NEXTera ENERGY
POINT BEACH

April 30, 2012

NRC 2012-0028
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

2011 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, 2011.

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 2011. 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 March 2011.

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

Very truly yours,

NextEra Energy Point Beach, LLC

James Costedio
Licensing Manager

Enclosures

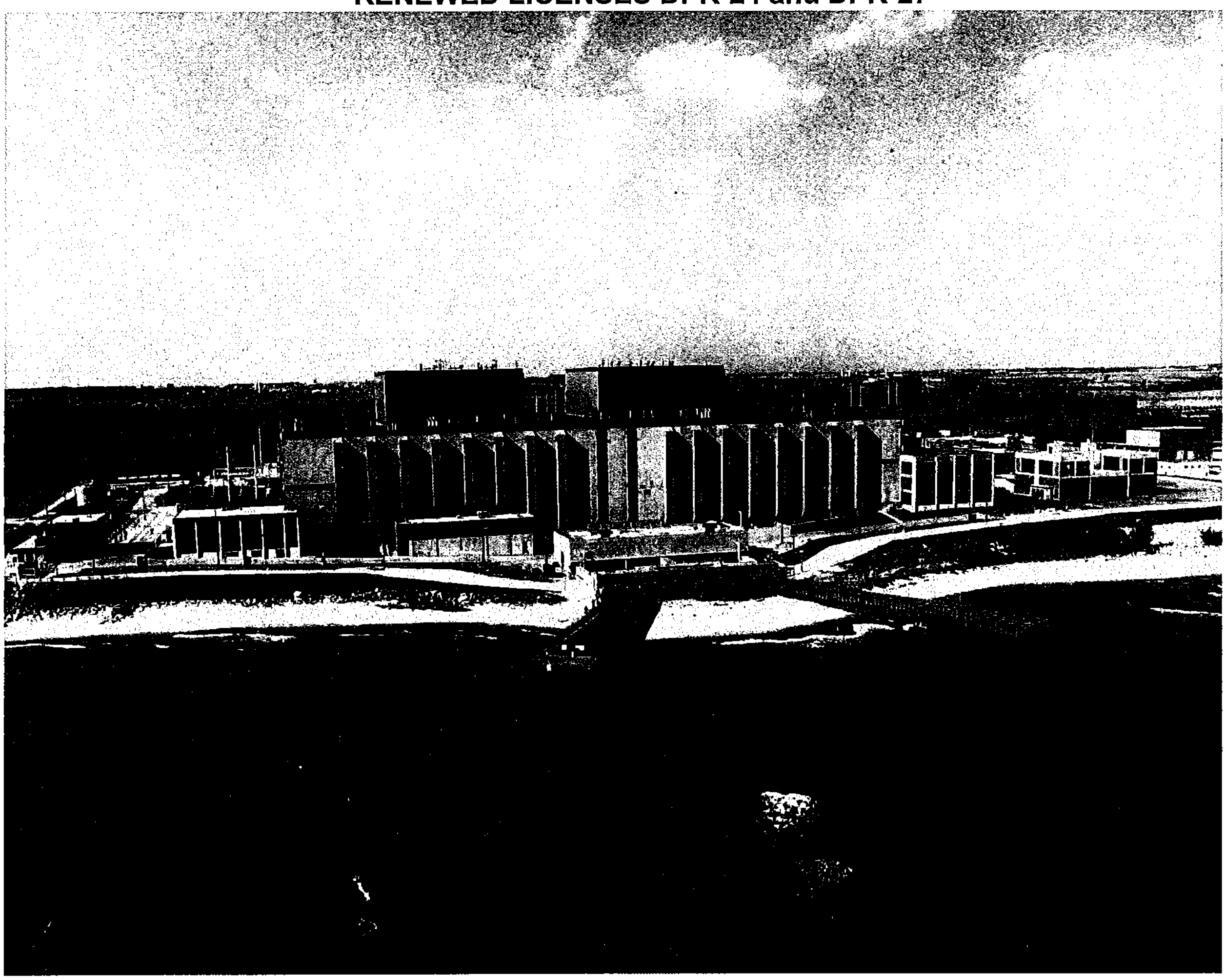
cc: Administrator, Region III, USNRC
Project Manager, Point Beach Nuclear Plant, USNRC
Resident Inspector, Point Beach Nuclear Plant, USNRC
PSCW
American Nuclear Insurers
WI Division of Public Health, Radiation Protection Section
Office of Nuclear Material Safety and Safeguards, USNRC

ENCLOSURE 1

ANNUAL MONITORING REPORT 2011

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, 2011 through December 31, 2011

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SUMMARY

The Annual Monitoring Report for the period from January 1, 2011, through December 31, 2011, 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 2011, the following Curies (Ci) of radioactive material were released via the liquid and atmospheric pathways:

	Liquid	Atmospheric
Tritium (Ci)	496	78.3
[1]Particulate (Ci)	0.0447	0.000217
Noble Gas (Ci)	(-)	6.23
C-14[2]	0.0148	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	0.00675 mrem	6 mrem
Organ dose	0.00692 mrem	20 mrem

ATMOSPHERIC RELEASES

Dose Category	Calculated Dose	Appendix I Dose
Organ dose	0.223 mrem	30 mrem
Noble gas beta air dose	0.000710 mrad	40 mrad
Noble gas gamma ray air dose	0.00150 mrad	20 mrad
Noble gas dose to the skin	0.00219 mrem	30 mrem
Noble gas dose to the whole body	0.00142 mrem	10 mrem

The results show that during 2011, the doses from PBNP effluents were a small percentage ($\leq$0.707%) of the Appendix I design objectives. Therefore, operation of PBNP continues to be ALARA.

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

The 2011 Radiological Environmental Monitoring Program (REMP) collected 768 individual samples for radiological analyses and 125 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 16 samples. This yields a total of 808 samples.

Air monitoring from six different sites did not reveal any effect from Point Beach effluents. However, the air particulate, charcoal cartridges, and precipitation samples in March and April showed fallout from the Fukushima Daiichi event. Sample results obtained before and after these two months consisted of background radioactivity from naturally occurring radionuclides. In addition to the scheduled REMP samples, an additional five sets (particulate and radioiodine) of air samples were obtained during this time period. During the time of the Fukushima event, air particulate filter were composited weekly and gamma scanned for radioactivity.

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. Although I-131 from the March Fukushima event was found in air samples, no I-131 was found in any of the milk samples obtained in the months following the event.

There were no new dry storage units added to the ISFSI in 2011. 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 2011 confirmed that the effluent control program at PBNP ensured a minimal impact on the environment.

Approximately 281 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.

Tritium being discharged via various plant stacks may be recaptured via precipitations and deposited on site. Precipitation sampling to evaluate the onsite recapture of discharged airborne H-3 found concentrations up to 2200 pCi/l close to the plant. The concentrations in rain water decreased to less than detectable levels at the site boundary. This demonstrates that the recapture of stack discharged H-3 can explain the H-3 concentrations found in the yard drain system and the various on-site, below ground electrical vaults. All recaptured tritium drains to Lake Michigan.

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 2011 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)	0.00675	0.113 %
20 (any organ)	0.00692	0.0346 %

2.2 2011 Circulating Water Radionuclide Release Summary

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

2.3 2011 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 curie distribution (gamma emitters plus hard-to-detects other than strontium) decreased by about 40% from 2010, with the main decrease being a factor of 20 decrease in Co-58. As in 2010, there was no Sr-89/90 in liquids in 2011. In 2011, H-3 is about 60 curies lower than 2010. Tritium continues to be the major radionuclide released via liquid discharges.

2.4 Beach Drain System Releases Tritium Summary

Beach drain is the term used to describe the point at which the site yard drainage system empties onto the beach of Lake Michigan. Six of these outfalls carry yard and roof drain runoff to the beach. A seventh drains a small portion of the grassy area on top of the bluff overlooking the lake. Each 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 2011, no tritium was observed in any of the beach drains at the effluent LLDs.

The principle source of water for the beach drains is the yard drain system. In addition to rain, snow melt also enters these drains. During the winter natural melting is enhanced by the use of snow melting machines. This water is poured into the yard drain system. Various roof drains connect to the yard drain system. The roof drains carry precipitation as well as the condensate from various building AC units. Depending upon the integrity of the buried drainage system piping, groundwater inleakage may occur. Because there are no external storage tanks or piping that carry radioactive liquids, the main source of radioactivity for this system is recapture/washout of airborne H-3 discharges. If groundwater inleakage occurs, then groundwater flow of H-3 from the up gradient area of the former retention pond could contribute H-3 to this system. Also, precipitation recharging the groundwater close to the plant would be another source of this H-3. Because of these various recapture sources, the beach drains also are sampled as part of the ground water monitoring program. These results and other groundwater monitoring results are presented in Part D of this Annual Monitoring Report.

Table 2-2
Summary of Circulating Water Discharge
January 1, 2011 through December 31, 2011

	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]	3.08E-03	1.06E-03	3.72E-03	5.85E-03	2.46E-03	9.47E-03	2.56E-02	1.64E-03	4.80E-03	3.45E-03	4.60E-03	1.70E-03	2.83E-03	4.47E-02
Gross Alpha	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tritium	3.49E+01	4.69E+01	2.28E+01	4.11E+01	6.62E+01	2.08E+01	2.33E+02	5.66E+01	8.14E+01	5.18E+01	3.54E+01	1.98E+01	1.82E+01	4.96E+02
Strontium (89/90/92)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total Vol Released (gal)														
Processed Waste	5.82E+04	7.22E+04	1.11E+05	1.09E+05	5.77E+04	6.71E+04	4.75E+05	6.18E+04	6.37E+04	9.28E+04	9.20E+04	9.51E+04	8.19E+04	9.63E+05
Waste Water Effluent[2]	3.30E+06	3.10E+06	2.88E+06	2.74E+06	3.62E+06	3.84E+06	1.95E+07	4.04E+06	2.70E+06	2.61E+06	2.73E+06	3.16E+06	3.25E+06	3.80E+07
U1 SG Blowdown	2.66E+06	2.45E+06	2.68E+06	2.56E+06	2.51E+06	2.51E+06	1.54E+07	2.47E+06	2.35E+06	2.33E+06	2.78E+05	0.00E+00	3.26E+06	2.61E+07
U2 SG Blowdown	2.68E+06	2.34E+06	1.23E+05	0.00E+00	0.00E+00	2.55E+06	7.69E+06	6.46E+06	5.79E+06	5.62E+06	5.51E+06	3.71E+06	4.10E+06	3.89E+07
Total Gallons	8.69E+06	7.96E+06	5.79E+06	5.41E+06	6.19E+06	8.97E+06	4.30E+07	1.30E+07	1.09E+07	1.07E+07	8.61E+06	6.96E+06	1.07E+07	1.04E+08
Total cc	3.29E+10	3.01E+10	2.19E+10	2.05E+10	2.34E+10	3.40E+10	1.63E+11	4.93E+10	4.13E+10	4.03E+10	3.26E+10	2.64E+10	4.05E+10	3.93E+11
Dilution vol(cc)[3]	6.62E+13	5.98E+13	3.73E+13	3.37E+13	4.61E+13	8.66E+13	3.30E+14	1.15E+14	1.15E+14	1.11E+14	6.46E+13	5.72E+13	5.49E+13	8.47E+14
Avg diluted discharge conc (µCi/cc)														
Gamma Scan (+HTDs)[1]	4.65E-11	1.78E-11	9.96E-11	1.74E-10	5.34E-11	1.09E-10		1.42E-11	4.18E-11	3.10E-11	7.12E-11	2.98E-11	5.16E-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	5.27E-07	7.83E-07	6.12E-07	1.22E-06	1.44E-06	9.53E-07		4.92E-07	7.08E-07	4.66E-07	5.49E-07	3.46E-07	3.32E-07	
Strontium (89/90/92)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Max Batch Discharge Conc (µCi/cc)														
Tritium	1.89E-05	2.11E-05	1.31E-05	7.54E-05	6.56E-05	1.17E-05		3.60E-05	3.83E-05	1.60E-05	1.28E-05	1.24E-05	1.72E-05	
Gamma Scan	5.97E-11	5.84E-11	3.59E-09	8.10E-09	3.30E-10	5.34E-09		4.24E-10	6.18E-10	5.91E-10	4.05E-10	1.14E-09	2.21E-09	

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

Table 2-3
Isotopic Composition of Circulating Water Discharges (Ci)
January, 2011 through December 31, 2011

Nuclide	Jan	Feb	Mar	Apr	May	Jun	Total Jan-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Jan-Dec
H-3	3.49E+01	4.69E+01	2.28E+01	4.11E+01	6.62E+01	2.08E+01	2.33E+02	5.66E+01	8.14E+01	5.18E+01	3.54E+01	1.98E+01	1.82E+01	4.96E+02
F-18	2.94E-04	6.55E-04	2.99E-04	2.93E-04	0.00E+00	5.25E-04	2.07E-03	2.24E-04	3.48E-04	3.51E-05	0.00E+00	0.00E+00	0.00E+00	2.67E-03
Cr-51	0.00E+00	0.00E+00	5.98E-04	1.80E-04	0.00E+00	1.59E-03	2.37E-03	6.94E-05	1.75E-05	0.00E+00	1.37E-05	1.10E-05	7.95E-05	2.56E-03
Mn-54	0.00E+00	0.00E+00	1.46E-05	0.00E+00	0.00E+00	1.46E-04	1.60E-04	1.63E-05	1.39E-05	1.68E-05	1.58E-05	1.30E-05	5.69E-06	2.42E-04
Fe-55	0.00E+00	0.00E+00	4.19E-04	0.00E+00	0.00E+00	4.07E-04	8.26E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.26E-04
Fe-59	0.00E+00	0.00E+00	2.57E-06	0.00E+00	0.00E+00	5.60E-05	5.86E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-05	6.91E-05
Co-57	0.00E+00	0.00E+00	5.64E-07	0.00E+00	0.00E+00	0.00E+00	5.64E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.64E-07
Co-58	1.38E-05	3.03E-06	3.03E-04	7.05E-05	1.82E-06	1.03E-03	1.42E-03	9.22E-05	2.10E-04	7.44E-05	1.33E-04	1.26E-04	4.57E-04	2.51E-03
Co-60	6.90E-05	4.15E-05	7.40E-04	1.29E-04	1.28E-05	3.81E-03	4.80E-03	4.08E-04	6.61E-04	6.26E-04	3.38E-04	3.69E-04	4.95E-04	7.70E-03
Zn-65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.96E-05	6.96E-05	0.00E+00	0.00E+00	0.00E+00	1.43E-06	0.00E+00	0.00E+00	7.10E-05
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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nb-95	0.00E+00	0.00E+00	5.88E-07	0.00E+00	0.00E+00	5.12E-04	5.13E-04	3.99E-05	2.93E-05	1.35E-05	1.67E-05	1.33E-05	2.65E-05	6.52E-04
Nb-97	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.68E-06	2.53E-06	4.21E-06
Zr-95	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.83E-04	2.83E-04	1.66E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.00E-04
Zr-97	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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
Ag-110m	4.43E-06	1.86E-05	1.76E-04	2.04E-05	0.00E+00	3.69E-05	2.56E-04	1.48E-06	5.64E-06	3.89E-04	2.00E-06	3.46E-06	6.31E-06	6.64E-04
Sn-113	0.00E+00	0.00E+00	3.43E-06	0.00E+00	0.00E+00	3.09E-04	3.12E-04	1.87E-05	2.02E-06	0.00E+00	1.21E-06	1.31E-05	1.76E-05	3.65E-04
Sn-117m	9.97E-06	2.21E-05	3.64E-05	2.32E-03	9.67E-05	3.58E-04	2.84E-03	1.30E-04	8.00E-05	1.21E-04	1.27E-04	1.01E-03	1.23E-03	5.54E-03
Sb-122	0.00E+00	0.00E+00	6.71E-06	0.00E+00	0.00E+00	0.00E+00	6.71E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.71E-06
Sb-124	0.00E+00	0.00E+00	2.60E-04	6.63E-04	1.68E-05	1.88E-04	1.13E-03	1.02E-05	4.37E-06	3.30E-06	8.19E-07	2.26E-06	6.64E-05	1.22E-03
Sb-125	0.00E+00	0.00E+00	1.01E-04	1.47E-03	1.42E-04	1.16E-04	1.83E-03	9.49E-06	4.98E-06	2.55E-05	0.00E+00	0.00E+00	2.49E-04	2.12E-03
I-131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.49E-06	0.00E+00	3.49E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.49E-06
I-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	0.00E+00	2.87E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.87E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.87E-05
Ba-140	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
La-140	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ce-144	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.42E-06	0.00E+00	0.00E+00	6.42E-06
C-14	2.64E-03	2.11E-04	6.71E-04	6.62E-04	2.19E-03	0.00E+00	6.37E-03	5.15E-04	2.36E-03	1.58E-03	3.83E-03	0.00E+00	9.29E-05	1.48E-02
Ni-63	3.30E-05	3.55E-05	7.55E-05	4.14E-05	0.00E+00	3.31E-05	2.18E-04	5.85E-05	1.06E-03	5.27E-04	1.01E-04	1.44E-04	8.67E-05	2.20E-03
Tc-99	9.91E-06	4.65E-05	7.55E-06	7.86E-06	0.00E+00	0.00E+00	7.18E-05	2.57E-05	5.06E-06	3.86E-05	1.15E-05	0.00E+00	5.58E-06	1.58E-04

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, 2011, through December 31, 2011

	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)	1.19E+06	9.84E+05	0.00E+00	0.00E+00	1.50E+05	0.00E+00	0.00E+00
2nd Qtr							
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	1.00E+06	2.19E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E+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)	8.52E+05	1.33E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.40E+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)	1.37E+06	2.84E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.16E+04

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 2011. All disposals were done at the Manitowoc Sewage Treatment Plant.

2.7 Carbon-14

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

Beginning with the 2010 monitoring reports, the NRC requested that all nuclear plants report C-14 emissions. Pursuant to NRC guidance in RG 1.21(Rev 2) , evaluation of C-14 in liquid wastes is not required because the quantity released via this pathway is much less than that contributed by gaseous emissions. However, based upon participation in industry workshops, PBNP began C-14 analyses and reporting prior to the issuance of RG 1.21 (Rev 2). The results show that C-14 meets the principal radionuclide criterion of RG 1.21. A principal radionuclide may be determined based on its relative contribution to the public dose compared to the 10 CFR 50, Appendix I dose objectives, or the amount of activity discharged compared to other radionuclides in its effluent type. In this case, it is compared to other radionuclides discharged in liquids. Furthermore, RG 1.21 states that a radionuclide is a principal effluent component if it contributes greater than 1% of the Appendix I design objective dose compared to the other radionuclides in the effluent type, or, if it is greater than 1% of the activity of all radionuclides in the effluent type. For 2011, the monthly and total C-14 (1.48E-02 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. The C-14 dose contribution has been required since 2010 (see Sections 3.4 through 3.6, below, for a more detailed description). The comparison between airborne effluent doses with and without C-14 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 2011 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 2011, from which the airborne doses were calculated, are presented in Table 3-3. Carbon-14 is not included in Table 3-3 because it was calculated and not measured. C-14 is discussed in the following sections.

3.4 Carbon-14

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

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

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

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

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 roughly three orders of magnitude higher than the 1.26E-02 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 show as 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

No C-14 measurements were made of PBNP effluents. In 2010, C-14 was measured in crops grown on fields in the owner controlled area located in the highest χ/Q sector at the site's south boundary. One field is leased for feed corn by a dairy south of the plant. That dairy is part of the REMP. In an adjacent field soybeans are grown by another farmer. These two crops were sampled in this sector and as well 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 PBNP airborne effluents should not measurably increase the C-14 dose compared to that received from naturally occurring C-14 in plants.

3.7 Errata to Previous Annual Monitoring Reports

During the process of upgrading the PBNP ODCM, the χ/Q and D/Q values in the Final Safety Analysis Report (FSAR) table containing the summary of meteorological parameters used in the ODCM were found to have been incorrectly transcribed from the other tables in the FSAR. As a result, the airborne effluent doses have been determined to have positive and negative biases. The χ/Q value used for noble gas dose calculations was determined to be 0.75% low. The D/Q value used in the ODCM for airborne particulates was 5.6% high. As a result, the noble gas doses are 0.75% low and the airborne ingestion doses are conservative by 5.6%. This situation has existed since approximately 1987. Pursuant to Reg. Guide 1.21 (Rev 2) any error $\leq$10% is considered a minor error and may be addressed in the effluent section of the AMR with a brief explanation and no revision to previous AMRs are required. FSAR transcription errors were captured in the corrective action system.

Table 3-1
Comparison of 2011 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	0.743
Noble gas	40 mrad (beta air)	0.000710 mrad	0.00178
Noble gas	20 mrad (gamma air)	0.00150 mrad	0.00750
Noble gas	30 mrem/skin	0.00219 mrem	0.00729
Noble gas	10 mrem (whole body)	0.00142 mrem	0.0142

Table 3-2
Radioactive Airborne Effluent Release Summary
January 1, 2011, through December 31, 2011

	Jan	Feb	Mar	Apr	May	Jun	Total Jan-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total NG from Liq (Ci)	5.45E-04	1.09E-04	1.45E-04	1.01E-03	3.19E-03	6.75E-04	5.68E-03	1.36E-03	1.03E-03	4.58E-04	9.97E-04	2.85E-05	7.31E-05	9.63E-03
Total Noble Gas (Ci)[1]	4.32E-02	3.66E-02	3.30E+00	2.21E-02	2.55E+00	2.31E-02	5.98E+00	5.40E-02	5.81E-02	4.52E-02	2.64E-02	2.37E-02	3.53E-02	6.23E+00
Total Radioiodines (Ci)[2]	1.46E-06	0.00E+00	2.16E-06	0.00E+00	0.00E+00	0.00E+00	3.62E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-06
Total Particulate (Ci)[3]	3.05E-05	1.73E-04	1.49E-06	2.18E-06	6.79E-07	1.47E-06	2.10E-04	0.00E+00	0.00E+00	0.00E+00	8.41E-07	2.34E-06	5.23E-07	2.13E-04
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	7.08E-12	1.59E-08	8.45E-12	1.59E-08
All other beta + gamma (Ci)	3.05E-05	1.73E-04	1.49E-06	2.18E-06	6.79E-07	1.47E-06	2.10E-04	0.00E+00	0.00E+00	0.00E+00	8.41E-07	2.33E-06	5.23E-07	2.13E-04
Total Tritium (Ci)	4.81E+00	4.21E+00	1.02E+01	9.86E+00	8.01E+00	4.53E+00	4.16E+01	2.02E+00	4.59E+00	5.47E+00	6.82E+00	1.04E+01	7.40E+00	7.83E+01
Max NG H'rly Rel.(Ci/sec)	4.42E-08	4.18E-08	4.27E-08	5.07E-08	4.23E-06	4.79E-08		5.05E-08	5.39E-07	4.71E-08	4.58E-08	4.90E-08	5.10E-08	

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

TABLE 3-3
Isotopic Composition of Airborne Releases
January 1, 2011 through December 31, 2011

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	4.81E+00	4.21E+00	1.02E+01	9.86E+00	8.01E+00	4.53E+00	4.16E+01	2.02E+00	4.59E+00	5.47E+00	6.82E+00	1.04E+01	7.40E+00	7.83E+01
Ar-41	4.21E-02	3.62E-02	2.26E+00	1.88E-02	1.47E-02	1.97E-02	2.39E+00	4.73E-02	4.66E-02	4.44E-02	2.53E-02	2.29E-02	2.76E-02	2.61E+00
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Kr-85m	0.00E+00	0.00E+00	3.05E-02	0.00E+00	0.00E+00	0.00E+00	3.05E-02	0.00E+00	1.54E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.06E-02
Kr-87	0.00E+00	0.00E+00	8.89E-02	0.00E+00	0.00E+00	0.00E+00	8.89E-02	0.00E+00	3.58E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.93E-02
Kr-88	0.00E+00	0.00E+00	8.03E-02	0.00E+00	0.00E+00	0.00E+00	8.03E-02	0.00E+00	3.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.07E-02
Xe-131m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Xe-133	1.05E-03	4.10E-04	2.88E-02	3.28E-03	2.54E+00	3.35E-03	2.58E+00	6.76E-03	6.69E-03	7.45E-04	1.10E-03	9.04E-04	7.41E-03	2.60E+00
Xe-133m	0.00E+00	0.00E+00	1.71E-02	0.00E+00	2.55E-05	0.00E+00	1.71E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-02
Xe-135	8.05E-06	0.00E+00	1.96E-01	6.17E-06	1.40E-04	4.65E-06	1.96E-01	1.07E-05	8.63E-04	1.26E-05	1.25E-05	3.34E-05	2.62E-04	1.97E-01
Xe-135m	0.00E+00	0.00E+00	2.34E-01	0.00E+00	1.82E-05	0.00E+00	2.34E-01	0.00E+00	1.20E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.35E-01
Xe-138	0.00E+00	0.00E+00	3.69E-01	0.00E+00	0.00E+00	0.00E+00	3.69E-01	0.00E+00	1.79E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.71E-01
F-18	2.98E-05	1.73E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.02E-04
Cr-51	0.00E+00	0.00E+00	0.00E+00	3.12E-07	0.00E+00	0.00E+00	3.12E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E-07
Mn-54	0.00E+00	0.00E+00	0.00E+00	5.03E-08	0.00E+00	0.00E+00	5.03E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.03E-08
Co-58	0.00E+00	0.00E+00	2.39E-08	1.30E-07	0.00E+00	0.00E+00	1.54E-07	0.00E+00	0.00E+00	0.00E+00	1.43E-07	1.19E-07	0.00E+00	4.16E-07
Co-60	0.00E+00	0.00E+00	4.66E-07	5.22E-07	0.00E+00	7.95E-08	1.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-06
Nb-95	0.00E+00	0.00E+00	0.00E+00	2.88E-07	0.00E+00	0.00E+00	2.88E-07	0.00E+00	0.00E+00	0.00E+00	7.38E-08	0.00E+00	0.00E+00	3.62E-07
Zr-95	0.00E+00	0.00E+00	0.00E+00	1.33E-07	0.00E+00	0.00E+00	1.33E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.33E-07
I-131	1.46E-06	0.00E+00	2.16E-06	0.00E+00	0.00E+00	0.00E+00	3.62E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.62E-06
I-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	0.00E+00	9.09E-11	0.00E+00	0.00E+00	0.00E+00	8.10E-07	8.10E-07	0.00E+00	0.00E+00	0.00E+00	1.19E-07	0.00E+00	0.00E+00	9.29E-07
Fe-55	2.84E-10	3.10E-10	4.16E-07	5.82E-08	2.69E-08	9.93E-11	5.02E-07	0.00E+00	0.00E+00	0.00E+00	3.97E-10	8.69E-07	4.62E-10	1.37E-06
Ni-63	6.35E-07	5.74E-07	5.33E-07	6.88E-07	6.52E-07	5.84E-07	3.67E-06	0.00E+00	0.00E+00	0.00E+00	4.88E-07	1.24E-06	5.04E-07	5.90E-06
Tc-99	5.09E-08	4.60E-08	5.08E-08	0.00E+00	0.00E+00	0.00E+00	1.48E-07	0.00E+00	0.00E+00	0.00E+00	1.75E-08	3.75E-08	1.81E-08	2.21E-07
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	7.26E-12	1.59E-08	8.45E-12	1.59E-08

Note: The Noble Gases listed above include the liquid contribution

Table 3-4
Comparison of Airborne Effluent Doses

2011 Airborne Particulate + Tritium Dose (mrem)

	Bone	Liver	T-WB	Thyroid	Kidney	Lung	GI-LLI	Skin
Adult	2.34E-04	1.84E-02	1.84E-02	1.84E-02	1.83E-02	1.83E-02	1.83E-02	5.48E-05
Teen	3.15E-04	2.11E-02	2.11E-02	2.12E-02	2.11E-02	2.11E-02	2.11E-02	5.48E-05
Child	5.08E-04	3.08E-02	3.09E-02	3.09E-02	3.08E-02	3.08E-02	3.08E-02	5.48E-05
Infant	1.54E-04	1.36E-02	1.36E-02	1.38E-02	1.36E-02	1.36E-02	1.35E-02	5.48E-05

Carbon-14 Dose (mrem)

	Bone	Liver	T. Body	Thyroid	Kidney	Lungs	GI-LLI	Skin
Adult	6.37E-02	1.27E-02	1.27E-02	1.27E-02	1.27E-02	1.27E-02	1.27E-02	0.00E+00
Teen	9.75E-02	1.94E-02	1.94E-02	1.94E-02	1.94E-02	1.94E-02	1.94E-02	0.00E+00
Child	2.23E-01	4.44E-02	4.44E-02	4.44E-02	4.44E-02	4.44E-02	4.44E-02	0.00E+00
Infant	1.10E-01	2.34E-02	2.34E-02	2.34E-02	2.34E-02	2.34E-02	2.34E-02	0.00E+00

2011 Total Airborne Non-Noble Gas Dose (Particulate + H-3 + C-14 (mrem))

	Bone	Liver	T-WB	Thyroid	Kidney	Lung	GI-LLI	Skin
Adult	6.40E-02	3.10E-02	3.11E-02	3.11E-02	3.10E-02	3.10E-02	3.10E-02	5.48E-05
Teen	9.78E-02	4.05E-02	4.05E-02	4.05E-02	4.05E-02	4.04E-02	4.05E-02	5.48E-05
Child	2.23E-01	7.52E-02	7.53E-02	7.54E-02	7.52E-02	7.52E-02	7.52E-02	5.48E-05
Infant	1.10E-01	3.70E-02	3.70E-02	3.72E-02	3.69E-02	3.69E-02	3.69E-02	5.48E-05
Ann.Limit	3.00E+01	3.00E+01		3.00E+01	3.00E+01	3.00E+01	3.00E+01	3.00E+01
% Limit	7.44E-01	2.51E-01		2.51E-01	2.51E-01	2.51E-01	2.51E-01	1.83E-04

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

4.0 RADIOACTIVE SOLID WASTE SHIPMENTS

4.1 Types, Volumes, and Activity of Shipped Solid Waste

The following types, volumes, and activity of solid waste were shipped from PBNP for offsite disposal or burial during 2011. No Type C or D waste was shipped. No irradiated fuel was shipped offsite. The volume, activity and type of waste are listed in Table 4-1.

Table 4-1
Quantities and Types of Waste Shipped from PBNP in 2011

Type of Waste	Quantity	Activity
A. Spent resins, filter sludge, evaporator bottoms, etc.	11.700 m^3	1.821 Ci
	414.8 ft^3	
B. Dry compressible waste, contaminated equipment, etc	660.2 m^3	0.268 Ci
	23314.0 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 2011 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
2011 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	30.7300%	Co-60	42.5100%				
Ni-63	17.0400%	Fe-55	15.9500%				
Sb-125	10.9000%	Nb-95	13.6200%				
Nb-95	9.4300%	Ni-63	10.9500%				
Fe-55	9.2200%	Sb-125	3.0700%				
H-3	7.7900%	Zr-95	2.4800%				
Co-58	4.7400%	Cs-137	2.4300%				
Cs-137	2.9800%	Co-58	2.1400%				
Ag-110m	1.6700%	Ag-110m	1.6500%				
Zr-95	1.6200%	Mn-54	1.4100%				
Sb-124	0.9500%	Tc-99	1.3500%				
Mn-54	0.9500%	Sb-124	1.1000%				
Mn-54	0.7700%	H-3	0.7700%				
C-14	0.5650%	Nb-94	0.1600%				
Ni-59	0.1900%	C-14	0.0900%				
Zn-65	0.1000%	Sr-90	0.0900%				
Ce-144	0.0900%	Pu-241	0.0700%				
Nb-94	0.0900%	Am-241	0.0400%				
Sr-90	0.0600%	Zn-65	0.0300%				
Pu-241	0.0600%	Ce-144	0.0300%				
Am-241	0.0200%	Ag-108m	0.0100%				
Cm-243	0.0000%	Co-57	0.0100%				
Pu-239	0.0000%	Pu-239	0.0100%				
Pu-238	0.0000%	Cm-243	0.0100%				
Pu-240	0.0000%	Sr-89	0.0100%				
Cm-242	0.0000%	Pu-238	0.0100%				
Cm-244	0.0000%	Pu-240	0.0000%				
		Cm-242	0.0000%				
		In-113m	0.0000%				

4.3 Solid Waste Disposition

There were seventeen solid waste shipments from PBNP during 2011. The dates and destinations are shown in Table 4-3.

Table 4-3
2011 PBNP Radioactive Waste Shipments

Date	Destination
02/18/11	Clive, UT
02/23/11	Oak Ridge, TN
03/22/11	Oak Ridge, TN
04/19/11	Oak Ridge, TN
05/16/11	Oak Ridge, TN
07/27/11	Oak Ridge, TN
09/13/11	Clive, UT
10/05/11	Oak Ridge, TN
10/13/11	Oak Ridge, TN
10/19/11	Oak Ridge, TN
10/25/11	Oak Ridge, TN
11/04/11	Oak Ridge, TN
11/09/11	Clive, UT
11/09/11	Clive, UT
11/09/11	Clive, UT
11/09/11	Clive, UT
11/16/11	Oak Ridge, TN

5.0 NONRADIOACTIVE CHEMICAL RELEASES

5.1 Scheduled Chemical Waste Releases

Scheduled chemical waste releases to the circulating water system from January 1, 2011, to June 30, 2011, included 7.23E+05 gallons of neutralized wastewater. The wastewater contained 6.66E+00 lbs. of suspended solids and 3.92E+03 lbs. of dissolved solids.

Scheduled chemical waste releases to the circulating water system from July 1, 2011, to December 31, 2011, included 9.72E+05 gallons of neutralized wastewater. The wastewater contained 9.63E+00 lbs. of suspended solids and 1.57E+03 lbs. of dissolved solids.

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

5.2 Miscellaneous Chemical Waste Releases

Miscellaneous chemical waste releases from the wastewater effluent (based on effluent analyses) to the circulating water for January 1, 2011, to June 30, 2011, included 1.95E+07 gallons of clarified wastewater. The wastewater contained 4.05E+03 lbs. of suspended solids.

Miscellaneous chemical waste releases from the wastewater effluent (based on effluent analyses) to the circulating water for July 1, 2011, to December 31, 2011, included 1.86E+07 gallons of clarified wastewater. The wastewater contained 2.93E+03 lbs. of suspended solids.

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from January 1, 2011, to June 30, 2011, included 2.64E+05 lbs. of sodium bisulfite solution (1.00E+05 lbs. sodium bisulfite), 2.23E+05 lbs of Sodium Hypochlorite Solution (2.78E+04 lbs. sodium hypochlorite), and 4.56E+03 lbs. Acti-Brom 1338 (2.05E+03 lbs. sodium bromide).

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from July 1, 2011, to December 31, 2011, included 4.91E+05 lbs. of sodium bisulfite solution (1.86E+05 lbs sodium bisulfite), 5.33E+05 lbs. Sodium Hypochlorite Solution (6.67E+04 lbs. sodium hypochlorite), 5.94E+03 lbs. Acti-Brom 1338 (2.67E+03 lbs. sodium bromide).

6.0 CIRCULATING WATER SYSTEM OPERATION

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

Table 6-1
Circulating Water System Operation for 2011

	UNIT	JAN	FEB	MAR*	APR	MAY	JUN
Average Volume Cooling Water Discharge [million gal/day]**	1	291.9	291.9	314.5	316.0	412.2	506.6
	2	291.9	291.9	233.8	*	*	320.2
Average Cooling Water Intake Temperature [°F]	1	38.1	37.3	37.0	42.0	48.3	53.2
	2	38.7	38.5	38.2	*	*	54.5
Average Cooling Water Discharge Temperature [°F]	1	70.0	69.0	67.5	72.7	72.9	72.8
	2	71.2	70.0	36.5	*	*	61.8
Average Ambient Lake Temperature [°F]		34.1	33.5	33.2	38.3	44.4	OOS

*U2 outage circ water shut down 3/3/11 - 6/6/11
** For days with cooling water discharge flow.
OOS - Data not available due to instrument issues.

Table 6-1(continued)
Circulating Water System Operation for 2011

	UNIT	JUL	AUG	SEP	OCT	NOV	DEC
Average Volume Cooling Water Discharge [million gal/day]**	1	499.3	499.3	499.3	453.2	*	291.9
	2	499.3	499.3	499.3	519.9	523.4	310.3
Average Cooling Water Intake Temperature [°F]	1	56.6	64.2	59.1	56.5	*	43.1
	2	57.8	65.2	59.8	51.4	44.7	40.5
Average Cooling Water Discharge Temperature [°F]	1	76.6	84.4	79.6	67.9	*	63.7
	2	79.1	87.1	81.9	74.4	62.7	75.0
Average Ambient Lake Temperature [°F]		OOS	OOS	OOS	OOS	42	36.2

*U1 outage circ water shut down 10/4/11 - 12/13/11
** 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 2011. However, the Environmental Manual (EM) was revised. The EM is part of the ODCM. Copies of the revised EM are being submitted with this 2011 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 2011. 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 2011.

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.

As mentioned above, radioactive decay is a statistical process which has an inherent uncertainty in the analytical result. No two measurements will yield exactly the same result. However, the results are considered equal if the results fall within a certain range based upon the statistical parameters involved in the process. The REMP analytical results are reported at the 95% confidence limit in which the true result may be two standard deviations above or below the reported result. This means that there is only a 5% chance of concluding that the identified radioactive atom is not there when it really is present in the sample. A false positive is an analytical result which statistically shows that the radionuclide is present in the sample when it really is not there. Typically, if the 95% confidence interval for a positive does not include zero, the radionuclide is considered to be present. For example, the result is reported as 100 ± 90. One hundred minus 90 yields a positive result and therefore may be considered to be present. However, this may be a false positive. If the radionuclide was not in the plant effluent, this result would fall into that category which 5% of the time it is falsely concluded that the radionuclide is present when in actuality it is not. This usually happens at low concentrations at or near the LLD where fluctuations in the background during the counting process skew the results to produce a positive result.

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

9.2 Sampling Parameters

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

9.3 Deviations from Required Collection Frequency

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

9.4 Assistance to the State of Wisconsin

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

9.5 Program Modifications

No new permanent monitoring sites were added in 2011. Two temporary air sampling sites close to the plant were added during the Fukushima event. Those results are reported in Table 10-4.

Table 9-1
PBNP REMP Sample Analysis and Frequency

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

Table 9-2
PBNP REMP Sampling Locations

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

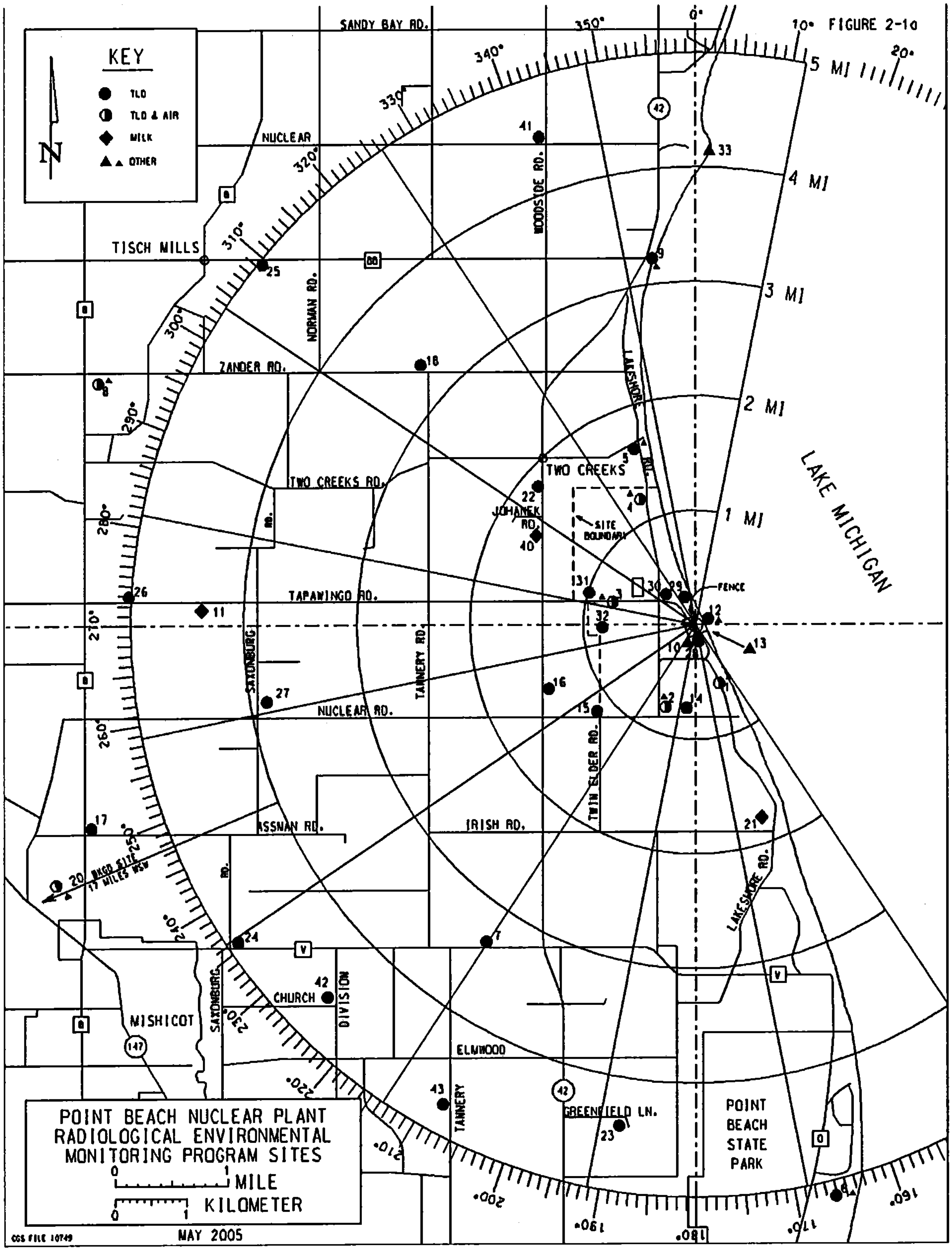


Figure 9-1
PBNP REMP Sampling Sites

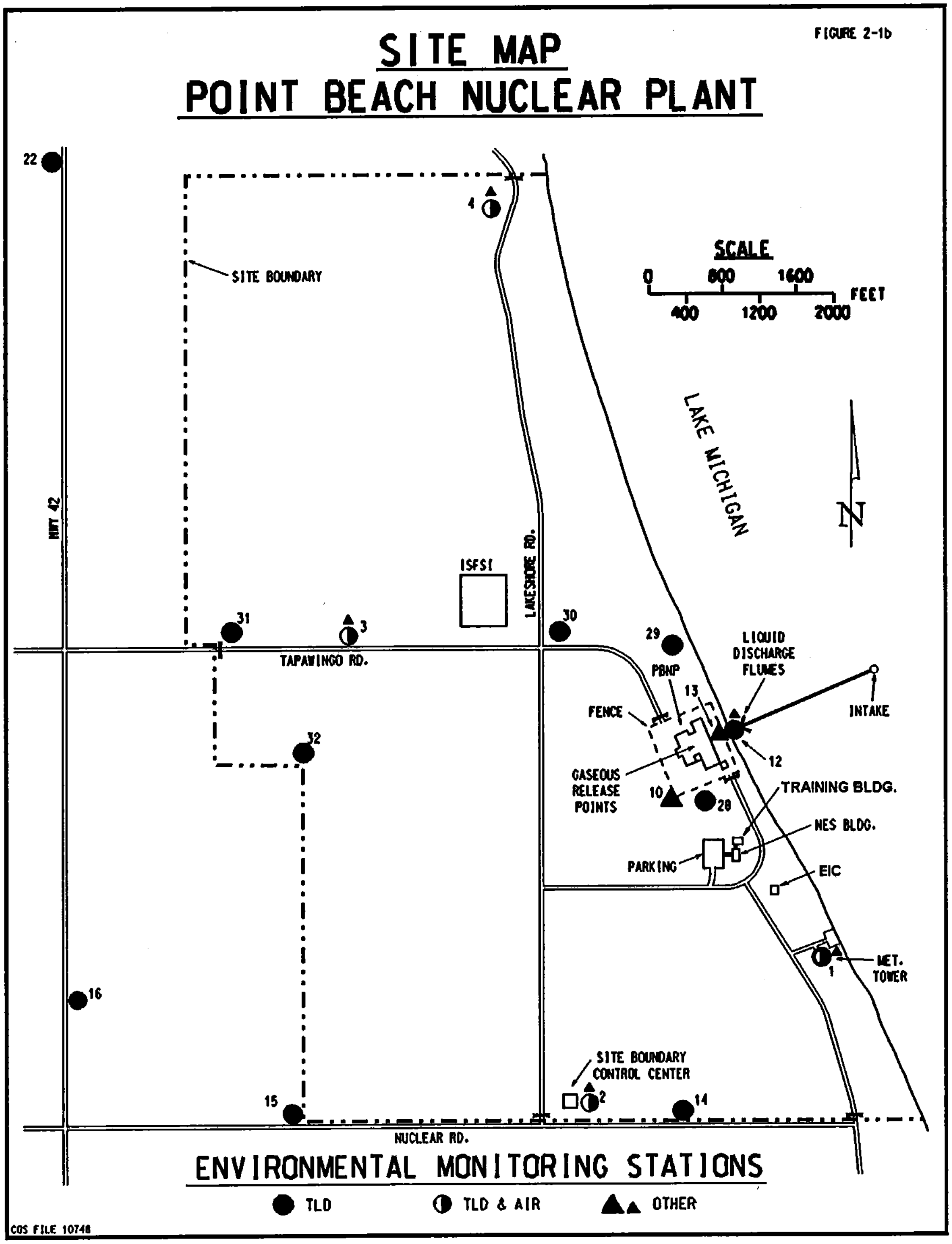


Figure 9-2
Map of REMP Sampling Sites Located Around PBNP

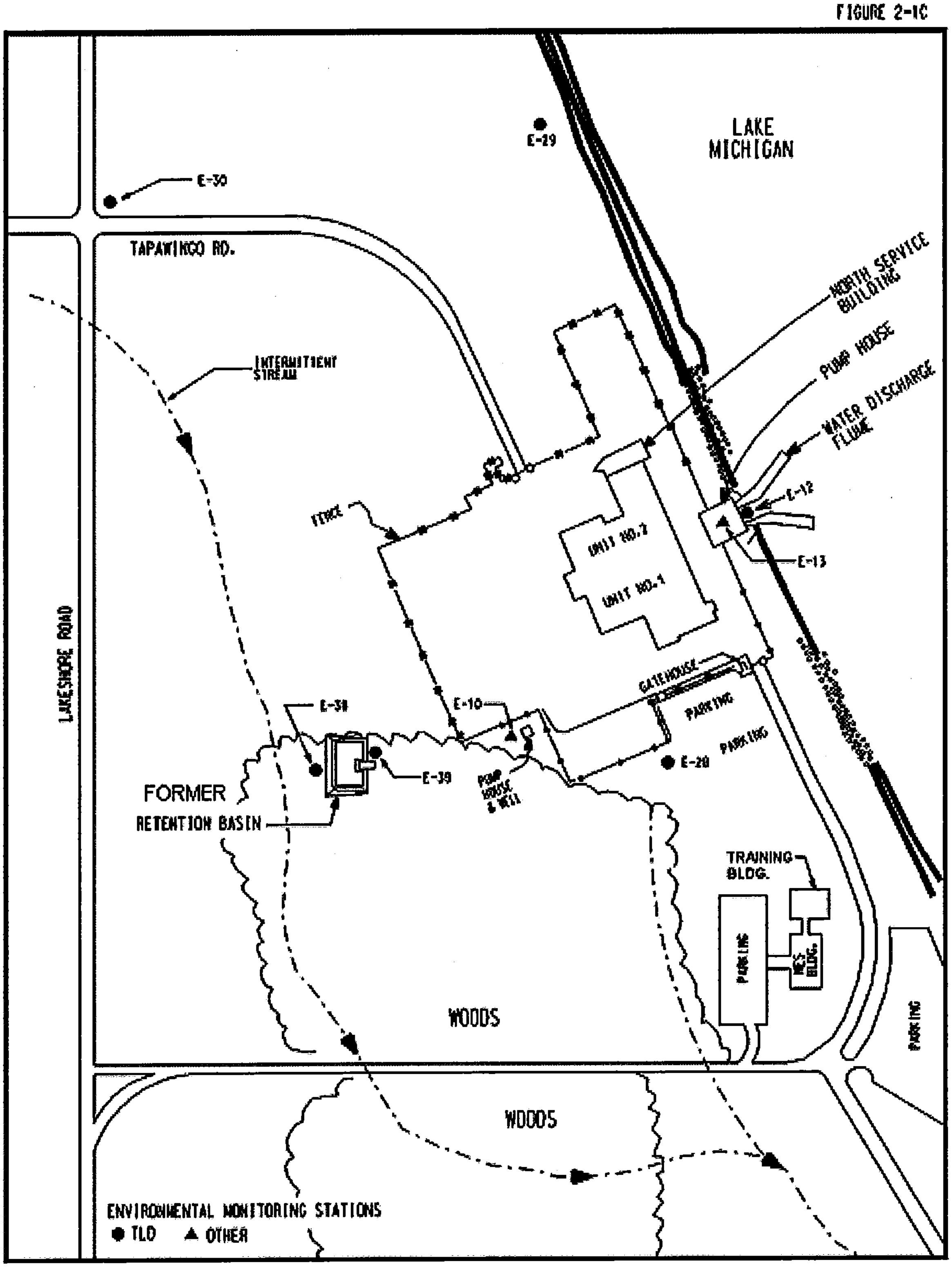


Figure 9-3
Enhanced Map Showing REMP Sampling Sites Closest to PBNP

Table 9-3
ISFSI Sampling Sites

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

Table 9-4
Minimum Acceptable Sample Size

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

Table 9-5
Deviations from Scheduled Sampling and Frequency

Sample Type	Location	Collection Date	Reason for not conducting REMP as required	Plans for Preventing Recurrence
AP/AI	E-04 E-03 E-03	3/10/11 5/24/11 6/30/11	Power loss Power loss to sampler Power loss to sampler	In all three cases the power was lost to the sampler resulting in a low volume. Hence each sample was considered to lost.
TLDs	E-42 E-15 E-31	07/07/11 10/07/11 10/07/11	TLD missing in the field TLD missing in the field TLD missing in the field	All three losses were beyond program control as the poles to which the TLDs were attached were changed out. The TLD was removed with the pole. In one instance the cage containing the TLD was found the next quarter but the data was not used.

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 2011.

9.7 Description of Analytical Parameters in Table 9-1

9.7.1 Gamma isotopic analysis

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

9.7.2 Gross Beta Analysis

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

9.7.3 Water Samples

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

9.7.4 Air Samples

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

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

9.7.5 Vegetation

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

No special vegetation samples were obtained for C-14 analyses in 2011.

9.7.6 Environmental Radiation Exposure

The 2011 environmental radiation exposure measurements were made using TLD cards. The TLD card is a small passive detector, which integrates radiation exposure. Each TLD consists of a Teflon sheet coated with a crystalline, phosphorus material (calcium sulfate containing dysprosium) which absorbs the gamma ray energy deposited in them. Each TLD is read in four distinct areas to yield four exposure values which are averaged. Prior to the third quarter of 2001, exposure data was obtained using three lithium fluoride (LiF) TLD chips sealed in black plastic. The difference in material types can impact the amount of exposure measured. A comparison of the first quarters to the last two quarters in 2001, shows that the TLD cards typically produce a higher measured exposure value than the LiF chips (Table 9-7).

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

As seen in Table 9-7, the change from LiF chips to TLD cards resulted in an average readout of 14%. If only the positive changes are compared, the increase is 17%. The largest increase was at Site E-38, a location near the former retention pond prior to completion of its remediation.

