0.34	-	-
Ac-228	0.50 ± 0.10	-	0.58 ± 0.11	-	0.66 ± 0.11	-	-
Collection Date	10/28/2010		10/28/2010		10/28/2010		
Lab Code	ESO- 6334		ESO- 6335		ESO- 6336		
Location	E-04		E-06		E-08		
Gross Beta	30.05 ± 1.66	< 1.54	15.61 ± 1.43	< 1.75	26.36 ± 1.67	< 1.75	2.0
Be-7	0.19 ± 0.12	< 0.27	0.12 ± 0.12	< 0.31	0.11 ± 0.090	< 0.21	
K-40	14.55 ± 0.79	-	8.73 ± 0.78	-	13.43 ± 0.76	-	-
Cs-137	0.11 ± 0.035	< 0.03	0.38 ± 0.047	< 0.03	0.23 ± 0.033	< 0.02	0.15
Tl-208	0.15 ± 0.035	-	0.057 ± 0.029	-	0.10 ± 0.033	-	-
Pb-212	0.43 ± 0.040	-	0.18 ± 0.034	-	0.24 ± 0.031	-	-
Bi-214	0.30 ± 0.049	-	0.23 ± 0.074	-	0.21 ± 0.045	-	-
Ra-226	0.74 ± 0.35	-	0.46 ± 0.27	< 0.50	0.57 ± 0.26	-	-
Ac-228	0.44 ± 0.11	-	0.11 ± 0.076	-	0.37 ± 0.090	-	-
Collection Date	10/28/2010		10/28/2010				
Lab Code	ESO- 6338		ESO- 6339		**Annual**		
Location	E-09		E-20		**Mean s.d.**		
Gross Beta	38.78 ± 1.89	< 1.71	29.97 ± 1.67	< 1.56	**31.30 ± 6.22**		2.0
Be-7	0.39 ± 0.23	-	0.014 ± 0.090	< 0.16	**0.103 ± 0.10**		
K-40	21.68 ± 0.96	-	17.35 ± 0.79	-	**15.42 ± 3.60**		-
Cs-137	0.43 ± 0.052	< 0.03	0.020 ± 0.013	< 0.02	**0.21 ± 0.13**		0.15
Tl-208	0.20 ± 0.031	-	0.18 ± 0.036	-	**0.15 ± 0.05**		-
Pb-212	0.71 ± 0.11	-	0.71 ± 0.10	-	**0.44 ± 0.17**		-
Bi-214	0.41 ± 0.059	-	0.42 ± 0.051	-	**0.32 ± 0.10**		-
Ra-226	0.94 ± 0.34	-	0.94 ± 0.28	-	**0.75 ± 0.28**		-
Ac-228	0.86 ± 0.12	-	0.65 ± 0.11	-	**0.54 ± 0.20**		-

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	5/26/2010		5/26/2010		5/26/2010	
Lab Code	EG- 2695		EG- 2696		EG- 2697	
Ratio (wet/dry)	3.75		5.42		4.36	
Gross Beta	7.37 ± 0.16	< 0.052	5.83 ± 0.12	< 0.038	6.36 ± 0.13	< 0.038
Be-7	1.25 ± 0.22	< 0.18	0.30 ± 0.12	< 0.12	0.30 ± 0.14	< 0.14
K-40	5.15 ± 0.48	-	4.37 ± 0.42	-	5.47 ± 0.46	-
I-131	-0.013 ± 0.009	< 0.021	-0.007 ± 0.008	< 0.031	-0.004 ± 0.007	< 0.028
Cs-134	0.000 ± 0.009	< 0.013	-0.004 ± 0.006	< 0.010	0.003 ± 0.008	< 0.012
Cs-137	-0.001 ± 0.011	< 0.017	0.003 ± 0.007	< 0.015	0.005 ± 0.009	< 0.014
Other (Co-60)	0.009 ± 0.010	< 0.015	0.007 ± 0.007	< 0.011	0.002 ± 0.009	< 0.018
Location	E-04		E-06		E-08	
Collection Date	5/26/2010		5/26/2010		5/26/2010	
Lab Code	EG- 2698		EG- 2699		EG- 2700	
Ratio (wet/dry)	7.02		4.03		4.31	
Gross Beta	6.15 ± 0.14	< 0.045	4.93 ± 0.10	< 0.038	7.71 ± 0.14	< 0.042
Be-7	0.26 ± 0.09	< 0.10	0.45 ± 0.17	< 0.17	0.65 ± 0.15	< 0.13
K-40	4.83 ± 0.39	-	4.75 ± 0.46	-	6.95 ± 0.47	-
I-131	-0.008 ± 0.006	< 0.021	-0.008 ± 0.008	< 0.024	-0.007 ± 0.007	< 0.019
Cs-134	0.000 ± 0.007	< 0.013	-0.004 ± 0.007	< 0.011	-0.002 ± 0.008	< 0.012
Cs-137	-0.001 ± 0.007	< 0.010	0.004 ± 0.008	< 0.016	-0.002 ± 0.009	< 0.010
Other (Co-60)	-0.001 ± 0.008	< 0.008	0.004 ± 0.008	< 0.012	0.002 ± 0.010	< 0.008
Location	E-09		E-20			
Collection Date	5/26/2010		5/26/2010			
Lab Code	EG- 2701		EG- 2702			
Ratio (wet/dry)	3.53		4.51			
Gross Beta	6.10 ± 0.13	< 0.046	5.29 ± 0.11	< 0.036		
Be-7	0.83 ± 0.19	< 0.17	1.00 ± 0.18	< 0.13		
K-40	5.15 ± 0.47	-	4.55 ± 0.38	-		
I-131	0.003 ± 0.007	< 0.025	0.005 ± 0.007	< 0.022		
Cs-134	0.002 ± 0.008	< 0.014	-0.002 ± 0.007	< 0.010		
Cs-137	0.003 ± 0.009	< 0.016	-0.002 ± 0.008	< 0.012		
Other (Co-60)	0.004 ± 0.008	< 0.011	0.009 ± 0.008	< 0.011		

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	7/28/2010		7/28/2010		7/28/2010	
Lab Code	EG- 4034		EG- 4035		EG- 4036	
Ratio (wet/dry)	2.97		4.26		2.90	
Gross Beta	7.66 ± 0.27	< 0.097	8.04 ± 0.27	< 0.094	7.27 ± 0.27	< 0.105
Be-7	3.75 ± 0.38	< 0.23	4.38 ± 0.48	< 0.31	5.83 ± 0.55	< 0.33
K-40	4.79 ± 0.58	-	7.99 ± 0.77	-	6.29 ± 0.83	-
I-131	-0.007 ± 0.012	< 0.039	-0.011 ± 0.014	< 0.033	-0.004 ± 0.017	< 0.047
Cs-134	0.002 ± 0.010	< 0.019	-0.009 ± 0.012	< 0.020	0.006 ± 0.015	< 0.029
Cs-137	0.008 ± 0.012	< 0.019	-0.002 ± 0.014	< 0.019	0.005 ± 0.015	< 0.033
Other (Co-60)	0.011 ± 0.014	< 0.022	0.007 ± 0.017	< 0.029	-0.003 ± 0.018	< 0.021
Location	E-04		E-06		E-08	
Collection Date	7/28/2010		7/28/2010		7/28/2010	
Lab Code	EG- 4038		EG- 4039		EG- 4040	
Ratio (wet/dry)	2.54		2.73		2.26	
Gross Beta	6.34 ± 0.27	< 0.114	6.77 ± 0.25	< 0.097	9.48 ± 0.38	< 0.160
Be-7	4.34 ± 0.44	< 0.26	4.74 ± 0.45	< 0.26	5.27 ± 0.50	< 0.32
K-40	4.90 ± 0.65	-	6.05 ± 0.76	-	7.46 ± 0.74	-
I-131	0.014 ± 0.013	< 0.052	0.011 ± 0.015	< 0.045	0.015 ± 0.015	< 0.041
Cs-134	0.006 ± 0.013	< 0.026	0.010 ± 0.016	< 0.024	-0.002 ± 0.016	< 0.025
Cs-137	0.002 ± 0.013	< 0.025	0.007 ± 0.020	< 0.039	0.008 ± 0.021	< 0.031
Other (Co-60)	0.003 ± 0.013	< 0.026	-0.005 ± 0.016	< 0.018	-0.011 ± 0.016	< 0.018
Location	E-09		E-20			
Collection Date	7/28/2010		7/28/2010			
Lab Code	EG- 4041		EG- 4042			
Ratio (wet/dry)	2.51		5.10			
Gross Beta	7.15 ± 0.32	< 0.144	6.18 ± 0.21	< 0.074		
Be-7	5.71 ± 0.45	< 0.29	3.36 ± 0.35	< 0.23		
K-40	5.36 ± 0.59	-	7.04 ± 0.66	-		
I-131	0.008 ± 0.013	< 0.043	-0.007 ± 0.012	< 0.035		
Cs-134	0.002 ± 0.014	< 0.022	0.002 ± 0.014	< 0.025		
Cs-137	-0.001 ± 0.014	< 0.018	0.004 ± 0.016	< 0.028		
Other (Co-60)	0.014 ± 0.014	< 0.022	0.010 ± 0.015	< 0.027		

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-02		
Collection Date	9/30/2010		9/8/2010		9/8/2010		
Lab Code	EG- 5450		EG- 5451		EG- 5452		Req. LLD
			Corn		Soybeans		
Ratio (wet/dry)	3.64		-		-		-
Gross Beta	6.62 ± 0.18	< 0.072	ND[a]		ND[a]		0.25
H-3[b]			99.3 ± 81.8	< 159	97.7 ± 106.0	< 168	
Be-7	3.35 ± 0.25	-	1.09 ± 0.06	-	1.18 ± 0.07	-	-
K-40	3.30 ± 0.34	-	2.21 ± 0.09	-	4.03 ± 0.13	-	-
I-131	0.000 ± 0.006	< 0.017	-0.012 ± 0.002	< 0.035	-0.012 ± 0.002	< 0.031	0.060
Cs-134	0.000 ± 0.006	< 0.010	0.001 ± 0.002	< 0.003	-0.004 ± 0.002	< 0.004	0.060
Cs-137	-0.001 ± 0.007	< 0.009	0.000 ± 0.002	< 0.004	0.000 ± 0.003	< 0.004	0.080
Other (Co-60)	-0.003 ± 0.006	< 0.010	0.002 ± 0.002	< 0.005	0.000 ± 0.003	< 0.005	0.060
Location	E-03		E-04		E-06		
Collection Date	9/30/2010		9/30/2010		9/30/2010		
Lab Code	EG- 5453		EG- 5454		EG- 5455		Req. LLD
Ratio (wet/dry)	4.37		4.41		3.87		-
Gross Beta	6.96 ± 0.17	< 0.064	8.21 ± 0.20	< 0.073	4.56 ± 0.13	< 0.050	0.25
Be-7	2.20 ± 0.20	-	1.29 ± 0.18	-	0.93 ± 0.16	-	-
K-40	4.91 ± 0.39	-	4.79 ± 0.36	-	2.84 ± 0.32	-	-
I-131	-0.001 ± 0.007	< 0.029	0.012 ± 0.006	< 0.016	-0.009 ± 0.007	< 0.017	0.060
Cs-134	-0.002 ± 0.008	< 0.016	0.001 ± 0.007	< 0.012	0.002 ± 0.007	< 0.012	0.060
Cs-137	0.014 ± 0.008	< 0.014	-0.004 ± 0.007	< 0.011	0.061 ± 0.021	< 0.018	0.080
Other (Co-60)	0.001 ± 0.009	< 0.018	-0.004 ± 0.008	< 0.008	0.005 ± 0.007	< 0.014	0.060
Location	E-08		E-09		E-20		
Collection Date	9/30/2010		9/30/2010		9/8/2010		
Lab Code	EG- 5456		EG- 5457		EG- 5458		Req. LLD
					Corn		
Ratio (wet/dry)	3.65		3.16		-		-
Gross Beta	8.88 ± 0.21	< 0.073	6.45 ± 0.19	< 0.078	ND[a]	< 0.078	0.25
H-3					-51.1 ± 99.6	< 168	
Be-7	2.06 ± 0.27	-	3.50 ± 0.25	-	0.72 ± 0.06	-	-
K-40	6.77 ± 0.55	-	4.51 ± 0.37	-	2.62 ± 0.10	-	-
I-131	0.005 ± 0.009	< 0.026	0.002 ± 0.007	< 0.019	-0.005 ± 0.002	< 0.036	0.060
Cs-134	-0.011 ± 0.010	< 0.013	-0.007 ± 0.007	< 0.011	-0.004 ± 0.002	< 0.003	0.060
Cs-137	-0.001 ± 0.010	< 0.013	-0.004 ± 0.007	< 0.010	0.001 ± 0.002	< 0.004	0.080
Other (Co-60)	-0.011 ± 0.011	< 0.016	0.003 ± 0.006	< 0.008	0.000 ± 0.002	< 0.004	0.060
Location	E-20						
Collection Date	9/8/2010						
Lab Code	EG- 5459						Req. LLD
	Soybeans						
Ratio (wet/dry)	-						-
Gross Beta	ND[a]						0.25
H-3	139.0 ± 83.9	< 159					
Be-7	1.55 ± 0.12	-					-
K-40	3.88 ± 0.17	-					-
I-131	-0.013 ± 0.003	< 0.048					0.060
Cs-134	-0.001 ± 0.003	< 0.005					0.060
Cs-137	0.001 ± 0.003	< 0.006					0.080
Other (Co-60)	0.000 ± 0.003	< 0.006					0.060

[a] "ND" = No data; gross beta analysis not required. [b] *Tritium units = pCi/L*

Gross Beta Annual Mean + s.d 6.83 ± 1.21
Be-7 Annual Mean + s.d. 2.32 ± 1.84
K-40 Annual Mean + s.d. 5.04 ± 1.46
I-131 Annual Mean + s.d. -0.002 ± 0.009
Cs-134 Annual Mean + s.d. -0.001 ± 0.005
Cs-137 Annual Mean + s.d. 0.004 ± 0.012
Co-60 Annual Mean + s.d. 0.002 ± 0.006