Table 9-7 Comparison of 2001 TLDs: LiF Chips vs. TLD Cards

	LiF Chips			TLD Cards			AVG	Percent	
Site	Q1	Q2	AVG	Q3	Q4	AVG	Δ	Change	
E-01	0.96	0.98	0.97	0.99	1.15	1.07	0.10	10.46	
E-02	1.12	1.12	1.12	1.28	1.43	1.35	0.23	20.79	
*E-03	1.00	0.98	0.99	1.76	1.51	1.64	0.65	65.34	
E-04	0.99	0.99	0.99	1.35	1.08	1.21	0.22	22.65	
E-05	0.97	0.92	0.94	1.29	1.21	1.25	0.31	32.79	
E-06	0.93	1.01	0.97	1.18	0.89	1.03	0.06	6.45	
E-07	0.95	0.94	0.94	1.04	0.85	0.95	0.00	0.25	
E-08	0.89	0.88	0.88	1.03	1.02	1.03	0.14	16.28	
E-09	0.99	0.99	0.99	1.27	1.07	1.17	0.18	18.08	
E-12	0.93	1.01	0.97	0.95	0.77	0.86	-0.11	-11.09	
E-14	1.10	1.09	1.10	1.17	1.06	1.11	0.02	1.73	
E-15	1.23	1.26	1.25	1.24	1.36	1.30	0.05	4.30	
E-16	0.97	0.97	0.97	1.09	1.01	1.05	0.08	8.70	
E-17	0.90	0.86	0.88	1.21	1.07	1.14	0.26	29.68	
E-18	1.25	1.26	1.26	1.41	1.20	1.30	0.05	3.82	
E-22	1.03	0.98	1.01	1.29	1.14	1.21	0.21	20.37	
E-23	1.14	1.14	1.14	1.36	1.19	1.27	0.14	11.95	
E-24	0.98	0.95	0.97	1.34	1.13	1.23	0.27	27.62	
E-25	1.04	1.02	1.03	1.19	1.12	1.15	0.12	11.63	
E-26	0.88	0.88	0.88	1.05	0.86	0.96	0.08	8.97	
E-27	1.01	1.02	1.01	1.15	1.05	1.10	0.08	8.31	
*E-28	1.04	1.03	1.03	0.95	0.77	0.86	-0.18	-17.01	
*E-29	0.98	1.02	1.00	1.17	1.11	1.14	0.14	14.33	
*E-30	1.02	1.08	1.05	0.98	0.99	0.99	-0.07	-6.33	
*E-31	1.06	1.00	1.03	1.23	1.09	1.16	0.13	12.69	
*E-32	1.01	0.93	0.97	1.08	1.14	1.11	0.14	14.60	
E-38	0.98	0.98	0.98	1.76	1.58	1.67	0.68	69.46	
E-39	1.00	0.96	0.98	0.99	0.98	0.98	0.00	0.17	
E-20	0.98	0.96	0.97	1.18	1.00	1.09	0.12	12.23	
			Statistics for all values			Avg Δ =	0.14	14.46	= Avg. Δ %
			Statistics for all + increases			Avg +Δ =	0.17	17.45	= Avg. +Δ %
	Statistics for selected TLD sites				Avg Δ % non-ISFSI TLDs			14.83	
					Avg Δ % ISFSI TLDs			13.93	
*ISFSI sites					Avg Δ % ISFSI TLDs w/o E-03			13.87	

The next highest increase, 65%, occurred at E-03, the site nearest the dry cask storage modules at the ISFSI. Two of the five TLD sites used to monitor the ISFSI saw a reduction. The increase at E-31 at the site boundary is comparable to the average of all non-ISFSI increases.

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 2011 REMP Results

Radiological environmental monitoring conducted at PBNP from January 1, 2011, through December 31, 2011, 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, a LLD, which is lower than 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 a 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 Japanese Fukushima Daiichi Event

On March 11, 2011, an underwater earthquake occurred off the shore of Japan and the resulting tsunami caused extensive damage to the Fukushima Daiichi nuclear plant. The prevailing global wind patterns transported the radioactive material released from this plant across the Pacific Ocean where it soon was detected along the west coast of the United States. Soon afterward this radioactivity was detected by the PBNP radiological environmental monitoring program (REMP) and by other REMPs across the country. As a result of this event, additional PBNP REMP samples obtained and analyses were made. The following is a description of the actions taken and the results obtained.

The first indication of activity from Fukushima occurred as I-131 collected on charcoal cartridges for the time period of March 16 to March 24, 2011. There was no definitive indication on the individual air particulate filters (APs) analyzed by gross beta counting. With the finding of I-131, the weekly APs were composited and gamma scanned. In addition to the 6 REMP air sampling sites, additional air samplers were set up at Warehouse 1 and the ISFSI. Also, precipitation samples were collected on March 22, 25, and April 6, 19, and 21, 2011.

Fukushima results are shown in the various tables. The results of individual gross beta and I-131 analyses from the six air sampling sites are shown in Table 10-3. Results of individual samples close to the site are shown in Table 10-4. In order to enhance the ability to see airborne particulate activity, each week's six air particulate samples were composited and gamma scanned (Table 10-5). Finally, precipitation samples collected from rain events from March 22 to April 21, 2011 were analyzed (Table 10-6).

Table 10-1
Summary of Radiological Environmental Monitoring Results for 2011

Sample	Description	N	LLD (a)	Average ± 1 Std. Deviation (b)	High ± 2 sigma	Units
TLD	Environmental Radiation	121	1 mrem	1.14 ± 0.25	1.57 ± 0.12	mR/7days
	Control (E-20)	4	1 mrem	1.15 ± 0.04	1.18 ± 0.10	mR/7days
Air	Gross Beta	257	0.01	0.026 ± 0.008	0.053 ± 0.004	pCi/m3
	Control (E-20) Gross beta	52	0.01	0.026 ± 0.009	0.049 ± 0.005	pCi/m3
	I-131	257	0.030 (0.07)	0.070 ± 0.027	0.125 ± 0.027	pCi/m3
	Control (E-20) I-131	52	0.030 (0.07)	0.087 ± 0.034	0.122 ± 0.025	pCi/m3
	Cs-134	20	0.01(0.05)	0.0001 ± 0.0005	0.0009 ± 0.0005	pCi/m3
	Control (E-20) Cs-134	4	0.01(0.05)	ND	-	pCi/m3
	Cs-137	20	0.01(0.06)	0.0002 ± 0.0003	0.0008 ± 0.0006	pCi/m3
	Control (E-20) Cs-137	4	0.01(0.06)	ND	-	pCi/m3
	Other gamma emitters	20	0.1	0.0001 ± 0.0003	0.0007 - 0.0006	pCi/m3
	Control (E-20) Other	4	0.1	0.0002 ± 0.0005	0.0008 ± 0.0005	pCi/m3
Milk	Sr-89	36	5	ND	-	pCi/L
	Sr-90	36	1	0.8 ± 0.4	1.7 ± 0.4	pCi/L
	I-131	36	0.5	ND	-	pCi/L
	Cs-134	36	5 (15)	ND	-	pCi/L
	Cs-137	36	5 (18)	0.3 ± 1.3	2.9 ± 2.1	pCi/L
	Ba-La-140	36	5 (15)	-0.8 ± 1.4	1.9 ± 1.2	pCi/L
	Other gamma emitters	36	15	0.3 ± 0.9	3.1 ± 1.9	pCi/L
Well Water	Gross beta	4	4	1.4 ± 1.3	3.0 ± 1.7	pCi/L
	H-3	4	200 (3000)	ND	-	pCi/L
	Sr-89	4	5(10)	ND	-	pCi/L
	Sr-90	4	1 (2)	ND	-	pCi/L
	I-131	4	0.5(2)	ND	-	pCi/L
	Mn-54	4	10 (15)	ND	-	pCi/L
	Fe-59	4	30	ND	-	pCi/L
	Co-58	4	10(15)	ND	-	pCi/L
	Co-60	4	10(15)	ND	-	pCi/L
	Zn-65	4	30	ND	-	pCi/L
	Zr-Nb-95	4	15	ND	-	pCi/L
	Cs-134	4	10(15)	ND	-	pCi/L
	Cs-137	4	10(18)	1.1 ± 1.3	2.2 ± 2.1	pCi/L
	Ba-La-140	4	15	1.5 ± 0.9	2.5 ± 2.0	pCi/L
	Other gamma emitters	4	30	ND	-	pCi/L
Algae	Gross beta	6	0.25	4.49 ± 1.19	5.86 ± 0.24	pCi/g
	Co-58	6	0.25	0.017 ± 0.038	0.093 ± 0.044	pCi/g
	Co-60	6	0.25	0.051 ± 0.114	0.284 ± 0.043	pCi/g
	Cs-134	6	0.25	0.001 ± 0.012	0.016 ± 0.013	pCi/g
	Cs-137	6	0.25	0.019 ± 0.013	0.042 ± 0.019	pCi/g

(a) When two LLD values are listed, the required LLD per the PBNP REMP is enclosed in the parentheses. Whenever possible, PBNP uses the lower value to obtain greater sensitivity.
(b) "ND" indicates that the sample result is Not Detectable, i.e., sample concentrations were statistically equivalent to zero and less than the MDA.

Table 10-1 (continued)
Summary of Radiological Environmental Monitoring Results for 2011

Sample	Description	N	LLD (a)	Average ± 1 Std. Deviation (b)	High ± 2 sigma	Units
Lake Water	Gross beta	48	4	2.1 ± 1.8	11.3 ± 1.2	pCi/L
	I-131	48	0.5 (2)	ND	-	pCi/L
	Mn-54	48	10 (15)	ND	-	pCi/L
	Fe-59	48	30	-0.2 ± 2.0	5.7 ± 5.4	pCi/L
	Co-58	48	10(15)	0.1 ± 1.0	2.5 ± 1.6	pCi/L
	Co-60	48	10(15)	-0.1 ± 1.1	2.3 ± 1.6	pCi/L
	Zn-65	48	30	-0.5 ± 2.0	3.9 ± 2.9	pCi/L
	Zr-Nb-95	48	15	-0.5 ± 1.4	2.1 ± 1.6	pCi/L
	Cs-134	48	10 (15)	ND	-	pCi/L
	Cs-137	48	10 (18)	0.3 ± 1.2	2.5 ± 2.4	pCi/L
	Ba-La-140	48	15	-0.2 ± 1.7	3.9 ± 2.5	pCi/L
	Ru-103 (Other gamma)	48	30	-0.3 ± 1.1	2.5 ± 1.5	pCi/L
	Sr-89	16	5(10)	ND	-	pCi/L
	Sr-90	16	1 (2)	0.25 ± 0.15	0.53 ± 0.38	pCi/L
	H-3	16	200 (3000)	1503 ± 5496	22096 ± 449	pCi/L
Fish	Gross beta	6	0.5	3.54 ± 0.20	3.73 ± 0.07	pCi/g
	Mn-54	6	0.13	ND	-	pCi/g
	Fe-59	6	0.26	0.015 ± 0.017	0.033 ± 0.017	pCi/g
	Co-58	6	0.13	0.006 ± 0.005	0.014 ± 0.007	pCi/g
	Co-60	6	0.13	ND	-	pCi/g
	Zn-65	6	0.26	ND	-	pCi/g
	Cs-134	6	0.13	ND	-	pCi/g
	Cs-137	6	0.15	0.043 ± 0.030	0.103 ± 0.021	pCi/g
	Ru-103 (Other gamma)	6	0.5	-0.001 ± 0.013	0.014 ± 0.008	pCi/g
Shoreline Sediment	Gross beta	10	2	8.61 ± 1.27	10.79 ± 1.00	pCi/g
	Cs-137	10	0.15	0.022 ± 0.007	0.032 ± 0.013	pCi/g
Soil	Gross beta	16	2	26.09 ± 7.1	33.81 ± 1.71	pCi/g
	Cs-137	16	0.15	0.17 ± 0.09	0.42 ± 0.04	pCi/g
Vegetation	Gross beta	24	0.25	6.81 ± 1.82	10.92 ± 0.31	pCi/g
	I-131	24	0.06	0.002 ± 0.007	0.020 ± 0.011	pCi/g
	Cs-134	24	0.06	0.001 ± 0.007	0.013 ± 0.009	pCi/g
	Cs-137	24	0.08	0.006 ± 0.007	0.019 ± 0.008	pCi/g
	Other gamma emitters	24	0.25	0.002 ± 0.009	0.030 ± 0.015	pCi/g

(a) When two LLD values are listed, the required LLD per the PBNP REMP is enclosed in the parentheses. Whenever possible, PBNP uses the lower value to obtain greater sensitivity.
(b) "ND" indicates that the sample result is Not Detectable, i.e., sample concentrations were statistically equal to zero or <MDA.

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 2011

Fence Location	Average	±	Standard Deviation	Units
North	2.44	±	0.1	mR/7 days
East	2.62	±	0.46	mR/7 days
South	1.31	±	0.1	mR/7 days
West	4.75	±	0.5	mR/7 days

Table 10-3 Fukushima Gross Beta and Charcoal Cartridge Results

Date	E-01 Particulate Gross β	Charcoal I-131	E-02 Particulate Gross β	Charcoal I-131	E-03 Particulate Gross β	Charcoal I-131
03-16-11	0.024 ± 0.003	< 0.016	0.024 ± 0.003	< 0.015	0.022 ± 0.003	< 0.017
03-24-11	0.037 ± 0.003	0.091±0.024	0.027 ± 0.003	0.101±0.022	0.027 ± 0.003	0.081±0.023
03-30-11	0.030 ± 0.005	0.080±0.022	0.032 ± 0.004	0.058±0.023	0.030 ± 0.004	0.068±0.019
04-06-11	0.033 ± 0.004	0.046±0.019	0.034 ± 0.004	0.095±0.021	0.033 ± 0.004	0.089±0.021
04-13-11	0.026 ± 0.003	0.024±0.013	0.027 ± 0.003	0.027±0.014	0.024 ± 0.003	0.040±0.019
04-20-11	0.026 ± 0.003	< 0.018	0.030 ± 0.003	< 0.014	0.028 ± 0.003	< 0.020
	E-04		E-08		E-20	
03-16-11	0.027 ± 0.004	< 0.016	0.024 ± 0.004	< 0.018	0.025 ± 0.004	< 0.018
03-24-11	0.030 ± 0.003	0.075±0.017	0.025 ± 0.003	0.073±0.018	0.031 ± 0.003	0.104±0.025
03-30-11	0.033 ± 0.005	0.125±0.027	0.033 ± 0.004	0.086±0.023	0.031 ± 0.005	0.122±0.025
04-06-11	0.031 ± 0.004	0.078±0.021	0.035 ± 0.004	0.087±0.026	0.034 ± 0.004	0.078±0.017
04-13-11	0.026 ± 0.003	0.038±0.018	0.025 ± 0.003	0.035±0.015	0.026 ± 0.003	0.044±0.021
04-20-11	0.026 ± 0.003	< 0.020	0.027 ± 0.003	< 0.018	0.026 ± 0.003	< 0.017

Table 10-4 Additional Fukushima I-131 Results

Date	Warehouse 1 Air particulate	Warehouse 1 Charcoal	ISFSI Air particulate	ISFSI Charcoal
3/27/2011	0.028 ± 0.014	0.050 ± 0.028		
3/31/2011	-	-	0.017 ± 0.009	0.105 ± 0.015
4/6/2011	-	-	0.024 ± 0.011	0.054 ± 0.017
4/14/2011	-	-	0.003 ± 0.003	0.019 ± 0.009
4/21/2011	-	-	0.002 ± 0.004	0.007 ± 0.005

- No sample

Table 10-5 Gamma Scan of Weekly Airborne Composite Samples.

	March 16	March 24	30-Mar
I-131	ND	0.0245 ± 0.0034	0.0399 ± 0.0038
Cs-134	ND	0.0007 ± 0.0006	ND
Cs-137	ND	0.0010 ± 0.0007	ND
	April 6	**April 13**	**April 20**
I-131	0.0238 ± 0.0028	0.0057 ± 0.0033	0.0076 ± 0.0007
Cs-134	0.0017 ± 0.0008	0.0019 ± 0.0010	0.0037 ± 0.0012
Cs-137	0.0026 ± 0.0014	0.0020 ± 0.0012	0.0038 ± 0.0016
	April 27	**May 4**	
I-131	ND	0.0008 ± 0.0006	
Cs-134	0.0010 ± 0.0009	ND	
Cs-137	0.0014 ± 0.0010	0.0010 ± 0.0007	

ND Sample result is below the minimum detectable concentration

Table 10-6 Precipitation Results South, West, and North of Point Beach

Fukushima Precipitation Samples (pCi/l)

	E-02 (S)	E-03 (W)	E-04 (N)
		March 22	
I-131	11.7 ± 3.8	10.4 ± 3.6	14.1 ± 5.1
Cs-137	ND	ND	ND
Sr-90	ND	ND	0.9 ± 0.7
		March 25	
I-131	24.4 ± 4.9	18.3 ± 4.8	33.1 ± 4.7
Cs-137	1.8 ± 1.8	ND	ND
Sr-90	ND	ND	ND
		April 6	
I-131	12.6 ± 1.6	13.6 ± 1.5	10.8 ± 1.5
Cs-137	ND	ND	ND
Sr-90	ND	ND	ND
		April 19	
I-131	1.00 ± 0.18	1.23 ± 0.19	0.86 ± 0.27
Cs-137	ND	ND	ND
Sr-90	ND	ND	ND
		April 21	
I-131	0.10 ± 0.22	0.05 ± 0.53	1.23 ± 0.30
Cs-137	ND	ND	ND
Sr-90	ND	ND	ND

April 19 and 21, I-131 by beta counting after column extraction

March 22 - April 6, I-131 by gamma scan

ND = not detected

11.0 DISCUSSION

11.1 TLD Cards

The ambient radiation was measured in the general area of the site boundary, at an outer ring four – five miles from the plant, at special interest areas, and at one control location, roughly 17 miles southwest of the plant. The average indicator TLD cards is 1.14 ± 0.50 mR/7 days and 1.15 ± 0.08 mR/7 days at the background location. These two values are not significantly different from each other. Neither are the indicator TLD values significantly different from those observed from 2001 through 2011 (tabulated below in Table 11-1) from 2000 to 2001. 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).

Table 11-1
Average Indicator TLD Results from 1993 – 2011

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

*St. Dev = Standard Deviation

There were no new dry fuel storage cask additions to the ISFSI in 2011. No new storage casks have been added since 2009 when 5 horizontal storage modules were loaded on the east pad. The west fence TLDs continue to record higher exposures. The north and east fence TLDs are statistically equal (2.44 ± 0.11 *vs.* 2.62 ± 0.46). The south fence continues to record the lowest exposures (Table 11-2).

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

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

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, 1.25 ± 0.31; E-32, 1.32 ± 0.23) are comparable to the background site E-20 (1.11 ± 0.19) within the associated measurement error, indicating no measurable increase in ambient gamma radiation at the site boundary due to the operation of the ISFSI.

Further data supporting this conclusion is the comparison of the TLD results at selected locations around the ISFSI before and after the storage of spent fuel at the ISFSI (Figure 11-1). As discussed in Section 9.7.6, the TLD values increased in the second half of 2001 when the TLD monitoring devices were changed from LiF chips in the first half of the year to calcium sulfate impregnated TLD cards beginning at the second half of the year. After that initial change, the radiation exposure as measured by the TLD cards has remained fairly constant even with the addition of stored fuel at the ISFSI. The results from E-30 continue to be lower than the results from E-31 even though E-30 is closer to the ISFSI than E-31. Each year the variations in the TLD results appear to move in concert with each other and with the background site, E-20, which is 17 miles south west of the ISFSI.

Therefore, the TLD monitoring results indicate that there is little or not effect on the ambient gamma radiation from the operation of the plant. Data supporting this conclusion is the comparison of TLD results for the first half of 2001 with the last half of 2001. As previously mentioned, for the last two quarters of 2001, the LiF TLD chips were replaced with calcium sulfate impregnated Teflon TLD cards which resulted in a higher reported background exposure (Figure 11-1).

Figure 11-1 ISFSI AREA TLD RESULTS

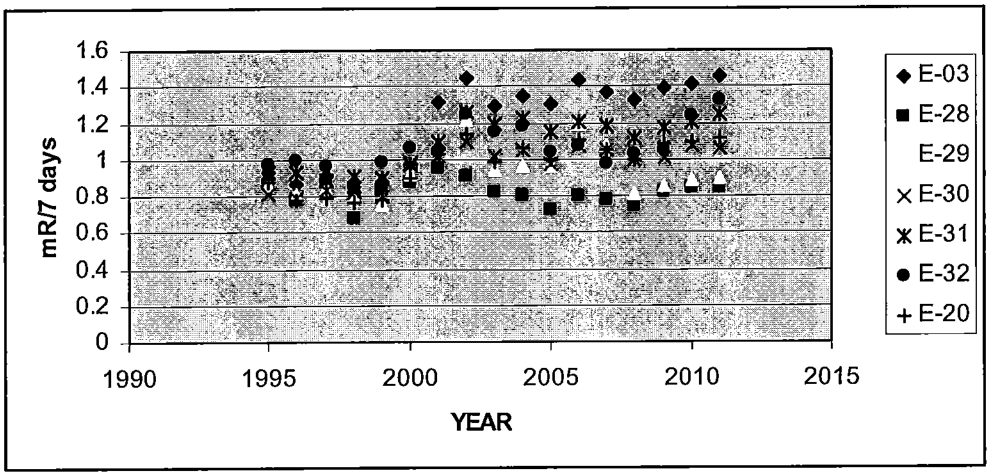


Table 11-3
Average TLD Results Surrounding the ISFSI (mR/7 days)

	Sampling Site						
	E-03	E-28	E-29	E-30	E-31**	E-32**	E-20***
Pre-Operation*	0.93	0.87	0.87	0.81	0.93	0.98	0.88
1996	0.87	0.78	0.81	0.79	0.93	1.00	0.78
1997	0.91	0.89	0.84	0.84	0.89	0.97	0.79
1998	0.82	0.68	0.80	0.82	0.91	0.85	0.77
1999	0.88	0.83	0.76	0.80	0.90	0.99	0.78
2000	0.98	0.88	0.92	0.99	0.98	1.06	0.90
2001	1.31	0.95	1.07	1.02	1.10	1.04	1.03
2002	1.45	0.91	1.22	1.10	1.26	1.25	1.14
2003	1.29	0.82	0.94	1.02	1.20	1.15	0.99
2004	1.35	0.80	0.96	1.05	1.23	1.18	1.06
2005	1.30	0.72	0.96	0.98	1.15	1.04	1.00
2006	1.44	0.80	1.19	1.07	1.21	1.07	1.11
2007	1.37	0.78	1.07	1.05	1.18	0.97	1.05
2008	1.33	0.75	0.81	1.00	1.12	1.03	1.00
2009	1.39	0.82	0.85	1.01	1.17	1.05	1.09
2010	1.41	0.84	0.89	1.07	1.21	1.24	1.10
2011	1.46	0.85	0.9	1.06	1.25	1.32	1.12

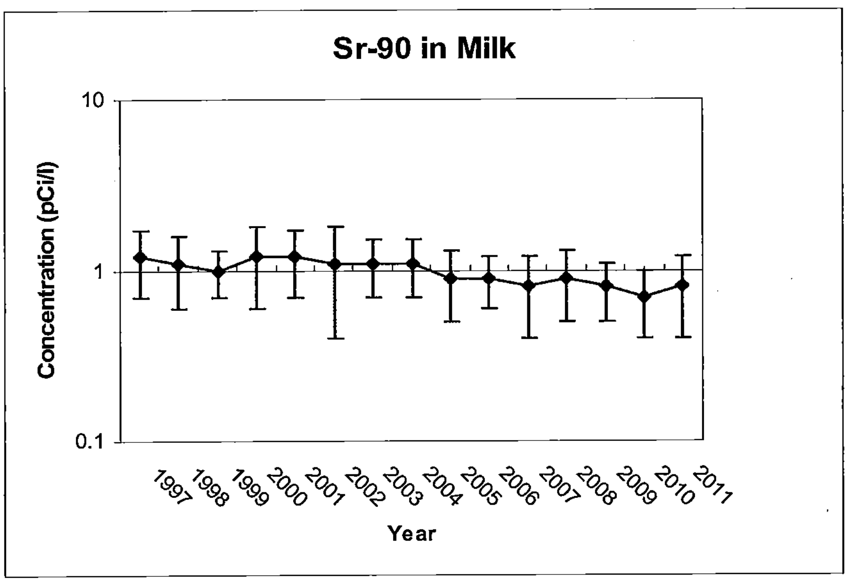
*Pre-Operational data are the averages of the years 1992 through 3rd quarter of 1995.
**Sites E-31 and E-32 are located at the Site Boundary to the West and South-West of the ISFSI.
***E-20 is located approximately 17 miles WSW of the ISFSI.

11.2 Milk

Naturally occurring potassium-40 (1421 ± 70 pCi/l) continues to be the most prevalent radionuclide measured in milk at concentrations roughly 1800 times higher than the only potential plant related radionuclide, Sr-90 (0.8 ± 0.8 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.

Though similar to previous years, the Strontium-90 results show a logarithmic decrease over time (Figure 11-2). The environmental half-life of Sr-90 calculated using the annual average Sr-90 concentration in milk between 1997 and 2011 is 23.9 years. Because the radiological half-life is 28 years, the shorter environmental half-life indicates that environmental factors as well as radioactive decay are working to decrease the concentration of Sr-90 in milk. The calculated physical removal half-life is 147 years. This indicates that the radiological half-life dominates the decrease of Sr-90 in the milk samples obtained around PBNP. 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 2011 show no radiological effects of the plant operation.

Figure 11-2
Sr-90 Concentration in Milk



11.3 Air

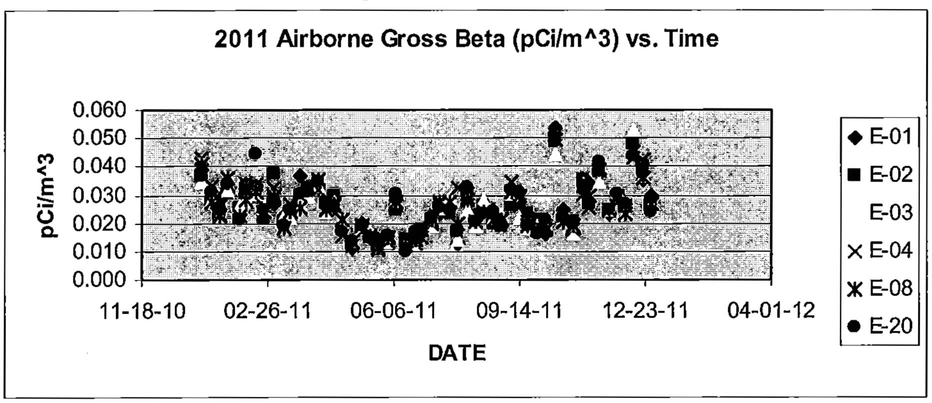
The average annual gross beta concentrations (plus/minus the two-sigma uncertainty) in weekly airborne particulates at the indicator and control locations were 0.026 ± 0.018 pCi/m^3 and 0.026 ± 0.018 pCi/m^3, respectively, and are similar to levels observed from 1993 through 2010 (Table 11-4).

Table 11-4
Average Gross Beta Measurements in Air

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

The 2011 weekly gross beta concentrations reveal higher winter values and lower summer values (Figure 11-3). This is a repeat of the patterns seen in 2006 - 2010. Again, as in previous years, another high period occurs during July-September. The cause for this scatter is not known but, may be due to a shift in land use or weather patterns. Also shown in Figure 11-3 is a slight increase in gross beta results beginning in March attributable to the Fukushima event. This small increase more perceptible when all the data are plotted as compared to merely looking at the tabulated, monthly results.

Figure 11-3



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 0.005 to 0.020 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 0.003 pCi/m^3.

I-131 was detected at all six REMP air sampling sites in weekly REMP samples and in the special samples obtained closer to the plant (Tables 10-3 through 10-6) beginning with the week of March 16 to March 24, 2011 and ending with the sample for the week of April 6 to April 13, 2011. I-131 appeared in both the particulate phase (particulate filters) and on the charcoal canisters (the gas or vapor phase). Comparing all of the measured I-131 concentrations indicates a uniform distribution over an area as far as 17 miles from the plant. PBNP released I-131 at a concentration of 5.6E-14 µCi/cc (0.056 pCi/m^3) during the week of March 21, to March 28, 2011. This release concentration is lower that the particulate+gas/vapor phase concentrations seen in the REMP and special airborne samples obtained during this period. Because the I-131 concentrations found in the PBNP REMP and special samples are higher than that released by PBNP, the I-131 found by monitoring is attributable to the Fukushima event and not to the small amount of I-131 PBNP released during the one week in March. Therefore, it is concluded that the release of the small amount of radioiodine by PBNP during the week of March 21 to March 28, 2011 had no measurable impact on the environment.

At each airborne REMP monitoring site the weekly air particulate filters are composited quarterly for gamma spectroscopic analysis. During the Fukushima event, all the individual, weekly particulate samples were composited for gamma analysis prior to being added to the quarterly composite of each location. Gamma scans of these weekly particulate filter composites indicates that I-131 was detectable in particulate samples at the same time it was detected in the analyses of individual charcoal canisters.

The detection of particulate I-131 occurs two weeks prior to the detection of either Cs-134 or Cs-137 and at higher concentrations (Table 10-5). All three continued to be easily detectable on particulate filters during the first three weeks of April until the week ending April 20, 2011. Because the only PBNP I-131 release prior to the first detection on particulate filters and charcoal canisters occurred in the week ending January 17, 2011, the I-131 is not attributable to PBNP because the PBNP I-131 would have decayed to below detectable levels by March 24, 2011. Similarly, PBNP had no Cs-134 or Cs-137 emissions during January to May of 2011. Therefore, the detected Cs-134 and Cs-137 could not be from PBNP. This is a further evidence that the radionuclides detected in PBNP airborne samples could not be attributable to the operation of PBNP.

In summary, the 2011 air data does not demonstrate an environmental impact from the operation of PBNP.

11.4 Lake Water

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

There were nineteen, slightly positive indications of gamma emitters during 2011. None of the concentrations were equal or greater than the MDC. Twelve positive results occurred at the two locations 1.5 and 4.5 miles north of the plant. These locations are considered to be upstream based on the north to south current flow on the west shore of Lake Michigan and therefore are very unlikely to be an indication of PBNP effluent. Of the remaining seven occurrences, four are for radionuclides not discharged the months they had a positive indication in Lake Michigan (Ru-103 in January; Fe-59, Cs-137, and Ba/La-140 in August). The remaining three positives are for Co-60 in January, Co-58 in May and September. In each case, the highest measured concentration, 2.5 ± 1.6 pCi/l is higher than the corresponding discharge concentration of 0.00067 pCi/l. Because the positive concentrations measured in the lake are higher than the discharge concentrations and because any discharges would be further diluted by mixing in the lake, the observed positive concentrations are considered to be false positives. Therefore, based on the results of the gamma scans of Lake Michigan water, there is no measureable impact on the lake from PBNP discharges.

Aliquots of the monthly samples are composite quarterly and analyzed for Sr-89/90 and for tritium. No Sr-89 was detected in any of the samples. There were six samples in which Sr-90 concentrations were slightly positive but below the MDC. Because PBNP did not discharged Sr-90 during 2011, these results are considered to be either false positives or the indication of persisting low levels of Sr-90 in the lake which resulted from fallout from atmospheric weapons testing in the1950s and 1960s.

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 2011, ranged from less than MDC to 22,096 pCi/l. This high occurred in the first quarter. Tritium analyses of the individual months in this quarter indicated that the March Lake Michigan sample had a tritium concentration of 64,741 pCi/l. This sampling location is locate 4.5 miles north of PBNP near another nuclear facility and is considered to be up-current from PBNP based on the currents on the west side of Lake Michigan. It is concluded that the PBNP sample was obtained sometime after a H-3 discharge from that facility. The only other quarterly H-3 result above its MDC occurred in the first quarter from a location approximately 0.7 miles south of the PBNP discharge. Analyses of the individual months indicates that elevated H-3 concentration resulted from the January 13, 2011 sample which had a 2709 pCi/l tritium concentration. A review of liquid discharge permits revealed that a waste tank containing H-3 was discharged that day. Therefore, is concluded that the measured concentration resulted from sampling either during or shortly after the discharge which occurred on January 13, 2011. The measured concentration is at about 10% of the EPA drinking water limit.

Based on analyses of Lake Michigan water, there is no measureable impact on the waters of Lake Michigan other than that indicated by the elevated H-3 concentration in the January 13, 2011 sample.

11.5 Algae

Filamentous algae attached to rocks along the Lake Michigan shoreline are known to concentrate radionuclides from the water. Samples were obtained at Two Creeks Park and at the PBNP discharge (locations 5 and 12 in Figure 9-1) in June, August, and October of 2011. There was one positive result for Cs-134 and that occurred at location 12 near the PBNP discharge. Because no Cs-134 was detected in any of the PBNP batch releases, this occurrence of Cs-134 is considered to be a false positive indication. Five of the six samples had measureable Cs-137 concentrations which were above the MDC. Three of the positive results were from north of PBNP and therefore are not considered to be related to any PBNP discharges. The only PBNP Cs-137 liquid discharge prior to the October sample occurred in February of 2011. The June algae sample from the vicinity of the PBNP discharge had no detectable Cs-137 even though it is the sample closest to the PBNP Cs-137 discharge date. The August sample from the same location was the highest of the six samples, 0.042 ± 0.019 pCi/g. These Cs-137 results, like those in the past, are attributable to the recycling of bomb fallout, from weapons testing in the '50s, 60's and other nuclear events such as Chernobyl, in the Lake Michigan environment.

PBNP discharged Co-60 and Co-58 every month in 2011. However, only the June 2011 sample from the location close to the PBNP discharge had any appreciable Co-58 (0.093 ± 0.044 pCi/g) and Co-60 (0.284 ± 0.043 pCi/g). In the subsequent samples from this location there is little or no radio-cobalt present. Similarly, at the site north of PBNP, no Co-58 was detected in any of the three samples. Only two of the three samples had detectable Co-60 concentrations and these concentrations were barely positive (0.010 ± 0.007 and 0.007 ± 0.003 pCi/g).

The Cs-137 and Co-60 results are well below the naturally occurring radionuclides Be-7 and K-40. The concentrations of these two radionuclides range from 0.87 ± 0.07 to 2.84 ± 0.34 pCi/g for Be-7 and from 0.96 ± 0.50 to 4.27 ± 0.50 pCi/g for K-40.

Based on the low concentrations of radio-cobalt and radio-cesium, the algae monitoring results indicate little to no effect by PBNP upon the environs.

11.6 Fish

All six fish samples were positive for Cs-137 with results greater than the MDC. The average Cs-137 concentration was 0.043 ± 0.060 pCi/g with a high of 0.103 ± 0.021 pCi/g (Table 10-1). The other Cs-137 concentrations ranged from 0.024 ± 0.014 to 0.040 ± 0.014 pCi/g. Of the other radionuclides specifically looked for in fish, only Fe-59 and Co-58 had any (5) positive values different from zero. Only one of these five values, Fe-59 at 0.033 ± 0.017 pCi/g, was above its MDC of 0.023 pCi/g. No Co-60, Zn-65, Mn-54, or Cs-134 was detected in any of the fish. Because no Co-60 was found, even though both Co-58 and Co-60 were discharged in 2011 and because none of the Co-58 results were greater than its MDC, it is likely that the two positive occurrences of Co-58 are false positives.

By comparison to the aforementioned radionuclides, the concentration of naturally occurring K-40 (2.17– 3.04 pCi/g) is about 10 times higher than the highest Cs-137 concentration.

Based on these results, it is concluded that there is no to little indication of plant effluents in fish.

11.7 Well Water

No plant related radionuclides were detected in well water during 2011, 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 2011 samples had low levels of Cs-137 with the highest level (0.42 ± 0.04 pCi/g) being found at E-06. The results from the indicator sites, except for E-06, are comparable to those from the concentration (0.23 ± 0.03 pCi/g) at the background site some 17 miles away in the low χ/Q sector. This is expected for the source of Cs-137 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 well below levels of naturally occurring K-40 (5.74 ± 0.39 to 23.33 ± 1.52 pCi/g).

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. All ten samples have Cs-137 concentrations statistically different from zero. The shoreline sediment Cs-137 concentrations continue to be about one-tenth of that found in soils. This is expected because Cs-137 in the geological media is bound to fine particles, such as clay, as opposed to the sand found on the beach. Lake Michigan sediments are a known reservoir of fallout Cs-137. Wave action suspends lake sediments depositing them on the beach. The fine particles deposited on the beach eventually are winnowed from the beach leaving the heavier sand; hence the lower Cs-137 concentrations in beach samples. In contrast to Cs-137, K-40, which is actually part of the minerals making up the clay and sand, is at a concentration about 300 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. 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 atoms 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 1950s and 1960s is now being incorporated into growing plants in the same manner as potassium because it is in the same chemical family as potassium. This fallout Cs-137 has been found in firewood ash at many locations in the United States that are far from any nuclear plants (S. Farber, "Cesium-137 in Wood Ash, Results of a Nationwide Survey," 5th Ann. Nat. Biofuels Conf., 10/21/1992).

In 2011 only six of the twenty-four vegetation samples had a positive indication for Cs-137 and only one of these (E-02, 0.019 ± 0.008, MDC = 0.014 pCi/g) was detected above the MDA. Typically, only the vegetation collected at monitoring site E-06, in the Point Beach State Park south of PBNP, has detectable levels of Cs-137. Of the three samples obtained at this site in 2011, only one had a positive indication for Cs-137 (0.016 ± 0.014 pCi/g) and that value was below its MDC (0.025.pCi/g). The highest Cs-137 concentration (0.019 ± 0.008 pCi/g) occurred in the sample obtained from the Site Boundary Control Center (E-02), on May 23, 2011. However, PBNP did not discharge any airborne effluent containing Cs-137 until the following month. Therefore, it is unlikely that the positive Cs-137 value resulted from PBNP releases. For the same reason, the slightly positive Cs-134 concentration (0.012 ± 0.007 pCi/g) which is above its MDC (0.011 pCi/g) also is a false positive.

Only two other radionuclides had positive indications: Co-60 and I-131. PBNP released small amounts of airborne I-131 in two of the months preceding vegetation sampling: 1.46 µCi in January and 2.16 µCi in March 2011. Based on I-131's 8-day half-life the amount released in March 2011 would have decayed to approximately 0.7% of its original amount by the time the May 23, 2011 sample was taken. The amount released in January 2011 would have decay substantially more. Therefore, the three samples with a positive indication for I-131 and below the I-131 MDC are considered to be false positives. Small amounts of Co-60 were released in March 2011 (0.47 µCi), April 2011 (0.52 µCi), and June 2011 (0.08 µCi) prior to collecting vegetation samples. Given the dispersion which occurs during atmospheric transport from PBNP to E-02 (about 0.8 miles) and to E-06 (about 5 miles), it is unlikely that these small amounts for Co-60 would be detectable. Therefore, the small, positive Co-60 are considered to be false positives.

Based on the 2011 vegetation sampling results, it is concluded that there are little or no effect from PBNP effluents.

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 2011. No significant change in the use of pasturelands or grazing herds was noted. Therefore, the existing milk-sampling program continues to be acceptable. In addition to visual verification, a land use census was performed to identify the nearest residence, garden >500 ft^2, and nearest dairy. The nearest dairy lies in the SSE sector and it is one of the PBNP REMP milk sampling sites. This dairy leases land in the S and SSE sectors at the PBNP site boundary for growing feed corn. Also, the highest χ/Q (1.09E-06) and D/Q (6.23E-09) values occur in these sectors. Therefore, dose calculations to the maximum exposed hypothetical individual, assumed to reside at the site boundary in the S sector, continues to be conservative for the purpose of calculating doses via the grass-cow-milk and the other ingestion pathways.

12.0 REMP CONCLUSION

Based on the analytical results from the 808 environmental samples, and from 125 sets of TLDs that comprised the PBNP REMP for 2011 and on the approximately 30 additional air and precipitation samples obtained during the period of March 16 through April 20, 2011, PBNP effluents had no discernable, permanent effect on the surrounding environs. The I-131, Cs-137, and Cs-134 detected in air and precipitation samples from March 16 through April 20, 2011 only occur during the period that Fukushima fallout was present over North America. They did not occur at any other time of the year. Furthermore, the observed concentrations are fairly uniform over a large area which includes the background site over 17 miles from PBNP. This is indicative sampling from a large, uniform air mass and would not be the case if the origin of these radionuclides were a point source such as PBNP. 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 2011 the sampling program consisted of beach drains, intermittent stream and bog locations, drinking water wells, façade wells, yard electrical manholes, ground water monitoring wells, and the subsurface drainage (SSD) system sump located in the U-2 façade.

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

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.

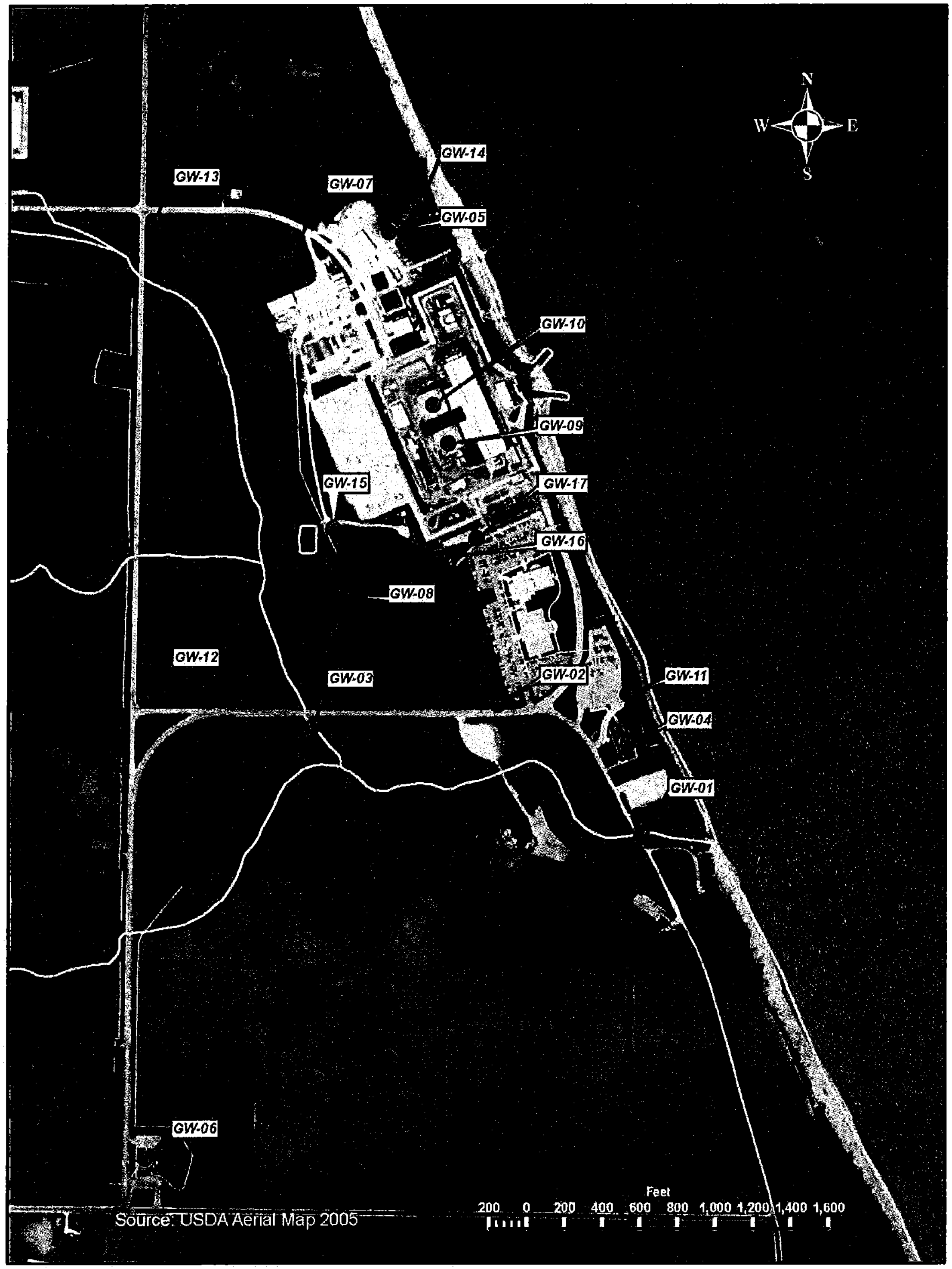
In addition to the main plant well, three other drinking water wells also are monitored. The Site Boundary Control Center well, located at the plant entrance, the Warehouse 6 well, on the north side of the plant, and the EIC well, located south of the plant. These wells do not draw water from the top 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 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 2011. Access to other parts of the SSD can be obtained vial manholes located in the facades, turbine building, and other locations. The SSD manholes were not sampled in 2011 because of the two Extended Power Uprate outages.

In the 1990s, two wells were sunk in each unit's façade to monitor the groundwater levels and look for evidence of concrete integrity as part of the ISI IWE Containment Inspection Program. These wells are stand pipes which are sampled periodically for chemical analyses. 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



14.0 RESULTS AND DISCUSSION

14.1 Streams and Bogs

The results from the surface groundwater monitoring associated with the former retention pond are presented in Table 14-1. 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	NF ±	NF ±	NF ±	NF ±			
Feb	NF ±	NF ±	NF ±	NF ±			
Mar	NF ±	NF ±	NF ±	422 ± 96			146
Apr	ND ±	322 ± 97	179 ± 91	393 ± 100			166
May	ND ±	130 ± 80	ND ±	132 ± 80	160 ± 84	331 ± 92	140
Jun	ND ±	217 ± 89	ND ±	184 ± 88			149
Jul	ND ±	ND ±	ND ±	ND ±			171
Aug	ND ±	ND ±	ND ±	ND ±			150
Sep	ND ±	156 ± 80	ND ±	ND ±			144
Oct	191 ± 84	185 ± 84	ND ±	251 ± 87			142
Nov	ND ±	214 ± 95	ND ±	269 ± 97			162
Dec	ND ±	259 ± 88	ND ±	ND ±			144

NF = no flow: 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. Only one of the samples from the confluence of the two creeks (GW-01), ESE of the former retention pond, and only one from the West (GW-03) have measureable levels of H-3. In contrast, at least six samples from the East Creek (G-02) (southeast of the former retention pond) and from GW-17, (directly east of the former retention pond) have results above the MDC. [Note that site GW-17 is at the north, upstream end of the east intermittent creek.] The bog (GW-08) SE of the former retention pond is higher than the bog at GW-07 north of the former retention pond. These results are in conformance with the west to east groundwater flow described in the Site Conceptual Model and the FSAR. The East Creek concentrations are generally lower than the 300 - 350 pCi/l seen in the late 1990s before the retention pond remediation. Likewise, 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 2011 results for the beach drains are presented in Table 14-2. [The drain data from left to right in the table are in the order of the drains from north to south.] S-1 collects yard drainage from the north part of the site yard; S-3, from the south part of the site yard. Note that S-1 no longer receives the output from the SSD sump located in the Unit 2 façade. Drains S-8 and S-9 carry water from the lake side yard drains whereas drains S-7 and S-10 are from the turbine building roof. S-11 is not connected to any yard drain system and mainly carries groundwater flow and runoff from a small lawn area south of the plant.

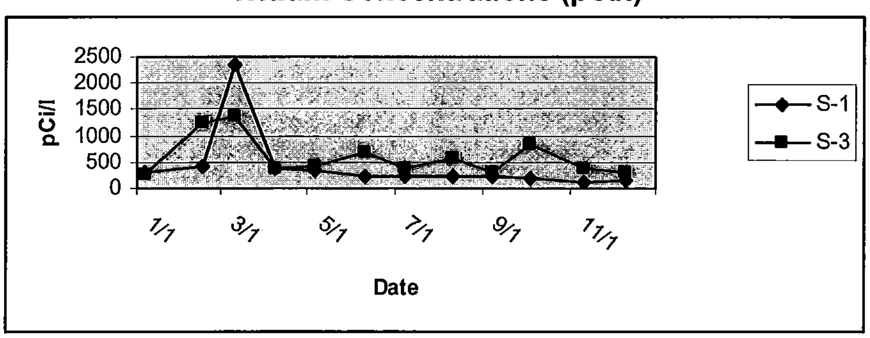
Table 14-2
2011 Beach Drain Tritium
Average H-3 Concentration (pCi/l)

Month	S-1	S-7	S-8	S-9	S-10	S-3	S-11
Jan	322 ± 97	NF ±	NF ±	NF ±	NF ±	282 ± 96	NF ±
Feb	408 ± 97	NF ±	NF ±	651 ± 107	NF ±	1268 ± 130	NF ±
Mar	2360 ± 164	NF ±	NF ±	199 ± 87	NF ±	1328 ± 135	NF ±
Apr	391 ± 95	NF ±	NF ±	NF ±	NF ±	378 ± 106	NF ±
May	333 ± 91	NF ±	NF ±	NF ±	NF ±	430 ± 95	NF ±
Jun	237 ± 88	NF ±	NF ±	NF ±	NF ±	663 ± 106	NF ±
Jul	224 ± 83	NF ±	NF ±	NF ±	NF ±	374 ± 90	NF ±
Aug	221 ± 98	NF ±	NF ±	NF ±	NF ±	557 ± 111	NF ±
Sep	220 ± 98	NF ±	NF ±	NF ±	NF ±	312 ± 101	117 ± 93
Oct	197 ± 82	NF ±	NF ±	NF ±	NF ±	817 ± 108	122 ± 80
Nov	123 ± 79	NF ±	NF ±	NF ±	NF ±	373 ± 91	NF ±
Dec	151 ± 83	NF ±	NF ±	NF ±	NF ±	298 ± 90	NF ±
Avg =	432 ± 1227			425 ± 639		590 ± 735	120 ± 7

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

The concentration profiles for S-1 and S-3 are similar (Figure 14-1). Both peak in February and March and then are fairly constant after the March maximum with the concentrations at S-3 being higher at S-1. The February-March tritium peaks

Figure 14-1 2011 H-3 Concentrations for S-1 and S-3
Tritium Concentrations (pCi/l)



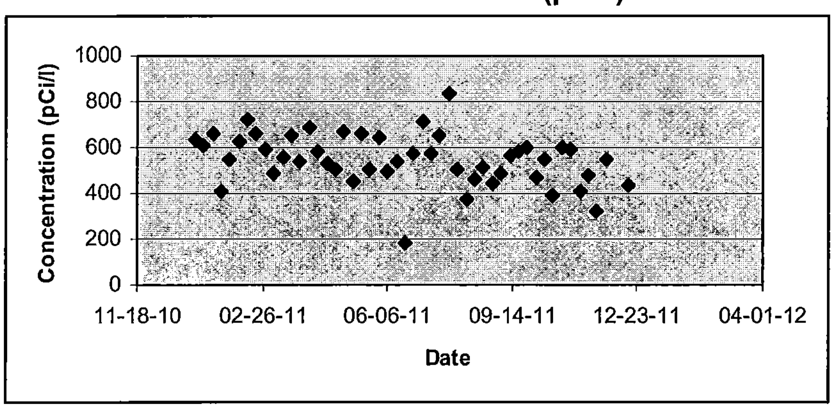
also occurred in 2010. At that time is was believed that the S-1 peak to be caused by the discharge of the subsurface drainage system (SSD) into the yard drain emptying into Lake Michigan at S-1. While that may have been a contributing factor, it did not explain the concurrence with the S-3 peak. Based on the completed H-3 washout/recapture study, it now is concluded that recapture of airborne H-3 discharges by snow followed by snow melting is the result of the concurrent, elevated H-3 concentrations found at S-1 and S-3. During February and March snow was melted on site and discharged via the yard drains. The reason for the higher H-3 concentrations at S-3 for the remainder of the year also may be related to washout and recapture. The washout study results will be discussed in more detail later in this section.

The SSD sump is located in the Unit 2 façade and its contents are discharged via the wastewater effluent line. The monthly averages are presented in Table 14-3. These H-3 concentrations appear to be slowly decreasing over the year (Figure 14-2).

Table 14-3
2011 Unit 2 Facade SSD Sump Monthly Average H-3 (pCi/l)

Month	Avg		2σ
Jan	572	±	198
Feb	650	±	109
Mar	559	±	138
Apr	576	±	157
May	584	±	199
Jun	448	±	358
Jul	695	±	222
Aug	460	±	114
Sep	561	±	102
Oct	519	±	174
Nov	437	±	193
Dec	437	±	98

Figure 14-2 2011 H-3 Concentrations SSD SUMP
Tritium Concentrations (pCi/l)



14.3 Electrical Vaults and Other Manholes

Manholes for access to below ground electrical facilities are susceptible to groundwater in-leakage. The manholes east side of the plant, between the Turbine building and Lake Michigan have low H-3 concentrations (Table 14-4). These manholes Z-066A and Z-067A through Z-066D AND Z-067D run in parallel in the NE section of the yard beginning just north of the Unit 2 truck bay and run from the Unit 2 truck bay north to the Emergency Diesel Generator (EDG) building. Z-068 is located just west of the EDG building. Based on being side-by-side, it is not unexpected that the each pair of manholes 66A/67A, etc. would have similar H-3 concentrations. Note the highest concentrations occur near the time that beach drains S-1 and S-2 also have their highest H-3 concentration.

Table 14-4
2011 East Yard Area Manhole Tritium (pCi/l)

MH	4/5/2011	9/28/2011	12/2/2011
Z-066A	258 ± 89	116 ± 92	114 ± 81
Z-067A	160 ± 84	90 ± 91	117 ± 82
Z-066B	711 ± 108	108 ± 92	NS ±
Z-067B	456 ± 97	90 ± 91	NS ±
Z-066C	242 ± 88	62 ± 80	NS ±
Z-067C	287 ± 90	62 ± 90	NS ±
Z-066D	485 ± 99	288 ± 100	NS ±
Z-067D	NS ±	280 ± 99	NS ±
Z-068	454 ± 97	199 ± 82	253 ± 88
MDC	145	166	144

NS = not sampled

14.4 Façade Wells

The four façade wells monitor the H-3 concentration under the plant footprint (Table 14-5). Each unit's façade has two wells used to monitor the

Table 14-5
2011 Facade Well Water Tritium Concentration (pCi/l)

Month	UNIT 1		UNIT 2		MDC
	1Z-361A	1Z-361B	2Z-361A	2Z-361B	
Jan	NS ±	NS ±	NS ±	NS ±	
Feb	372 ± 93	224 ± 86	NS ±	199 ± 85	141
Mar	248 ± 87	ND ±	ND ±	ND ±	142
Apr	373 ± 92	164 ± 83	ND ±	ND ±	142
May	227 ± 93	136 ± 89	ND ±	ND ±	138
Jun	228 ± 87	ND ±	ND ±	139 ± 83	144
Jul	246 ± 99	ND ±	ND ±	ND ±	146
Aug	172 ± 94	ND ±	ND ±	ND ±	142
Sep	NS ±	NS ±	NS ±	NS ±	
Oct	262 ± 97	ND ±	ND ±	ND ±	140
Nov	178 ± 85	ND ±	ND ±	ND ±	144
Dec	NS ±	NS ±	NS ±	NS ±	

ND = not detected NS = sample not collected groundwater for conditions that could impact containment integrity. Samples from these wells also are analyzed for H-3 (Table 14-5). In Unit 2 there is one well 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.

The 2011 results are similar to those obtained in previous years. The Unit 1 wells continue to have higher H-3 concentrations than the U2 wells with 1Z-361A, in the SE corner of the Unit 1 façade, having the highest H-3 concentrations. The 2011 high is lower that the tritium concentrations of 1169 - 1331 pCi/l seen in 2007 and 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. Damage to the monitoring well casings was repaired in 2011. The potable water wells have no detectable H-3 (Table 14-6).

Table 14-6
2011 Potable Well Water Tritium Concentration (pCi/l)

Month	EIC WELL GW-04	Warehouse 6 Well GW-05	SBCC Well GW-06	EIC MDC	GW-05,06 MDC
Jan	ND	ND	ND	138	138
Feb	ND			152	
Mar	ND			146	
Apr	ND	ND	ND	166	142
May	ND			140	
Jun	ND			149	
Jul	ND	ND	ND	171	148
Aug	ND			150	
Sep	ND			144	
Oct	ND	ND	ND	142	145
Nov	ND			162	
Dec	ND			144	

ND=Not Detected NS=No Sample

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

Table 14-7 2011 Monitoring Wells Tritium 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	±		NS	±		NS	±		144
Feb	ND	±		ND	±		ND	±		ND	±		424	±	95	NS	±		152
Mar	168	±	85	ND	±		ND	±		ND	±		394	±	95	NS	±		146
Apr	ND	±		ND	±		ND	±		ND	±		313	±	89	244	±	86	141
May	ND	±		ND	±		ND	±		ND	±		263	±	87	NS	±		141
Jun	ND	±		ND	±		ND	±		ND	±		282	±	86	198	±	82	144
Jul	ND	±		ND	±		ND	±		ND	±		274	±	89	221	±	87	144
Aug	ND	±		ND	±		ND	±		ND	±		230	±	84	179	±	82	150
Sep	ND	±		ND	±		ND	±		ND	±		367	±	103	161	±	94	166
Oct	ND	±		ND	±		ND	±		ND	±		209	±	87	193	±	87	147
Nov	ND	±		ND	±		ND	±		ND	±		311	±	99	148	±	92	162
Dec	ND	±		ND	±		ND	±		ND	±		298	±	90	225	±	87	144

ND= <MDC NS=no sample, well frozen

14.6 Washout/Recapture

During 2010 and 2011, PBNP analyzed numerous precipitation samples to determine whether the washout/recapture of airborne effluent H-3 could contribute to the H-3 concentrations found onsite in manholes and the beach drain samples. Because the H-3 concentrations in precipitation samples obtained at the North, West, and South boundaries were expected to be low, these samples were analyzed at a lab that has a H-3 MDC of 6 Tritium Units or 19.3 pCi/l (1 TU = 3.221 pCi/). This value is roughly one-tenth of the LLD of 200 pCi/l obtained by the lab used for the REMP tritium analysis.

The H-3 concentrations at the site boundaries in 2011 (Table 14-8) are similar to those observed during 2010 with the highest concentration at roughly 120 pCi/l. In 2011, as in 2010, the highest H-3 concentration in precipitation occurred at the south boundary, site E-02. Although there is one occurrence of a H-3 concentration greater than 100 pCi/l at both the south (E-02) and north (E-03) boundaries, most results do not indicate significant concentrations H-3 at the site boundary.

In next phase of the investigation, twelve sampling sites were established to ascertain the recapture concentrations at locations closer to Units 1 and 2 (Figure14-3)

Table 14-8
2011 Precipitation H-3 at Boundary Locations

DATE	E-02 (S) pCi/l	E-03 (W) pCi/l	E-04 (N) pCi/l
6-Jan	53.8	29.0	37.0
9-Feb	30.9	48.0	37.0
10-Mar	113	56.4	66.0
22-Mar	82.8	104	79.9
25-Mar	25.4	54.4	73.8
6-Apr	63.1	43.8	65.1
19-Apr	119	76.0	ND
21-Apr	78.3	22.5	26.7
4-May	52.8	48.6	49.9
8-Jun	87.0	ND	ND
6-Jul	41.9	ND	ND
10-Aug	ND	ND	ND
7-Sep	29.0	25.4	ND
5-Oct	29.6	28.0	ND
11-Nov	35.1	ND	ND
12-Dec	47.7	ND	22.9

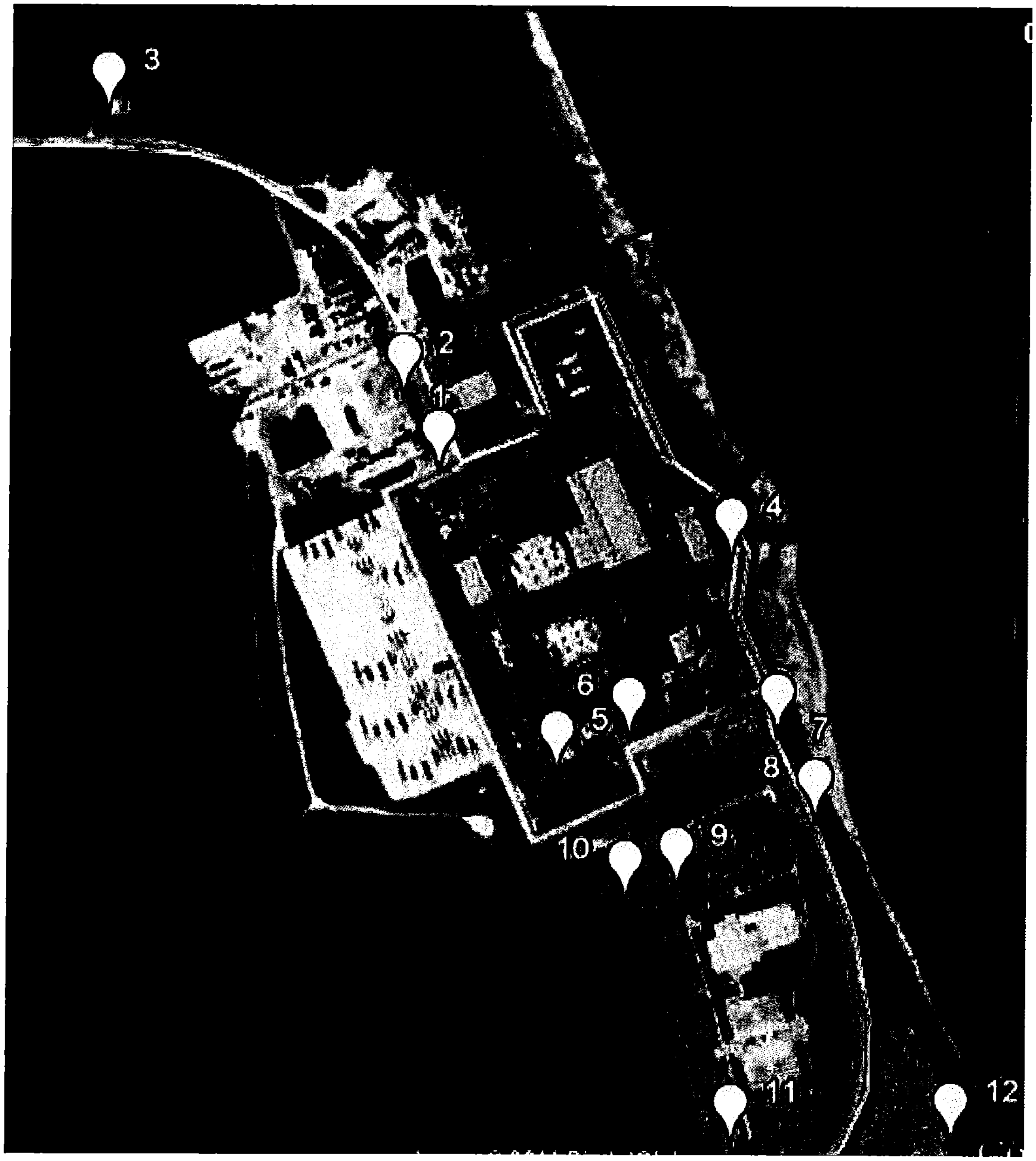
MDC = 19.3 pCi/l   ND = <MDC $2\sigma = 51.5$

The northern-most site (3) is about 1400 feet NW of Unit 2; the southern-most site (12), about 1400 feet SSE of Unit 1. Sites 1, 2, and 4-7 are in areas where yard drains run-off is expected to discharge via the beach drains. Precipitation from sites 9 -11 will discharge to Lake Michigan via the East Creek. Precipitation site 12 is close to the monitoring well GW-11. Precipitation at site 3 will not impact any of the groundwater monitoring locations.

By comparison to the H-3 concentrations of 1000 and 5000 pCi/l in AC condensate obtained close to the plant, the 2010 H-3 concentrations in the precipitation from sites 1-12 were low. However, the 2011 precipitation samples from these same sites had H-3 concentrations up to 2200 pCi/l (Table 14-9). The highest concentrations of 800 - 2200 pCi/l are more in line with the AC condensate results from 2010.

Precipitation constitutes the main source of water for samples obtained at the beach drains. However, there are additional water sources as evidenced by beach drain flow even many days after a precipitation event. One of these sources is the roof drains that are connected to the yard drains. Because condensate from the AC unit on the roof of the South Service Building is piped to that building's roof drain, the high H-3 concentration found in this liquid is discharged via S-3, the southern most beach drain. This may account for the higher H-3 levels found at S-3 as compared to S-1 (Figure 14-1). Another source may be groundwater inleakage into the yard drainage system. However, this has not been verified.

Figure 14-3 Location of Washout/Recapture Sampling Sites



Based on the H-3 concentrations observed in rainwater close to the plant, recapture of H-3 in airborne effluents are sufficient to account for the concentrations seen in the beach drains and in the yard manholes.

Table 14-9
2010 and 2011 H-3 Concentrations Close to Plant

Date ->	11/15/2010	12/6/2010	4/11/2011	4/19/2011	4/20/2011
Location	pCi/l	pCi/l	pCi/l	pCi/l	pCi/l
1	147	313	1670	53.5	60.2
2	148	437	1533	NS	58.3
3	93.4	88.8	609	69.9	38.7
4	401	266	670	287	35.1
5	230	NS	ND	2200	2130
6	128	50.9	354	786	821
7	115	46.4	302	717	32.9
8	102	31.6	247	514	57
9	216	NS	208	315	180
10	276	NS	351	863	332
11	168	ND	ND	241	114
12	37.7	NS	170	130	82.8

NS = no sample collected ND = not detected

15.0 GROUNDWATER SUMMARY

Groundwater monitoring indicates that low levels of tritium continue to occur in the upper soil layer but not in the deep, drinking water aquifer. These results also indicate that the low levels of tritium are restricted to a small, well defined area close to the plant. Results from precipitation analyses show that airborne H-3 concentrations are higher close to the plant as compared to results at the site boundaries. The observed tritium concentrations in the beach drains can be explained by the higher H-3 in precipitation close to the plant and in the condensate from AC units that are connected to the yard drains. The use of snow melting equipment during February and March may be an important source of the peaking of beach drain H-3 concentrations during those months.

Except for the monitoring wells downstream from the former retention pond, the monitoring well tritium concentrations are not different from zero. The higher H-3 concentrations at beach drain S-3 suggests that it is impacted more that beach drain S-1 by the known inputs of AC condensate and the possible inleakage of groundwater recharged by precipitation. The impact of the flow of tritiated groundwater from the vicinity of the former retention pond toward the lake can not be discounted. The impact of this flow would be greater on beach drain S-3 than on S-1 because the eastward flow in the area of S-3 would be less impacted by plant structures than the drainage system feeding beach drain S-1.

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

APPENDIX 1

Environmental, Inc. Midwest Laboratory
Final Report for the Point Beach Nuclear Plant
and
Other Analyses
Reporting Period: January – December 2011

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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, 2011

Reviewed and Approved by ______________________ Date 02-03-2012
B. Grob, M.S.
Laboratory Manager

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

POINT BEACH NUCLEAR PLANT

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POINT BEACH NUCLEAR PLANT

1.0 INTRODUCTION

The following constitutes the final 2011 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
AP/AI	E-04	03-10-11	Volume estimated @ 295m^3; AP result = 0.024±0.003 pCi/m^3 AI result = <0.009 pCi/m^3
AP/AI	E-03	05-24-11	Loss of power; volume = 172.4 m^3. AP result = 0.011±0.004 pCi/m^3 AI result = <0.029 pCi/m^3
AP/AI	E-03	06-30-11	Run time=5 hrs.; volume = 9.0 m^3. AP result = 0.005±0.063 pCi/m^3 AI result = <0.37 pCi/m^3
TLD	E-42	07-07-11	TLD missing in field. NOTE: TLD removed 10-07-11; read 10/19/11.
TLD	E-15	10-07-11	TLD missing in field.
TLD	E-31	10-07-11	TLD missing in field.

3.0 Data Tables

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

Date Collected	Vol. (m^3)	Gross Beta	I-131	Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030	Required LLD		0.010	0.030
01-05-11	303	0.041 ± 0.004	< 0.011	07-06-11	306	0.019 ± 0.003	< 0.013
01-12-11	302	0.028 ± 0.004	< 0.015	07-13-11	306	0.023 ± 0.003	< 0.010
01-19-11	302	0.028 ± 0.003	< 0.009	07-20-11	312	0.025 ± 0.003	< 0.007
01-26-11	304	0.031 ± 0.004	< 0.008	07-27-11	314	0.013 ± 0.003	< 0.011
02-03-11	343	0.023 ± 0.003	< 0.009	08-03-11	294	0.027 ± 0.003	< 0.007
02-09-11	260	0.034 ± 0.004	< 0.016	08-10-11	306	0.021 ± 0.003	< 0.007
02-16-11	301	0.033 ± 0.004	< 0.009	08-17-11	301	0.026 ± 0.003	< 0.007
02-23-11	304	0.024 ± 0.003	< 0.011	08-24-11	301	0.022 ± 0.003	< 0.008
03-02-11	308	0.027 ± 0.003	< 0.010	08-31-11	305	0.021 ± 0.003	< 0.008
03-10-11	306	0.022 ± 0.003	< 0.009	09-07-11	310	0.032 ± 0.004	< 0.005
03-16-11	294	0.024 ± 0.003	< 0.016	09-14-11	315	0.031 ± 0.004	< 0.012
03-24-11	360	0.037 ± 0.003	0.091±0.024	09-21-11	293	0.020 ± 0.003	< 0.010
03-30-11	216	0.030 ± 0.005	0.080±0.022	09-28-11	302	0.021 ± 0.003	< 0.017
1st Quarter Mean ± s.d.		0.029 ± 0.006	0.086	3rd Quarter Mean ± s.d.		0.023 ± 0.005	< 0.009
04-06-11	298	0.033 ± 0.004	0.046±0.019	10-05-11	299	0.016 ± 0.003	< 0.009
04-13-11	305	0.026 ± 0.003	0.024±0.013	10-12-11	308	0.053 ± 0.005	< 0.012
04-20-11	323	0.026 ± 0.003	< 0.018	10-19-11	303	0.024 ± 0.003	< 0.009
04-26-11	262	0.018 ± 0.003	< 0.017	10-27-11	342	0.016 ± 0.003	< 0.008
				11-03-11	315	0.032 ± 0.004	< 0.009
05-04-11	343	0.011 ± 0.002	< 0.011				
05-11-11	309	0.020 ± 0.003	< 0.017	11-09-11	256	0.034 ± 0.004	< 0.008
05-18-11	300	0.015 ± 0.003	< 0.020	11-16-11	294	0.037 ± 0.004	< 0.010
05-24-11	248	0.011 ± 0.003	< 0.020	11-24-11	340	0.023 ± 0.003	< 0.014
06-01-11	345	0.013 ± 0.002	< 0.008	12-01-11	295	0.030 ± 0.004	< 0.008
06-08-11	301	0.029 ± 0.003	< 0.011	12-07-11	261	0.027 ± 0.004	< 0.012
06-15-11	303	0.012 ± 0.003	< 0.006	12-14-11	312	0.051 ± 0.004	< 0.010
06-23-11	349	0.014 ± 0.002	< 0.013	12-21-11	307	0.036 ± 0.004	< 0.007
06-29-11	261	0.017 ± 0.003	< 0.013	12-28-11	307	0.030 ± 0.004	< 0.007
2nd Quarter Mean ± s.d.		0.019 ± 0.007	0.035	4th Quarter Mean ± s.d.		0.032 ± 0.011	< 0.009
				Cumulative Average		0.026 ± 0.008	0.060

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

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
01-05-11	302	0.037 ± 0.004	< 0.011
01-12-11	302	0.028 ± 0.004	< 0.015
01-19-11	303	0.022 ± 0.003	< 0.009
01-26-11	303	0.031 ± 0.004	< 0.008
02-03-11	343	0.025 ± 0.003	< 0.009
02-09-11	259	0.029 ± 0.004	< 0.016
02-16-11	303	0.032 ± 0.004	< 0.009
02-23-11	303	0.022 ± 0.003	< 0.011
03-02-11	308	0.038 ± 0.004	< 0.010
03-10-11	305	0.021 ± 0.003	< 0.009
03-16-11	296	0.024 ± 0.003	< 0.015
03-24-11	352	0.027 ± 0.003	0.101±0.022
03-30-11	256	0.032 ± 0.004	0.058±0.023
1st Quarter Mean ± s.d.		0.028 ± 0.005	0.080
04-06-11	294	0.034 ± 0.004	0.095±0.021
04-13-11	307	0.027 ± 0.003	0.027±0.014
04-20-11	316	0.030 ± 0.003	< 0.014
04-26-11	267	0.018 ± 0.003	< 0.017
05-04-11	347	0.012 ± 0.002	< 0.010
05-11-11	310	0.018 ± 0.003	< 0.017
05-18-11	299	0.015 ± 0.003	< 0.020
05-24-11	250	0.012 ± 0.003	< 0.020
06-01-11	344	0.014 ± 0.002	< 0.008
06-08-11	307	0.025 ± 0.003	< 0.011
06-15-11	305	0.014 ± 0.003	< 0.006
06-23-11	345	0.013 ± 0.002	< 0.013
06-29-11	260	0.018 ± 0.003	< 0.013
2nd Quarter Mean ± s.d.		0.019 ± 0.007	0.061

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
07-06-11	299	0.021 ± 0.003	< 0.013
07-13-11	299	0.025 ± 0.003	< 0.010
07-20-11	301	0.023 ± 0.003	< 0.008
07-27-11	296	0.017 ± 0.003	< 0.012
08-03-11	294	0.031 ± 0.004	< 0.007
08-10-11	305	0.022 ± 0.003	< 0.007
08-17-11	304	0.026 ± 0.003	< 0.007
08-24-11	304	0.020 ± 0.003	< 0.008
08-31-11	304	0.019 ± 0.003	< 0.008
09-07-11	309	0.026 ± 0.003	< 0.006
09-14-11	310	0.027 ± 0.003	< 0.012
09-21-11	292	0.023 ± 0.003	< 0.010
09-28-11	304	0.021 ± 0.003	< 0.017
3rd Quarter Mean ± s.d.		0.023 ± 0.004	< 0.010
10-05-11	284	0.021 ± 0.003	< 0.009
10-12-11	292	0.050 ± 0.005	< 0.012
10-19-11	305	0.021 ± 0.003	< 0.009
10-27-11	342	0.021 ± 0.003	< 0.008
11-03-11	307	0.035 ± 0.004	< 0.010
11-09-11	255	0.027 ± 0.004	< 0.008
11-16-11	296	0.038 ± 0.004	< 0.010
11-24-11	348	0.024 ± 0.003	< 0.013
12-01-11	298	0.030 ± 0.004	< 0.008
12-07-11	263	0.026 ± 0.004	< 0.012
12-14-11	313	0.048 ± 0.004	< 0.010
12-21-11	295	0.040 ± 0.004	< 0.007
12-28-11	295	0.026 ± 0.003	< 0.007
4th Quarter Mean ± s.d.		0.031 ± 0.010	< 0.009
Cumulative Average		0.025 ± 0.008	0.070

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

Date Collected	Vol. (m^3)	Gross Beta	I-131	Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030	Required LLD		0.010	0.030
01-05-11	282	0.034 ± 0.004	< 0.012	07-06-11	285	0.019 ± 0.003	< 0.014
01-12-11	280	0.028 ± 0.004	< 0.016	07-13-11	285	0.025 ± 0.004	< 0.011
01-19-11	282	0.023 ± 0.003	< 0.010	07-20-11	294	0.029 ± 0.004	< 0.008
01-26-11	281	0.032 ± 0.004	< 0.009	07-27-11	303	0.014 ± 0.003	< 0.011
02-03-11	319	0.026 ± 0.003	< 0.010	08-03-11	298	0.025 ± 0.003	< 0.007
02-09-11	242	0.028 ± 0.004	< 0.017	08-10-11	306	0.019 ± 0.003	< 0.007
02-16-11	280	0.030 ± 0.004	< 0.010	08-17-11	310	0.028 ± 0.003	< 0.007
02-23-11	282	0.026 ± 0.003	< 0.012	08-24-11	310	0.022 ± 0.003	< 0.008
03-02-11	286	0.030 ± 0.004	< 0.011	08-31-11	312	0.023 ± 0.003	< 0.008
03-10-11	285	0.022 ± 0.003	< 0.010	09-07-11	324	0.031 ± 0.003	< 0.005
03-16-11	274	0.022 ± 0.003	< 0.017	09-14-11	329	0.022 ± 0.003	< 0.011
03-24-11	327	0.027 ± 0.003	0.081±0.023	09-21-11	299	0.019 ± 0.003	< 0.009
03-30-11	254	0.030 ± 0.004	0.068±0.019	09-28-11	316	0.019 ± 0.003	< 0.016
1st Quarter Mean ± s.d.		0.028 ± 0.004	0.075	3rd Quarter Mean ± s.d.		0.023 ± 0.005	< 0.009
04-06-11	310	0.033 ± 0.004	0.089±0.021	10-05-11	308	0.019 ± 0.003	< 0.009
04-13-11	307	0.024 ± 0.003	0.040±0.019	10-12-11	310	0.044 ± 0.004	< 0.012
04-20-11	327	0.028 ± 0.003	< 0.020	10-19-11	311	0.022 ± 0.003	< 0.009
04-26-11	267	0.020 ± 0.003	< 0.008	10-27-11	348	0.016 ± 0.003	< 0.007
				11-03-11	310	0.034 ± 0.004	< 0.009
05-04-11	344	0.013 ± 0.002	< 0.011				
05-11-11	310	0.018 ± 0.003	< 0.017	11-09-11	258	0.029 ± 0.004	< 0.007
05-18-11	300	0.017 ± 0.003	< 0.020	11-16-11	303	0.035 ± 0.004	< 0.010
05-24-11		ND[a]		11-24-11	348	0.025 ± 0.003	< 0.013
06-01-11	329	0.013 ± 0.003	< 0.008	12-01-11	316	0.031 ± 0.003	< 0.007
06-08-11	304	0.028 ± 0.003	< 0.011	12-07-11	273	0.024 ± 0.003	< 0.011
06-15-11	323	0.012 ± 0.003	< 0.006	12-14-11	314	0.053 ± 0.004	< 0.010
06-23-11	291	0.013 ± 0.003	< 0.016	12-21-11	305	0.037 ± 0.004	< 0.007
06-30-11		ND[a]		12-28-11	305	0.026 ± 0.003	< 0.007
2nd Quarter Mean ± s.d.		0.020 ± 0.007	0.065	4th Quarter Mean ± s.d.		0.030 ± 0.010	< 0.009
				Cumulative Average		0.025 ± 0.007	0.070

[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	Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030	Required LLD		0.010	0.030
01-05-11	293	0.043 ± 0.004	< 0.012	07-06-11	300	0.020 ± 0.003	< 0.013
01-12-11	291	0.033 ± 0.004	< 0.015	07-13-11	300	0.027 ± 0.003	< 0.010
01-19-11	293	0.023 ± 0.003	< 0.009	07-20-11	311	0.024 ± 0.003	< 0.007
01-26-11	293	0.036 ± 0.004	< 0.008	07-27-11	304	0.033 ± 0.004	< 0.011
02-03-11	332	0.022 ± 0.003	< 0.009	08-03-11	301	0.030 ± 0.004	< 0.007
02-09-11	252	0.034 ± 0.004	< 0.016	08-10-11	303	0.020 ± 0.003	< 0.007
02-16-11	291	0.034 ± 0.004	< 0.010	08-17-11	310	0.024 ± 0.003	< 0.007
02-23-11	293	0.026 ± 0.003	< 0.012	08-24-11	310	0.021 ± 0.003	< 0.008
03-02-11	298	0.032 ± 0.004	< 0.011	08-31-11	323	0.022 ± 0.003	< 0.008
03-10-11		ND[a]		09-07-11	265	0.034 ± 0.004	< 0.006
03-16-11	286	0.027 ± 0.004	< 0.016	09-14-11	319	0.026 ± 0.003	< 0.011
03-24-11	337	0.030 ± 0.003	0.075±0.017	09-21-11	294	0.021 ± 0.003	< 0.009
03-30-11	215	0.033 ± 0.005	0.125±0.027	09-28-11	256	0.019 ± 0.003	< 0.020
1st Quarter Mean ± s.d.		0.031 ± 0.006	0.100	3rd Quarter Mean ± s.d.		0.025 ± 0.005	< 0.010
04-06-11	302	0.031 ± 0.004	0.078±0.021	10-05-11	289	0.019 ± 0.003	< 0.009
04-13-11	312	0.026 ± 0.003	0.038±0.018	10-12-11	297	0.051 ± 0.005	< 0.012
04-20-11	319	0.026 ± 0.003	< 0.020	10-19-11	315	0.023 ± 0.003	< 0.009
04-26-11	260	0.015 ± 0.003	< 0.018	10-27-11	343	0.018 ± 0.003	< 0.008
				11-03-11	312	0.031 ± 0.003	< 0.009
05-04-11	349	0.012 ± 0.002	< 0.010				
05-11-11	324	0.017 ± 0.003	< 0.016	11-09-11	258	0.026 ± 0.004	< 0.007
05-18-11	303	0.016 ± 0.003	< 0.020	11-16-11	297	0.038 ± 0.004	< 0.010
05-24-11	244	0.010 ± 0.003	< 0.021	11-24-11	347	0.025 ± 0.003	< 0.014
06-01-11	353	0.014 ± 0.002	< 0.008	12-01-11	302	0.030 ± 0.004	< 0.008
06-08-11	300	0.026 ± 0.003	< 0.011	12-07-11	259	0.026 ± 0.004	< 0.012
06-15-11	311	0.012 ± 0.003	< 0.006	12-14-11	317	0.043 ± 0.004	< 0.010
06-23-11	344	0.013 ± 0.002	< 0.013	12-21-11	300	0.043 ± 0.004	< 0.007
06-29-11	261	0.015 ± 0.003	< 0.013	12-28-11	300	0.026 ± 0.003	< 0.007
2nd Quarter Mean ± s.d.		0.018 ± 0.007	0.058	4th Quarter Mean ± s.d.		0.031 ± 0.010	< 0.009
				Cumulative Average		0.026 ± 0.008	0.079

[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	Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030	Required LLD		0.010	0.030
01-05-11	304	0.041 ± 0.004	< 0.011	07-06-11	293	0.021 ± 0.003	< 0.013
01-12-11	300	0.027 ± 0.004	< 0.015	07-13-11	293	0.028 ± 0.004	< 0.011
01-19-11	303	0.023 ± 0.003	< 0.009	07-20-11	300	0.027 ± 0.003	< 0.008
01-26-11	303	0.036 ± 0.004	< 0.008	07-27-11	302	0.020 ± 0.003	< 0.011
02-03-11	343	0.023 ± 0.003	< 0.009	08-03-11	300	0.028 ± 0.004	< 0.007
02-09-11	260	0.028 ± 0.004	< 0.016	08-10-11	302	0.021 ± 0.003	< 0.007
02-16-11	301	0.031 ± 0.003	< 0.009	08-17-11	305	0.024 ± 0.003	< 0.007
02-23-11	304	0.024 ± 0.003	< 0.011	08-24-11	305	0.021 ± 0.003	< 0.008
03-02-11	308	0.030 ± 0.004	< 0.010	08-31-11	315	0.022 ± 0.003	< 0.008
03-10-11	345	0.018 ± 0.003	< 0.008	09-07-11	320	0.031 ± 0.003	< 0.005
03-16-11	256	0.024 ± 0.004	< 0.018	09-14-11	316	0.029 ± 0.004	< 0.012
03-24-11	348	0.025 ± 0.003	0.073±0.018	09-21-11	293	0.019 ± 0.003	< 0.010
03-30-11	258	0.033 ± 0.004	0.086±0.023	09-28-11	293	0.018 ± 0.003	< 0.017
1st Quarter Mean ± s.d.		0.028 ± 0.006	0.080	3rd Quarter Mean ± s.d.		0.024 ± 0.004	< 0.010
04-06-11	299	0.035 ± 0.004	0.087±0.026	10-05-11	302	0.018 ± 0.003	< 0.009
04-13-11	306	0.025 ± 0.003	0.035±0.015	10-12-11	295	0.050 ± 0.005	< 0.012
04-20-11	313	0.027 ± 0.003	< 0.018	10-19-11	311	0.020 ± 0.003	< 0.009
04-26-11	256	0.021 ± 0.003	< 0.020	10-27-11	345	0.019 ± 0.003	< 0.007
				11-03-11	309	0.033 ± 0.004	< 0.009
05-04-11	350	0.013 ± 0.002	< 0.010				
05-11-11	307	0.019 ± 0.003	< 0.017	11-09-11	254	0.030 ± 0.004	< 0.008
05-18-11	319	0.016 ± 0.003	< 0.019	11-16-11	294	0.039 ± 0.004	< 0.010
05-24-11	258	0.012 ± 0.003	< 0.020	11-24-11	349	0.025 ± 0.003	< 0.013
06-01-11	345	0.015 ± 0.002	< 0.008	12-01-11	300	0.029 ± 0.004	< 0.008
06-08-11	302	0.028 ± 0.003	< 0.011	12-07-11	262	0.023 ± 0.004	< 0.012
06-15-11	326	0.012 ± 0.003	< 0.006	12-14-11	313	0.045 ± 0.004	< 0.010
06-23-11	350	0.014 ± 0.002	< 0.013	12-21-11	301	0.036 ± 0.004	< 0.007
06-29-11	265	0.018 ± 0.003	< 0.013	12-28-11	301	0.027 ± 0.003	< 0.007
2nd Quarter Mean ± s.d.		0.020 ± 0.007	0.061	4th Quarter Mean ± s.d.		0.030 ± 0.010	< 0.009
				Cumulative Average		0.025 ± 0.008	0.070
				Indicator Locations Annual Mean ± s.d.		**0.026 ± 0.008**	**0.070**

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

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
01-05-11	294	0.037 ± 0.004	< 0.012
01-12-11	290	0.031 ± 0.004	< 0.015
01-19-11	303	0.026 ± 0.003	< 0.009
01-26-11	303	0.034 ± 0.004	< 0.008
02-03-11	343	0.021 ± 0.003	< 0.009
02-09-11	263	0.032 ± 0.004	< 0.016
02-16-11	299	0.044 ± 0.004	< 0.010
02-23-11	304	0.025 ± 0.003	< 0.011
03-02-11	302	0.028 ± 0.004	< 0.011
03-10-11	334	0.019 ± 0.003	< 0.008
03-16-11	247	0.025 ± 0.004	< 0.018
03-24-11	331	0.031 ± 0.003	0.104±0.025
03-30-11	176	0.031 ± 0.005	0.122±0.025
1st Quarter Mean ± s.d.		0.029 ± 0.007	0.113
04-06-11	304	0.034 ± 0.004	0.078±0.017
04-13-11	312	0.026 ± 0.003	0.044±0.021
04-20-11	316	0.026 ± 0.003	< 0.017
04-26-11	259	0.017 ± 0.003	< 0.015
05-04-11	351	0.013 ± 0.002	< 0.010
05-11-11	299	0.019 ± 0.003	< 0.018
05-18-11	313	0.015 ± 0.003	< 0.019
05-24-11	259	0.014 ± 0.003	< 0.019
06-01-11	338	0.016 ± 0.003	< 0.008
06-08-11	316	0.031 ± 0.003	< 0.011
06-15-11	311	0.010 ± 0.002	< 0.006
06-23-11	344	0.017 ± 0.003	< 0.013
06-29-11	265	0.016 ± 0.003	< 0.012
2nd Quarter Mean ± s.d.		0.020 ± 0.007	0.061

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
07-06-11	301	0.022 ± 0.003	< 0.013
07-13-11	301	0.025 ± 0.003	< 0.010
07-20-11	313	0.025 ± 0.003	< 0.007
07-27-11	316	0.017 ± 0.003	< 0.011
08-03-11	296	0.033 ± 0.004	< 0.007
08-10-11	319	0.020 ± 0.003	< 0.007
08-17-11	303	0.023 ± 0.003	< 0.007
08-24-11	303	0.024 ± 0.003	< 0.008
08-31-11	303	0.020 ± 0.003	< 0.008
09-07-11	304	0.032 ± 0.004	< 0.006
09-14-11	312	0.030 ± 0.004	< 0.012
09-21-11	292	0.019 ± 0.003	< 0.010
09-28-11	304	0.016 ± 0.003	< 0.017
3rd Quarter Mean ± s.d.		0.024 ± 0.005	< 0.009
10-05-11	307	0.021 ± 0.003	< 0.009
10-12-11	307	0.049 ± 0.005	< 0.012
10-19-11	309	0.022 ± 0.003	< 0.009
10-27-11	347	0.021 ± 0.003	< 0.007
11-03-11	311	0.034 ± 0.004	< 0.009
11-09-11	255	0.028 ± 0.004	< 0.008
11-16-11	298	0.042 ± 0.004	< 0.010
11-24-11	351	0.025 ± 0.003	< 0.013
12-01-11	302	0.030 ± 0.004	< 0.008
12-07-11	268	0.027 ± 0.004	< 0.012
12-14-11	310	0.044 ± 0.004	< 0.010
12-21-11	301	0.038 ± 0.004	< 0.007
12-28-11	301	0.024 ± 0.003	< 0.007
4th Quarter Mean ± s.d.		0.031 ± 0.009	< 0.009
Cumulative Average		0.026 ± 0.009	0.087
Control Annual Mean ± s.d.		0.026 ± 0.009	**0.087**

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- 1880	0.069 ± 0.012	-	0.0000 ± 0.000	< 0.0007	0.0000 ± 0.001	< 0.0008	0.0004 ± 0.000	< 0.0005	3902
E-02	- 1881	0.065 ± 0.013	-	0.0000 ± 0.000	< 0.0004	0.0002 ± 0.000	< 0.0005	-0.0001 ± 0.000	< 0.0006	3934
E-03	- 1882	0.073 ± 0.016	-	-0.0008 ± 0.001	< 0.0005	-0.0002 ± 0.000	< 0.0002	0.0002 ± 0.001	< 0.0008	3675
E-04	- 1883	0.071 ± 0.015	-	0.0003 ± 0.001	< 0.0009	-0.0003 ± 0.001	< 0.0003	-0.0006 ± 0.001	< 0.0007	3472
E-08	- 1885	0.081 ± 0.018	-	0.0004 ± 0.000	< 0.0006	0.0001 ± 0.001	< 0.0007	0.0003 ± 0.001	< 0.0007	3933
E-20	- 1886	0.064 ± 0.017	-	0.0001 ± 0.001	< 0.0010	0.0000 ± 0.001	< 0.0009	0.0008 ± 0.001	< 0.0006	3788
					2nd Quarter					
E-01	4848	0.084 ± 0.016	-	0.0005 ± 0.000	< 0.0006	0.0008 ± 0.001	< 0.0010	-0.0001 ± 0.001	< 0.0007	3945
E-02	4850	0.086 ± 0.014	-	0.0007 ± 0.000	< 0.0007	0.0003 ± 0.001	< 0.0009	0.0001 ± 0.001	< 0.0007	3949
E-03	4851	0.064 ± 0.020	-	0.0002 ± 0.001	< 0.0009	0.0004 ± 0.001	< 0.0013	0.0004 ± 0.001	< 0.0013	3411
E-04	4852	0.076 ± 0.016	-	0.0007 ± 0.001	< 0.0010	0.0004 ± 0.001	< 0.0010	0.0007 ± 0.001	< 0.0007	3981
E-08	4853	0.081 ± 0.016	-	0.0009 ± 0.001	< 0.0005	0.0000 ± 0.001	< 0.0009	-0.0004 ± 0.001	< 0.0006	3995
E-20	4854	0.082 ± 0.015	-	0.0000 ± 0.001	< 0.0007	0.0000 ± 0.000	< 0.0006	0.0003 ± 0.001	< 0.0006	3988
					3rd Quarter					
E-01	7045	0.064 ± 0.016	-	0.0000 ± 0.001	< 0.0006	0.0002 ± 0.001	< 0.0009	0.0000 ± 0.001	< 0.0005	3965
E-02	7046	0.073 ± 0.017	-	-0.0015 ± 0.001	< 0.0010	-0.0003 ± 0.001	< 0.0007	0.0000 ± 0.001	< 0.0009	3918
E-03	7047	0.062 ± 0.012	-	-0.0003 ± 0.000	< 0.0005	0.0004 ± 0.000	< 0.0007	0.0001 ± 0.000	< 0.0008	3970
E-04	7048	0.068 ± 0.011	-	-0.0005 ± 0.000	< 0.0004	0.0002 ± 0.000	< 0.0006	0.0002 ± 0.000	< 0.0003	3897
E-08	7049	0.074 ± 0.014	-	-0.0001 ± 0.000	< 0.0007	0.0000 ± 0.000	< 0.0006	0.0000 ± 0.001	< 0.0007	3936
E-20	7050	0.080 ± 0.013	-	0.0004 ± 0.000	< 0.0006	0.0003 ± 0.000	< 0.0006	-0.0001 ± 0.001	< 0.0005	3965
					4th Quarter					
E-01	9262	0.062 ± 0.012		0.0001 ± 0.000	< 0.0004	0.0001 ± 0.000	< 0.0004	0.0003 ± 0.000	< 0.0004	3937
E-02	9263	0.065 ± 0.016		0.0003 ± 0.001	< 0.0007	0.0001 ± 0.001	< 0.0010	0.0004 ± 0.001	< 0.0006	3894
E-03	9264	0.058 ± 0.011		0.0001 ± 0.000	< 0.0005	0.0002 ± 0.001	< 0.0007	0.0003 ± 0.000	< 0.0007	4009
E-04	9265	0.071 ± 0.015		0.0003 ± 0.000	< 0.0005	0.0001 ± 0.001	< 0.0006	0.0003 ± 0.000	< 0.0006	3936
E-08	9267	0.061 ± 0.014		0.0000 ± 0.000	< 0.0007	0.0005 ± 0.000	< 0.0007	-0.0004 ± 0.000	< 0.0005	3936
E-20	9268	0.076 ± 0.013		-0.0001 ± 0.000	< 0.0006	0.0000 ± 0.000	< 0.0005	-0.0004 ± 0.000	< 0.0004	3966
Annual Mean±s.d.		**0.071 ± 0.008**		**0.0001 ± 0.0005**	**< 0.0007**	**0.0001 ± 0.0003**	**< 0.0007**	**0.0001 ± 0.0003**	**< 0.0006**	

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	01-12-11	MDC	02-09-11	MDC	03-09-11	MDC	Required LLD
Lab Code	EMI- 107		EMI- 535		EMI- 995		
Sr-89	-0.1 ± 0.8	< 0.7	0.5 ± 0.7	< 0.7	0.1 ± 0.9	< 0.8	5.0
Sr-90	1.0 ± 0.3	< 0.5	0.7 ± 0.3	< 0.5	1.0 ± 0.3	< 0.5	1.0
I-131	-0.06 ± 0.15	< 0.28	0.04 ± 0.15	< 0.26	-0.13 ± 0.18	< 0.33	0.5
K-40	1400 ± 112	-	1499 ± 104	-	1389 ± 117	-	
Cs-134	-1.1 ± 1.6	< 2.7	-2.8 ± 2.0	< 2.8	-0.4 ± 2.0	< 3.9	5.0
Cs-137	1.9 ± 2.1	< 4.4	0.9 ± 2.1	< 4.2	-1.0 ± 2.6	< 4.1	5.0
Ba-La-140	-1.4 ± 2.2	< 3.1	0.2 ± 1.3	< 1.6	1.3 ± 1.5	< 1.6	5.0
Other (Co-60)	-0.2 ± 2.1	< 3.5	-0.9 ± 2.4	< 3.8	-0.5 ± 2.5	< 3.3	15.0

Collection Date	04-13-11	MDC	05-11-11	MDC	06-08-11	MDC	Required LLD
Lab Code	EMI- 1981		EMI- 2817		EMI- 3643		
Sr-89	0.3 ± 0.8	< 0.6	0.2 ± 1.2	< 0.7	-0.4 ± 0.9	< 0.8	5.0
Sr-90	0.9 ± 0.3	< 0.5	0.9 ± 0.5	< 0.8	1.1 ± 0.3	< 0.5	1.0
I-131	0.13 ± 0.14	< 0.20	0.04 ± 0.18	< 0.32	0.12 ± 0.19	< 0.33	0.5
K-40	1433 ± 121	-	1478 ± 96	-	1505 ± 93	-	
Cs-134	1.3 ± 2.2	< 4.2	-1.4 ± 1.6	< 2.1	0.6 ± 1.7	< 3.2	5.0
Cs-137	-1.4 ± 2.7	< 2.8	-0.3 ± 1.9	< 3.2	-0.6 ± 1.9	< 2.7	5.0
Ba-La-140	0.2 ± 2.3	< 4.4	0.2 ± 1.4	< 3.8	0.2 ± 1.5	< 3.1	5.0
Other (Co-60)	-0.1 ± 2.1	< 3.0	-0.6 ± 1.8	< 1.3	-0.2 ± 2.0	< 3.9	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-11 Lambert Dairy Farm

Collection Date	07-13-11	MDC	08-17-11	MDC	09-14-11	MDC	Required LLD
Lab Code	EMI- 4465		EMI- 5594		EMI- 6172		
Sr-89	0.4 ± 0.8	< 0.7	0.0 ± 1.0	< 0.8	-1.0 ± 0.9	< 0.7	5.0
Sr-90	0.8 ± 0.3	< 0.5	1.3 ± 0.4	< 0.6	1.7 ± 0.4	< 0.6	1.0
I-131	0.15 ± 0.16	< 0.23	0.09 ± 0.12	< 0.18	-0.05 ± 0.13	< 0.24	0.5
K-40	1349 ± 114	-	1395 ± 106	-	1451 ± 114	-	
Cs-134	-0.7 ± 1.4	< 2.2	0.2 ± 1.3	< 3.2	0.9 ± 1.5	< 3.0	5.0
Cs-137	0.8 ± 2.3	< 4.2	1.8 ± 1.9	< 3.5	-0.2 ± 2.3	< 4.0	5.0
Ba-La-140	-0.5 ± 1.6	< 2.2	-2.5 ± 1.9	< 2.2	-1.1 ± 1.9	< 4.5	5.0
Other (Co-60)	-0.1 ± 2.5	< 2.3	0.6 ± 2.2	< 3.6	0.7 ± 1.8	< 2.6	15.0

Collection Date	10-12-11	MDC	11-09-11	MDC	12-14-11	MDC	Required LLD
Lab Code	EMI- 6893		EMI- 7854		EMI- 8657		
Sr-89	-0.7 ± 0.9	< 0.7	0.1 ± 0.8	< 0.7	0.8 ± 0.8	< 0.7	5.0
Sr-90	1.5 ± 0.4	< 0.5	1.2 ± 0.3	< 0.5	0.7 ± 0.3	< 0.5	1.0
I-131	0.13 ± 0.22	< 0.37	0.06 ± 0.14	< 0.25	-0.04 ± 0.14	< 0.21	0.5
K-40	1376 ± 81	-	1352 ± 99	-	1336 ± 91	-	
Cs-134	-0.6 ± 1.1	< 1.7	-0.1 ± 1.5	< 2.4	0.4 ± 1.5	< 2.7	5.0
Cs-137	-1.2 ± 1.6	< 2.2	0.9 ± 2.0	< 3.7	-1.4 ± 1.8	< 2.4	5.0
Ba-La-140	-2.5 ± 1.5	< 3.2	-2.9 ± 1.6	< 2.6	0.2 ± 1.5	< 1.6	5.0
Other (Co-60)	-0.9 ± 1.4	< 2.1	0.7 ± 1.5	< 1.8	-0.1 ± 2.0	< 2.6	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-21 Strutz Dairy Farm

Collection Date	01-12-11	MDC	02-09-11	MDC	03-09-11	MDC	Required LLD
Lab Code	EMI- 108		EMI- 538		EMI- 996		
Sr-89	0.3 ± 0.8	< 0.8	-0.4 ± 0.7	< 0.8	-0.1 ± 0.7	< 0.8	5.0
Sr-90	0.4 ± 0.3	< 0.6	0.4 ± 0.3	< 0.6	0.5 ± 0.3	< 0.5	1.0
I-131	0.02 ± 0.16	< 0.29	-0.02 ± 0.18	< 0.28	0.20 ± 0.22	< 0.38	0.5
K-40	1487 ± 116	-	1433 ± 108	-	1429 ± 106	-	
Cs-134	-1.0 ± 2.2	< 3.5	0.4 ± 1.6	< 3.1	1.0 ± 1.5	< 3.1	5.0
Cs-137	-2.1 ± 2.3	< 2.8	-1.0 ± 2.1	< 2.5	0.1 ± 1.5	< 2.8	5.0
Ba-La-140	0.3 ± 2.0	< 2.0	0.2 ± 2.2	< 2.8	-0.2 ± 1.2	< 1.7	5.0
Other (Co-60)	1.4 ± 2.2	< 4.1	-0.1 ± 2.2	< 1.7	2.4 ± 1.8	< 2.7	15.0

Collection Date	04-13-11	MDC	05-11-11	MDC	06-08-11	MDC	Required LLD
Lab Code	EMI- 1982		EMI- 2818		EMI- 3644		
Sr-89	-0.6 ± 0.7	< 0.7	-1.2 ± 1.1	< 0.7	-0.4 ± 0.7	< 0.9	5.0
Sr-90	0.6 ± 0.3	< 0.5	0.8 ± 0.4	< 0.8	0.3 ± 0.3	< 0.5	1.0
I-131	0.12 ± 0.16	< 0.27	-0.13 ± 0.17	< 0.32	0.09 ± 0.25	< 0.44	0.5
K-40	1329 ± 110	-	1334 ± 95	-	1262 ± 87	-	
Cs-134	-0.2 ± 1.5	< 2.8	0.1 ± 1.3	< 2.7	0.6 ± 1.4	< 2.7	5.0
Cs-137	0.5 ± 1.8	< 3.3	-0.1 ± 1.8	< 2.8	1.0 ± 1.5	< 3.4	5.0
Ba-La-140	-2.3 ± 2.1	< 4.7	-1.7 ± 1.4	< 1.5	-1.5 ± 1.4	< 2.3	5.0
Other (Co-60)	-0.1 ± 1.8	< 2.2	-1.1 ± 1.9	< 1.9	0.1 ± 1.4	< 2.1	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-21 Strutz Dairy Farm

Collection Date	07-13-11	MDC	08-17-11	MDC	09-14-11	MDC	Required LLD
Lab Code	EMI- 4466		EMI- 5595		EMI- 6173		
Sr-89	-0.4 ± 0.7	< 0.8	0.2 ± 0.7	< 0.8	-0.6 ± 0.9	< 0.7	5.0
Sr-90	0.4 ± 0.3	< 0.5	0.4 ± 0.3	< 0.5	1.0 ± 0.4	< 0.6	1.0
I-131	0.06 ± 0.20	< 0.35	-0.07 ± 0.12	< 0.18	0.00 ± 0.14	< 0.25	0.5
K-40	1488 ± 100	-	1368 ± 119	-	1380 ± 98	-	
Cs-134	-0.1 ± 1.8	< 2.9	1.6 ± 1.8	< 2.4	2.7 ± 1.7	< 3.1	5.0
Cs-137	1.8 ± 1.7	< 3.0	-0.5 ± 2.4	< 2.9	0.5 ± 1.9	< 3.6	5.0
Ba-La-140	-1.6 ± 1.5	< 4.0	-0.2 ± 2.3	< 4.9	-1.4 ± 1.5	< 3.6	5.0
Other (Co-60)	1.3 ± 1.9	< 1.8	0.3 ± 2.2	< 2.6	0.9 ± 1.8	< 3.0	15.0

Collection Date	10-12-11	MDC	11-09-11	MDC	12-14-11	MDC	Required LLD
Lab Code	EMI- 6894		EMI- 7855		EMI- 8658		
Sr-89	0.0 ± 0.7	< 0.8	0.4 ± 0.8	< 0.8	-0.5 ± 0.8	< 0.9	5.0
Sr-90	0.5 ± 0.3	< 0.5	0.3 ± 0.4	< 0.7	0.6 ± 0.3	< 0.6	1.0
I-131	0.03 ± 0.16	< 0.29	0.05 ± 0.16	< 0.28	0.11 ± 0.16	< 0.23	0.5
K-40	1369 ± 80	-	1437 ± 102		1411 ± 95		
Cs-134	-0.1 ± 1.1	< 2.3	0.4 ± 1.8	< 3.3	-0.8 ± 1.3	< 2.1	5.0
Cs-137	-0.7 ± 1.5	< 2.3	0.0 ± 2.0	< 3.6	1.9 ± 2.0	< 3.4	5.0
Ba-La-140	-0.2 ± 1.4	< 4.5	0.3 ± 1.5	< 2.5	-0.2 ± 1.3	< 1.5	5.0
Other (Co-60)	-0.6 ± 1.7	< 2.2	3.1 ± 1.9	< 2.9	-0.5 ± 1.6	< 0.9	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-40 Barta

Collection Date	01-12-11	MDC	02-09-11	MDC	03-09-11	MDC	Required LLD
Lab Code	EMI- 109		EMI- 538		EMI- 997		
Sr-89	-0.3 ± 0.7	< 0.7	0.4 ± 0.7	< 0.6	0.6 ± 0.7	< 0.7	5.0
Sr-90	0.6 ± 0.3	< 0.5	0.6 ± 0.3	< 0.5	0.5 ± 0.3	< 0.4	1.0
I-131	-0.04 ± 0.18	< 0.33	-0.09 ± 0.15	< 0.28	0.14 ± 0.19	< 0.28	0.5
K-40	1362 ± 104	-	1433 ± 108	-	1425 ± 94		
Cs-134	-0.6 ± 1.5	< 3.3	0.4 ± 1.6	< 3.1	-1.9 ± 1.9	< 2.7	5.0
Cs-137	-0.3 ± 1.7	< 3.3	-1.0 ± 2.1	< 2.5	2.9 ± 2.1	< 4.0	5.0
Ba-La-140	-2.1 ± 1.5	< 2.1	0.2 ± 2.2	< 2.8	-1.4 ± 1.7	< 1.4	5.0
Other (Co-60)	0.9 ± 1.9	< 3.4	-0.1 ± 2.2	< 1.7	-0.1 ± 1.5	< 2.4	15.0