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

Collection: Triannual
Units: pCi/g wet

Sample Description and Concentration

Collection Date	06-09-10	MDC	06-09-10	MDC	Req.		
Lab Code	ESL- 2970		ESL- 2971		LLD		
Location	E-05		E-12				
Ratio (wet wt./dry wt.)	5.10		2.48				
Gross Beta	4.67 ± 0.15	< 0.12	6.48 ± 0.33	< 0.33	0.25		
Be-7	1.60 ± 0.22	< 0.15	1.15 ± 0.26	< 0.20	-		
K-40	2.03 ± 0.28	-	5.05 ± 0.58	-	-		
Co-58	0.011 ± 0.008	< 0.016	0.010 ± 0.011	< 0.022	0.25		
Co-60	-0.003 ± 0.009	< 0.008	-0.002 ± 0.013	< 0.019	0.25		
Cs-134	0.000 ± 0.008	< 0.012	-0.004 ± 0.009	< 0.018	0.25		
Cs-137	0.018 ± 0.010	< 0.019	0.011 ± 0.013	< 0.024	0.25		
Collection Date	08-04-10		08-04-10		Req.		
Lab Code	ESL- 4243		ESL- 4244		LLD		
Location	E-05		E-12				
Ratio (wet wt./dry wt.)	8.09		6.48				
Gross Beta	2.45 ± 0.13	< 0.10	2.63 ± 0.17	< 0.16	0.25		
Be-7	0.97 ± 0.28	< 0.14	1.37 ± 0.23	< 0.88	-		
K-40	2.01 ± 0.33	-	2.54 ± 0.31	-	-		
Co-58	0.003 ± 0.007	< 0.012	0.000 ± 0.007	< 0.013	0.25		
Co-60	-0.002 ± 0.009	< 0.014	0.005 ± 0.009	< 0.013	0.25		
Cs-134	-0.001 ± 0.008	< 0.014	0.003 ± 0.006	< 0.008	0.25		
Cs-137	0.002 ± 0.009	< 0.011	0.023 ± 0.010	< 0.009	0.25		
Collection Date	10-06-10		10-06-10		Req.		
Lab Code	ESL- 5631		ESL- 5632		LLD	**Annual**	
Location	E-05		E-12			**Mean**	**s.d.**
Ratio (wet wt./dry wt.)	7.30		5.19				
Gross Beta	1.85 ± 0.14	< 0.14	3.13 ± 0.25	< 0.25	0.25	**3.54 ± 1.73**	
Be-7	0.69 ± 0.20	< 0.12	0.97 ± 0.22	< 0.12	-	**1.12 ± 0.32**	
K-40	1.69 ± 0.31	-	2.37 ± 0.37	-	-	**2.62 ± 1.23**	
Co-58	-0.011 ± 0.007	< 0.015	-0.005 ± 0.010	< 0.019	0.25	**0.001 ± 0.009**	
Co-60	-0.004 ± 0.009	< 0.013	0.007 ± 0.011	< 0.015	0.25	**0.000 ± 0.005**	
Cs-134	0.005 ± 0.007	< 0.012	-0.004 ± 0.009	< 0.014	0.25	**0.000 ± 0.004**	
Cs-137	0.025 ± 0.014	< 0.016	0.018 ± 0.011	< 0.020	0.25	**0.016 ± 0.008**	

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

1st. Quarter, 2010

	Date Annealed:	12-01-09	Days in the field	85
	Date Placed:	01-06-10	Days from Annealing	
	Date Removed:	04-01-10	to Readout:	127
	Date Read:	04-07-10		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	85	15.2 ± 0.7	10.5 ± 0.9	0.86 ± 0.08
E-2	85	19.8 ± 0.7	15.1 ± 0.9	1.24 ± 0.08
E-3	85	21.8 ± 1.7	17.1 ± 1.8	1.41 ± 0.15
E-4	85	19.0 ± 1.3	14.3 ± 1.4	1.18 ± 0.12
E-5	85	18.9 ± 1.1	14.2 ± 1.3	1.17 ± 0.10
E-6	85	18.8 ± 0.8	14.1 ± 1.0	1.16 ± 0.08
E-7	85	19.7 ± 0.9	15.0 ± 1.1	1.24 ± 0.09
E-8	85	18.7 ± 1.5	14.0 ± 1.6	1.15 ± 0.13
E-9	85	20.7 ± 0.4	16.0 ± 0.7	1.32 ± 0.06
E-12	85	16.3 ± 0.4	11.6 ± 0.7	0.96 ± 0.06
E-14	85	19.7 ± 0.4	15.0 ± 0.7	1.24 ± 0.06
E-15	85	18.5 ± 0.7	13.8 ± 0.9	1.14 ± 0.08
E-16	85	18.1 ± 0.4	13.4 ± 0.7	1.10 ± 0.06
E-17	85	19.0 ± 0.6	14.3 ± 0.8	1.18 ± 0.07
E-18	85	18.1 ± 0.8	13.4 ± 1.0	1.10 ± 0.08
E-22	85	18.7 ± 1.1	14.0 ± 1.3	1.15 ± 0.10
E-23	85	18.1 ± 0.5	13.4 ± 0.8	1.10 ± 0.06
E-24	85	19.8 ± 0.9	15.1 ± 1.1	1.24 ± 0.09
E-25	85	18.7 ± 0.4	14.0 ± 0.7	1.15 ± 0.06
E-26	85	17.7 ± 0.4	13.0 ± 0.7	1.07 ± 0.06
E-27	85	20.0 ± 0.4	15.3 ± 0.7	1.26 ± 0.06
E-28	85	15.9 ± 0.3	11.2 ± 0.7	0.92 ± 0.06
E-29	85	16.6 ± 0.9	11.9 ± 1.1	0.98 ± 0.09
E-30	85	18.1 ± 0.9	13.4 ± 1.1	1.10 ± 0.09
E-31	85	18.7 ± 0.7	14.0 ± 0.9	1.15 ± 0.08
E-32	85	18.5 ± 0.6	13.8 ± 0.8	1.14 ± 0.07
E-38	85	19.3 ± 1.0	14.6 ± 1.2	1.20 ± 0.10
E-39	85	16.1 ± 0.6	11.4 ± 0.8	0.94 ± 0.07
E-41	85	15.3 ± 0.3	10.6 ± 0.7	0.87 ± 0.06
E-42	85	16.9 ± 0.4	12.2 ± 0.7	1.00 ± 0.06
E-43	85	16.4 ± 0.4	11.7 ± 0.7	0.96 ± 0.06
Control				
E-20	85	19.2 ± 1.4	14.5 ± 1.5	1.19 ± 0.13
Mean±s.d.		18.3 ± 1.6	13.6 ± 1.6	1.12 ± 0.12

In-Transit Exposure

Date Annealed	12-01-09	03-08-10
Date Read	01-13-10	04-07-10
	Total mR	
ITC-1	6.5 ± 0.5	3.0 ± 0.1
ITC-2	6.2 ± 0.3	3.1 ± 0.1

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Table 12. Ambient Gamma Radiation

2nd Quarter, 2010

	Date Annealed:	03-08-10	Days in the field	97
	Date Placed:	04-01-10	Days from Annealing	
	Date Removed:	07-07-10	to Readout:	126
	Date Read:	07-12-10		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	97	15.3 ± 0.9	11.4 ± 1.0	0.82 ± 0.07
E-2	97	20.9 ± 0.8	17.0 ± 0.9	1.23 ± 0.07
E-3	97	22.8 ± 1.3	18.9 ± 1.4	1.36 ± 0.10
E-4	97	18.0 ± 0.4	14.1 ± 0.6	1.02 ± 0.04
E-5	97	19.9 ± 0.6	16.0 ± 0.7	1.15 ± 0.05
E-6	97	17.9 ± 0.5	14.0 ± 0.7	1.01 ± 0.05
E-7	97	17.6 ± 0.5	13.7 ± 0.7	0.99 ± 0.05
E-8	97	18.1 ± 0.8	14.2 ± 0.9	1.02 ± 0.07
E-9	97	20.4 ± 0.9	16.5 ± 1.0	1.19 ± 0.07
E-12	97	14.7 ± 1.2	10.8 ± 1.3	0.78 ± 0.09
E-14	97	18.0 ± 0.5	14.1 ± 0.7	1.02 ± 0.05
E-15	97	21.9 ± 1.0	18.0 ± 1.1	1.30 ± 0.08
E-16	97	18.0 ± 0.3	14.1 ± 0.5	1.02 ± 0.04
E-17	97	18.4 ± 1.0	14.5 ± 1.1	1.05 ± 0.08
E-18	97	20.7 ± 1.2	16.8 ± 1.3	1.21 ± 0.09
E-22	97	19.5 ± 0.5	15.6 ± 0.7	1.13 ± 0.05
E-23	97	20.5 ± 0.8	16.6 ± 0.9	1.20 ± 0.07
E-24	97	18.9 ± 0.2	15.0 ± 0.5	1.08 ± 0.03
E-25	97	20.7 ± 0.2	16.8 ± 0.5	1.21 ± 0.03
E-26	97	16.8 ± 0.8	12.9 ± 0.9	0.93 ± 0.07
E-27	97	21.9 ± 1.0	18.0 ± 1.1	1.30 ± 0.08
E-28	97	14.3 ± 0.2	10.4 ± 0.5	0.75 ± 0.03
E-29	97	15.1 ± 0.5	11.2 ± 0.7	0.81 ± 0.05
E-30	97	17.7 ± 0.6	13.8 ± 0.7	1.00 ± 0.05
E-31	97	20.6 ± 0.2	16.7 ± 0.5	1.21 ± 0.03
E-32	97	20.7 ± 0.3	16.8 ± 0.5	1.21 ± 0.04
E-38	97	17.6 ± 0.6	13.7 ± 0.7	0.99 ± 0.05
E-39	97	16.4 ± 0.7	12.5 ± 0.8	0.90 ± 0.06
E-41	97	18.1 ± 0.5	14.2 ± 0.7	1.02 ± 0.05
E-42	97	20.0 ± 0.2	16.1 ± 0.5	1.16 ± 0.03
E-43	97	18.1 ± 0.4	14.2 ± 0.6	1.02 ± 0.04
Control				
E-20	97	17.8 ± 0.7	13.9 ± 0.8	1.00 ± 0.06
Mean±s.d.		18.7 ± 2.2	14.8 ± 2.2	1.07 ± 0.15

In-Transit Exposure

Date Annealed	03-08-10	06-09-10
Date Read	04-07-10	07-12-10
	Total mR	
ITC-1	3.0 ± 0.1	4.9 ± 0.4
ITC-2	3.1 ± 0.1	4.6 ± 0.1

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Table 12. Ambient Gamma Radiation

3rd Quarter, 2010

Date Annealed:	06-09-10	Days in the field	90
Date Placed:	07-08-10	Days from Annealing	
Date Removed:	10-06-10	to Readout:	125
Date Read:	10-12-10		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	90	14.2 ± 0.8	9.8 ± 0.9	0.76 ± 0.07
E-2	90	18.9 ± 0.3	14.5 ± 0.6	1.13 ± 0.04
E-3	90	22.9 ± 1.6	18.5 ± 1.7	1.44 ± 0.13
E-4	90	18.5 ± 1.3	14.1 ± 1.4	1.09 ± 0.11
E-5	90	19.0 ± 1.1	14.6 ± 1.2	1.13 ± 0.09
E-6	90	18.2 ± 1.0	13.8 ± 1.1	1.07 ± 0.09
E-7	90	18.6 ± 1.0	14.2 ± 1.1	1.10 ± 0.09
E-8	90	17.6 ± 0.6	13.2 ± 0.8	1.02 ± 0.06
E-9	90	20.3 ± 0.7	15.9 ± 0.8	1.23 ± 0.07
E-12	90	15.2 ± 0.3	10.8 ± 0.6	0.84 ± 0.04
E-14	90	19.1 ± 0.5	14.7 ± 0.7	1.14 ± 0.05
E-15	90	19.9 ± 0.7	15.5 ± 0.8	1.20 ± 0.07
E-16	90	18.3 ± 0.4	13.9 ± 0.6	1.08 ± 0.05
E-17	90	19.1 ± 0.6	14.7 ± 0.8	1.14 ± 0.06
E-18	90	19.9 ± 1.1	15.5 ± 1.2	1.20 ± 0.09
E-22	90	19.9 ± 1.2	15.5 ± 1.3	1.20 ± 0.10
E-23	90	19.5 ± 0.3	15.1 ± 0.6	1.17 ± 0.04
E-24	90	19.3 ± 0.6	14.9 ± 0.8	1.16 ± 0.06
E-25	90	18.8 ± 0.2	14.4 ± 0.5	1.12 ± 0.04
E-26	90	17.3 ± 0.5	12.9 ± 0.7	1.00 ± 0.05
E-27	90	21.3 ± 0.4	16.9 ± 0.6	1.31 ± 0.05
E-28	90	14.6 ± 0.4	10.2 ± 0.6	0.79 ± 0.05
E-29	90	15.4 ± 0.8	11.0 ± 0.9	0.85 ± 0.07
E-30	90	17.7 ± 1.2	13.3 ± 1.3	1.03 ± 0.10
E-31	90	19.6 ± 0.8	15.2 ± 0.9	1.18 ± 0.07
E-32	90	21.6 ± 0.8	17.2 ± 0.9	1.34 ± 0.07
E-38	90	18.6 ± 1.3	14.2 ± 1.4	1.10 ± 0.11
E-39	90	16.3 ± 0.5	11.9 ± 0.7	0.92 ± 0.05
E-41	90	16.7 ± 0.6	12.3 ± 0.8	0.95 ± 0.06
E-42	90	17.7 ± 0.6	13.3 ± 0.8	1.03 ± 0.06
E-43	90	17.7 ± 0.4	13.3 ± 0.6	1.03 ± 0.05
Control				
E-20	90	18.5 ± 0.9	14.1 ± 1.0	1.09 ± 0.08
Mean±s.d.		18.4 ± 1.9	14.0 ± 1.9	1.09 ± 0.14

	In-Transit Exposure	
Date Annealed	06-09-10	09-09-10
Date Read	07-12-10	10-12-10
	Total mR	
ITC-1	4.9 ± 0.4	4.1 ± 0.2
ITC-2	4.6 ± 0.1	4.1 ± 0.1

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Table 12. Ambient Gamma Radiation

4th Quarter, 2010

	Date Annealed:	09-09-10	Days in the field	89
	Date Placed:	10-08-10	Days from Annealing	
	Date Removed:	01-05-11	to Readout:	124
	Date Read:	01-11-11		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	89	15.4 ± 0.8	11.5 ± 0.9	0.90 ± 0.07
E-2	89	20.9 ± 1.0	17.0 ± 1.1	1.34 ± 0.08
E-3	89	22.1 ± 1.6	18.2 ± 1.6	1.43 ± 0.13
E-4	89	18.3 ± 0.2	14.4 ± 0.4	1.13 ± 0.03
E-5	89	19.8 ± 0.4	15.9 ± 0.5	1.25 ± 0.04
E-6	89	18.1 ± 1.2	14.2 ± 1.3	1.11 ± 0.10
E-7	89	17.5 ± 0.3	13.6 ± 0.5	1.07 ± 0.04
E-8	89	18.3 ± 0.8	14.4 ± 0.9	1.13 ± 0.07
E-9	89	20.5 ± 1.0	16.6 ± 1.1	1.30 ± 0.08
E-12	89	15.2 ± 1.1	11.3 ± 1.2	0.89 ± 0.09
E-14	89	18.4 ± 0.5	14.5 ± 0.6	1.14 ± 0.05
E-15	89	21.4 ± 0.7	17.5 ± 0.8	1.37 ± 0.06
E-16	89	18.2 ± 0.3	14.3 ± 0.5	1.12 ± 0.04
E-17	89	18.4 ± 1.1	14.5 ± 1.2	1.14 ± 0.09
E-18	89	19.4 ± 0.4	15.5 ± 0.5	1.22 ± 0.04
E-22	89	18.6 ± 0.5	14.7 ± 0.6	1.15 ± 0.05
E-23	89	20.6 ± 0.7	16.7 ± 0.8	1.31 ± 0.06
E-24	89	18.9 ± 0.3	15.0 ± 0.5	1.18 ± 0.04
E-25	89	20.3 ± 0.2	16.4 ± 0.4	1.29 ± 0.03
E-26	89	17.4 ± 0.6	13.5 ± 0.7	1.06 ± 0.06
E-27	89	21.5 ± 0.6	17.6 ± 0.7	1.38 ± 0.06
E-28	89	15.4 ± 0.3	11.5 ± 0.5	0.90 ± 0.04
E-29	89	15.8 ± 0.5	11.9 ± 0.6	0.93 ± 0.05
E-30	89	18.3 ± 1.0	14.4 ± 1.1	1.13 ± 0.08
E-31	89	20.2 ± 1.7	16.3 ± 1.7	1.28 ± 0.14
E-32	89	20.1 ± 0.1	16.2 ± 0.4	1.27 ± 0.03
E-38	89	17.6 ± 0.4	13.7 ± 0.5	1.08 ± 0.04
E-39	89	17.0 ± 0.4	13.1 ± 0.5	1.03 ± 0.04
E-41	89	18.0 ± 0.5	14.1 ± 0.6	1.11 ± 0.05
E-42	89	19.1 ± 0.4	15.2 ± 0.5	1.19 ± 0.04
E-43	89	16.9 ± 0.6	13.0 ± 0.7	1.02 ± 0.06
Control				
E-20	89	18.1 ± 0.8	14.2 ± 0.9	1.11 ± 0.07
Mean±s.d.		18.6 ± 1.8	14.7 ± 1.8	1.16 ± 0.14