Collection Date	04-13-11	MDC	05-11-11	MDC	06-08-11	MDC	Required LLD
Lab Code	EMI- 1983		EMI- 2819		EMI- 3646		
Sr-89	0.4 ± 0.8	< 0.6	-1.9 ± 1.4	< 0.7	-0.6 ± 0.8	< 0.7	5.0
Sr-90	0.5 ± 0.3	< 0.6	1.4 ± 0.5	< 0.8	0.7 ± 0.3	< 0.5	1.0
I-131	0.14 ± 0.17	< 0.29	-0.01 ± 0.18	< 0.33	0.08 ± 0.13	< 0.20	0.5
K-40	1474 ± 118	-	1489 ± 121		1438 ± 86		
Cs-134	0.1 ± 1.9	< 2.9	-0.5 ± 1.6	< 2.7	-0.6 ± 1.5	< 2.5	5.0
Cs-137	1.8 ± 2.2	< 3.5	1.8 ± 2.3	< 2.5	-0.1 ± 1.5	< 2.7	5.0
Ba-La-140	1.0 ± 2.0	< 3.9	-2.3 ± 2.0	< 4.2	0.5 ± 1.4	< 2.3	5.0
Other (Co-60)	1.3 ± 2.4	< 2.9	1.3 ± 2.5	< 2.6	0.1 ± 1.8	< 3.3	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-40 Barta

Collection Date	07-13-11	MDC	08-17-11	MDC	09-14-11	MDC	Required LLD
Lab Code	EMI- 4467		EMI- 5596		EMI- 6174		
Sr-89	0.1 ± 0.8	< 0.7	-0.3 ± 0.7	< 0.7	0.1 ± 0.7	< 0.6	5.0
Sr-90	0.7 ± 0.3	< 0.5	0.8 ± 0.3	< 0.4	0.5 ± 0.3	< 0.5	1.0
I-131	-0.05 ± 0.19	< 0.34	0.00 ± 0.11	< 0.16	-0.06 ± 0.12	< 0.22	0.5
K-40	1535 ± 99	-	1506 ± 118	-	1411 ± 107	-	
Cs-134	0.8 ± 1.3	< 2.7	-0.1 ± 1.5	< 2.9	-1.4 ± 1.9	< 3.0	5.0
Cs-137	2.0 ± 1.6	< 3.1	0.1 ± 2.3	< 2.7	-0.2 ± 1.9	< 2.9	5.0
Ba-La-140	-3.6 ± 1.6	< 2.9	-1.5 ± 1.2	< 2.3	-2.0 ± 1.8	< 3.4	5.0
Other (Co-60)	-0.9 ± 1.8	< 1.7	1.5 ± 1.9	< 2.9	0.4 ± 2.4	< 1.9	15.0

Collection Date	10-12-11	MDC	11-09-11	MDC	12-14-11	MDC	Required LLD
Lab Code	EMI- 6895		EMI- 7856		EMI- 8659		
Sr-89	-0.8 ± 0.8	< 0.8	0.2 ± 0.6	< 0.6	0.1 ± 0.8	< 0.8	5.0
Sr-90	1.0 ± 0.4	< 0.5	0.5 ± 0.3	< 0.5	0.5 ± 0.3	< 0.5	1.0
I-131	0.17 ± 0.20	< 0.37	0.06 ± 0.14	< 0.20	-0.09 ± 0.14	< 0.20	0.5
K-40	1557 ± 117	-	1297 ± 97	-	1528 ± 117	-	
Cs-134	-0.1 ± 1.6	< 2.6	0.6 ± 1.4	< 3.1	-0.7 ± 1.5	< 2.2	5.0
Cs-137	2.6 ± 2.1	< 3.5	0.3 ± 1.8	< 2.6	-1.4 ± 2.2	< 2.8	5.0
Ba-La-140	1.8 ± 1.4	< 2.9	1.9 ± 1.2	< 2.8	-3.8 ± 2.2	< 1.7	5.0
Other (Co-60)	-0.1 ± 2.1	< 2.9	0.1 ± 2.1	< 2.1	-0.2 ± 2.2	< 3.3	15.0

Sr-89 Annual Mean + s.d.	**-0.1 ± 0.6**
Sr-90 Annual Mean + s.d.	**0.8 ± 0.4**
I-131 Annual Mean + s.d.	**0.03 ± 0.09**
K-40 Annual Mean + s.d.	**1421 ± 70**
Cs-134 Annual Mean + s.d.	**-0.1 ± 1.0**
Cs-137 Annual Mean + s.d.	**0.3 ± 1.3**
Ba-La Annual Mean + s.d.	**-0.8 ± 1.4**
Co-60 Annual Mean + s.d.	**0.3 ± 0.9**

POINT BEACH NUCLEAR PLANT

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

	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Req. LLD	Annual Mean	s.d
Collection Date	01-13-11	04-19-11	07-14-11	10-13-11	Req.		
Lab Code	EWW- 123	EWW- 2227	EWW- 4616	EWW- 6934	LLD		
Gross Beta	1.9 ± 1.6	0.7 ± 1.1	0.0 ± 0.4	3.0 ± 1.7	4.0	**1.4**	
H-3	53.4 ± 86.2	58.6 ± 77.9	-44.2 ± 70.7	-14.1 ± 86.6	500	**13.4**	
Sr-89	-0.3 ± 0.7	-0.2 ± 0.5	0.2 ± 0.5	0.3 ± 0.5	5.0	**0.0**	
Sr-90	0.0 ± 0.3	0.0 ± 0.2	-0.1 ± 0.3	-0.2 ± 0.2	1.0	**-0.1**	
I-131	-0.03 ± 0.14	-0.01 ± 0.15	0.09 ± 0.20	0.15 ± 0.16	0.5	**0.05**	
Mn-54	-1.6 ± 1.7	2.1 ± 2.0	0.2 ± 1.5	-1.3 ± 2.2	10	**-0.2**	
Fe-59	-2.8 ± 3.1	1.0 ± 2.8	3.0 ± 3.2	-2.0 ± 4.9	30	**-0.2**	
Co-58	-1.3 ± 1.5	-0.8 ± 1.7	-0.8 ± 1.8	0.3 ± 2.0	10	**-0.6**	
Co-60	-0.5 ± 1.8	-1.4 ± 2.0	-1.1 ± 1.5	-1.1 ± 2.4	10	**-1.0**	
Zn-65	-0.4 ± 3.3	2.0 ± 3.6	1.0 ± 3.5	-5.4 ± 5.6	30	**-0.7**	
Zr-Nb-95	-2.7 ± 2.3	-0.1 ± 2.0	-1.5 ± 2.0	-4.1 ± 2.2	15	**-2.1**	
Cs-134	-1.4 ± 2.0	-1.0 ± 1.7	0.3 ± 1.4	0.7 ± 2.1	10	**-0.4**	
Cs-137	0.2 ± 2.3	2.2 ± 2.1	-0.2 ± 1.6	2.1 ± 2.5	10	**1.1**	
Ba-La-140	2.0 ± 2.0	2.5 ± 2.0	1.1 ± 2.0	0.5 ± 2.4	15	**1.5**	
Other (Ru-103)	-0.3 ± 2.0	-3.5 ± 2.1	-0.2 ± 1.4	-0.8 ± 2.5	30	**-1.2**	

MDC Data

Collection Date	01-13-10	04-19-11	07-14-11	10-13-11	Req.	
Lab Code	EWW- 123	EWW- 2227	EWW- 4616	EWW- 6934	LLD	
Gross Beta	< 2.9	< 2.0	< 0.8	< 2.9	4.0	**< 2.2**
H-3	< 138.0	< 142.2	< 147.7	< 143.8	500	**< 142.9**
Sr-89	< 0.8	< 0.7	< 0.5	< 0.7	5.0	**< 0.7**
Sr-90	< 0.7	< 0.5	< 0.7	< 0.4	1.0	**< 0.6**
I-131	< 0.26	< 0.23	< 0.38	< 0.24	0.5	**< 0.3**
Mn-54	< 2.3	< 3.0	< 2.5	< 2.4	10	**< 2.5**
Fe-59	< 5.7	< 5.1	< 6.0	< 5.7	30	**< 5.6**
Co-58	< 2.3	< 2.1	< 1.9	< 1.5	10	**< 1.9**
Co-60	< 2.8	< 2.8	< 1.6	< 2.4	10	**< 2.4**
Zn-65	< 5.0	< 4.0	< 2.9	< 5.9	30	**< 4.4**
Zr-Nb-95	< 3.0	< 4.4	< 2.7	< 2.9	15	**< 3.2**
Cs-134	< 3.8	< 2.3	< 2.8	< 3.9	10	**< 3.2**
Cs-137	< 2.6	< 3.6	< 2.3	< 4.6	10	**< 3.3**
Ba-La-140	< 2.6	< 4.6	< 3.1	< 5.7	15	**< 4.0**
Other (Ru-103)	< 2.4	< 3.0	< 3.0	< 3.6	30	**< 3.0**

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

		MDC		MDC		MDC		MDC	
Lab Code	ELW- 119		ELW- 618		ELW- 1148		ELW- 2137		
Date Collected	01-13-10		02-16-11		03-17-11		04-14-11		Req. LLD
Gross beta	4.9 ± 0.9	< 1.2	3.0 ± 0.5	< 0.6	5.5 ± 0.9	< 1.4	1.7 ± 0.6	< 0.9	4.0
I-131	0.11 ± 0.16	< 0.29	-0.09 ± 0.15	< 0.28	0.03 ± 0.13	< 0.20	0.07 ± 0.18	< 0.31	0.5
Be-7	-5.8 ± 11.4	< 17.9	-3.5 ± 13.1	< 27.9	-1.9 ± 14.2	< 27.6	1.5 ± 14.9	< 29.2	
Mn-54	0.7 ± 1.5	< 3.0	-0.7 ± 1.6	< 2.3	1.3 ± 1.5	< 3.0	-0.4 ± 1.9	< 2.3	10
Fe-59	-0.2 ± 2.7	< 3.0	-0.9 ± 2.8	< 3.7	0.1 ± 2.5	< 3.5	-4.4 ± 3.6	< 5.4	30
Co-58	1.0 ± 1.2	< 2.1	0.2 ± 1.5	< 2.2	1.5 ± 1.6	< 2.4	0.8 ± 1.6	< 2.4	10
Co-60	1.1 ± 1.0	< 2.2	0.3 ± 1.5	< 1.8	-0.3 ± 2.0	< 2.6	0.0 ± 1.5	< 1.8	10
Zn-65	-0.8 ± 3.2	< 6.8	-0.3 ± 3.1	< 5.2	-1.4 ± 3.4	< 2.9	0.1 ± 3.8	< 5.7	30
Zr-Nb-95	-1.4 ± 1.7	< 2.3	-1.9 ± 1.7	< 1.7	-0.8 ± 1.9	< 2.7	0.2 ± 1.9	< 3.4	15
Cs-134	-0.9 ± 1.4	< 2.3	-0.2 ± 1.5	< 2.6	-0.4 ± 1.8	< 2.9	0.7 ± 1.4	< 2.9	10
Cs-137	-0.5 ± 1.5	< 2.4	2.6 ± 1.8	< 3.4	0.4 ± 2.1	< 3.0	-0.1 ± 1.6	< 3.0	10
Ba-La-140	0.1 ± 1.5	< 2.6	-3.0 ± 1.4	< 1.7	0.8 ± 1.6	< 1.3	0.3 ± 1.7	< 4.0	15
Other (Ru-103)	0.1 ± 1.3	< 2.3	-0.3 ± 1.4	< 2.2	-1.0 ± 1.5	< 2.2	-2.3 ± 1.3	< 2.1	30
Lab Code	ELW- 3046		ELW- 3851		ELW- 4493		ELW- 5609		
Date Collected	05-16-11		06-17-11		07-14-11		08-18-11		Req. LLD
Gross beta	0.9 ± 0.5	< 0.9	2.0 ± 0.8	< 1.3	0.7 ± 0.5	< 0.9	1.0 ± 0.5	< 0.9	4.0
I-131	0.11 ± 0.12	< 0.21	0.04 ± 0.22	< 0.39	-0.02 ± 0.19	< 0.34	0.01 ± 0.16	< 0.23	0.5
Be-7	-4.0 ± 14.7	< 28.2	-8.7 ± 13.2	< 21.1	1.4 ± 17.9	< 28.5	6.7 ± 21.5	< 46.6	
Mn-54	0.4 ± 1.5	< 2.7	1.1 ± 1.5	< 2.6	0.7 ± 2.0	< 4.1	-2.6 ± 2.9	< 3.5	10
Fe-59	0.0 ± 2.6	< 2.6	-0.1 ± 2.5	< 2.5	2.4 ± 4.0	< 3.7	5.7 ± 5.4	< 8.8	30
Co-58	1.5 ± 1.3	< 1.8	0.2 ± 1.5	< 1.6	-1.0 ± 1.9	< 3.6	1.8 ± 2.6	< 2.8	10
Co-60	0.2 ± 1.5	< 2.0	-0.8 ± 1.4	< 1.4	0.1 ± 1.8	< 2.0	-1.0 ± 2.8	< 3.7	10
Zn-65	-1.4 ± 3.4	< 6.0	2.3 ± 2.5	< 3.0	-1.2 ± 4.6	< 6.1	-3.5 ± 7.8	< 5.2	30
Zr-Nb-95	-0.6 ± 1.9	< 2.4	1.0 ± 1.6	< 3.4	-1.4 ± 1.9	< 2.5	1.6 ± 2.9	< 2.9	15
Cs-134	-1.6 ± 1.7	< 2.2	-0.2 ± 1.2	< 1.9	-1.2 ± 2.0	< 2.8	-4.1 ± 3.0	< 4.2	10
Cs-137	0.5 ± 2.1	< 3.7	0.0 ± 1.5	< 2.2	1.2 ± 2.2	< 3.8	-0.7 ± 3.1	< 4.4	10
Ba-La-140	1.8 ± 1.9	< 5.7	1.0 ± 1.8	< 2.9	-0.1 ± 1.8	< 2.8	-2.8 ± 2.9	< 3.4	15
Other (Ru-103)	0.1 ± 1.6	< 3.7	0.3 ± 1.6	< 3.0	0.2 ± 2.2	< 3.2	-0.4 ± 2.5	< 5.3	30
Lab Code	ELW- 6238		ELW- 6936		ELW- 8075		ELW- 8730		
Date Collected	09-13-11		10-13-11		11-16-11		12-15-11		Req. LLD
Gross beta	0.6 ± 0.4	< 0.6	2.6 ± 0.8	< 1.3	1.9 ± 0.6	< 0.9	2.4 ± 0.8	< 1.2	4.0
I-131	0.14 ± 0.20	< 0.34	0.00 ± 0.19	< 0.33	0.09 ± 0.23	< 0.40	0.06 ± 0.13	< 0.18	0.5
Be-7	9.1 ± 12.7	< 30.3	5.6 ± 17.1	< 37.3	-7.7 ± 12.6	< 26.8	-3.3 ± 17.9	< 38.2	
Mn-54	-0.3 ± 1.5	< 2.5	0.1 ± 1.8	< 3.7	0.7 ± 1.5	< 2.8	1.0 ± 2.3	< 3.9	10
Fe-59	1.3 ± 3.4	< 7.0	-2.5 ± 3.5	< 4.5	1.7 ± 2.4	< 4.2	-1.3 ± 4.4	< 4.4	30
Co-58	2.5 ± 1.6	< 2.5	1.2 ± 1.8	< 2.7	-1.9 ± 1.4	< 1.4	-0.2 ± 2.0	< 2.2	10
Co-60	1.6 ± 1.6	< 1.8	-1.1 ± 2.2	< 2.7	-1.4 ± 1.6	< 0.8	0.2 ± 2.4	< 2.7	10
Zn-65	-1.6 ± 3.8	< 4.2	-3.6 ± 3.5	< 2.4	-0.9 ± 2.8	< 3.8	1.5 ± 4.0	< 7.2	30
Zr-Nb-95	2.1 ± 1.6	< 3.9	2.0 ± 1.8	< 4.4	0.1 ± 1.6	< 3.7	-0.7 ± 2.3	< 5.1	15
Cs-134	0.9 ± 1.4	< 2.7	-0.4 ± 1.9	< 3.7	0.3 ± 1.3	< 2.1	-0.7 ± 2.4	< 2.8	10
Cs-137	-1.3 ± 1.9	< 2.5	0.0 ± 2.1	< 2.6	1.1 ± 1.6	< 2.8	2.1 ± 2.6	< 5.3	10
Ba-La-140	-1.5 ± 1.8	< 4.0	-3.2 ± 2.6	< 5.4	1.8 ± 2.0	< 4.1	2.1 ± 2.2	< 3.4	15
Other (Ru-103)	-0.8 ± 1.2	< 2.2	0.9 ± 2.0	< 3.6	-0.5 ± 1.5	< 3.9	-3.2 ± 2.4	< 2.4	30

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

		MDC		MDC		MDC		MDC	
Lab Code	ELW- 120		ELW- 619		ELW- 1149		ELW- 2138		
Date Collected	01-13-11		02-16-11		03-17-11		04-14-11		Req. LLD
Gross beta	2.4 ± 0.8	< 1.2	1.5 ± 0.4	< 0.6	2.3 ± 0.7	< 1.1	1.2 ± 0.6	< 0.9	4.0
I-131	0.12 ± 0.12	< 0.18	-0.11 ± 0.16	< 0.30	0.01 ± 0.14	< 0.21	-0.03 ± 0.19	< 0.35	0.5
Be-7	-2.4 ± 12.0	< 22.7	1.0 ± 17.3	< 37.7	10.1 ± 13.4	< 26.4	12.2 ± 13.7	< 39.9	
Mn-54	0.0 ± 1.3	< 2.3	0.2 ± 2.0	< 2.8	0.5 ± 1.6	< 2.7	-0.1 ± 1.6	< 1.7	10
Fe-59	0.3 ± 2.4	< 4.4	-1.6 ± 2.7	< 4.6	-0.9 ± 2.9	< 5.4	-0.2 ± 2.6	< 3.6	30
Co-58	-1.4 ± 1.4	< 2.4	1.2 ± 1.9	< 3.5	-0.6 ± 1.8	< 1.7	-0.8 ± 1.6	< 2.6	10
Co-60	-0.5 ± 1.4	< 1.2	0.3 ± 1.6	< 2.4	-1.0 ± 2.0	< 2.4	1.6 ± 1.4	< 1.6	10
Zn-65	0.2 ± 2.9	< 5.0	0.9 ± 3.8	< 5.0	-0.9 ± 3.1	< 4.2	1.3 ± 2.4	< 2.1	30
Zr-Nb-95	0.2 ± 1.6	< 3.3	0.2 ± 1.9	< 3.5	-4.7 ± 2.3	< 2.3	-1.7 ± 1.9	< 4.1	15
Cs-134	-0.8 ± 1.2	< 2.2	-0.4 ± 2.0	< 3.3	-1.9 ± 1.5	< 2.5	1.2 ± 1.7	< 3.1	10
Cs-137	-0.2 ± 1.5	< 3.0	1.2 ± 2.2	< 4.1	-0.7 ± 2.1	< 3.1	-1.9 ± 1.9	< 2.8	10
Ba-La-140	-1.1 ± 1.6	< 2.4	0.3 ± 1.6	< 2.5	1.1 ± 1.8	< 3.3	-1.3 ± 1.5	< 3.6	15
Other (Ru-103)	0.3 ± 1.2	< 2.3	-1.3 ± 2.0	< 2.6	0.7 ± 1.3	< 2.4	1.7 ± 1.4	< 3.9	30
Lab Code	ELW- 3047		ELW- 3852		ELW- 4494		ELW- 5610		
Date Collected	05-16-11		06-17-11		07-14-11		08-18-11		Req. LLD
Gross beta	1.2 ± 1.0	< 1.9	2.0 ± 0.7	< 1.1	1.1 ± 0.6	< 0.9	1.8 ± 0.6	< 0.9	4.0
I-131	0.10 ± 0.13	< 0.23	0.26 ± 0.24	< 0.42	-0.04 ± 0.18	< 0.32	0.12 ± 0.14	< 0.21	0.5
Be-7	10.3 ± 13.0	< 28.9	6.3 ± 14.1	< 31.4	1.4 ± 13.8	< 33.9	11.2 ± 21.1	< 35.6	
Mn-54	1.4 ± 1.4	< 2.5	0.2 ± 1.6	< 2.7	-0.4 ± 1.7	< 2.1	-1.1 ± 2.4	< 4.6	10
Fe-59	-3.8 ± 2.4	< 2.4	-1.1 ± 2.9	< 4.3	-1.0 ± 3.1	< 3.1	2.5 ± 4.1	< 6.2	30
Co-58	-0.2 ± 1.4	< 2.0	-0.4 ± 1.5	< 2.3	1.5 ± 1.5	< 2.8	1.4 ± 2.0	< 3.4	10
Co-60	1.3 ± 1.7	< 2.4	-0.8 ± 1.8	< 1.7	-2.7 ± 1.8	< 1.5	0.9 ± 2.3	< 2.5	10
Zn-65	2.5 ± 2.8	< 3.8	-1.3 ± 3.0	< 3.5	-1.4 ± 3.4	< 3.3	2.1 ± 4.7	< 4.2	30
Zr-Nb-95	-0.8 ± 1.4	< 2.0	-0.2 ± 1.7	< 3.1	-0.7 ± 1.8	< 1.8	-1.9 ± 2.4	< 4.6	15
Cs-134	-0.4 ± 1.3	< 2.2	-1.6 ± 1.8	< 2.8	0.3 ± 1.5	< 2.6	1.7 ± 2.1	< 2.9	10
Cs-137	-0.3 ± 1.6	< 2.8	0.9 ± 1.9	< 3.5	0.4 ± 2.0	< 3.5	-0.2 ± 2.4	< 3.0	10
Ba-La-140	0.6 ± 1.9	< 2.4	-3.6 ± 1.8	< 3.0	-0.6 ± 1.8	< 3.4	0.3 ± 2.6	< 3.9	15
Other (Ru-103)	0.3 ± 1.3	< 2.3	2.5 ± 1.5	< 3.2	0.4 ± 1.5	< 3.2	0.4 ± 2.5	< 4.1	30
Lab Code	ELW- 6239		ELW- 6937		ELW- 8077		ELW- 8731		
Date Collected	09-13-11		10-13-11		11-16-11		12-15-11		Req. LLD
Gross beta	0.9 ± 0.4	< 0.6	1.9 ± 0.7	< 1.1	1.5 ± 0.6	< 1.0	2.8 ± 0.8	< 1.3	4.0
I-131	0.10 ± 0.19	< 0.33	0.13 ± 0.20	< 0.34	-0.07 ± 0.15	< 0.28	0.10 ± 0.13	< 0.19	0.5
Be-7	0.6 ± 13.1	< 27.6	-5.7 ± 15.0	< 21.6	-0.9 ± 11.8	< 29.7	-0.5 ± 10.4	< 19.1	
Mn-54	0.6 ± 1.5	< 2.7	1.4 ± 1.5	< 2.5	-0.2 ± 1.6	< 2.7	-0.1 ± 1.3	< 2.2	10
Fe-59	-1.0 ± 2.6	< 3.7	2.7 ± 3.1	< 6.9	-1.8 ± 2.3	< 5.1	-0.2 ± 2.0	< 3.3	30
Co-58	-0.8 ± 1.4	< 2.3	0.1 ± 1.4	< 1.5	-0.1 ± 1.3	< 1.3	0.5 ± 1.2	< 1.9	10
Co-60	-1.5 ± 1.5	< 1.6	0.3 ± 1.5	< 2.3	0.4 ± 1.3	< 1.2	0.1 ± 1.4	< 0.7	10
Zn-65	2.0 ± 3.2	< 5.7	-3.7 ± 3.3	< 3.3	1.2 ± 3.0	< 4.2	-0.7 ± 2.7	< 4.7	30
Zr-Nb-95	-1.4 ± 1.4	< 1.6	1.1 ± 1.6	< 4.4	-0.4 ± 1.6	< 3.8	0.4 ± 1.4	< 2.4	15
Cs-134	0.7 ± 1.5	< 2.6	0.1 ± 1.5	< 2.9	0.0 ± 1.3	< 2.7	0.4 ± 1.1	< 2.0	10
Cs-137	2.3 ± 1.7	< 2.7	0.2 ± 1.8	< 4.2	1.7 ± 1.6	< 2.7	0.4 ± 1.6	< 2.8	10
Ba-La-140	-0.9 ± 1.5	< 4.7	3.9 ± 1.8	< 5.1	1.0 ± 1.8	< 5.5	-0.3 ± 1.3	< 1.8	15
Other (Ru-103)	-0.4 ± 1.4	< 3.6	-0.3 ± 1.7	< 2.8	-0.7 ± 1.4	< 2.2	-0.6 ± 1.1	< 1.7	30

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

		MDC		MDC		MDC		MDC	
Lab Code	ELW- 121		ELW- 620		ELW- 1150		ELW- 2139		
Date Collected	01-13-11		02-16-11		03-17-11		04-14-11		Req. LLD
Gross beta	11.3 ± 1.2	< 1.2	2.3 ± 0.5	< 0.6	2.7 ± 0.8	< 1.3	0.4 ± 0.5	< 0.9	4.0
I-131	0.06 ± 0.14	< 0.24	-0.01 ± 0.18	< 0.33	-0.05 ± 0.23	< 0.46	-0.13 ± 0.18	< 0.33	0.5
Be-7	3.2 ± 16.9	< 30.6	11.9 ± 14.0	< 30.6	3.7 ± 13.8	< 34.3	14.4 ± 14.1	< 32.8	
Mn-54	-0.5 ± 1.7	< 2.5	0.1 ± 1.7	< 2.0	0.6 ± 1.6	< 2.4	-0.4 ± 1.8	< 2.7	10
Fe-59	-2.0 ± 3.0	< 5.4	-2.3 ± 3.4	< 5.8	-1.7 ± 2.5	< 2.5	0.9 ± 3.2	< 3.9	30
Co-58	-0.7 ± 1.6	< 2.9	0.4 ± 1.4	< 1.6	-0.5 ± 1.5	< 2.3	0.1 ± 1.6	< 1.8	10
Co-60	0.6 ± 1.9	< 2.5	-1.0 ± 1.8	< 2.1	-0.5 ± 1.8	< 2.8	-0.1 ± 1.6	< 1.3	10
Zn-65	-1.7 ± 3.5	< 4.2	0.5 ± 2.3	< 2.7	-3.5 ± 3.0	< 3.3	-1.6 ± 3.0	< 4.2	30
Zr-Nb-95	-0.1 ± 1.7	< 2.0	-0.7 ± 1.7	< 2.9	-1.0 ± 1.8	< 3.2	-1.7 ± 1.6	< 3.1	15
Cs-134	-1.3 ± 1.8	< 3.2	-0.5 ± 1.4	< 3.1	0.1 ± 1.5	< 2.3	-0.1 ± 1.7	< 2.4	10
Cs-137	0.2 ± 1.9	< 3.9	0.4 ± 1.6	< 2.9	-2.1 ± 1.9	< 2.1	-0.1 ± 1.8	< 3.0	10
Ba-La-140	0.3 ± 1.7	< 3.8	-1.1 ± 1.9	< 2.3	-1.6 ± 1.8	< 1.3	-0.3 ± 1.9	< 5.0	15
Other (Ru-103)	2.3 ± 2.0	< 4.5	-1.7 ± 1.5	< 1.9	0.2 ± 1.5	< 3.0	0.4 ± 1.4	< 4.2	30
Lab Code	ELW- 3048		ELW- 3853		ELW- 4495		ELW- 5611		
Date Collected	05-16-11		06-17-11		07-14-11		08-18-11		Req. LLD
Gross beta	1.4 ± 0.9	< 1.7	1.2 ± 0.8	< 1.3	1.1 ± 0.6	< 0.9	1.4 ± 0.6	< 0.9	4.0
I-131	0.02 ± 0.12	< 0.22	0.10 ± 0.22	< 0.39	-0.04 ± 0.20	< 0.41	0.08 ± 0.13	< 0.19	0.5
Be-7	12.7 ± 14.9	< 35.6	12.6 ± 18.9	< 36.2	-7.2 ± 17.7	< 23.5	11.2 ± 21.9	< 36.8	
Mn-54	-0.3 ± 1.3	< 1.5	-0.6 ± 1.8	< 3.0	0.5 ± 1.8	< 3.2	-0.9 ± 2.2	< 2.6	10
Fe-59	-1.2 ± 2.5	< 3.2	0.4 ± 4.0	< 7.0	0.7 ± 3.3	< 6.8	0.4 ± 4.6	< 6.2	30
Co-58	0.8 ± 1.7	< 2.9	-1.1 ± 1.7	< 2.1	-1.8 ± 1.7	< 1.5	0.1 ± 2.1	< 4.3	10
Co-60	-0.7 ± 1.6	< 1.7	-0.9 ± 1.6	< 1.7	0.7 ± 1.7	< 2.4	0.2 ± 2.7	< 2.3	10
Zn-65	-2.8 ± 3.0	< 2.3	0.5 ± 4.7	< 4.1	3.1 ± 3.1	< 3.7	0.4 ± 4.4	< 2.9	30
Zr-Nb-95	-1.7 ± 1.8	< 2.7	-1.8 ± 1.9	< 2.6	0.4 ± 1.8	< 3.0	0.2 ± 2.4	< 3.3	15
Cs-134	0.1 ± 1.5	< 3.1	1.1 ± 2.1	< 3.9	0.5 ± 1.7	< 2.4	0.3 ± 2.0	< 3.4	10
Cs-137	-0.1 ± 1.6	< 3.1	1.9 ± 2.5	< 4.0	1.4 ± 2.1	< 3.4	2.5 ± 2.4	< 3.7	10
Ba-La-140	-2.5 ± 1.9	< 2.2	-1.4 ± 2.3	< 7.0	-0.2 ± 1.8	< 1.6	2.7 ± 2.3	< 3.5	15
Other (Ru-103)	0.2 ± 1.5	< 3.0	-0.7 ± 2.2	< 4.3	-0.8 ± 2.0	< 2.9	1.0 ± 2.4	< 4.6	30
Lab Code	ELW- 6240		ELW- 6938		ELW- 8078		ELW- 8732		
Date Collected	09-13-11		10-13-11		11-16-11		12-15-11		Req. LLD
Gross beta	0.9 ± 0.4	< 0.6	2.1 ± 0.8	< 1.3	0.8 ± 0.5	< 0.9	2.9 ± 0.7	< 1.1	4.0
I-131	-0.02 ± 0.21	< 0.38	0.11 ± 0.15	< 0.21	0.00 ± 0.16	< 0.29	-0.02 ± 0.19	< 0.37	0.5
Be-7	-4.7 ± 11.5	< 25.1	-6.7 ± 20.2	< 34.5	12.4 ± 11.5	< 31.5	6.9 ± 10.5	< 19.8	
Mn-54	-0.1 ± 1.4	< 1.5	-1.3 ± 1.9	< 2.6	0.7 ± 1.6	< 3.1	-0.1 ± 1.3	< 2.8	10
Fe-59	1.8 ± 2.7	< 5.2	0.9 ± 4.0	< 6.1	-0.7 ± 2.6	< 5.6	2.3 ± 2.7	< 5.6	30
Co-58	0.2 ± 1.2	< 1.9	-0.1 ± 1.6	< 2.5	-0.6 ± 1.2	< 1.4	-0.3 ± 1.3	< 1.9	10
Co-60	0.6 ± 1.4	< 1.9	2.1 ± 2.4	< 3.7	-1.3 ± 1.7	< 1.7	0.8 ± 1.4	< 2.2	10
Zn-65	-1.2 ± 2.7	< 3.0	-0.3 ± 4.2	< 2.2	-3.4 ± 3.1	< 2.9	-3.0 ± 2.4	< 2.0	30
Zr-Nb-95	1.5 ± 1.5	< 2.8	-1.3 ± 1.7	< 2.9	-0.6 ± 1.7	< 4.9	0.1 ± 1.4	< 2.4	15
Cs-134	0.6 ± 1.3	< 2.9	0.7 ± 2.0	< 2.0	0.0 ± 1.3	< 1.9	-0.5 ± 1.1	< 1.8	10
Cs-137	0.6 ± 1.7	< 3.2	0.0 ± 2.3	< 4.5	-0.4 ± 1.7	< 3.0	-1.5 ± 1.4	< 2.2	10
Ba-La-140	0.3 ± 1.7	< 3.9	3.9 ± 2.5	< 6.1	-0.6 ± 1.6	< 2.7	0.4 ± 1.6	< 1.6	15
Other (Ru-103)	-0.1 ± 1.4	< 3.9	-0.9 ± 2.1	< 4.1	-1.0 ± 1.3	< 2.3	-1.5 ± 1.1	< 1.4	30

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

		MDC		MDC		MDC		MDC	
Lab Code	ELW- 122		ELW- 621		ELW- 1151		ELW- 2140		
Date Collected	01-13-11		02-16-11		03-17-11		04-14-11		Req. LLD
Gross beta	5.3 ± 1.0	< 1.2	2.2 ± 0.5	< 0.6	4.5 ± 0.9	< 1.3	1.2 ± 0.6	< 1.0	4.0
I-131	0.10 ± 0.15	< 0.25	-0.11 ± 0.17	< 0.31	0.16 ± 0.17	< 0.30	-0.11 ± 0.19	< 0.35	0.5
Be-7	-3.9 ± 12.4	< 23.5	10.9 ± 19.5	< 33.3	-11.0 ± 13.4	< 21.2	-4.5 ± 12.6	< 22.8	
Mn-54	0.6 ± 1.5	< 2.3	-0.6 ± 2.1	< 3.1	0.8 ± 1.6	< 2.6	1.5 ± 1.6	< 1.9	10
Fe-59	1.9 ± 2.3	< 4.4	0.4 ± 4.1	< 6.7	-0.7 ± 2.9	< 3.9	-1.9 ± 2.7	< 2.9	30
Co-58	0.0 ± 1.2	< 1.9	-0.8 ± 2.0	< 3.2	1.7 ± 1.5	< 1.7	-1.3 ± 1.5	< 2.2	10
Co-60	0.4 ± 1.2	< 2.5	-1.4 ± 2.0	< 2.9	2.3 ± 1.6	< 2.4	1.8 ± 1.5	< 2.1	10
Zn-65	3.9 ± 2.9	< 5.4	2.4 ± 4.1	< 5.3	-1.4 ± 2.6	< 3.5	-0.3 ± 3.4	< 5.0	30
Zr-Nb-95	-0.4 ± 1.4	< 2.7	-0.6 ± 2.1	< 4.1	-1.7 ± 1.8	< 2.4	-3.1 ± 1.8	< 3.2	15
Cs-134	0.2 ± 1.4	< 2.5	1.3 ± 2.1	< 3.4	-0.4 ± 1.5	< 2.4	-0.2 ± 1.4	< 3.1	10
Cs-137	0.1 ± 1.5	< 2.2	2.0 ± 2.5	< 4.7	0.2 ± 1.7	< 3.8	-1.3 ± 1.9	< 2.2	10
Ba-La-140	1.4 ± 1.5	< 1.7	-2.5 ± 2.5	< 3.0	1.2 ± 2.1	< 2.2	-1.5 ± 1.6	< 3.3	15
Other (Ru-103)	0.3 ± 1.4	< 3.0	1.4 ± 2.3	< 4.0	-0.7 ± 1.5	< 2.2	-0.1 ± 1.4	< 2.8	30

Lab Code	ELW- 3049		ELW- 3854		ELW- 4496		ELW- 5612		
Date Collected	05-16-11		06-27-11		07-14-11		08-18-11		Req. LLD
Gross beta	0.6 ± 1.0	< 1.9	2.0 ± 0.8	< 1.3	2.8 ± 0.7	< 1.0	1.2 ± 0.5	< 0.8	4.0
I-131	0.04 ± 0.13	< 0.23	0.01 ± 0.20	< 0.35	0.12 ± 0.21	< 0.39	0.01 ± 0.14	< 0.20	0.5
Be-7	12.8 ± 12.2	< 28.8	-4.3 ± 17.0	< 30.8	1.1 ± 11.4	< 22.2	6.7 ± 23.2	< 39.9	
Mn-54	1.4 ± 1.9	< 3.0	-0.2 ± 1.7	< 2.5	0.4 ± 1.5	< 2.9	-0.9 ± 2.8	< 4.5	10
Fe-59	-4.6 ± 3.4	< 5.4	-0.2 ± 2.9	< 2.3	0.3 ± 2.7	< 4.1	-0.5 ± 6.7	< 9.9	30
Co-58	0.4 ± 1.4	< 1.9	-1.2 ± 1.7	< 2.0	1.0 ± 1.4	< 1.9	1.1 ± 3.2	< 6.0	10
Co-60	-1.4 ± 1.9	< 1.7	-1.4 ± 1.9	< 2.8	-1.3 ± 1.5	< 1.2	-2.0 ± 3.5	< 3.8	10
Zn-65	-2.8 ± 2.6	< 1.9	1.5 ± 3.8	< 4.3	0.7 ± 2.8	< 3.0	-5.2 ± 7.4	< 7.2	30
Zr-Nb-95	1.4 ± 1.8	< 3.6	0.5 ± 1.7	< 4.0	-0.4 ± 1.7	< 2.4	-2.7 ± 2.7	< 3.2	15
Cs-134	-0.2 ± 1.4	< 2.3	0.8 ± 1.8	< 2.2	0.9 ± 1.6	< 2.9	0.7 ± 3.1	< 3.9	10
Cs-137	2.0 ± 2.1	< 3.5	-1.9 ± 1.9	< 2.4	-0.7 ± 1.9	< 2.1	-1.1 ± 3.6	< 5.3	10
Ba-La-140	-2.6 ± 1.9	< 2.8	2.0 ± 2.0	< 4.5	-1.5 ± 1.6	< 3.0	-1.7 ± 3.6	< 3.8	15
Other (Ru-103)	-0.9 ± 1.3	< 2.1	-1.3 ± 2.1	< 2.7	0.4 ± 1.5	< 3.5	-0.7 ± 2.8	< 4.7	30

										All locations
Lab Code	ELW- 6241		ELW- 6939		ELW- 8079		ELW- 8733			**Annual**
Date Collected	09-14-11		10-13-11		11-17-11		12-15-11		Req. LLD	**Mean ± s.d.**
Gross beta	0.2 ± 0.4	< 0.6	1.5 ± 0.7	< 1.2	0.5 ± 0.5	< 0.9	3.0 ± 0.8	< 1.3	4.0	**2.1 ± 1.8**
I-131	0.12 ± 0.17	< 0.29	0.02 ± 0.17	< 0.31	-0.06 ± 0.14	< 0.26	0.15 ± 0.21	< 0.37	0.5	**0.04 ± 0.08**
Be-7	2.7 ± 9.6	< 24.7	8.9 ± 12.4	< 29.1	11.0 ± 10.4	< 25.9	7.9 ± 11.0	< 22.7		**3.0 ± 7.2**
Mn-54	-0.5 ± 1.3	< 2.2	0.1 ± 1.3	< 2.4	0.3 ± 1.2	< 2.3	0.5 ± 1.3	< 2.2	10	**0.1 ± 0.8**
Fe-59	2.3 ± 2.2	< 5.6	2.6 ± 2.3	< 4.4	-0.8 ± 2.5	< 4.6	-1.7 ± 2.7	< 3.8	30	**-0.2 ± 2.0**
Co-58	0.2 ± 1.1	< 2.1	-0.3 ± 1.3	< 2.4	-1.5 ± 1.3	< 1.7	-0.6 ± 1.4	< 1.7	10	**0.1 ± 1.0**
Co-60	0.3 ± 1.2	< 1.8	0.7 ± 1.3	< 2.2	0.5 ± 1.0	< 1.2	-1.1 ± 1.7	< 0.9	10	**-0.1 ± 1.1**
Zn-65	0.9 ± 2.5	< 4.5	0.9 ± 2.9	< 4.0	-1.5 ± 2.9	< 2.7	-2.3 ± 2.5	< 2.2	30	**-0.5 ± 2.0**
Zr-Nb-95	-0.6 ± 1.4	< 3.0	-1.9 ± 1.3	< 2.7	2.1 ± 1.6	< 4.0	-0.2 ± 1.4	< 2.1	15	**-0.5 ± 1.4**
Cs-134	-0.5 ± 1.0	< 2.1	0.0 ± 1.2	< 2.0	0.0 ± 1.5	< 2.7	-0.7 ± 1.3	< 3.0	10	**-0.1 ± 1.0**
Cs-137	1.3 ± 1.4	< 2.6	0.2 ± 1.5	< 1.7	0.5 ± 1.7	< 3.0	0.2 ± 1.4	< 1.9	10	**0.3 ± 1.2**
Ba-La-140	1.1 ± 1.6	< 4.3	-0.6 ± 1.4	< 2.5	0.5 ± 1.7	< 7.6	-1.3 ± 1.8	< 2.5	15	**-0.2 ± 1.7**
Other (Ru-103)	-0.7 ± 1.1	< 2.6	-1.1 ± 1.5	< 2.6	-0.6 ± 1.3	< 3.2	-1.4 ± 1.3	< 2.6	30	**-0.3 ± 1.1**

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- 1152		ELW- 4332		ELW- 6277		ELW- 8740		Req. LLDs
H-3	905 ± 123 [a]	< 163	85 ± 76	< 144	75 ± 79	< 143	55 ± 76	< 147	500
Sr-89	0.05 ± 0.47	< 0.52	-0.49 ± 0.83	< 0.74	-0.15 ± 0.60	< 0.72	0.10 ± 0.68	< 0.75	5.0
Sr-90	0.28 ± 0.25	< 0.47	0.53 ± 0.38	< 0.70	0.33 ± 0.28	< 0.53	0.28 ± 0.28	< 0.53	1.0

Location	E-05 (Two Creeks Park)								
Period	1st Qtr.		2nd Qtr.		3rd Qtr.		4th Qtr.		
Lab Code	ELW- 1153		ELW- 4333		ELW- 6278		ELW- 8741		Req. LLDs
H-3	58 ± 88	< 163	110 ± 78	< 144	53 ± 78	< 143	130 ± 80	< 147	500
Sr-89	-0.39 ± 0.61	< 0.71	0.32 ± 0.99	< 0.97	0.47 ± 0.51	< 0.61	0.65 ± 0.78	< 0.95	5.0
Sr-90	0.45 ± 0.36	< 0.65	0.20 ± 0.44	< 0.91	0.08 ± 0.23	< 0.47	0.00 ± 0.30	< 0.66	1.0

Location	E-06 (Coast Guard Station)								
Period	1st Qtr.		2nd Qtr.		3rd Qtr.		4th Qtr.		
Lab Code	ELW- 1154		ELW- 4334		ELW- 6279		ELW- 8742		Req. LLDs
H-3	65 ± 89	< 163	128 ± 79	< 144	73 ± 79	< 143	87 ± 78	< 147	500
Sr-89	0.13 ± 0.46	< 0.55	-0.21 ± 0.74	< 0.68	0.38 ± 0.49	< 0.56	0.11 ± 0.74	< 0.77	5.0
Sr-90	0.13 ± 0.25	< 0.49	0.35 ± 0.33	< 0.62	0.12 ± 0.22	< 0.44	0.23 ± 0.31	< 0.60	1.0

Location	E-33 (Kewaunee)								
Period	1st Qtr.		2nd Qtr.		3rd Qtr.		4th Qtr.		
Lab Code	ELW- 1155		ELW- 4335		ELW- 6280		ELW- 8743		Req. LLDs
H-3	22096 ± 449 [b]	< 163	-1 ± 72	< 144	30 ± 77	< 143	94 ± 78	< 147	500
Sr-89	-0.10 ± 0.49	< 0.56	0.19 ± 0.63	< 0.66	0.22 ± 0.52	< 0.58	-0.03 ± 0.71	< 0.71	5.0
Sr-90	0.21 ± 0.35	< 0.55	0.03 ± 0.28	< 0.59	0.29 ± 0.24	< 0.45	0.43 ± 0.30	< 0.53	1.0

[a] January sample tritium = 2709±194 pCi/L; February tritium = 111±119 pCi/L; March tritium = 60±117 -Ci/L.

[b] Tritium reanalyzed with a result of 22307±456 pCi/L. January sample tritium = 73±100 pCi/L; February = 64±99 pCi/L; March = 64741±758 pCi/L.

Tritium Annual Mean + s.d.	**1503 ± 5496**
Sr-89 Annual Mean + s.d.	**0.08 ± 0.30**
Sr-90 Annual Mean + s.d.	**0.25 ± 0.15**

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	02-24-11		05-24-11		08-15-11		
Lab Code	EF- 3174		EF- 3175		EF- 5824		
Type	Burbot		Lake Trout		Brown Trout		
Ratio (wet/dry wt.)	4.97		4.75		3.68		
Gross Beta	3.20 ± 0.12	< 0.043	3.46 ± 0.11	< 0.036	3.73 ± 0.07	< 0.026	0.5
K-40	2.22 ± 0.33	-	2.17 ± 0.34	-	2.45 ± 0.35	-	
Mn-54	0.006 ± 0.009	< 0.020	-0.002 ± 0.009	< 0.017	0.002 ± 0.007	< 0.012	0.13
Fe-59	0.006 ± 0.015	< 0.074	0.029 ± 0.015	< 0.079	-0.011 ± 0.019	< 0.028	0.26
Co-58	0.014 ± 0.007	< 0.022	0.006 ± 0.007	< 0.026	0.012 ± 0.008	< 0.012	0.13
Co-60	-0.014 ± 0.011	< 0.014	0.006 ± 0.008	< 0.009	-0.010 ± 0.011	< 0.009	0.13
Zn-65	-0.020 ± 0.020	< 0.010	0.009 ± 0.014	< 0.018	-0.020 ± 0.021	< 0.012	0.26
Cs-134	0.001 ± 0.008	< 0.012	0.003 ± 0.007	< 0.009	-0.003 ± 0.008	< 0.008	0.13
Cs-137	0.103 ± 0.021	< 0.012	0.040 ± 0.014	< 0.010	0.033 ± 0.017	< 0.015	0.15
Other (Ru-103)	0.002 ± 0.008	< 0.069	-0.021 ± 0.006	< 0.046	0.014 ± 0.008	< 0.021	0.5
Collection Date	08-30-11		11-08-11		11-19-11		
Lab Code	EF- 5825		EF- 8662		EF- 8663		
Type	Rainbow Trout		Coho Salmon		Coho Salmon		
Ratio (wet/dry wt.)	3.44		4.17		3.74		
Gross Beta	3.72 ± 0.08	< 0.024	3.60 ± 0.10	< 0.034	3.55 ± 0.10	< 0.030	0.5
K-40	2.94 ± 0.38	-	2.43 ± 0.35	-	3.04 ± 0.42	-	
Mn-54	0.011 ± 0.009	< 0.014	0.002 ± 0.007	< 0.010	0.002 ± 0.008	< 0.012	0.13
Fe-59	0.033 ± 0.017	< 0.023	0.024 ± 0.016	< 0.049	0.007 ± 0.016	< 0.038	0.26
Co-58	0.000 ± 0.007	< 0.008	0.002 ± 0.008	< 0.021	0.006 ± 0.008	< 0.014	0.13
Co-60	-0.001 ± 0.009	< 0.013	0.001 ± 0.009	< 0.014	-0.002 ± 0.010	< 0.014	0.13
Zn-65	0.001 ± 0.018	< 0.015	-0.012 ± 0.017	< 0.020	-0.007 ± 0.021	< 0.011	0.26
Cs-134	0.000 ± 0.009	< 0.012	0.004 ± 0.008	< 0.014	0.000 ± 0.008	< 0.012	0.13
Cs-137	0.026 ± 0.011	< 0.015	0.024 ± 0.014	< 0.015	0.033 ± 0.018	< 0.015	0.15
Other (Ru-103)	0.009 ± 0.008	< 0.021	-0.009 ± 0.007	< 0.018	0.001 ± 0.007	< 0.019	0.5

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

Sample Description and Concentration (pCi/g wet)				Req.
MDC	MDC		MDC	LLD
		Annual		
		Mean s.d.		
		3.54 ± 0.20		
		2.54 ± 0.36		
		0.004 ± 0.005		
		0.015 ± 0.017		
		0.006 ± 0.005		
		-0.003 ± 0.007		
		-0.008 ± 0.012		
		0.001 ± 0.003		
		0.043 ± 0.030		
		-0.001 ± 0.013		

Table 8. Radioactivity in shoreline sediment samples

Collection: Semiannual

Sample Description and Concentration (pCi/g dry)

		MDC		MDC		MDC	
Collection Date	4/14/2011		4/14/2011		4/14/2011		
Lab Code	ESS- 2147		ESS- 2148		ESS- 2149		LLD
Location	E-01		E-05		E-06		
Gross Beta	10.79 ± 1.00	< 1.13	8.39 ± 0.81	< 1.00	10.01 ± 0.91	< 1.08	2.0
Be-7	0.078 ± 0.043	< 0.10	0.077 ± 0.049	< 0.13	0.041 ± 0.044	< 0.089	
K-40	7.29 ± 0.37	-	6.72 ± 0.41	-	6.49 ± 0.37	-	-
Cs-137	0.021 ± 0.012	< 0.011	0.020 ± 0.009	< 0.008	0.024 ± 0.014	< 0.011	0.15
Tl-208	0.045 ± 0.014	-	0.041 ± 0.018	-	0.047 ± 0.015	-	-
Pb-212	0.11 ± 0.021	-	0.14 ± 0.044	< 0.091	0.10 ± 0.018	-	-
Bi-214	0.092 ± 0.021	-	0.10 ± 0.025	-	0.10 ± 0.023	-	-
Ra-226	0.30 ± 0.12	< 0.22	0.45 ± 0.13	< 0.25	0.40 ± 0.12	< 0.23	-
Ac-228	0.13 ± 0.033	-	0.20 ± 0.053	-	0.14 ± 0.036	-	-
Collection Date	4/14/2011		4/14/2011				
Lab Code	ESS- 2150		ESS- 2151				
Location	E-12		E-33				
Gross Beta	9.42 ± 0.80	< 0.91	7.76 ± 0.85	< 1.03			2.0
Be-7	0.032 ± 0.046	< 0.11	0.035 ± 0.040	< 0.11			
K-40	6.72 ± 0.36	-	5.24 ± 0.33	-			-
Cs-137	0.025 ± 0.011	< 0.009	0.029 ± 0.014	< 0.010			0.15
Tl-208	0.046 ± 0.015	-	0.038 ± 0.013	-			-
Pb-212	0.11 ± 0.017	-	0.086 ± 0.014	-			-
Bi-214	0.11 ± 0.028	-	0.095 ± 0.023	-			-
Ra-226	0.38 ± 0.12	< 0.23	0.26 ± 0.11	< 0.21			-
Ac-228	0.20 ± 0.050	-	0.17 ± 0.035	-			-

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN SHORELINE SEDIMENT SAMPLES

(Semiannual Collections)

Sample Description and Concentration (pCi/g dry)

		MDC		MDC		MDC	
Collection Date	10/13/2011		10/13/2011		10/13/2011		Req.
Lab Code	ESS- 7154		ESS- 7155		ESS- 7156		LLD
Location	E-01		E-05		E-06		
Gross Beta	6.83 ± 1.19	< 1.75	9.34 ± 1.12	< 1.45	8.47 ± 1.13	< 1.54	2.0
Be-7	0.022 ± 0.046	< 0.093	-0.13 ± 0.058	< 0.15	-0.022 ± 0.056	< 0.11	
K-40	5.20 ± 0.38	-	6.34 ± 0.45	-	6.23 ± 0.44	-	-
Cs-137	0.016 ± 0.009	< 0.013	0.011 ± 0.009	< 0.010	0.026 ± 0.009	< 0.013	0.15
Tl-208	0.038 ± 0.016	-	0.040 ± 0.020	-	0.054 ± 0.022	-	-
Pb-212	0.091 ± 0.017	-	0.12 ± 0.027	-	0.069 ± 0.048	< 0.11	-
Bi-214	0.12 ± 0.025	-	0.093 ± 0.028	-	0.12 ± 0.031	-	-
Ra-226	0.23 ± 0.14	< 0.25	0.29 ± 0.16	< 0.29	0.32 ± 0.15	< 0.29	-
Ac-228	0.16 ± 0.046	-	0.21 ± 0.063	-	0.19 ± 0.059		-

						Annual
Collection Date	10/13/2011		10/13/2011			
Lab Code	ESS- 7157		ESS- 7158			
Location	E-12		E-33			Mean s.d.
Gross Beta	7.05 ± 1.16	< 1.69	8.08 ± 1.26	< 1.83	2.0	**8.61 ± 1.27**
Be-7	0.11 ± 0.049	< 0.13	0.037 ± 0.049	< 0.14		**0.028 ± 0.067**
K-40	4.64 ± 0.35	-	5.11 ± 0.38	-	-	**6.00 ± 0.88**
Cs-137	0.014 ± 0.008	< 0.012	0.032 ± 0.013	< 0.011	0.15	**0.022 ± 0.007**
Tl-208	0.039 ± 0.013	-	0.049 ± 0.017	-	-	**0.04 ± 0.01**
Pb-212	0.082 ± 0.047	< 0.11	0.11 ± 0.018	-	-	**0.10 ± 0.02**
Bi-214	0.10 ± 0.025	-	0.11 ± 0.025	-	-	**0.10 ± 0.01**
Ra-226	0.38 ± 0.14	< 0.25	0.28 ± 0.17	-	-	**0.33 ± 0.07**
Ac-228	0.14 ± 0.048	-	0.12 ± 0.050	-	-	**0.17 ± 0.03**

POINT BEACH NUCLEAR PLANT

Table 9. Radioactivity in soil samples

Collection: Semiannual

Sample Description and Concentration (pCi/g dry)

		MDC		MDC		MDC	
Collection Date	5/23/2011		5/23/2011		5/23/2011		Req.
Lab Code	ESO- 3201		ESO- 3202		ESO- 3203		LLD
Location	E-01		E-02		E-03		
Gross Beta	10.67 ± 1.25	< 1.52	33.41 ± 1.51	< 1.40	28.60 ± 1.44	< 1.38	2.0
Be-7	0.28 ± 0.15	-	0.012 ± 0.090	< 0.14	1.34 ± 0.24	-	
K-40	5.74 ± 0.39	-	19.25 ± 0.83	-	15.90 ± 0.78	-	-
Cs-137	0.03 ± 0.014	<0.011	0.13 ± 0.030	<0.024	0.10 ± 0.030	<0.024	0.15
Tl-208	0.05 ± 0.018	-	0.20 ± 0.031	-	0.16 ± 0.029	-	-
Pb-212	0.18 ± 0.054	-	0.54 ± 0.038	-	0.58 ± 0.089	-	-
Bi-214	0.09 ± 0.024	-	0.42 ± 0.047	-	0.34 ± 0.047	-	-
Ra-226	0.27 ± 0.16	-	1.20 ± 0.29	-	1.14 ± 0.28	-	-
Ac-228	0.15 ± 0.059	-	0.78 ± 0.13	-	0.61 ± 0.087	-	-
Collection Date	5/23/2011		5/23/2011		5/23/2011		
Lab Code	ESO- 3204		ESO- 3205		ESO- 3206		
Location	E-04		E-06		E-08		
Gross Beta	30.12 ± 1.74	< 1.74	14.37 ± 1.25	< 1.44	20.49 ± 1.50	< 1.68	2.0
Be-7	-0.073 ± 0.088	< 0.16	-0.020 ± 0.069	< 0.12	0.045 ± 0.084	< 0.15	
K-40	16.70 ± 0.82	-	9.29 ± 0.57	-	12.83 ± 0.71	-	-
Cs-137	0.14 ± 0.032	0.02	0.18 ± 0.024	<0.016	0.25 ± 0.035	<0.021	0.15
Tl-208	0.16 ± 0.033	-	0.04 ± 0.020	-	0.09 ± 0.026	-	-
Pb-212	0.40 ± 0.037	-	0.13 ± 0.028	-	0.26 ± 0.041	-	-
Bi-214	0.26 ± 0.049	-	0.08 ± 0.031	-	0.15 ± 0.041	-	-
Ra-226	0.74 ± 0.29	-	0.45 ± 0.19	< 0.35	0.66 ± 0.23	< 0.42	-
Ac-228	0.42 ± 0.091	-	0.20 ± 0.078	-	0.31 ± 0.085	-	-
Collection Date	5/23/2011		5/23/2011				
Lab Code	ESO- 3207		ESO- 3208				
Location	E-09		E-20				
Gross Beta	33.30 ± 1.38	< 1.24	32.63 ± 1.38	< 1.24			2.0
Be-7	-0.035 ± 0.085	< 0.08	-0.083 ± 0.089	< 0.13			
K-40	19.33 ± 0.83	-	16.28 ± 0.81	-			-
Cs-137	0.14 ± 0.033	<0.023	0.21 ± 0.035	<0.023			0.15
Tl-208	0.19 ± 0.030	-	0.16 ± 0.033	-			-
Pb-212	0.47 ± 0.036	-	0.48 ± 0.047	-			-
Bi-214	0.31 ± 0.048	-	0.30 ± 0.048	-			-
Ra-226	0.79 ± 0.27	-	0.77 ± 0.30	-			-
Ac-228	0.60 ± 0.10	-	0.48 ± 0.11	-			-

Table 9. Radioactivity in soil samples

Collection: Semiannual

	Sample Description and Concentration (pCi/g dry)	MDC		MDC		MDC	
Collection Date	10/27/2011		10/27/2011		10/27/2011		Req.
Lab Code	ESO- 7522		ESO- 7523		ESO- 7524		LLD
Location	E-01		E-02		E-03		
Gross Beta	26.89 ± 1.68	< 1.79	33.81 ± 1.71	< 1.53	30.92 ± 1.76	< 1.75	2.0
Be-7	0.085 ± 0.093	< 0.24	-0.055 ± 0.15	< 0.30	0.089 ± 0.12	< 0.32	
K-40	15.47 ± 0.82	-	23.33 ± 1.52	-	19.39 ± 0.92	-	-
Cs-137	0.17 ± 0.035	< 0.025	0.10 ± 0.057	< 0.051	0.23 ± 0.045	< 0.038	0.15
Tl-208	0.18 ± 0.037	-	0.24 ± 0.060	-	0.23 ± 0.036	-	-
Pb-212	0.47 ± 0.054	-	0.69 ± 0.063	-	0.61 ± 0.046	-	-
Bi-214	0.31 ± 0.053	-	0.52 ± 0.086	-	0.41 ± 0.053	-	-
Ra-226	0.81 ± 0.31	-	1.21 ± 0.50	-	1.45 ± 0.37	-	-
Ac-228	0.60 ± 0.11	-	0.80 ± 0.17	-	0.77 ± 0.13	-	-
Collection Date	10/27/2011		10/27/2011		10/27/2011		
Lab Code	ESO- 7525		ESO- 7526		ESO- 7527		
Location	E-04		E-06		E-08		
Gross Beta	29.82 ± 1.61	< 1.45	19.38 ± 1.41	< 1.54	22.50 ± 1.55	< 1.69	2.0
Be-7	0.086 ± 0.13	< 0.39	0.072 ± 0.10	< 0.23	-0.14 ± 0.088	< 0.12	
K-40	16.55 ± 1.08	-	11.68 ± 0.76	-	14.31 ± 0.77	-	-
Cs-137	0.12 ± 0.045	< 0.041	0.42 ± 0.040	< 0.020	0.21 ± 0.034	< 0.023	0.15
Tl-208	0.18 ± 0.054	-	0.057 ± 0.028	-	0.093 ± 0.028	-	-
Pb-212	0.44 ± 0.048	-	0.25 ± 0.073	< 0.15	0.22 ± 0.032	-	-
Bi-214	0.28 ± 0.058	-	0.16 ± 0.044	-	0.23 ± 0.045	-	-
Ra-226	0.75 ± 0.39	-	0.65 ± 0.24	< 0.44	0.46 ± 0.26	-	-
Ac-228	0.55 ± 0.15	-	0.19 ± 0.065	< 0.12	0.27 ± 0.095	-	-
Collection Date	10/27/2011		10/27/2011				
Lab Code	ESO- 7528		ESO- 7529		**Annual**		
Location	E-09		E-20		**Mean s.d.**		
Gross Beta	28.59 ± 1.74	< 1.82	21.99 ± 1.46	< 1.52	**26.09 ± 7.10**		2.0
Be-7	-0.018 ± 0.098	< 0.23	0.035 ± 0.12	< 0.26	**0.101 ± 0.34**		
K-40	18.74 ± 0.91	-	11.34 ± 0.86	-	**15.38 ± 4.42**		-
Cs-137	0.12 ± 0.028	< 0.021	0.23 ± 0.034	< 0.032	**0.17 ± 0.09**		0.15
Tl-208	0.18 ± 0.035	-	0.13 ± 0.045	-	**0.15 ± 0.06**		-
Pb-212	0.42 ± 0.043	-	0.33 ± 0.045	-	**0.40 ± 0.16**		-
Bi-214	0.37 ± 0.061	-	0.33 ± 0.064	-	**0.28 ± 0.12**		-
Ra-226	0.87 ± 0.33	-	0.67 ± 0.38	-	**0.81 ± 0.31**		-
Ac-228	0.51 ± 0.13	-	0.42 ± 0.13	-	**0.48 ± 0.21**		-

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	5/23/2011		5/23/2011		5/23/2011		
Lab Code	EG- 3176		EG- 3178		EG- 3179		Req. LLD
Ratio (wet/dry)	4.16		6.03		5.29		-
Gross Beta	8.26 ± 0.19	< 0.062	6.74 ± 0.15	< 0.048	8.25 ± 0.17	< 0.055	0.25
Be-7	1.12 ± 0.17	-	2.32 ± 0.23	-	0.82 ± 0.15	-	-
K-40	4.99 ± 0.40	-	4.15 ± 0.38	-	5.85 ± 0.40	-	-
I-131	0.000 ± 0.006	< 0.023	-0.006 ± 0.007	< 0.024	0.003 ± 0.006	< 0.016	0.060
Cs-134	0.010 ± 0.007	< 0.011	0.012 ± 0.007	< 0.011	-0.001 ± 0.006	< 0.009	0.060
Cs-137	0.008 ± 0.007	< 0.012	0.019 ± 0.008	< 0.014	0.007 ± 0.008	< 0.013	0.080
Other (Co-60)	-0.002 ± 0.007	< 0.010	-0.002 ± 0.008	< 0.012	-0.003 ± 0.007	< 0.009	0.060
Location	E-04		E-06		E-08		
Collection Date	5/23/2011		5/23/2011		5/23/2011		
Lab Code	EG- 3180		EG- 3181		EG- 3182		Req. LLD
Ratio (wet/dry)	5.24		5.55		4.01		-
Gross Beta	8.38 ± 0.18	< 0.055	8.33 ± 0.17	< 0.052	10.92 ± 0.31	< 0.087	0.25
Be-7	0.69 ± 0.16	-	0.56 ± 0.14	-	1.13 ± 0.19	-	-
K-40	5.37 ± 0.40	-	6.62 ± 0.46	-	6.39 ± 0.44	-	-
I-131	0.006 ± 0.006	< 0.020	0.010 ± 0.008	< 0.029	0.002 ± 0.006	< 0.022	0.060
Cs-134	0.001 ± 0.007	< 0.011	0.004 ± 0.008	< 0.015	0.000 ± 0.006	< 0.010	0.060
Cs-137	0.005 ± 0.008	< 0.014	-0.003 ± 0.009	< 0.015	0.010 ± 0.009	< 0.015	0.080
Other (Co-60)	-0.003 ± 0.009	< 0.009	0.001 ± 0.010	< 0.013	-0.002 ± 0.007	< 0.011	0.060
Location	E-09		E-20				
Collection Date	5/23/2011		5/23/2011				
Lab Code	EG- 3183		EG- 3184				Req. LLD
Ratio (wet/dry)	4.44		4.80				-
Gross Beta	8.76 ± 0.24	< 0.073	8.67 ± 0.25	< 0.080			0.25
Be-7	0.78 ± 0.12	-	0.66 ± 0.19	-			-
K-40	6.44 ± 0.37	-	6.31 ± 0.50	-			-
I-131	0.004 ± 0.004	< 0.015	-0.006 ± 0.008	< 0.037			0.060
Cs-134	0.009 ± 0.005	< 0.010	0.010 ± 0.009	< 0.013			0.060
Cs-137	0.004 ± 0.007	< 0.012	-0.008 ± 0.010	< 0.010			0.080
Other (Co-60)	0.001 ± 0.007	< 0.006	0.008 ± 0.011	< 0.014			0.060

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

Sample Description and Concentration (pCi/g wet)

		MDC		MDC		MDC	
Location	E-01		E-02		E-03		
Collection Date	7/28/2011		7/28/2011		7/28/2011		
Lab Code	EG- 5123		EG- 5124		EG- 5126		Req. LLD
Ratio (wet/dry)	2.77		3.03		2.64		-
Gross Beta	5.41 ± 0.21	< 0.094	7.48 ± 0.20	< 0.088	6.16 ± 0.21	< 0.081	0.25
Be-7	2.42 ± 0.26	-	3.04 ± 0.36	-	1.44 ± 0.26	-	-
K-40	4.91 ± 0.47	-	5.21 ± 0.52	-	5.16 ± 0.52	-	-
I-131	-0.007 ± 0.009	< 0.023	0.012 ± 0.010	< 0.030	0.000 ± 0.010	< 0.037	0.060
Cs-134	0.013 ± 0.009	< 0.014	0.002 ± 0.010	< 0.020	-0.006 ± 0.010	< 0.015	0.060
Cs-137	0.004 ± 0.012	< 0.019	0.008 ± 0.013	< 0.022	0.009 ± 0.012	< 0.020	0.080
Other (Co-60)	0.008 ± 0.012	< 0.020	0.005 ± 0.012	< 0.015	0.010 ± 0.012	< 0.014	0.060
Location	E-04		E-06		E-08		
Collection Date	7/28/2011		7/28/2011		7/28/2011		
Lab Code	EG- 5127		EG- 5128		EG- 5129		Req. LLD
Ratio (wet/dry)	2.30		2.34		2.14		-
Gross Beta	4.87 ± 0.19	< 0.083	4.14 ± 0.09	< 0.036	7.08 ± 0.23	< 0.082	0.25
Be-7	2.31 ± 0.26	-	0.76 ± 0.23	-	2.02 ± 0.25	-	-
K-40	3.23 ± 0.40	-	3.01 ± 0.46	-	5.93 ± 0.51	-	-
I-131	0.009 ± 0.009	< 0.027	-0.008 ± 0.011	< 0.036	-0.003 ± 0.008	< 0.022	0.060
Cs-134	-0.003 ± 0.009	< 0.013	-0.003 ± 0.011	< 0.019	0.003 ± 0.008	< 0.018	0.060
Cs-137	0.012 ± 0.010	< 0.019	0.016 ± 0.014	< 0.025	0.004 ± 0.011	< 0.017	0.080
Other (Co-60)	0.001 ± 0.010	< 0.007	0.020 ± 0.011	< 0.014	-0.006 ± 0.010	< 0.014	0.060
Location	E-09		E-20				
Collection Date	7/28/2011		7/28/2011				
Lab Code	EG- 5130		EG- 5131				Req. LLD
Ratio (wet/dry)	2.46		3.78				-
Gross Beta	7.87 ± 0.26	< 0.098	7.09 ± 0.23	< 0.089			0.25
Be-7	1.87 ± 0.25	-	2.76 ± 0.29	-			-
K-40	6.67 ± 0.58	-	6.12 ± 0.52	-			-
I-131	0.004 ± 0.009	< 0.028	0.013 ± 0.008	< 0.033			0.060
Cs-134	-0.004 ± 0.008	< 0.018	0.009 ± 0.009	< 0.016			0.060
Cs-137	0.012 ± 0.012	< 0.022	0.001 ± 0.012	< 0.020			0.080
Other (Co-60)	-0.010 ± 0.012	< 0.016	0.002 ± 0.010	< 0.012			0.060

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

Sample Description and Concentration (pCi/g wet)

		MDC		MDC		MDC	
Location	E-01		E-02		E-03		
Collection Date	9/29/2011		9/29/2011		9/29/2011		
Lab Code	EG- 6504		EG- 6505		EG- 6506		Req. LLD
Ratio (wet/dry)	3.08		2.97		3.85		-
Gross Beta	5.50 ± 0.19	< 0.078	5.55 ± 0.23	< 0.116	7.26 ± 0.23	< 0.080	0.25
Be-7	5.39 ± 0.38	-	4.41 ± 0.37	-	5.15 ± 0.42	-	-
K-40	5.69 ± 0.55	-	3.96 ± 0.46	-	6.10 ± 0.61	-	-
I-131	0.020 ± 0.011	< 0.043	0.002 ± 0.010	< 0.028	-0.001 ± 0.011	< 0.032	0.060
Cs-134	-0.012 ± 0.010	< 0.015	-0.007 ± 0.008	< 0.011	-0.002 ± 0.010	< 0.019	0.060
Cs-137	0.013 ± 0.015	< 0.023	0.009 ± 0.013	< 0.023	-0.005 ± 0.012	< 0.016	0.080
Other (Co-60)	0.011 ± 0.013	< 0.012	0.005 ± 0.011	< 0.010	0.030 ± 0.015	< 0.022	0.060
Location	E-04		E-06		E-08		
Collection Date	9/29/2011		9/29/2011		9/29/2011		
Lab Code	EG- 6507		EG- 6508		EG- 6509		Req. LLD
Ratio (wet/dry)	2.64		1.93		1.98		-
Gross Beta	5.39 ± 0.22	< 0.103	4.06 ± 0.13	< 0.042	3.68 ± 0.16	< 0.080	0.25
Be-7	5.60 ± 0.40	-	3.01 ± 0.32	-	8.85 ± 0.46	-	-
K-40	4.52 ± 0.46	-	2.88 ± 0.38	-	1.94 ± 0.31	-	-
I-131	0.000 ± 0.010	< 0.037	-0.003 ± 0.009	< 0.031	0.003 ± 0.010	< 0.028	0.060
Cs-134	0.004 ± 0.008	< 0.016	0.002 ± 0.010	< 0.021	0.000 ± 0.007	< 0.012	0.060
Cs-137	0.019 ± 0.011	< 0.020	0.003 ± 0.012	< 0.020	-0.002 ± 0.010	< 0.015	0.080
Other (Co-60)	0.002 ± 0.011	< 0.015	-0.017 ± 0.012	< 0.009	0.002 ± 0.008	< 0.012	0.060
Location	E-09		E-20				
Collection Date	9/29/2011		9/29/2011				
Lab Code	EG- 6510		EG- 6511				Req. LLD
Ratio (wet/dry)	2.60		2.29				-
Gross Beta	6.60 ± 0.24	< 0.097	6.13 ± 0.22	< 0.090			0.25
Be-7	3.67 ± 0.26	-	3.63 ± 0.23	-			-
K-40	4.82 ± 0.41	-	4.74 ± 0.34	-			-
I-131	-0.001 ± 0.007	< 0.021	0.001 ± 0.006	< 0.022			0.060
Cs-134	-0.009 ± 0.007	< 0.010	0.003 ± 0.006	< 0.011			0.060
Cs-137	-0.007 ± 0.008	< 0.009	0.004 ± 0.007	< 0.014			0.080
Other (Co-60)	0.002 ± 0.008	< 0.011	0.002 ± 0.007	< 0.011			0.060

Beta Annual Mean + s.d. 6.81 ± 1.82
Be-7 Annual Mean + s.d. 2.68 ± 2.05
K-40 Annual Mean + s.d. 5.04 ± 1.30
I-131 Annual Mean + s.d. 0.002 ± 0.007
Cs-134 Annual Mean + s.d. 0.001 ± 0.007
Cs-137 Annual Mean + s.d. 0.006 ± 0.007
Co-60 Annual Mean + s.d. 0.002 ± 0.009

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

Collection: Triannual
Units: pCi/g wet

Sample Description and Concentration

Collection Date	06-17-11	**MDC**	06-17-11	**MDC**	Req.		
Lab Code	ESL- 3860		ESL- 3861		LLD		
Location	E-05		E-12				
Ratio (wet wt./dry wt.)	6.30		6.23				
Gross Beta	5.00 ± 0.27	< 0.21	2.80 ± 0.19	< 0.17	0.25		
Be-7	1.37 ± 0.17	-	2.14 ± 0.53	-	-		
K-40	3.33 ± 0.26	-	0.96 ± 0.50	-	-		
Co-58	0.000 ± 0.005	< 0.009	0.093 ± 0.044	< 0.035	0.25		
Co-60	0.010 ± 0.007	< 0.010	0.284 ± 0.043	< 0.040	0.25		
Cs-134	0.003 ± 0.004	< 0.008	-0.022 ± 0.016	< 0.026	0.25		
Cs-137	0.011 ± 0.006	< 0.010	0.004 ± 0.025	< 0.047	0.25		
Collection Date	08-11-11		08-11-11		Req.		
Lab Code	ESL- 5506		ESL- 5507		LLD		
Location	E-05		E-12				
Ratio (wet wt./dry wt.)	3.88		2.48				
Gross Beta	5.59 ± 0.22	< 0.20	5.86 ± 0.24	< 0.20	0.25		
Be-7	2.05 ± 0.10	-	2.84 ± 0.34	-	-		
K-40	3.19 ± 3.19	-	4.27 ± 0.50	-	-		
Co-58	0.000 ± 0.003	< 0.006	0.012 ± 0.014	< 0.032	0.25		
Co-60	0.007 ± 0.003	< 0.005	0.002 ± 0.017	< 0.032	0.25		
Cs-134	0.004 ± 0.003	< 0.005	0.016 ± 0.013	< 0.024	0.25		
Cs-137	0.023 ± 0.006	< 0.006	0.042 ± 0.019	< 0.034	0.25		
Collection Date	10-05-11		10-05-11		Req.		
Lab Code	ESL- 6678		ESL- 6679		LLD	**Annual**	
Location	E-05		E-12			**Mean**	**s.d.**
Ratio (wet wt./dry wt.)	5.74		5.34				
Gross Beta	3.66 ± 0.24	< 0.22	4.02 ± 0.25	< 0.21	0.25	**4.49 ± 1.19**	
Be-7	1.23 ± 0.08	-	0.87 ± 0.07	-	-	**1.75 ± 0.72**	
K-40	2.01 ± 0.11	-	2.40 ± 0.10	-	-	**2.69 ± 1.16**	
Co-58	-0.001 ± 0.002	< 0.004	-0.001 ± 0.002	< 0.003	0.25	**0.017 ± 0.038**	
Co-60	0.002 ± 0.003	< 0.004	0.003 ± 0.002	< 0.004	0.25	**0.051 ± 0.114**	
Cs-134	0.002 ± 0.002	< 0.004	0.000 ± 0.002	< 0.004	0.25	**0.001 ± 0.012**	
Cs-137	0.020 ± 0.007	< 0.006	0.010 ± 0.004	< 0.005	0.25	**0.019 ± 0.013**	

POINT BEACH NUCLEAR PLANT

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

1st. Quarter, 2011

Date Annealed:	12-13-10	Days in the field	90
Date Placed:	01-05-11	Days from Annealing	
Date Removed:	04-05-11	to Readout:	123
Date Read:	04-15-11		

Location	Days in Field	Total mR	Net mR	mR/Stnd Qtr (91 days)	Net mR per 7 days
Indicator					
E-1	90	14.1 ± 0.6	9.9 ± 0.7	14.3 ± 0.6	0.77 ± 0.05
E-2	90	19.0 ± 0.8	14.8 ± 0.9	19.2 ± 0.8	1.15 ± 0.07
E-3	90	20.0 ± 1.5	15.8 ± 1.5	20.2 ± 1.5	1.23 ± 0.12
E-4	90	17.3 ± 1.2	13.1 ± 1.2	17.5 ± 1.3	1.02 ± 0.10
E-5	90	17.0 ± 0.3	12.8 ± 0.4	17.2 ± 0.3	1.00 ± 0.03
E-6	90	17.6 ± 0.8	13.4 ± 0.9	17.8 ± 0.8	1.04 ± 0.07
E-7	90	17.1 ± 0.9	12.9 ± 1.0	17.3 ± 0.9	1.00 ± 0.07
E-8	90	16.9 ± 1.4	12.7 ± 1.4	17.1 ± 1.4	0.99 ± 0.11
E-9	90	19.0 ± 0.5	14.8 ± 0.6	19.3 ± 0.5	1.15 ± 0.05
E-12	90	15.1 ± 0.3	10.9 ± 0.4	15.3 ± 0.3	0.85 ± 0.03
E-14	90	17.7 ± 0.4	13.5 ± 0.5	17.9 ± 0.4	1.05 ± 0.04
E-15	90	15.1 ± 0.5	10.9 ± 0.6	15.3 ± 0.5	0.85 ± 0.05
E-16	90	15.3 ± 0.2	11.1 ± 0.4	15.5 ± 0.2	0.86 ± 0.03
E-17	90	17.5 ± 0.4	13.3 ± 0.5	17.6 ± 0.4	1.03 ± 0.04
E-18	90	16.7 ± 0.9	12.5 ± 1.0	16.9 ± 0.9	0.97 ± 0.07
E-22	90	15.8 ± 0.9	11.6 ± 1.0	16.0 ± 0.9	0.90 ± 0.07
E-23	90	16.2 ± 0.5	12.0 ± 0.6	16.4 ± 0.5	0.93 ± 0.05
E-24	90	17.1 ± 0.5	12.9 ± 0.6	17.3 ± 0.5	1.00 ± 0.05
E-25	90	16.1 ± 0.2	11.9 ± 0.4	16.3 ± 0.2	0.93 ± 0.03
E-26	90	15.8 ± 0.5	11.6 ± 0.6	15.9 ± 0.5	0.90 ± 0.05
E-27	90	18.1 ± 0.3	13.9 ± 0.4	18.3 ± 0.3	1.08 ± 0.03
E-28	90	14.5 ± 0.4	10.3 ± 0.5	14.6 ± 0.4	0.80 ± 0.04
E-29	90	14.8 ± 0.8	10.6 ± 0.9	15.0 ± 0.8	0.82 ± 0.07
E-30	90	15.8 ± 0.9	11.6 ± 1.0	16.0 ± 0.9	0.90 ± 0.07
E-31	90	17.5 ± 0.8	13.3 ± 0.9	17.7 ± 0.8	1.03 ± 0.07
E-32	90	18.9 ± 0.7	14.7 ± 0.8	19.1 ± 0.7	1.14 ± 0.06
E-38	90	16.1 ± 0.9	11.9 ± 1.0	16.3 ± 0.9	0.93 ± 0.07
E-39	90	14.3 ± 0.6	10.1 ± 0.7	14.5 ± 0.6	0.79 ± 0.05
E-41	90	13.9 ± 0.4	9.7 ± 0.5	14.1 ± 0.4	0.75 ± 0.04
E-42	90	14.8 ± 0.5	10.6 ± 0.6	15.0 ± 0.5	0.82 ± 0.05
E-43	90	13.5 ± 0.4	9.3 ± 0.5	13.6 ± 0.4	0.72 ± 0.04
Control					
E-20	90	18.2 ± 1.0	14.0 ± 1.0	18.2 ± 1.0	1.09 ± 0.08
Mean±s.d.		16.5 ± 1.7	12.3 ± 1.7	16.6 ± 1.7	0.95 ± 0.12

In-Transit Exposure

Date Annealed	12-13-10	03-10-11
Date Read	01-11-11	04-15-11
	Total mR	
ITC-1	3.8 ± 0.2	4.6 ± 0.1
ITC-2	3.7 ± 0.2	4.7 ± 0.1

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Table 12. Ambient Gamma Radiation

2nd Quarter, 2011

Date Annealed:	03-10-11	Days in the field		93
Date Placed:	04-05-11	Days from Annealing		
Date Removed:	07-07-11	to Readout:		127
Date Read:	07-15-11			

Location	Days in Field	Total mR	Net mR	mR/Stnd Qtr (91 days)	Net mR per 7 days
Indicator					
E-1	93	17.4 ± 0.8	12.1 ± 1.0	17.0 ± 0.8	0.91 ± 0.07
E-2	93	23.8 ± 1.0	18.5 ± 1.1	23.3 ± 1.0	1.39 ± 0.09
E-3	93	25.6 ± 1.7	20.3 ± 1.8	25.1 ± 1.6	1.53 ± 0.13
E-4	93	20.5 ± 0.4	15.2 ± 0.7	20.1 ± 0.4	1.15 ± 0.05
E-5	93	22.8 ± 0.7	17.5 ± 0.9	22.3 ± 0.7	1.32 ± 0.07
E-6	93	20.3 ± 0.8	15.0 ± 1.0	19.9 ± 0.8	1.13 ± 0.07
E-7	93	19.8 ± 0.3	14.5 ± 0.6	19.4 ± 0.3	1.09 ± 0.05
E-8	93	20.4 ± 0.9	15.1 ± 1.1	20.0 ± 0.9	1.14 ± 0.08
E-9	93	22.7 ± 1.0	17.4 ± 1.1	22.2 ± 1.0	1.31 ± 0.09
E-12	93	15.9 ± 0.5	10.6 ± 0.7	15.6 ± 0.5	0.80 ± 0.06
E-14	93	21.5 ± 1.7	16.2 ± 1.8	21.0 ± 1.6	1.22 ± 0.13
E-15	93	24.9 ± 1.2	19.6 ± 1.3	24.4 ± 1.2	1.48 ± 0.10
E-16	93	19.7 ± 0.7	14.4 ± 0.9	19.3 ± 0.7	1.09 ± 0.07
E-17	93	20.3 ± 1.3	15.0 ± 1.4	19.8 ± 1.3	1.13 ± 0.11
E-18	93	21.9 ± 0.6	16.6 ± 0.8	21.4 ± 0.6	1.25 ± 0.06
E-22	93	21.6 ± 0.4	16.3 ± 0.7	21.1 ± 0.4	1.23 ± 0.05
E-23	93	23.5 ± 0.8	18.2 ± 1.0	23.0 ± 0.8	1.37 ± 0.07
E-24	93	21.1 ± 0.4	15.8 ± 0.7	20.6 ± 0.4	1.19 ± 0.05
E-25	93	23.0 ± 0.3	17.7 ± 0.6	22.5 ± 0.3	1.33 ± 0.05
E-26	93	19.2 ± 0.8	13.9 ± 1.0	18.8 ± 0.8	1.05 ± 0.07
E-27	93	24.2 ± 1.0	18.9 ± 1.1	23.7 ± 1.0	1.42 ± 0.09
E-28	93	16.4 ± 0.4	11.1 ± 0.7	16.1 ± 0.4	0.84 ± 0.05
E-29	93	17.0 ± 0.7	11.7 ± 0.9	16.7 ± 0.7	0.88 ± 0.07
E-30	93	19.8 ± 0.8	14.5 ± 1.0	19.3 ± 0.8	1.09 ± 0.07
E-31	93	22.9 ± 2.1	17.6 ± 2.2	22.4 ± 2.1	1.33 ± 0.16
E-32	93	23.0 ± 0.3	17.7 ± 0.6	22.5 ± 0.3	1.33 ± 0.05
E-38	93	19.8 ± 0.2	14.5 ± 0.6	19.2 ± 0.2	1.09 ± 0.04
E-39	93	18.7 ± 0.5	13.4 ± 0.7	18.1 ± 0.5	1.01 ± 0.06
E-41	93	20.3 ± 0.6	15.0 ± 0.8	19.6 ± 0.5	1.13 ± 0.06
E-42	93		ND[a]		
E-43	93	18.9 ± 0.6	13.6 ± 0.8	18.5 ± 0.6	1.03 ± 0.06
Control					
E-20	92	[b] 20.2 ± 0.8	14.9 ± 1.0	20.0 ± 0.8	1.14 ± 0.07
Mean±s.d.		20.9 ± 2.4	15.6 ± 2.4	20.4 ± 2.4	1.17 ± 0.18

In-Transit Exposure

Date Annealed	03-10-11	06-03-11
Date Read	04-15-11	07-15-11
	Total mR	
ITC-1	4.6 ± 0.1	6.0 ± 0.5
ITC-2	4.7 ± 0.1	5.8 ± 0.2

[a] "ND" = No data; see Table 2.0, Listing of Missed Samples. [b] Placed 04-06-11.

POINT BEACH NUCLEAR PLANT

Table 12. Ambient Gamma Radiation

3rd Quarter, 2011

Date Annealed:	06-03-11	Days in the field	92
Date Placed:	07-07-11	Days from Annealing	
Date Removed:	10-07-11	to Readout:	137
Date Read:	10-18-11		

Location	Days in Field	Total mR	Net mR	mR/Stnd Qtr (91 days)	Net mR per 7 days
Indicator					
E-1	92	15.9 ± 0.7	10.7 ± 0.9	15.7 ± 0.7	0.81 ± 0.07
E-2	92	20.9 ± 0.4	15.7 ± 0.7	20.7 ± 0.4	1.19 ± 0.05
E-3	92	25.0 ± 1.6	19.8 ± 1.7	24.8 ± 1.6	1.51 ± 0.13
E-4	92	20.8 ± 1.5	15.6 ± 1.6	20.6 ± 1.4	1.19 ± 0.12
E-5	92	21.1 ± 1.4	15.9 ± 1.5	20.9 ± 1.4	1.21 ± 0.12
E-6	92	19.9 ± 0.7	14.7 ± 0.9	19.7 ± 0.7	1.12 ± 0.07
E-7	92	21.1 ± 1.0	15.9 ± 1.2	20.9 ± 1.0	1.21 ± 0.09
E-8	92	20.6 ± 1.6	15.4 ± 1.7	20.3 ± 1.6	1.17 ± 0.13
E-9	92	23.2 ± 0.5	18.0 ± 0.8	22.9 ± 0.5	1.37 ± 0.06
E-12	92	16.7 ± 0.2	11.5 ± 0.6	16.5 ± 0.2	0.88 ± 0.05
E-14	92	22.1 ± 0.8	16.9 ± 1.0	21.8 ± 0.8	1.29 ± 0.08
E-15	92			ND[a]	
E-16	92	20.2 ± 0.6	15.0 ± 0.8	19.9 ± 0.6	1.14 ± 0.06
E-17	92	21.7 ± 0.8	16.5 ± 1.0	21.4 ± 0.7	1.26 ± 0.08
E-18	92	22.4 ± 0.9	17.2 ± 1.1	22.1 ± 0.9	1.31 ± 0.08
E-22	92	22.1 ± 1.3	16.9 ± 1.4	21.9 ± 1.3	1.29 ± 0.11
E-23	92	22.0 ± 0.5	16.8 ± 0.8	21.8 ± 0.5	1.28 ± 0.06
E-24	92	21.8 ± 0.8	16.6 ± 1.0	21.6 ± 0.8	1.26 ± 0.08
E-25	92	21.3 ± 0.2	16.1 ± 0.6	21.1 ± 0.2	1.23 ± 0.05
E-26	92	19.5 ± 0.7	14.3 ± 0.9	19.3 ± 0.7	1.09 ± 0.07
E-27	92	23.5 ± 0.2	18.3 ± 0.6	23.2 ± 0.2	1.39 ± 0.05
E-28	92	16.3 ± 0.4	11.1 ± 0.7	16.1 ± 0.4	0.84 ± 0.05
E-29	92	17.9 ± 0.8	12.7 ± 1.0	17.7 ± 0.7	0.97 ± 0.08
E-30	92	20.2 ± 1.3	15.0 ± 1.4	20.0 ± 1.3	1.14 ± 0.11
E-31	92			ND[a]	
E-32	92	24.4 ± 0.8	19.2 ± 1.0	24.2 ± 0.8	1.46 ± 0.08
E-38	92	21.2 ± 1.7	16.0 ± 1.8	21.0 ± 1.7	1.22 ± 0.14
E-39	92	19.2 ± 0.5	14.0 ± 0.8	19.0 ± 0.5	1.07 ± 0.06
E-41	92	19.1 ± 0.5	13.9 ± 0.8	19.1 ± 0.5	1.06 ± 0.06
E-42	92	19.9 ± 0.6	14.7 ± 0.8	19.7 ± 0.6	1.12 ± 0.06
E-43	92	19.5 ± 0.5	14.3 ± 0.8	19.3 ± 0.5	1.09 ± 0.06
Control					
E-20	92	20.7 ± 0.8	15.5 ± 1.0	20.4 ± 0.8	1.18 ± 0.08
Mean±s.d.		20.7 ± 2.1	15.5 ± 2.1	20.5 ± 2.1	1.18 ± 0.15

In-Transit Exposure

Date Annealed	06-03-11	09-16-11
Date Read	07-15-11	10-18-11
	Total mR	
ITC-1	6.0 ± 0.5	4.5 ± 0.2
ITC-2	5.8 ± 0.2	4.5 ± 0.1

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

POINT BEACH NUCLEAR PLANT

Table 12. Ambient Gamma Radiation

4th Quarter, 2011

Date Annealed:	09-16-11	Days in the field	91
Date Placed:	10-07-11	Days from Annealing	
Date Removed:	01-06-12	to Readout:	118
Date Read:	01-12-12		

Location	Days in Field	Total mR	Net mR	mR/Stnd Qtr (91 days)	Net mR per 7 days
Indicator					
E-1	91	16.2 ± 0.6	12.5 ± 0.7	16.2 ± 0.6	0.96 ± 0.05
E-2	91	22.1 ± 1.0	18.4 ± 1.1	22.1 ± 1.0	1.41 ± 0.08
E-3	91	24.1 ± 1.5	20.4 ± 1.5	24.1 ± 1.5	1.57 ± 0.12
E-4	91	19.4 ± 0.4	15.7 ± 0.5	19.4 ± 0.4	1.21 ± 0.04
E-5	91	21.3 ± 0.4	17.6 ± 0.5	21.3 ± 0.4	1.35 ± 0.04
E-6	91	19.0 ± 0.4	15.3 ± 0.5	19.0 ± 0.4	1.18 ± 0.04
E-7	91	18.5 ± 0.5	14.8 ± 0.6	18.5 ± 0.5	1.14 ± 0.05
E-8	91	19.3 ± 0.8	15.6 ± 0.9	19.3 ± 0.8	1.20 ± 0.07
E-9	91	21.8 ± 0.8	18.1 ± 0.9	21.8 ± 0.8	1.39 ± 0.07
E-12	91	15.5 ± 0.9	11.8 ± 1.0	15.5 ± 0.9	0.91 ± 0.07
E-14	91	19.0 ± 0.2	15.3 ± 0.4	19.0 ± 0.2	1.18 ± 0.03
E-15	91	22.4 ± 1.0	18.7 ± 1.1	22.4 ± 1.0	1.44 ± 0.08
E-16	91	18.5 ± 0.6	14.8 ± 0.7	18.5 ± 0.6	1.14 ± 0.05
E-17	91	19.1 ± 1.2	15.4 ± 1.3	19.1 ± 1.2	1.18 ± 0.10
E-18	91	21.0 ± 0.3	17.3 ± 0.5	21.0 ± 0.3	1.33 ± 0.04
E-22	91	20.7 ± 0.6	17.0 ± 0.7	20.7 ± 0.6	1.31 ± 0.05
E-23	91	21.8 ± 0.5	18.1 ± 0.6	21.8 ± 0.5	1.39 ± 0.05
E-24	91	19.4 ± 0.6	15.7 ± 0.7	19.4 ± 0.6	1.21 ± 0.05
E-25	91	20.5 ± 0.5	16.8 ± 0.6	20.5 ± 0.5	1.29 ± 0.05
E-26	91	17.7 ± 0.7	14.0 ± 0.8	17.7 ± 0.7	1.08 ± 0.06
E-27	91	22.4 ± 1.0	18.7 ± 1.1	22.4 ± 1.0	1.44 ± 0.08
E-28	91	15.4 ± 0.2	11.7 ± 0.4	15.4 ± 0.2	0.90 ± 0.03
E-29	91	15.6 ± 0.7	11.9 ± 0.8	15.6 ± 0.7	0.91 ± 0.06
E-30	91	18.2 ± 0.4	14.5 ± 0.5	18.2 ± 0.4	1.11 ± 0.04
E-31	91	21.7 ± 1.6	18.0 ± 1.6	21.7 ± 1.6	1.38 ± 0.13
E-32	91	21.4 ± 0.2	17.7 ± 0.4	21.4 ± 0.2	1.36 ± 0.03
E-38	91	18.3 ± 0.4	14.6 ± 0.5	18.3 ± 0.4	1.12 ± 0.04
E-39	91	18.0 ± 0.6	14.3 ± 0.7	18.0 ± 0.6	1.10 ± 0.05
E-41	91	19.2 ± 1.3	15.5 ± 1.3	19.2 ± 1.3	1.19 ± 0.10
E-42	91	18.5 ± 0.7	14.8 ± 0.8	18.5 ± 0.7	1.14 ± 0.06
E-43	91	17.7 ± 0.7	14.0 ± 0.8	17.7 ± 0.7	1.08 ± 0.06
Control					
E-20	91	19.0 ± 1.3	15.3 ± 1.3	19.0 ± 1.3	1.18 ± 0.10
Mean±s.d.		19.5 ± 2.2	15.7 ± 2.2	19.5 ± 2.2	1.21 ± 0.16

In-Transit Exposure

Date Annealed	09-16-11	12-19-11
Date Read	10-18-11	01-12-12
	Total mR	
ITC-1	4.5 ± 0.2	3.0 ± 0.2
ITC-2	4.5 ± 0.1	2.9 ± 0.2

Annual Indicator Mean±s.d.	**19.5 ± 3.6**	**14.9 ± 3.4**	**19.2 ± 2.6**	**1.1 ± 0.3**
Annual Control Mean±s.d.	**19.5 ± 1.1**	**14.9 ± 0.7**	**19.4 ± 1.0**	**1.1 ± 0.0**
Annual Indicator/Control Mean±s.d.	**19.5 ± 3.5**	**14.9 ± 3.4**	**19.2 ± 2.6**	**1.1 ± 0.3**

POINT BEACH NUCLEAR PLANT

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)
01-27-11		NS[a]		01-27-11		NS[a]	
02-23-11		NS[a]		02-23-11		NS[a]	
03-02-11		NS[b]		03-02-11		NS[b]	
04-26-11	EWW-2487	72 ± 86	< 166	04-26-11	EWW-2488	322 ± 97	< 166
05-23-11	EWW-3189	94 ± 78	< 140	05-23-11	EWW-3190	130 ± 80	< 140
06-29-11	EWW-4229	53 ± 81	< 149	06-29-11	EWW-4230	217 ± 89	< 149
07-28-11	EWW-5161	99 ± 89	< 171	07-28-11	EWW-5162	88 ± 89	< 171
08-30-11	EWW-5817	85 ± 95	< 150	08-30-11	EWW-5818	133 ± 97	< 150
09-28-11	EWW-6565	63 ± 75	< 144	09-28-11	EWW-6566	156 ± 80	< 144
10-27-11	EWW-7516	191 ± 84	< 142 [c]	10-27-11	EWW-7518	185 ± 84	< 142
12-01-11	EWW-8431	89 ± 89	< 162	12-01-11	EWW-8433	214 ± 95	< 162
12-28-11	EWW-8989	39 ± 78	< 144	12-28-11	EWW-8990	259 ± 88	< 144
Mean + s.d.		94 ± 46		Mean + s.d.		176 ± 77	

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)
01-27-11		NS[a]		01-27-11		NS[a]	
02-23-11		NS[a]		02-23-11		NS[a]	
03-02-11		NS[b]		03-02-11		NS[b]	
04-26-11	EWW-2489	179 ± 91	< 166	03-30-11	EWW-1449	422 ± 96	< 146
05-23-11	EWW-3191	85 ± 78	< 140	04-26-11	EWW-2491	393 ± 100	< 166
06-29-11	EWW-4231	109 ± 84	< 149	05-23-11	EWW-3193	132 ± 80	< 140
07-28-11	EWW-5163	-21 ± 84	< 171	06-29-11	EWW-4233	184 ± 88	< 149
08-30-11	EWW-5819	17 ± 92	< 150	07-28-11	EWW-5165	70 ± 88	< 171
09-28-11	EWW-6567	80 ± 76	< 144	08-30-11	EWW-5821	110 ± 96	< 150
10-27-11	EWW-7519	122 ± 81	< 142	09-28-11	EWW-6569	71 ± 75	< 144
12-01-11	EWW-8434	14 ± 86	< 162	10-27-11	EWW-7521	251 ± 87	< 142
12-28-11	EWW-8991	80 ± 80	< 144	12-01-11	EWW-8436	269 ± 97	< 162
				12-28-11	EWW-8993	142 ± 83	< 144
Mean + s.d.		73 ± 66		Mean + s.d.		204 ± 139	

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)
01-27-11	EWW-408	-33 ± 66	< 138	01-27-11	EWW-548	31 ± 73	< 144
03-02-11	EWW-895	62 ± 76	< 152	02-23-11	EWW-896	102 ± 79	< 152
03-30-11	EWW-1448	47 ± 79	< 146	03-27-11	EWW-1443	168 ± 85	< 146
04-26-11	EWW-2490	35 ± 84	< 166	04-09-11	EWW-3194	95 ± 79	< 141
05-23-11	EWW-3192	18 ± 75	< 140	05-08-11	EWW-2978	105 ± 80	< 141
06-29-11	EWW-4232	-43 ± 76	< 149	06-28-11	EWW-4314	116 ± 78	< 144
07-28-11	EWW-5164	-5 ± 84	< 171	07-19-11	EWW-4743	22 ± 77	< 144
08-30-11	EWW-5820	-27 ± 90	< 150	08-24-11	EWW-5774	18 ± 73	< 150
09-28-11	EWW-6568	19 ± 72	< 144	09-25-11	EWW-6570	90 ± 91	< 166
10-27-11	EWW-7520	33 ± 76	< 142	10-09-11	EWW-7102	31 ± 79	< 147
12-01-11	EWW-8435	51 ± 88	< 162	11-25-11	EWW-8437	101 ± 90	< 162
12-28-11	EWW-8992	23 ± 77	< 144	12-23-11	EWW-8994	60 ± 79	< 144
Mean + s.d.		14 ± 36		Mean + s.d.		80 ± 48	

[a] "NS" = no sample; not sent.
[b] "NS" = no sample; water frozen.
[c] Duplicate result = 224±86 pCi/L.

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)
01-27-11	EWW- 549	66 ± 75	< 144	01-27-11	EWW- 550	92 ± 76	< 144
02-23-11	EWW- 897	12 ± 74	< 152	02-23-11	EWW- 898	86 ± 78	< 152
03-27-11	EWW- 1444	39 ± 79	< 146	03-27-11	EWW- 1445	114 ± 82	< 146
04-09-11	EWW- 3195	0 ± 74	< 141	04-09-11	EWW- 3196	103 ± 79	< 141
05-08-11	EWW- 2979	2 ± 74	< 141	05-08-11	EWW- 2980	86 ± 79	< 141
06-28-11	EWW- 4315	46 ± 74	< 144	06-28-11	EWW- 4316	15 ± 72	< 144
07-19-11	EWW- 4745	-26 ± 74	< 144	07-19-11	EWW- 4746	22 ± 77	< 144
08-24-11	EWW- 5776	78 ± 81	< 146	08-24-11	EWW- 5777	105 ± 78	< 150
09-25-11	EWW- 6571	-23 ± 86	< 166	09-25-11	EWW- 6572	15 ± 88	< 166
10-09-11	EWW- 7103	5 ± 77	< 147	10-09-11	EWW- 7104	-7 ± 77	< 147
11-25-11	EWW- 8438	69 ± 89	< 162	11-25-11	EWW- 8439	69 ± 89	< 162
12-23-11	EWW- 8996	37 ± 78	< 144	12-23-11	EWW- 8997	82 ± 80	< 144
Mean + s.d.		24 ± 37		Mean + s.d.		64 ± 44	

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)
01-27-11	EWW- 551	16 ± 72	< 144	01-27-11	NS[a]		
02-23-11	EWW- 899	126 ± 80	< 152	02-23-11	EWW- 900	424 ± 95	< 152
03-27-11	EWW- 1446	144 ± 84	< 146	03-27-11	EWW- 1447	394 ± 95	< 146
04-09-11	EWW- 3197	24 ± 75	< 141	04-09-11	EWW- 3199	313 ± 89	< 141
05-08-11	EWW- 2981	26 ± 76	< 141	05-08-11	EWW- 2983	263 ± 87	< 141
06-28-11	EWW- 4317	81 ± 76	< 144	06-28-11	EWW- 4318	282 ± 86	< 144
07-19-11	EWW- 4747	110 ± 81	< 144	07-19-11	EWW- 4748	274 ± 89	< 144
08-24-11	EWW- 5778	18 ± 73	< 150	08-24-11	EWW- 5779	230 ± 84	< 150
09-25-11	EWW- 6573	134 ± 93	< 166	09-25-11	EWW- 6574	367 ± 103	< 166
10-09-11	EWW- 7105	31 ± 79	< 147	10-09-11	EWW- 7106	209 ± 87	< 147
11-25-11	EWW- 8440	67 ± 88	< 162	11-25-11	EWW- 8441	311 ± 99	< 162
12-23-11	EWW- 8998	96 ± 81	< 144	12-23-11	EWW- 8999	298 ± 90	< 144
Mean + s.d.		71 ± 51		Mean + s.d.		307 ± 70	

Sample ID	GW-16 (MW-3)		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-27-11		NS[a]	
02-23-11		NS[b]	
03-27-11		NS[b]	
04-09-11	EWW- 3200	244 ± 86	< 141
05-08-11		NS[a]	
06-28-11	EWW- 4319	198 ± 82	< 144
07-19-11	EWW- 4749	221 ± 87	< 144
08-24-11	EWW- 5780	179 ± 82	< 150
09-25-11	EWW- 6575	161 ± 94	< 166
10-09-11	EWW- 7107	193 ± 87	< 147
11-25-11	EWW- 8442	148 ± 92	< 162
12-23-11	EWW- 9000	225 ± 87	< 144
Mean + s.d.		192 ± 33	

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

POINT BEACH NUCLEAR PLANT

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

Beach Drains

Sample ID	S-1				S-3		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-06-11	EW- 65	322 ± 97	< 137	01-06-11	EW- 67	282 ± 96	< 137
02-16-11	EW- 625	408 ± 97	< 147	02-16-11	EW- 626	1268 ± 130	< 147
03-10-11	EW- 1026	2360 ± 164	< 154	03-10-11	EW- 1027	1382 ± 135	< 154
04-08-11	EW- 1921	391 ± 95	< 145	04-08-11	EW- 1922	378 ± 106	< 152
05-05-11	EW- 2697	333 ± 91	< 143	05-05-11	EW- 2698	430 ± 95	< 143
06-09-11	EW- 3673	237 ± 88	< 144	06-09-11	EW- 3674	663 ± 106	< 144
07-07-11	EW- 4312	224 ± 83	< 144	07-07-11	EW- 4313	374 ± 90	< 144
08-11-11	EW- 5445	221 ± 98	< 145	08-11-11	EW- 5446	557 ± 111	< 145
09-08-11	EW- 6059	220 ± 98	< 145	09-08-11	EW- 6061	312 ± 101	< 145
10-04-11	EW- 6680	197 ± 82	< 144	10-04-11	EW- 6681	817 ± 108	< 144
11-11-11	EW- 7941	123 ± 79	< 147	11-11-11	EW- 7942	373 ± 91	< 147
12-10-11	EWW- 8844	151 ± 83	< 144	12-10-11	EWW- 8845	298 ± 90	< 144
Mean + s.d.		432 ± 614		Mean + s.d.		595 ± 377	

POINT BEACH NUCLEAR PLANT

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)
01-03-11		NS[a]		01-03-11		NS[a]	
02-16-11		NS[a]		02-16-11		NS[a]	
03-10-11		NS[a]		03-10-11		NS[a]	
04-08-11		NS[a]		04-08-11		NS[a]	
05-05-11		NS[a]		05-05-11		NS[a]	
06-09-11		NS[a]		06-09-11		NS[a]	
07-07-11		NS[a]		07-07-11		NS[a]	
08-11-11		NS[a]		08-11-11		NS[a]	
09-08-11		NS[a]		09-08-11		NS[a]	
10-04-11		NS[a]		10-04-11		NS[a]	
11-11-11		NS[a]		11-11-11		NS[a]	
12-10-11		NS[a]		12-10-11		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)
01-03-11		NS[a]		01-03-11		NS[a]	
02-16-11	EW- 628	651 ± 107	< 147	02-16-11		NS[a]	
03-10-11	EW- 1028	199 ± 87	< 154	03-10-11		NS[a]	
04-08-11		NS[a]		04-08-11		NS[a]	
05-05-11		NS[a]		05-05-11		NS[a]	
06-09-11		NS[a]		06-09-11		NS[a]	
07-07-11		NS[a]		07-07-11		NS[a]	
08-11-11		NS[a]		08-11-11		NS[a]	
09-08-11		NS[a]		09-08-11		NS[a]	
10-04-11		NS[a]		10-04-11		NS[a]	
11-11-11		NS[a]		11-11-11		NS[a]	
12-10-11		NS[a]		12-10-11		NS[a]	
Mean + s.d.				Mean + s.d.			