In-Transit Exposure

Date Annealed	09-09-10	12-13-10
Date Read	10-12-10	01-11-11
	Total mR	
ITC-1	4.1 ± 0.2	3.8 ± 0.2
ITC-2	4.1 ± 0.1	3.7 ± 0.2

Annual Indicator Mean±s.d.	**18.5 ± 1.9**	**14.3 ± 1.9**	**1.11 0.15**
Annual Control Mean±s.d.	**18.4 ± 0.6**	**14.2 ± 0.3**	**1.10 0.08**
Annual Indicator/Control Mean±s.d.	**18.5 ± 1.9**	**14.3 ± 1.9**	**1.11 0.15**

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

Intermittent Streams

Sample ID	GW-01				GW-02		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-27-10		NS[a]		01-27-10		NS[a]	
02-26-10		NS[a]		02-26-10		NS[a]	
03-24-10	EWW-1215	88 ± 78	< 148	03-24-10	EWW-1216	202 ± 84	< 148
04-28-10	EWW-2101	76 ± 78	< 149	04-28-10	EWW-2103	61 ± 77	< 149
05-26-10	EWW-2711	137 ± 83	< 144	05-26-10	EWW-2712	228 ± 83	< 143
06-30-10	EWW-3392	47 ± 84	< 164	06-30-10	EWW-3393	95 ± 86	< 164
07-29-10	EWW-4251	49 ± 86	< 159	07-29-10	EWW-4252	85 ± 88	< 159
08-25-10	EWW-4727	86 ± 88	< 160	08-25-10	EWW-4728	45 ± 86	< 160
09-29-10	EWW-5427	25 ± 86	< 160	09-29-10	EWW-5428	173 ± 93	< 160
10-27-10	EWW-6320	110 ± 87	< 154	10-27-10	EWW-6321	40 ± 83	< 154
12-01-10	EWW-7063	74 ± 73	< 139	12-01-10	EWW-7064	110 ± 75	< 139
Mean + s.d.		77 ± 34		Mean + s.d.		115 ± 69	

Sample ID	GW-03				GW-17		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-27-10		NS[a]		01-27-10	EWW-289	135 ± 83	< 154
02-26-10		NS[a]		02-26-10		NS[a]	
03-24-10	EWW-1217	31 ± 75	< 148	03-24-10	EWW-1219	179 ± 83	< 148
04-28-10	EWW-2104	78 ± 78	< 149	04-28-10	EWW-2106	190 ± 84	< 149
05-26-10	EWW-2713	201 ± 82	< 143	05-26-10	EWW-2717	238 ± 84	< 143
06-30-10	EWW-3395	51 ± 84	< 164	06-30-10	EWW-3397	272 ± 95	< 164
07-29-10	EWW-4253	30 ± 85	< 159	07-29-10	EWW-4255	85 ± 88	< 159
08-25-10	EWW-4729	32 ± 86	< 160	08-25-10	EWW-4731	110 ± 89	< 160
09-29-10	EWW-5429	-3 ± 84	< 160	09-29-10	EWW-5431	167 ± 93	< 160
10-27-10	EWW-6322	51 ± 84	< 154	10-27-10	EWW-6324	108 ± 87	< 154
12-01-10	EWW-7065	27 ± 70	< 139	12-01-10	EWW-7067	108 ± 75	< 139
				12-28-10	EWW-7411	151 ± 79	< 144
Mean + s.d.		55 ± 59		Mean + s.d.		159 ± 58	

Wells

Sample ID	GW-04 (EIC Well)				GW-11 (MW-1)		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-28-10		NS[a]		01-22-10	EWW-1167	59 ± 96	< 153
02-26-10	EWW-711	-8 ± 72	< 146	02-26-10	EWW-712	55 ± 75	< 146
03-24-10	EWW-1218	2 ± 73	< 148	03-18-10	EWW-1171	92 ± 96	< 152
04-28-10	EWW-2105	-25 ± 72	< 149	04-23-10	EWW-2265	60 ± 80	< 147
05-26-10	EWW-2714	82 ± 75	< 143	05-26-10	EWW-2721	149 ± 79	< 143
06-30-10	EWW-3396	-61 ± 78	< 164	06-25-10	EWW-3458	82 ± 88	< 160
07-29-10	EWW-4254	28 ± 85	< 159	07-29-10	EWW-4245	11 ± 84	< 159
08-25-10	EWW-4730	37 ± 86	< 160	08-19-10	EWW-4855	105 ± 82	< 154
09-29-10	EWW-5430	8 ± 85	< 160	09-24-10	EWW-5624	101 ± 82	< 159
10-28-10	EWW-6323	20 ± 82	< 154	10-19-10	EWW-6325	181 ± 90	< 154
12-01-10	EWW-7066	68 ± 73	< 139	11-22-10	EWW-6919	131 ± 82	< 144
12-28-10	EWW-7410	-5 ± 71	< 144	12-20-10	EWW-7355	46 ± 82	< 161
Mean + s.d.		13 ± 41		Mean + s.d.		89 ± 48	

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

POINT BEACH NUCLEAR PLANT

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

Wells (cont.)

Sample ID	GW-12 (MW-2)			GW-13 (MW-6)			
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-22-10	EWW- 1168	-27 ± 92	< 153	01-22-10	EWW- 1169	57 ± 96	< 153
02-26-10	EWW- 713	2 ± 73	< 146	02-26-10	EWW- 714	43 ± 75	< 146
03-18-10	EWW- 1172	15 ± 93	< 152	03-18-10	EWW- 1174	27 ± 93	< 152
04-23-10	EWW- 2266	-9 ± 77	< 147	04-23-10	EWW- 2267	98 ± 82	< 147
05-26-10	EWW- 2722	68 ± 75	< 143	05-26-10	EWW- 2723	212 ± 82	< 143
06-25-10	EWW- 3459	34 ± 86	< 160	06-25-10	EWW- 3460	80 ± 88	< 160
07-29-10	EWW- 4246	-8 ± 83	< 159	07-29-10	EWW- 4247	57 ± 86	< 159
08-19-10	EWW- 4856	-4 ± 76	< 154	08-19-10	EWW- 4857	41 ± 79	< 154
09-24-10	EWW- 5625	31 ± 78	< 159	09-24-10	EWW- 5627	103 ± 82	< 159
10-19-10	EWW- 6326	18 ± 82	< 154	10-19-10	EWW- 6327	108 ± 87	< 154
11-22-10	EWW- 6920	-69 ± 72	< 144	11-22-10	EWW- 6921	81 ± 80	< 144
12-20-10	EWW- 7356	-88 ± 75	< 161	12-20-10	EWW- 7357	88 ± 84	< 161
Mean + s.d.		-3 ± 43		Mean + s.d.		83 ± 48	

Sample ID	GW-14 (MW-5)			GW-15 (MW-4)			
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-22-10	EWW- 1170	19 ± 94	< 153	01-28-10	EWW- 424	422 ± 96	< 152
02-26-10	EWW- 715	141 ± 80	< 146	02-26-10	EWW- 716	386 ± 92	< 146
03-18-10	EWW- 1175	17 ± 93	< 152	03-18-10	EWW- 1176	374 ± 108	< 152
04-23-10	EWW- 2268	142 ± 85	< 147	04-23-10	EWW- 2269	359 ± 95	< 147
05-26-10	EWW- 2724	133 ± 78	< 143	05-26-10	EWW- 2725	486 ± 95	< 143
06-25-10	EWW- 3461	126 ± 90	< 160	06-25-10	EWW- 3462	379 ± 102	< 160
07-29-10	EWW- 4248	98 ± 88	< 159	07-29-10	EWW- 4249	363 ± 100	< 159
08-19-10	EWW- 4858	90 ± 81	< 154	08-19-10	EWW- 4859	393 ± 96	< 154
09-24-10	EWW- 5628	112 ± 82	< 159	09-24-10	EWW- 5629	464 ± 99	< 159
10-19-10	EWW- 6328	198 ± 91	< 154	10-19-10	EWW- 6329	441 ± 102	< 154
11-22-10	EWW- 6922	123 ± 82	< 144	11-22-10	EWW- 6924	337 ± 92	< 144
12-20-10	EWW- 7358	95 ± 84	< 161	12-20-10	EWW- 7359	378 ± 97	< 161
Mean + s.d.		108 ± 51		Mean + s.d.		398 ± 45	

Sample ID	GW-16 (MW-3)		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-28-10		NS[a]	
02-26-10		NS[a]	
03-18-10		NS[a]	
04-23-10	EWW- 2270	298 ± 92	< 147
05-26-10	EWW- 2726	301 ± 87	< 143
06-25-10	EWW- 3463	237 ± 96	< 160
07-29-10	EWW- 4250	212 ± 94	< 159
08-19-10	EWW- 4860	235 ± 89	< 154
09-24-10	EWW- 5630	319 ± 93	< 159
10-19-10	EWW- 6330	260 ± 94	< 154
11-22-10	EWW- 6925	240 ± 88	< 144
12-20-10	EWW- 7360	207 ± 89	< 161
Mean + s.d.		257 ± 41	

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

POINT BEACH NUCLEAR PLANT

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

Beach Drains

Sample ID S-1

Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-07-10	EW- 75	111 ± 102	< 161	06-25-10	EW- 3307	361 ± 99	< 154
02-18-10	EW- 609	1402 ± 132	< 146	06-28-10	EW- 3505	272 ± 96	< 166
03-01-10	EW- 901	354 ± 105	< 149	06-30-10	EW- 3506	229 ± 94	< 166
03-04-10 8:02	EW- 888	395 ± 94	< 151	07-02-10	EW- 3507	245 ± 94	< 166
03-04-10 7:05	EW- 902	324 ± 104	< 149	07-06-10	EW- 3511	1289 ± 135	< 166
03-06-10	EW- 903	513 ± 111	< 149	07-06-10	EW- 3575	1319 ± 147	< 164
03-08-10	EW- 1098	429 ± 97	< 145	07-09-10	EW- 3576	346 ± 114	< 164
03-10-10	EW- 1099	652 ± 106	< 145	07-12-10	EW- 3829	161 ± 68	< 104
03-17-10	EW- 1282	536 ± 111	< 146	07-13-10	EW- 3830	266 ± 71	< 104
03-22-10	EW- 1283	464 ± 108	< 145	07-16-10	EW- 3831	163 ± 89	< 156
03-24-10	EW- 1426	485 ± 105	< 167	07-19-10	EW- 3944	221 ± 93	< 157
03-26-10	EW- 1284	455 ± 107	< 145	07-21-10	EW- 3945	191 ± 92	< 157
03-29-10	EW- 1427	522 ± 107	< 167	07-23-10	EW- 3946	262 ± 103	< 178
03-31-10	EW- 1428	488 ± 105	< 167	07-28-10	EW- 4256	181 ± 95	< 164
04-02-10	EW- 1429	470 ± 105	< 167	07-30-10	EW- 4257	234 ± 97	< 164
04-05-10	EW- 1551	494 ± 105	< 165	08-02-10	EW- 4364	257 ± 108	< 188
04-07-10	EW- 1522	259 ± 99	< 144	08-04-10	EW- 4365	351 ± 111	< 188
04-07-10	EW- 1552	387 ± 102	< 165	08-04-10	EW- 4260	301 ± 98	< 159
04-09-10	EW- 1553	579 ± 108	< 165	08-06-10	EW- 4366	255 ± 108	< 188
04-12-10	EW- 1644	313 ± 100	< 178	08-09-10	EW- 4496	50 ± 86	< 158
04-14-10	EW- 1645	312 ± 100	< 178	08-11-10	EW- 4497	43 ± 85	< 158
04-16-10	EW- 1647	365 ± 102	< 178	08-13-10	EW- 4498	275 ± 96	< 158
04-19-10	EW- 1967	365 ± 104	< 171	09-10-10	EW- 5070	189 ± 101	< 153
04-21-10	EW- 1968	332 ± 102	< 171	10-07-10	EW- 5653	366 ± 114	< 166
04-23-10	EW- 1969	390 ± 104	< 171	11-01-10	EW- 6717	250 ± 98	< 165
04-26-10	EW- 2118	320 ± 106	< 151	12-09-10	EW- 7300	239 ± 82	< 141
04-29-10	EW- 2119	374 ± 108	< 151				
04-30-10	EW- 2120	322 ± 106	< 151				
05-03-10	EW- 2271	371 ± 95	< 147				
05-05-10	EW- 2242	170 ± 90	< 156				
05-05-10	EW- 2272	209 ± 88	< 147				
05-07-10	EW- 2273	289 ± 91	< 147				
05-10-10	EW- 2402	238 ± 83	< 142				
05-12-10	EW- 2403	247 ± 83	< 142				
05-14-10	EW- 2404	655 ± 101	< 142				
05-17-10	EW- 2543	443 ± 105	< 142				
05-19-10	EW- 2544	359 ± 102	< 142				
05-21-10	EW- 2545	388 ± 103	< 142				
05-24-10	EW- 2876	478 ± 99	< 145				
05-26-10	EW- 2877	405 ± 96	< 145				
05-28-10	EW- 2878	388 ± 95	< 145				
06-01-10	EW- 2879	336 ± 93	< 145				
06-02-10	EW- 3018	1216 ± 130	< 160				
06-04-10	EW- 3020	819 ± 116	< 160				
06-07-10	EW- 3021	265 ± 93	< 160				
06-09-10	EW- 3022	250 ± 92	< 160				
06-10-10	EW- 2978	304 ± 93	< 149				
06-11-10	EW- 3023	154 ± 87	< 160				
06-15-10	EW- 3129	154 ± 104	< 160				
06-16-10	EW- 3130	243 ± 108	< 160				
06-18-10	EW- 3131	416 ± 115	< 160				
06-21-10	EW- 3305	287 ± 95	< 154				
06-23-10	EW- 3306	201 ± 91	< 154				
				Mean + s.d.		380 ± 254	