Sample ID				S-11
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	
01-03-11		NS[a]		
02-16-11		NS[a]		
03-10-11		NS[a]		
04-08-11	EW- 1923	96 ± 96	< 152	
05-05-11		NS[a]		
06-09-11		NS[a]		
07-07-11		NS[a]		
08-11-11		NS[a]		
09-08-11	EW- 6062	117 ± 93	< 145	
10-11-11	EW- 7943	122 ± 80	< 148	
11-11-11		NS[a]		
12-10-11		NS[a]		
Mean + s.d.		111 ± 14		Mean + s.d.

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

POINT BEACH NUCLEAR PLANT

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)
01-03-11	EW- 105	631 ± 110	< 138				
01-10-11	EW- 106	605 ± 109	< 138				
01-17-11	EW- 409	663 ± 97	< 138				
01-24-11	EW- 410	411 ± 87	< 138				
01-31-11	EW- 693	550 ± 101	< 141				
02-07-11	EW- 694	628 ± 104	< 141				
02-14-11	EW- 700	719 ± 108	< 141				
02-21-11	EW- 701	661 ± 105	< 141				
02-28-11	EW- 1023	591 ± 106	< 154				
03-07-11	EW- 1024	490 ± 101	< 154				
03-14-11	EW- 3185	557 ± 100	< 142				
03-21-11	EW- 2142	654 ± 104	< 141				
03-28-11	EW- 2143	536 ± 99	< 141				
04-04-11	EW- 2145	683 ± 105	< 141				
04-11-11	EW- 2146	584 ± 101	< 141				
04-18-11	EW- 3186	528 ± 98	< 141				
04-25-11	EW- 3187	508 ± 97	< 141				
05-02-11	EW- 3188	666 ± 103	< 140				
05-09-11	EW- 3120	450 ± 101	< 138				
05-16-11	EW- 3121	658 ± 108	< 138				
05-22-11	EW- 3862	504 ± 101	< 147				
05-30-11	EW- 3863	641 ± 106	< 146				
06-06-11	EW- 3864	499 ± 100	< 146				
06-13-11	EW- 3866	540 ± 102	< 146				
06-20-11	EW- 4911	183 ± 90	< 155				
06-27-11	EW- 4912	570 ± 107	< 154				
07-04-11	EW- 4913	715 ± 112	< 154				
07-11-11	EW- 4914	576 ± 110	< 164				
07-18-11	EW- 5537	650 ± 105	< 144				
07-25-11	EW- 5539	839 ± 112	< 144				
08-01-11	EW- 5540	505 ± 99	< 144				
08-08-11	EW- 5541	371 ± 93	< 143				
08-15-11	EW- 6143	463 ± 106	< 142				
08-22-11	EW- 6144	513 ± 108	< 142				
08-29-11	EW- 6145	446 ± 105	< 142				
09-05-11	EW- 6146	488 ± 107	< 142				
09-12-11	EW- 7097	567 ± 102	< 146				
09-19-11	EW- 7098	587 ± 103	< 146				
09-26-11	EW- 7100	603 ± 104	< 147				
10-03-11	EW- 7101	467 ± 99	< 147				
10-10-11	EW- 7751	545 ± 102	< 147				
10-17-11	EW- 7752	394 ± 96	< 147				
10-24-11	EW- 7753	596 ± 104	< 147				
10-31-11	EW- 7754	592 ± 104	< 147				
11-07-11	EW- 8304	404 ± 96	< 146				
11-14-11	EW- 8305	479 ± 99	< 146				
11-21-11	EW- 8853	321 ± 92	< 145				
11-28-11	EW- 8854	545 ± 101	< 144				
12-16-11	EW- 9104	437 ± 98	< 148				
Mean + s.d.		538 ± 137					

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)
04-06-11		NS[a]		04-06-11		NS[a]	
09-28-11		NS[a]		09-28-11		NS[a]	
12-02-11		NS[a]		12-02-11		NS[a]	
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)
04-06-11		NS[a]		04-06-11		NS[a]	
09-28-11		NS[a]		09-28-11		NS[a]	
12-02-11		NS[a]		12-02-11		NS[a]	
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)
04-05-11	EW- 1913	258 ± 89	< 145	04-06-11	EW- 1914	711 ± 108	< 145
09-28-11	EW- 6576	116 ± 92	< 166	09-27-11	EW- 6577	108 ± 92	< 166
12-02-11	EW- 8846	114 ± 81	< 152	12-02-11		NS[a]	
Mean + s.d.		163 ± 83		Mean + s.d.		410 ± 426	

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)
04-06-11	EW- 1915	242 ± 88	< 145	04-06-11	EW- 1916	485 ± 99	< 145
09-27-11	EW- 6578	62 ± 90	< 166	09-27-11	EW- 6579	288 ± 100	< 166
12-02-11		NS[a]		12-02-11		NS[a]	
Mean + s.d.		152 ± 127		Mean + s.d.		386 ± 139	

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)
04-06-11	EW- 1917	160 ± 84	< 145	04-06-11	EW- 1918	456 ± 97	< 145
09-28-11	EW- 6581	90 ± 91	< 166	09-27-11	EW- 6582	90 ± 91	< 166
12-02-11	EW- 8847	117 ± 82	< 144	12-02-11		NS[a]	
Mean + s.d.		122 ± 35		Mean + s.d.		273 ± 259	

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

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)
04-06-11	EW- 1919	287 ± 90	< 145	04-06-11		NS[a]	
09-27-11	EW- 6583	62 ± 90	< 166	09-27-11	EW- 6584	280 ± 99	< 166
12-02-11		NS[a]		12-02-11		NS[a]	
Mean + s.d.		174 ± 159		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)
04-06-11	EW- 1920	454 ± 97	< 145	04-06-11		NS[a]	
09-27-11	EW- 6585	199 ± 82	< 144	09-27-11		NS[a]	
12-02-11	EW- 8848	253 ± 88	< 144	12-02-11		NS[a]	
Mean + s.d.		302 ± 134		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)
04-06-11		NS[a]		04-06-11		NS[a]	
09-27-11		NS[a]		09-27-11		NS[a]	
12-02-11		NS[a]		12-02-11		NS[a]	
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)
04-06-11		NS[a]		04-06-11		NS[a]	
09-27-11		NS[a]		09-27-11		NS[a]	
12-02-11		NS[a]		12-02-11		NS[a]	
Mean + s.d.				Mean + s.d.			

Sample ID	MH-16				MH-2		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
04-06-11		NS[a]		04-06-11		NS[a]	
09-27-11		NS[a]		09-27-11		NS[a]	
12-02-11		NS[a]		12-02-11		NS[a]	
Mean + s.d.				Mean + s.d.			

Sample ID	MH-5A				MH-9		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
04-06-11		NS[a]		04-06-11		NS[a]	
09-27-11		NS[a]		09-27-11		NS[a]	
12-02-11		NS[a]		12-02-11		NS[a]	
Mean + s.d.				Mean + s.d.			

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

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)
01-12-11	EWW- 124	-28 ± 82	< 138	01-12-11	EWW- 125	-14 ± 83	< 138
04-19-11	EWW- 2232	-18 ± 74	< 142	04-19-11	EWW- 2233	-4 ± 75	< 142
07-14-11	EWW- 4617	5 ± 73	< 148	07-14-11	EWW- 4619	41 ± 75	< 148
10-13-11	EWW- 7095	2 ± 76	< 145	10-13-11	EWW- 7096	-63 ± 73	< 145
Mean + s.d.		-10 ± 16		Mean + s.d.		-10 ± 43	

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)
02-07-11	EWW- 697	372 ± 93	< 141	02-07-11	EWW- 698	224 ± 86	< 141
03-28-11	EWW- 2970	248 ± 87	< 142	03-28-11	EWW- 2971	48 ± 77	< 142
04-16-11	EWW- 2974	373 ± 92	< 142	04-16-11	EWW- 2975	164 ± 83	< 142
05-20-11	EWW- 3122	227 ± 93	< 138	05-20-11	EWW- 3123	136 ± 89	< 138
06-29-11	EWW- 4751	228 ± 87	< 144	06-29-11	EWW- 4752	114 ± 82	< 144
07-26-11	EWW- 5447	246 ± 99	< 146	07-26-11	EWW- 5449	66 ± 91	< 146
08-23-11	EWW- 6139	172 ± 94	< 142	08-23-11	EWW- 6140	87 ± 90	< 142
10-09-11	EWW- 7755	262 ± 97	< 140	10-09-11	EWW- 7757	13 ± 78	< 147
11-24-11	EWW- 8849	178 ± 85	< 144	11-24-11	EWW- 8850	98 ± 83	< 148
Mean + s.d.		256 ± 73		Mean + s.d.		106 ± 64	

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)
02-07-11		NS[a]		02-07-11	EWW- 699	199 ± 85	< 141
03-28-11	EWW- 2972	26 ± 76	< 142	03-28-11	EWW- 2973	92 ± 80	< 142
04-16-11	EWW- 2976	-8 ± 74	< 142	04-16-11	EWW- 2977	110 ± 80	< 142
05-20-11	EWW- 3124	-38 ± 82	< 138	05-20-11	EWW- 3125	61 ± 86	< 138
06-29-11	EWW- 4753	28 ± 77	< 144	06-29-11	EWW- 4754	139 ± 83	< 144
07-26-11	EWW- 5450	77 ± 92	< 146	07-26-11	EWW- 5451	122 ± 94	< 146
08-23-11	EWW- 6141	-6 ± 86	< 142	08-23-11	EWW- 6142	93 ± 91	< 142
10-09-11	EWW- 7758	48 ± 80	< 147	10-09-11	EWW- 7759	72 ± 81	< 147
11-24-11	EWW- 8851	36 ± 78	< 144	11-24-11	EWW- 8852	72 ± 80	< 144
Mean + s.d.		20 ± 36		Mean + s.d.		107 ± 43	

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)
05-05-11	EWW- 2762	160 ± 84	< 145	05-05-11	EWW- 2763	331 ± 92	< 145

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

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APPENDIX A

INTERLABORATORY COMPARISON PROGRAM RESULTS

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

January through December, 2011

Appendix A

Interlaboratory Comparison Program Results

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

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

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

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

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

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

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

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

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

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

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

Attachment A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

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

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

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

[b] Laboratory limit.

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

		Concentration (pCi/L)				
Lab Code	Date	Analysis	Laboratory Result [b]	ERA Result [c]	Control Limits	Acceptance
STW-1243	04/04/11	Sr-89	68.2 ± 5.8	63.2	51.1 - 71.2	Pass
STW-1243	04/04/11	Sr-90	44.3 ± 2.4	42.5	31.3 - 48.8	Pass
STW-1244	04/04/11	Ba-133	69.8 ± 3.9	75.3	63.0 - 82.8	Pass
STW-1244	04/04/11	Co-60	87.9 ± 3.8	88.8	79.9 - 100.0	Pass
STW-1244	04/04/11	Cs-134	69.5 ± 3.7	72.9	59.5 - 80.2	Pass
STW-1244	04/04/11	Cs-137	77.9 ± 5.3	77.0	69.3 - 87.4	Pass
STW-1244	04/04/11	Zn-65	105.2 ± 8.4	98.9	89.0 - 118.0	Pass
STW-1245	04/04/11	Gr. Alpha	41.5 ± 2.3	50.1	26.1 - 62.9	Pass
STW-1245	04/04/11	Gr. Beta	48.9 ± 1.8	49.8	33.8 - 56.9	Pass
STW-1246	04/04/11	I-131	26.6 ± 1.7	27.5	22.9 - 32.3	Pass
STW-1247	04/04/11	Ra-226	13.2 ± 0.6	12.1	9.0 - 14.0	Pass
STW-1247	04/04/11	Ra-228	11.2 ± 0.6	11.6	7.6 - 14.3	Pass
STW-1247	04/04/11	Uranium	36.4 ± 0.6	39.8	32.2 - 44.4	Pass
STW-1248	04/04/11	H-3	10322 ± 285	10200.0	8870 - 11200	Pass
STW-1256	10/07/11	Sr-89	68.7 ± 6.0	69.7	56.9 - 77.9	Pass
STW-1256	10/07/11	Sr-90	36.9 ± 2.4	41.1	30.2 - 47.2	Pass
STW-1257	10/07/11	Ba-133	88.2 ± 7.8	96.9	81.8 - 106.0	Pass
STW-1257	10/07/11	Co-60	116.5 ± 7.1	119.0	107.0 - 133.0	Pass
STW-1257 [d]	10/07/11	Cs-134	38.8 ± 8.0	33.4	26.3 - 36.7	Fail
STW-1257	10/07/11	Cs-137	45.6 ± 7.3	44.3	39.4 - 51.7	Pass
STW-1257	10/07/11	Zn-65	84.9 ± 15.4	76.8	68.9 - 92.5	Pass
STW-1258	10/07/11	Gr. Alpha	35.7 ± 3.8	53.2	27.8 - 66.6	Pass
STW-1258	10/07/11	Gr. Beta	36.1 ± 3.3	45.9	30.9 - 53.1	Pass
STW-1259	10/07/11	I-131	25.0 ± 1.1	27.5	22.9 - 32.3	Pass
STW-1260	10/07/11	Ra-226	12.2 ± 0.6	11.6	8.7 - 13.4	Pass
STW-1260	10/07/11	Ra-228	11.5 ± 1.7	10.3	6.7 - 12.8	Pass
STW-1260	10/07/11	Uranium	46.6 ± 0.5	48.6	39.4 - 54.0	Pass
STW-1261	10/07/11	H-3	17435 ± 382	17400	15200 - 19100	Pass

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

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

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

[d] The sample was reanalyzed. Result of reanalysis was acceptable, 32.9 ± 7.4 pCi/L.

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

			mR			
Lab Code	Date	Description	Known Value	Lab Result ± 2 sigma	Control Limits	Acceptance
Environmental, Inc.						
2010-2	12/13/2010	100 cm.	4.94	4.65 ± 0.57	3.46 - 6.42	Pass
2010-2	12/13/2010	110 cm.	4.09	3.50 ± 0.74	2.86 - 5.32	Pass
2010-2	12/13/2010	120 cm.	3.43	2.68 ± 0.36	2.40 - 4.46	Pass
2010-2	12/13/2010	150 cm.	2.2	1.75 ± 0.42	1.54 - 2.86	Pass
2010-2	12/13/2010	180 cm.	1.53	1.32 ± 0.52	1.07 - 1.99	Pass
2010-2	12/13/2010	40 cm.	30.89	38.56 ± 2.11	21.62 - 40.16	Pass
2010-2	12/13/2010	50 cm.	19.77	23.35 ± 1.82	13.84 - 25.70	Pass
2010-2	12/13/2010	60 cm.	13.73	14.53 ± 1.24	9.61 - 17.85	Pass
2010-2	12/13/2010	60 cm.	13.73	15.84 ± 1.53	9.61 - 17.85	Pass
2010-2	12/13/2010	80 cm.	7.72	8.33 ± 0.74	5.40 - 10.04	Pass
2010-2	12/13/2010	90 cm.	6.1	5.93 ± 0.73	4.27 - 7.93	Pass
Environmental, Inc.						
2011-1	7/6/2011	100 cm.	6.71	5.64 ± 0.30	4.70 - 8.72	Pass
2011-1	7/6/2011	110 cm.	5.54	4.60 ± 0.46	3.88 - 7.20	Pass
2011-1	7/6/2011	120 cm.	4.66	4.68 ± 0.29	3.26 - 6.06	Pass
2011-1	7/6/2011	150 cm.	2.98	2.93 ± 0.66	2.09 - 3.87	Pass
2011-1	7/6/2011	180 cm.	2.07	2.05 ± 0.18	1.45 - 2.69	Pass
2011-1	7/6/2011	40 cm.	41.92	52.36 ± 3.08	29.34 - 54.50	Pass
2011-1	7/6/2011	45 cm.	33.12	41.83 ± 3.46	23.18 - 43.06	Pass
2011-1	7/6/2011	50 cm.	26.83	28.61 ± 2.63	18.78 - 34.88	Pass
2011-1	7/6/2011	60 cm.	18.63	21.00 ± 1.15	13.04 - 24.22	Pass
2011-1	7/6/2011	70 cm.	13.69	13.24 ± 1.76	9.58 - 17.80	Pass
2011-1	7/6/2011	80 cm.	10.48	12.18 ± 0.65	7.34 - 13.62	Pass
2011-1	7/6/2011	90 cm.	8.28	7.95 ± 0.82	5.80 - 10.76	Pass

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

		Concentration (pCi/L)[a]				
Lab Code[b]	Date	Analysis	Laboratory results 2s, n=1[c]	Known Activity	Control Limits[d]	Acceptance
SPW-202	1/17/2011	U-238	4.19 ± 0.19	4.17	0.00 - 16.17	Pass
W-20111	2/1/2011	Ra-226	16.32 ± 0.47	16.77	11.74 - 21.80	Pass
W-20711	2/7/2011	Gr. Alpha	23.02 ± 0.45	20.00	10.00 - 30.00	Pass
W-20711	2/7/2011	Gr. Beta	46.59 ± 0.41	45.20	35.20 - 55.20	Pass
XWW-331	2/11/2011	Ba-133	144.30 ± 8.50	144.40	129.96 - 158.84	Pass
XWW-331	2/11/2011	Cs-134	22.20 ± 3.70	21.50	11.50 - 31.50	Pass
XWW-331	2/11/2011	Cs-137	64.70 ± 7.40	61.00	51.00 - 71.00	Pass
XWW-331	2/11/2011	H-3	13399 ± 334	12538	10030 - 15046	Pass
SPAP-567	2/14/2011	Gr. Beta	46.90 ± 0.11	48.10	28.86 - 67.34	Pass
SPAP-569	2/14/2011	Cs-134	7.70 ± 1.70	7.49	0.00 - 17.49	Pass
SPAP-569	2/14/2011	Cs-137	102.47 ± 3.20	106.79	96.11 - 117.47	Pass
SPAP-571	2/14/2011	H-3	75815 ± 542	73230	58584 - 87876	Pass
SPW-581	2/15/2011	Cs-134	39.91 ± 1.38	37.45	27.45 - 47.45	Pass
SPW-581	2/15/2011	Cs-137	56.28 ± 2.28	53.39	43.39 - 63.39	Pass
SPW-581	2/15/2011	Sr-89	112.92 ± 5.61	121.42	97.14 - 145.70	Pass
SPW-581	2/15/2011	Sr-90	47.80 ± 2.02	42.07	33.66 - 50.48	Pass
SPMI-583	2/15/2011	Cs-137	57.04 ± 2.76	53.39	43.39 - 63.39	Pass
SPMI-583	2/15/2011	Sr-90	36.27 ± 1.47	42.07	33.66 - 50.48	Pass
SPW-602	2/17/2011	U-238	3.98 ± 0.19	4.17	0.00 - 16.17	Pass
SPW-686	2/25/2011	Ni-63	167.41 ± 3.05	208.11	145.68 - 270.54	Pass
SPF-1113	3/17/2011	Cs-137	2369 ± 22	2170	1953 - 2387	Pass
XWW-1602	3/21/2011	Ba-133	26.83 ± 6.35	28.58	18.58 - 38.58	Pass
XWW-1602	3/21/2011	Cs-134	18.90 ± 4.06	16.30	6.30 - 26.30	Pass
XWW-1602	3/21/2011	Cs-137	33.98 ± 5.88	30.50	20.50 - 40.50	Pass
XWW-1602	3/21/2011	H-3	7348 ± 248	7617	6094 - 9140	Pass
XWW-2537	4/4/2011	Ba-133	43.40 ± 4.26	42.70	32.70 - 52.70	Pass
XWW-2537	4/4/2011	Cs-134	13.50 ± 2.40	11.90	1.90 - 21.90	Pass
XWW-2537	4/4/2011	Cs-137	68.30 ± 5.90	60.70	50.70 - 70.70	Pass
XWW-2537	4/4/2011	H-3	7134 ± 257	7234	5787 - 8681	Pass
SPW-2877	5/3/2011	Ra-228	25.23 ± 2.48	31.62	22.13 - 41.11	Pass
SPMI-3167	5/24/2011	Cs-134	33.04 ± 8.25	34.19	24.19 - 44.19	Pass
SPMI-3167	5/24/2011	Cs-137	51.53 ± 8.63	53.06	43.06 - 63.06	Pass
SPMI-3167	5/24/2011	Sr-89	90.89 ± 4.30	93.47	74.78 - 112.16	Pass
SPMI-3167	5/24/2011	Sr-90	41.17 ± 1.53	41.80	33.44 - 50.16	Pass
W-52411	5/24/2011	Ra-226	17.90 ± 0.42	16.80	11.76 - 21.84	Pass
W-60711	6/7/2011	Gr. Alpha	23.00 ± 0.49	20.00	10.00 - 30.00	Pass
W-60711	6/7/2011	Gr. Beta	43.27 ± 0.42	45.20	35.20 - 55.20	Pass
SPAP-4167	7/7/2011	Cs-134	6.92 ± 1.45	6.57	0.00 - 16.57	Pass
SPAP-4167	7/7/2011	Cs-137	108.02 ± 2.84	105.80	95.22 - 116.38	Pass
SPW-4169	7/7/2011	Cs-134	34.52 ± 4.79	32.84	22.84 - 42.84	Pass
SPW-4169	7/7/2011	Cs-137	58.29 ± 6.19	52.92	42.92 - 62.92	Pass

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

Lab Code [b]	Date	Analysis	Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance
		Concentration (pCi/L)[a]				
SPW-4169	7/7/2011	Sr-89	66.12 ± 4.18	69.64	55.71 - 83.57	Pass
SPW-4169	7/7/2011	Sr-90	41.72 ± 1.79	41.68	33.34 - 50.02	Pass
SPW-4171	7/7/2011	H-3	70582 ± 767	71646	57317 - 85975	Pass
SPW-4180	7/7/2011	Tc-99	95.69 ± 1.65	97.02	67.91 - 126.13	Pass
SPW-41821	7/7/2011	Ra-228	32.57 ± 2.63	30.63	21.44 - 39.82	Pass
SPW-4241	7/7/2011	Ni-63	403.01 ± 4.66	415.20	290.64 - 539.76	Pass
SPW-4180	7/8/2011	Tc-99	100.30 ± 1.75	97.02	67.91 - 126.13	Pass
SPW-5029	7/29/2011	C-14	3991 ± 17	4739	2843 - 6634	Pass
SPW-5031	7/29/2011	Fe-55	13801 ± 331	14895	11916 - 17874	Pass
W-91411	9/14/2011	Gr. Alpha	21.58 ± 0.44	20.00	10.00 - 30.00	Pass
W-91411	9/14/2011	Gr. Beta	43.02 ± 0.40	45.20	35.20 - 55.20	Pass
SPW-91511	9/15/2011	Tc-99	29.92 ± 1.07	32.34	20.34 - 44.34	Pass
W-91911	9/19/2011	Ra-226	17.06 ± 0.42	16.80	11.76 - 21.84	Pass
W-100711	10/7/2011	Gr. Alpha	22.05 ± 0.45	20.00	10.00 - 30.00	Pass
W-100711	10/7/2011	Gr. Beta	45.51 ± 0.41	45.20	35.20 - 55.20	Pass
W-101111	10/11/2011	Ra-226	16.02 ± 0.40	16.80	11.76 - 21.84	Pass
XWW-7220	11/17/2011	Ba-133	25.11 ± 4.36	27.47	17.47 - 37.47	Pass
XWW-7220	11/17/2011	Cs-134	14.09 ± 3.11	16.60	6.60 - 26.60	Pass
XWW-7220	11/17/2011	Cs-137	35.59 ± 4.28	29.98	19.98 - 39.98	Pass
W-113011	11/30/2011	Ra-226	16.12 ± 0.39	16.80	11.76 - 21.84	Pass
W-120111	12/1/2011	Gr. Alpha	21.34 ± 0.43	20.00	10.00 - 30.00	Pass
W-120111	12/1/2011	Gr. Beta	45.55 ± 0.41	45.20	35.20 - 55.20	Pass
SPW-41823	12/9/2011	Ra-228	26.98 ± 2.38	29.40	20.58 - 38.22	Pass
SPMI-8906	12/22/2011	Cs-134	29.11 ± 3.52	28.14	18.14 - 38.14	Pass
SPMI-8906	12/22/2011	Cs-137	58.27 ± 7.62	52.36	42.36 - 62.36	Pass
SPW-8916	12/22/2011	Cs-134	31.74 ± 3.63	28.14	18.14 - 38.14	Pass
SPW-8916	12/22/2011	Cs-137	56.48 ± 6.12	52.36	42.36 - 62.36	Pass
SPAP-8902	12/23/2011	Gr. Beta	45.72 ± 0.11	47.11	28.27 - 65.95	Pass
SPAP-8904	12/23/2011	Cs-134	5.19 ± 0.63	5.63	0.00 - 15.63	Pass
SPAP-8904	12/23/2011	Cs-137	101.21 ± 2.55	104.71	94.24 - 115.18	Pass
SPW-8918	12/23/2011	H-3	136759 ± 1056	137638	110110 - 165166	Pass
SPW-8922	12/23/2011	Ni-63	202.21 ± 3.75	206.88	144.82 - 268.94	Pass
SPW-8924	12/23/2011	Tc-99	126.10 ± 1.86	129.36	90.55 - 168.17	Pass
SPF-8926	12/23/2011	Cs-134	0.34 ± 0.01	0.33	0.20 - 0.47	Pass
SPF-8926	12/23/2011	Cs-137	2.34 ± 0.02	2.09	1.25 - 2.93	Pass

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

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

[c] Results are based on single determinations.

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

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

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

Lab Code	Sample Type	Date	Analysis[b]	Concentration (pCi/L)[a] Laboratory results (4.66σ) LLD	Activity[c]	Acceptance Criteria (4.66 σ)
SPW-202	Water	1/17/2011	U-238	0.10	0.12 ± 0.12	1
W-20111	Water	2/1/2011	Ra-226	0.04	0.05 ± 0.03	1
W-20711	Water	2/7/2011	Gr. Alpha	0.44	-0.02 ± 0.29	1
W-20711	Water	2/7/2011	Gr. Beta	0.75	-0.03 ± 0.53	3.2
SPAP-566	Air Filter	2/14/2011	Gr. Beta	0.64	2.24 ± 0.61	3.2
SPAP-568	Air Filter	2/14/2011	Cs-134	2.34	-	100
SPAP-568	Air Filter	2/14/2011	Cs-137	1.56	-	100
SPAP-570	Air Filter	2/14/2011	H-3	103.20	-49.40 ± 52.50	200
SPW-580	Water	2/15/2011	Cs-134	2.68	-	10
SPW-580	Water	2/15/2011	Cs-137	2.84	-	10
SPW-580	Water	2/15/2011	Sr-89	0.73	0.24 ± 0.57	5
SPW-580	Water	2/15/2011	Sr-90	0.57	0.02 ± 0.27	1
SPMI-582	Milk	2/15/2011	Cs-134	3.49	-	10
SPMI-582	Milk	2/15/2011	Cs-137	3.54	-	10
SPMI-582	Milk	2/15/2011	I-131(G)	4.14	-	20
SPMI-582	Milk	2/15/2011	Sr-89	0.71	0.16 ± 0.67	5
SPMI-582	Milk	2/15/2011	Sr-90	0.55	0.59 ± 0.32	1
SPW-601	Water	2/17/2011	U-238	0.20	0.09 ± 0.17	1
SPW-685	Water	2/25/2011	Ni-63	1.61	0.05 ± 0.98	20
SPF-1112	Fish	3/17/2011	Cs-134	6.74	-	100
SPF-1112	Fish	3/17/2011	Cs-137	5.45	-	100
BKW-40111	Water	4/1/2011	I-131	4.16	-	10
BKW-40111	Water	4/1/2011	Co-60	3.11	-	10
BKW-40111	Water	4/1/2011	Cs-134	4.73	-	10
BKW-40111	Water	4/1/2011	Cs-137	5.04	-	10
SPW-2887	Water	5/3/2011	Ra-228	0.72	0.46 ± 0.39	2
W-52411	Water	5/24/2011	Ra-226	0.04	0.05 ± 0.03	1
W-60711	Water	6/7/2011	Gr. Alpha	0.51	0.00 ± 0.36	1
W-60711	Water	6/7/2011	Gr. Beta	1.58	0.38 ± 1.12	3.2
SPAP-4164	Air Filter	7/7/2011	Gr. Beta	0.72	1.04 ± 0.48	3.2
SPW-4168	Water	7/7/2011	Cs-134	3.41	-	10
SPW-4168	Water	7/7/2011	Cs-137	2.45	-	10
SPW-4168	Water	7/7/2011	Sr-89	0.72	0.40 ± 0.50	5
SPW-4168	Water	7/7/2011	Sr-90	0.51	-0.19 ± 0.21	1
SPW-4171	Water	7/7/2011	H-3	152.00	37.10 ± 81.80	200
SPW-41811	Water	7/7/2011	Ra-228	0.77	0.51 ± 0.42	2

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

Lab Code	Sample Type	Date	Analysis[b]	Concentration (pCi/L)[a] Laboratory results (4.66σ) LLD	Activity[c]	Acceptance Criteria (4.66 σ)
SPW-4241	Water	7/7/2011	Ni-63	1.70	0.09 ± 1.03	20
SPW-4179	Water	7/8/2011	Tc-99	1.20	-0.96 ± 0.71	10
SPW-5028	Water	7/29/2011	C-14	109.80	61.90 ± 59.20	200
SPW-5031	Water	7/29/2011	Fe-55	140.60	0.00 ± 85.30	1000
W-91411	Water	9/14/2011	Gr. Alpha	0.48	-0.06 ± 0.33	1
W-91411	Water	9/14/2011	Gr. Beta	0.78	-0.43 ± 0.53	3.2
SPW-91511	Water	9/15/2011	Tc-99	1.11	-0.62 ± 0.66	10
W-91911	Water	9/19/2011	Ra-226	0.03	0.04 ± 0.02	1
W-100711	Water	10/7/2011	Gr. Alpha	0.44	-0.26 ± 0.28	1
W-100711	Water	10/7/2011	Gr. Beta	0.76	-0.43 ± 0.52	3.2
W-101111	Water	10/11/2011	Ra-226	0.04	0.05 ± 0.03	1
W-113011	Water	11/30/2011	Ra-226	0.03	0.04 ± 0.02	1
W-120111	Water	12/1/2011	Gr. Alpha	0.41	-0.20 ± 0.27	1
W-120111	Water	12/1/2011	Gr. Beta	0.75	-0.10 ± 0.53	3.2
SPW-41813	Water	12/9/2011	Ra-228	0.71	0.17 ± 0.35	2
SPMI-8905	Milk	12/22/2011	Cs-134	3.27	-	10
SPMI-8905	Milk	12/22/2011	Cs-137	3.38	-	10
SPMI-8905	Milk	12/22/2011	I-131(G)	2.17	-	20
SPW-8915	Water	12/22/2011	Cs-134	3.37	-	10
SPW-8915	Water	12/22/2011	Cs-137	3.45	-	10
SPW-8915	Water	12/22/2011	I-131(G)	3.38	-	20
SPAP-8901	Air Filter	12/23/2011	Gr. Beta	0.78	0.50 ± 0.46	3.2
SPAP-8903	Air Filter	12/23/2011	Cs-134	1.65	-	100
SPAP-8903	Air Filter	12/23/2011	Cs-137	2.41	-	100
SPW-8917	Water	12/23/2011	H-3	150.20	-3.04 ± 78.80	200
SPW-8921	Water	12/23/2011	Ni-63	16.92	-4.60 ± 10.16	20
SPW-8923	Water	12/23/2011	Tc-99	5.66	-5.45 ± 3.34	10
SPF-8925	Fish	12/23/2011	Cs-134	7.15	-	100
SPF-8925	Fish	12/23/2011	Cs-137	9.73	-	100

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

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

[c] Activity reported is a net activity result. For gamma spectroscopic analysis, activity detected below the LLD value is not reported.

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

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
CF-20, 21	1/3/2011	Be-7	0.24 ± 0.14	0.34 ± 0.17	0.29 ± 0.11	Pass
CF-20, 21	1/3/2011	K-40	10.37 ± 0.43	9.76 ± 0.68	10.07 ± 0.40	Pass
CF-20, 21	1/3/2011	Sr-90	0.01 ± 0.01	0.01 ± 0.01	0.01 ± 0.00	Pass
WW-65, 66	1/6/2011	H-3	321.91 ± 97.19	345.76 ± 98.16	333.83 ± 69.06	Pass
BS-165, 166	1/11/2011	Cs-137	0.13 ± 0.02	0.15 ± 0.02	0.14 ± 0.01	Pass
BS-165, 166	1/11/2011	H-3	286.00 ± 80.00	284.00 ± 80.00	285.00 ± 56.57	Pass
BS-165, 166	1/11/2011	K-40	14.11 ± 0.52	13.79 ± 0.60	13.95 ± 0.40	Pass
BS-176, 177	1/11/2011	H-3	391.00 ± 92.00	332.00 ± 89.00	361.50 ± 64.00	Pass
BS-176, 177	1/11/2011	K-40	9.06 ± 0.44	8.28 ± 0.81	8.67 ± 0.46	Pass
BS-197, 198	1/11/2011	Cs-137	0.14 ± 0.03	0.15 ± 0.04	0.15 ± 0.03	Pass
BS-197, 198	1/11/2011	H-3	459.00 ± 103.00	283.00 ± 95.00	371.00 ± 70.06	Pass
BS-197, 198	1/11/2011	K-40	14.40 ± 0.77	14.16 ± 1.23	14.28 ± 0.73	Pass
WW-358, 359	1/17/2011	H-3	331.44 ± 93.05	407.65 ± 95.91	369.55 ± 66.81	Pass
DW-20009, 20010	1/19/2011	Ra-226	3.66 ± 0.57	2.74 ± 0.43	3.20 ± 0.36	Pass
DW-20009, 20010	1/19/2011	Ra-228	1.51 ± 0.64	1.36 ± 0.60	1.44 ± 0.44	Pass
WW-337, 338	1/25/2011	H-3	21986 ± 402	21896 ± 401	21941 ± 284	Pass
W-491, 492	1/27/2011	Ra-226	6.70 ± 0.50	6.10 ± 0.50	6.40 ± 0.35	Pass
W-491, 492	1/27/2011	Ra-228	6.60 ± 1.30	8.40 ± 1.40	7.50 ± 0.96	Pass
DW-20014, 20015	1/28/2011	Gr. Alpha	1.91 ± 0.71	2.34 ± 0.80	2.13 ± 0.53	Pass
SWU-447, 448	1/31/2011	Gr. Beta	7.42 ± 1.17	6.85 ± 1.11	7.14 ± 0.81	Pass
W-694, 695	2/7/2011	H-3	628.26 ± 104.30	692.37 ± 106.89	660.32 ± 74.67	Pass
DW-20022, 20023	2/9/2011	Ra-228	0.71 ± 0.47	1.13 ± 0.54	0.92 ± 0.36	Pass
SW-626, 627	2/16/2011	H-3	1268.17 ± 129.52	1144.65 ± 125.39	1206.41 ± 90.14	Pass
LW-825, 826	2/24/2011	Gr. Beta	2.65 ± 0.82	2.45 ± 0.74	2.55 ± 0.55	Pass
SWT-845, 846	3/1/2011	Gr. Beta	1.11 ± 0.39	0.80 ± 0.37	0.96 ± 0.27	Pass
MI-998, 999	3/7/2011	K-40	1760.10 ± 127.50	1708.50 ± 131.60	1734.30 ± 91.62	Pass
W-1024, 1025	3/7/2011	H-3	489.83 ± 101.09	581.39 ± 105.06	535.61 ± 72.90	Pass
WW-1156, 1157	3/16/2011	Gr. Beta	1.79 ± 0.78	0.47 ± 0.66	1.13 ± 0.51	Pass
P-1198, 1199	3/17/2011	H-3	504.00 ± 133.00	597.00 ± 136.00	550.50 ± 95.11	Pass
SW-1434, 1435	3/28/2011	H-3	15523 ± 359	15968 ± 364	15746 ± 256	Pass
WW-1588, 1589	3/28/2011	Gr. Beta	1.81 ± 1.23	2.81 ± 1.38	2.31 ± 0.92	Pass
SG-1714, 1715	3/28/2011	Gr. Alpha	8.82 ± 0.81	8.58 ± 0.74	8.70 ± 0.55	Pass
SG-1714, 1715	3/28/2011	Gr. Beta	13.78 ± 0.65	12.76 ± 0.58	13.27 ± 0.44	Pass
AP-1862, 1863	3/28/2011	Be-7	0.09 ± 0.02	0.08 ± 0.02	0.08 ± 0.01	Pass
W-2143, 2144	3/28/2011	H-3	536.40 ± 99.37	466.79 ± 96.46	501.59 ± 69.25	Pass
AP-2269, 2270	3/28/2011	Be-7	0.07 ± 0.01	0.08 ± 0.01	0.07 ± 0.01	Pass
DW-20061, 20062	3/28/2011	Gr. Alpha	2.82 ± 1.33	3.89 ± 1.26	3.36 ± 0.92	Pass
SWU-1455, 1456	3/29/2011	Gr. Beta	2.50 ± 0.75	2.75 ± 0.83	2.62 ± 0.56	Pass
SWU-1522, 1523	3/29/2011	Gr. Beta	1.36 ± 0.87	2.14 ± 0.96	1.75 ± 0.65	Pass
PM-1543, 1544	3/29/2011	Gr. Beta	13.81 ± 0.26	13.67 ± 0.27	13.74 ± 0.19	Pass
PM-1543, 1544	3/29/2011	Sr-90	8.12 ± 3.20	7.71 ± 3.25	7.91 ± 2.28	Pass

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

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
SWT-5885, 5886	3/29/2011	Gr. Beta	1.21 ± 0.54	0.77 ± 0.54	0.99 ± 0.38	Pass
AP-1883, 1884	3/30/2011	Be-7	0.07 ± 0.01	0.09 ± 0.02	0.08 ± 0.01	Pass
AP-2248, 2249	3/30/2011	Be-7	0.06 ± 0.01	0.06 ± 0.01	0.06 ± 0.01	Pass
DW-20066, 20067	3/30/2011	Ra-226	2.14 ± 0.16	2.10 ± 0.16	2.12 ± 0.11	Pass
DW-20066, 20067	3/30/2011	Ra-228	2.55 ± 0.65	1.78 ± 0.62	2.17 ± 0.45	Pass
P-1567, 1568	4/1/2011	H-3	289.00 ± 103.00	296.00 ± 103.00	292.50 ± 72.83	Pass
MI-1609, 1610	4/4/2011	I-131	0.85 ± 0.17	0.91 ± 0.18	0.88 ± 0.13	Pass
MI-1609, 1610	4/4/2011	K-40	1323.80 ± 112.00	1323.20 ± 96.22	1323.50 ± 73.83	Pass
MI-1609, 1610	4/4/2011	Sr-90	0.85 ± 0.33	0.97 ± 0.34	0.91 ± 0.24	Pass
S-1651, 1652	4/4/2011	Ac-228	0.88 ± 0.08	1.03 ± 0.22	0.96 ± 0.12	Pass
S-1651, 1652	4/4/2011	Pb-214	1.09 ± 0.12	0.84 ± 0.16	0.97 ± 0.10	Pass
AP-1841, 1842	4/7/2011	Be-7	0.12 ± 0.02	0.12 ± 0.01	0.12 ± 0.01	Pass
AP-1841, 1842	4/7/2011	Cs-137	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	Pass
AP-1841, 1842	4/7/2011	I-131(G)	0.02 ± 0.00	0.03 ± 0.00	0.03 ± 0.00	Pass
S-1990, 1991	4/7/2011	Ac-228	15.83 ± 0.39	16.12 ± 0.64	15.98 ± 0.37	Pass
S-1990, 1991	4/7/2011	Pb-214	11.21 ± 0.23	11.81 ± 1.22	11.51 ± 0.62	Pass
WW-2552, 2553	4/7/2011	H-3	761.09 ± 116.48	759.04 ± 116.41	760.07 ± 82.34	Pass
PM-1904, 1905	4/11/2011	K-40	13585 ± 611	14278 ± 648	13932 ± 445	Pass
PM-1904, 1905	4/11/2011	Sr-90	9.94 ± 3.05	5.62 ± 2.52	7.78 ± 1.98	Pass
P-2011, 2012	4/11/2011	H-3	670.00 ± 108.00	619.00 ± 106.00	644.50 ± 75.66	Pass
WW-2053, 2054	4/13/2011	H-3	220.20 ± 86.50	246.80 ± 87.80	233.50 ± 61.63	Pass
BS-2095, 2096	4/13/2011	K-40	12.88 ± 0.72	13.56 ± 1.08	13.22 ± 0.65	Pass
DW-20099, 20100	4/13/2011	U-233/4	1.64 ± 0.40	1.31 ± 0.34	1.48 ± 0.26	Pass
DW-20099, 20100	4/13/2011	U-238	1.49 ± 0.39	1.28 ± 0.33	1.39 ± 0.26	Pass
WW-2416, 2417	4/19/2011	H-3	217.10 ± 97.00	184.90 ± 95.60	201.00 ± 68.10	Pass
P-2185, 2186	4/20/2011	H-3	405.00 ± 93.00	504.00 ± 98.00	454.50 ± 67.55	Pass
WW-2353, 2354	4/20/2011	H-3	525.54 ± 119.74	399.41 ± 115.99	462.48 ± 83.35	Pass
DW-20115, 20116	4/26/2011	U-233/4	11.94 ± 2.34	10.71 ± 1.19	11.33 ± 1.31	Pass
DW-20115, 20116	4/26/2011	U-238	2.70 ± 1.15	3.89 ± 0.72	3.30 ± 0.68	Pass
SO-2960, 2961	4/27/2011	K-40	22.63 ± 1.36	22.90 ± 0.03	22.77 ± 0.68	Pass
MI-2657, 2658	5/2/2011	K-40	1319.30 ± 101.30	1403.20 ± 131.60	1361.25 ± 83.04	Pass
DW-20130, 20131	5/2/2011	U-233/4	7.59 ± 0.90	7.62 ± 0.83	7.61 ± 0.61	Pass
DW-20130, 20131	5/2/2011	U-238	4.67 ± 0.72	4.84 ± 0.66	4.76 ± 0.49	Pass
DW-20148, 20149	5/3/2011	U-233/4	6.64 ± 0.83	6.35 ± 0.81	6.50 ± 0.58	Pass
DW-20148, 20149	5/3/2011	U-238	6.11 ± 0.83	5.18 ± 0.73	5.65 ± 0.55	Pass
PM-2810, 2811	5/4/2011	Cs-134	18.64 ± 12.16	33.33 ± 11.86	25.99 ± 8.49	Pass
PM-2810, 2811	5/4/2011	Cs-137	28.99 ± 14.92	21.17 ± 12.16	25.08 ± 9.62	Pass
PM-2810, 2811	5/4/2011	K-40	14368 ± 720	14309 ± 638	14339 ± 481	Pass
WW-3065, 3066	5/16/2011	H-3	280.51 ± 86.98	179.46 ± 82.83	229.98 ± 60.05	Pass
WW-3086, 3087	5/16/2011	H-3	341.14 ± 85.94	377.97 ± 87.43	359.56 ± 61.30	Pass

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

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
SG-3134, 3135	5/16/2011	Ac-228	11.19 ± 0.82	12.50 ± 0.84	11.85 ± 0.59	Pass
SG-3134, 3135	5/16/2011	Pb-214	9.12 ± 0.17	9.37 ± 0.42	9.25 ± 0.23	Pass
F-3221, 3222	5/23/2011	K-40	2.73 ± 0.39	2.81 ± 0.42	2.77 ± 0.29	Pass
SS-3434, 3435	5/25/2011	K-40	11533.00 ± 563.70	11236.00 ± 566.10	11384.50 ± 399.45	Pass
AP-3329, 3330	5/26/2011	Be-7	0.24 ± 0.11	0.23 ± 0.13	0.24 ± 0.08	Pass
WW-3350, 3351	6/1/2011	H-3	235.37 ± 83.98	173.12 ± 81.05	204.25 ± 58.36	Pass
G-3413, 3414	6/1/2011	Be-7	0.28 ± 0.10	0.25 ± 0.09	0.27 ± 0.07	Pass
G-3413, 3414	6/1/2011	Gr. Beta	11.04 ± 0.31	10.85 ± 0.31	10.95 ± 0.22	Pass
G-3413, 3414	6/1/2011	K-40	6.80 ± 0.33	6.71 ± 0.38	6.76 ± 0.25	Pass
AP-3602, 3603	6/3/2011	Be-7	0.20 ± 0.08	0.25 ± 0.10	0.22 ± 0.07	Pass
SO-3797, 3798	6/8/2011	Ac-228	0.99 ± 0.05	1.00 ± 0.06	1.00 ± 0.04	Pass
SO-3797, 3798	6/8/2011	Bi-212	1.10 ± 0.12	1.08 ± 0.17	1.09 ± 0.10	Pass
SO-3797, 3798	6/8/2011	Bi-214	0.87 ± 0.02	0.86 ± 0.02	0.87 ± 0.01	Pass
SO-3797, 3798	6/8/2011	Cs-137	0.41 ± 0.01	0.39 ± 0.01	0.40 ± 0.01	Pass
SO-3797, 3798	6/8/2011	K-40	16.08 ± 0.26	16.27 ± 0.29	16.18 ± 0.19	Pass
SO-3797, 3798	6/8/2011	Pb-212	0.98 ± 0.10	0.93 ± 0.02	0.96 ± 0.05	Pass
SO-3797, 3798	6/8/2011	Pb-214	0.95 ± 0.02	0.91 ± 0.02	0.93 ± 0.01	Pass
SO-3797, 3798	6/8/2011	Th-232	0.47 ± 0.05	0.49 ± 0.04	0.48 ± 0.03	Pass
SO-3797, 3798	6/8/2011	U-233/4	0.16 ± 0.02	0.15 ± 0.02	0.16 ± 0.01	Pass
SO-3797, 3798	6/8/2011	U-238	0.16 ± 0.02	0.13 ± 0.02	0.15 ± 0.01	Pass
MI-3935, 3936	6/20/2011	K-40	1764.60 ± 119.40	1843.10 ± 136.50	1803.85 ± 90.68	Pass
BS-4172, 4173	6/21/2011	Cs-137	51.50 ± 23.78	48.57 ± 17.06	50.04 ± 14.63	Pass
BS-4172, 4173	6/21/2011	K-40	11730.00 ± 679.60	11120.00 ± 512.30	11425.00 ± 425.53	Pass
DW-20183, 20184	6/21/2011	U-233/4	10.00 ± 1.00	8.40 ± 0.90	9.20 ± 0.67	Pass
DW-20183, 20184	6/21/2011	U-238	6.70 ± 0.80	6.10 ± 0.80	6.40 ± 0.57	Pass
WW-4019, 4020	6/24/2011	Gr. Beta	3.56 ± 1.20	3.16 ± 1.21	3.36 ± 0.85	Pass
PM-4193, 4194	6/30/2011	K-40	14795.00 ± 759.00	14660.00 ± 750.00	14727.50 ± 533.52	Pass
LW-4235, 4236	6/30/2011	Gr. Beta	2.70 ± 0.72	2.11 ± 0.78	2.41 ± 0.53	Pass
AP-4367, 4368	7/7/2011	Be-7	0.17 ± 0.10	0.19 ± 0.11	0.18 ± 0.07	Pass
MI-4416, 4417	7/11/2011	K-40	1342.40 ± 91.49	1447.00 ± 114.80	1394.70 ± 73.40	Pass
W-4914, 4915	7/11/2011	H-3	576.36 ± 110.35	584.67 ± 110.67	580.52 ± 78.14	Pass
MI-4438, 4439	7/12/2011	K-40	1280.60 ± 107.50	1381.20 ± 112.70	1330.90 ± 77.87	Pass
VE-4481, 4482	7/13/2011	K-40	4452.60 ± 332.40	4767.90 ± 349.70	4610.25 ± 241.24	Pass
AP-4677, 4678	7/15/2011	Be-7	0.18 ± 0.08	0.23 ± 0.09	0.20 ± 0.06	Pass
W-5537, 5538	7/18/2011	H-3	650.13 ± 105.19	695.39 ± 106.94	672.76 ± 75.00	Pass
P-4764, 4765	7/19/2011	H-3	179.82 ± 84.81	138.72 ± 82.79	159.27 ± 59.26	Pass
WW-5211, 5212	7/24/2011	H-3	191.94 ± 85.50	136.22 ± 82.76	164.08 ± 59.50	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result	Acceptance
VE-4998, 4999	7/25/2011	Be-7	543.90 ± 158.20	488.30 ± 163.80	516.10 ± 113.86	Pass
VE-4998, 4999	7/25/2011	K-40	2562.20 ± 319.80	2414.00 ± 350.00	2488.10 ± 237.05	Pass
DW-20258, 20259	7/25/2011	U-233/4	21.34 ± 1.52	24.93 ± 2.93	23.14 ± 1.65	Pass
DW-20258, 20259	7/25/2011	U-235	0.57 ± 0.26	0.69 ± 0.26	0.63 ± 0.18	Pass
DW-20258, 20259	7/25/2011	U-238	14.11 ± 1.24	15.81 ± 1.23	14.96 ± 0.87	Pass
DW-20269, 20270	7/25/2011	U-233/4	4.93 ± 0.73	4.65 ± 0.68	4.79 ± 0.50	Pass
DW-20269, 20270	7/25/2011	U-238	3.26 ± 0.60	2.53 ± 0.50	2.90 ± 0.39	Pass
DW-20280, 20281	7/25/2011	U-233/4	3.58 ± 0.58	3.33 ± 0.56	3.46 ± 0.40	Pass
DW-20280, 20281	7/25/2011	U-238	1.64 ± 0.40	2.11 ± 0.45	1.88 ± 0.30	Pass
MI-5019, 5020	7/26/2011	K-40	1348.50 ± 101.00	1347.40 ± 109.70	1347.95 ± 74.56	Pass
W-5447, 5448	7/26/2011	H-3	246.31 ± 99.19	241.99 ± 99.02	244.15 ± 70.08	Pass
G-5124, 5125	7/28/2011	Gr. Beta	7.48 ± 0.20	7.17 ± 0.19	7.33 ± 0.14	Pass
AP-5232, 5233	7/28/2011	Be-7	0.15 ± 0.08	0.22 ± 0.13	0.19 ± 0.08	Pass
SL-5169, 5170	8/1/2011	Be-7	2.37 ± 0.16	2.17 ± 0.17	2.27 ± 0.12	Pass
SL-5169, 5170	8/1/2011	Gr. Beta	4.74 ± 0.45	3.94 ± 0.39	4.34 ± 0.30	Pass
SL-5169, 5170	8/1/2011	K-40	3.12 ± 0.16	2.96 ± 0.21	3.04 ± 0.13	Pass
G-5190, 5191	8/1/2011	Be-7	3.14 ± 0.30	3.44 ± 0.27	3.29 ± 0.20	Pass
G-5190, 5191	8/1/2011	Gr. Beta	8.07 ± 0.28	7.86 ± 0.27	7.97 ± 0.19	Pass
G-5190, 5191	8/1/2011	K-40	5.51 ± 0.46	5.57 ± 0.44	5.54 ± 0.32	Pass
DW-20291, 20292	8/2/2011	U-233/4	3.24 ± 0.54	2.60 ± 0.50	2.92 ± 0.37	Pass
DW-20291, 20292	8/2/2011	U-238	1.59 ± 0.38	2.00 ± 0.43	1.80 ± 0.29	Pass
SG-5342, 5343	8/5/2011	Ac-228	14.41 ± 0.36	14.13 ± 0.48	14.27 ± 0.30	Pass
SG-5342, 5343	8/5/2011	Bi-212	4.14 ± 0.65	4.73 ± 1.21	4.44 ± 0.69	Pass
SG-5342, 5343	8/5/2011	K-40	7.67 ± 0.92	7.95 ± 1.21	7.81 ± 0.76	Pass
SG-5342, 5343	8/5/2011	Pb-214	10.72 ± 0.21	10.67 ± 0.28	10.70 ± 0.18	Pass
SG-5342, 5343	8/5/2011	Tl-208	0.96 ± 0.06	1.00 ± 0.06	0.98 ± 0.04	Pass
MI-5405, 5406	8/8/2011	K-40	1545.30 ± 116.00	1388.00 ± 98.20	1466.65 ± 75.99	Pass
DW-20301, 20302	8/9/2011	Gr. Alpha	6.36 ± 1.09	5.30 ± 1.08	5.83 ± 0.77	Pass
DW-20301, 20302	8/9/2011	Gr. Beta	14.36 ± 0.92	13.51 ± 0.89	13.94 ± 0.64	Pass
DW-5603, 5604	8/16/2011	Ra-228	1.68 ± 0.88	2.26 ± 0.91	1.97 ± 0.63	Pass
VE-5753, 5754	8/22/2011	Be-7	0.78 ± 0.20	0.75 ± 0.23	0.77 ± 0.15	Pass
VE-5753, 5754	8/22/2011	K-40	6.16 ± 0.51	6.63 ± 0.57	6.40 ± 0.38	Pass
S-5801, 5802	8/29/2011	Ac-228	0.43 ± 0.09	0.38 ± 0.07	0.41 ± 0.06	Pass
S-5801, 5802	8/29/2011	K-40	6.54 ± 0.51	5.96 ± 0.49	6.25 ± 0.35	Pass
S-5801, 5802	8/29/2011	Pb-212	0.31 ± 0.03	0.36 ± 0.03	0.34 ± 0.02	Pass
S-5801, 5802	8/29/2011	Pb-214	0.28 ± 0.04	0.25 ± 0.04	0.27 ± 0.03	Pass
S-5801, 5802	8/29/2011	Tl-208	0.14 ± 0.02	0.12 ± 0.02	0.13 ± 0.01	Pass
S-5801, 5802	8/29/2011	U-235	0.05 ± 0.02	0.04 ± 0.01	0.05 ± 0.01	Pass
ME-5996, 5997	9/1/2011	Gr. Alpha	0.03 ± 0.02	0.03 ± 0.02	0.03 ± 0.01	Pass
ME-5996, 5997	9/1/2011	Gr. Beta	2.55 ± 0.07	2.62 ± 0.07	2.58 ± 0.05	Pass
ME-5996, 5997	9/1/2011	K-40	2.66 ± 0.35	2.24 ± 0.58	2.45 ± 0.34	Pass