POINT BEACH NUCLEAR PLANT

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

Beach Drains

Sample ID: S-3

Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-07-10	EW- 76	479 ± 115	< 161	06-25-10	EW- 3311	421 ± 101	< 154
02-18-10	EW- 611	1334 ± 130	< 146	06-28-10	EW- 3508	301 ± 97	< 166
03-01-10 7:28	EW- 904	362 ± 94	< 147	06-30-10	EW- 3509	314 ± 98	< 166
03-04-10	EW- 889	326 ± 91	< 151	07-02-10	EW- 3510	410 ± 102	< 166
03-01-10 7:12	EW- 906	271 ± 90	< 147	07-06-10	EW- 3512	441 ± 103	< 166
03-01-10 12:21	EW- 907	368 ± 94	< 147	07-06-10	EW- 3577	456 ± 118	< 164
03-08-10	EW- 1100	384 ± 95	< 145	07-09-10	EW- 3578	443 ± 118	< 164
03-10-10	EW- 1101	340 ± 93	< 145	07-12-10	EW- 3832	511 ± 104	< 156
03-17-10	EW- 1285	378 ± 104	< 146	07-13-10	EW- 3833	395 ± 99	< 156
03-22-10	EW- 1287	355 ± 104	< 145	07-16-10	EW- 3834	416 ± 100	< 156
03-24-10	EW- 1288	297 ± 101	< 145	07-19-10	EW- 3947	369 ± 100	< 157
03-26-10	EW- 1289	367 ± 104	< 145	07-21-10	EW- 3948	457 ± 103	< 157
03-29-10	EW- 1430	402 ± 103	< 167	07-23-10	EW- 3949	264 ± 95	< 157
03-31-10	EW- 1431	334 ± 100	< 167	07-28-10	EW- 4258	772 ± 118	< 164
04-02-10	EW- 1432	373 ± 101	< 167	07-30-10	EW- 4259	476 ± 107	< 164
04-05-10	EW- 1554	528 ± 106	< 165	08-02-10	EW- 4367	496 ± 116	< 188
04-07-10	EW- 1523	292 ± 100	< 144	08-04-10	EW- 4368	448 ± 114	< 188
04-07-10	EW- 1556	391 ± 102	< 165	08-04-10	EW- 4261	391 ± 101	< 159
04-09-10	EW- 1557	454 ± 104	< 165	08-06-10	EW- 4369	612 ± 120	< 188
04-12-10	EW- 1648	313 ± 100	< 178	08-09-10	EW- 4499	413 ± 102	< 158
04-14-10	EW- 1649	436 ± 104	< 178	08-11-10	EW- 4500	609 ± 110	< 158
04-16-10	EW- 1650	306 ± 101	< 145	08-13-10	EW- 4501	488 ± 105	< 158
04-19-10	EW- 1970	372 ± 104	< 171	09-10-10	EW- 5071	187 ± 101	< 153
04-21-10	EW- 1971	377 ± 104	< 171	10-07-10	EW- 5654	601 ± 122	< 166
04-23-10	EW- 1972	332 ± 102	< 171	11-01-10	EW- 6718	490 ± 108	< 165
04-26-10	EW- 2121	389 ± 108	< 151	12-09-10	EW- 7301	196 ± 80	< 141
04-29-10	EW- 2122	316 ± 106	< 151				
04-30-10	EW- 2123	348 ± 107	< 151				
05-03-10	EW- 2274	360 ± 95	< 147				
05-05-10	EW- 2243	743 ± 114	< 156				
05-05-10	EW- 2275	801 ± 113	< 147				
05-07-10	EW- 2276	429 ± 98	< 147				
05-10-10	EW- 2405	263 ± 84	< 142				
05-12-10	EW- 2406	363 ± 89	< 142				
05-14-10	EW- 2407	481 ± 94	< 142				
05-17-10	EW- 2546	357 ± 102	< 142				
05-19-10	EW- 2547	480 ± 107	< 142				
05-21-10	EW- 2548	537 ± 109	< 142				
05-24-10	EW- 2881	332 ± 93	< 145				
05-26-10	EW- 2882	469 ± 99	< 145				
05-28-10	EW- 2883	525 ± 101	< 145				
06-01-10	EW- 2884	504 ± 100	< 145				
06-02-10	EW- 3024	499 ± 103	< 160				
06-04-10	EW- 3025	239 ± 92	< 160				
06-07-10	EW- 3026	394 ± 99	< 160				
06-09-10	EW- 3027	452 ± 101	< 160				
06-10-10	EW- 2979	395 ± 97	< 149				
06-11-10	EW- 3028	415 ± 99	< 160				
06-15-10	EW- 3132	358 ± 113	< 160				
06-16-10	EW- 3133	278 ± 109	< 160				
06-18-10	EW- 3134	521 ± 119	< 160				
06-21-10	EW- 3308	416 ± 101	< 154				
06-23-10	EW- 3309	1139 ± 129	< 154				
				Mean + s.d.		435 ± 173	

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

Beach Drains

Sample ID	S-7				S-8		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-07-10		NS[a]		01-07-10		NS[a]	
02-18-10		NS[a]		02-18-10		NS[a]	
03-31-10		NS[a]		03-31-10		NS[a]	
04-30-10		NS[a]		04-30-10		NS[a]	
05-31-10		NS[a]		05-31-10		NS[a]	
06-30-10		NS[a]		06-30-10		NS[a]	
07-29-10		NS[a]		07-29-10		NS[a]	
08-25-10		NS[a]		08-25-10		NS[a]	
09-30-10		NS[a]		09-30-10		NS[a]	
10-27-10		NS[a]		10-27-10		NS[a]	
11-01-10		NS[a]		11-01-10		NS[a]	
12-09-10		NS[a]		12-09-10		NS[a]	
Mean + s.d.				Mean + s.d.			

Sample ID	S-9				S-10		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-07-10		NS[a]		01-07-10		NS[a]	
02-18-10	EW- 612	66 ± 80	< 146	02-18-10		NS[a]	
03-31-10		NS[a]		03-31-10		NS[a]	
04-07-10	EW- 1524	165 ± 95	< 144	04-30-10		NS[a]	
04-07-10	EW- 1558	224 ± 96	< 165	05-31-10		NS[a]	
05-05-10	EW- 2244	531 ± 106	< 156	06-30-10		NS[a]	
05-05-10	EW- 2277	577 ± 104	< 147	07-29-10		NS[a]	
06-30-10		NS[a]		08-25-10		NS[a]	
07-29-10		NS[a]		09-30-10		NS[a]	
08-25-10		NS[a]		10-27-10		NS[a]	
09-30-10		NS[a]		11-01-10		NS[a]	
10-27-10		NS[a]		12-09-10		NS[a]	
11-01-10		NS[a]					
12-09-10		NS[a]					
Mean + s.d.		312 ± 228		Mean + s.d.			

Sample ID	S-11						
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)				
01-07-10		NS[a]		04-23-10	EW- 1975	161 ± 96	< 171
02-18-10		NS[a]		04-26-10	EW- 2124	125 ± 97	< 151
03-18-10	EW- 1290	151 ± 95	< 146	05-05-10	EW- 2245	19 ± 83	< 156
04-07-10	EW- 1525	56 ± 90	< 144	05-05-10	EW- 2278	85 ± 82	< 147
04-07-10	EW- 1559	229 ± 96	< 165	06-10-10	EW- 2980	155 ± 86	< 149
04-09-10	EW- 1560	220 ± 95	< 165	07-06-10	EW- 3514	111 ± 88	< 166
04-12-10	EW- 1651	179 ± 96	< 145	07-12-10	EW- 3835	105 ± 86	< 156
04-14-10	EW- 1652	198 ± 97	< 145	08-25-10		NS[a]	
04-16-10	EW- 1653	162 ± 95	< 145	09-30-10		NS[a]	
04-19-10	EW- 1973	164 ± 96	< 171	10-27-10		NS[a]	
04-21-10	EW- 1974	155 ± 96	< 171	11-01-10		NS[a]	
				12-09-10		NS[a]	
				Mean + s.d.		142 ± 57	

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

Table 13. Groundwater Tritium Monitoring Program

Units = pCi/L

Sample ID		U2 Façade Subsurface Drain Sump					
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-01-10	EW- 274	550 ± 102	< 155	04-23-10	EW- 2324	556 ± 99	< 145
01-04-10	EW- 275	560 ± 103	< 155	04-26-10	EW- 2325	399 ± 92	< 145
01-06-10	EW- 276	853 ± 114	< 155	04-28-10	EW- 2327	1446 ± 132	< 145
01-08-10	EW- 277	497 ± 100	< 155	04-30-10	EW- 2328	370 ± 91	< 145
01-11-10	EW- 278	685 ± 108	< 155	05-03-10	EW- 2329	487 ± 96	< 145
01-13-10	EW- 908	2109 ± 152	< 148	05-05-10	EW- 2744	657 ± 103	< 143
01-15-10	EW- 909	2114 ± 152	< 148	05-07-10	EW- 2745	631 ± 102	< 143
01-18-10	EW- 910	587 ± 104	< 148	05-10-10	EW- 2746	856 ± 110	< 143
01-20-10	EW- 595	580 ± 104	< 147	05-12-10	EW- 2747	687 ± 104	< 143
01-22-10	EW- 596	1072 ± 122	< 147	05-14-10	EW- 2740	629 ± 101	< 143
01-25-10	EW- 911	696 ± 108	< 148	05-17-10	EW- 2741	1051 ± 117	< 143
01-27-10	EW- 912	637 ± 106	< 148	05-19-10	EW- 2742	818 ± 109	< 143
01-29-10	EW- 913	542 ± 99	< 148	05-21-10	EW- 2743	1080 ± 118	< 143
02-01-10	EW- 914	579 ± 101	< 148	05-24-10	EW- 4054	715 ± 114	< 157
02-03-10	EW- 915	678 ± 105	< 148	05-26-10	EW- 4055	781 ± 117	< 157
02-05-10	EW- 916	672 ± 105	< 148	05-28-10	EW- 4056	615 ± 110	< 157
02-08-10	EW- 917	649 ± 104	< 148	05-31-10	EW- 2981	604 ± 106	< 149
02-10-10	EW- 918	657 ± 104	< 148	06-02-10	EW- 2982	1001 ± 120	< 149
02-12-10	EW- 597	3288 ± 181	< 147	06-04-10	EW- 2983	1607 ± 140	< 149
02-15-10	EW- 598	2694 ± 167	< 146	06-07-10	EW- 3135	916 ± 133	< 161
02-17-10	EW- 919	2105 ± 151	< 148	06-09-10	EW- 3136	771 ± 128	< 160
02-19-10	EW- 920	1886 ± 145	< 148	06-11-10	EW- 3137	550 ± 120	< 160
02-22-10	EW- 921	1656 ± 138	< 147	06-14-10	EW- 3464	502 ± 107	< 160
02-24-10	EW- 922	1521 ± 134	< 147	06-16-10	EW- 3465	414 ± 103	< 160
02-26-10	EW- 923	1370 ± 129	< 147	06-18-10	EW- 3466	436 ± 104	< 160
02-28-10	EW- 924	1490 ± 133	< 147	06-21-10	EW- 3467	549 ± 109	< 160
03-03-10	EW- 925	716 ± 106	< 147	06-23-10	EW- 3468	514 ± 107	< 160
03-05-10	EW- 927	564 ± 100	< 147	06-25-10	EW- 3469	573 ± 110	< 160
03-08-10	EW- 1902	618 ± 114	< 145	06-28-10	EW- 4057	951 ± 122	< 157
03-10-10	EW- 1903	576 ± 113	< 145	06-30-10	EW- 4058	809 ± 117	< 157
03-12-10	EW- 1904	652 ± 116	< 145	07-05-10	EW- 4059	639 ± 111	< 156
03-15-10	EW- 1905	1083 ± 131	< 145	07-07-10	EW- 4060	1415 ± 137	< 156
03-17-10	EW- 1906	705 ± 118	< 145	07-09-10	EW- 4061	502 ± 105	< 156
03-19-10	EW- 1907	627 ± 115	< 145	07-12-10	EW- 4062	491 ± 105	< 156
03-22-10	EW- 1908	468 ± 108	< 145	07-14-10	EW- 4063	469 ± 104	< 156
03-24-10	EW- 1909	1529 ± 145	< 145	07-16-10	EW- 4065	829 ± 118	< 156
03-26-10	EW- 1911	545 ± 111	< 145	07-19-10	EW- 4066	509 ± 105	< 156
03-29-10	EW- 1912	764 ± 120	< 145	07-21-10	EW- 4067	357 ± 99	< 156
03-31-10	EW- 1913	684 ± 117	< 145	07-23-10	EW- 4068	312 ± 97	< 156
04-02-10	EW- 1914	701 ± 117	< 145	07-26-10	EW- 4361	549 ± 101	< 151
04-05-10	EW- 1915	645 ± 116	< 147	07-28-10	EW- 4362	341 ± 92	< 151
04-07-10	EW- 1916	2027 ± 158	< 147	07-30-10	EW- 4363	514 ± 100	< 151
04-09-10	EW- 1917	1242 ± 135	< 147	08-02-10	EW- 4629	342 ± 94	< 154
04-12-10	EW- 1918	552 ± 111	< 144	08-04-10	EW- 4630	485 ± 100	< 154
04-14-10	EW- 1919	1295 ± 137	< 144	08-06-10	EW- 4631	400 ± 96	< 154
04-16-10	EW- 1920	617 ± 114	< 147	08-09-10	EW- 4626	391 ± 96	< 154
04-19-10	EW- 2322	465 ± 95	< 145	08-11-10	EW- 4628	424 ± 97	< 154
04-21-10	EW- 2323	623 ± 102	< 145	08-16-10	EW- 4758	446 ± 104	< 160

Table 13. Groundwater Tritium Monitoring Program

Units = pCi/L

Sample ID **U2 Façade Subsurface Drain Sump (cont.)**

Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
08-23-10	EW- 4759	521 ± 107	< 160	11-22-10	EW- 7302	429 ± 91	< 141
08-30-10	EW- 4861	496 ± 100	< 154	11-29-10	EW- 7303	665 ± 101	< 141
09-06-10	EW- 5135	659 ± 111	< 155	12-06-10	EW- 7412	470 ± 94	< 144
09-13-10	EW- 5134	530 ± 106	< 155	12-13-10	EW- 7414	708 ± 103	< 144
09-20-10	EW- 5471	898 ± 122	< 160	12-20-10	EW- 7415	479 ± 94	< 144
09-26-10	EW- 5812	618 ± 106	< 158	12-27-10	EW- 7438	603 ± 99	< 144
10-04-10	EW- 5813	488 ± 100	< 158				
10-11-10	EW- 5814	816 ± 113	< 158				
10-18-10	EW- 6294	1681 ± 146	< 154				
10-25-10	EW- 6296	848 ± 118	< 154				
11-01-10	EW- 6716	886 ± 123	< 165				
11-08-10	EW- 6853	521 ± 106	< 163				
11-15-10	EW- 7068	520 ± 94	< 139				
Mean + s.d.		819 ± 513				806 ± 503	

POINT BEACH NUCLEAR PLANT

Table 13. Groundwater Tritium Monitoring Program

Units = pCi/L

Manholes

Sample ID	MH Z-065A			MH Z-065B			
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
03-15-10	EW- 1053	139 ± 85	< 149	03-15-10	EW- 1054	158 ± 86	< 149
Mean + s.d.				Mean + s.d.			

Sample ID	MH Z-065C			MH Z-065D			
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
03-15-10	EW- 1055	447 ± 99	< 149	03-15-10	EW- 1056	643 ± 107	< 149
Mean + s.d.				Mean + s.d.			

Sample ID	MH Z-066A			MH Z-066B			
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
03-11-10	EW- 1044	146 ± 86	< 149	03-11-10	EW- 1045	220 ± 89	< 149
04-06-10	EW- 1947	215 ± 98	< 172				
Gross beta	EW- 1947	55.8 ± 3.4	< 3.6				
11-03-10	EW- 6546	114 ± 90	< 161				
Mean + s.d.		158 ± 52		Mean + s.d.			

Sample ID	MH Z-066C			MH Z-066D			
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
03-11-10	EW- 1046	150 ± 86	< 149	03-11-10	EW- 1047	65 ± 82	< 149
04-06-10	EW- 1948	81 ± 93	< 172				
Gross beta	EW- 1948	649.9 ± 10.2	< 5.1 [a]				
Mean + s.d.		116 ± 48		Mean + s.d.			

Sample ID	MH Z-067A			MH Z-067B			
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
03-11-10	EW- 1048	156 ± 86	< 149	03-11-10	EW- 1049	201 ± 88	< 149
04-06-10	EW- 1949	218 ± 99	< 147				
11-03-10	EW- 6547	136 ± 91	< 161				
Mean + s.d.		170 ± 43		Mean + s.d.			

[a] Due to high weight of suspended solids only 50 mL. of sample analyzed; counted for 1000 minutes.

Manholes (cont.)

Sample ID	MH Z-067C				MH Z-067D		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
03-11-10	EW- 1050	96 ± 83	< 149	03-11-10	EW- 1051	71 ± 82	< 149
Mean + s.d.				Mean + s.d.			