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

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
SL-6017, 6018	9/6/2011	Be-7	0.47 ± 0.17	0.51 ± 0.19	0.49 ± 0.13	Pass
SL-6017, 6018	9/6/2011	Gr. Beta	4.23 ± 0.16	3.94 ± 0.15	4.09 ± 0.11	Pass
SL-6017, 6018	9/6/2011	K-40	4.43 ± 0.55	4.24 ± 0.53	4.34 ± 0.38	Pass
VE-6038, 6039	9/7/2011	Sr-90	1.86 ± 0.98	2.30 ± 0.92	2.08 ± 0.67	Pass
SW-6059, 6060	9/8/2011	H-3	219.75 ± 97.52	177.41 ± 95.76	198.58 ± 68.34	Pass
VE-6302, 6303	9/13/2011	Be-7	0.76 ± 0.24	0.85 ± 0.20	0.81 ± 0.16	Pass
VE-6302, 6303	9/13/2011	Gr. Beta	27.00 ± 1.02	25.50 ± 0.95	26.25 ± 0.70	Pass
VE-6302, 6303	9/13/2011	H-3	6966.00 ± 249.00	6947.00 ± 249.00	6956.50 ± 176.07	Pass
VE-6302, 6303	9/13/2011	K-40	20.62 ± 0.68	20.63 ± 0.64	20.63 ± 0.47	Pass
W-7098, 7099	9/19/2011	H-3	586.61 ± 103.06	525.71 ± 100.63	556.16 ± 72.02	Pass
W-6407, 6408	9/20/2011	Ra-228	1.61 ± 0.94	0.79 ± 0.81	1.20 ± 0.62	Pass
MI-6479, 6480	9/27/2011	K-40	1384.10 ± 111.10	1411.40 ± 105.00	1397.75 ± 76.43	Pass
W-6579, 6580	9/27/2011	H-3	287.97 ± 99.68	285.95 ± 99.60	286.96 ± 70.45	Pass
AP-7015, 7016	9/27/2011	Be-7	0.08 ± 0.02	0.09 ± 0.02	0.08 ± 0.01	Pass
AP-6105, 6106	9/28/2011	Be-7	0.11 ± 0.02	0.09 ± 0.02	0.10 ± 0.01	Pass
LW-6603, 6604	9/28/2011	Gr. Beta	2.15 ± 1.04	1.65 ± 0.90	1.90 ± 0.69	Pass
AP-7056, 7057	9/29/2011	Be-7	0.08 ± 0.02	0.06 ± 0.01	0.07 ± 0.01	Pass
G-6730, 6731	10/3/2011	Be-7	4.24 ± 0.36	4.47 ± 0.37	4.36 ± 0.26	Pass
G-6730, 6731	10/3/2011	Gr. Beta	8.27 ± 0.33	7.93 ± 0.31	8.10 ± 0.23	Pass
G-6730, 6731	10/3/2011	K-40	6.46 ± 0.56	5.41 ± 0.50	5.94 ± 0.38	Pass
AP-7077, 7078	10/3/2011	Be-7	0.08 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	Pass
AP-7077, 7078	10/3/2011	Be-7	0.08 ± 0.01	0.07 ± 0.01	0.07 ± 0.01	Pass
VE-6798, 6799	10/4/2011	K-40	11.76 ± 0.65	11.91 ± 0.62	11.84 ± 0.45	Pass
AP-6820, 6821	10/6/2011	Be-7	0.22 ± 0.08	0.18 ± 0.10	0.20 ± 0.06	Pass
W-7755, 7756	10/9/2011	H-3	261.92 ± 96.52	221.92 ± 94.80	241.92 ± 67.65	Pass
BS-7944, 7945	10/10/2011	Cs-137	291.17 ± 34.00	330.68 ± 36.40	310.93 ± 24.90	Pass
BS-7944, 7945	10/10/2011	K-40	14237.00 ± 686.40	15359.00 ± 703.80	14798.00 ± 491.55	Pass
BS-7140, 7141	10/13/2011	K-40	2.59 ± 0.35	2.58 ± 0.52	2.59 ± 0.31	Pass
AP-7168, 7169	10/13/2011	Be-7	0.25 ± 0.09	0.25 ± 0.11	0.25 ± 0.07	Pass
DW-20349, 20350	10/13/2011	U-233/4	1.77 ± 0.41	2.25 ± 0.77	2.01 ± 0.44	Pass
DW-20349, 20350	10/13/2011	U-238	0.28 ± 0.19	0.31 ± 0.33	0.30 ± 0.19	Pass
WW-7667, 7668	10/19/2011	H-3	1049.11 ± 116.32	1071.39 ± 117.10	1060.25 ± 82.53	Pass
WW-7381, 7382	10/21/2011	H-3	1904.40 ± 145.45	1813.62 ± 142.91	1859.01 ± 101.95	Pass
SS-7495, 7496	10/26/2011	K-40	10.16 ± 0.55	9.56 ± 0.49	9.86 ± 0.37	Pass
W-7516, 7517	10/27/2011	H-3	191.46 ± 84.47	224.05 ± 86.03	207.76 ± 60.28	Pass
VE-7537, 7538	10/28/2011	K-40	2.08 ± 0.23	2.41 ± 0.21	2.24 ± 0.16	Pass
MI-7622, 7623	10/31/2011	K-40	1386.20 ± 116.80	1407.90 ± 116.50	1397.05 ± 82.48	Pass
DW-20399, 20400	10/31/2011	U-233/4	5.70 ± 0.70	5.70 ± 0.70	5.70 ± 0.49	Pass
DW-20399, 20400	10/31/2011	U-238	3.10 ± 0.50	3.70 ± 0.70	3.40 ± 0.43	Pass
BS-7600, 7601	11/1/2011	Gr. Beta	6.83 ± 1.44	5.31 ± 1.35	6.07 ± 0.98	Pass

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

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
SG-8471, 8472	11/1/2011	Gr. Alpha	13.63 ± 2.32	11.13 ± 2.00	12.38 ± 1.53	Pass
SG-8471, 8472	11/1/2011	Gr. Beta	20.30 ± 1.43	17.65 ± 1.42	18.98 ± 1.01	Pass
DW-20424, 20425	11/7/2011	U-233/4	5.90 ± 0.80	6.10 ± 0.80	6.00 ± 0.57	Pass
DW-20424, 20425	11/7/2011	U-235	0.10 ± 0.10	0.30 ± 0.20	0.20 ± 0.11	Pass
DW-20424, 20425	11/7/2011	U-238	4.30 ± 0.70	3.70 ± 0.60	4.00 ± 0.46	Pass
DW-20424, 20425	11/7/2011	U-238	10.30 ± 1.00	10.10 ± 1.00	10.20 ± 0.71	Pass
DW-20435, 20436	11/8/2011	U-233/4	11.00 ± 1.10	10.60 ± 0.80	10.80 ± 0.68	Pass
DW-20435, 20436	11/8/2011	U-238	5.90 ± 0.80	4.90 ± 0.60	5.40 ± 0.50	Pass
SG-7902, 7903	11/10/2011	Ac-228	21.38 ± 0.47	20.48 ± 0.52	20.93 ± 0.35	Pass
SG-7902, 7903	11/10/2011	K-40	9.72 ± 1.04	9.53 ± 0.92	9.63 ± 0.69	Pass
SG-7902, 7903	11/10/2011	Pb-212	3.99 ± 0.10	3.99 ± 0.10	3.99 ± 0.07	Pass
SG-7902, 7903	11/10/2011	Pb-214	9.15 ± 0.23	9.14 ± 0.21	9.15 ± 0.16	Pass
BS-8033, 8034	11/11/2011	Cs-137	0.03 ± 0.02	0.03 ± 0.02	0.03 ± 0.01	Pass
LW-8075, 8076	11/16/2011	Gr. Beta	1.93 ± 0.62	2.55 ± 0.64	2.24 ± 0.44	Pass
AP-8193, 8194	11/17/2011	Be-7	0.21 ± 0.11	0.26 ± 0.13	0.24 ± 0.08	Pass
F-8663, 8664	11/19/2011	Cs-137	0.03 ± 0.02	0.03 ± 0.02	0.03 ± 0.01	Pass
F-8663, 8664	11/19/2011	Gr. Beta	3.55 ± 0.10	3.71 ± 0.10	3.63 ± 0.07	Pass
F-8663, 8664	11/19/2011	K-40	3.04 ± 0.42	3.05 ± 0.35	3.05 ± 0.27	Pass
DW-20449, 20450	11/28/2011	U-233/4	0.70 ± 0.20	0.80 ± 0.20	0.75 ± 0.14	Pass
DW-20449, 20450	11/28/2011	U-238	0.60 ± 0.20	0.60 ± 0.20	0.60 ± 0.14	Pass
SWU-8388, 8389	11/29/2011	Gr. Beta	1.66 ± 0.57	1.65 ± 0.59	1.66 ± 0.41	Pass
AP-8841, 8842	12/15/2011	Be-7	0.23 ± 0.12	0.19 ± 0.09	0.21 ± 0.07	Pass
W-8886, 8887	12/15/2011	Gr. Alpha	0.83 ± 0.81	1.58 ± 0.99	1.21 ± 0.64	Pass
W-8886, 8887	12/15/2011	Gr. Beta	6.80 ± 1.25	5.94 ± 1.22	6.37 ± 0.87	Pass
W-8886, 8887	12/15/2011	Ra-226	0.23 ± 0.15	0.41 ± 0.16	0.32 ± 0.11	Pass
SO-8958, 8959	12/21/2011	K-40	14.58 ± 0.86	15.07 ± 0.87	14.83 ± 0.61	Pass
AP-8907, 8908	12/22/2011	Be-7	0.15 ± 0.06	0.11 ± 0.07	0.13 ± 0.05	Pass
AP-9196, 9197	12/28/2011	Be-7	0.06 ± 0.01	0.07 ± 0.01	0.06 ± 0.01	Pass
LW-9091, 9092	12/29/2011	Gr. Beta	1.97 ± 0.63	1.74 ± 0.60	1.86 ± 0.44	Pass

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

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

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP)[a].

			Concentration [b]			
Lab Code [c]	Date	Analysis	Laboratory result	Known Activity	Control Limits [d]	Acceptance
STW-1237 [e]	02/01/11	Am-241	0.35 ± 0.10	0.53	0.37 - 0.69	Fail
STW-1237	02/01/11	Co-57	< 0.2	0.00	-	Pass
STW-1237	02/01/11	Co-60	24.10 ± 0.40	24.60	17.20 - 32.00	Pass
STW-1237	02/01/11	Cs-134	19.80 ± 0.40	21.50	15.10 - 28.00	Pass
STW-1237	02/01/11	Cs-137	29.40 ± 0.50	29.40	20.60 - 38.20	Pass
STW-1237	02/01/11	H-3	238.90 ± 8.80	243.00	170.00 - 316.00	Pass
STW-1237	02/01/11	K-40	95.40 ± 3.10	91.00	64.00 - 118.00	Pass
STW-1237	02/01/11	Mn-54	32.50 ± 0.60	31.60	22.10 - 41.10	Pass
STW-1237	02/01/11	Ni-63	16.30 ± 0.60	18.60	13.00 - 24.20	Pass
STW-1237	02/01/11	Pu-238	1.11 ± 0.12	1.06	0.75 - 1.38	Pass
STW-1237	02/01/11	Pu-239/40	0.88 ± 0.12	0.81	0.57 - 1.05	Pass
STW-1237	02/01/11	Sr-90	8.70 ± 0.70	8.72	6.10 - 11.34	Pass
STW-1237	02/01/11	Tc-99	7.60 ± 0.60	8.99	6.29 - 11.69	Pass
STW-1237	02/01/11	Zn-65	< 0.5	0.00	-	Pass
STW-1238	02/01/11	Gr. Alpha	0.82 ± 0.07	1.14	0.34 - 1.93	Pass
STW-1238	02/01/11	Gr. Beta	2.82 ± 0.07	2.96	1.48 - 4.44	Pass
STVE-1239	02/01/11	Co-57	11.27 ± 0.21	9.94	6.96 - 12.92	Pass
STVE-1239	02/01/11	Co-60	4.95 ± 0.16	4.91	3.44 - 6.38	Pass
STVE-1239	02/01/11	Cs-134	5.18 ± 0.19	5.50	3.85 - 7.15	Pass
STVE-1239	02/01/11	Cs-137	< 0.09	0.00	-	Pass
STVE-1239	02/01/11	Mn-54	6.91 ± 0.25	6.40	4.48 - 8.32	Pass
STVE-1239	02/01/11	Zn-65	3.10 ± 0.32	2.99	2.09 - 3.89	Pass
STSO-1240	02/01/11	Co-57	984.10 ± 4.10	927.00	649.00 - 1205.00	Pass
STSO-1240	02/01/11	Co-60	540.70 ± 3.00	482.00	337.00 - 627.00	Pass
STSO-1240	02/01/11	Cs-134	726.70 ± 5.92	680.00	476.00 - 884.00	Pass
STSO-1240	02/01/11	Cs-137	883.10 ± 4.70	758.00	531.00 - 985.00	Pass
STSO-1240	02/01/11	K-40	622.70 ± 16.70	540.00	378.00 - 702.00	Pass
STSO-1240	02/01/11	Mn-54	-0.30 ± 1.00	0.00	-	Pass
STSO-1240 [f]	02/01/11	Ni-63	384.00 ± 16.90	582.00	407.00 - 757.00	Fail
STSO-1240	02/01/11	U-233/4	166.60 ± 7.30	176.00	123.00 - 229.00	Pass
STSO-1240	02/01/11	U-238	172.00 ± 7.40	184.00	129.00 - 239.00	Pass
STSO-1240	02/01/11	Zn-65	1671.00 ± 13.10	1359.00	951.00 - 1767.00	Pass
STAP-1241	02/01/11	Am-241	0.00 ± 0.01	0.00	-0.10 - 0.10	Pass
STAP-1241	02/01/11	Co-57	3.48 ± 0.06	3.33	2.33 - 4.33	Pass
STAP-1241	02/01/11	Co-60	0.00 ± 0.02	0.00	-0.10 - 0.10	Pass
STAP-1241	02/01/11	Cs-134	3.44 ± 0.27	3.49	2.44 - 4.54	Pass
STAP-1241	02/01/11	Cs-137	2.46 ± 0.27	2.28	1.60 - 2.96	Pass

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP)[a].

			Concentration [b]			
Lab Code [c]	Date	Analysis	Laboratory result	Known Activity	Control Limits [d]	Acceptance
STAP-1241	02/01/11	Gr. Alpha	0.39 ± 0.05	0.66	0.20 - 1.12	Pass
STAP-1241	02/01/11	Gr. Beta	1.54 ± 0.07	1.32	0.66 - 1.99	Pass
STAP-1241	02/01/11	Mn-54	2.90 ± 0.10	2.64	1.85 - 3.43	Pass
STAP-1241	02/01/11	Pu-238	0.07 ± 0.02	0.10	0.07 - 0.13	Pass
STAP-1241	02/01/11	Pu-239/40	0.06 ± 0.02	0.08	0.05 - 0.10	Pass
STAP-1241 [g]	02/01/11	Sr-90	1.89 ± 0.15	1.36	0.95 - 1.77	Fail
STAP-1241	02/01/11	U-233/4	0.13 ± 0.02	0.18	0.13 - 0.23	Pass
STAP-1241	02/01/11	U-238	0.14 ± 0.02	0.19	0.13 - 0.24	Pass
STAP-1241	02/01/11	Zn-65	3.80 ± 0.18	3.18	2.23 - 4.13	Pass
STW-1249	08/01/11	I-129	7.32 ± 0.30	9.50	6.70 - 12.40	Pass
STVE-1250	08/01/11	Co-57	0.01 ± 0.02	0.00	-	Pass
STVE-1250	08/01/11	Co-60	3.57 ± 0.13	3.38	2.37 - 4.39	Pass
STVE-1250	08/01/11	Cs-134	-0.02 ± 0.04	0.00	-0.10 - 0.10	Pass
STVE-1250	08/01/11	Cs-137	5.28 ± 0.20	4.71	3.30 - 6.12	Pass
STVE-1250	08/01/11	Mn-54	6.48 ± 0.22	5.71	4.00 - 7.42	Pass
STVE-1250	08/01/11	Zn-65	7.35 ± 0.34	6.39	4.47 - 8.31	Pass
STSO-1251	08/01/11	Co-57	1333.90 ± 4.20	1180.00	826.00 - 1534.00	Pass
STSO-1251	08/01/11	Co-60	701.30 ± 3.40	644.00	451.00 - 837.00	Pass
STSO-1251	08/01/11	Cs-134	0.71 ± 1.05	0.00	-	Pass
STSO-1251	08/01/11	Cs-137	1106.00 ± 5.60	979.00	685.00 - 1273.00	Pass
STSO-1251	08/01/11	K-40	749.20 ± 19.00	625.00	438.00 - 813.00	Pass
STSO-1251	08/01/11	Mn-54	984.30 ± 5.40	848.00	594.00 - 1102.00	Pass
STSO-1251	08/01/11	Ni-63	0.11 ± 1.21	0.00	-	Pass
STSO-1251	08/01/11	Pu-238	97.90 ± 7.40	93.60	65.50 - 121.70	Pass
STSO-1251	08/01/11	Pu-239/40	78.80 ± 6.40	77.40	54.20 - 100.60	Pass
STSO-1251 [h]	08/01/11	Sr-90	219.40 ± 16.70	320.00	224.00 - 416.00	Fail
STSO-1251 [i]	08/01/11	Tc-99	110.00 ± 8.00	182.00	127.00 - 237.00	Fail
STSO-1251	08/01/11	U-233/4	267.00 ± 10.20	263.00	184.00 - 342.00	Pass
STSO-1251	08/01/11	U-238	280.30 ± 10.40	274.00	192.00 - 356.00	Pass
STSO-1251	08/01/11	Zn-65	1639.90 ± 11.40	1560.00	1092.00 - 2028.00	Pass
STAP-1252	08/01/11	Co-57	5.06 ± 0.08	5.09	3.56 - 6.62	Pass
STAP-1252	08/01/11	Co-60	3.13 ± 0.09	3.20	2.24 - 4.16	Pass
STAP-1252	08/01/11	Cs-134	0.01 ± 0.03	0.00	-0.10 - 0.10	Pass
STAP-1252	08/01/11	Cs-137	2.61 ± 0.09	2.60	1.82 - 3.38	Pass
STAP-1252	08/01/11	Mn-54	0.01 ± 0.03	0.00	-0.10 - 0.10	Pass
STAP-1252	08/01/11	Pu-238	0.13 ± 0.02	0.12	0.08 - 0.15	Pass
STAP-1252	08/01/11	Pu-239/40	0.15 ± 0.02	0.14	0.10 - 0.18	Pass
STAP-1252	08/01/11	Sr-90	1.65 ± 0.16	1.67	1.17 - 2.17	Pass

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP)[a].

			Concentration [b]			
Lab Code [c]	Date	Analysis	Laboratory result	Known Activity	Control Limits [d]	Acceptance
STAP-1252	08/01/11	U-233/4	0.17 ± 0.02	0.16	0.11 - 0.21	Pass
STAP-1252	08/01/11	U-238	0.17 ± 0.02	0.17	0.12 - 0.22	Pass
STAP-1252	08/01/11	Zn-65	4.46 ± 0.23	4.11	2.88 - 5.34	Pass
STW-1254	08/01/11	Co-57	37.20 ± 0.50	36.60	25.60 - 47.60	Pass
STW-1254	08/01/11	Co-60	28.80 ± 0.40	29.30	20.50 - 38.10	Pass
STW-1254	08/01/11	Cs-134	18.00 ± 0.60	19.10	13.40 - 24.80	Pass
STW-1254	08/01/11	Cs-137	0.06 ± 0.13	0.00	-	Pass
STW-1254	08/01/11	H-3	1039.90 ± 17.90	1014.00	710.00 - 1318.00	Pass
STW-1254	08/01/11	K-40	161.40 ± 4.10	156.00	109.00 - 203.00	Pass
STW-1254	08/01/11	Mn-54	25.70 ± 0.50	25.00	17.50 - 32.50	Pass
STW-1254	08/01/11	Ni-63	0.60 ± 2.00	0.00	-	Pass
STW-1254	08/01/11	Pu-238	0.04 ± 0.02	0.02	0.00 - 1.00	Pass
STW-1254	08/01/11	Pu-239/40	2.27 ± 0.14	2.40	1.68 - 3.12	Pass
STW-1254	08/01/11	Sr-90	15.60 ± 1.80	14.20	9.90 - 18.50	Pass
STW-1254	08/01/11	Tc-99	-0.30 ± 0.50	0.00	-	Pass
STW-1254	08/01/11	U-233/4	2.78 ± 0.20	2.78	1.95 - 3.61	Pass
STW-1254	08/01/11	U-238	2.86 ± 0.21	2.89	2.02 - 3.76	Pass
STW-1254	08/01/11	Zn-65	30.20 ± 0.90	28.50	20.00 - 37.10	Pass
STW-1255	08/01/11	Gr. Alpha	0.72 ± 0.12	0.87	0.26 - 1.47	Pass
STW-1255	08/01/11	Gr. Beta	4.71 ± 0.15	4.81	2.41 - 7.22	Pass

[a] Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the Department of Energy's Mixed Analyte Performance Evaluation Program, Idaho Operations office, Idaho Falls, Idaho

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

[c] Laboratory codes as follows: STW (water), STAP (air filter), STSO (soil), STVE (vegetation).

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

[e] Result of a repeat analysis was still unacceptable. ERA crosschecks for Am-241 were acceptable, but biased low. Matrix spikes were prepared, (5.17 and 51.7 pCi/L), to verify method; results were acceptable, 4.4 and 47.5 pCi/L. Am-241 has been added to the internal spike and blank program for 2012.

[f] An error in percent recovery was found, result of recalculation, 427.3 ± 18.8 Bq/kg dry.

[g] No errors found in calculation or procedure, results of reanalysis; 1.73 Bq/filter.

[h] The analyses were repeated through a strontium column; mean result of triplicate analyses, 304.2 Bq/kg.

[i] The lab does not currently analyze soil for Tc-99, but is evaluating the procedure. After consultation with Eichrom, the analysis was repeated using a matrix spike correction. Mean result of triplicate reanalyses; 183.3 Bq/kg.

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

	Concentration (pCi/L) [b]					
Lab Code [b]	Date	Analysis	Laboratory Result [c]	ERA Result [d]	Control Limits	Acceptance
STAP-1230	03/21/11	Am-241	46.0 ± 1.8	62.5	36.6 - 85.7	Pass
STAP-1230	03/21/11	Co-60	401.2 ± 12.1	390.0	302.0 - 487.0	Pass
STAP-1230	03/21/11	Cs-134	268.2 ± 24.8	279.0	182.0 - 345.0	Pass
STAP-1230	03/21/11	Cs-137	345.3 ± 24.9	312.0	234.0 - 410.0	Pass
STAP-1230	03/21/11	Mn-54	< 1.9	0.0	-	Pass
STAP-1230	03/21/11	Pu-238	76.1 ± 3.2	69.0	47.4 - 90.7	Pass
STAP-1230	03/21/11	Pu-239/40	70.50 ± 3.10	65.5	47.5 - 85	Pass
STAP-1230	03/21/11	Sr-90	208.40 ± 18.70	185.0	81.4 - 288	Pass
STAP-1230	03/21/11	U-233/4	56.10 ± 2.10	61.5	38.7 - 91	Pass
STAP-1230	03/21/11	U-238	58.90 ± 2.60	61.0	39.0 - 87	Pass
STAP-1230	03/21/11	Uranium	118.50 ± 5.52	125.0	63.9 - 199	Pass
STAP-1230	03/21/11	Zn-65	312.60 ± 23.40	279.0	193.0 - 386	Pass
STAP-1231	03/21/11	Gr. Alpha	88.40 ± 3.70	74.3	38.5 - 112	Pass
STAP-1231	03/21/11	Gr. Beta	85.10 ± 2.80	69.5	42.8 - 102	Pass
STSO-1232	03/21/11	Ac-228	1327.8 ± 97.5	1490.0	958.0 - 2100.0	Pass
STSO-1232	03/21/11	Am-241	662.8 ± 88.1	914.0	546.0 - 1170.0	Pass
STSO-1232	03/21/11	Bi-212	1396.2 ± 185.3	1400.0	368.0 - 2090.0	Pass
STSO-1232	03/21/11	Bi-214	841.1 ± 33.2	725.0	445.0 - 1040.0	Pass
STSO-1232	03/21/11	Co-60	2423.7 ± 27.1	2220.0	1620.0 - 2980.0	Pass
STSO-1232	03/21/11	Cs-134	2481.3 ± 42.2	2450.0	1580.0 - 2950.0	Pass
STSO-1232	03/21/11	Cs-137	2108.2 ± 30.2	1920.0	1470.0 - 2490.0	Pass
STSO-1232	03/21/11	K-40	11497.3 ± 276.6	11500.0	8320.0 - 15600.0	Pass
STSO-1232	03/21/11	Mn-54	< 17.4	0.0	-	Pass
STSO-1232	03/21/11	Pb-212	994.7 ± 30.0	1440.0	931.0 - 2030.0	Pass
STSO-1232	03/21/11	Pb-214	918.3 ± 42.6	805.0	482.0 - 1200.0	Pass
STSO-1232	03/21/11	Pu-238	1593.6 ± 156.7	1420.0	813.0 - 2000.0	Pass
STSO-1232	03/21/11	Pu-239/40	1428.9 ± 143.4	1400.0	956.0 - 1860.0	Pass
STSO-1232	03/21/11	Sr-90	8638.0 ± 442.8	7590.0	2740.0 - 12400.0	Pass
STSO-1232	03/21/11	Th-234	1350.1 ± 180.0	962.0	305.0 - 1830.0	Pass
STSO-1232	03/21/11	U-233/4	748.0 ± 94.4	972.0	616.0 - 1210.0	Pass
STSO-1232	03/21/11	U-238	909.0 ± 104.9	962.0	588.0 - 1220.0	Pass
STSO-1232	03/21/11	Uranium	1690.8 ± 104.9	1980.0	1130.0 - 2670.0	Pass
STSO-1232	03/21/11	Zn-65	2356.2 ± 57.1	1990.0	1580.0 - 2670.0	Pass

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

			Concentration (pCi/L) [b]			
Lab Code [b]	Date	Analysis	Laboratory Result [c]	ERA Result [d]	Control Limits	Acceptance
STVE-1233	03/21/11	Am-241	2377.5 ± 83.2	3200.0	1820.0 - 4400.0	Pass
STVE-1233	03/21/11	Cm-244	602.9 ± 38.4	812.0	400.0 - 1260.0	Pass
STVE-1233	03/21/11	Co-60	810.2 ± 32.4	733.0	496.0 - 1050.0	Pass
STVE-1233	03/21/11	Cs-134	849.4 ± 54.5	770.0	441.0 - 1070.0	Pass
STVE-1233	03/21/11	Cs-137	889.9 ± 36.3	829.0	608.0 - 1150.0	Pass
STVE-1233	03/21/11	K-40	28146.70 ± 698.80	25800.0	18500.0 - 36500	Pass
STVE-1233	03/21/11	Mn-54	< 19.3	0.0	-	Pass
STVE-1233	03/21/11	Pu-238	3068.10 ± 170.70	2990.0	1610.0 - 4380	Pass
STVE-1233	03/21/11	Pu-239/40	3180.00 ± 88.90	3100.0	1920.0 - 4230	Pass
STVE-1233	03/21/11	Sr-90	8549.20 ± 675.00	7890.0	4410.0 - 10500	Pass
STVE-1233	03/21/11	U-233/4	2418.60 ± 142.50	2610.0	1790.0 - 3460	Pass
STVE-1233	03/21/11	U-238	2417.00 ± 142.50	2590.0	1820.0 - 3270	Pass
STVE-1233	03/21/11	Uranium	4929.80 ± 142.50	5320.0	3660.0 - 6860	Pass
STVE-1233	03/21/11	Zn-65	962.40 ± 62.50	799.0	577.0 - 1090	Pass
STW-1234	03/21/11	Am-241	100.0 ± 6.4	135.0	92.5 - 182.0	Pass
STW-1234	03/21/11	Co-60	401.6 ± 7.2	411.0	358.0 - 486.0	Pass
STW-1234	03/21/11	Cs-134	222.7 ± 12.3	231.0	171.0 - 265.0	Pass
STW-1234	03/21/11	Cs-137	410.3 ± 9.5	417.0	354.0 - 500.0	Pass
STW-1234	03/21/11	Mn-54	< 3.0	0.0	-	Pass
STW-1234	03/21/11	Pu-238	130.9 ± 5.5	131.0	99.1 - 162.0	Pass
STW-1234	03/21/11	Pu-239/40	113.0 ± 5.0	119.0	92.1 - 147.0	Pass
STW-1234	03/21/11	Sr-90	739.6 ± 13.0	773.0	491.0 - 1030.0	Pass
STW-1234	03/21/11	U-233/4	83.4 ± 3.8	94.3	71.1 - 122.0	Pass
STW-1234	03/21/11	U-238	85.5 ± 3.9	93.5	71.4 - 116.0	Pass
STW-1234	03/21/11	Uranium	172.0 ± 8.5	192.0	138.0 - 256.0	Pass
STW-1234	03/21/11	Zn-65	114.5 ± 10.8	111.0	94.1 - 138.0	Pass
STW-1235	03/21/11	Gr. Alpha	97.6 ± 2.9	112.0	49.7 - 166.0	Pass
STW-1235	03/21/11	Gr. Beta	99.6 ± 2.0	99.8	58.4 - 146.0	Pass
STW-1236	03/21/11	H-3	16307.0 ± 377.0	15200.0	9900.0 - 22500.0	Pass

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

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

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

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

APPENDIX B

DATA REPORTING CONVENTIONS

Data Reporting Conventions

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

2.0. Single Measurements

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

where: x = value of the measurement;

$s = 2\sigma$ counting uncertainty (corresponding to the 95% confidence level).

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

3.0. Duplicate analyses

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

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

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

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

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

4.0. Computation of Averages and Standard Deviations

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

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

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

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

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

4.5 In rounding off, the following rules are followed:

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

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

APPENDIX C

Sampling Program and Locations

Sample Type	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.

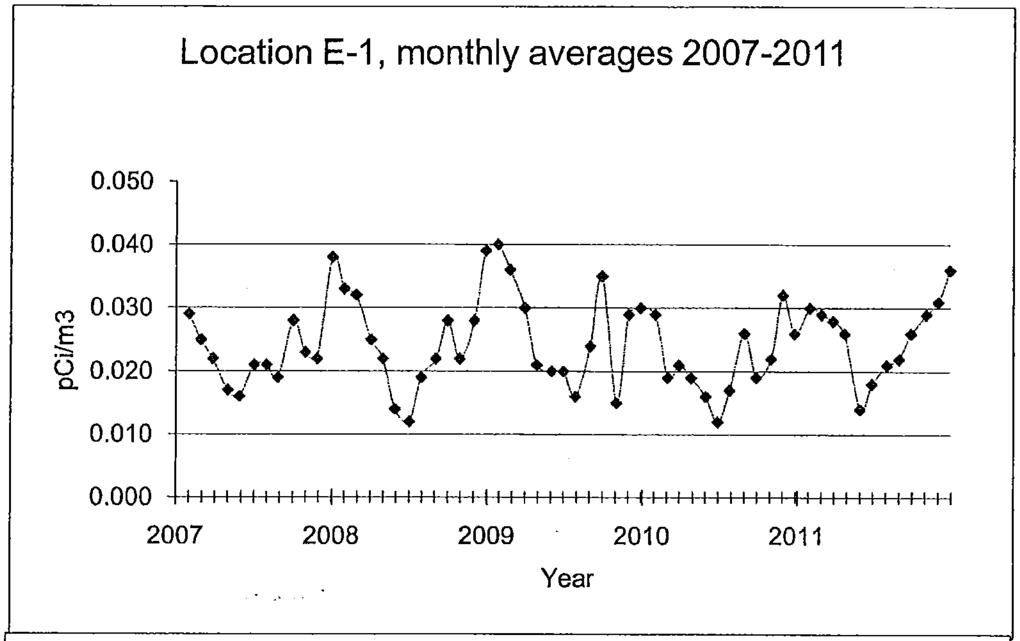
[b] Analysis type is coded as follows: GB = gross beta, GA = gross alpha, GS = gamma spectroscopy, H-3 = tritium, Sr-89 = strontium-89, Sr-90 = strontium-90, I-131 = iodine-131. Analysis frequency is coded as follows: MC = monthly composite, QC = quarterly composite.

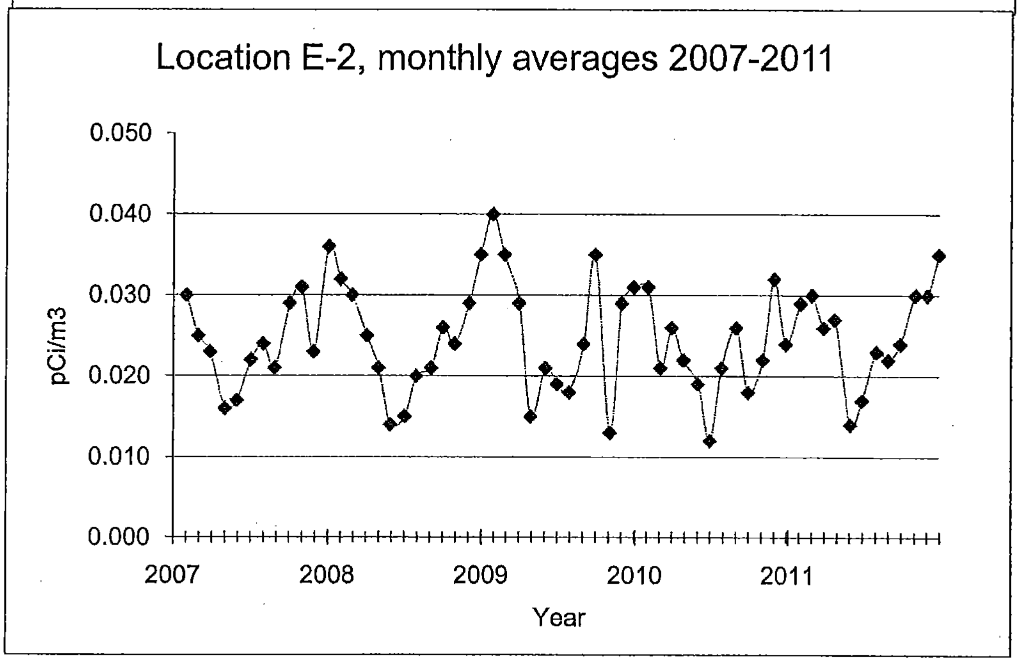
APPENDIX D

Graphs of Data Trends

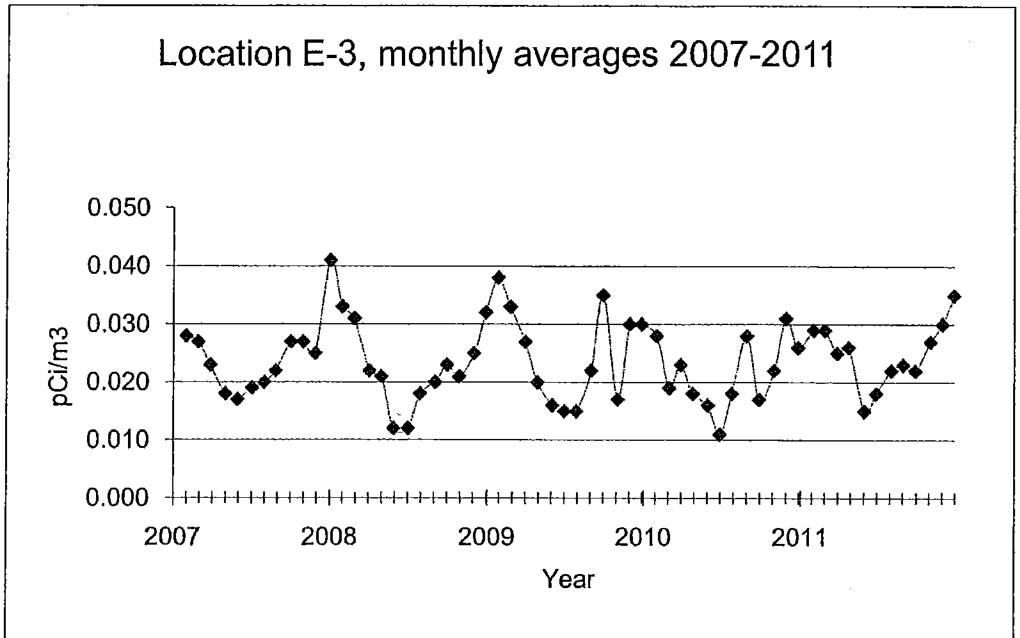
POINT BEACH

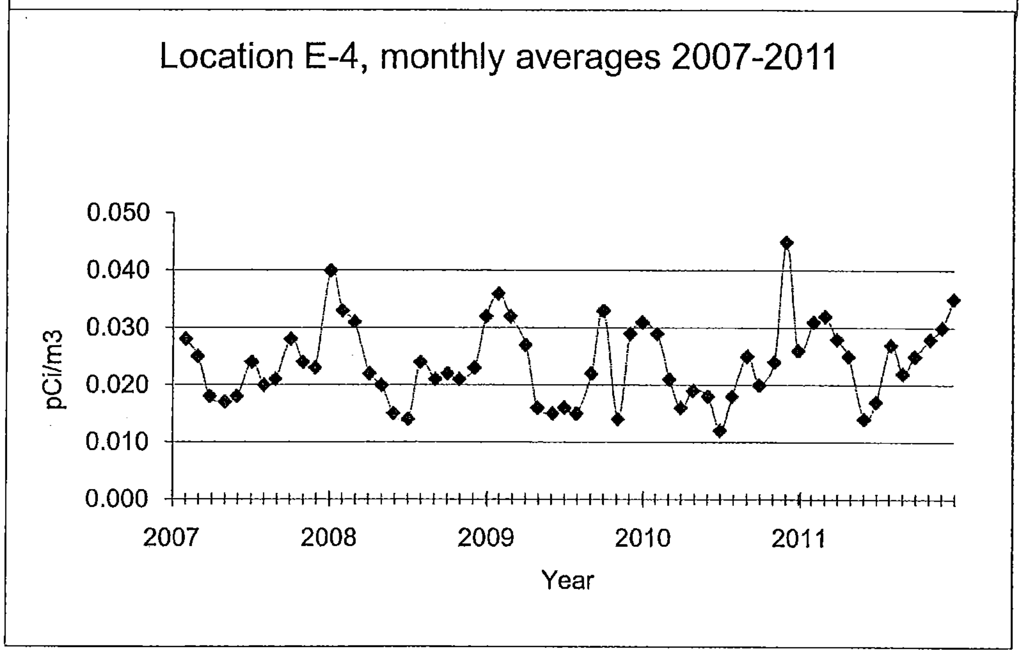
Air Particulates - Gross Beta



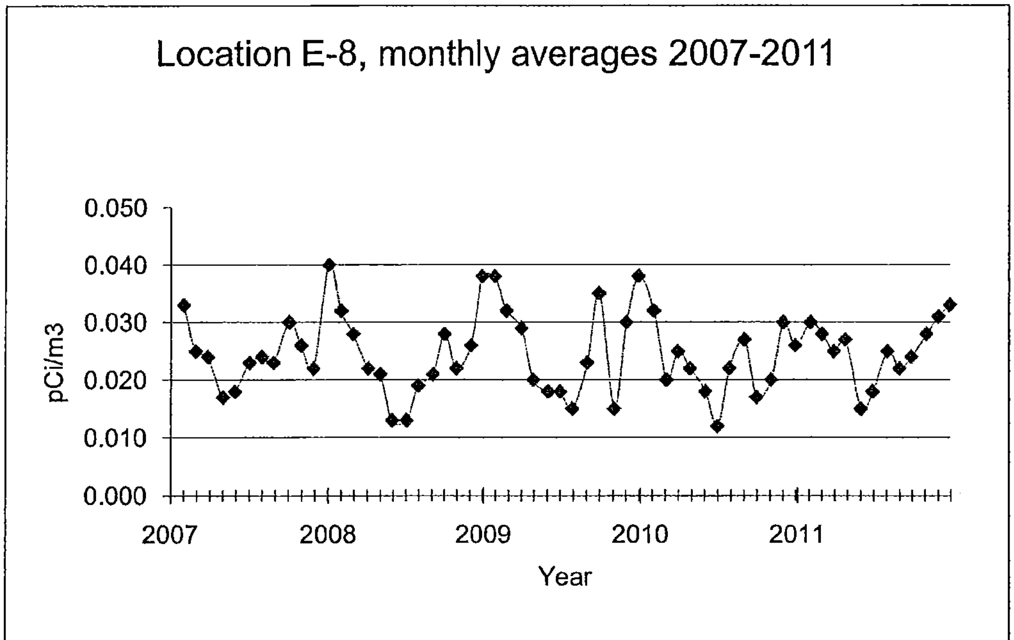


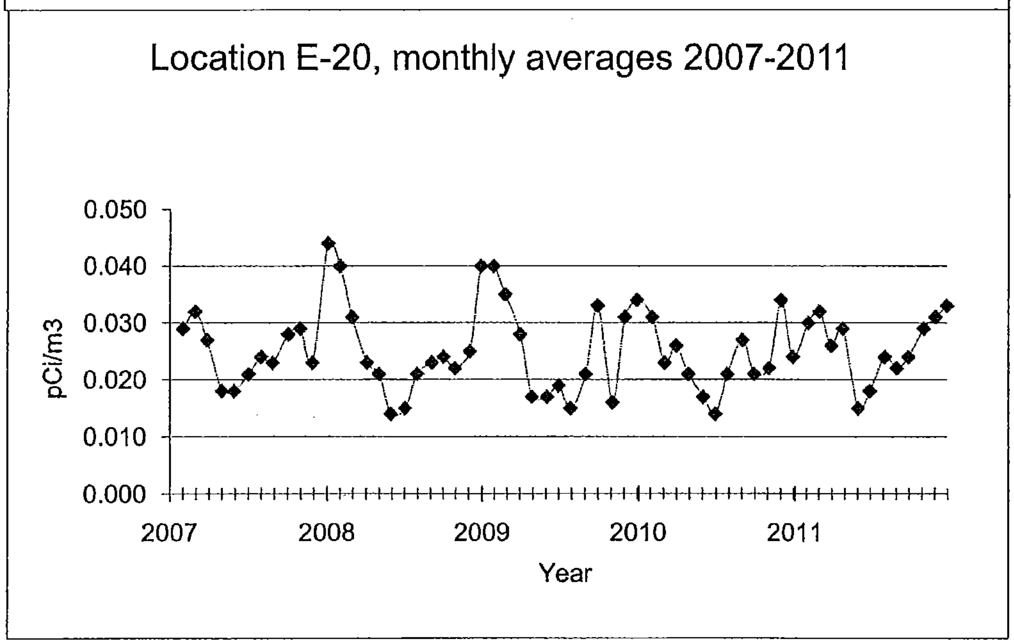
Air Particulates - Gross Beta





Air Particulates - Gross Beta





APPENDIX E

Supplemental Analyses

APPENDIX F

Special Analyses

POINT BEACH NUCLEAR PLANT

Special Analyses

Precipitation samples

Units = pCi/L

Location	E-01		E-05		E-06	
Collection Date	03-22-11		03-22-11		03-22-11	
Lab Code	EP- 1172	MDC	EP- 1173	MDC	EP- 1174	MDC
Gross Beta	1.2 ± 0.7	< 1.2	1.0 ± 0.7	< 1.1	1.8 ± 0.8	< 1.2
Sr-90	-0.59 ± 0.87	< 2.07	-0.11 ± 0.51	< 1.12	0.94 ± 0.70	< 1.30
H-3	124 ± 101	< 158	114 ± 101	< 158	48 ± 98	< 158
I-131	11.7 ± 3.8	< 3.7	10.4 ± 3.6	< 3.5	14.1 ± 5.1	< 4.7
Be-7	40.9 ± 13.7	< 27.2	10.8 ± 12.2	< 20.8	26.5 ± 17.8	< 36.2
Mn-54	-0.1 ± 1.5	< 3.1	-0.3 ± 1.5	< 1.6	0.8 ± 1.6	< 3.2
Fe-59	-4.1 ± 2.7	< 2.5	-2.9 ± 2.8	< 3.8	-2.5 ± 2.7	< 4.1
Co-58	-0.5 ± 1.4	< 1.3	-1.1 ± 1.2	< 1.5	1.3 ± 1.7	< 2.7
Co-60	-0.6 ± 1.6	< 2.9	0.6 ± 1.6	< 2.3	0.2 ± 1.7	< 2.3
Zn-65	-1.6 ± 3.2	< 5.3	0.4 ± 2.4	< 3.2	3.4 ± 3.6	< 6.8
Zr-Nb-95	-1.0 ± 1.6	< 2.1	0.1 ± 1.6	< 2.2	-0.2 ± 1.7	< 1.8
Cs-134	0.7 ± 1.5	< 2.5	-0.1 ± 1.1	< 2.6	-1.1 ± 1.7	< 3.0
Cs-137	-0.3 ± 1.6	< 2.0	1.2 ± 1.5	< 2.9	-0.7 ± 1.9	< 2.1
Ba-La-140	1.5 ± 1.2	< 1.5	-0.4 ± 1.8	< 1.7	2.2 ± 1.5	< 2.0
Location	E-02		E-03		E-04	
Collection Date	03-25-11		03-25-11		03-25-11	
Lab Code	EP- 1292	MDC	EP- 1293	MDC	EP- 1294	MDC
Gross Beta	3.1 ± 0.6	< 0.8	2.3 ± 0.6	< 0.7	1.2 ± 0.6	< 0.7
Sr-90	-0.04 ± 0.33	< 0.71	0.03 ± 0.33	< 0.71	-0.03 ± 0.33	< 0.71
H-3	47 ± 96	< 154	-28 ± 92	< 154	4 ± 94	< 154
I-131	24.4 ± 4.9	< 3.7	18.3 ± 4.8	< 3.1	33.1 ± 4.7	< 3.9
Be-7	72.5 ± 29.4	-	22.5 ± 14.7	< 31.5	51.2 ± 25.1	-
Mn-54	0.4 ± 1.2	< 2.0	-0.9 ± 1.3	< 2.1	0.3 ± 1.3	< 2.0
Fe-59	0.6 ± 2.7	< 3.2	-2.4 ± 2.8	< 4.8	0.8 ± 2.3	< 5.0
Co-58	-0.6 ± 1.4	< 1.2	0.3 ± 1.5	< 2.2	-0.3 ± 1.3	< 1.6
Co-60	0.7 ± 1.7	< 2.4	-1.4 ± 1.8	< 2.9	1.2 ± 1.3	< 1.7
Zn-65	-0.9 ± 2.7	< 2.4	0.2 ± 2.5	< 2.9	-0.7 ± 2.3	< 2.4
Zr-Nb-95	-2.8 ± 1.6	< 1.6	-2.1 ± 1.6	< 2.9	-0.1 ± 1.3	< 1.4
Cs-134	0.3 ± 1.4	< 2.7	-0.8 ± 1.7	< 2.5	0.3 ± 1.1	< 2.0
Cs-137	1.8 ± 1.8	< 3.7	0.1 ± 1.8	< 2.9	0.1 ± 1.6	< 2.8
Ba-La-140	0.2 ± 1.7	< 3.2	-0.5 ± 1.6	< 1.9	0.9 ± 1.7	< 2.1

POINT BEACH NUCLEAR PLANT

Special Analyses

Weekly Composites of airborne particulates

Units = pCi/m^3

Collection Start	02-23-11		03-02-11		03-10-11	
Collection End	03-02-11		03-10-11		03-16-11	
Lab Code	EAP- 1169	MDC	EAP- 1170	MDC	EAP- 1171	MDC
Volume (m3)	1809		1869		1602	
Be-7	0.1177 ± 0.0204	-	0.1413 ± 0.0177	-	0.1372 ± 0.0171	-
K-40	0.0552 ± 0.0166	< 0.0342	0.0711 ± 0.0171	< 0.0347	0.0296 ± 0.0124	< 0.0283
Mn-54	0.0002 ± 0.0008	< 0.0011	0.0004 ± 0.0008	< 0.0011	-0.0002 ± 0.0006	< 0.0008
Fe-59	0.0013 ± 0.0015	< 0.0022	-0.0010 ± 0.0016	< 0.0017	-0.0002 ± 0.0011	< 0.0021
Co-58	-0.0001 ± 0.0007	< 0.0012	-0.0002 ± 0.0007	< 0.0009	0.0008 ± 0.0006	< 0.0010
Co-60	-0.0005 ± 0.0009	< 0.0004	-0.0004 ± 0.0008	< 0.0004	0.0006 ± 0.0007	< 0.0010
Zn-65	-0.0017 ± 0.0021	< 0.0012	0.0018 ± 0.0013	< 0.0019	0.0002 ± 0.0012	< 0.0020
Nb-95	0.0006 ± 0.0008	< 0.0013	0.0016 ± 0.0006	< 0.0011	-0.0002 ± 0.0007	< 0.0012
Zr-95	-0.0009 ± 0.0017	< 0.0020	0.0009 ± 0.0016	< 0.0020	-0.0007 ± 0.0011	< 0.0014
Ru-103	-0.0002 ± 0.0007	< 0.0010	-0.0009 ± 0.0007	< 0.0013	0.0003 ± 0.0005	< 0.0009
Ru-106	-0.0004 ± 0.0061	< 0.0082	0.0030 ± 0.0071	< 0.0128	0.0006 ± 0.0064	< 0.0121
I-131	0.0015 ± 0.0007	< 0.0058	-0.0006 ± 0.0007	< 0.0038	-0.0005 ± 0.0006	< 0.0012
Cs-134	-0.0003 ± 0.0007	< 0.0007	0.0005 ± 0.0006	< 0.0008	-0.0008 ± 0.0007	< 0.0009
Cs-137	0.0000 ± 0.0008	< 0.0007	-0.0005 ± 0.0008	< 0.0007	-0.0005 ± 0.0008	< 0.0011
Ce-141	-0.0004 ± 0.0008	< 0.0022	-0.0009 ± 0.0009	< 0.0021	0.0005 ± 0.0008	< 0.0014
Ce-144	0.0018 ± 0.0035	< 0.0060	0.0006 ± 0.0036	< 0.0084	0.0007 ± 0.0032	< 0.0051