Sample ID	MH Z-068				MH-3		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
03-11-10	EW- 1052	453 ± 99	< 149	04-04-10	EW- 1941	375 ± 105	< 147
05-04-10	EW- 2984	237 ± 90	< 150				
11-03-10	EW- 6548	111 ± 90	< 161				
Mean + s.d.		267 ± 173		Mean + s.d.			

Sample ID	MH-4				MH-6		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
04-04-10	EW- 1942	479 ± 109	< 147	04-05-10	EW- 1943	464 ± 109	< 147
Mean + s.d.				Mean + s.d.			

Sample ID	MH-7				MH-8		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
04-05-10	EW- 1944	196 ± 98	< 147	04-05-10	EW- 1945	173 ± 97	< 147
Mean + s.d.				Mean + s.d.			

Sample ID	MH-16		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
04-04-10	EW- 1946	296 ± 102	< 147
Mean + s.d.			

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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 (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-13-10	EWW- 259	-23 ± 75	< 154	01-13-10	EWW- 260	-36 ± 75	< 154
04-15-10	EWW- 1654	-40 ± 86	< 178	04-15-10	EWW- 1655	-73 ± 85	< 178
07-15-10	EWW- 3818	11 ± 55	< 105	07-15-10	EWW- 3819	2 ± 55	< 105
10-14-10	EWW- 5883	30 ± 81	< 160	10-15-10	EWW- 5884	34 ± 81	< 160
Mean + s.d.		-6 ± 32		Mean + s.d.		-18 ± 46	

Quarterly Façade Wells

Sample ID	GW-09 1Z-361A				GW-09 1Z-361B		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-27-10	EWW- 1658	393 ± 106	< 147	01-27-10	EWW- 1659	111 ± 94	< 147
02-03-10	EWW- 592	462 ± 99	< 147	02-03-10	EWW- 593	193 ± 87	< 147
03-21-10	EWW- 1662	404 ± 106	< 145	03-21-10	EWW- 1663	144 ± 95	< 145
04-11-10	EWW- 1898	359 ± 104	< 144	04-11-10	EWW- 1899	90 ± 92	< 144
05-17-10	EWW- 2736	333 ± 88	< 143	05-17-10	EWW- 2737	118 ± 78	< 143
07-08-10	EWW- 4049	356 ± 99	< 156	07-08-10	EWW- 4050	133 ± 89	< 156
09-07-10	EWW- 5803	442 ± 98	< 159	09-07-10	EWW- 5804	94 ± 81	< 159
09-16-10	EWW- 5807	318 ± 93	< 159	09-16-10	EWW- 5808	136 ± 84	< 159
11-28-10	EWW- 7304	402 ± 90	< 141	11-28-10	EWW- 7305	132 ± 77	< 141
12-19-10	EWW- 7435	274 ± 85	< 144	12-19-10	EWW- 7436	116 ± 77	< 144
Mean + s.d.		374 ± 58		Mean + s.d.		127 ± 29	

Sample ID	GW-10 2Z-361A				GW-10 2Z-361B		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-27-10	EWW- 1660	49 ± 91	< 147	01-27-10	EWW- 1661	75 ± 92	< 147
03-21-10	EWW- 1664	-6 ± 88	< 145	02-03-10	EWW- 594	129 ± 84	< 147
04-11-10	EWW- 1900	79 ± 91	< 144	03-21-10	EWW- 1665	110 ± 93	< 145
05-17-10	EWW- 2738	81 ± 75	< 143	04-11-10	EWW- 1901	99 ± 92	< 144
07-08-10	EWW- 4051	-19 ± 81	< 156	05-17-10	EWW- 2739	222 ± 83	< 143
09-07-10	EWW- 5805	-16 ± 75	< 159	07-08-10	EWW- 4052	279 ± 96	< 156
09-16-10	EWW- 5810	70 ± 80	< 159	09-07-10	EWW- 5806	307 ± 92	< 159
11-28-10	EWW- 7306	134 ± 77	< 141	09-16-10	EWW- 5811	255 ± 90	< 159
				11-28-10	EWW- 7307	172 ± 79	< 141
				12-19-10	EWW- 7437	58 ± 74	< 144
Mean + s.d.		46 ± 55		Mean + s.d.		171 ± 90	

Groundwater Tritium Monitoring Program
(Annual Collections)
Units = pCi/L

Bogs

Sample ID	GW-07 (North Bog)				GW-08 EIC Bog		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
05-26-10	EWW- 2715	295 ± 86	< 143	05-26-10	EWW- 2716	548 ± 98	< 143

POINT BEACH NUCLEAR PLANT

Table 13. Groundwater Tritium Monitoring Program

Units = pCi/L

Sample ID **U1 Façade Subsurface Drainage Manholes**

Collection Date		Lab Code	Tritium (pCi/L)	MDC (pCi/L)	
05-17-10	#1	EW- 2750	500 ± 109	< 146	
05-17-10	#2	EW- 2752	449 ± 108	< 146	
05-17-10	#3	EW- 2753	494 ± 109	< 146	
05-17-10	#4	EW- 2754	467 ± 108	< 146	
07-22-10	#4[a]	EW- 4053	324 ± 97	< 155	Sludge liquid
Mean + s.d.			447 ± 72		

Sample ID **U2 Façade Subsurface Drainage Manholes**

Collection Date		Lab Code	Tritium (pCi/L)	MDC (pCi/L)
08-30-10	#2	EW- 7416	443 ± 94	< 146
08-30-10	#4	EW- 7417	400 ± 92	< 146
08-30-10	#5a	EW- 7418	400 ± 92	< 146
08-30-10	#9	EW- 7419	239 ± 85	< 146
Mean + s.d.				

Groundwater Inleakage

Sample ID U1 Façade Pillar Q-10

Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
06-23-10	EW- 3471	224 ± 95	< 160
09-01-10	EW- 7584	78 ± 84	< 133
Mean + s.d.		151 ± 103	

[a] Resample of 05-17-10 collection (EW-2754). Previous sample confirmed as contaminated.

POINT BEACH NUCLEAR PLANT

Table 13. Groundwater Tritium Monitoring Program

Units = pCi/L

Sample ID **U1 Turbine Building Subsurface Drainage Manholes**

Collection Date		Lab Code	Tritium (pCi/L)	MDC (pCi/L)
08-30-10	TSC	EW- 4862	236 ± 89	< 154
08-30-10	AFW	EW- 4864	592 ± 104	< 154
08-30-10	TB#6	EW- 4865	1218 ± 127	< 154
08-30-10	TB#8	EW- 4866	707 ± 109	< 154
08-30-10	TB#10	EW- 4867	1179 ± 128	< 160
08-30-10	TB#11	EW- 4868	736 ± 112	< 160
08-30-10	TB#12	EW- 4869	1550 ± 140	< 160
08-30-10	TB#13	EW- 4870	573 ± 106	< 160
08-30-10	TB#14	EW- 4871	721 ± 112	< 160
Mean + s.d.			835 ± 403	

Sample ID **U2 Turbine Building Subsurface Drainage Manholes**

Collection Date		Lab Code	Tritium (pCi/L)	MDC (pCi/L)	
08-30-10	TB#1	EW- 4872	2234 ± 158	< 154	
08-30-10	TB#2	EW- 4873	952 ± 118	< 154	
08-30-10	TB#3	EW- 4874	409 ± 97	< 154	
08-30-10	TB#3	EW- 4875	342 ± 96	< 160	Prime
08-30-10	TB#4	EW- 4876	347 ± 94	< 154	
08-30-10	TB#5	EW- 4877	411 ± 97	< 154	
08-30-10	TB#7	EW- 4878	1291 ± 130	< 154	
08-31-10	TB#10	EW- 4879	1072 ± 125	< 160	
08-30-10	TB#12	EW- 4880	410 ± 99	< 160	
08-30-10	TB#13	EW- 4881	678 ± 110	< 160	
Mean + s.d.			815 ± 604		

APPENDIX B

DATA REPORTING CONVENTIONS

Data Reporting Conventions

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

2.0. Single Measurements

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

where: x = value of the measurement;

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

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

3.0. Duplicate analyses

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

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

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

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

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

4.0. Computation of Averages and Standard Deviations

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

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

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

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

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

4.5 In rounding off, the following rules are followed:

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

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

APPENDIX C

Sampling Program and Locations

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

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

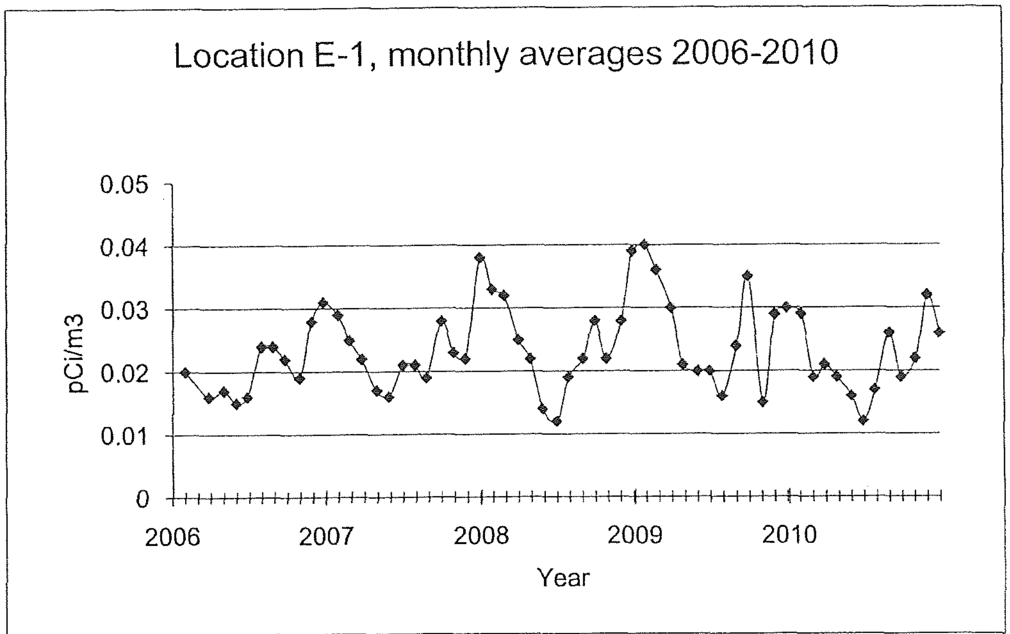
[b] Analysis type is coded as follows: GB = gross beta, GA = gross alpha, GS = gamma spectroscopy, H-3 = tritium, Sr-89 = strontium-89, Sr-90 = strontium-90, I-131 = iodine-131. Analysis frequency is coded as follows: MC = monthly composite, QC = quarterly composite.

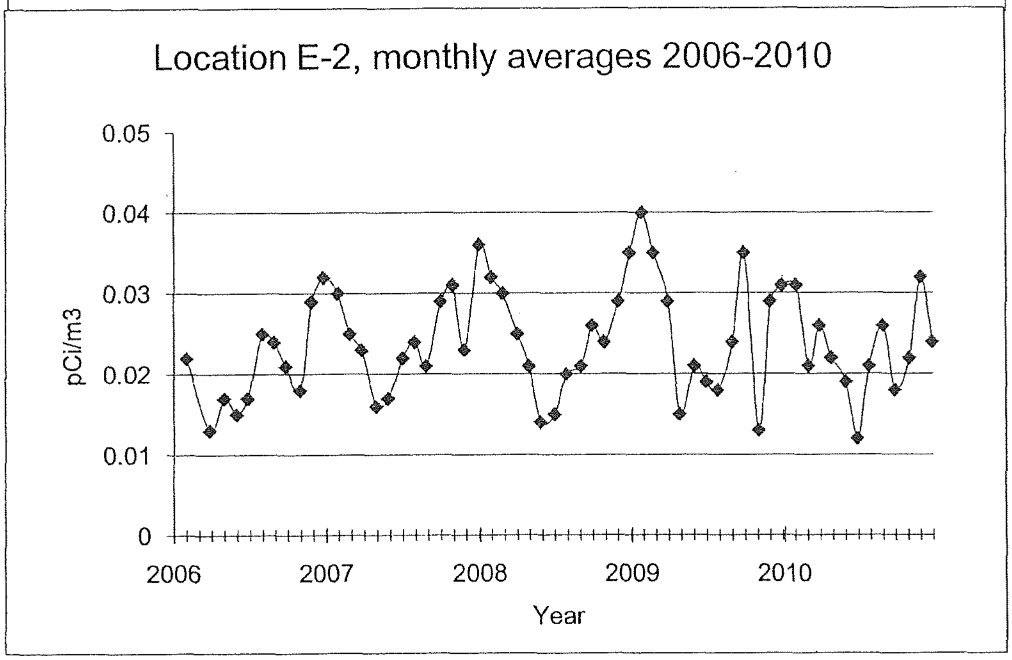
APPENDIX D

Graphs of Data Trends

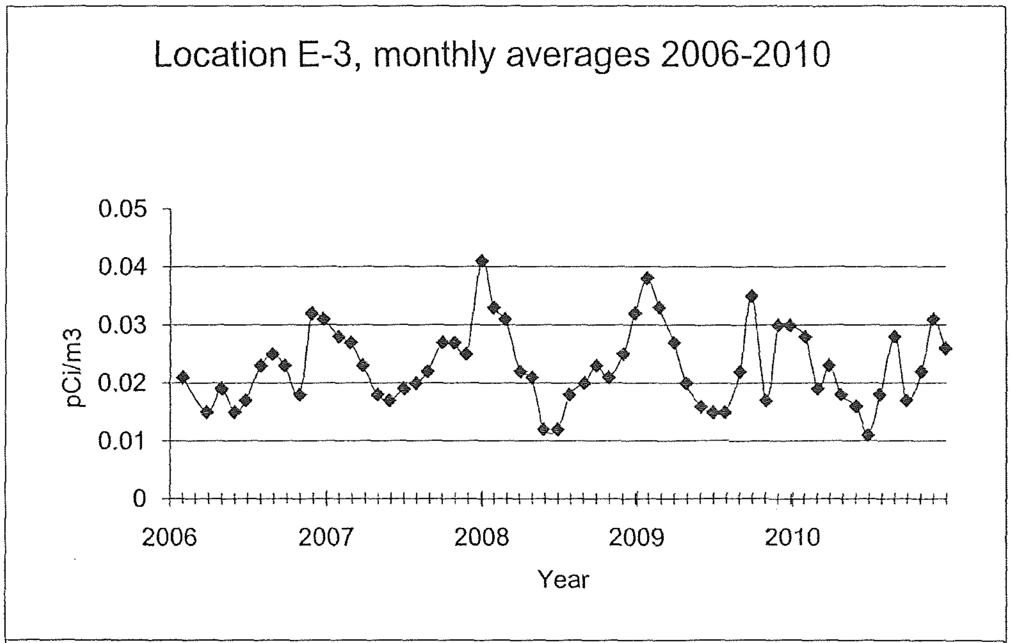
POINT BEACH

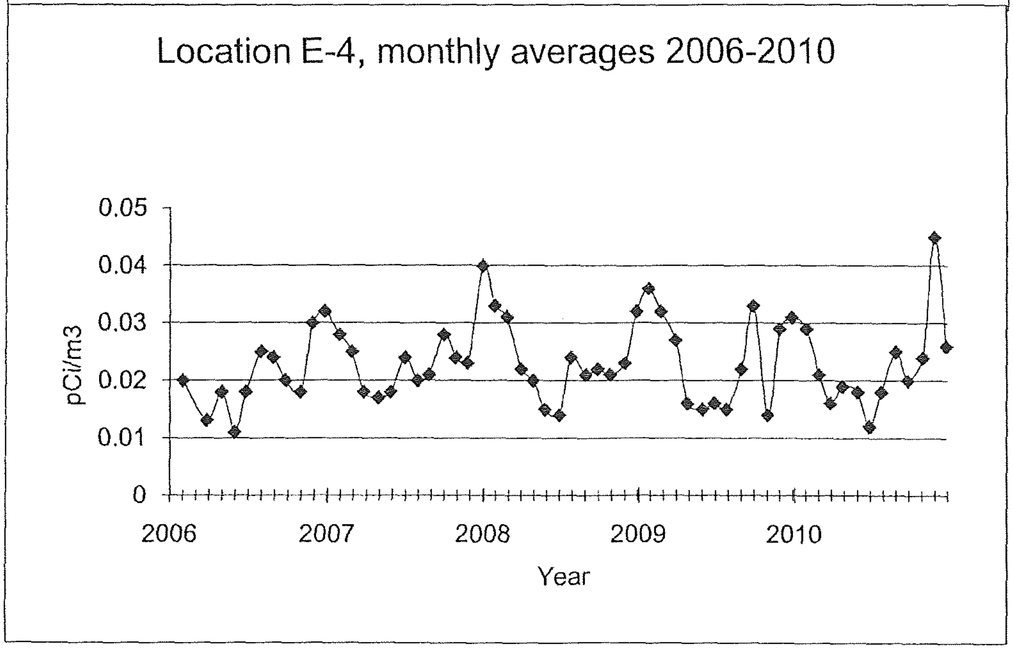
Air Particulates - Gross Beta



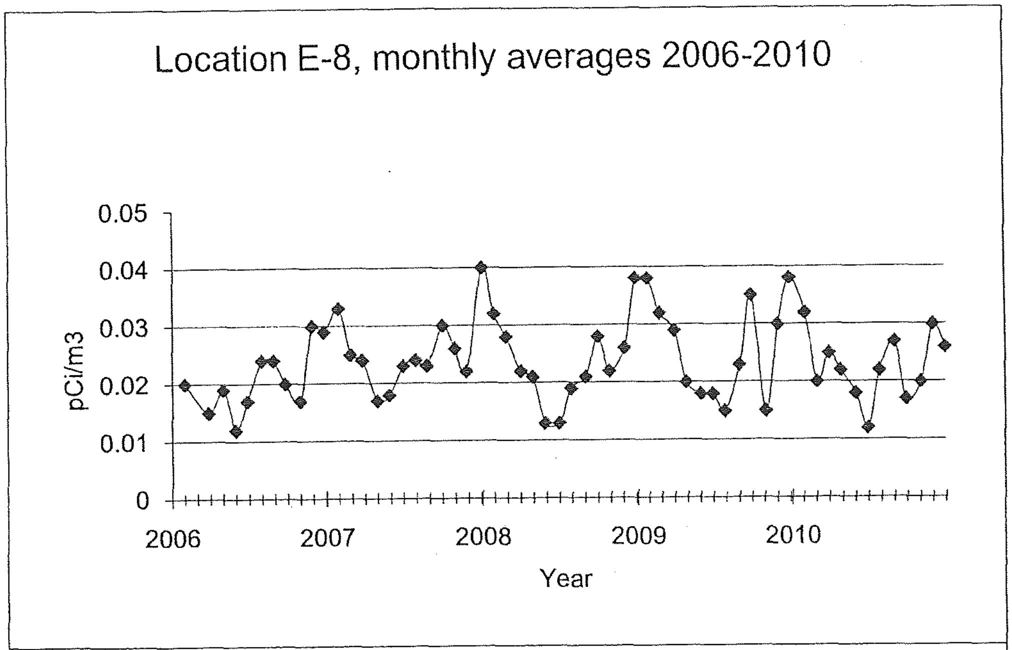


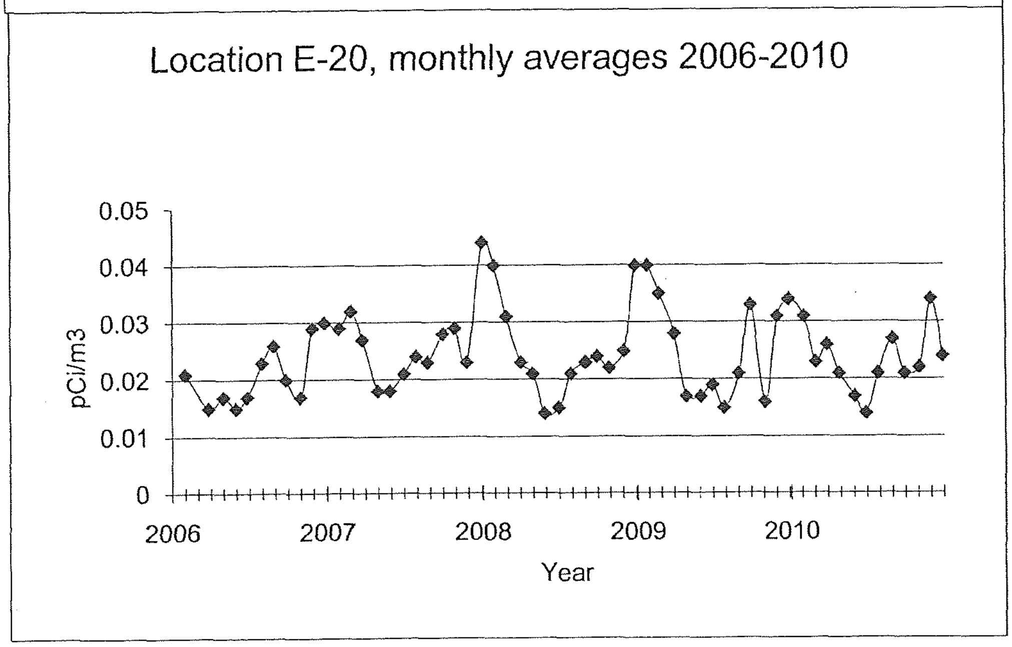
Air Particulates - Gross Beta





Air Particulates - Gross Beta





APPENDIX E

Supplemental Analyses

POINT BEACH NUCLEAR PLANT

Supplemental Analyses

Units: sediment = pCi\gdry Water and water extracted from sediment (H-3) = pCi\L

Location	U1FSSD #4		U1FSSD #2		U1FSSD #3	
Collection Date	05-17-10		05-17-10		05-17-10	
Lab Code	EW- 2754	MDC	ESG- 2755	MDC	ESG- 2756	MDC
Sr-89	0.99 ± 1.49	< 1.71				
Sr-90	0.14 ± 0.41	< 0.84	0.00 ± 0.09	< 0.20	0.21 ± 0.05	< 0.06
Fe-55	-134 ± 395.0	< 660				
H-3	467 ± 108	< 146	565 ± 112	< 146	522 ± 110	< 146
Be-7	18.2 ± 10.8	< 29.4	1.2 ± 1.2	< 28.1	-0.12 ± 0.25	< 0.51
K-40	212.8 ± 25.5	< 65.3	30.7 ± 30.7	< 8.2	7.2 ± 1.1	-
Mn-54	0.1 ± 1.3	< 2.4	0.076 ± 0.14	< 0.3	0.020 ± 0.026	< 0.040
Fe-59	-2.7 ± 2.5	< 8.0	-0.066 ± 0.32	< 0.8	-0.009 ± 0.058	< 0.12
Co-58	-0.3 ± 1.3	< 3.0	-0.089 ± 0.14	< 0.3	-0.031 ± 0.028	< 0.054
Co-60	1.3 ± 1.4	< 2.9	0.16 ± 0.18	< 0.3	0.13 ± 0.043	< 0.073
Zn-65	2.4 ± 2.4	< 5.8	0.18 ± 0.35	< 0.5	0.055 ± 0.061	< 0.10
Zr-Nb-95	-3.2 ± 1.4	< 4.8	0.037 ± 0.15	< 0.5	0.035 ± 0.028	< 0.056
Cs-134	-0.8 ± 1.6	< 2.7	-0.25 ± 0.16	< 0.2	-0.013 ± 0.036	< 0.024
Cs-137	1.2 ± 1.6	< 3.0	0.64 ± 0.30	-	1.30 ± 0.11	-
Ba-La-140	0.4 ± 1.6	< 14.2	0.090 ± 0.17	< 1.1	-0.063 ± 0.026	< 0.072
Ce-141	2.2 ± 2.1	< 7.9	0.051 ± 0.17	< 0.5	-0.024 ± 0.035	< 0.098
Ce-144	-1.1 ± 9.5	< 17.8	0.31 ± 0.74	< 1.4	0.035 ± 0.15	< 0.17
Other Gammas (Ru-103)	-2.0 ± 1.2	< 4.2	-0.28 ± 0.14	< 0.4	-0.064 ± 0.027	< 0.039
Location	U1FSSD[a] #4		U1FSSD #6		U1FSSD[b] #4	
Collection Date	05-17-10		05-17-10		07-22-10	
Lab Code	ESG- 2757	MDC	ESG- 2758	MDC	ESG- 4053	MDC
H-3	582 ± 112	< 146	478 ± 99	< 145	324 ± 97	< 155
Fe-55					12.9 ± 18	< 28.7
Be-7	0.012 ± 0.25	< 0.58	0.16 ± 0.17	< 0.44	-0.21 ± 0.27	< 0.44
K-40	10.39 ± 1.13	-	5.89 ± 0.72	-	12.89 ± 1.41	-
Mn-54	0.010 ± 0.028	< 0.063	0.032 ± 0.018	< 0.040	0.017 ± 0.032	< 0.060
Fe-59	-0.018 ± 0.054	< 0.14	0.015 ± 0.036	< 0.081	-0.041 ± 0.064	< 0.082
Co-58	0.33 ± 0.11	-	0.010 ± 0.018	< 0.028	0.005 ± 0.030	< 0.050
Co-60	0.73 ± 0.064	-	0.020 ± 0.023	< 0.039	0.057 ± 0.040	< 0.050
Zn-65	0.070 ± 0.061	< 0.11	-0.004 ± 0.040	< 0.052	0.022 ± 0.069	< 0.15
Zr-Nb-95	-0.014 ± 0.030	< 0.081	-0.047 ± 0.020	< 0.041	0.041 ± 0.034	< 0.094
Cs-134	0.012 ± 0.026	< 0.054	0.009 ± 0.019	< 0.037	0.016 ± 0.032	< 0.056
Cs-137	4.40 ± 0.13	-	1.01 ± 0.055	-	2.33 ± 0.15	-
Ba-La-140	0.17 ± 0.10	< 0.14	0.003 ± 0.021	< 0.31	-0.023 ± 0.038	< 0.099
Ce-141	-0.030 ± 0.031	< 0.061	-0.028 ± 0.023	< 0.036	0.031 ± 0.043	< 0.12
Ce-144	-0.043 ± 0.14	< 0.28	-0.074 ± 0.099	< 0.11	0.134 ± 0.18	< 0.37
Other Gammas (Ru-103)	-0.054 ± 0.027	< 0.073	-0.003 ± 0.019	< 0.049	0.017 ± 0.032	< 0.062

[a] Results indicate contamination.

[b] Resample of Manhole #4 (ESG-2757) to confirm previous sample was contaminated.

Supplemental Analyses

Units: sediment = pCi\gdry Water and water extracted from sediment (H-3) = pCi\L

Location	Water Treatment Sump-Turbine Bldg.		U2TBSSD TB#1		U2FSSD January composite	
Collection Date	08-11-10		08-30-10		01-15-10	
Lab Code	EW- 4463	MDC	EW- 4872	MDC	EW- 4502[a]	MDC
Sr-89					13.50 ± 21.61	< 27.16
Sr-90					-0.08 ± 0.49	< 1.07
H-3	505 ± 113	< 151				
Be-7	12.1 ± 11.0	< 26.8	11.3 ± 18.5	< 39.0	-13.9 ± 12.2	< 390.0
K-40	57.7 ± 24.3	< 54.3	454.4 ± 45.4	< 107.1	273.4 ± 27.3	< 79.2
Mn-54	-0.7 ± 1.5	< 2.6	2.7 ± 2.2	< 4.4	1.2 ± 1.5	< 4.2
Fe-59	-2.5 ± 2.4	< 3.3	-0.9 ± 4.4	< 8.9	-55.3 ± 2.9	< 138.4
Co-58	-1.2 ± 1.2	< 1.7	1.1 ± 2.1	< 4.5	6.8 ± 1.4	< 20.1
Co-60	0.2 ± 1.1	< 2.5	-1.1 ± 2.5	< 4.2	0.8 ± 1.5	< 2.9
Zn-65	-0.5 ± 2.5	< 3.3	0.2 ± 4.7	< 6.5	-1.6 ± 3.0	< 11.0
Zr-Nb-95	-0.6 ± 1.3	< 2.4	-1.8 ± 2.4	< 5.7	-264.2 ± 1.8	< 41.4
Cs-134	0.2 ± 1.1	< 2.6	-2.8 ± 2.2	< 3.5	-1.1 ± 1.6	< 3.3
Cs-137	0.2 ± 1.2	< 2.6	1.9 ± 2.3	< 4.2	-0.2 ± 1.8	< 3.0
Ba-La-140	5.3 ± 1.5	< 5.1	5.3 ± 2.7	< 3.9	- ± -	< -
Ce-141	-1.8 ± 2.7	< 7.9	-2.4 ± 3.1	< 8.4	-313.5 ± 2.4	< 495.4
Ce-144	-1.3 ± 12.2	< 16.3	-5.2 ± 13.5	< 17.4	0.4 ± 10.8	< 42.5
Other Gammas (Ru-103)	-1.3 ± 1.3	< 3.4	1.9 ± 2.1	< 5.4	-30.2 ± 1.4	< 105.8

Location	U2FSSD February composite #1		U2FSSD February composite #2		U2FSSD March composite	
Collection Date	02-19-10		02-28-10		03-24-10	
Lab Code	EW- 4503[a]	MDC	EW- 4504[a]	MDC	EW- 4505	MDC
Sr-89	1.16 ± 11.90	< 13.90	4.58 ± 9.33	< 12.43		
Sr-90	0.12 ± 0.46	< 0.95	-0.15 ± 0.38	< 0.86		
Be-7	-245.0 ± 15.6	< 211.7	21.1 ± 15.1	< 272.6	32.8 ± 14.6	< 174.1
K-40	275.4 ± 33.1	< 108.7	298.4 ± 35.8	< 84.9	280.6 ± 33.7	< 91.0
Mn-54	-0.1 ± 0.8	< 3.1	3.1 ± 1.8	< 4.7	1.9 ± 1.7	< 3.7
Fe-59	-8.3 ± 3.6	< 67.8	2.7 ± 3.6	< 107.8	-13.9 ± 3.5	< 40.6
Co-58	1.4 ± 1.6	< 17.6	-4.2 ± 1.8	< 10.6	-10.1 ± 1.9	< 17.2
Co-60	-1.5 ± 2.1	< 3.5	0.4 ± 1.9	< 4.0	1.3 ± 2.0	< 3.6
Zn-65	0.3 ± 4.1	< 11.8	-2.8 ± 3.9	< 11.1	0.1 ± 4.0	< 10.2
Zr-Nb-95	-80.0 ± 1.9	< 99.0	-41.6 ± 2.0	< 74.5	-1.8 ± 1.9	< 55.2
Cs-134	1.1 ± 1.8	< 4.2	1.2 ± 1.6	< 2.9	1.8 ± 1.7	< 3.6
Cs-137	2.2 ± 1.8	< 3.5	2.4 ± 1.9	< 4.2	2.1 ± 1.8	< 3.3
Ba-La-140	- ± -	< -	- ± -	< -	-4333.1 ± 2.1	< 5335.6
Ce-141	-86.1 ± 2.7	< 260.4	-35.8 ± 2.7	< 131.2	-15.0 ± 2.6	< 108.7
Ce-144	-9.5 ± 11.9	< 25.8	0.9 ± 11.8	< 28.0	3.9 ± 11.9	< 29.4
Other Gammas (Ru-103)	-53.5 ± 1.8	< 47.8	9.4 ± 1.7	< 55.9	-25.4 ± 1.8	< 42.8

[a] Ba-La-140 = >12 halflives due to age of sample; composited August 2010.

POINT BEACH NUCLEAR PLANT

Supplemental Analyses

Units: sediment = pCi\gdry — Water and water extracted from sediment (H-3) = pCi\L

Location	U2FSSD April composite		U2FSSD May composite		U2FSSD MH-4 Solids	
Collection Date	04-28-10		05-21-10		08-30-10	
Lab Code	EW- 4506	MDC	EW- 4507	MDC	EWW- 7583	MDC
H-3					406 ± 103	< 141
Be-7	-30.1 ± 18.8	< 96.8	-66.1 ± 24.0	< 101.5	3.69 ± 1.00	< 0.13
K-40	284.9 ± 39.9	< 100.7	228.3 ± 45.7	< 123.7	9.41 ± 3.79	-
Mn-54	0.0 ± 2.3	< 5.8	0.8 ± 2.6	< 4.0	0.24 ± 0.12	< 0.31
Fe-59	-2.6 ± 4.2	< 30.5	-11.4 ± 5.3	< 26.0	0.93 ± 0.22	< 2.32
Co-58	-3.8 ± 2.2	< 11.6	-1.4 ± 2.5	< 9.3	0.52 ± 0.12	< 0.73
Co-60	0.2 ± 2.4	< 4.9	1.1 ± 2.5	< 5.0	0.90 ± 0.24	< 0.27
Zn-65	-1.5 ± 4.8	< 6.6	3.9 ± 5.1	< 8.0	0.01 ± 0.27	< 0.63
Zr-Nb-95	2.9 ± 2.2	< 31.4	1.9 ± 2.5	< 14.2	-3.27 ± 0.12	< 2.35
Cs-134	-0.5 ± 2.1	< 2.5	1.7 ± 2.4	< 3.9	-0.01 ± 0.11	< 0.24
Cs-137	0.6 ± 2.3	< 2.5	-0.5 ± 2.7	< 5.4	2.88 ± 0.33	< 0.28
Ba-La-140	45.8 ± 2.2	< 1009.9	-17.9 ± 2.6	< 29.5	-58.40 ± 0.15	< 2.42
Ce-141	-30.4 ± 3.3	< 57.5	2.9 ± 3.9	< 36.5	-1.02 ± 0.13	< 5.06
Ce-144	7.4 ± 14.3	< 33.0	-0.7 ± 17.3	< 42.1	-0.49 ± 0.55	< 1.25
Other Gammas (Ru-103)	2.6 ± 2.1	< 19.1	-0.8 ± 2.4	< 18.4	-0.05 ± 0.11	< 3.02

POINT BEACH NUCLEAR PLANT

Supplemental Analyses

Units: sediment = pCi\gdry Water and water extracted from sediment (H-3) = pCi\L

	E-02		E-03		E-04	
Collection Date	07-07-10		07-07-10		07-07-10	
Lab Code	EP- 3558	MDC	EP- 3559	MDC	EP- 3560	MDC
Units	pCi/L		pCi/L		pCi/L	
H-3	-33 ± 79	< 163	80 ± 85	< 163	7 ± 81	< 163

	STP		SG EPU AC		CHEM OFFICE	
Collection Date	09-28-10		09-28-10		09-27-10	
Lab Code	EP- 5472	MDC	EW- 5473	MDC	EW- 5474	MDC
Units	pCi/L		pCi/L		pCi/L	
H-3	192 ± 93	< 160	1004 ± 126	< 160	218 ± 95	< 160

Location	U1FSSD #4		U1FSSD #2		U1FSSD #3	
Collection Date	07-22-10		05-17-10		05-17-10	
Lab Code	ESG- 4053	MDC	ESG- 2755	MDC	ESG- 2756	MDC
Sr-89	-0.29 ± 0.59	< 0.61				
Sr-90	0.22 ± 0.13	< 0.23				
Pu-238	0.005 ± 0.010	< 0.010	0.008 ± 0.013	< 0.008	0.001 ± 0.008	< 0.006
Pu-239/240	0.008 ± 0.011	< 0.010	0.002 ± 0.015	< 0.010	0.011 ± 0.013	< 0.009

APPENDIX F

DUPLICATE ANALYSES

F-1. Airborne particulate filters, duplicate analyses for gross beta.

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Location	Date Collected	Volume (m^3)	Gross Beta
E-08	02-17-10	302	0.016 ± 0.003
E-08	04-14-10	303	0.018 ± 0.003
E-02	04-28-10	295	0.019 ± 0.003
E-04	06-02-10	322	0.017 ± 0.003
E-08	06-23-10	304	0.013 ± 0.003
E-08	07-21-10	347	0.018 ± 0.003
E-08	08-12-10	347	0.024 ± 0.003
E-04	08-25-10	302	0.024 ± 0.003
E-04	09-01-10	304	0.029 ± 0.003
E-04	09-08-10	307	0.019 ± 0.003
E-02	09-15-10	297	0.016 ± 0.003
E-04	10-21-10	344	0.022 ± 0.003
E-04	10-27-10	260	0.034 ± 0.004

F -2. Lake Water, duplicate analyses for gross beta, iodine-131 andgamma isotopic.

Units: pCi/L

Collections: Monthly

Location	E-01	E-05
Lab Code	ELW- 3813	ELW- 5199
Date Collected	07-13-10	09-15-10
Gross beta	0.9 ± 0.3	1.1 ± 0.9
I-131	0.14 ± 0.28	0.05 ± 0.21
Be-7	-13.7 ± 17.3	-0.5 ± 18.7
Mn-54	-1.3 ± 2.0	-1.0 ± 1.9
Fe-59	-0.3 ± 2.9	-2.6 ± 2.9
Co-58	1.9 ± 1.6	-0.4 ± 1.6
Co-60	0.1 ± 2.1	-0.8 ± 1.4
Zn-65	1.4 ± 3.8	2.1 ± 4.4
Zr-Nb-95	-0.7 ± 1.7	-1.1 ± 2.0
Cs-134	-0.2 ± 1.7	-0.6 ± 1.9
Cs-137	1.1 ± 2.0	1.2 ± 2.1
Ba-La-140	-3.8 ± 2.2	-0.5 ± 1.5
Ru-103	-1.4 ± 1.7	-1.0 ± 2.0

F -3. Lake Water, duplicate analyses for tritium, strontium-89 and strontium-90.

Location	E-033
Lab Code	ELW- 5672
Collection Period	3rd Qtr.
H-3	65 ± 100
Sr-89	
Sr-90	

F-4. Milk, duplicate analyses for I-131, Sr-89/90 and gamma isotopic.

Units: pCi/L

Collection: Monthly

Location	E-40	E-21	E-40
Lab Code	EMI- 2969	EMI- 4466	EMI- 7188
Date Collected	06-09-10	08-11-10	12-08-10
Sr-89	1.0 ± 0.9	-0.5 ± 0.8	-0.5 ± 0.7
Sr-90	0.3 ± 0.3	0.6 ± 0.3	0.7 ± 0.3
I-131	-0.02 ± 0.15	-0.12 ± 0.21	0.09 ± 0.16
K-40	1521 ± 102	1365 ± 117	1398 ± 109
Cs-134	-0.7 ± 1.7	-1.2 ± 1.9	-2.1 ± 1.7
Cs-137	0.9 ± 2.0	-0.2 ± 2.1	1.1 ± 2.1
Ba-La-140	1.4 ± 1.4	0.3 ± 1.7	-3.0 ± 1.6
Co-60	0.1 ± 2.1	1.7 ± 2.1	0.2 ± 2.3

F-5. Surface Water/Well Water, duplicate analyses for tritium.

Units: pCi/L

Collections: Monthly, quarterly, quarterly composites

Location	GW-15	S-1	S-3
Collection Date	01-28-10	02-18-10	03-01-10
Lab Code	EWW-425	EWW-610	EWW-905
H-3	484 ± 98	1375 ± 131	384 ± 95
Location	U2FSSD	GW-12	S-3
Collection Date	03-03-10	03-18-10	03-17-10
Lab Code	EWW-926	EWW-1173	EWW-1268
H-3	654 ± 104	-42 ± 90	283 ± 101
Location	MH-Z65D	GW-01	S-3
Collection Date	03-15-10	04-28-10	04-05-10
Lab Code	EWW-1057	EWW-2102	EWW-1555
H-3	631 ± 106	133 ± 81	479 ± 105
Location	S-1	S-11	U2FSSD
Collection Date	04-14-10	04-23-10	03-24-10
Lab Code	EWW-1646	EWW-1976	EWW-1910
H-3	352 ± 102	240 ± 99	1404 ± 141
Location	U2FSSD	U1SSD #1	S-1
Collection Date	04-26-10	05-17-10	06-01-10
Lab Code	EWW-2326	EW-2751	EWW-2880
H-3	429 ± 94	457 ± 108	356 ± 94
Location	GW-2	S-1	S-3
Collection Date	06-30-10	06-02-10	06-23-10
Lab Code	EWW-3394	ESW-3019	ESW-3310
H-3	182 ± 90	1264 ± 132	1172 ± 130
Location	U2FSSD	U2FSSD	U2FSSD
Collection Date	06-25-10	07-14-10	08-09-10
Lab Code	EWW-3470	EWW-4064	EWW-4627
H-3	525 ± 108	351 ± 99	428 ± 98
Location	SSD TSC	GW-12	S-1
Collection Date	08-30-10	09-24-10	09-10-10
Lab Code	EW-4863	EW-5626	EW-5072
H-3	228 ± 88	31 ± 78	267 ± 104

F-5. Surface Water/Well Water, duplicate analyses for tritium, continued.

Units: pCi/L

Collections: Monthly, quarterly, quarterly composites

Location	U2FSSD	GW-09 1Z-361B	U2FSSD
Collection Date	09-06-10	09-16-10	10-18-10
Lab Code	EW-5136	EW-5809	EW-6295
H-3	601 ± 109	103 ± 82	1637 ± 145

Location	GW-14
Collection Date	11-22-10
Lab Code	EW-6923
H-3	95 ± 81

F.6 Sediment/soil, duplicate analyses for gross beta and gamma isotopic

Units: pCi/g dry
Collection: Semiannual

Location	E-03	E-08
Collection Date	5/26/2010	10/28/2010
Lab Code	ESO- 2730	ESO- 6337
Gross Beta	38.96 ± 1.32	24.78 ± 1.52
Be-7	0.03 ± 0.14	0.16 ± 0.11
K-40	18.72 ± 1.11	13.73 ± 0.81
Cs-137	0.28 ± 0.056	0.23 ± 0.037
Tl-208	0.21 ± 0.042	0.10 ± 0.026
Pb-212	0.57 ± 0.050	0.29 ± 0.035
Bi-214	0.49 ± 0.072	0.23 ± 0.045
Ra-226	1.09 ± 0.43	0.65 ± 0.33
Ac-228	0.66 ± 0.16	0.29 ± 0.12

F.7 Grass, duplicate analyses for gross beta and gamma isotopic

Units: pCi/g dry
Collection: Semiannual

Location	E-20	E-20
Collection Date	5/26/2010	7/28/2010
Lab Code	EG- 2703	EG- 4037
Ratio (wet/dry)	4.51	2.90
Gross Beta	5.29 ± 0.11	7.61 ± 0.30
Be-7	1.10 ± 0.24	6.05 ± 0.51
K-40	4.76 ± 0.57	5.86 ± 0.70
I-131	0.011 ± 0.011	0.006 ± 0.016
Cs-134	0.004 ± 0.009	-0.001 ± 0.016
Cs-137	-0.006 ± 0.013	0.004 ± 0.018
Co-60	0.003 ± 0.015	0.006 ± 0.016

F.8 Fish, duplicate analyses for gross beta and gamma isotopic

	Units: pCi/g wet Collection: Semiannual
Collection Date	11-04-10
Lab Code	EF- 6566
Location	E-13
Ratio (wet/dry)	3.43
Gross Beta	4.05 ± 0.08
K-40	2.57 ± 0.35
Mn-54	0.004 ± 0.008
Fe-59	0.003 ± 0.014
Co-58	-0.001 ± 0.009
Co-60	-0.009 ± 0.011
Zn-65	-0.012 ± 0.024
Cs-134	-0.001 ± 0.007
Cs-137	0.041 ± 0.014
Other (Ru-103)	-0.002 ± 0.008

F.9 Air particulates, duplicate analysis for quarterly gamma emitting isotopes.

Collection Period	
Lab Code	
Location	
Be-7	
Cs-134	
Cs-137	
Co-60	

APPENDIX 2

University of Waterloo (Ontario)
Environmental Isotope Laboratory
Precipitation Monitoring Results for the Point Beach Nuclear Plant
Reporting Period: January – December 2010

Client: Johansen
FPLE Point Beach Nuclear Plant
Contract #: 25473
NPL 2010-0007

ISO# 2010030
Location: T - 3 for 3H

Environmental Isotope Lab
4/4/2011

#	Sample		Lab#	^3H	Result	± 1σ	Repeat	± 1σ	pCi/l
	January 7, 2009								
1	E-02	01/07/10	226695	X	17.1	8.0			55.1
2	E-03	01/07/10	226696	X	42.7	8.0			137.5
3	E-04	01/07/10	226697	X	12.8	8.0	13.0	8.0	41.2

Tritium is reported in Tritium Units.
1TU = 3.221 Picocurries/L per IAEA, 2000 Report.
1TU = 0.11919 Becquerels/L per IAEA, 2000 Report.

Rick Heemskerk
uwEILAB Manager
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519 888 4567 ext 35838

To Contact uwEILAB:
519 888 4732

Client: Johansen
FPL Energy Point Beach
Contract # 25473
NPL 2010-0042

ISO# 2010107
Location: T -
3 for 3H

Environmental Isotope Lab
4/4/2011

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ	pCi/l
	February 3, 2010							
1	E-02 02/03/10	228891	X	17.1	8.0			55.1
2	E-03 02/03/10	228892	X	36.5	8.0			117.6
3	E-04 02/03/10	228893	X	20.7	8.0			66.7

Tritium is reported in Tritium Units.
1TU = 3.221 Picocurries/L per IAEA, 2000 Report.
1TU = 0.11919 Becquerels/L per IAEA, 2000 Report.

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Client: Johansen
FPL Energy Point Beach
Contract #: 25473
NPL 2010-0072

ISO# 2010192
Location: T -
3 for 3H

Environmental Isotope Lab
4/4/2011

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ
	March 4, 2010						
1	E-02 03/04/10	232139	X	10.3	8.0		
2	E-03 03/04/10	232140	X	24.6	8.0		
3	E-04 03/04/10	232141	X	18.3	8.0		

Conductivity	pCi/l
	33.2
	79.2
	58.9

Tritium is reported in Tritium Units.
1TU = 3.221 Picocurries/L per IAEA, 2000 Report.
1TU = 0.11919 Becquerels/L per IAEA, 2000 Report.

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Client: Johansen
FPL Energy Point Beach
Contact #: 25473
NPL 2010-0114

ISO# 2010236
Location: T-8
3for 3H

Environmental Isotope Lab
4/4/2011

#	Sample	Lab#	^{3}H	Result	± 1σ	Repeat	± 1σ	pCi/l
	April 7, 2010							
1	E-02 04/07/10	233656	X	36.8	8.0			118.5
2	E-03 04/07/10	233657	X	15.4	8.0			49.6
3	E-04 04/07/10	233658	X	15.1	8.0			48.6

Tritium is reported in Tritium Units.
1TU = 3.221 Picocurries/L per IAEA, 2000 Report.
1TU = 0.11919 Becquerels/L per IAEA, 2000 Report.

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FPL Energy Point Beach
Contract #: 25473
NPL 2010-0153

ISO# 2010301
Location: T -
3 for 3H

Environmental Isotope Lab
4/4/2011

#	Sample		Lab#	^3H	Result	± 1σ	Repeat	± 1σ
	May 5, 2010							
1	E-02	May 5, 2010	236205	X	15.2	8.0		
2	E-03	May 5, 2010	236206	X	21.0	8.0		
3	E-04	May 5, 2010	236207	X	13.9	8.0		

Conductivity	pCi/l
	49.0
	67.6
	44.8

Tritium is reported in Tritium Units.
1TU = 3.221 Picocurries/L per IAEA, 2000 Report.
1TU = 0.11919 Becquerels/L per IAEA, 2000 Report.

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NPL 2010-0190

ISO# 2010372
Location: T -
3 for 3H

Environmental Isotope Lab
4/4/2011

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ
	June 9, 2010						
1	E-02	237922	X	20.1	8.0		
2	E-03	237923	X	18.3	8.0		
3	E-04	237924	X	12.6	8.0		

Conductivity	pCi/l
	64.7
	58.9
	40.6

Tritium is reported in Tritium Units.
1TU = 3.221 Picocurries/L per IAEA, 2000 Report.
1TU = 0.11919 Becquerels/L per IAEA, 2000 Report.

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Contract #25473
NPL 2010-0225-1
NPL 2010-0268

ISO# 2010563
Location: T -
6 for 3H

Environmental Isotope Lab
4/4/2011

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ		Conductivity	pCi/l
	July 7, 2010, August 4, 2010									
1	E-02 07/07/10	244482	X	<6.0	8.0			125ml bottle		<MDA
2	E-03 07/07/10	244483	X	8.1	8.0			125ml bottle		26.1
3	E-04 07/07/10	244484	X	<6.0	8.0			125ml bottle		<MDA
4	E-02 08/04/10	244485	X	10.9	8.0			125ml bottle		35.1
5	E-03 08/04/10	244486	X	<6.0	8.0			125ml bottle		<MDA
6	E-04 08/04/10	244487	X	<6.0	8.0	<6.0	8.0	125ml bottle		<MDA

Tritium is reported in Tritium Units.
1TU = 3.221 Picocurries/L per IAEA, 2000 Report.
1TU = 0.11919 Becquerels/L per IAEA, 2000 Report.

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Contract #: 25473
NPL 2010-0316

ISO# 2010584
Location:
3 for 3H

Environmental Isotope Lab
4/4/2011

#	Sample		Lab#	^3H	Result	± 1σ	Repeat	± 1σ		Conductivity	pCi/l
	September 9, 2010										
1	E-02	09/09/10	245248	X	<6.0	8.0			125ml bottle		<MDA
2	E-03	09/09/10	245249	X	<6.0	8.0			125ml bottle		<MDA
3	E-04	09/09/10	245250	X	<6.0	8.0	<6.0	8.0	125ml bottle		<MDA

Tritium is reported in Tritium Units.
1TU = 3.221 Picocurries/L per IAEA, 2000 Report.
1TU = 0.11919 Becquerels/L per IAEA, 2000 Report.

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Contract#: 25473
NPL 2010-0346

ISO# 2010650
Location:
3 for 3H

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ
	October 6, 2010						
1	E-02	246745	X	<6.0	8.0		
2	E-03	246746	X	<6.0	8.0		
3	E-04	246747	X	<6.0	8.0		

Conductivity	pCi/l
	<MDA
	<MDA
	<MDA

Tritium is reported in Tritium Units.
1TU = 3.221 Picocurries/L per IAEA, 2000 Report.
1TU = 0.11919 Becquerels/L per IAEA, 2000 Report.

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Contract #24573
NPL 2010-0415

ISO# 2010747
Location:
3 for 3H

Environmental Isotope Lab
4/4/2011

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ	Conductivity	pC/l
	November 17, 2010								
1	E-02	249385	X	18.4	8.0				59.3
2	E-03	249386	X	19.4	8.0				62.5
3	E-04	249387	X	17.5	8.0				56.4

Tritium is reported in Tritium Units.
1TU = 3.221 Picocurries/L per IAEA, 2000 Report.
1TU = 0.11919 Becquerels/L per IAEA, 2000 Report.

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Contract #: 25473
NPL 2010-0438

ISO# 2010797
Location: T - 8
3 for 3H

Environmental Isotope Lab
4/4/2011

#	Sample	Lab#	^{3}H	Result	± 1σ	Repeat	± 1σ
	Dec 8, 2010						
1	E-02	250594	X	<6.0	8.0		
2	E-03	250595	X	7.9	8.0		
3	E-04	250596	X	10.2	8.0		

Conductivity		pCi/l
	<	19.3
		25.4
		32.9

Tritium is reported in Tritium Units.
1TU = 3.221 Picocurries/L per IAEA, 2000 Report.
1TU = 0.11919 Becquerels/L per IAEA, 2000 Report.

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ENCLOSURE 2

NEXTERA ENERGY POINT BEACH, LLC
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

ENVIRONMENTAL MANUAL
REVISION 22
APRIL 20, 2010

34 pages follow

EM

ENVIRONMENTAL MANUAL

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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 the PBNP Reportability Manual 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 $\leq$1000 grams; and fish $\geq$1000 grams;

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

f. Name of person collecting the sample.

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

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

2.2.8 Sample shipping

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

2.2.9 Sample analyses and frequency

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

2.2.10 Analytical laboratory

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

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

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

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

2.3 Assistance to the State of Wisconsin

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, rotameter 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 rotameters 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. The correct flow rate is determined by multiplying the rotameter reading by the correction factor indicated on the calibration sticker affixed to the rotameter.

Some pumps are equipped with an elapsed time meter which reads in hours. Form PBF-4078 is used for recording pertinent air sampling data for each location. At a normal filter change, the following procedure will apply:

1. Record "date off" and "time off."

2. Record rotameter reading for end of period (R_2).

3. Turn off pump, if necessary, and record hour meter reading or actual time for end of period (t_2).

4. Before removing the filter, label the sample envelope as directed in Section 2.2.7. Also enter any other pertinent information at this time. Always write data on the envelope before inserting the particulate filter in the envelope.

5. Remove particulate filter being careful to handle filter only by edges, place in the glassine envelope. Do not fold the filter. Folding and unfolding may dislodge material from the filter. It also may make a reproducible counting geometry impossible to achieve.

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

7. Install new charcoal cartridge and particulate filter being sure to check the charcoal cartridge for breaks and the particulate filter for holes in the filter surface. Discard unacceptable filter media.

8. Record "date on."

9. Record hour meter reading or time for beginning of period (t_1).

10. Turn pump on (if necessary).

11. Perform weekly gross leak test by blocking the air flow with a large rubber stopper. (For this test only, the rotameter ball may register zero or drop all the way to the bottom. The difference between zero and the bottom is not significant.)

12. Record rotameter reading for beginning of period (R_1).

13. Record correction factor as indicated on calibration sticker affixed to rotameter (C).

14. Observe that the starting rotameter reading (R_1) is close to the previous ending reading (R_2). A substantial difference indicates need for further investigation because the regulator will generally maintain constant flow regardless of filter loading.

15. Calculate total volume for period and enter on data sheet (m^3). (This step may be performed at a later time.)

16. Any unusual conditions or observations should be referenced under (*) and recorded under "*NOTES" at the bottom of the data sheet.

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

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 rotameters 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 rotameter 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 indicating the correction factor is affixed to, or near, the built-in rotameter. 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 ADJUST 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 <u>Milk Survey</u>

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

TABLE 2-1
RECOMMENDED MINIMUM SAMPLE SIZES

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

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

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

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

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

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

TABLE 2-3
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

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

TABLE 2-3
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

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

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

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

TABLE 2-5
SAMPLES COLLECTED FOR STATE OF WISCONSIN

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

FIGURE 2-1a
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

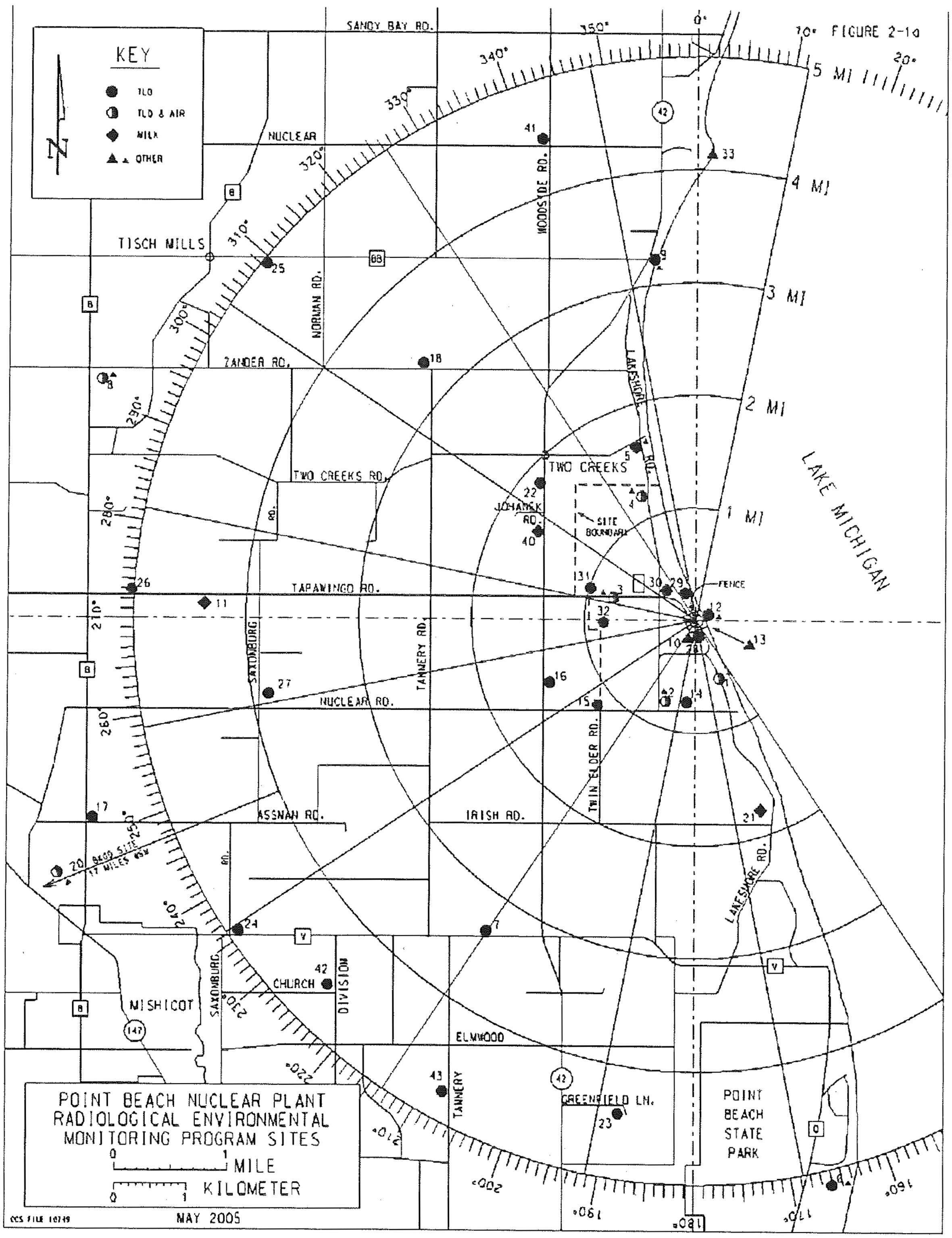
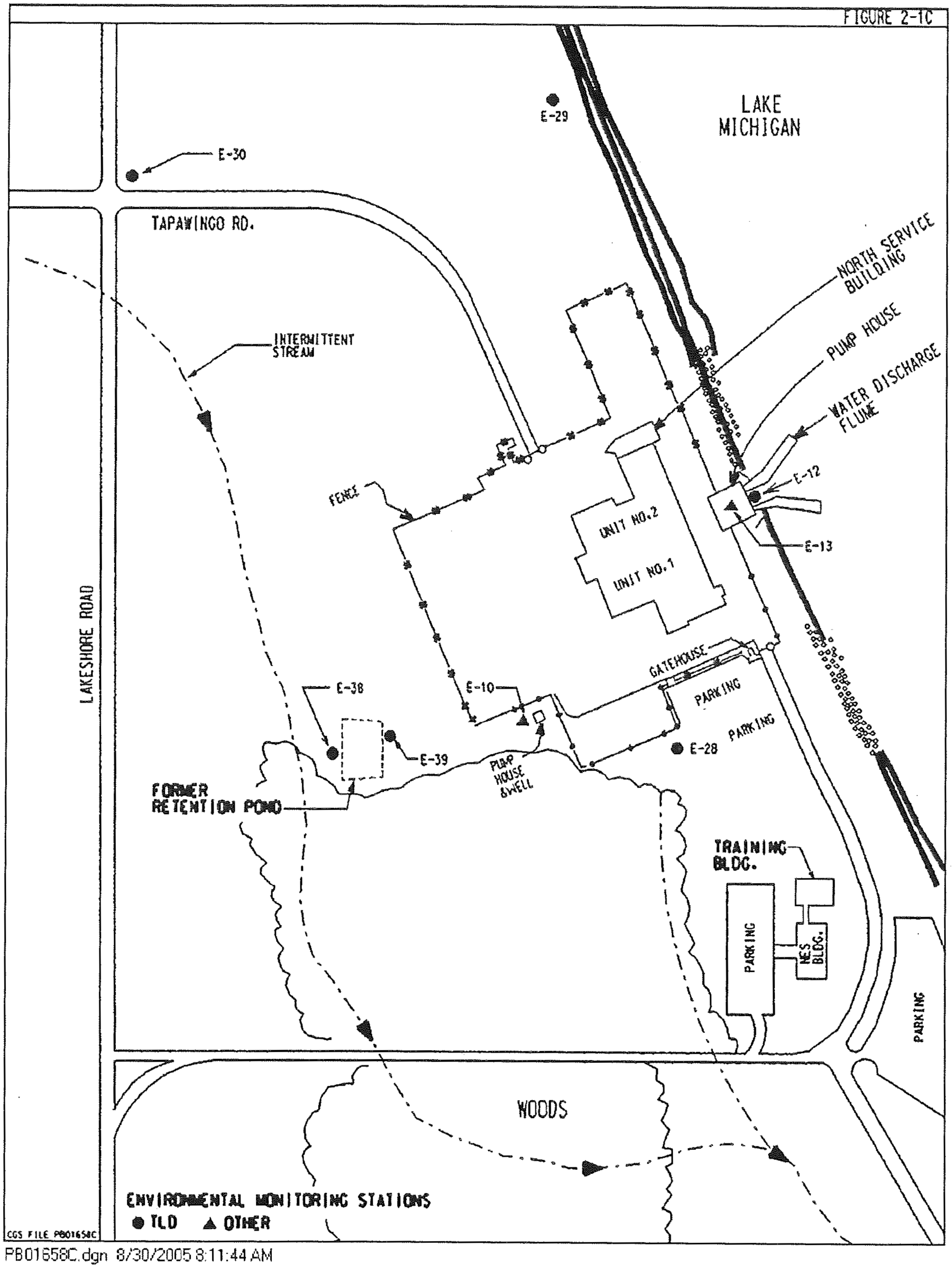


FIGURE 2-1b
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

Figure Withheld Under 10 CFR 2.390

CGS FILE 10748

FIGURE 2-1c
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS



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