Collection Start	03-16-11		03-24-11		03-30-11	
Collection End	03-24-11		03-30-11		04-06-11	
Lab Code	EAP- 1288	MDC	EAP- 1466	MDC	EAP- 1704	MDC
Volume (m3)	2054		1374		1809	
Be-7	0.1062 ± 0.0157	-	0.1977 ± 0.0222	-	0.1161 ± 0.0138	-
K-40	0.0567 ± 0.0125	< 0.0301	0.0404 ± 0.0145	< 0.0290	0.0288 ± 0.0115	< 0.0231
Mn-54	-0.0001 ± 0.0006	< 0.0009	0.0005 ± 0.0007	< 0.0012	-0.0003 ± 0.0006	< 0.0009
Fe-59	0.0011 ± 0.0010	< 0.0023	-0.0001 ± 0.0012	< 0.0018	-0.0008 ± 0.0010	< 0.0013
Co-58	0.0004 ± 0.0006	< 0.0008	-0.0007 ± 0.0008	< 0.0007	0.0000 ± 0.0005	< 0.0008
Co-60	0.0003 ± 0.0006	< 0.0009	-0.0007 ± 0.0008	< 0.0008	-0.0002 ± 0.0006	< 0.0007
Zn-65	0.0002 ± 0.0013	< 0.0020	0.0014 ± 0.0019	< 0.0025	0.0007 ± 0.0011	< 0.0016
Nb-95	-0.0001 ± 0.0006	< 0.0009	-0.0005 ± 0.0008	< 0.0013	-0.0002 ± 0.0006	< 0.0009
Zr-95	-0.0004 ± 0.0010	< 0.0014	-0.0008 ± 0.0012	< 0.0018	-0.0008 ± 0.0010	< 0.0015
Ru-103	-0.0003 ± 0.0006	< 0.0010	0.0004 ± 0.0006	< 0.0014	0.0001 ± 0.0005	< 0.0011
Ru-106	-0.0065 ± 0.0057	< 0.0050	-0.0026 ± 0.0078	< 0.0137	0.0050 ± 0.0058	< 0.0089
I-131	0.0245 ± 0.0034	-	0.0399 ± 0.0038	-	0.0238 ± 0.0028	-
Cs-134	0.0007 ± 0.0006	< 0.0009	0.0001 ± 0.0008	< 0.0012	0.0017 ± 0.0008	< 0.0011
Cs-137	0.0010 ± 0.0007	< 0.0013	-0.0006 ± 0.0008	< 0.0012	0.0026 ± 0.0014	< 0.0014
Ce-141	0.0009 ± 0.0007	< 0.0019	-0.0003 ± 0.0009	< 0.0018	-0.0006 ± 0.0007	< 0.0013
Ce-144	-0.0017 ± 0.0031	< 0.0062	0.0026 ± 0.0037	< 0.0063	0.0001 ± 0.0028	< 0.0048

POINT BEACH NUCLEAR PLANT

Special Analyses

Weekly Composites of airborne particulates

Units = pCi/m³

Collection Start	04-06-11		04-13-11		04-20-11	
Collection End	04-13-11		04-20-11		04-27-11	
Lab Code	EAP- 2045	MDC	EAP- 2439	MDC	EAP- 2501	MDC
Volume (m3)	1849		1912		1912	
Be-7	0.1016 ± 0.0146	-	0.1510 ± 0.0204	-	0.1171 ± 0.0237	-
K-40	0.0457 ± 0.0155	< 0.0346	0.0400 ± 0.0168	< 0.0341	0.0779 ± 0.0187	< 0.0407
Mn-54	0.0000 ± 0.0008	< 0.0013	0.0001 ± 0.0007	< 0.0012	0.0005 ± 0.0009	< 0.0017
Fe-59	-0.0003 ± 0.0015	< 0.0019	0.0004 ± 0.0013	< 0.0021	0.0006 ± 0.0016	< 0.0029
Co-58	-0.0005 ± 0.0007	< 0.0010	-0.0002 ± 0.0007	< 0.0011	-0.0002 ± 0.0006	< 0.0008
Co-60	0.0002 ± 0.0010	< 0.0015	-0.0007 ± 0.0010	< 0.0010	-0.0007 ± 0.0009	< 0.0010
Zn-65	-0.0005 ± 0.0019	< 0.0022	0.0010 ± 0.0015	< 0.0011	0.0030 ± 0.0017	< 0.0028
Nb-95	-0.0002 ± 0.0007	< 0.0011	0.0007 ± 0.0007	< 0.0011	-0.0004 ± 0.0008	< 0.0010
Zr-95	0.0006 ± 0.0012	< 0.0023	0.0022 ± 0.0015	< 0.0022	0.0001 ± 0.0019	< 0.0023
Ru-103	-0.0006 ± 0.0008	< 0.0013	0.0002 ± 0.0007	< 0.0015	-0.0003 ± 0.0008	< 0.0011
Ru-106	0.0012 ± 0.0075	< 0.0128	0.0017 ± 0.0058	< 0.0062	0.0068 ± 0.0078	< 0.0115
I-131	0.0057 ± 0.0033	-	0.0076 ± 0.0007	< 0.0046	-0.0001 ± 0.0008	< 0.0025
Cs-134	0.0019 ± 0.0010	< 0.0015	0.0037 ± 0.0012	< 0.0015	0.0010 ± 0.0009	< 0.0011
Cs-137	0.0020 ± 0.0012	< 0.0014	0.0038 ± 0.0016	< 0.0013	0.0014 ± 0.0010	< 0.0014
Ce-141	0.0007 ± 0.0010	< 0.0019	0.0001 ± 0.0008	< 0.0016	-0.0003 ± 0.0009	< 0.0016
Ce-144	-0.0018 ± 0.0043	< 0.0079	0.0004 ± 0.0034	< 0.0059	0.0025 ± 0.0041	< 0.0067

Collection Start	04-27-11		05-04-11	
Collection End	05-04-11		05-11-11	
Lab Code	EAP- 2699	MDC	EAP- 2867	MDC
Volume (m3)	2085		1860	
Be-7	0.1007 ± 0.0181	-	0.1302 ± 0.0189	-
K-40	0.0500 ± 0.0130	< 0.0292	0.0405 ± 0.0138	< 0.0314
Mn-54	-0.0007 ± 0.0006	< 0.0009	-0.0002 ± 0.0008	< 0.0014
Fe-59	-0.0001 ± 0.0013	< 0.0012	0.0005 ± 0.0014	< 0.0027
Co-58	-0.0003 ± 0.0007	< 0.0012	0.0001 ± 0.0007	< 0.0016
Co-60	-0.0003 ± 0.0008	< 0.0013	0.0006 ± 0.0009	< 0.0016
Zn-65	-0.0011 ± 0.0017	< 0.0013	0.0002 ± 0.0019	< 0.0018
Nb-95	0.0002 ± 0.0007	< 0.0016	0.0006 ± 0.0007	< 0.0016
Zr-95	-0.0005 ± 0.0012	< 0.0012	0.0009 ± 0.0011	< 0.0012
Ru-103	-0.0003 ± 0.0006	< 0.0012	0.0005 ± 0.0007	< 0.0017
Ru-106	0.0026 ± 0.0064	< 0.0136	-0.0008 ± 0.0067	< 0.0080
I-131	0.0008 ± 0.0006	< 0.0022	0.0010 ± 0.0007	< 0.0022
Cs-134	0.0006 ± 0.0007	< 0.0015	0.0006 ± 0.0007	< 0.0015
Cs-137	0.0010 ± 0.0007	< 0.0014	0.0007 ± 0.0008	< 0.0014
Ce-141	-0.0004 ± 0.0009	< 0.0019	-0.0004 ± 0.0010	< 0.0020
Ce-144	-0.0019 ± 0.0038	< 0.0063	0.0008 ± 0.0040	< 0.0088

POINT BEACH NUCLEAR PLANT

Special Analyses

Air particulate and air iodine cartridges for gross beta and gamma emitting isotopes — Units = pCi/m^3

Location	WHSE #1		WHSE #1	
Collection Date	03-27-11		03-27-11	
Lab Code	EAP- 1407	MDC	ECH- 1408	MDC
Volume (m^3)	121.5		121.5	
Gross Beta	0.040 ± 0.007	< 0.008		
Be-7	0.22 ± 0.091	< 0.170		
Mn-54	-0.001 ± 0.008	< 0.011		
Fe-59	0.001 ± 0.018	< 0.036		
Co-58	-0.001 ± 0.009	< 0.015		
Co-60	0.005 ± 0.011	< 0.019		
Zn-65	0.009 ± 0.018	< 0.030		
Zr-Nb-95	-0.024 ± 0.011	< 0.018		
I-131	0.028 ± 0.014	< 0.026	0.050 ± 0.028	< 0.028
Cs-134	0.001 ± 0.009	< 0.015		
Cs-137	0.002 ± 0.086	< 0.018		
Ba-La-140	0.007 ± 0.009	< 0.016		
Ce-141	-0.003 ± 0.008	< 0.022		
Ce-144	0.014 ± 0.010	< 0.088		

Location	ISFSI		ISFSI	
Collection Date	03-31-11		03-31-11	
Lab Code	EAP- 1467	MDC	ECH- 1468	MDC
Volume (m^3)	288.7		288.7	
Gross Beta	0.028 ± 0.004	< 0.003		
Be-7	0.19 ± 0.074	-		
Mn-54	0.004 ± 0.004	< 0.007		
Fe-59	0.000 ± 0.006	< 0.005		
Co-58	0.001 ± 0.003	< 0.005		
Co-60	-0.001 ± 0.004	< 0.004		
Zn-65	0.007 ± 0.008	< 0.012		
Zr-Nb-95	-0.002 ± 0.004	< 0.005		
I-131	0.017 ± 0.009	< 0.008	0.105 ± 0.015	< 0.011
Cs-134	0.000 ± 0.004	< 0.007		
Cs-137	0.000 ± 0.004	< 0.007		
Ba-La-140	-0.002 ± 0.004	< 0.007		
Ce-141	-0.001 ± 0.004	< 0.009		
Ce-144	-0.005 ± 0.018	< 0.023		

POINT BEACH NUCLEAR PLANT

Special Analyses

Air particulate and air iodine cartridges for gross beta and gamma emitting isotopes

Units = pCi/m^3

Location	ISFSI		ISFSI	
Collection Date	04-06-11		04-06-11	
Lab Code	EAP- 1702	MDC	ECH- 1703	MDC
Volume (m^3)	266.5		266.5	
Gross Beta	0.030 ± 0.004	< 0.003		
Be-7	0.079 ± 0.043	< 0.073		
Mn-54	0.004 ± 0.004	< 0.008		
Fe-59	-0.002 ± 0.008	< 0.009		
Co-58	-0.002 ± 0.004	< 0.004		
Co-60	-0.001 ± 0.006	< 0.008		
Zn-65	0.017 ± 0.010	< 0.010		
Zr-Nb-95	0.000 ± 0.004	< 0.004		
I-131	0.024 ± 0.011	< 0.024	0.054 ± 0.017	< 0.012
Cs-134	0.006 ± 0.004	< 0.006		
Cs-137	0.007 ± 0.005	< 0.006		
Ba-La-140	0.009 ± 0.006	< 0.007		
Ce-141	-0.002 ± 0.005	< 0.010		
Ce-144	0.011 ± 0.022	< 0.041		

Location	ISFSI		ISFSI	
Collection Date	04-14-11		04-14-11	
Lab Code	EAP- 2025	MDC	ECH- 2026	MDC
Volume (m^3)	338.6		338.6	
Gross Beta	0.023 ± 0.003	< 0.003		
Be-7	0.105 ± 0.056	-		
Mn-54	-0.004 # 0.004	< 0.006		
Fe-59	-0.004 # 0.007	< 0.008		
Co-58	0.001 ± 0.003	< 0.004		
Co-60	0.002 ± 0.004	< 0.004		
Zn-65	0.003 ± 0.007	< 0.005		
Zr-Nb-95	-0.002 ± 0.003	< 0.003		
I-131	0.003 ± 0.003	< 0.006	0.019 ± 0.009	< 0.007
Cs-134	0.017 ± 0.004	< 0.004		
Cs-137	0.005 ± 0.004	< 0.007		
Ba-La-140	0.002 ± 0.005	< 0.008		
Ce-141	-0.001 ± 0.004	< 0.007		
Ce-144	0.003 ± 0.017	< 0.027		

POINT BEACH NUCLEAR PLANT

Special Analyses

Air particulate and air iodine cartridges for gross beta and gamma emitting isotopes

Units = pCi/m^3

Location	ISFSI		ISFSI	
Collection Date	04-21-11		04-21-11	
Lab Code	EAP- 2299	MDC	ECH- 2298	MDC
Volume (m^3)	301.4		301.4	
Gross Beta	0.024 ± 0.003	< 0.003		
Be-7	0.123 ± 0.044	< 0.081		
Mn-54	0.000 ± 0.004	< 0.005		
Fe-59	-0.004 ± 0.007	< 0.008		
Co-58	0.001 ± 0.004	< 0.004		
Co-60	-0.001 ± 0.004	< 0.007		
Zn-65	-0.006 ± 0.009	< 0.009		
Zr-Nb-95	0.003 ± 0.004	< 0.007		
I-131	0.002 ± 0.004	< 0.008	0.007 ± 0.005	< 0.010
Cs-134	0.001 ± 0.004	< 0.007		
Cs-137	0.000 ± 0.004	< 0.008		
Ba-La-140	-0.001 ± 0.006	< 0.005		
Ce-141	-0.001 ± 0.005	< 0.010		
Ce-144	0.010 ± 0.022	< 0.036		

POINT BEACH NUCLEAR PLANT

Special Analyses

Precipitation samples

Units = pCi/L

Location	E-02		E-03		E-04	
Collection Date	04-06-11		04-06-11		04-06-11	
Lab Code	EP- 1706	MDC	EP- 1707	MDC	EP- 1708	MDC
Gross Beta	2.9 ± 1.9	< 3.6	1.9 ± 1.7	< 3.1	3.5 ± 1.9	< 3.5
Sr-90	-0.27 ± 0.56	< 1.28	-0.15 ± 0.69	< 1.53	-0.17 ± 0.49	< 1.11
H-3	48 ± 89	< 143	28 ± 88	< 143	72 ± 90	< 143
I-131	12.6 ± 1.6	< 13.6	13.6 ± 1.5	< 11.4	10.8 ± 1.5	< 11.2
Be-7	-7.4 ± 14.7	< 22.5	2.5 ± 11.0	< 30.5	11.4 ± 11.0	< 27.5
Mn-54	1.0 ± 1.5	< 3.5	0.6 ± 1.3	< 2.6	0.4 ± 1.3	< 2.4
Fe-59	0.3 ± 2.4	< 4.8	3.6 ± 2.3	< 5.8	-2.3 ± 2.5	< 4.1
Co-58	1.8 ± 1.4	< 2.5	-1.3 ± 1.2	< 1.6	-0.3 ± 1.2	< 2.6
Co-60	-0.6 ± 1.5	< 2.6	-0.1 ± 1.4	< 2.4	0.4 ± 1.5	< 2.7
Zn-65	-2.5 ± 2.9	< 4.4	0.5 ± 2.5	< 4.2	1.3 ± 2.5	< 4.7
Zr-Nb-95	0.3 ± 1.4	< 3.9	0.6 ± 1.4	< 3.8	-1.6 ± 1.4	< 2.5
Cs-134	-0.3 ± 1.5	< 2.8	-0.5 ± 1.4	< 1.8	0.4 ± 1.4	< 2.4
Cs-137	-0.4 ± 1.7	< 1.7	0.8 ± 1.4	< 2.7	-0.2 ± 1.5	< 2.5
Ba-La-140	-3.5 ± 1.5	< 5.3	-2.2 ± 1.5	< 4.5	-4.3 ± 1.4	< 4.0

Location	E-02		E-03		E-04	
Collection Date	04-19-11		04-19-11		04-19-11	
Lab Code	EP- 2229	MDC	EP- 2230	MDC	EP- 2231	MDC
Gross Beta	1.7 ± 1.6	< 3.1	2.8 ± 1.8	< 3.4	1.7 ± 0.6	< 0.8
Sr-90	-0.09 ± 0.25	< 0.56	-0.03 ± 0.31	< 0.67	-0.09 ± 0.33	< 0.75
H-3	174 ± 84	< 142	20 ± 76	< 142	12 ± 75	< 142
I-131	1.00 ± 0.18	< 0.24 [a]	1.23 ± 0.19	< 0.24 [a]	0.86 ± 0.27	< 0.37 [a]
Be-7	33.2 ± 20.2	< 37.7	11.9 ± 14.7	< 29.0	8.4 ± 14.7	< 29.3
Mn-54	-0.3 ± 1.4	< 2.4	0.0 ± 1.5	< 1.7	-0.4 ± 1.5	< 2.1
Fe-59	-0.4 ± 3.4	< 3.4	1.8 ± 3.4	< 4.6	-0.1 ± 2.9	< 4.2
Co-58	0.6 ± 1.8	< 3.0	-0.6 ± 1.3	< 1.6	-1.3 ± 1.6	< 1.3
Co-60	-1.7 ± 1.7	< 2.3	1.2 ± 1.3	< 1.5	1.9 ± 1.5	< 1.9
Zn-65	0.7 ± 3.8	< 6.8	-1.0 ± 3.4	< 3.7	0.5 ± 3.3	< 5.6
Zr-Nb-95	0.3 ± 1.7	< 3.3	-1.1 ± 1.8	< 3.1	-0.8 ± 1.7	< 3.1
Cs-134	0.5 ± 1.7	< 3.4	-0.6 ± 1.2	< 1.9	-0.6 ± 1.7	< 2.6
Cs-137	0.8 ± 2.0	< 3.2	0.7 ± 1.4	< 2.9	1.3 ± 1.6	< 2.4
Ba-La-140	0.1 ± 2.1	< 2.9	1.1 ± 2.1	< 3.3	-0.1 ± 1.8	< 2.7

[a] I-131 analyzed by column.

POINT BEACH NUCLEAR PLANT

Special Analyses

Precipitation samples Units = pCi/L

Location	E-02			E-03			E-04		
Collection Date	04-21-11			04-21-11			04-21-11		
Lab Code	EP- 2368	MDC		EP- 2369	MDC		EP- 2370	MDC	
Gross Beta	-0.5 ± 1.2	< 2.2		0.7 ± 1.1	< 1.6		1.5 ± 1.3	< 2.2	
Sr-90	0.03 ± 0.30	< 0.63		-0.22 ± 0.78	< 1.74		0.05 ± 0.27	< 0.58	
H-3	10 ± 88	< 144		-34 ± 86	< 144		70 ± 91	< 144	
I-131	0.10 ± 0.22	< 0.41	a	0.05 ± 0.53	< 0.78	a	1.23 ± 0.30	< 0.39	a
Be-7	-0.9 ± 17.9	< 32.1		34.1 ± 36.0	< 77.1		12.1 ± 19.7	< 38.4	
Mn-54	1.2 ± 1.9	< 3.4		-0.4 ± 3.4	< 4.9		-0.2 ± 1.7	< 2.7	
Fe-59	0.3 ± 3.7	< 3.3		0.4 ± 6.5	< 9.8		2.6 ± 3.4	< 5.0	
Co-58	-0.9 ± 2.0	< 3.0		1.4 ± 3.3	< 5.0		1.2 ± 1.8	< 3.1	
Co-60	0.1 ± 2.0	< 2.6		0.5 ± 4.0	< 4.0		1.0 ± 2.2	< 3.5	
Zn-65	-3.4 ± 4.6	< 3.9		6.4 ± 4.4	< 3.7		-1.8 ± 3.6	< 2.4	
Zr-Nb-95	-0.8 ± 2.0	< 3.4		-1.1 ± 3.9	< 4.4		-2.5 ± 1.9	< 2.1	
Cs-134	0.2 ± 2.1	< 3.3		3.6 ± 4.1	< 7.9		-0.8 ± 1.7	< 2.5	
Cs-137	0.0 ± 1.9	< 2.5		-2.1 ± 4.2	< 7.1		-0.8 ± 2.2	< 3.3	
Ba-La-140	0.3 ± 2.2	< 3.9		1.2 ± 3.6	< 4.2		1.5 ± 1.8	< 2.2	

Location	Composite of Onsite Samples			PBNP-3-12 Composite		
Collection Date	04-19-11			04-20-11		
Lab Code	EP- 2367	MDC		EP- 2492	MDC	
Gross Beta	8.8 ± 1.3	< 1.5		-0.4 ± 0.6	< 1.1	
H-3	410 ± 105	< 144				b
I-131	1.40 ± 0.78	< 1.09	a	0.90 ± 0.32	< 0.44	a
Be-7	52.9 ± 24.1	< 47.8		73.1 ± 30.3	-	
Mn-54	-0.9 ± 2.2	< 2.3		2.3 ± 1.4	< 2.4	
Fe-59	-3.3 ± 4.6	< 4.4		0.0 ± 2.6	< 2.9	
Co-58	0.9 ± 1.9	< 1.9		-1.6 ± 1.3	< 1.7	
Co-60	-0.6 ± 3.0	< 3.3		0.4 ± 1.5	< 2.0	
Zn-65	1.2 ± 4.1	< 4.8		-0.4 ± 2.3	< 2.3	
Zr-Nb-95	0.5 ± 2.3	< 4.1		-0.2 ± 1.4	< 2.7	
Cs-134	0.4 ± 2.7	< 3.4		0.1 ± 1.3	< 2.5	
Cs-137	4.2 ± 3.0	< 4.8		1.8 ± 1.5	< 2.9	
Ba-La-140	-2.8 ± 2.8	< 2.9		0.3 ± 1.7	< 2.9	

[a] I-131 analyzed by column.

[b] Tritium analysis not requested.

POINT BEACH NUCLEAR PLANT

Special Analyses

Precipitation samples

Units = pCi/L

Collection Date	Lab Code	Tritium	MDC	Location
04-11-11	EP- 2008	1670 ± 141	< 149	Precip 1
04-11-11	EP- 2009	1533 ± 137	< 149	Precip 2
04-11-11	EP- 2010	609 ± 105	< 149	Precip 3
04-11-11	EP- 2011	670 ± 108	< 149	Precip 4
04-11-11	EP- 2013	28 ± 70	< 73	Precip 5
04-11-11	EP- 2014	354 ± 95	< 149	Precip 6
04-11-11	EP- 2015	302 ± 93	< 149	Precip 7
04-11-11	EP- 2016	247 ± 90	< 149	Precip 8
04-11-11	EP- 2017	208 ± 89	< 149	Precip 9
04-11-11	EP- 2018	351 ± 95	< 149	Precip 10
04-11-11	EP- 2019	88 ± 83	< 149	Precip 11
04-11-11	EP- 2020	170 ± 87	< 149	Precip 12

Special Analyses

Lake water samples

Required LLD = 1E-06 μCi/mL

Units = pCi/L

Collection Date	Lab Code	carbon-14	Location
09-13-11	ELW- 6278	< 89	E-005
09-13-11	ELW- 6279	< 89	E-006

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Midwest Laboratory
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phone (847) 564-0700 • fax (847) 564-4517

Mr. Daniel Craine	LABORATORY REPORT NO.: 8006-100-972
Radiation Protection Mgr.	DATE: 04-15-11
Point Beach Nuclear Plant	SAMPLES RECEIVED: 04-08-11
NextEraEnergy	PURCHASE ORDER NO.:
6610 Nuclear Road	
Two Rivers, WI 54241	

Below are the results of the readout of supplemental TLDs deployed during the first quarter, 2011.

Period:	1st Quarter, 2011
Date Annealed:	12/13/10
Date Placed:	01/06/11
Date Removed:	04/05/11
Date Read:	04/13/11
Days in the Field:	89
Days from Annealing to Readout:	121
In-transit exposure:	4.78 ± 0.44

Location	Total mR	Net mR	Net mR per 7 days
SGSF-North	15.8 ± 0.7	11.0 ± 0.7	0.87 ± 0.06
SGSF-East	15.5 ± 0.7	10.7 ± 0.7	0.84 ± 0.07
SGSF-South	17.6 ± 0.4	12.9 ± 0.4	1.01 ± 0.05
SGSF-West	16.8 ± 1.0	12.0 ± 1.0	0.95 ± 0.08
ISFSI-North	35.6 ± 1.2	30.8 ± 1.2	2.42 ± 0.10
ISFSI-East	41.1 ± 1.3	36.3 ± 1.3	2.85 ± 0.11
ISFSI-South	20.8 ± 0.6	16.0 ± 0.6	1.26 ± 0.06
ISFSI-West	67.6 ± 0.7	62.8 ± 0.7	4.94 ± 0.07
Control	19.4 ± 0.8	14.6 ± 0.8	1.15 ± 0.09

SA Coorlim,
Quality Assurance

APPROVED

Bronia Grob, M. S.
Laboratory Manager

cc: K. Johansen

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700 Landwehr Road • Northbrook, IL 60062-2310
phone (847) 564-0700 • fax (847) 564-4517

Mr. Daniel Craine	LABORATORY REPORT NO.: 8006-100-990
Radiation Protection Mgr.	DATE: 08-04-11
Point Beach Nuclear Plant	SAMPLES RECEIVED: 07-11-11
NextEraEnergy	PURCHASE ORDER NO.:
6610 Nuclear Road	
Two Rivers, WI 54241	

Below are the results of the readout of supplemental TLDs deployed during the second quarter, 2011.

Period:	2nd Quarter, 2011
Date Annealed:	03/10/11
Date Placed:	04/05/11
Date Removed:	07/08/11
Date Read:	07/15/11
Days in the Field:	94
Days from Annealing to Readout:	127
In-transit exposure:	4.44 ± 0.37

Location	Total mR	Net mR	Net mR Std Qtr	Net mR per 7 days
SGSF-North	17.4 ± 0.5	12.9 ± 0.5	12.5 ± 0.6	0.96 ± 0.05
SGSF-East	18.0 ± 0.3	13.6 ± 0.3	13.2 ± 0.5	1.01 ± 0.03
SGSF-South	18.8 ± 0.4	14.4 ± 0.4	13.9 ± 0.5	1.07 ± 0.04
SGSF-West	20.3 ± 0.9	15.8 ± 0.9	15.3 ± 0.9	1.18 ± 0.07
ISFSI-North	37.4 ± 1.5	33.0 ± 1.5	31.9 ± 1.5	2.45 ± 0.11
ISFSI-East	41.6 ± 1.1	37.1 ± 1.1	36.0 ± 1.1	2.77 ± 0.09
ISFSI-South	23.0 ± 0.9	18.5 ± 0.9	17.9 ± 0.9	1.38 ± 0.07
ISFSI-West	66.6 ± 2.5	62.1 ± 2.5	60.2 ± 2.5	4.63 ± 0.19
Control	19.0 ± 1.3	14.6 ± 1.3	14.1 ± 1.3	1.08 ± 0.10

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Mr. Daniel Craine
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Point Beach Nuclear Plant
NextEraEnergy
6610 Nuclear Road
Two Rivers, WI 54241

LABORATORY REPORT NO.:	8006-100-999
DATE:	10-25-11
SAMPLES RECEIVED:	10-13-11
PURCHASE ORDER NO.:	

Below are the results of the readout of supplemental TLDs deployed during the third quarter, 2011.

Period:	3rd Quarter, 2011
Date Annealed:	06/03/11
Date Placed:	07/08/11
Date Removed:	10/07/11
Date Read:	10/19/11
Days in the Field:	91
Days from Annealing to Readout:	138
In-transit exposure:	7.5 ± 0.6

Location	Total mR	Net mR	Net mR Std Qtr	Net mR per 7 days
SGSF-North	18.4 ± 0.7	10.9 ± 1.0	10.9 ± 1.0	0.84 ± 0.07
SGSF-East	18.3 ± 1.0	10.8 ± 1.2	10.8 ± 1.2	0.83 ± 0.09
SGSF-South	20.7 ± 0.8	13.2 ± 1.0	13.2 ± 1.0	1.01 ± 0.08
SGSF-West	20.5 ± 0.7	13.0 ± 1.0	13.0 ± 1.0	1.00 ± 0.07
ISFSI-North	40.0 ± 0.9	32.5 ± 1.1	32.5 ± 1.1	2.50 ± 0.09
ISFSI-East	38.9 ± 1.0	31.5 ± 1.2	31.5 ± 1.2	2.42 ± 0.09
ISFSI-South	24.4 ± 0.4	16.9 ± 0.7	16.9 ± 0.7	1.30 ± 0.06
ISFSI-West	72.0 ± 3.7	64.5 ± 3.8	64.5 ± 3.8	4.96 ± 0.29
Control	20.4 ± 0.8	12.9 ± 1.0	12.9 ± 1.0	0.99 ± 0.08

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Quality Assurance

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Laboratory Manager

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REC'D NOV 02 2011

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Mr. Daniel Craine		LABORATORY REPORT NO.:	8006-100-1010
Radiation Protection Mgr.		DATE:	02-01-12
Point Beach Nuclear Plant		SAMPLES RECEIVED:	01-09-12
NextEraEnergy		PURCHASE ORDER NO.:	
6610 Nuclear Road			
Two Rivers, WI 54241			

Below are the results of the readout of supplemental TLDs deployed during the fourth quarter, 2011.

Period:	4th Quarter, 2011
Date Annealed:	09/16/11
Date Placed:	10/07/11
Date Removed:	01/06/12
Date Read:	01/12/12
Days in the Field:	90
Days from Annealing to Readout:	118
In-transit exposure:	5.01 ± 0.48

Location	Total mR	Net mR	Net mR Std Qtr	Net mR per 7 days
SGSF-North [a]	16.4 ± 1.0	11.4 ± 1.1	11.5 ± 1.1	0.89 ± 0.08
SGSF-East [a]	17.4 ± 0.2	12.4 ± 0.5	12.6 ± 0.5	0.97 ± 0.04
SGSF-South [a]	17.8 ± 0.6	12.8 ± 0.8	13.0 ± 0.8	1.00 ± 0.06
SGSF-West [a]	19.7 ± 0.8	14.7 ± 0.9	14.8 ± 1.0	1.14 ± 0.07
ISFSI-North	35.7 ± 1.7	30.9 ± 1.8	30.9 ± 1.8	2.38 ± 0.14
ISFSI-East	36.3 ± 1.3	31.5 ± 1.4	31.5 ± 1.4	2.42 ± 0.10
ISFSI-South	21.7 ± 1.0	16.9 ± 1.1	16.9 ± 1.1	1.30 ± 0.09
ISFSI-West	62.6 ± 2.8	57.8 ± 2.9	57.8 ± 2.9	4.45 ± 0.22
Control	16.8 ± 0.9	12.0 ± 1.0	12.0 ± 1.0	0.92 ± 0.08

[a] Date removed 01-05-12.

SA Coorlim,
Quality Assurance

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Bronia Grob, M. S.
Laboratory Manager

cc: K. Johansen

REC'D MAR 01 2012

APPENDIX 2

University of Waterloo (Ontario)
Environmental Isotope Laboratory
Precipitation Monitoring Results for the Point Beach Nuclear Plant
Reporting Period: January – December 2011

Client: Johansen
NextEra Energy Point Beach
Contract #: 25473
NPL 2011-0006

ISO# 2011032
Location: T-8
3 for 3H

Environmental Isotope Lab
7/6/2011

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ
	January 6, 2011						
1	E-02	252041	X	16.7	8.0		
2	E-03	252042	X	9.0	8.0		
3	E-04	252043	X	11.5	8.0	17.9	8.0

Conductivity

pCi/l
53.8
29.0
37.0

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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519 888 4567 ext 35838

To Contact uwEILAB:
519 888 4732

Client: Johansen
NextEra Energy Point Beach
Contract #: 25473
NPL 2011-0054

ISO# 2011130
Location: T-8
3 for 3H

Environmental Isotope Lab
3/19/2012

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ
	February 9, 2011						
1	E-02	254909	X	9.6	8.0		
2	E-03	254910	X	14.9	8.0		
3	E-04	254911	X	11.5	8.0		

Conductivity

pCi/l
30.9
48.0
37.0

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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To Contact uwEILAB:
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Client: Johansen
NextEra Energy Point Beach
Contract #25473
NPL 2011-0096

ISO# 2011182
Location: T-8
3 for 3H

Environmental Isotope Lab
3/21/2012

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ	pCi/l	Conductivity
	March 10, 2011								
1	E-02	256600	X	35.0	8.0			112.7	
2	E-03	256601	X	17.5	8.0			56.4	
3	E-04	256602	X	20.5	8.0			66.0	

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 2011-0107

ISO# 2011217
Location: T - 8
3 for 3H

Environmental Isotope Lab
3/21/2012

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ	Conductivity	pCi/l
	March 22, 2011								
1	E-02	257675	X	25.7	8.0				82.8
2	E-03	257676	X	32.2	8.0				103.7
3	E-04	257677	X	24.8	8.0				79.9

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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Contract #25473
NPL 2011-0111

ISO# 2011234
Location: T-8
3 for 3H

Environmental Isotope Lab
3/21/2012

#	Sample	Lab#	^{3}H	Result	± 1σ	Repeat	± 1σ
	March 25, 2011						
1	E-02	258473	X	7.9	8.0		
2	E-03	258474	X	16.9	8.0		
3	E-04	258475	X	22.9	8.0		

Conductivity	pCi/l
	25.4
	54.4
	73.8

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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Contract #: 25473
NPL 2011-0123

ISO# 2011264
Location: T - 8
3 for 3H

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ
	April 6, 2011						
1	E-02	259543	X	19.6	8.0		
2	E-03	259544	X	13.6	8.0		
3	E-04	259545	X	20.2	8.0	19.0	8.0

Conductivity

pCi/l
63.1
43.8
65.1

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 2011-0144

ISO# 2011295
Location: T - 8
3 for 3H

Environmental Isotope Lab
3/21/2012
1 of 1

#	Sample	Lab#	^3H	Result	± 1σ	Repeat
	April 19, 2011					
1	E-02	260365	X	36.8	8.0	
2	E-03	260366	X	23.6	8.0	
3	E-04	260367	X	<6.0	8.0	

Conductivity

pCi/l
118.5
76.0
0.0

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 2011-0153

ISO# 2011297
Location: T - 8
3 for 3H

Environmental Isotope Lab
3/21/2012

#	Sample	Lab#	^{3}H	Result	± 1σ
	April 21, 2011				
1	E-02	260379	X	24.3	8.0
2	E-03	260380	X	7.0	8.0
3	E-04	260381	X	8.3	8.0

Conductivity	pCi/l
	78.3
	22.5
	26.7

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
NextEra Energy Point Beach
Contrac t#25473
NPL 2011-0169

ISO# 2011339
Location: T - 8
3 for 3H

Environmental Isotope Lab
3/19/2012

#	Sample	Lab#	^3H	Result	± 1σ
	May 4, 2011				
1	E-02	261482	X	16.4	8.0
2	E-03	261483	X	15.1	8.0
3	E-04	261484	X	15.5	8.0

Conductivity	pCi/l
	52.8
	48.6
	49.9

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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NextEra Energy Point Beach
Contract #25473
NPL 2011-0214

ISO# 2011384
Location: T - 8
3 for 3H

Environmental Isotope Lab
3/19/2012

#	Sample	Lab#	3H	Result	± 1σ		pCi/l
	June 8, 2011						
1	E-02	262414	X	27.0	8.0		86.967
2	E-03	262415	X	<6.0	8.0	<	19.326
3	E-04	262416	X	<6.0	8.0	<	19.326

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
NextEra Energy Point Beach
Contract #: 25473
NPL 2011-0237

ISO# 2011465
Location: T - 8
3 for 3H

Environmental Isotope Lab
3/19/2012

#	Sample	Lab#	3H	Result	± 1σ	Result	± 1σ	pCi/l
	July 6, 2011							
1	E-02	265309	X	13.0	8.0			41.9
2	E-03	265310	X	<6.0	8.0			
3	E-04	265311	X	<6.0	8.0	<6.0	8.0	

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 2011-0290

ISO# 2011530
Location: T - 8
3 for 3H

Environmental Isotope Lab
3/19/2012

#	Sample	Lab#	3H	Result	± 1σ	Repeat	± 1σ
	August 10, 2011						
1	E-02	268079	X	<6.0	8.0		
2	E-03	268080	X	<6.0	8.0		
3	E-04	268081	X	<6.0	8.0		

AZD

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
NextEra Energy Point Beach
Contract #: 25473
NPL 2011-0312

ISO# 2011586
Location: T - 8
3 for 3H

Environmental Isotope Lab
3/19/2012

#	Sample	Lab#	3H	Result	± 1σ	Result	± 1σ	pCi/l
	September 7, 2011							
1	E-02	269915	X	9.0	8.0			29.0
2	E-03	269916	X	7.9	8.0			25.4
3	E-04	269917	X	<6.0	8.0	<6.0	8.0	

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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NextEra Energy Point Beach
Contract #25473
NPL 2011-0343

ISO# 2011639
Location: T-8
3 for 3H

Environmental Isotope Lab
3/19/2012

#	Sample	Lab#	^{3}H	Result	± 1σ	Repeat	± 1σ
	October 5, 2011						
1	E-02	270971	X	9.2	8.0		
2	E-03	270972	X	8.7	8.0		
3	E-04	270973	X	<6.0	8.0		

pCi/l
29.6
28.0

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
Nextera Energy Point Beach
Contract #25473
NPL 2011-0398

ISO# 2011733
Location: T-2
3 for 3H

Environmental Isotope Lab
3/20/2012

#	Sample	Lab#	3H	Result	± 1σ	Repeat	± 1σ	pCi/l	± 1σ
	11-Nov-11								
1	E-02 (SBCC Rain Water)	273954	X	10.9	8.0			35.1	25.8
2	E-03 (Tapawingo Rd West of Lakeshore Rd)	273955	X	<6.0	8.0			<19.3	
3	E-04 (North Boundary)	273956	X	<6.0	8.0			<19.3	

Rainwater samples

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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Conctract #25473
NPL 2011-0426

ISO# 2011796
Location: T-8
3 for 3H

Environmental Isotope Lab
3/20/2012

#	Sample	Lab#	3H	Result	± 1σ	Repeat	± 1σ	pCi/l	± 1σ
	December 12, 2011								
1	E-02	276407	X	14.8	8.0			47.7	25.8
2	E-03	276408	X	<6.0	8.0			<19.3	
3	E-04	276409	X	7.1	8.0			22.9	25.8

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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Contract #25473
NPL 2012-009

ISO# 2012012
Location: T-8
3 for 3H

Environmental Isotope Lab
3/19/2012

#	Sample	Lab#	3H	Result	± 1σ	Repeat	± 1σ
	January 4, 2012						
1	E-02	277353	X	<6.0	8.0		
2	E-03	277354	X	<6.0	8.0		
3	E-04	277355	X	<6.0	8.0		

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 Ponit Peach
Contract #: 25473
NPL.2010-0412

ISO# 2010748
Location:
12 for 3H

Environmental Isotope Lab
12/7/2010

#	Sample	Lab#	^{3}H	Result	± 1σ	Repeat	± 1σ
	November 15, 2010						
1	Precip 1	249388	X	45.5	8.0	43.5	8.0
2	Precip 2	249389	X	45.9	8.0		
3	Precip 3	249390	X	29.0	8.0		
4	Precip 4	249391	X	124.4	8.0		
5	Precip 5	249392	X	71.5	8.0		
6	Precip 6	249393	X	39.8	8.0		
7	Precip 7	249394	X	35.6	8.0		
8	Precip 8	249395	X	31.7	8.0		
9	Precip 9	249396	X	67.2	8.0		
10	Precip 10	249397	X	85.8	8.0		
11	Precip 11	249398	X	52.3	8.0		
12	Precip 12	249399	X	11.7	8.0		

pCi/l

~~Conductivity~~
147
148
93
401
230
128
115
112
217
276
169
38

Client's Note:
We expect that some samples will have more H-3 than previous rain water samples, on the order of 400 - 800 T.U.

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
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Contract #25473
NPL 2011-0150

ISO# 2011324
Location: T - 8
13 for 3H

Environmental Isotope Lab
4/27/2012

#	Sample	Lab#	^{3}H	Result	± 1σ	Repeat	± 1σ	Conductivity	pCi/l
	April 20, 2011								
1	PBNP-1	260988	X	18.7	8.0				60.2
2	PBNP-2	260989	X	18.1	8.0				58.3
3	PBNP-3	260990	X	12.0	8.0				38.7
4	PBNP-4	260991	X	10.9	8.0				35.1
5	PBNP-5	260992	X	660.2	8.0				2126.5
6	PBNP-6	260993	X	255.0	8.0				821.4
7	PBNP-7	260994	X	10.2	8.0				32.9
8	PBNP-8	260995	X	17.7	8.0				57.0
9	PBNP-9	260996	X	55.8	8.0				179.7
10	PBNP-10	260997	X	103.2	8.0				332.4
11	PBNP-11	260998	X	35.4	8.0				114.0
12	PBNP-11*	260999	X	37.6	8.0				121.1
13	PBNP-12	261000	X	25.7	8.0	34.4	8.0		82.8

*sample taken 04/11/11

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 2011-0145

ISO# 2011296
Location: T - 8
11 for 3H

Environmental Isotope Lab
4/27/2012

#	Sample	Lab#	^{3}H	Result	± 1σ	Conductivity	pCi/l
	April 19, 2011						
1	Precip 1	260368	X	16.6	8.0		53.5
2	Precip 3	260369	X	21.7	8.0		69.9
3	Precip 4	260370	X	89.2	8.0		287.3
4	Precip 5	260371	X	683.2	8.0		2200.6
5	Precip 6	260372	X	243.9	8.0		785.6
6	Precip 7	260373	X	222.5	8.0		716.7
7	Precip 8	260374	X	159.6	8.0		514.1
8	Precip 9	260375	X	97.9	8.0		315.3
9	Precip 10	260376	X	267.9	8.0		862.9
10	Precip 11	260377	X	74.9	8.0		241.3
11	Precip 12	260378	X	40.4	8.0		130.1

Tritium is reported in Tritium Units.
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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 23
MARCH 30, 2011

34 pages follow

EM

ENVIRONMENTAL MANUAL

DOCUMENT TYPE:	Controlled Reference
CLASSIFICATION:	N/A
REVISION:	23
EFFECTIVE DATE:	March 30, 2011
REVIEWER:	Plant Operations Review Committee (PORC)
APPROVAL AUTHORITY:	Plant Manager (PORC Chair)
PROCEDURE OWNER (title):	Group Head
OWNER GROUP:	Chemistry

TABLE OF CONTENTS

1.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ADMINISTRATION

1.1 Definition and Basis

1.1.1 Definition

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

1.1.2 Basis

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

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

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

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

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

1.2 Responsibilities for Program Implementation

1.2.1 Chemistry Functions

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

a. Program scope

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

b. Record keeping

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

c. Data monitoring

Chemistry reviews the monthly analytical results from the vendor. Trends, if any, are noted. Any resulting corrections, modifications and additions to the data are made by Chemistry . The review is documented and sent to records, as noted in Section 1.2.1.b. Inconsistencies are investigated by Chemistry with the cooperation of Radiation Protection (RP) and contractor personnel, as required. Radioactivity levels in excess of administrative notification levels would be evaluated and notifications made, as appropriate, in accordance with 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 ≤1000 grams; and fish ≥1000 grams;

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

f. Name of person collecting the sample.

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

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

2.2.8 Sample shipping

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

2.2.9 Sample analyses and frequency

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

2.2.10 Analytical laboratory

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

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

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

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

2.3 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, flow meter readings at the beginning and ending of the sampling period should be nearly identical. Substantial differences in readings usually require some investigation to determine the cause. The flow meter attached to the pumps are calibrated in liters per minute. When new filters are installed, flow rate should be about 28-30 lpm. Flow rates less than 26 lpm or greater than 32 lpm require that the pump regulator be readjusted.

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

NOTE: Environmental flow rates should be approximately 30 lpm.

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

1. Ensure unit is in flow mode.

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

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

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

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

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

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

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

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

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

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

9. Install new charcoal cartridge and particulate filter.

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

11. Press the RESET button to zero the time.

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

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

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

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

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

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

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

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

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

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

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

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

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

b. Air sampling system description

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

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

c. Calibration

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

d. Inspection and maintenance

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

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

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

e. Pump repair and replacement

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

2.4.6 Milk

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

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

The following sequence should be followed:

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

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

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

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

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

2.4.7 Algae

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

2.4.8 Fish

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

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

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

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

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

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

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

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

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

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

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

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

2.4.9 Soil

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

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

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

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

2.4.10 Shoreline Sediment

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

2.5 Milk Survey

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

TABLE 2-1
RECOMMENDED MINIMUM SAMPLE SIZES

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

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

SAMPLE TYPE	REPORTING UNIT	PARAMETER	LLD[a]	NOTIFICATION LEVELS NRC (Regulatory)	NOTIFICATION LEVELS PBNP[b] (Admin.)	WEIGHTED SUM ACTION LEVEL
Vegetation	pCi/g wet	Gross Beta	0.25	---	60	---
		Cs-137	0.08	2	0.40	0.50
		Cs-134	0.06	1	0.20	0.25
		I-131	0.06	0.1	0.06	0.06
		Other[c]	0.25	---	2.0	---
Shoreline Sediment and Soil	pCi/g dry	Gross Beta	2.0	---	100	---
		Cs-137	0.15	---	20	---
		Other[c]	0.15	---	20	---
Algae	pCi/g wet	Gross Beta	0.25	---	12	---
		Cs-137	0.25	10	1	2.5
		Cs-134	0.25	10	1	2.5
		Co-58	0.25	10	1	2.5
		Co-60	0.25	10	1	2.5
		Other[c]	0.25	---	1	---
Fish	pCi/g wet	Gross Beta	0.5	---	125	---
		Cs-137	0.15	2	0.40	0.50
		Cs-134	0.13	1	0.20	0.25
		Co-58	0.13	30	3	7.5
		Co-60	0.13	10	1	2.5
		Mn-54	0.13	30	3	7.5
		Fe-59	0.26	10	1	2.5
		Zn-65	0.26	20	2	5.0
		Other[c]	0.5	---	6	---
TLDs	mR/7 days	Gamma Exposure	1mR/TLD	---	5mR/7 days	---
Lakewater[c] 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

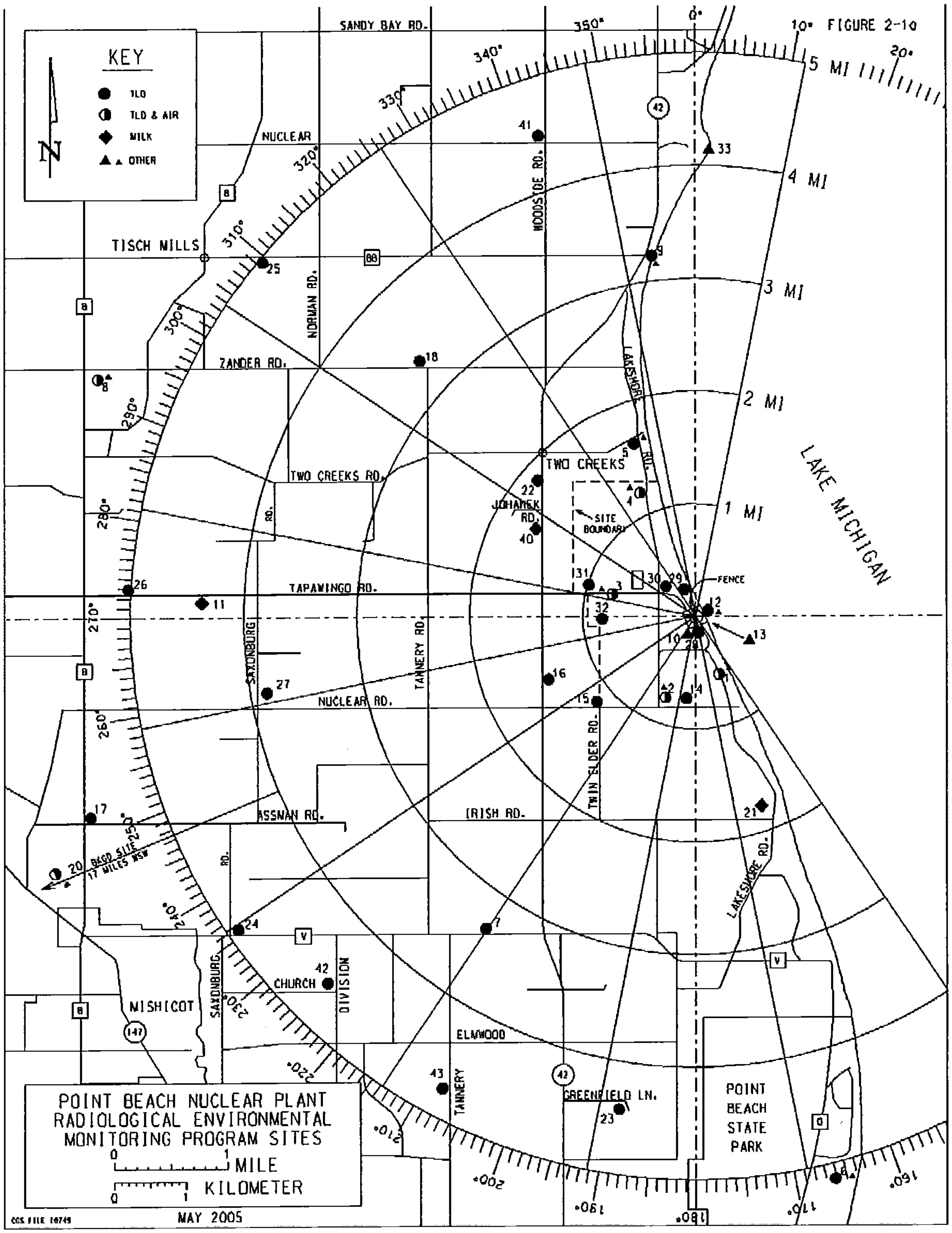
TABLE 2-4
PBNP RADIOLOGICAL ENVIRONMENTAL SAMPLE COLLECTION AND ANALYSIS FREQUENCY

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



 INFORMATION USE

FIGURE 2-1b
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

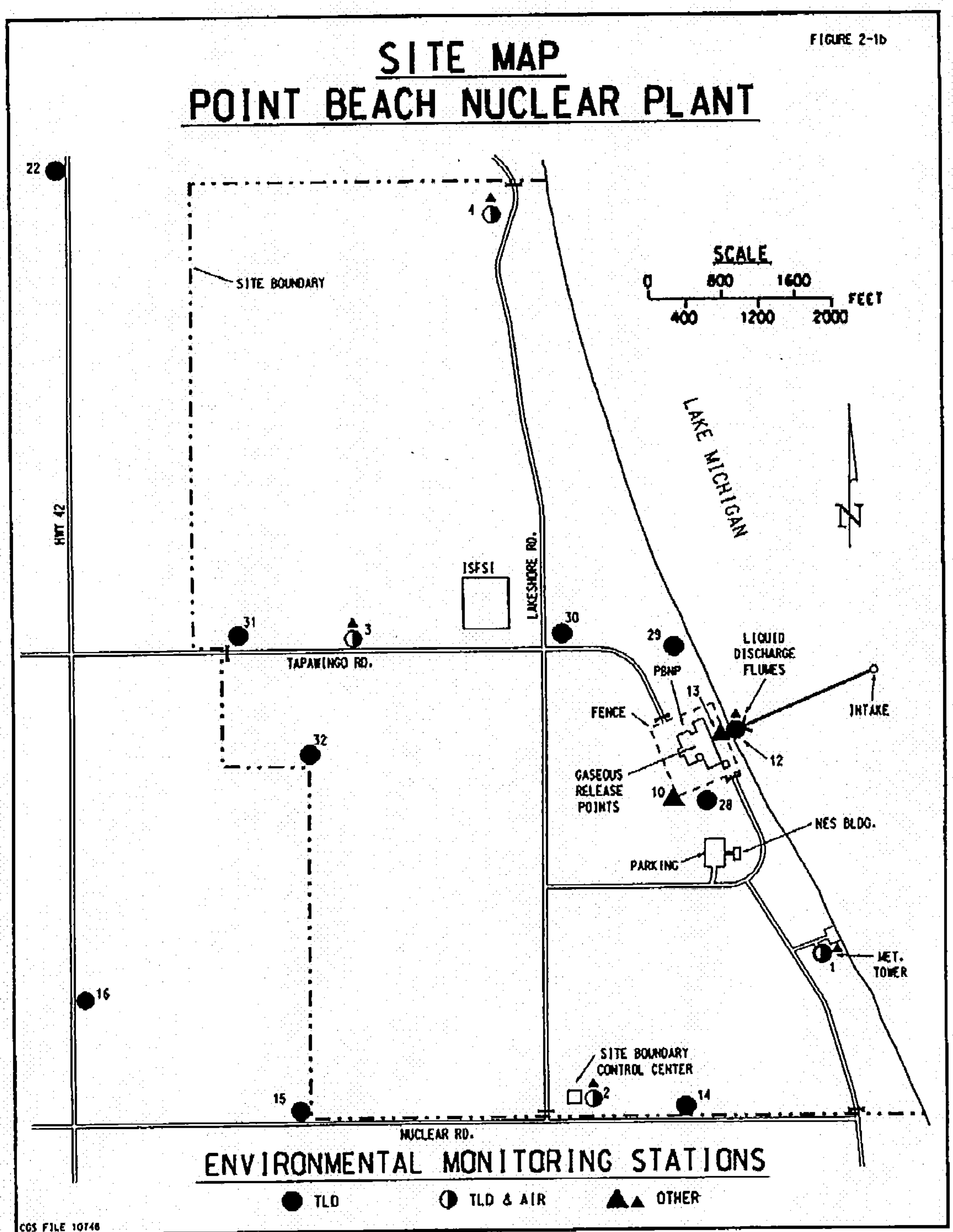


FIGURE 2-1c
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS