NEXTera ENERGY
POINT BEACH

April 30, 2010

NRC 2010-0062
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

2009 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, 2009.

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 2009. 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 May 2009. Enclosure 3 contains the PBNP Radiological Effluent Control Manual, which was revised in January 2009.

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

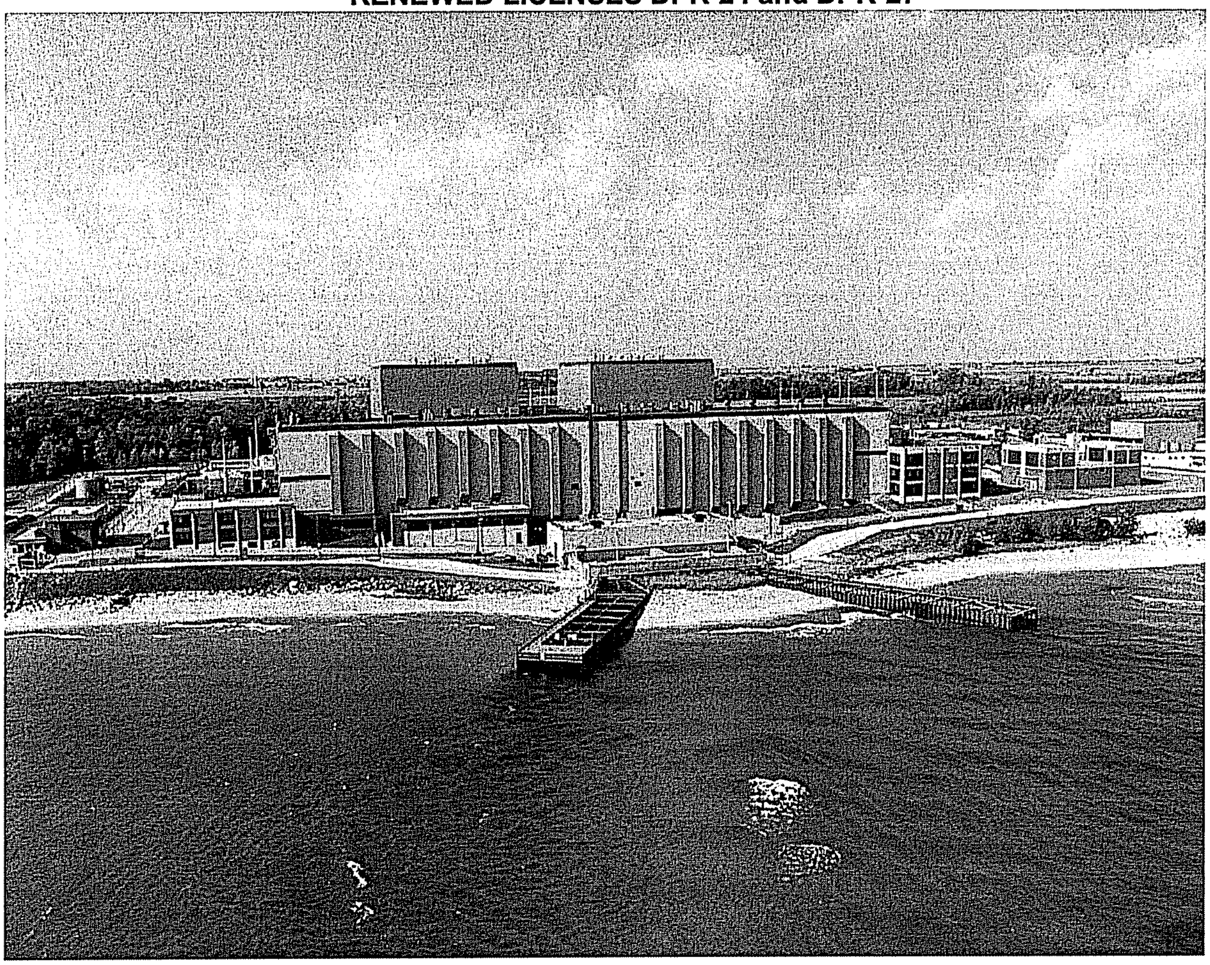
cc: Administrator, Region III, USNRC
Project Manager, Point Beach Nuclear Plant, USNRC
Resident Inspector, Point Beach Nuclear Plant, USNRC
PSCW
American Nuclear Insurers
WI Division of Public Health, Radiation Protection Section

ENCLOSURE 1

ANNUAL MONITORING REPORT 2009

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, 2009 through December 31, 2009

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SUMMARY

The Annual Monitoring Report for the period from January 1, 2009, through December 31, 2009, 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 2009, the following Curies (Ci) of radioactive material were released via the liquid and atmospheric pathways:

	Liquid	Atmospheric
Tritium (Ci)	637	81.6
[1]Particulate (Ci)	0.097	0.00050
Noble Gas (Ci)	(-)	1.040

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

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	0.00602 mrem	6 mrem
Organ dose	0.00701 mrem	20 mrem

ATMOSPHERIC RELEASES

Dose Category	Calculated Dose	Appendix I Dose
Organ dose	0.0321 mrem	30 mrem
Noble gas beta air dose	0.00016 mrad	40 mrad
Noble gas gamma ray air dose	0.00041 mrad	20 mrad
Noble gas dose to the skin	0.00059 mrem	30 mrem
Noble gas dose to the whole body	0.00039 mrem	10 mrem

The results show that during 2009, the doses from PBNP effluents were a small percentage (0.11% at the most) of the Appendix I design objectives. Therefore, operation of PBNP continues to be ALARA.

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

The 2009 Radiological Environmental Monitoring Program (REMP) collected 814 samples for radiological analyses and 124 sets of thermoluminescent dosimeters (TLDs) to measure ambient radiation in the vicinity of PBNP and the ISFSI. Air monitoring from six different sites showed only background radioactivity from naturally occurring radionuclides. Terrestrial monitoring consisting of soil, vegetation and milk found no influence from PBNP. Similarly, samples from the aquatic environment, consisting of lake and well water, fish and algae revealed no buildup of PBNP radionuclides released in liquid effluents. Therefore, the data show no plant effect on its environs.

There were five (5) NUHOMS® dry storage units added to the ISFSI in 2009. The total number is now 30 dry storage casks. Sixteen are the ventilated, vertical storage casks (VSC-24) and fourteen (14) are the 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 2009 confirmed that the effluent control program at PBNP ensured a minimal impact on the environment.

Part A
EFFLUENT MONITORING

1.0 INTRODUCTION

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

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

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

A General License was granted pursuant to 10 CFR 72.210, for an Independent Spent Fuel Storage Installation (ISFSI). The 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. Per 10 CFR 72.44(d) (3), the results of radiological effluent monitoring are to be reported annually.* 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

* Holders of a Part 72 license are allowed to submit the report required by 72.44(d)(3) concurrent with the effluent report required by 10 CFR 50.36a (a)(2). (Reference: 64 FR 33178)

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 2009 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)	0.00602	0.100 %
20 (any organ)	0.00701	0.035 %

2.2 2009 Circulating Water Radionuclide Release Summary

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

2.3 2009 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 isotopic distribution shows slight change from 2008, with tritium up from 2008 but similar to 2006. Tritium continues to be the major radionuclide released via liquid discharges.

2.4 Beach Drain System Releases Tritium Summary

Beach drains is the term used to describe the point at which the site yard drainage system empties onto the shore of the lake. Six of the drains carry yard and roof drain off 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 2009, no tritium was observed in any of the beach drains at the effluent LLDs used to detect and quantify tritium released from discreet volumes such as hold up tanks and waste distillate tanks.

Because these drains are subject to ground water inleakage, they are sampled as part of the ground water monitoring program. These beach drain results and other groundwater monitoring results are presented in Part D of this Annual Monitoring Report. One of these drains receives water from a groundwater sump under the plant. Others receive yard runoff or roof drainage. The southern most drain was added in May of 2009. This drain carries no roof or yard drainage. It was added to the beach drain sampling program to check on rain from a small, grassy area on the bluff overlooking the beach.

Table 2-2
Summary of Circulating Water Discharge
January 1, 2009 through December 31, 2009

	Jan	Feb	Mar	Apr	May	Jun	Total Jan-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total
Total Activity Released (Ci)														
Gamma Scan (+Fe-55)	5.22E-04	3.58E-03	9.95E-04	4.57E-03	5.70E-03	1.68E-02	3.22E-02	1.94E-02	1.04E-03	2.25E-03	8.74E-04	2.44E-03	3.83E-02	9.65E-02
Gross Alpha	2.31E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-07	2.02E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-06
Tritium	8.37E+00	1.60E+01	2.43E+01	5.49E+01	3.16E+01	1.06E+02	2.41E+02	1.60E+02	1.81E+01	7.85E+01	5.93E+01	6.18E+01	1.77E+01	6.37E+02
Strontium (89/90/92)	7.69E-05	0.00E+00	0.00E+00	4.29E-07	7.79E-06	7.02E-06	9.21E-05	4.28E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-06	9.82E-05
Total Vol Released (gal)														
Processed Waste	8.04E+03	3.16E+04	1.69E+04	2.22E+04	1.47E+05	7.42E+04	3.00E+05	8.07E+04	3.94E+04	9.05E+04	8.87E+04	1.36E+05	9.65E+04	8.32E+05
Waste Water Effluent*	3.44E+06	3.83E+06	4.08E+06	3.10E+06	2.74E+06	2.63E+06	1.98E+07	2.06E+06	2.26E+06	2.41E+06	3.79E+06	3.40E+06	3.16E+07	6.53E+07
U1 SG Blowdown	3.81E+06	2.73E+06	2.61E+06	2.59E+06	2.64E+06	2.53E+06	1.69E+07	2.59E+06	2.68E+06	2.88E+06	2.47E+06	2.58E+06	2.54E+06	3.27E+07
U2 SG Blowdown	2.52E+06	2.39E+06	2.57E+06	2.53E+06	2.54E+06	2.33E+06	1.49E+07	2.59E+06	2.59E+06	2.55E+06	1.09E+06	0.00E+00	4.17E+06	2.79E+07
Total Gallons	9.78E+06	8.99E+06	9.28E+06	8.25E+06	8.07E+06	7.56E+06	5.19E+07	7.32E+06	7.56E+06	7.93E+06	7.44E+06	6.12E+06	3.84E+07	1.27E+08
Total cc	3.70E+10	3.40E+10	3.51E+10	3.12E+10	3.05E+10	2.86E+10	1.97E+11	2.77E+10	2.86E+10	3.00E+10	2.82E+10	2.31E+10	1.45E+11	4.80E+11
Dilution vol(cc)**	6.62E+13	5.98E+13	6.62E+13	9.09E+13	1.08E+14	1.11E+14	5.02E+14	1.14E+14	1.15E+14	1.11E+14	8.48E+13	5.63E+13	8.31E+13	1.07E+15
Avg diluted discharge conc (µCi/cc)														
Gamma Scan (+Fe-55)	7.89E-12	5.99E-11	1.50E-11	5.03E-11	5.28E-11	1.51E-10		1.70E-10	9.04E-12	2.03E-11	1.03E-11	4.33E-11	4.61E-10	
Gross Alpha	3.49E-15	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	1.26E-07	2.68E-07	3.67E-07	6.04E-07	2.93E-07	9.53E-07		1.40E-06	1.58E-07	7.06E-07	7.00E-07	1.10E-06	2.13E-07	
Strontium (89/90/92)	1.16E-12	0.00E+00	0.00E+00	4.72E-15	7.21E-14	6.32E-14		3.74E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.12E-14	
Max Batch Discharge Conc (µCi/cc)														
Tritium	1.69E-05	2.12E-05	2.37E-05	2.18E-05	1.39E-05	2.10E-05		4.09E-05	1.80E-05	1.76E-05	2.49E-05	4.87E-05	1.40E-05	
Gamma Scan	5.88E-10	2.74E-09	8.36E-10	1.05E-09	1.54E-09	5.15E-09		6.63E-09	2.50E-10	4.27E-10	2.59E-10	1.67E-09	2.86E-08	

* The waste water effluent system replaced the Retention Pond which was taken out of service in September 2002.
** 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, 2009 through December 31, 2009

							Total							Total
Nuclide	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jan-Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan-Dec**
H-3	8.37E+00	1.60E+01	2.43E+01	5.49E+01	3.16E+01	1.06E+02	2.41E+02	1.60E+02	1.81E+01	7.85E+01	5.93E+01	6.18E+01	1.77E+01	6.37E+02
F-18	1.19E-04	2.06E-04	3.04E-04	4.14E-04	1.56E-04	3.14E-04	1.51E-03	3.43E-04	3.57E-04	4.88E-05	4.72E-04	1.72E-04	9.04E-04	3.81E-03
Cr-51	0.00E+00	6.56E-05	0.00E+00	0.00E+00	4.24E-06	1.56E-04	2.26E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.86E-05	8.35E-03	8.63E-03
Mn-54	9.37E-06	1.78E-05	1.11E-05	2.78E-05	6.16E-06	7.32E-05	1.45E-04	1.25E-04	3.57E-06	2.75E-06	7.69E-06	0.00E+00	6.26E-04	9.10E-04
Fe-55	0.00E+00	2.27E-04	0.00E+00	1.94E-04	2.78E-03	5.05E-04	3.71E-03	9.16E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.62E-03
Fe-59	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-04	1.49E-04
Co-57	0.00E+00	2.50E-06	2.64E-06	5.66E-06	1.39E-06	6.49E-06	1.87E-05	4.08E-05	0.00E+00	3.71E-06	0.00E+00	9.42E-07	2.72E-05	9.13E-05
Co-58	2.34E-04	5.97E-04	5.83E-04	7.12E-04	5.14E-04	8.42E-04	3.48E-03	3.35E-03	4.26E-05	1.42E-04	4.59E-05	4.45E-04	6.05E-03	1.36E-02
Co-60	4.08E-05	1.81E-04	8.50E-05	5.60E-04	4.30E-04	7.13E-04	2.01E-03	2.66E-03	2.41E-04	1.84E-04	1.48E-04	2.43E-04	1.62E-02	2.17E-02
Zn-65	0.00E+00	0.00E+00	0.00E+00	1.51E-05	0.00E+00	0.00E+00	1.51E-05	4.06E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.31E-04	3.50E-04
As-76	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.33E-05	0.00E+00	0.00E+00	9.33E-05
Sr-89	7.69E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.69E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.69E-05
Sr-90	0.00E+00	0.00E+00	0.00E+00	4.29E-07	7.79E-06	7.02E-06	1.52E-05	4.28E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E-05
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	1.76E-06	1.76E-06
Nb-95	0.00E+00	2.89E-05	0.00E+00	5.00E-05	0.00E+00	0.00E+00	7.89E-05	6.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.49E-03	1.57E-03
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	1.63E-06	0.00E+00	4.73E-06	0.00E+00	6.36E-06
Zr-95	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.17E-04	8.17E-04
Ag-110m	5.81E-06	8.85E-05	9.48E-06	3.15E-04	7.19E-05	1.51E-04	6.42E-04	7.68E-05	1.05E-05	3.05E-06	5.82E-05	1.19E-05	2.60E-04	1.06E-03
Sn-113	0.00E+00	1.75E-05	0.00E+00	3.66E-05	0.00E+00	0.00E+00	5.41E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.80E-04	4.34E-04
Sn-117m	1.68E-06	1.75E-04	0.00E+00	8.92E-05	2.27E-06	9.25E-06	2.77E-04	2.15E-05	1.09E-05	3.99E-05	2.83E-05	1.46E-03	1.84E-03	3.68E-03
Sb-122	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.66E-07	0.00E+00	0.00E+00	5.66E-07
Sb-124	0.00E+00	7.84E-05	0.00E+00	0.00E+00	4.80E-05	2.22E-04	3.48E-04	1.95E-05	0.00E+00	0.00E+00	0.00E+00	1.47E-05	3.76E-04	7.59E-04
Sb-125	0.00E+00	1.30E-03	0.00E+00	1.20E-03	8.44E-04	4.30E-03	7.64E-03	7.23E-04	4.27E-05	3.95E-05	1.23E-05	2.07E-05	4.18E-04	8.90E-03
I-131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-132	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-136	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.67E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.67E-06
Cs-137	0.00E+00	1.50E-04	0.00E+00	1.63E-04	2.63E-05	7.95E-04	1.13E-03	1.23E-03	3.55E-05	3.30E-05	7.61E-06	3.84E-06	1.63E-06	2.45E-03
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
Te-131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Na-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.58E-06	5.58E-06
Ni-63	3.35E-05	3.23E-04	4.74E-05	6.82E-04	7.79E-04	1.49E-03	3.35E-03	5.19E-03	1.16E-04	5.48E-04	1.28E-04	1.65E-04	4.38E-04	9.94E-03
Tc-99	1.10E-06	1.20E-04	2.56E-06	3.28E-05	3.00E-05	2.08E-04	3.94E-04	8.55E-05	2.24E-06	4.11E-06	8.39E-06	9.29E-06	1.42E-04	6.46E-04
C-14	-	-	-	7.66E-05	0.00E+00	7.02E-03	7.10E-03	4.58E-03	1.79E-04	1.20E-03	2.11E-04	1.50E-03	0.00E+00	1.48E-02

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, 2009, through December 31, 2009

	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)	1.12E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2nd Qtr							
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	7.62E+05	2.40E+05	0.00E+00	2.16E+04	2.07E+03	6.91E+01	1.44E+04
3rd Qtr							
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	9.04E+04	4.82E+04	0.00E+00	0.00E+00	0.00E+00	8.64E+02	1.33E+04
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)	7.11E+05	2.04E+05	0.00E+00	0.00E+00	1.41E+05	0.00E+00	1.57E+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 requires analyses prior to every disposal. Based upon an investigation of the source of the radionuclides, a combination of engineering modifications and administrative controls has 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. Sludge is routinely monitored and no radionuclides attributable to PBNP have been found.

There was no disposal of sewage by land application during 2009. All disposals were done at the Manitowoc Sewage Treatment Plant.

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 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 2009 are summarized in Table 3-2. Noble gases are similar to 2008 totals but airborne tritium is seventeen curies higher.

3.3 Isotopic Airborne Releases

The monthly isotopic airborne releases for 2009, from which the airborne doses were calculated, are presented in Table 3-3. When both the equipment hatch and the Elevation 66' hatch are open during an outage, there is a measurable, convective flow out the upper hatch. Because this air is not filtered, whatever is measured in containment air (particulates, tritium, noble gases, radioiodine) is assumed to be carried out the hatch, through the façade, and into the environment thereby contributing to the effluent and the calculated dose.

Table 3-1
Comparison of 2009 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	0.0321 mrem	0.107
Noble gas	40 mrad (beta air)	0.00016 mrad	0.0004
Noble gas	20 mrad (gamma air)	0.00041 mrad	0.0020
Noble gas	30 mrem/skin	0.00059 mrem	0.0020
Noble gas	10 mrem (whole body)	0.00039 mrem	0.0039

Table 3-2
Radioactive Airborne Effluent Release Summary
January 1, 2009, through December 31, 2009

							Total							
	Jan	Feb	Mar	Apr	May	Jun	J-Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total NG from Liq (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.70E-06	3.70E-06	3.88E-04	5.00E-04	9.23E-04	6.47E-04	7.01E-03	1.89E-03	1.14E-02
Total Noble Gas (Ci)1	7.29E-02	5.51E-02	1.05E-01	5.66E-02	1.72E-01	1.11E-01	5.73E-01	1.25E-01	6.53E-02	5.89E-02	5.00E-02	2.74E-02	1.44E-01	1.04E+00
Total Radioiodines (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.17E-07	3.17E-07	0.00E+00	0.00E+00	0.00E+00	2.21E-07	0.00E+00	0.00E+00	5.38E-07
Total Particulate (Ci)2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-06	9.47E-07	3.55E-06	0.00E+00	0.00E+00	0.00E+00	6.84E-07	5.69E-06	0.00E+00	9.92E-06
Alpha (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Strontium(Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
All other beta + gamma (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-06	9.47E-07	3.55E-06	0.00E+00	0.00E+00	0.00E+00	6.84E-07	5.69E-06	0.00E+00	9.92E-06
Total Tritium (Ci)	6.38E+00	8.67E+00	1.10E+01	8.71E+00	5.08E+00	4.74E+00	4.46E+01	3.76E+00	2.44E+00	4.53E+00	1.19E+01	7.94E+00	6.47E+00	8.16E+01
Max NG H'rly Rel.(Ci/sec)	5.01E-07	1.33E-07	5.39E-07	3.02E-07	7.27E-07	4.22E-08		9.19E-07	4.74E-08	4.96E-08	6.30E-07	6.58E-07	6.20E-07	

[1] Total noble gas (airborne + liquid releases).
[2] Total Particulate is the sum of alpha, strontium, and others. It does not include radioiodines or F-18. F-18 and other airborne particulates with half-lives <8 days do not to be considered for dose calculations. Airborne radioiodines only include I-131 and I-133.

TABLE 3-3
Isotopic Composition of Airborne Releases
January 1, 2009, through December 31, 2009

	Jan	Feb	Mar	Apr	May	Jun	Semi-	Jul	Aug	Sep	Oct	Nov	Dec	Total
Nuclide	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	**Annual**	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)
H-3	6.38E+00	8.67E+00	1.10E+01	8.71E+00	5.08E+00	4.74E+00	4.46E+01	3.76E+00	2.44E+00	4.53E+00	1.19E+01	7.94E+00	6.47E+00	8.16E+01
Ar-41	5.81E-02	5.18E-02	7.60E-02	5.30E-02	1.15E-01	8.52E-02	4.39E-01	8.11E-02	5.43E-02	5.15E-02	3.67E-02	1.46E-02	8.96E-02	7.67E-01
Kr-85	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.66E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.66E-03
Kr-85m	4.89E-04	1.22E-04	9.93E-04	8.85E-05	1.98E-03	7.76E-04	4.45E-03	1.11E-03	4.67E-05	0.00E+00	3.06E-04	1.41E-04	1.55E-03	7.60E-03
Kr-87	1.29E-03	2.26E-04	2.58E-03	2.14E-04	5.06E-03	2.04E-03	1.14E-02	2.56E-03	1.08E-04	0.00E+00	7.37E-04	3.17E-04	3.49E-03	1.86E-02
Kr-88	1.28E-03	2.19E-04	2.53E-03	2.09E-04	4.74E-03	1.86E-03	1.08E-02	2.61E-03	1.18E-04	0.00E+00	7.22E-04	3.21E-04	3.43E-03	1.80E-02
Xe-131m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.73E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.31E-04	8.04E-04
Xe-133	2.61E-04	3.67E-04	7.00E-04	1.12E-03	3.32E-03	3.28E-03	9.05E-03	5.06E-03	9.65E-03	7.39E-03	3.69E-03	7.59E-03	1.19E-02	5.43E-02
Xe-133m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.47E-04	5.47E-04	1.79E-04	3.57E-05	0.00E+00	5.21E-05	6.76E-05	5.89E-05	9.40E-04
Xe-135	2.45E-03	4.16E-04	4.88E-03	5.06E-04	9.65E-03	3.82E-03	2.17E-02	7.76E-03	2.73E-04	1.27E-05	2.02E-03	1.72E-03	9.31E-03	4.28E-02
Xe-135m	2.20E-03	4.94E-04	4.54E-03	3.41E-04	8.11E-03	3.30E-03	1.90E-02	3.84E-03	2.16E-04	0.00E+00	1.88E-03	9.51E-04	7.68E-03	3.36E-02
Xe-138	6.81E-03	1.47E-03	1.32E-02	1.05E-03	2.44E-02	1.03E-02	5.72E-02	1.17E-02	5.52E-04	0.00E+00	3.92E-03	1.62E-03	1.67E-02	9.17E-02
Cr-51	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-06	0.00E+00	1.62E-06
Mn-54	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.29E-08	0.00E+00	3.29E-08
Nd-147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.08E-08	0.00E+00	2.08E-08
Co-58	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E-07	4.10E-07	0.00E+00	5.57E-07
Co-60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E-07	1.16E-06	0.00E+00	1.47E-06
Nb-95	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.89E-07	0.00E+00	9.89E-07
Zr-95	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-06	0.00E+00	1.05E-06
Ag-110m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sn-113	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.38E-07	0.00E+00	3.38E-07
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
I-131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.93E-08	0.00E+00	0.00E+00	5.93E-08
I-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.17E-07	3.17E-07	0.00E+00	0.00E+00	0.00E+00	1.61E-07	0.00E+00	0.00E+00	4.78E-07
Cs-137	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.25E-08	0.00E+00	0.00E+00	2.25E-08
Sn-117m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.02E-08	0.00E+00	9.02E-08
Ni-63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-06	9.47E-07	3.55E-06	0.00E+00	0.00E+00	0.00E+00	2.02E-07	8.47E-10	0.00E+00	3.75E-06
Fe-55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.62E-09	0.00E+00	1.62E-09
Sr-89	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sr-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tc-99	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Note: The Noble Gases listed above include the liquid contribution

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 2009. No Types C or D were shipped. No irradiated fuel was shipped offsite. The volume, activity and type of waste are listed in Table 4-1.

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

Type of Waste	Quantity	Activity
A. Spent resins, filter sludge, evaporator bottoms, etc.	9.100 m^3	183.670 Ci
	320.00 ft^3	
B. Dry compressible waste, contaminated equipment, etc	552.7 m^3	0.479 Ci
	19520.0 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 2009 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
2009 Estimated Solid Waste Major Radionuclide Composition

TYPE A		TYPE B		TYPE C		TYPE D	
	Percent		Percent		Percent		Percent
Nuclide	Abundance	Nuclide	Abundance	Nuclide	Abundance	Nuclide	Abundance
Ni-63	47.250%	Co-60	26.828%				
Co-60	11.994%	Fe-55	27.065%				
Sr-90	11.509%	Nb-95	18.174%				
Am-241	10.493%	Ni-63	9.713%				
Co-58	5.013%	Ag-110m	6.741%				
Fe-55	3.219%	Co-58	2.481%				
Sb-125	2.785%	Sb-125	2.352%				
Cs-137	2.121%	Cs-137	2.244%				
Zr-95	1.745%	Zr-95	1.847%				
Mn-54	1.501%	Mn-54	1.036%				
Ce-144	0.505%	Tc-99	0.755%				
Ni-59	0.474%	H-3	0.225%				
Tc-99	0.435%	Zn-65	0.132%				
Pu-241	0.330%	In-113m	0.113%				
Co-57	0.214%	Sr-90	0.067%				
Cm-243	0.151%	Ce-144	0.050%				
Ag-110m	0.121%	Sr-89	0.038%				
C-14	0.095%	Pu-241	0.038%				
Cm-244	0.018%	Ag-108m	0.034%				
Zn-65	0.010%	Co-57	0.027%				
Cm-242	0.008%	Am-241	0.022%				
H-3	0.005%	Pu-239	0.008%				
Fe-55	0.002%	Pu-238	0.006%				
Pu-239	0.001%	Cm-243	0.004%				
Pu-238	0.000%	Cm-242	0.000%				
Nb-95	0.000%						
Pu-240	0.000%						

4.3 Solid Waste Disposition

There were thirteen solid waste shipments from PBNP during 2009. The dates and destinations are shown in Table 4-3.

Table 4-3
2009 PBNP Radioactive Waste Shipments

Date	Destination
01/05/09	Oak Ridge, TN
02/06/09	Oak Ridge, TN
02/17/09	Erwin, TN
04/23/09	Oak Ridge, TN
05/13/09	Oak Ridge, TN
06/03/09	Oak Ridge, TN
08/13/09	Oak Ridge, TN
09/30/09	Oak Ridge, TN
10/07/09	Erwin, TN
10/23/09	Oak Ridge, TN
11/02/09	Oak Ridge, TN
11/18/09	Oak Ridge, TN
12/11/09	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, 2009, to June 30, 2009, included 4.67E+05 gallons of neutralized wastewater. The wastewater contained 1.65E+01 pounds of suspended solids and 3.03E+03 pounds of dissolved solids.

Scheduled chemical waste releases to the circulating water system from July 1, 2009, to December 31, 2009, included 6.31E+05 gallons of neutralized wastewater. The wastewater contained 5.8E-01 pounds of suspended solids and 1.03E+02 pounds of dissolved solids.

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

5.2 Miscellaneous Chemical Waste Releases

Miscellaneous chemical waste releases from the wastewater effluent (based on effluent analyses) to the circulating water for January 1, 2009, to June 30, 2009, included 1.98E+07 gallons of clarified wastewater. The wastewater contained 6.52E+03 pounds of suspended solids.

Miscellaneous chemical waste releases from the Wastewater Effluent (based on effluent analyses) to the circulating water for July 1, 2009, to December 31, 2009, included 4.55E+07 gallons of clarified wastewater. The wastewater contained 9.90E+03 pounds of suspended solids.

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from January 1, 2009, to June 30, 2009, included 2.81E+05 pounds of sodium bisulfite and 1.19E+05 pounds of sodium hypochlorite (January-April). There was also 1.34E+05 pounds of Stabrex ST70 released into the circulating water via wastewater effluent. Stabrex ST70 is a liquid bromine biocide.

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from July 1, 2009, to December 31, 2009, included 5.60E+05 pounds of sodium bisulfite and 6.95E+05 pounds of Stabrex ST70. Stabrex ST70 is a liquid bromine biocide.

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 2009

	UNIT	JAN	FEB	MAR	APR	MAY	JUN
Average Volume Cooling Water Discharge [million gal/day]**	1	282.2	282.2	282.5	400.6	441.5	489.6
	2	282.2	282.2	282.5	400.6	478.5	489.6
Average Cooling Water Intake Temperature [°F]	1	38.0	36.7	37.0	42.0	47.9	53.5
	2	39.5	38.3	38.0	42.4	48.6	54.3
Average Cooling Water Discharge Temperature [°F]	1	69.6	68.5	68.7	66.1	66.6	72.4
	2	78.6	77.3	76.5	72.4	73.3	79.0
Average Ambient Lake Temperature [°F]		33.1	32.8	34.7	39.8	44.9	49.0

** For days with cooling water discharge flow.

Table 6-1(continued)
Circulating Water System Operation for 2009

	UNIT	JUL	AUG	SEP	OCT*	NOV*	DEC
Average Volume Cooling Water Discharge [million gal/day]**	1	487.1	489.6	489.6	491.1	495.2	353.5
	2	487.4	489.6	489.6	445.6	234.6	354.7
Average Cooling Water Intake Temperature [°F]	1	55.7	54.7	66.1	53.2	46.4	39.0
	2	56.6	55.6	66.9	56.7	46.7	39.4
Average Cooling Water Discharge Temperature [°F]	1	75.1	73.6	85.4	72.2	62.7	65.8
	2	81.5	80.2	92.6	79.1	51.2	69.2
Average Ambient Lake Temperature [°F]		52.0	49.7	61.3	49.6	42.5	35.4

* Unit 2 outage 10/17/09 -12/3/09
** 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 2009. However, the Environmental Manual and the Radiological Effluent Control Manual were revised. Both manuals are part of the ODCM. Copies of the revised manuals are being submitted with this 2009 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 2009. 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 2009.

Part C
RADIOLOGICAL ENVIRONMENTAL MONITORING

8.0 INTRODUCTION

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

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

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

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

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

9.0 PROGRAM DESCRIPTION

9.1 Results Reporting Convention

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

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

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

Just because a result is statistically greater than zero, it does not necessarily indicate that the radionuclide is present in an environmental sample. False positives may be obtained by fluctuations in background during the counting process. This phenomenon is most prevalent for concentrations at or near the LLD. Therefore, other information such as PBNP emissions records and radionuclide half-life must be used to evaluate whether the result is real or a statistical artifact.

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 collect 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

Three new TLD monitoring sites were added to the REMP during 2009. One dairy farm went out of business and was replaced by a new dairy farm in the area.

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 (on total solids)	Quarterly
Lake Water	E-01, -05, -06, -33	Gross Beta, Sr-89/90, H-3 I-131 Gamma Isotopic Analysis (on total solids)	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

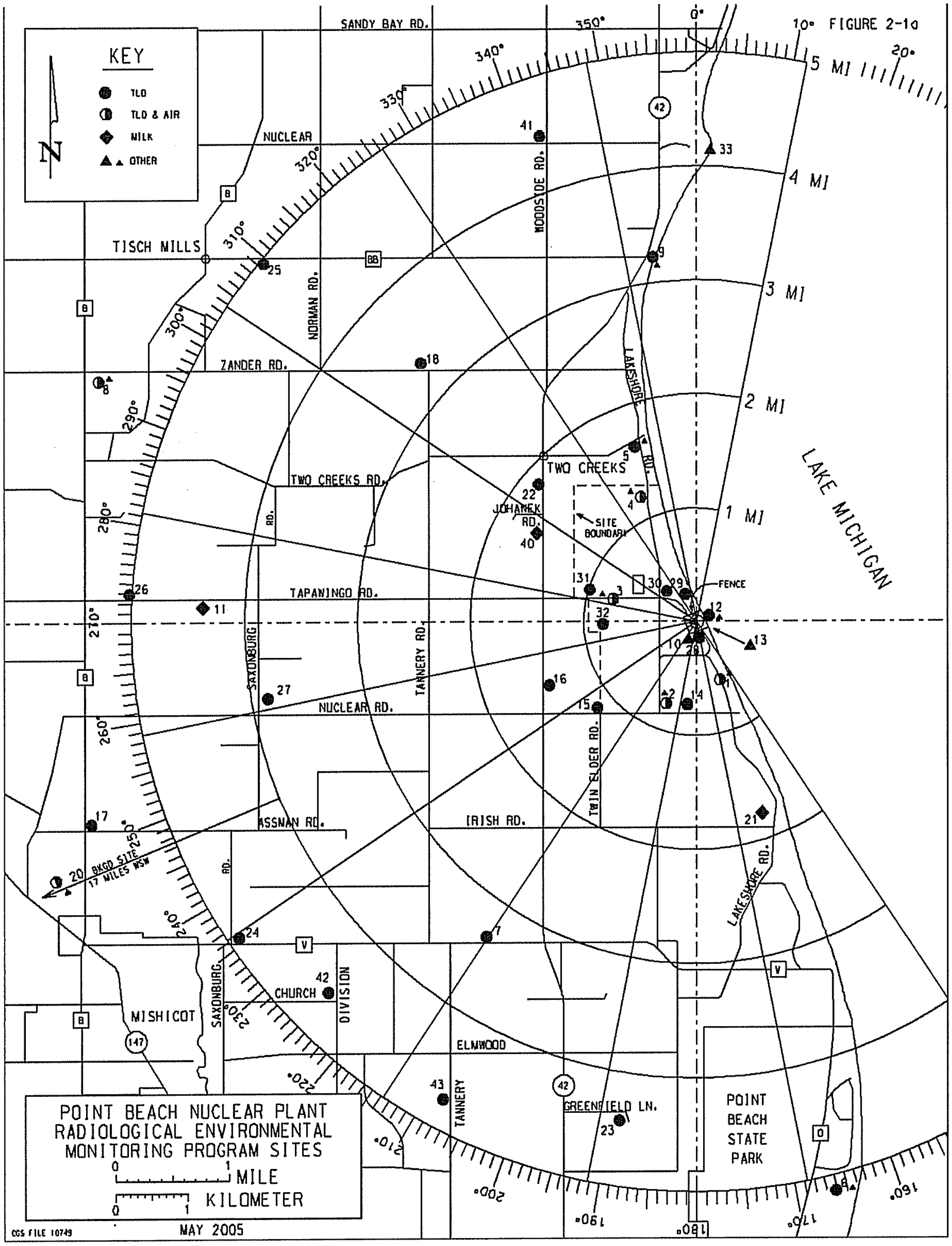


Figure 9-1
PBNP REMP Sampling Sites

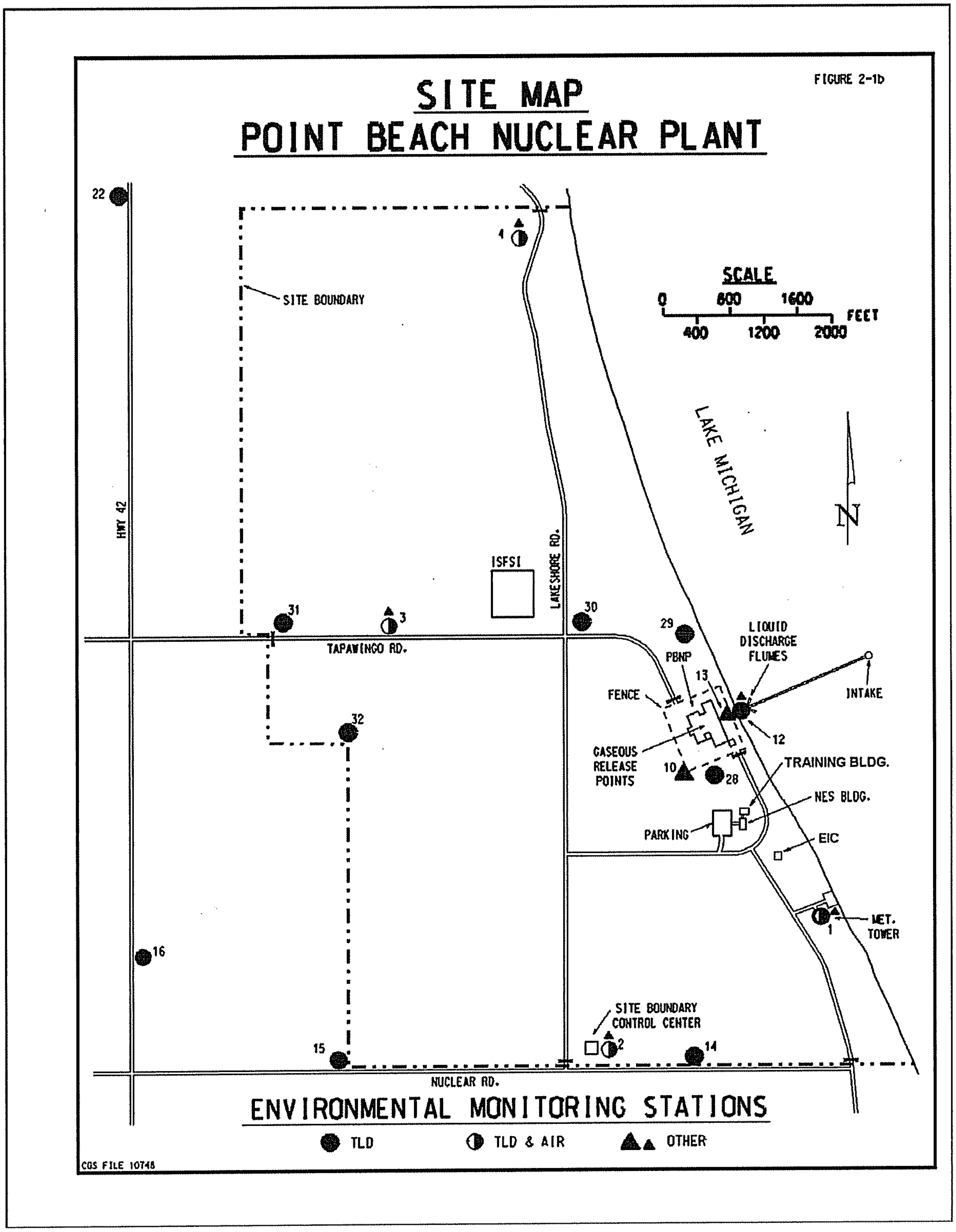


Figure 9-2
Map of REMP Sampling Sites Located Around PBNP

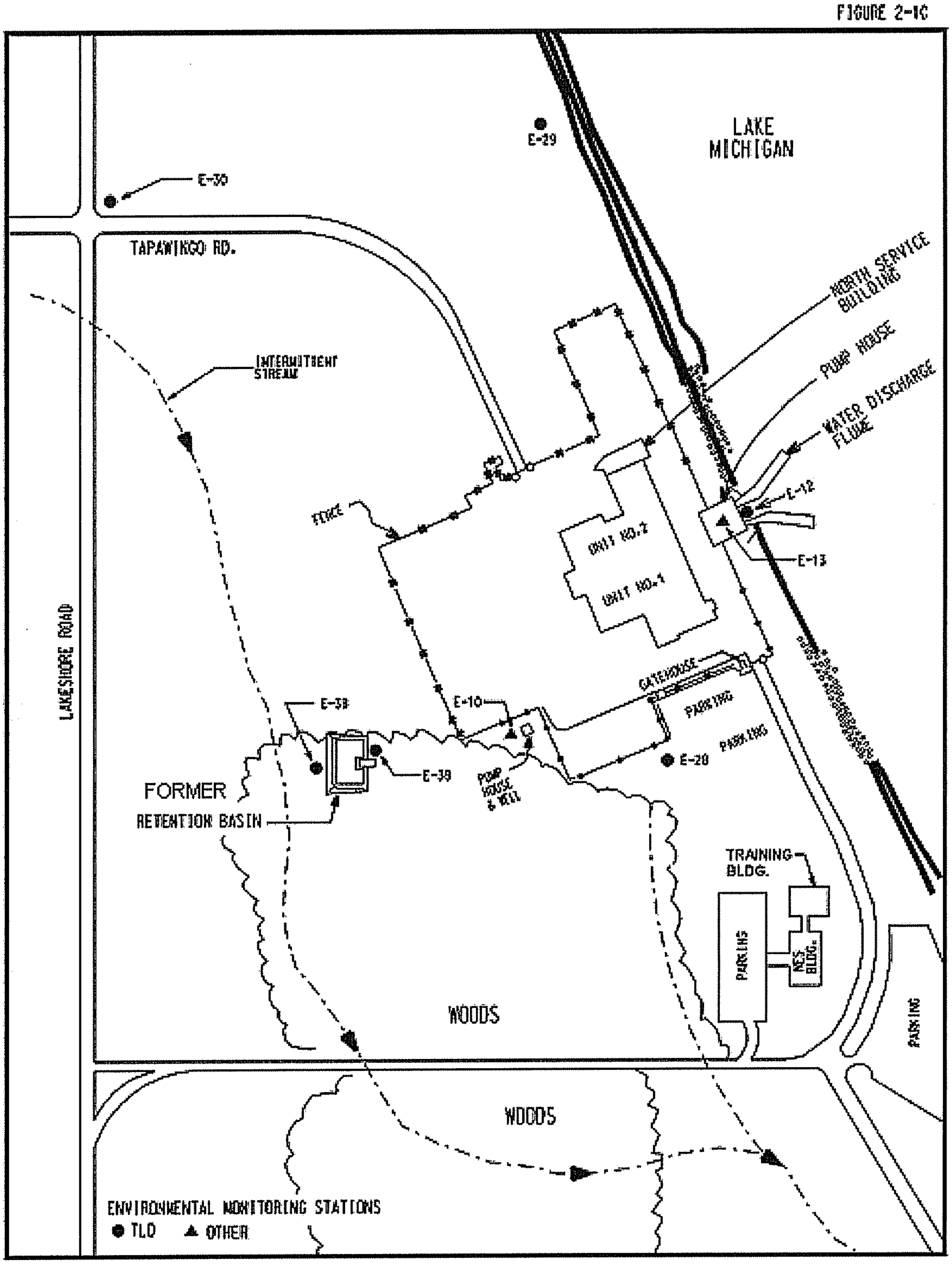


Figure 9-3
Enhanced Map Showing REMP Sampling Sites Closest to PBNP

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-03 E-20 E-20 E-06	4/29/2009 7/22/09 & 7/29/09 12/09/09	Power loss Power cut off during construction activities Power loss due to snowstorm	None as reason for loss not determined. Power had to be cut to area for electrical safety reasons during construction in the area. Loss beyond plant's control
Lake Water	E-01, E-05, E-06 E-01	1/13/2009 2/12/09	Lake Frozen Lost in transit	Loss beyond plant's control

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 2009.

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 and gamma isotopic analytical results for water are obtained by measurements on the solids remaining after evaporation of the unfiltered sample to dryness. Hence, the results are indicated as “on total solids” in Table 10-1.

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 canisters for radioiodine are counted as soon as possible so the I-131 will undergo only minimal decay prior to analyses. The weekly charcoal canisters 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 canister 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.

9.7.6 Environmental Radiation Exposure

The 2009 environmental radiation exposure measurements were made using TLD cards. The TLD card is a small passive detector, which integrates radiation exposure. Each TLD consists of a Teflon sheet coated with a crystalline, phosphorus material (calcium sulfate containing dysprosium) which absorbs the gamma ray energy deposited in them. Each TLD is read in four distinct areas to yield four exposure values which are averaged. Prior to the third quarter of 2001, exposure data were obtained using three lithium fluoride (LiF) TLD chips sealed in black plastic. The difference in material types can impact the amount of exposure measured. As seen in 2001, the Environmental Inc. TLD cards typically produce a slightly higher measured exposure value, although within the uncertainty of that value recorded by the TLD chips.

The reported field exposure is the arithmetic average of the four exposure values obtained minus the exposure received while the field TLD is in storage and transit.

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

9.7.7 ISFSI Ambient Radiation Exposure

Although the ISFSI fence TLDs are not considered part of the REMP, because of their location directly on site, their results can be used indirectly to determine whether the operation of the ISFSI is having an impact on the ambient environmental radiation beyond the site boundary. Impacts are determined by comparison of fence TLD results to the results of the monitoring at PBNP site boundary and other selected locations.

10.0 RESULTS

Summary of 2009 REMP Results

Radiological environmental monitoring conducted at PBNP from January 1, 2009, through December 31, 2009, consisted of analysis of air filters, milk, lake water, well water, soil, fish, shoreline sediments, algae, and vegetation as well as TLDs. The results are summarized in Table 10-1.

Table 10-1 contains the following information:

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

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

In Table 10-1, no results are reported as <LLD. An ND radionuclide is one for which none of the individual measurements was statistically different from zero. When one or more of the measured radionuclide concentrations was positive and statistically different from zero, the average reported in Table 10-1 is the average ± one standard deviation. Both the positive and negative results were used to calculate the average and standard deviation. Some of the reported averages are 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 based on counting statistics.

The method of determining averages follows the recommendation 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.

Table 10-1
Summary of Radiological Environmental Monitoring Results for 2009

Sample	Description	N	LLD (a)	Average ± Standard Deviation (b)	High ± 2 sigma	Units
TLD	Environmental Radiation	124	1 mrem	1.08 ± 0.17	1.54 ± 0.12	mR/7days
	Control (E-20)	4	1 mrem	1.09 ± 0.10	1.18 ± 0.14	mR/7days
Air	Gross Beta	258	0.01	0.025 ± 0.011	0.056 ± 0.004	pCi/m3
	Control (E-20) Gross beta	50	0.01	0.026 ± 0.011	0.052 ± 0.004	pCi/m3
	I-131	258	0.030 (0.07)	ND	-	pCi/m3
	Control (E-20) I-131	50	0.030 (0.07)	ND	-	pCi/m3
	Cs-134	20	0.01(0.05)	-0.0001 ± 0.0004	0.0014 ± 0.0008	pCi/m3
	Control (E-20) Cs-134	4	0.01(0.05)	ND	-	pCi/m3
	Cs-137	20	0.01(0.06)	0.0001 ± 0.0003	0.0009 ± 0.0005	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	0.0009 ± 0.0006	pCi/m3
	Control (E-20) Other	4	0.1	0.0000 ± 0.0004	0.0005 ± 0.0004	pCi/m3
Milk	Sr-89	35	5(10)	ND	-	pCi/L
	Sr-90	35	1(2)	0.8 ± 0.3	1.4 ± 0.3	pCi/L
	I-131	35	0.5	ND	-	pCi/L
	Cs-134	35	5 (15)	ND	-	pCi/L
	Cs-137	35	5 (18)	0.2 ± 0.9	2.4 ± 1.8	pCi/L
	Ba-La-140	35	5 (15)	ND	-	pCi/L
	Other gamma emitters	35	15	0.5 ± 1.1	3.1 ± 2.1	pCi/L
Well Water	Gross beta	4	4	1.7 ± 1.1	2.9 ± 2.1	pCi/L
	H-3	4	500 (3000)	ND	-	pCi/L
	Sr-89	4	5(10)	ND	-	pCi/L
	Sr-90	4	1 (2)	ND	-	pCi/L
	I-131	4	0.5 (2)	ND	-	pCi/L
	Mn-54	4	10 (15)	ND	-	pCi/L
	Fe-59	4	30	ND	-	pCi/L
	Co-58	4	10(15)	ND	-	pCi/L
	Co-60	4	10(15)	-0.02 ± 1.1	1.3 ± 1.2	pCi/L
	Zn-65	4	30	ND	-	pCi/L
	Zr-Nb-95	4	15	ND	-	pCi/L
	Cs-134	4	10(15)	ND	-	pCi/L
	Cs-137	4	10(18)	ND	-	pCi/L
	Ba-La-140	4	15	ND	-	pCi/L
	Other gamma emitters	4	30	ND	-	pCi/L
Algae	Gross beta	6	0.25	5.29 ± 2.28	8.76 ± 0.8	pCi/g
	Co-58	6	0.25	ND	-	pCi/g
	Co-60	6	0.25	ND	-	pCi/g
	Cs-134	6	0.25	ND	-	pCi/g
	Cs-137	6	0.25	0.016 ± 0.012	0.030 ± 0.022	pCi/g

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

Table 10-1 (continued)
Summary of Radiological Environmental Monitoring Results for 2009

Sample	Description	N	LLD (a)	Average ± Standard Deviation (b)	High ± 2 sigma	Units
Lake Water	Gross beta	47	4	2.2 ± 1.3	7.6 ± 2.1	pCi/L
	I-131	47	0.5 (2)	ND	-	pCi/L
	Mn-54	47	10 (15)	ND	-	pCi/L
	Fe-59	47	30	0.2 ± 1.6	3.1 ± 2.6	pCi/L
	Co-58	47	10(15)	-0.3 ± 0.8	2.3 ± 1.6	pCi/L
	Co-60	47	10(15)	0.2 ± 0.8	2.1 ± 1.9	pCi/L
	Zn-65	47	30	-0.2 ± 2.3	3.9 ± 3.7	pCi/L
	Zr-Nb-95	47	15	-0.2 ± 1.0	1.8 ± 1.5	pCi/L
	Cs-134	47	10 (15)	ND	-	pCi/L
	Cs-137	47	10 (18)	0.1 ± 1.1	3.5 ± 2.7	pCi/L
	Ba-La-140	47	15	-0.1 ± 1.8	4.5 ± 2.1	pCi/L
	Ru-103 (Other gamma)	47	30	-0.3 ± 1.1	3.4 ± 2.0	pCi/L
	Sr-89	18	5(10)	ND	-	pCi/L
	Sr-90	18	1 (2)	0.32 ± 0.26	0.87 ± 0.47	pCi/L
	H-3	18	500 (3000)	119 ± 80	306 ± 106	pCi/L
Fish	Gross beta	13	0.5	4.03 ± 1.05	5.59 ± 0.18	pCi/g
	Mn-54	13	0.13	ND	-	pCi/g
	Fe-59	13	0.26	0.002 ± 0.017	0.042 ± 0.016	pCi/g
	Co-58	13	0.13	-0.002 ± 0.007	0.011 ± 0.007	pCi/g
	Co-60	13	0.13	ND	-	pCi/g
	Zn-65	13	0.26	0.000 ± 0.017	0.030 ± 0.017	pCi/g
	Cs-134	13	0.13	-0.001 ± 0.008	0.022 ± 0.015	pCi/g
	Cs-137	13	0.15	0.031 ± 0.020	0.073 ± 0.022	pCi/g
	Other gamma emitters	13	0.5	ND	-	pCi/g
Shoreline Sediment	Gross beta	11	2	11.12 ± 1.92	14.51 ± 2.04	pCi/g
	Cs-137	11	0.15	0.017 ± 0.009	0.027 ± 0.011	pCi/g
Soil	Gross beta	16	2	31.10 ± 6.26	42.39 ± 3.34	pCi/g
	Cs-137	16	0.15	0.19 ± 0.08	0.43 ± 0.096	pCi/g
Vegetation	Gross beta	24	0.25	5.57 ± 2.55	8.88 ± 0.28	pCi/g
	I-131	24	0.06	0.000 ± 0.007	0.014 ± 0.008	pCi/g
	Cs-134	24	0.06	-0.001 ± 0.005	0.010 ± 0.008	pCi/g
	Cs-137	24	0.08	0.007 ± 0.016	0.079 ± 0.025	pCi/g
	Other gamma emitters	24	0.06	ND	-	pCi/g

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

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 2009

Fence Location	Average	±	Standard Deviation	Units
North	2.36	±	0.21	mR/7 days
East	2.35	±	0.40	mR/7 days
South	1.20	±	0.14	mR/7 days
West	4.63	±	0.48	mR/7 days

11.0 DISCUSSION

11.1 TLD Cards

The ambient radiation was measured in the general area of the site boundary, at an outer ring four – five miles from the plant, at special interest areas, and at one control location, roughly 17 miles southwest of the plant. The average of the indicator TLD cards is 1.08 mR/7-days and 1.09 mR/7-days at the control location. These results are not significantly different from each other nor from those observed from 2001 through 2008 (tabulated below in Table 11-1). The change in TLD types in 2001 accounts for the increase in average TLD readings (i.e., prior to third quarter 2001 TLD LiF chips were used versus the TLD cards, see Section 9.7.6 for additional information) from 2000 to 2001. Therefore, the operation of the plant has had no effect on the ambient gamma radiation.

Table 11-1
Average Indicator TLD Results from 1993 – 2009

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

*St. Dev = Standard Deviation

There were five new cask additions in 2009 with no significant change in the average annual ISFSI fence TLD results (Table 11-2). The west fence TLDs continue to record higher exposures. The north and east fence TLDs are statistically equal. The south fence continues to record the lowest exposures (Table 11-2). The addition of five NUHOMS casks produced no significant exposure increases at 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 with E-03 being closer to the ISFSI [see Figs. 9-1 and 9-2 for locations]. The results near the site boundary (E-31, 1.17 ± 0.19; E-32, 1.05 ± 0.27) are comparable to the background site E-20 (1.09 ± 0.20) within the associated measurement error, indicating no measurable increase in ambient gamma radiation at the site boundary due to the operation of the ISFSI.

Table 11-2
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

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

*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 <u>Milk</u>

Naturally occurring potassium-40 (1378 ± 61 pCi/l) continues to be the most prevalent radionuclide measured in milk at concentrations roughly 1000 times higher than the next most positive radionuclide, Sr-90 (0.8 ± 0.3 pCi/l). The annual average radionuclide concentrations in milk continue to be similar to previous years. The small positive indications for Co-60 and Cs-137 are not statistically significant. Strontium-90 results are not statistically different from previous years going back to 1997. The Sr-90 in milk results of the cycling in the biosphere after the atmospheric weapons tests of the '50s, '60s, and '70s and the Chernobyl accident. Although these tests also introduced Cs-137 into the environment, Cs-137 binds more strongly to soils and therefore less likely to get into cows and milk. Similar to 2005, 2006 and 2008, there were no airborne Sr-90 releases from PBNP during 2009. The 2009 average Sr-90 of 0.8 ± 0.3 pCi/l is statistically equal to that of previous years: 0.9 ± 0.4 in 2008; 0.8 ± 0.4 in 2007; 0.9 ± 0.3 in 2006; 0.9 ± 0.4 in 2005; 1.1 ± 0.4 in 2004; 1.1 ± 0.4 in 2003; 1.1 ± 0.7 in 2002; 1.2 ± 0.5 in 2001; 1.2 ± 0.6 in 2000; 1.0 ± 0.3 in 1999; 1.1 ± 0.5 in 1998; and 1.2 ± 0.5 in 1997. These results are common throughout the Great Lakes region and North America. Therefore, it is concluded that the milk data for 2009 show no radiological effects of the plant operation.

11.3 Air

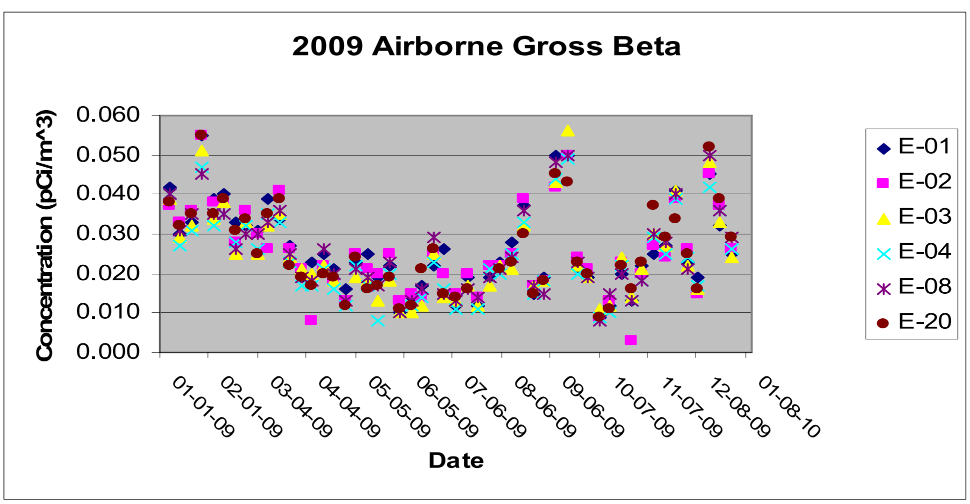
The average annual gross beta concentrations (plus/minus the one-sigma uncertainty) in weekly airborne particulates at the indicator and control locations were 0.026 ± 0.011 pCi/m^3 and 0.025 ± 0.011 pCi/m^3, respectively, and are similar to levels observed from 1993 through 2008 (Table 11-4).

Table 11-4
Average Gross Beta Measurements in Air

Year	Average (pCi/m3)
1993	0.022
1994	0.022
1995	0.021
1996	0.021
1997	0.021
1998	0.022
1999	0.024
2000	0.022
2001	0.023
2002	0.023
2003	0.023
2004	0.021
2005	0.024
2006	0.021
2007	0.025
2008	0.023
2009	0.025

The annual gross beta concentration variation reveals higher concentrations in the fall and winter as compared to the spring and summer. This is present again during 2009. However, as in 2006 -2008, another high period with more scatter occurs during July-September (Figure 11-1). The cause for this scatter is not known but may be due to a shift in land use or weather patterns.

Figure 11-1
2009 Airborne Gross Beta Concentration (pCi/m^3) vs. Time



In 2005, the new method of evaluating airborne I-131 was instituted. Instead of counting each charcoal cartridge separately, all six cartridges for the week are counted as one sample in a predetermined geometry to screen the samples for I-131. If any airborne radioiodine is detected, each sample cartridge is counted individually. With no detectable I-131, the reported analytical result is the minimum detectable activity (MDA) conservatively calculated using the smallest of the six sample volumes. The reported MDAs ranged from 0.005 to 0.025 pCi/m^3. Because the analysis LLD is based on counting only one cartridge, the use of six cartridges or roughly six times the sample volume with the same count time as would be needed to achieve the desired LLD for only one sample, the actual LLD is about six times lower than the programmatic value given in Table 10-1. Similarly, the actual MDA is about one-sixth of that reported, or in the range of 0.001 to 0.005 pCi/m^3. Therefore, because no I-131 was detected, it is concluded that the release of small amounts of radioiodine during June and October (Table 3-2) had no measurable impact on the environment.

Gamma spectroscopic analysis of quarterly composites of air particulate filters for radionuclides attributable to PBNP yielded similar results for indicator and control locations. All results for Cs-134, Cs-137, and any other radionuclide are less than the minimum detectable concentration (MDC). By comparison, the measured concentration of naturally occurring Be-7 was 0.079 ± 0.013 pCi/m^3. Be-7 is not required to be measured by the PBNP REMP; however, it serves as a means to monitor the internal consistency of the vendor's analytical program and for comparisons to radionuclides that may be in PBNP airborne effluent.

In summary, the 2009 air data do not demonstrate a significant environmental impact from the operation of PBNP.

11.4 Lake Water

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

There were 13 slightly positive indications of gamma emitters during 2009. Only three were statistically above the minimum detectable concentration (MDC). A positive result for Ba-La-140 was obtained at E-01 (in November) located just south of the plant and at E-05 (in August) located north of the plant. Because PBNP did not discharge Ba-La-140 during 2009, these results are determined to be false positives. Furthermore, location E-05 is, based on the current flow of the lake in the vicinity of the plant, upstream of plant discharges. The third positive result above the MDC occurred for Zn-65 at E-06, some six miles south and downstream of the plant. Although PBNP released Zn-65 a week prior to obtaining the lake water sample, the release concentration was 1000 times lower than that measured in the lake water sample, 0.0063 pCi/l vs. 3.9 pCi/l. Therefore, the Zn-65 result at E-06 is determined to be a false positive.

Aliquots of the monthly samples are composted quarterly and analyzed for Sr-89/90 and for tritium. No Sr-89 was detected in any of the samples. Sr-90, because of its long half-life, still persists in Lake Michigan from radioactive fallout in the1950s and '60s. Therefore, it is not surprising that there were ten slightly positive results for Sr-90. Only two of the results were above the MDC and these were from locations upstream from PBNP. Furthermore, PBNP did not discharge Sr-89 or Sr-90 during 2009. Therefore, the positive results are not due to PBNP.

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 2009 ranged from ND to 306 pCi/l. Although 10 of the 16 composites showed results above zero, only three of these results were above the MDC. Two of the three occurred upstream of PBNP and therefore are unlikely to result from PBNP discharges. The third result from south of PBNP is at roughly 1.5% of the drinking water standard. Based on these results and their occurrences, it is concluded that PBNP liquid discharges produced a minimal, if any, impact on the waters of Lake Michigan.

11.5 Algae

Filamentous algae attached to rocks along the Lake Michigan shoreline are known to concentrate radionuclides from the water. None of the cobalt radionuclides discharged by PBNP was detected. Neither was Cs-134. Four of the six samples had positive indications of Cs-137, but only one at 0.029 ± 0.017 pCi/g was statistically above the MDC. Because fallout Cs-137 from 1950s and 60s weapons testing is known to still persist in Lake Michigan, the one positive Cs-137 result could be the result of recycling of fallout Cs-137 from the 1950s and 60s in the lake. By contrast to the low level of Cs-137, the average concentrations of naturally occurring Be-7 and K-40 are higher: 0.89 and 5.29 pCi/g, respectively. Therefore, the algae monitoring results indicate only a minor, if any, effect by PBNP upon the environs.

11.6 Fish

The analyses of 13 fish produced 15 results above zero. Of these 15, six were below the MDC. Of the remaining nine, eight were for Cs-137. The highest Cs-137 concentration 0.073 ± 0.022 is comparable to the 0.070, 0.049 and 0.055 pCi/g found in 2008, 2007, and 2006 but is lower than the high of 0.172 pCi/g in 2005 and considerably lower than the 2.8 pCi/g seen in PBNP in the mid-1970s during the Chinese weapons tests. It is not possible to determine whether this Cs-137 represents PBNP effluent or the recycling of fallout Cs-137 from the 1950s and 60s. The only other result greater than the MDC was for Zn-65 in a fish from March. None of the other radionuclides in PBNP effluent were found in fish.

By comparison, the concentration of naturally occurring K-40 (1.16–4.05 pCi/g) is about 55 times higher than the highest Cs-137 concentration. Based on these results, it is concluded that there is, at most, a minor indication of a plant effect.

11.7 Well Water

No plant related radionuclides were detected in well water during 2009, as all results were not significantly different from zero. The one slightly positive value was below the MDC. The gross beta values result from naturally occurring radionuclides. Therefore, it is concluded that there is no evidence of PBNP effluents are 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. The main contributor to this worldwide distribution is the weapons testing in the 1950s and 1960s with lesser amounts from Chinese atmospheric nuclear tests in the 1970s and 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. The main modifiers of soil Cs-137 concentration levels are erosion and radioactive decay. All samples for 2009 had low levels of Cs-137. The results from the indicator sites are comparable to those from the background site some 17 miles away in the low χ/Q sector. This is expected for the Cs-137 source being atmospheric fallout as discussed above. Therefore, there is no indication of a plant effect based on the comparison of indicator and background results. By comparison to naturally occurring radionuclides, the Cs-137 concentrations continue to be present in soil samples at about 1% of the levels of naturally occurring K-40.

Table 11-5
Average Gross Beta Concentrations in Soil

Year	Activity (pCi/g)
1993	23.6
1994	19.4
1995	18.0
1996	19.4
1997	22.8
1998	20.0
1999	23.1
2000	22.1
2001	23.5
2002	21.9
2003	22.5
2004	24.3
2005	29.1
2006	27.4
2007	31.0
2008	30.0
2009	31.1

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. Three of the 11 samples have Cs-137 concentrations statistically different from zero. The Cs-137 concentrations of the shoreline sediment are about one-tenth of that found in soils. This is expected because Cs-137 in the geological media is bound to clay as opposed to the sand found on the beach. Wave action winnows clay particles 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 soil/sand 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. Because Lake Michigan sediments are a known reservoir of fallout Cs-137, the shoreline sediment data indicate no radiological effects from 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 knocks neutrons or protons off the target atom's nucleus producing a radionuclide of lower mass.) In contrast, K-40 is a primordial radionuclide which is incorporated into vegetation from the soil during the growing process. Cs-137 can be present via both pathways. Fresh Cs-137 fallout is associated, like Be-7, with deposition on the plant surface. Old fallout from the ‘50s and ‘60s is now being incorporated into growing plants in the same manner as potassium because it is in the same chemical family as potassium. The only location where Cs-137 was detected above the MDC was at E-06, a campground area in the Point Beach State Forest. The highest Cs-137 concentration of 0.079 pCi/g is approximately 6% of the average vegetation Be-7 concentration of 1.38 pCi/g and 2% of the average K-40 concentration of 4.72 pCi/g.

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

PBNP released no airborne Cs-137 effluent prior to the collection of the two vegetation samples with positive Cs-137 results. That, and given that there is no measurable Cs-137 in the air samples, leads to the conclusion that the two measurable Cs-137 concentrations are not due to PBNP effluents. The Cs-137 results from E-06 demonstrate that Cs-137 fallout from the Chernobyl accident and from atmospheric weapons tests continues to be recycled in the environment by the spreading of wood ash at camp sites.

Based on the 2009 vegetation sampling results, it is concluded that no effect from PBNP effluents are indicated.

11.11 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 2009. No significant change in the use of pasturelands or grazing herds was noted. Therefore, the existing milk-sampling program continues to be acceptable. It continues to be conservative for the purpose of calculating doses via the grass-cow-milk pathway to ensure that the milk sampling locations remain as conservative as practicable.

12.0 REMP CONCLUSION

Based on the analytical results from the 814 environmental samples, and from 128 sets of TLDs that comprised the PBNP REMP for 2009, PBNP effluents had no discernable, permanent effect on the surrounding environs. These results demonstrate that PBNP continues to have good controls on fuel integrity and on effluent releases. The control of effluents from PBNP continues to be acceptable pursuant to the ALARA criteria of 10 CFR 50.34a.

Part D
GROUNDWATER MONITORING

13.0 PROGRAM DESCRIPTION

PBNP monitors groundwater for tritium. During 2009 the sampling program consisted of six beach drains, six intermittent stream and bog locations, four drinking water wells, four façade wells, eight yard electrical manholes, six ground water monitoring wells, and the Unit 2 facade subsurface drainage (SSD) system sump.

In the late 1970s, the beach drains entering Lake Michigan were found to contain tritium. The beach drains are the discharge points for yard drainage system, which carries storm water runoff, and are known to be infiltrated by groundwater as observed by discharges even when no rain has occurred. In the 1980s, the source of H-3 for this pathway was postulated to be spent fuel pool leakage into the groundwater under the plant based on the observation that after modifications were made to the pool, 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 site's meteorological tower. The intermittent stream samples track H-3 in the surface groundwater.

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

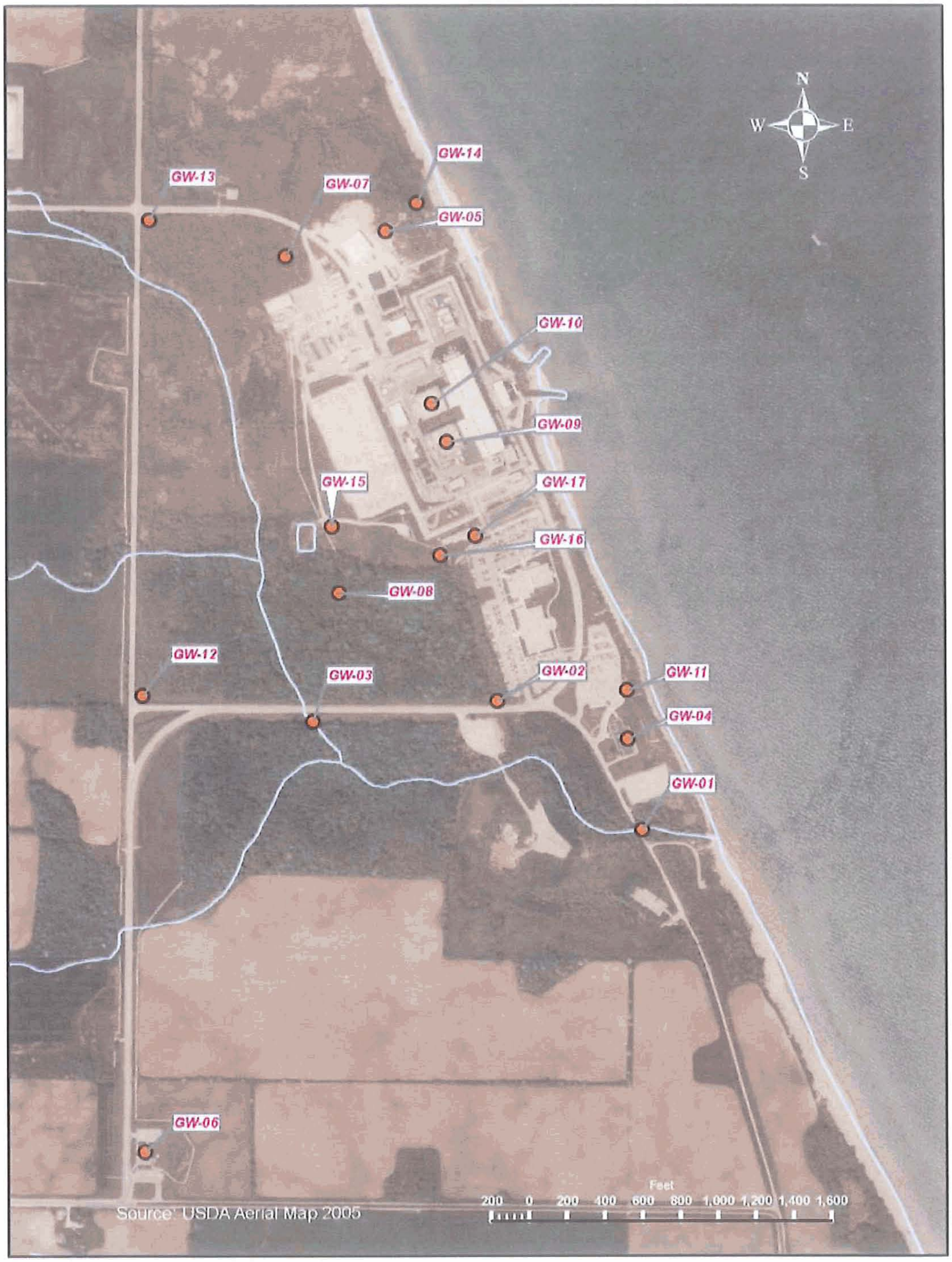
In addition to the main plant well, three other drinking water wells also are monitored. The Site Boundary Control Center well, located at the plant entrance, the Warehouse 6 well, on the north side of the plant, and the EIC well, located south of the plant. These wells do not draw water from the top 20 - 30 feet of soil which is known to contain H-3. These wells monitor the deeper (200 - 350 feet), drinking water aquifer from which the main plant well draws its water. The two soil layers are separated by a gray, very dense till layer of low permeability identified by hydrological studies.

Manholes in the plant yard and for the subsurface drainage (SSD) system under the plant are available for obtaining ground water samples. The plant yard manholes for accessing electrical conduits are susceptible to ground water in-leakage. Therefore, a number of these were sampled. The SSD were 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. A monthly composite from this sump was analyzed from January through August. In September, compositing was discontinued and individual samples were analyzed as part of the program.

In the 1990s, two wells were sunk in each unit's façade to monitor the groundwater levels and look at evidence of concrete integrity as part of the ISI IWE Containment Inspection Program required by 10 CFR 50.65. 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

14.1 Streams and Bogs

The results from the groundwater monitoring associated with the former retention pond are presented in Table 14-1. For the most part, the creek results are barely above the detection level. There are more positive values for the East Creek than for the West Creek or for the confluence of the two creeks south of the plant near Lake Michigan. GW-08 is a bog near the former retention pond.

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

Month	GW-01(E-01)	GW-02	GW-03	GW-17	BOGS		MDC
	Creek Confluence	E. Creek	W. Creek	STP	GW-07	GW-08	
Jan	±	±	±	±			
Feb	±	±	±	±			
Mar	80 ± 87	249 ± 95	144 ± 90	223 ± 94	±	±	158
Apr	158 ± 104	314 ± 94	ND ±	240 ± 91	±	±	159
May	118 ± 89	383 ± 101	ND ±	709 ± 115	ND ±	847 ± 120	158
Jun	±	±	±	±	±	±	
Jul	ND ±	141 ± 80	108 ± 78	251 ± 86			147
	±	ND ±	119 ± 77	123 ± 77	±	±	149
Aug	±	±	±	119 ± 79	±	±	147
Sep	147 ± 98	86 ± 81	196 ± 86	109 ± 82	±	±	153
Oct	131 ± 96	301 ± 103	ND ±	427 ± 108	±	±	148
Nov	99 ± 83	204 ± 89	145 ± 86	346 ± 95	±	±	149
Dec	±	±	±	141 ± 80	±	±	150

A blank indicates no sample was available. Streams are sampled monthly; bogs, annually.
Values are presented as the measured value and the 95% confidence level counting error.
ND = measured value is less than the 2-sigma counting error.

The analyses of these surface water samples show low concentrations of H-3. None of the sample from the confluence of the two creeks (GW-01), ESE of the former retention pond, and only one of the West Creek (GW-02) samples, have results above the minimum detectable concentration (MDC). In contrast, most of the results from the south section of the East Creek (GW-02), the north section near the sewage treatment plant (GW-17), and from the one bog SE of the former retention pond have results above the MDC. This indicates that the predominant H-3 flow in the top soil layer flow away from the area of the retention pond is more east to Lake Michigan than to the south. This is in agreement with site hydrological studies reported in the FSAR and the Site Conceptual Model. The East Creek concentrations are generally lower than the 300 - 350 pCi/l seen in the late 90s. The 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 2009 results for the beach drains are presented in Table 14-2. [The drain data from left to right in the table are in the order of the drains from north to south.] Beginning in September, S-1 and S-3 were sampled more frequently than once per month. S-1 collects yard drainage from the north part of the site yard; S-3, from the south part of the site yard. Additionally, S-1 receives the output from the SSD sump located in the Unit 2 façade. Drains S-8 and S-9 carry water from the lake side yard drains whereas drains S-7 and S-10 are from the turbine building roof. S-11 is no longer connected to any yard drain system and mainly carries groundwater flow and runoff from a small lawn area south of the plant.

S-1 shows more variability than S-3 (Figure 14-1). Most S-1 H-3 concentrations are in the 300 - 500 pCi/l range and followed by concentrations in the 2000 - 7000 pCi/l range. At S-3, the H-3 concentrations are more uniform with one spike at 3688 and another at 1370 pCi/l. Possible H-3 contributions to S-1 from groundwater inleakage upstream of this discharge were investigated. Tritium concentrations in groundwater from the electrical vaults immediately west of S-1 were not detectable to very low. Similar results were obtained from a manhole along the discharge pathway from the former retention pond (see below Section 14.3). Therefore, the high concentration spikes found at S-1 are attributable to receiving discharges from the SSD sump. The reason for the two spikes at S-3 is unknown. S-3 is located in the suspected drainage path from the former retention pond area to the lake but no other monitoring site along this path has had H-3 concentrations this high.

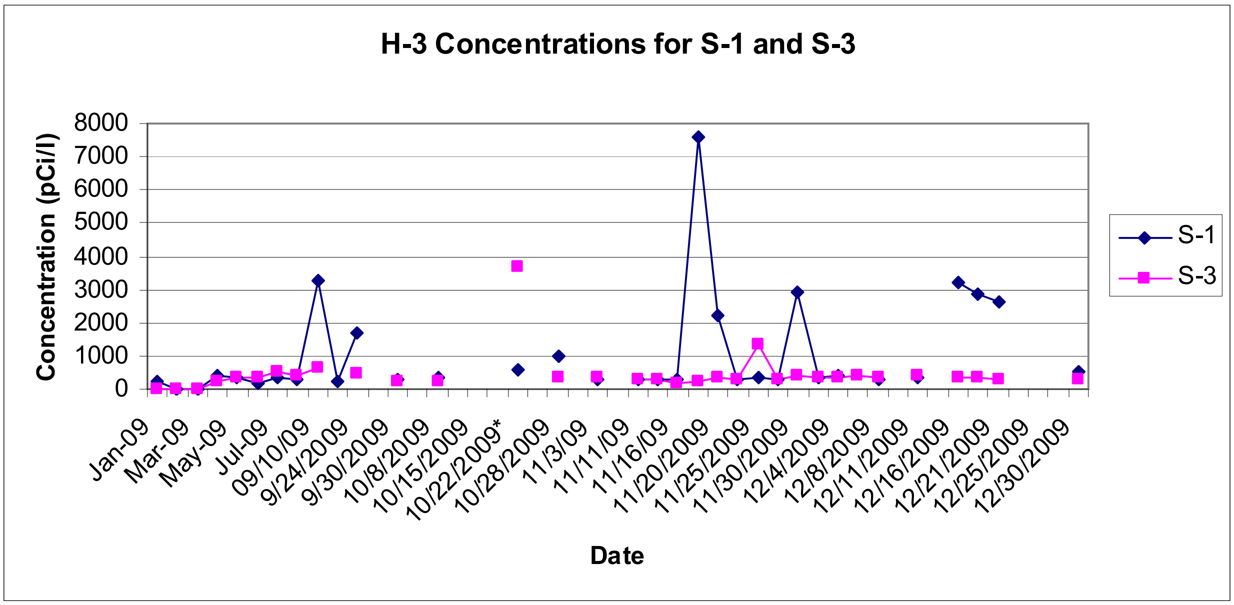
Table 14-2
2009 Beach Drain Tritium
Average H-3 Concentration (pCi/l)

Month	S-1	S-7	S-8	S-9	S-10	S-3	S-11
Jan	231 ± 81	NF ±	NF ±	NF ±	NF ±	NF ±	±
Feb	NF ±	NF ±	NF ±	NF ±	NF ±	NF ±	±
Mar	NF ±	NF ±	NF ±	NF ±	NF ±	NF ±	±
Apr	395 ± 98	NF ±	575 ± 106	482 ± 102	304 ± 94	240 ± 91	±
May	336 ± 96	NF ±	NF ±	458 ± 102	NF ±	375 ± 98	161 ± 88
Jun	200 ± 100	NF ±	NF ±	NF ±	NF ±	362 ± 107	38 ± 94
Jul	362 ± 94	NF ±	NF ±	NF ±	NF ±	534 ± 101	152 ± 85
Aug	270 ± 90	NF ±	NF ±	NF ±	±	422 ± 96	±
Sep	1364 ± 1392	NF ±	NF ±	NF ±	191 ± 94	466 ± 215	212 ± 95
Oct	639 ± 320	NF ±	NF ±	229 ± 98	NF ±	1415 ± 1969	217 ± 97
Nov	1487 ± 2351	NF ±	NF ±	105 ± 87	NF ±	413 ± 341	144 ± 71
Dec	1133 ± 1224	590 ± 103	NF ±	NF ±	435 ± 97	352 ± 53	206 ± 25

NF = no sample due to no flow

The data from the remaining beach drains from the plant area (S-7 - S-10) are sparse in that there is no flow unless there is precipitation or some groundwater intrusion. In contrast, at S-11 the flow appears to be mainly from groundwater. Nine of the 14 analyses revealed low H-3 concentrations slightly above the MDC.

Figure 14-1
2009 H-3 Concentrations for S-1 and S-3
Tritium Concentrations (pCi/l)



The SSD sump is located in the Unit 2 façade. The monthly results are presented in Table 14-3. The January - August data are from a single measurement of a monthly composite sample. The remaining monthly concentrations are the average of individual measurements made during that month. These results are generally higher than those from S-1, the beach drain to which the sump is pumped. The source of the higher SSD sump tritium concentrations is under investigation. The October 12 and 26 samples were gamma scanned. Both results were below the MDC.

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

Month	pCi/l		2σ
Jan*	510	±	98
Feb*	468	±	96
Mar*	609	±	109
Apr*	533	±	104
May*	539	±	105
Jun*	541	±	110
Jul*	473	±	97
Aug*	551	±	98
Sep+	889	±	706
Oct+	2224	±	2373
Nov+	6644	±	15768
Dec+	1830	±	1574

*Monthly composites
+Monthly average

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14.3 Electrical Vault and Other Manholes

Manholes for access to below ground electrical facilities are susceptible to groundwater in-leakage as is evident by very low concentrations of H-3 (Table 14-4). The manhole series M-66 A-D run from south to north on the east side of the Unit 2 Turbine Building. M-66A is located near the Unit 2 truck bay and M-66D is just east of the emergency diesel generator building. The M-67A-D series is parallel to the M-66A-D series so that M-67A is next to M-66A but on the east side of it. MH-68 is in the west side of the EDG Building directly opposite the D manholes. Based on their proximity, it was expected that the each pair of manholes would have nearly the same H-3 concentration. This holds true for the C and D pairs but not the A pair.

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

Man Hole	pCi/l	±	2σ	MDC
MH-66A	90	±	38	155
MH-66B	86	±	52	152
MH-66C	89	±	25	152
MH-66D	184	±	84	152
MH-67A	242	±	25	155
MH-67B*	-			
MH-67C	109	±	83	147
MH-67D	162	±	85	147
MH-68	201	±	94	152
Average =	145	±	60	

* = not enough water to obtain a sample

In addition to the yard manholes, a manhole (R-4) along the abandoned line from the remediated retention pond to the plant was checked as a possible source for carrying groundwater H-3 from the area of the remediated pond to the north side of the plant. It is postulated that the trench would provide a pathway to bring the tritiated groundwater from the pond area to the north side of the plant where it would be discharged via the S-1 beach drain. No H-3, Sr-90 or any effluent-related gamma emitters were detected.

14.4 Façade Wells and Tendon Gallery Sumps

Two wells are located in each unit's façade. In Unit 2 there is one on each side of containment, approximately 180° apart. The Unit 1 façade wells are east of the containment in the SE (1Z-361A) and NE (1Z-361B) corners of the façade. No samples were collected during the first quarter of 2009. In April the sampling frequency was increased. Some samples were not collected because the well cap could not be removed.

The 2009 results are similar to those obtained in 2008. The Unit 2 continues to have low H-3 concentrations, only a few of which are above the MDC. In Unit 1 the well in the SE corner of the façade continues to have the higher H-3 concentrations, although lower than the 929 - 1169 pCi/l seen in 2008. Based on these results, the conclusion that H-3 is not evenly distributed under the plant still is valid.

Table 14-5
2009 Facade Well Water Tritium
H-3 Concentration (pCi/l)

Month	UNIT 1		UNIT 2		MDC
	1Z-361A	1Z-361B	2Z-361A	2Z-361B	
Jan	NS ±	NS ±	NS ±	NS ±	
Feb	NS ±	NS ±	NS ±	NS ±	
Mar	NS ±	NS ±	NS ±	NS ±	
Apr	780 ± 114	165 ± 87	91 ± 84	91 ± 84	<159
May*	705 ± 113	232 ± 93	241 ± 93	219 ± 92	<154
Jun	633 ± 106	ND ±	ND ±	ND ±	<152
Jul	466 ± 99	ND ±	ND ±	NS ±	<147
Aug	548 ± 114	ND ±	ND ±	NS ±	<151
Sep	535 ± 100	ND ±	NS ±	NS ±	<152
Oct	468 ± 110	182 ± 97	ND ±	NS ±	<148
Nov	678 ± 122	201 ± 105	136 ± 102	ND ±	<158
Dec	474 ± 112	ND ±	ND ±	ND ±	<152

ND = not detected * = collected June 1 NS = sample not collected

Further samples of the groundwater were obtained from each units tendon gallery sump in October. In contrast to the difference between the units observed in the façade well results, the Unit 2 tendon gallery sump had higher H-3 (4747 ± 216 pCi/l) than Unit 1 (1293 ± 141 pCi/l) tendon gallery sump. The Unit 2 tendon gallery sump also had higher Cs-137 and Co-60 (794 ± 10 and 23.6 ± 3.0 pCi/l) compared to the Unit 1 tendon gallery sump (43.3 ± 5.3 and non-detectable pCi/l). Again, an uneven distribution of radionuclides in the groundwater around each unit.

The groundwater in the tendon gallery sumps is pumped to the facade sumps from where it is discharged.

14.5 Potable Water and Monitoring Wells

In addition to the main plant well (Section 11.7), nine other wells are monitored for H-3. These consist of three potable water wells, GW-04, GW-05, and GW-06, and six H-3 groundwater monitoring wells, GW-11 through GW-16 installed in 2007 (Figure 13-1). The monitoring wells are located at the periphery of the area affected by diffusion from the former retention pond and known spent fuel pool leakage during the 1970s. Two of the potable water wells are for buildings close to the plant (GW-04 and GW-05) whereas, the other (GW-06) is at the Site Boundary Control Center some 3200 feet from the former retention pond. The potable water wells are from the deep aquifer whereas, the monitoring wells are in the shallow (< 30 feet), surface water aquifer above the thick, impermeable clay layer separating the two. The EIC well is sampled monthly and the other two potable wells are sampled quarterly.

The potable water wells have no H-3 (Table 14-6). Although there was one slightly positive value, it was below the MDC. It is concluded that this is a false positive.

The only monitoring wells to show consistent, detectable H-3 are the two (GW15, GW-16) in the flow path from the retention pond area to the lake (Table 14-7). The highest H-3 concentrations occur at GS-15, the well closest to the former retention pond.

Table 14-6
2009 Potable Well Water Tritium
H-3 Concentration (pCi/l)

Month	EIC WELL GW-04	Warehouse 6 Well GW-05	SBCC Well GW-06	**MDC**
Jan	ND	ND	ND	
Feb	ND			
Mar	104 ± 89			<158
Apr	ND	ND	ND	
May	ND			
Jun	ND			
Jul	ND	ND	ND	
Aug	ND			
Sep	ND			
Oct	ND	ND	ND	
Nov	ND			
Dec	NS			

ND=Not Detected NS=No Sample

Table 14-7
2009 Monitoring Well Water Tritium
H-3 Concentration (pCi/l)

Month	MW-01 GW-11	MW-02 GW-12	MW-06 GW-13	MW-05 GW-14	MW-04 GW-15	MW-03 GW-16	**MDC**
Jan	105 ± 81	ND	ND	173 ± 84	423 ± 96	131 ± 82	<152
Feb	108 ± 81	ND	ND	101 ± 80	566 ± 102	NS	<151
Mar	123 ± 98	ND	131 ± 83	150 ± 84	615 ± 105	382 ± 95	<152
Apr	90 ± 83	ND	103 ± 83	ND	446 ± 100	244 ± 91	<157
May	ND	ND	ND ±	ND	379 ± 99	138 ± 88	<162
Jun	ND ±	ND	116 ± 84	ND	387 ± 96	175 ± 87	<149
Jul	82 ± 75	ND	137 ± 78	ND	423 ± 91	215 ± 82	<149
Aug	149 ± 80	ND	82 ± 76	ND	495 ± 96	216 ± 83	<145
Sep	ND	ND	ND	ND	452 ± 97	230 ± 87	<152
Oct	NS	NS	NS	NS	NS	NS	
Nov	ND	ND	ND	174 ± 101	410 ± 109	272 ± 104	<155
	145 ± 96	ND ±	ND	114 ± 94	503 ± 110	296 ± 102	<147
Dec	140 ± 103	ND	127 ± 103	144 ± 103	452 ± 114	325 ± 110	<161

NOTE: MW-01 through MW-06 obtained on 11/5/2009 and on 11/21/2009

14.6 Miscellaneous Sampling

In addition to groundwater, analyses have been made of precipitation, rainwater and snow. These H-3 measurements were undertaken in order to obtain information on potential background levels of tritium. Another reason for sampling the rainwater is to determine whether it is possible to see the outwash of atmospheric H-3 releases from PBNP. A condensate sample from the air conditioner's condenser located on the roof of the South Service Building yielded 3000 pCi/l. Samplers are located at the Site Boundary Control Center (E-04), which is located in the highest χ/Q sector and near the western (E-03) and northern (E-04) boundaries. Results do not indicate any significant washout of H-3 at the site boundary (Table 14-8).

Table 14-8
2009 Precipitation H-3

DATE	E-02 pCi/l	E-02 2σ	E-03 pCi/l	E-03 2σ	E-04 pCi/l	E-04 2σ	Collection DATE
Jan	95.3	51.6	128.2	51.6	93.1.	51.6	2/4/2009
Feb	79.6	51.6	70.9	51.6	49.6	51.6	3/4/2009
Mar	53.1	51.6	133.7	51.6	51.9	51.6	4/8/2009
Apr	100.2	51.6	54.8	51.6	38.7	51.6	5/6/2009
May	75.7	51.6	59.3	51.6	52.2	51.6	6/11/2009
June	53.2	51.6	88.9	51.6	65.1	51.6	7/8/2009
July	74.1	51.6	41.2	51.6	41.2	51.6	8/5/2009
August	29	51.6	58.9	51.6	70.2	51.6	9/9/2009
Sept	30.6	51.6	47.0	51.6	60.9	51.6	10/7/2009
Oct	60.6	51.6	45.4	51.6	57.7	51.6	11/3/2009
Nov	<19.3	51.6	30.3	51.6	31.2	51.6	12/9/2009
Dec	55.5	51.6	137.5	51.6	41.2	51.6	1/7/2009

15.0 GROUNDWATER SUMMARY

Groundwater monitoring indicates that low levels of tritium continues 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. Except for the monitoring wells downstream from the former retention pond, the monitoring well tritium concentrations are not different from zero.

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

APPENDIX 1

Environmental, Inc. Midwest Laboratory
Final Report for the Point Beach Nuclear Plant
and
Other Analyses
Reporting Period: January – December 2009

Environmental, Inc.
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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

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POINT BEACH NUCLEAR PLANT

1.0 INTRODUCTION

The following constitutes the final 2009 Monthly Progress Report for the Environmental Radiological Monitoring Program conducted at the Point Beach Nuclear Plant, Two Rivers, Wisconsin. Results of analyses are presented in the attached tables. Data tables reflect sample analysis results for both Technical Specification requirements and Special Interest locations and samples are randomly selected within the Program monitoring area to provide additional data for cross-comparisons.

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

All concentrations, except gross beta, are decay corrected 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
MI	E-11	01-14-09	Funk Farm no longer in dairy cow business.
LW	E-01	01-13-09	Sample not sent; assumed frozen.
LW	E-05	01-13-09	Sample not sent; assumed frozen.
LW	E-06	01-13-09	Sample not sent; assumed frozen.
LW	E-01	02-12-09	Sample lost in transit.
AP/AI	E-03	04-29-09	No power to sampler.
AP/AI	E-20	07-22-09	No power to sampler due to construction in area.
AP/AI	E-20	07-29-09	No power to sampler.
AP/AI	E-06	12-09-09	No power to sampler due to snowstorm.
LW	E-33a	12-17-09	Unable to obtain due to snow accumulation.

NOTE: Page 3 is intentionally left out.

3.0 Data Tables

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

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
01-07-09	339	0.042 ± 0.004	< 0.021
01-14-09	294	0.030 ± 0.004	< 0.011
01-21-09	292	0.033 ± 0.004	< 0.007
01-28-09	291	0.055 ± 0.004	< 0.006
02-04-09	293	0.039 ± 0.004	< 0.014
02-11-09	294	0.040 ± 0.004	< 0.005
02-18-09	293	0.033 ± 0.004	< 0.010
02-25-09	293	0.032 ± 0.004	< 0.011
03-04-09	295	0.031 ± 0.004	< 0.010
03-11-09	292	0.039 ± 0.004	< 0.005
03-18-09	292	0.034 ± 0.004	< 0.016
03-25-09	294	0.027 ± 0.004	< 0.010
04-01-09	293	0.019 ± 0.003	< 0.011
1st Quarter Mean ± s.d.		0.035 ± 0.009	< 0.011
04-08-09	297	0.023 ± 0.003	< 0.011 [a]
04-15-09	290	0.025 ± 0.004	< 0.013
04-22-09	293	0.021 ± 0.003	< 0.013
04-29-09	293	0.016 ± 0.003	< 0.014
05-06-09	293	0.023 ± 0.003	< 0.010
05-13-09	295	0.025 ± 0.003	< 0.012
05-20-09	293	0.019 ± 0.003	< 0.007
05-27-09	294	0.022 ± 0.003	< 0.018
06-03-09	293	0.010 ± 0.003	< 0.013
06-10-09	301	0.014 ± 0.003	< 0.011
06-17-09	291	0.017 ± 0.003	< 0.013
06-24-09	293	0.022 ± 0.003	< 0.020
07-01-09	294	0.026 ± 0.004	< 0.008
2nd Quarter Mean ± s.d.		0.020 ± 0.005	< 0.013

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
07-08-09	296	0.012 ± 0.003	< 0.010
07-15-09	291	0.019 ± 0.003	< 0.010
07-22-09	293	0.012 ± 0.003	< 0.023
07-29-09	294	0.019 ± 0.003	< 0.011
08-05-09	291	0.023 ± 0.003	< 0.007
08-13-09	326	0.028 ± 0.003	< 0.015
08-20-09	290	0.037 ± 0.004	< 0.011
08-26-09	268	0.015 ± 0.003	< 0.009
09-02-09	308	0.019 ± 0.003	< 0.014
09-09-09	296	0.050 ± 0.004	< 0.009
09-17-09	347	0.050 ± 0.004	< 0.008
09-23-09	258	0.021 ± 0.004	< 0.018
09-30-09	303	0.019 ± 0.003	< 0.010
3rd Quarter Mean ± s.d.		0.025 ± 0.013	< 0.012
10-07-09	301	0.009 ± 0.003	< 0.016
10-14-09	308	0.012 ± 0.003	< 0.008
10-22-09	339	0.020 ± 0.003	< 0.014
10-28-09	266	0.013 ± 0.003	< 0.012
11-03-09	255	0.022 ± 0.003	< 0.010
11-11-09	353	0.025 ± 0.003	< 0.008
11-18-09	296	0.027 ± 0.003	< 0.008
11-25-09	303	0.041 ± 0.004	< 0.018
12-02-09	299	0.023 ± 0.003	< 0.007
12-09-09	305	0.019 ± 0.003	< 0.008
12-16-09	317	0.045 ± 0.004	< 0.020
12-23-09	323	0.032 ± 0.003	< 0.017
12-30-09	321	0.025 ± 0.003	< 0.021
4th Quarter Mean ± s.d.		0.024 ± 0.010	< 0.013
Cumulative Average		0.026 ± 0.011	< 0.012

[a] Gross beta recounted.

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
01-07-09	324	0.037 ± 0.004	< 0.021
01-14-09	283	0.033 ± 0.004	< 0.012
01-21-09	279	0.036 ± 0.004	< 0.007
01-28-09	279	0.055 ± 0.005	< 0.006
02-04-09	281	0.038 ± 0.004	< 0.015
02-11-09	282	0.038 ± 0.004	< 0.005
02-18-09	282	0.028 ± 0.004	< 0.011
02-25-09	281	0.036 ± 0.004	< 0.011
03-04-09	282	0.030 ± 0.004	< 0.010
03-11-09	280	0.026 ± 0.004	< 0.005
03-18-09	280	0.041 ± 0.004	< 0.016
03-25-09	281	0.026 ± 0.004	< 0.011
04-01-09	281	0.021 ± 0.003	< 0.011
1st Quarter Mean ± s.d.		0.034 ± 0.009	< 0.011
04-08-09	284	0.008 ± 0.002	< 0.011 [a]
04-15-09	279	0.022 ± 0.003	< 0.013
04-22-09	281	0.018 ± 0.003	< 0.014
04-29-09	272	0.013 ± 0.003	< 0.015
05-06-09	281	0.025 ± 0.004	< 0.011
05-13-09	283	0.021 ± 0.003	< 0.012
05-20-09	281	0.020 ± 0.003	< 0.007
05-27-09	282	0.025 ± 0.004	< 0.019
06-03-09	281	0.013 ± 0.003	< 0.013
06-10-09	284	0.015 ± 0.003	< 0.011
06-17-09	278	0.014 ± 0.003	< 0.014
06-24-09	281	0.025 ± 0.004	< 0.021
07-01-09	282	0.020 ± 0.003	< 0.009
2nd Quarter Mean ± s.d.		0.018 ± 0.005	< 0.013

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
07-08-09	283	0.015 ± 0.003	< 0.010
07-15-09	279	0.020 ± 0.003	< 0.011
07-22-09	280	0.014 ± 0.003	< 0.024
07-29-09	282	0.022 ± 0.003	< 0.011
08-05-09	282	0.022 ± 0.003	< 0.008
08-13-09	311	0.025 ± 0.003	< 0.016
08-20-09	229	0.039 ± 0.005	< 0.014
08-26-09	294	0.017 ± 0.003	< 0.008
09-02-09	307	0.018 ± 0.003	< 0.014
09-09-09	297	0.042 ± 0.004	< 0.009
09-17-09	305	0.050 ± 0.004	< 0.010
09-23-09	300	0.024 ± 0.003	< 0.016
09-30-09	303	0.021 ± 0.003	< 0.010
3rd Quarter Mean ± s.d.		0.025 ± 0.011	< 0.012
10-07-09	306	0.009 ± 0.002	< 0.015
10-14-09	314	0.013 ± 0.003	< 0.008
10-21-09	304	0.023 ± 0.003	< 0.017
10-28-09	301	0.003 ± 0.002	< 0.011 [b]
11-03-09	256	0.020 ± 0.003	< 0.010
11-11-09	353	0.027 ± 0.003	< 0.008
11-18-09	297	0.024 ± 0.003	< 0.008
11-25-09	304	0.039 ± 0.004	< 0.025
12-02-09	299	0.026 ± 0.003	< 0.007
12-09-09	306	0.015 ± 0.003	< 0.008
12-16-09	296	0.045 ± 0.004	< 0.021
12-23-09	297	0.037 ± 0.004	< 0.019
12-30-09	290	0.026 ± 0.003	< 0.023
4th Quarter Mean ± s.d.		0.024 ± 0.012	< 0.014
Cumulative Average		0.026 ± 0.011	< 0.013

[a] Gross beta recounted with a result of 0.006±0.002 pCi/m^3.
[b] Filter light.

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

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
01-07-09	335	0.039 ± 0.004	< 0.021
01-14-09	293	0.029 ± 0.004	< 0.011
01-21-09	292	0.032 ± 0.004	< 0.007
01-28-09	291	0.051 ± 0.004	< 0.006
02-04-09	294	0.034 ± 0.004	< 0.014
02-11-09	294	0.038 ± 0.004	< 0.005
02-18-09	293	0.025 ± 0.003	< 0.010
02-25-09	293	0.033 ± 0.004	< 0.011
03-04-09	294	0.025 ± 0.003	< 0.010
03-11-09	293	0.032 ± 0.004	< 0.005
03-18-09	291	0.035 ± 0.004	< 0.016
03-25-09	293	0.024 ± 0.003	< 0.010
04-01-09	293	0.021 ± 0.003	< 0.011
1st Quarter Mean ± s.d.		0.032 ± 0.008	< 0.011
04-08-09	297	0.020 ± 0.003	< 0.011
04-15-09	290	0.022 ± 0.003	< 0.013
04-22-09	293	0.018 ± 0.003	< 0.013
04-29-09		NS[a]	
05-06-09	293	0.019 ± 0.003	< 0.010
05-13-09	295	0.018 ± 0.003	< 0.012
05-20-09	293	0.013 ± 0.003	< 0.007
05-27-09	294	0.018 ± 0.003	< 0.018
06-03-09	293	0.010 ± 0.003	< 0.013
06-10-09	296	0.010 ± 0.002	< 0.011
06-17-09	292	0.012 ± 0.003	< 0.013
06-24-09	292	0.025 ± 0.003	< 0.020
07-01-09	294	0.014 ± 0.003	< 0.008
2nd Quarter Mean ± s.d.		0.017 ± 0.005	< 0.012

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
07-08-09	295	0.013 ± 0.003	< 0.010
07-15-09	291	0.017 ± 0.003	< 0.010
07-22-09	292	0.012 ± 0.003	< 0.023
07-29-09	294	0.017 ± 0.003	< 0.011
08-05-09	294	0.022 ± 0.003	< 0.007
08-13-09	326	0.021 ± 0.003	< 0.015
08-20-09	283	0.032 ± 0.004	< 0.011
08-26-09	259	0.017 ± 0.003	< 0.009
09-02-09	308	0.018 ± 0.003	< 0.014
09-09-09	298	0.043 ± 0.004	< 0.009
09-17-09	306	0.056 ± 0.004	< 0.010
09-23-09	299	0.022 ± 0.003	< 0.016
09-30-09	304	0.019 ± 0.003	< 0.010
3rd Quarter Mean ± s.d.		0.024 ± 0.013	< 0.012
10-07-09	302	0.011 ± 0.003	< 0.016
10-14-09	307	0.012 ± 0.003	< 0.008
10-21-09	304	0.024 ± 0.003	< 0.017
10-28-09	301	0.014 ± 0.003	< 0.011
11-03-09	256	0.021 ± 0.003	< 0.010
11-11-09	353	0.030 ± 0.003	< 0.008
11-18-09	297	0.027 ± 0.003	< 0.008
11-25-09	304	0.041 ± 0.004	< 0.017
12-02-09	299	0.022 ± 0.003	< 0.007
12-09-09	306	0.016 ± 0.003	< 0.008
12-16-09	301	0.048 ± 0.004	< 0.021
12-23-09	302	0.033 ± 0.004	< 0.019
12-30-09	301	0.024 ± 0.003	< 0.022
4th Quarter Mean ± s.d.		0.025 ± 0.011	< 0.013
Cumulative Average		0.025 ± 0.011	< 0.012

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

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

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
01-07-09	350	0.040 ± 0.004	< 0.020
01-14-09	302	0.027 ± 0.003	< 0.011
01-21-09	301	0.031 ± 0.004	< 0.007
01-28-09	330	0.047 ± 0.004	< 0.005
02-04-09	334	0.032 ± 0.003	< 0.012
02-11-09	333	0.035 ± 0.003	< 0.004
02-18-09	333	0.028 ± 0.003	< 0.009
02-25-09	332	0.032 ± 0.003	< 0.009
03-04-09	317	0.026 ± 0.003	< 0.009
03-11-09	305	0.035 ± 0.004	< 0.005
03-18-09	308	0.033 ± 0.004	< 0.015
03-25-09	311	0.023 ± 0.003	< 0.010
04-01-09	310	0.017 ± 0.003	< 0.010
1st Quarter Mean ± s.d.		0.031 ± 0.008	< 0.010
04-08-09	314	0.017 ± 0.003	< 0.010
04-15-09	307	0.021 ± 0.003	< 0.012
04-22-09	310	0.016 ± 0.003	< 0.012
04-29-09	332	0.012 ± 0.003	< 0.012
05-06-09	332	0.022 ± 0.003	< 0.009
05-13-09	334	0.017 ± 0.003	< 0.010
05-20-09	310	0.008 ± 0.002	< 0.007
05-27-09	311	0.020 ± 0.003	< 0.017
06-03-09	309	0.010 ± 0.003	< 0.012
06-10-09	314	0.012 ± 0.002	< 0.010
06-17-09	320	0.014 ± 0.003	< 0.012
06-24-09	321	0.023 ± 0.003	< 0.019
07-01-09	333	0.016 ± 0.003	< 0.007
2nd Quarter Mean ± s.d.		0.016 ± 0.005	< 0.011

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
07-08-09	329	0.011 ± 0.002	< 0.009
07-15-09	319	0.016 ± 0.003	< 0.009
07-22-09	321	0.011 ± 0.002	< 0.021
07-29-09	317	0.021 ± 0.003	< 0.010
08-05-09	312	0.020 ± 0.003	< 0.007
08-13-09	356	0.025 ± 0.003	< 0.014
08-20-09	315	0.033 ± 0.004	< 0.010
08-26-09	266	0.015 ± 0.003	< 0.009
09-02-09	316	0.018 ± 0.003	< 0.013
09-09-09	306	0.044 ± 0.004	< 0.009
09-17-09	314	0.049 ± 0.004	< 0.009
09-23-09	306	0.020 ± 0.003	< 0.016
09-30-09	312	0.019 ± 0.003	< 0.010
3rd Quarter Mean ± s.d.		0.023 ± 0.012	< 0.011
10-07-09	310	0.009 ± 0.002	< 0.015
10-14-09	315	0.010 ± 0.003	< 0.008
10-21-09	313	0.022 ± 0.003	< 0.016
10-28-09	309	0.013 ± 0.003	< 0.011
11-03-09	263	0.018 ± 0.003	< 0.010
11-11-09	362	0.029 ± 0.003	< 0.008
11-18-09	305	0.025 ± 0.003	< 0.008
11-25-09	312	0.039 ± 0.004	< 0.017
12-02-09	307	0.024 ± 0.003	< 0.007
12-09-09	314	0.017 ± 0.003	< 0.008
12-16-09	309	0.042 ± 0.004	< 0.020
12-23-09	310	0.036 ± 0.004	< 0.018
12-30-09	309	0.026 ± 0.003	< 0.021
4th Quarter Mean ± s.d.		0.024 ± 0.011	< 0.013
Cumulative Average		0.024 ± 0.011	< 0.011

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

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
01-07-09	351	0.040 ± 0.004	< 0.020
01-14-09	301	0.031 ± 0.004	< 0.011
01-21-09	301	0.035 ± 0.004	< 0.007
01-28-09	300	0.045 ± 0.004	< 0.006
02-04-09	304	0.035 ± 0.004	< 0.014
02-11-09	303	0.035 ± 0.004	< 0.005
02-18-09	303	0.026 ± 0.003	< 0.010
02-25-09	302	0.030 ± 0.003	< 0.010
03-04-09	303	0.030 ± 0.004	< 0.010
03-11-09	302	0.033 ± 0.004	< 0.005
03-18-09	300	0.036 ± 0.004	< 0.015
03-25-09	302	0.025 ± 0.003	< 0.010
04-01-09	303	0.019 ± 0.003	< 0.010
1st Quarter Mean ± s.d.		0.032 ± 0.007	< 0.010
04-08-09	305	0.018 ± 0.003	< 0.010
04-15-09	299	0.026 ± 0.003	< 0.012
04-22-09	303	0.020 ± 0.003	< 0.013
04-29-09	301	0.013 ± 0.003	< 0.013
05-06-09	301	0.021 ± 0.003	< 0.010
05-13-09	304	0.019 ± 0.003	< 0.011
05-20-09	302	0.017 ± 0.003	< 0.007
05-27-09	303	0.023 ± 0.003	< 0.017
06-03-09	301	0.010 ± 0.003	< 0.012
06-10-09	306	0.013 ± 0.003	< 0.010
06-17-09	302	0.016 ± 0.003	< 0.012
06-24-09	275	0.029 ± 0.004	< 0.022
07-01-09	303	0.015 ± 0.003	< 0.008
2nd Quarter Mean ± s.d.		0.019 ± 0.005	< 0.012

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
07-08-09	303	0.013 ± 0.002	< 0.010
07-15-09	300	0.016 ± 0.003	< 0.010
07-22-09	302	0.014 ± 0.003	< 0.022
07-29-09	304	0.019 ± 0.003	< 0.010
08-05-09	304	0.021 ± 0.003	< 0.007
08-13-09	339	0.024 ± 0.003	< 0.014
08-20-09	283	0.036 ± 0.004	< 0.011
08-26-09	259	0.017 ± 0.003	< 0.009
09-02-09	308	0.015 ± 0.003	< 0.014
09-09-09	297	0.048 ± 0.004	< 0.009
09-17-09	310	0.050 ± 0.004	< 0.010
09-23-09	295	0.023 ± 0.003	< 0.016
09-30-09	305	0.019 ± 0.003	< 0.010
3rd Quarter Mean ± s.d.		0.024 ± 0.012	< 0.012
10-07-09	303	0.008 ± 0.002	< 0.015
10-14-09	305	0.015 ± 0.003	< 0.008
10-21-09	305	0.020 ± 0.003	< 0.017
10-28-09	300	0.013 ± 0.003	< 0.011
11-03-09	256	0.018 ± 0.003	< 0.010
11-11-09	353	0.030 ± 0.003	< 0.008
11-18-09	297	0.028 ± 0.003	< 0.008
11-25-09	304	0.040 ± 0.004	< 0.010
12-02-09	300	0.021 ± 0.003	< 0.007
12-09-09		NS[a]	
12-16-09	261	0.050 ± 0.005	< 0.024
12-23-09	301	0.036 ± 0.004	< 0.019
12-30-09	301	0.029 ± 0.003	< 0.022
4th Quarter Mean ± s.d.		0.026 ± 0.012	< 0.013
Cumulative Average		0.025 ± 0.011	< 0.012

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

Date Collected	Vol. (m^3)	Gross Beta	I-131	Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030	Required LLD		0.010	0.030
01-07-09	351	0.038 ± 0.004	< 0.020	07-08-09	304	0.014 ± 0.003	< 0.010
01-14-09	301	0.032 ± 0.004	< 0.011	07-15-09	299	0.016 ± 0.003	< 0.010
01-21-09	301	0.035 ± 0.004	< 0.007	07-22-09		NS[a]	
01-28-09	300	0.055 ± 0.004	< 0.006	07-29-09		NS[a]	
02-04-09	304	0.035 ± 0.004	< 0.014	08-05-09	304	0.021 ± 0.003	< 0.007
02-11-09	304	0.039 ± 0.004	< 0.005	08-13-09	348	0.023 ± 0.003	< 0.014
02-18-09	302	0.031 ± 0.004	< 0.010	08-20-09	295	0.030 ± 0.004	< 0.010
02-25-09	303	0.034 ± 0.004	< 0.010	08-26-09	262	0.015 ± 0.003	< 0.009
				09-02-09	305	0.018 ± 0.003	< 0.014
03-04-09	302	0.025 ± 0.003	< 0.010				
03-11-09	302	0.035 ± 0.004	< 0.005	09-09-09	300	0.045 ± 0.004	< 0.009
03-18-09	301	0.039 ± 0.004	< 0.015	09-17-09	347	0.043 ± 0.004	< 0.008
03-25-09	302	0.022 ± 0.003	< 0.010	09-23-09	255	0.023 ± 0.004	< 0.019
04-01-09	302	0.019 ± 0.003	< 0.011	09-30-09	305	0.020 ± 0.003	< 0.010
1st Quarter Mean ± s.d.		0.034 ± 0.009	< 0.010	3rd Quarter Mean ± s.d.		0.024 ± 0.011	< 0.011
04-08-09	305	0.017 ± 0.003	< 0.010	10-07-09	303	0.009 ± 0.003	< 0.015
04-15-09	300	0.020 ± 0.003	< 0.012	10-14-09	305	0.011 ± 0.003	< 0.008
04-22-09	303	0.019 ± 0.003	< 0.013	10-21-09	305	0.022 ± 0.003	< 0.017
04-29-09	301	0.012 ± 0.003	< 0.013	10-28-09	301	0.016 ± 0.003	< 0.011
				11-03-09	260	0.023 ± 0.003	< 0.010
05-06-09	304	0.024 ± 0.003	< 0.010				
05-13-09	302	0.016 ± 0.003	< 0.011	11-11-09	349	0.037 ± 0.003	< 0.008
05-20-09	302	0.017 ± 0.003	< 0.007	11-18-09	297	0.029 ± 0.003	< 0.008
05-27-09	303	0.019 ± 0.003	< 0.017	11-25-09	305	0.034 ± 0.004	< 0.013
06-03-09	302	0.011 ± 0.003	< 0.012	12-02-09	299	0.025 ± 0.003	< 0.007
06-10-09	304	0.012 ± 0.003	< 0.010	12-09-09	306	0.016 ± 0.003	< 0.008
06-17-09	212	0.021 ± 0.004	< 0.018	12-16-09	300	0.052 ± 0.004	< 0.021
06-24-09	300	0.026 ± 0.003	< 0.020	12-23-09	302	0.039 ± 0.004	< 0.019
07-01-09	303	0.015 ± 0.003	< 0.008	12-30-09	300	0.029 ± 0.003	< 0.022
2nd Quarter Mean ± s.d.		0.018 ± 0.004	< 0.012	4th Quarter Mean ± s.d.		0.026 ± 0.012	< 0.013
				Cumulative Average		0.026 ± 0.011	< 0.012
				All Locations Annual Mean ± s.d.		**0.025 ± 0.011**	**< 0.012**

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

POINT BEACH NUCLEAR PLANT

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

Units: pCi/m^3

Location	Lab Code Req. LLD	Be-7 -	Be-7 MDC	Cs-134 0.01	Cs-134 MDC	Cs-137 0.01	Cs-137 MDC	(Other) Co-60 (0.10)	(Other) (Co-60) MDC	Volume m^3
				1st Quarter						
E-01	EAP- 1427	0.083 ± 0.014	-	-0.0002 ± 0.0006	< 0.0005	-0.0001 ± 0.0005	< 0.0006	0.0005 ± 0.0006	< 0.0010	3854
E-02	- 1428	0.056 ± 0.072	-	0.0014 ± 0.0008	< 0.0007	-0.0002 ± 0.0005	< 0.0006	-0.0001 ± 0.0005	< 0.0008	3696
E-03	- 1429	0.099 ± 0.015	-	0.0000 ± 0.0006	< 0.0008	0.0004 ± 0.0005	< 0.0007	0.0004 ± 0.0004	< 0.0008	3850
E-04	- 1430	0.080 ± 0.015	-	-0.0002 ± 0.0004	< 0.0005	0.0001 ± 0.0005	< 0.0005	-0.0001 ± 0.0006	< 0.0007	4165
E-08	- 1431	0.085 ± 0.013	-	-0.0003 ± 0.0004	< 0.0006	-0.0002 ± 0.0005	< 0.0009	-0.0002 ± 0.0005	< 0.0006	3974
E-20	- 1432	0.088 ± 0.012	-	0.0002 ± 0.0004	< 0.0007	-0.0001 ± 0.0003	< 0.0005	-0.0003 ± 0.0004	< 0.0004	3975
				2nd Quarter						
E-01	EAP- 3841	0.088 ± 0.015	-	0.0000 ± 0.0004	< 0.0008	0.0001 ± 0.0005	< 0.0007	0.0001 ± 0.0005	< 0.0007	3818
E-02	- 3842	0.090 ± 0.011	-	-0.0001 ± 0.0002	< 0.0004	-0.0001 ± 0.0003	< 0.0004	0.0001 ± 0.0003	< 0.0006	3648
E-03	- 3843	0.084 ± 0.016	-	0.0002 ± 0.0004	< 0.0008	0.0001 ± 0.0004	< 0.0007	0.0000 ± 0.0005	< 0.0007	3521
E-04	- 3844	0.075 ± 0.014	-	0.0000 ± 0.0004	< 0.0002	0.0000 ± 0.0005	< 0.0004	-0.0001 ± 0.0005	< 0.0003	4147
E-08	- 3845	0.082 ± 0.016	-	-0.0004 ± 0.0006	< 0.0009	0.0009 ± 0.0005	< 0.0007	0.0002 ± 0.0006	< 0.0007	3906
E-20	- 3846	0.088 ± 0.016	-	0.0000 ± 0.0005	< 0.0007	-0.0005 ± 0.0006	< 0.0007	0.0005 ± 0.0004	< 0.0008	3839
				3rd Quarter						
E-01	EAP- 5790	0.095 ± 0.014	-	-0.0001 ± 0.0003	< 0.0006	0.0002 ± 0.0003	< 0.0007	0.0001 ± 0.0005	< 0.0008	3859
E-02	- 5791	0.082 ± 0.017	-	-0.0003 ± 0.0005	< 0.0005	-0.0002 ± 0.0006	< 0.0006	-0.0001 ± 0.0006	< 0.0005	3753
E-03	- 5792	0.090 ± 0.015	-	-0.0002 ± 0.0004	< 0.0007	0.0001 ± 0.0005	< 0.0007	-0.0002 ± 0.0005	< 0.0006	3848
E-04	- 5793	0.067 ± 0.012	-	0.0002 ± 0.0003	< 0.0006	0.0000 ± 0.0004	< 0.0007	0.0000 ± 0.0004	< 0.0003	4088
E-08	- 5794	0.091 ± 0.019	-	0.0000 ± 0.0005	< 0.0009	-0.0001 ± 0.0005	< 0.0007	0.0007 ± 0.0005	< 0.0007	3907
E-20	- 5795	0.094 ± 0.020	-	0.0001 ± 0.0006	< 0.0007	0.0000 ± 0.0006	< 0.0008	0.0001 ± 0.0008	< 0.0008	3323
				4th Quarter						
E-01	EAP- 7164	0.058 ± 0.013	-	-0.0007 ± 0.0005	< 0.0006	0.0000 ± 0.0006	< 0.0008	0.0009 ± 0.0006	< 0.0008	3986
E-02	- 7165	0.069 ± 0.015	-	0.0001 ± 0.0005	< 0.0004	0.0002 ± 0.0005	< 0.0006	0.0006 ± 0.0004	< 0.0005	3922
E-03	- 7166	0.059 ± 0.015	-	-0.0004 ± 0.0005	< 0.0005	0.0001 ± 0.0005	< 0.0007	0.0001 ± 0.0005	< 0.0005	3932
E-04	- 7168	0.063 ± 0.012	-	0.0000 ± 0.0005	< 0.0007	0.0002 ± 0.0005	< 0.0009	0.0000 ± 0.0005	< 0.0006	4037
E-08	- 7169	0.072 ± 0.016	-	-0.0001 ± 0.0005	< 0.0007	-0.0004 ± 0.0006	< 0.0007	-0.0005 ± 0.0009	< 0.0010	3585
E-20	- 7170	0.055 ± 0.011	-	-0.0002 ± 0.0003	< 0.0004	0.0001 ± 0.0004	< 0.0006	-0.0005 ± 0.0004	< 0.0004	3930
Annual Mean±s.d.		**0.079 ± 0.013**		***0.0000 ± 0.0004***		***0.0000 ± 0.0003***		***0.0001 ± 0.0004***		

Table 3. *Radioactivity in milk samples*

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-11 Lambert Dairy Farm[b]

		MDC		MDC		MDC	Required LLD
Collection Date	01-14-09		02-11-09		03-12-09		
Lab Code	NS[a]		EMI- 449		EMI- 810		
Sr-89	-	-	0.1 ± 0.9	< 0.7	0.7 ± 0.9	< 0.6	5.0
Sr-90	-	-	1.0 ± 0.4	< 0.6	1.0 ± 0.4	< 0.6	1.0
I-131	-	-	0.06 ± 0.20	< 0.35	0.15 ± 0.17	< 0.31	0.5
K-40	-	-	1376 ± 95	-	1365 ± 99	-	
Cs-134	-	-	0.9 ± 1.6	< 3.0	0.3 ± 1.7	< 2.3	5.0
Cs-137	-	-	0.5 ± 2.0	< 2.9	0.7 ± 2.0	< 3.3	5.0
Ba-La-140	-	-	-1.2 ± 1.7	< 1.9	0.5 ± 1.7	< 2.7	5.0
Other (Co-60)	-	-	0.8 ± 1.8	< 2.4	-0.7 ± 2.0	< 2.0	15.0

							Required LLD
Collection Date	04-08-09		05-06-09		06-10-09		
Lab Code	EMI- 1224		EMI- 2084		EMI- 2814		
Sr-89	-0.3 ± 0.8	< 0.7	-0.3 ± 0.9	< 0.8	-0.7 ± 1.0	< 0.8	5.0
Sr-90	1.3 ± 0.3	< 0.5	0.8 ± 0.3	< 0.5	1.1 ± 0.4	< 0.5	1.0
I-131	0.22 ± 0.22	< 0.38	0.15 ± 0.18	< 0.31	0.07 ± 0.16	< 0.28	0.5
K-40	1316 ± 92	-	1351 ± 102	-	1339 ± 103	-	
Cs-134	0.7 ± 1.6	< 2.9	-1.5 ± 1.7	< 2.5	-1.5 ± 2.2	< 3.3	5.0
Cs-137	1.5 ± 1.8	< 3.4	0.1 ± 2.1	< 3.3	0.6 ± 2.1	< 3.5	5.0
Ba-La-140	1.5 ± 1.6	< 2.5	-0.8 ± 1.7	< 2.7	0.5 ± 2.0	< 3.0	5.0
Other (Co-60)	-0.3 ± 1.7	< 2.2	0.2 ± 2.2	< 2.0	2.7 ± 2.1	< 3.3	15.0

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

POINT BEACH NUCLEAR PLANT

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-11 Lambert Dairy Farm

Collection Date	07-08-09	MDC	08-12-09	MDC	09-09-09	MDC	Required LLD
Lab Code	EMI- 3386		EMI- 4238		EMI- 4678		
Sr-89	-0.9 ± 1.4	< 1.1	0.9 ± 1.3	< 1.2	0.0 ± 0.9	< 0.7	5.0
Sr-90	1.4 ± 0.3	< 0.4	0.8 ± 0.3	< 0.6	1.4 ± 0.3	< 0.4	1.0
I-131	0.13 ± 0.16	< 0.28	0.03 ± 0.16	< 0.24	-0.05 ± 0.15	< 0.28	0.5
K-40	1376 ± 100	-	1408 ± 113	-	1376 ± 108	-	
Cs-134	-0.7 ± 1.7	< 3.3	-1.9 ± 1.9	< 3.4	-0.9 ± 1.8	< 2.4	5.0
Cs-137	1.0 ± 1.9	< 2.9	0.4 ± 2.3	< 2.2	0.7 ± 2.0	< 3.3	5.0
Ba-La-140	-0.1 ± 1.6	< 1.7	0.4 ± 1.7	< 2.1	0.6 ± 1.5	< 1.7	5.0
Other (Co-60)	0.6 ± 2.0	< 3.1	0.4 ± 2.4	< 3.2	3.1 ± 2.1	< 3.0	15.0

Collection Date	10-14-09		11-11-09		12-09-09		Required LLD
Lab Code	EMI- 5522		EMI- 6280		EMI- 6757		
Sr-89	0.4 ± 1.0	< 0.9	-0.4 ± 0.8	< 0.7	-0.4 ± 1.0	< 0.8	5.0
Sr-90	0.6 ± 0.4	< 0.6	0.9 ± 0.3	< 0.5	1.3 ± 0.4	< 0.5	1.0
I-131	-0.07 ± 0.17	< 0.31	0.08 ± 0.15	< 0.28	-0.02 ± 0.16	< 0.29	0.5
K-40	1348 ± 117	-	1200 ± 102	-	1348 ± 100	-	
Cs-134	0.9 ± 1.7	< 3.3	1.4 ± 2.0	< 2.9	-0.3 ± 1.7	< 3.0	5.0
Cs-137	-0.7 ± 2.3	< 3.4	1.6 ± 2.5	< 4.8	-0.5 ± 2.1	< 2.6	5.0
Ba-La-140	0.7 ± 1.7	< 1.4	0.3 ± 1.8	< 1.5	-1.9 ± 1.8	< 1.7	5.0
Other (Co-60)	2.2 ± 1.8	< 2.5	0.5 ± 2.0	< 3.0	-0.5 ± 2.0	< 2.6	15.0

POINT BEACH NUCLEAR PLANT

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-21 Strutz Dairy Farm

Collection Date	01-14-09	MDC	02-12-09	MDC	03-11-09	MDC	Required LLD
Lab Code	EMI- 90		EMI- 450		EMI- 788		
Sr-89	0.6 ± 1.0	< 0.7	0.1 ± 0.7	< 0.8	0.6 ± 1.0	< 0.8	5.0
Sr-90	0.9 ± 0.4	< 0.6	0.6 ± 0.3	< 0.5	0.8 ± 0.5	< 0.8	1.0
I-131	0.03 ± 0.17	< 0.03	0.06 ± 0.14	< 0.21	-0.16 ± 0.18	< 0.38	0.5
K-40	1400 ± 120	-	1348 ± 96	-	1345 ± 106	-	
Cs-134	0.1 ± 2.1	< 3.4	-0.2 ± 1.5	< 3.2	-0.4 ± 1.8	< 3.2	5.0
Cs-137	-0.8 ± 2.1	< 2.1	0.9 ± 1.5	< 3.1	-1.4 ± 2.0	< 2.3	5.0
Ba-La-140	-1.5 ± 1.7	< 2.3	-0.1 ± 1.4	< 1.7	0.7 ± 1.9	< 1.9	5.0
Other (Co-60)	-0.1 ± 2.4	< 3.1	0.0 ± 2.0	< 3.2	-0.3 ± 2.1	< 3.3	15.0

Collection Date	04-08-09		05-06-09		06-10-09		Required LLD
Lab Code	EMI- 1225		EMI- 2085		EMI- 2815		
Sr-89	0.7 ± 0.7	< 0.8	0.2 ± 0.9	< 0.9	0.1 ± 0.9	< 0.9	5.0
Sr-90	0.2 ± 0.2	< 0.5	0.5 ± 0.3	< 0.5	0.6 ± 0.3	< 0.5	1.0
I-131	0.12 ± 0.19	< 0.33	0.03 ± 0.26	< 0.50	-0.08 ± 0.16	< 0.30	0.5
K-40	1381 ± 115	-	1357 ± 117	-	1428 ± 99	-	
Cs-134	-0.6 ± 1.9	< 3.0	-1.3 ± 1.8	< 2.8	-0.1 ± 1.8	< 2.6	5.0
Cs-137	-0.2 ± 2.1	< 4.3	-0.5 ± 2.1	< 3.6	0.4 ± 1.7	< 2.6	5.0
Ba-La-140	0.2 ± 1.7	< 1.4	-0.2 ± 1.7	< 2.1	0.9 ± 1.5	< 2.2	5.0
Other (Co-60)	0.9 ± 2.1	< 2.5	1.9 ± 2.5	< 3.7	2.1 ± 1.8	< 3.1	15.0

POINT BEACH NUCLEAR PLANT

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-21 Strutz Dairy Farm

Collection Date	07-08-09	MDC	08-12-09	MDC	09-09-09	MDC	Required LLD
Lab Code	EMI- 3387		EMI- 4239		EMI- 4679		
Sr-89	-0.1 ± 1.1	< 1.3	-1.5 ± 1.1	< 1.0	0.2 ± 0.7	< 0.7	5.0
Sr-90	0.4 ± 0.3	< 0.5	0.9 ± 0.3	< 0.5	0.5 ± 0.3	< 0.4	1.0
I-131	0.01 ± 0.15	< 0.27	0.10 ± 0.17	< 0.31	0.00 ± 0.18	< 0.33	0.5
K-40	1505 ± 115	-	1530 ± 110	-	1495 ± 116	-	
Cs-134	-1.9 ± 1.9	< 2.1	0.4 ± 1.9	< 3.3	0.5 ± 1.4	< 2.5	5.0
Cs-137	0.1 ± 2.3	< 3.0	0.4 ± 2.2	< 4.0	0.3 ± 1.8	< 3.2	5.0
Ba-La-140	-0.8 ± 2.1	< 2.6	0.7 ± 1.7	< 3.4	-1.1 ± 1.4	< 1.8	5.0
Other (Co-60)	1.2 ± 2.1	< 3.4	-0.1 ± 2.3	< 3.4	0.2 ± 2.1	< 3.8	15.0

Collection Date	10-14-09		11-11-09		12-09-09		Required LLD
Lab Code	EMI- 5524		EMI- 6281		EMI- 6758		
Sr-89	-0.4 ± 0.9	< 0.8	0.1 ± 0.7	< 0.9	0.1 ± 0.9	< 0.9	5.0
Sr-90	0.7 ± 0.4	< 0.6	0.3 ± 0.3	< 0.5	0.6 ± 0.3	< 0.6	1.0
I-131	0.00 ± 0.14	< 0.25	0.08 ± 0.12	< 0.17	0.04 ± 0.14	< 0.25	0.5
K-40	1396 ± 118	-	1376 ± 108	-	1403 ± 107	-	
Cs-134	-0.5 ± 1.4	< 2.3	-1.6 ± 1.7	< 2.2	0.8 ± 1.7	< 3.1	5.0
Cs-137	1.0 ± 2.1	< 4.6	1.1 ± 2.1	< 3.8	0.8 ± 2.1	< 3.4	5.0
Ba-La-140	-1.4 ± 1.9	< 1.3	1.7 ± 1.8	< 1.2	-2.6 ± 1.7	< 2.0	5.0
Other (Co-60)	1.0 ± 2.2	< 3.7	-1.3 ± 1.9	< 2.4	0.6 ± 2.2	< 3.8	15.0

Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-40 Barta

		MDC		MDC		MDC	Required LLD
Collection Date	01-14-09		02-11-09		03-11-09		
Lab Code	EMI- 91		EMI- 451		EMI- 789		
Sr-89	-0.5 ± 1.2	< 1.0	-0.6 ± 0.8	< 0.8	0.3 ± 0.7	< 0.7	5.0
Sr-90	1.1 ± 0.5	< 0.8	1.0 ± 0.4	< 0.5	0.8 ± 0.3	< 0.5	1.0
I-131	0.04 ± 0.17	< 0.30	0.15 ± 0.22	< 0.32	0.10 ± 0.18	< 0.35	0.5
K-40	1343 ± 103	-	1318 ± 104	-	1365 ± 97	-	
Cs-134	0.4 ± 1.5	< 3.2	0.4 ± 1.7	< 2.7	-0.7 ± 1.6	< 2.3	5.0
Cs-137	0.0 ± 1.8	< 2.9	-0.8 ± 2.1	< 3.2	-0.6 ± 1.7	< 2.4	5.0
Ba-La-140	-2.2 ± 1.9	< 1.7	-0.2 ± 1.6	< 1.7	-0.2 ± 1.3	< 1.4	5.0
Other (Co-60)	-0.1 ± 2.2	< 4.2	1.8 ± 2.3	< 3.6	0.1 ± 1.7	< 2.2	15.0

							Required LLD
Collection Date	04-08-09		05-06-09		06-10-09		
Lab Code	EMI- 1226		EMI- 2086		EMI- 2816		
Sr-89	0.1 ± 0.7	< 0.7	-0.7 ± 1.0	< 0.8	-0.2 ± 0.9	< 0.8	5.0
Sr-90	0.6 ± 0.3	< 0.5	1.2 ± 0.3	< 0.5	1.0 ± 0.3	< 0.5	1.0
I-131	0.09 ± 0.16	< 0.29	0.11 ± 0.25	< 0.45	0.16 ± 0.19	< 0.34	0.5
K-40	1443 ± 116	-	1323 ± 98	-	1402 ± 101	-	
Cs-134	0.1 ± 1.7	< 3.7	-0.7 ± 1.7	< 2.3	0.0 ± 1.8	< 2.4	5.0
Cs-137	-0.3 ± 1.8	< 2.8	1.2 ± 2.0	< 4.1	-1.8 ± 1.6	< 1.9	5.0
Ba-La-140	0.2 ± 1.5	< 1.9	-0.4 ± 1.7	< 2.1	-0.9 ± 1.6	< 1.4	5.0
Other (Co-60)	0.1 ± 2.3	< 2.2	-1.0 ± 2.4	< 2.3	0.7 ± 1.6	< 3.1	15.0

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Table 3. Radioactivity in milk samples

Collection: Monthly

Sample Description and Concentration (pCi/L)

E-40 Barta

		MDC		MDC		MDC	Required LLD
Collection Date	07-08-09		08-12-09		09-09-09		
Lab Code	EMI- 3389		EMI- 4240		EMI- 4681		
Sr-89	0.8 ± 1.1	< 1.1	0.5 ± 1.1	< 1.0	0.1 ± 0.9	< 0.8	5.0
Sr-90	0.6 ± 0.3	< 0.4	0.7 ± 0.3	< 0.4	0.6 ± 0.3	< 0.5	1.0
I-131	-0.02 ± 0.14	< 0.25	0.10 ± 0.15	< 0.22	-0.12 ± 0.14	< 0.27	0.5
K-40	1399 ± 117	-	1445 ± 108	-	1432 ± 101	-	
Cs-134	1.6 ± 1.9	< 3.1	0.6 ± 1.7	< 2.5	-0.6 ± 1.9	< 2.8	5.0
Cs-137	-0.7 ± 2.6	< 4.3	0.5 ± 2.0	< 2.1	1.3 ± 1.7	< 2.5	5.0
Ba-La-140	-0.1 ± 1.6	< 2.8	1.8 ± 1.6	< 3.2	-1.5 ± 1.6	< 2.2	5.0
Other (Co-60)	1.8 ± 2.4	< 3.7	0.7 ± 2.2	< 1.8	0.7 ± 1.8	< 1.5	15.0
							Required LLD
Collection Date	10-14-09		11-11-09		12-09-09		
Lab Code	EMI- 5525		EMI- 6282		EMI- 6759		
Sr-89	-0.5 ± 1.2	< 1.0	-0.5 ± 0.8	< 0.8	-0.3 ± 0.9	< 0.8	5.0
Sr-90	1.3 ± 0.4	< 0.7	0.8 ± 0.3	< 0.5	0.7 ± 0.3	< 0.6	1.0
I-131	-0.11 ± 0.16	< 0.30	0.07 ± 0.13	< 0.19	-0.02 ± 0.15	< 0.27	0.5
K-40	1332 ± 110	-	1336 ± 109	-	1335 ± 95	-	
Cs-134	-0.9 ± 1.3	< 2.3	-0.5 ± 1.5	< 2.6	0.7 ± 1.7	< 2.7	5.0
Cs-137	-0.1 ± 1.9	< 3.6	-0.5 ± 1.8	< 3.5	2.4 ± 1.8	< 2.1	5.0
Ba-La-140	-0.3 ± 2.1	< 2.2	0.6 ± 1.7	< 2.0	-1.2 ± 1.7	< 1.4	5.0
Other (Co-60)	0.2 ± 1.8	< 3.8	-1.0 ± 2.0	< 3.1	-0.7 ± 1.9	< 2.3	15.0

Sr-89 Annual Mean + s.d.	**0.0 ± 0.5**
Sr-90 Annual Mean + s.d.	**0.8 ± 0.3**
I-131 Annual Mean + s.d.	**0.04 ± 0.09**
K-40 Annual Mean + s.d.	**1378 ± 61**
Cs-134 Annual Mean + s.d.	**-0.2 ± 0.9**
Cs-137 Annual Mean + s.d.	**0.2 ± 0.9**
Ba-La Annual Mean + s.d.	**-0.2 ± 1.1**
Co-60 Annual Mean + s.d.	**0.5 ± 1.1**

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

	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Req. LLD	Annual Mean s.d
Collection Date	01-19-09	04-16-09	07-16-09	10-17-09	Req.	
Lab Code	EWW- 139	EWW- 1657	EWW- 3633	EWW- 5642	LLD	
Gross Beta	2.2 ± 2.2	0.8 ± 0.6	2.9 ± 2.1	0.8 ± 0.7	4.0	**1.7 ± 1.1**
H-3	-33.0 ± 73.5	48.5 ± 80.6	34.6 ± 71.8	-17.9 ± 82.6	500	**8.1 ± 39.6**
Sr-89	-0.3 ± 0.5	-0.1 ± 0.4	0.3 ± 0.6	0.4 ± 0.6	5.0	**0.1 ± 0.3**
Sr-90	0.2 ± 0.3	0.0 ± 0.2	-0.1 ± 0.2	-0.1 ± 0.2	1.0	**0.0 ± 0.1**
I-131	0.11 ± 0.11	0.06 ± 0.17	0.09 ± 0.14	0.06 ± 0.13	0.5	**0.08 ± 0.02**
Mn-54	0.8 ± 1.9	-0.2 ± 1.5	-0.5 ± 1.9	0.1 ± 1.7	10	**0.1 ± 0.6**
Fe-59	0.2 ± 3.7	1.1 ± 2.8	2.0 ± 3.3	-0.7 ± 3.2	30	**0.6 ± 1.1**
Co-58	0.7 ± 2.0	-0.7 ± 1.5	1.2 ± 1.8	0.1 ± 1.5	10	**0.3 ± 0.8**
Co-60	-1.2 ± 2.4	1.3 ± 1.2	-0.9 ± 1.6	0.2 ± 1.4	10	**-0.2 ± 1.1**
Zn-65	-5.3 ± 5.3	-2.0 ± 4.0	-2.9 ± 4.4	-2.5 ± 4.4	30	**-3.2 ± 1.5**
Zr-Nb-95	-3.4 ± 2.5	-2.3 ± 1.7	-3.2 ± 2.1	-1.8 ± 1.6	15	**-2.6 ± 0.8**
Cs-134	-0.7 ± 2.1	-3.1 ± 1.6	-3.3 ± 1.9	1.5 ± 1.6	10	**-1.4 ± 2.3**
Cs-137	-2.7 ± 2.5	-1.2 ± 1.7	0.5 ± 2.1	0.6 ± 1.7	10	**-0.7 ± 1.6**
Ba-La-140	1.3 ± 2.6	0.7 ± 2.1	-3.7 ± 2.5	0.1 ± 1.8	15	**-0.4 ± 2.2**
Other (Ru-103)	0.6 ± 2.2	-1.6 ± 1.7	-1.3 ± 2.0	-0.4 ± 1.8	30	**-0.7 ± 1.0**

MDC Data

Collection Date	01-19-09	04-16-09	07-16-09	10-17-09	Req.
Lab Code	EWW- 139	EWW- 1657	EWW- 3633	EWW- 5642	LLD
Gross Beta	< 3.0	< 1.1	< 3.9	< 1.2	4.0
H-3	< 143.1	< 157.3	< 148.5	< 158.8	500
Sr-89	< 0.5	< 0.6	< 0.8	< 0.8	5.0
Sr-90	< 0.5	< 0.4	< 0.5	< 0.5	1.0
I-131	< 0.16	< 0.30	< 0.21	< 0.24	0.5
Mn-54	< 3.5	< 1.5	< 2.5	< 2.6	10
Fe-59	< 3.2	< 5.4	< 4.6	< 4.2	30
Co-58	< 3.6	< 1.5	< 2.7	< 2.7	10
Co-60	< 2.4	< 2.2	< 2.4	< 1.9	10
Zn-65	< 7.4	< 5.4	< 5.5	< 7.1	30
Zr-Nb-95	< 2.9	< 2.2	< 2.6	< 1.3	15
Cs-134	< 3.6	< 2.2	< 2.5	< 3.0	10
Cs-137	< 2.6	< 1.9	< 3.5	< 2.9	10
Ba-La-140	< 4.0	< 4.3	< 3.4	< 3.5	15
Other (Ru-103)	< 3.6	< 2.5	< 2.8	< 1.9	30

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

		MDC		MDC		MDC		MDC	
Lab Code	NS[a]		NS[a]		ELW- 799		ELW- 1653		
Date Collected	01-13-09		02-12-09		03-10-09		04-16-09		Req. LLD
Gross beta	-		-		3.4 ± 0.9	< 1.3	1.5 ± 0.6	< 0.9	4.0
I-131	-		-		-0.06 ± 0.15	< 0.27	0.00 ± 0.20	< 0.36	0.5
Be-7	-		-		5.3 ± 14.9	< 26.9	4.8 ± 14.2	< 27.0	
Mn-54	-		-		0.3 ± 1.3	< 2.0	1.3 ± 1.9	< 2.8	10
Fe-59	-		-		0.1 ± 3.5	< 5.3	-0.3 ± 2.9	< 4.3	30
Co-58	-		-		-0.6 ± 1.3	< 1.8	-1.0 ± 1.5	< 2.0	10
Co-60	-		-		0.5 ± 1.5	< 1.3	-0.1 ± 1.8	< 2.3	10
Zn-65	-		-		-2.0 ± 3.3	< 3.3	-2.2 ± 4.1	< 3.6	30
Zr-Nb-95	-		-		0.5 ± 1.4	< 2.3	-0.8 ± 1.7	< 1.8	15
Cs-134	-		-		0.5 ± 1.4	< 2.6	-2.2 ± 1.6	< 2.0	10
Cs-137	-		-		0.3 ± 1.8	< 3.1	-2.2 ± 1.8	< 2.0	10
Ba-La-140	-		-		-1.9 ± 1.5	< 1.2	-0.3 ± 1.6	< 1.4	15
Other (Ru-103)	-		-		0.1 ± 1.9	< 3.5	0.0 ± 1.9	< 3.9	30
Lab Code	ELW- 2306		ELW- 3020		ELW- 3629		ELW- 4252		
Date Collected	05-14-09		06-17-09		07-16-09		08-12-09		Req. LLD
Gross beta	4.0 ± 1.2	< 1.9	1.6 ± 1.1	< 2.0	1.5 ± 0.6	< 0.9	2.0 ± 1.1	< 1.9	4.0
I-131	0.01 ± 0.20	< 0.35	0.18 ± 0.19	< 0.32	0.02 ± 0.16	< 0.28	0.03 ± 0.25	< 0.36	0.5
Be-7	-12.9 ± 14.1	< 29.7	-15.4 ± 14.2	< 17.5	7.8 ± 13.5	< 25.7	-5.8 ± 17.0	< 20.8	
Mn-54	0.8 ± 1.3	< 2.0	0.5 ± 1.6	< 2.1	-0.3 ± 1.5	< 2.3	-0.4 ± 1.7	< 3.0	10
Fe-59	-0.5 ± 2.1	< 2.4	2.6 ± 2.7	< 4.6	2.0 ± 2.9	< 4.5	1.5 ± 3.0	< 4.8	30
Co-58	-0.3 ± 1.3	< 2.5	0.3 ± 1.4	< 2.1	0.5 ± 1.7	< 2.8	-0.2 ± 1.5	< 2.2	10
Co-60	1.2 ± 1.3	< 2.2	-0.1 ± 1.3	< 2.2	0.3 ± 2.0	< 3.8	0.1 ± 1.8	< 0.9	10
Zn-65	-2.4 ± 3.4	< 2.5	3.1 ± 3.5	< 2.5	0.2 ± 2.6	< 2.9	0.3 ± 4.7	< 6.6	30
Zr-Nb-95	0.4 ± 1.4	< 3.2	0.0 ± 1.6	< 2.6	0.1 ± 1.7	< 3.5	0.0 ± 1.6	< 3.9	15
Cs-134	0.2 ± 1.6	< 1.9	0.8 ± 1.4	< 2.3	-1.5 ± 1.8	< 2.3	-0.2 ± 1.8	< 2.5	10
Cs-137	1.9 ± 1.8	< 3.1	0.9 ± 1.8	< 2.9	0.2 ± 2.0	< 3.4	-0.8 ± 2.0	< 3.0	10
Ba-La-140	-5.9 ± 1.7	< 2.4	-2.5 ± 1.8	< 1.4	-1.4 ± 2.0	< 2.3	0.3 ± 2.0	< 3.0	15
Other (Ru-103)	0.9 ± 1.5	< 3.3	0.1 ± 1.7	< 3.6	-0.1 ± 1.8	< 2.2	0.7 ± 2.0	< 3.7	30
Lab Code	ELW- 4940		ELW- 5637		ELW- 6347		ELW- 6876		
Date Collected	09-16-09		10-17-09		11-13-09		12-17-09		Req. LLD
Gross beta	1.2 ± 0.6	< 0.9	1.1 ± 0.6	< 1.0	3.2 ± 2.0	< 3.6	0.8 ± 1.4	< 2.5	4.0
I-131	-0.03 ± 0.14	< 0.26	-0.03 ± 0.14	< 0.26	0.06 ± 0.11	< 0.16	-0.29 ± 0.22	< 0.33	0.5
Be-7	-9.2 ± 18.8	< 33.9	7.9 ± 17.7	< 30.8	2.1 ± 19.6	< 32.5	1.4 ± 16.5	< 23.1	
Mn-54	0.6 ± 1.8	< 3.2	-0.7 ± 1.7	< 2.9	-0.9 ± 2.4	< 3.0	-0.2 ± 1.5	< 1.4	10
Fe-59	2.1 ± 4.0	< 4.4	0.3 ± 3.2	< 3.4	0.2 ± 4.0	< 6.1	0.9 ± 3.1	< 4.8	30
Co-58	-0.4 ± 1.9	< 3.8	-0.6 ± 1.7	< 2.1	-0.9 ± 2.4	< 3.0	-0.3 ± 1.7	< 1.5	10
Co-60	0.8 ± 1.8	< 1.9	1.1 ± 1.5	< 2.0	2.2 ± 2.5	< 2.7	-0.5 ± 2.0	< 2.9	10
Zn-65	1.9 ± 4.5	< 7.5	-4.6 ± 3.7	< 2.9	2.2 ± 4.1	< 5.2	4.3 ± 4.3	< 3.5	30
Zr-Nb-95	1.8 ± 1.5	< 2.7	-1.3 ± 2.1	< 3.2	1.1 ± 2.3	< 4.1	1.2 ± 1.9	< 3.5	15
Cs-134	-0.1 ± 1.8	< 2.6	-0.6 ± 1.8	< 2.8	-0.1 ± 2.0	< 4.1	-0.5 ± 1.8	< 2.7	10
Cs-137	0.9 ± 2.0	< 3.0	-0.9 ± 2.3	< 3.1	3.5 ± 2.7	< 4.3	-1.3 ± 2.1	< 2.3	10
Ba-La-140	1.6 ± 2.2	< 3.2	2.0 ± 1.8	< 1.9	-0.5 ± 2.7	< 4.2	-0.4 ± 1.8	< 2.2	15
Other (Ru-103)	3.4 ± 2.0	< 3.9	0.3 ± 2.1	< 4.1	-1.7 ± 2.3	< 4.2	-1.0 ± 2.0	< 3.5	30

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

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

		MDC		MDC		MDC		MDC	
Lab Code	NS[a]		ELW- 491		ELW- 800		ELW- 1654		
Date Collected	01-13-09		02-12-09		03-10-09		04-16-09		Req. LLD
Gross beta	-		1.7 ± 1.0	< 1.7	2.1 ± 0.7	< 1.2	1.6 ± 0.6	< 0.9	4.0
I-131	-		0.18 ± 0.27	< 0.47	0.08 ± 0.16	< 0.28	-0.06 ± 0.19	< 0.34	0.5
Be-7	-		-15.3 ± 13.1	< 22.4	1.1 ± 15.4	< 26.3	17.0 ± 14.0	< 31.7	
Mn-54	-		1.8 ± 1.8	< 3.4	0.6 ± 1.4	< 1.9	0.4 ± 1.7	< 2.8	10
Fe-59	-		3.1 ± 2.6	< 3.4	-2.7 ± 2.8	< 2.1	-1.2 ± 3.2	< 4.0	30
Co-58	-		-0.2 ± 1.5	< 2.5	-1.2 ± 1.3	< 1.0	-0.6 ± 1.4	< 2.0	10
Co-60	-		-0.3 ± 1.8	< 2.4	0.2 ± 1.3	< 1.4	-0.6 ± 1.6	< 1.3	10
Zn-65	-		-1.9 ± 2.6	< 2.4	-4.3 ± 3.5	< 2.5	1.6 ± 2.9	< 4.1	30
Zr-Nb-95	-		-0.4 ± 1.4	< 2.4	-0.1 ± 1.7	< 3.1	-0.8 ± 1.7	< 2.6	15
Cs-134	-		0.5 ± 1.3	< 2.8	-0.8 ± 1.4	< 2.1	0.0 ± 1.5	< 2.2	10
Cs-137	-		0.4 ± 1.6	< 2.6	-0.6 ± 1.7	< 2.6	-0.6 ± 1.4	< 1.8	10
Ba-La-140	-		0.9 ± 1.1	< 1.6	-0.9 ± 1.8	< 2.2	0.1 ± 1.3	< 1.9	15
Other (Ru-103)	-		0.3 ± 1.5	< 3.4	-2.1 ± 1.8	< 2.5	-0.9 ± 1.3	< 2.2	30
Lab Code	ELW- 2307		ELW- 3021		ELW- 3630		ELW- 4253		
Date Collected	05-14-09		06-17-09		07-16-09		08-12-09		Req. LLD
Gross beta	3.0 ± 1.0	< 1.7	1.7 ± 0.9	< 1.7	1.9 ± 0.6	< 0.7	1.5 ± 0.9	< 1.7	4.0
I-131	0.06 ± 0.23	< 0.44	0.15 ± 0.16	< 0.24	0.08 ± 0.17	< 0.29	0.20 ± 0.23	< 0.35	0.5
Be-7	-13.7 ± 12.9	< 23.2	9.4 ± 15.8	< 29.0	5.0 ± 13.2	< 27.3	0.2 ± 19.9	< 32.5	
Mn-54	-0.4 ± 1.6	< 2.3	-1.2 ± 1.7	< 2.4	-0.5 ± 1.5	< 2.1	-0.8 ± 1.8	< 2.0	10
Fe-59	-1.7 ± 3.0	< 5.7	-0.2 ± 2.9	< 4.1	1.6 ± 2.6	< 5.2	1.6 ± 3.7	< 5.5	30
Co-58	2.3 ± 1.6	< 3.3	1.1 ± 1.7	< 1.9	-0.4 ± 1.7	< 3.2	-0.2 ± 1.8	< 2.0	10
Co-60	-0.2 ± 1.4	< 1.8	1.1 ± 1.8	< 2.9	0.7 ± 1.6	< 2.3	-1.6 ± 1.6	< 1.5	10
Zn-65	-0.3 ± 3.0	< 5.3	1.0 ± 3.9	< 4.9	2.8 ± 3.3	< 5.1	-0.7 ± 4.7	< 5.7	30
Zr-Nb-95	-1.1 ± 1.9	< 4.0	-0.1 ± 1.8	< 2.0	0.1 ± 1.8	< 3.1	1.4 ± 2.0	< 4.4	15
Cs-134	-0.6 ± 1.9	< 2.3	0.8 ± 1.7	< 2.8	-0.5 ± 1.4	< 1.7	0.1 ± 1.9	< 3.9	10
Cs-137	0.5 ± 2.0	< 4.0	-0.4 ± 1.8	< 2.7	1.0 ± 1.9	< 3.4	0.9 ± 2.1	< 3.9	10
Ba-La-140	0.3 ± 1.8	< 9.1	-0.9 ± 2.0	< 2.9	-0.2 ± 1.5	< 1.7	4.5 ± 2.1	< 3.5	15
Other (Ru-103)	-1.7 ± 1.4	< 2.9	-0.4 ± 2.0	< 3.3	-0.4 ± 1.5	< 3.1	0.5 ± 2.2	< 3.6	30
Lab Code	ELW- 4941		ELW- 5638		ELW- 6348		ELW- 6877		
Date Collected	09-16-09		10-17-09		11-13-09		12-17-09		Req. LLD
Gross beta	1.0 ± 0.5	< 0.8	0.9 ± 0.5	< 0.9	3.0 ± 1.8	< 3.2	2.1 ± 1.3	< 2.3	4.0
I-131	0.07 ± 0.13	< 0.18	-0.06 ± 0.14	< 0.27	0.09 ± 0.11	< 0.16	0.12 ± 0.12	< 0.17	0.5
Be-7	9.6 ± 13.5	< 26.4	-3.9 ± 13.9	< 21.1	-7.5 ± 12.7	< 20.7	4.2 ± 12.9	< 25.8	
Mn-54	0.1 ± 1.5	< 2.3	-0.1 ± 1.6	< 2.4	-0.8 ± 1.5	< 1.6	0.5 ± 1.6	< 3.1	10
Fe-59	-0.5 ± 3.2	< 6.0	-0.3 ± 3.6	< 4.4	-0.4 ± 2.4	< 3.8	-0.9 ± 2.8	< 3.6	30
Co-58	-0.4 ± 1.7	< 2.1	0.4 ± 1.4	< 1.6	-1.0 ± 1.6	< 1.4	-0.1 ± 1.5	< 2.0	10
Co-60	0.4 ± 1.8	< 2.4	2.1 ± 1.9	< 2.7	-0.4 ± 1.3	< 1.7	0.1 ± 1.6	< 2.0	10
Zn-65	-0.5 ± 3.6	< 4.0	-1.1 ± 3.8	< 4.9	-0.1 ± 2.8	< 3.4	1.8 ± 2.9	< 3.7	30
Zr-Nb-95	-0.4 ± 1.7	< 3.6	-2.0 ± 1.8	< 2.1	-1.1 ± 1.7	< 2.1	-0.9 ± 1.6	< 2.7	15
Cs-134	0.8 ± 1.7	< 3.2	-0.6 ± 1.6	< 2.3	0.1 ± 1.3	< 1.8	0.2 ± 1.3	< 2.2	10
Cs-137	0.6 ± 1.8	< 2.9	-0.1 ± 1.8	< 3.3	0.3 ± 1.5	< 3.1	-1.6 ± 1.3	< 1.7	10
Ba-La-140	0.3 ± 1.5	< 2.2	1.0 ± 1.9	< 1.9	-0.5 ± 2.0	< 2.3	-0.1 ± 1.9	< 1.8	15
Other (Ru-103)	-0.2 ± 1.4	< 2.5	-1.2 ± 1.6	< 2.8	0.8 ± 1.4	< 2.9	-0.7 ± 1.5	< 1.7	30

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

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

		MDC		MDC		MDC		MDC	
Lab Code	NS[a]		ELW- 492		ELW- 801		ELW- 1655		
Date Collected	01-13-09		02-12-09		03-10-09		04-16-09		Req. LLD
Gross beta	-		0.4 ± 0.9	< 1.7	2.5 ± 0.8	< 1.3	1.4 ± 0.6	< 0.9	4.0
I-131	-		0.05 ± 0.22	< 0.39	0.02 ± 0.16	< 0.28	0.05 ± 0.18	< 0.32	0.5
Be-7	-		-3.8 ± 14.9	< 26.5	5.6 ± 12.1	< 22.5	10.6 ± 13.4	< 27.4	
Mn-54	-		0.3 ± 1.5	< 2.5	1.3 ± 1.3	< 2.5	0.0 ± 1.3	< 2.0	10
Fe-59	-		-2.1 ± 3.1	< 3.9	2.5 ± 2.0	< 2.5	2.5 ± 2.7	< 5.1	30
Co-58	-		0.3 ± 1.6	< 2.2	1.0 ± 1.4	< 2.4	-0.8 ± 1.6	< 2.2	10
Co-60	-		0.3 ± 1.8	< 2.3	0.5 ± 1.2	< 1.7	-0.8 ± 1.5	< 1.8	10
Zn-65	-		0.7 ± 3.7	< 4.1	2.0 ± 2.7	< 4.2	3.6 ± 2.8	< 2.7	30
Zr-Nb-95	-		-0.2 ± 1.7	< 3.3	-0.1 ± 1.6	< 3.0	-0.3 ± 1.5	< 2.9	15
Cs-134	-		0.4 ± 1.7	< 3.1	-0.7 ± 1.3	< 2.1	0.3 ± 1.6	< 2.8	10
Cs-137	-		-0.5 ± 1.7	< 2.8	1.2 ± 1.4	< 2.4	-1.1 ± 1.7	< 2.1	10
Ba-La-140	-		1.7 ± 2.2	< 2.9	0.8 ± 1.6	< 1.5	1.3 ± 1.6	< 3.1	15
Other (Ru-103)	-		1.1 ± 1.8	< 3.2	0.6 ± 1.2	< 2.5	-0.9 ± 1.4	< 2.2	30
Lab Code	ELW- 2308		ELW- 3022		ELW- 3631		ELW- 4254		
Date Collected	05-14-09		06-17-09		07-16-09		08-12-09		Req. LLD
Gross beta	2.6 ± 1.1	< 1.9	1.7 ± 1.0	< 1.9	3.5 ± 1.2	< 1.6	2.1 ± 1.0	< 1.9	4.0
I-131	-0.63 ± 0.29	< 0.49	0.04 ± 0.21	< 0.38	0.15 ± 0.18	< 0.31	0.22 ± 0.22	< 0.32	0.5
Be-7	-0.3 ± 11.4	< 27.5	-14.0 ± 12.2	< 13.0	15.0 ± 14.0	< 34.0	-7.7 ± 16.9	< 28.3	
Mn-54	0.5 ± 1.1	< 1.9	1.3 ± 1.3	< 2.6	0.9 ± 1.4	< 2.4	-1.0 ± 1.6	< 2.2	10
Fe-59	-1.2 ± 2.1	< 2.4	-1.6 ± 2.4	< 3.1	-1.7 ± 2.7	< 2.4	-3.0 ± 3.3	< 2.4	30
Co-58	-1.0 ± 1.3	< 2.2	-1.9 ± 1.3	< 0.9	-2.2 ± 1.8	< 1.9	-0.6 ± 1.6	< 2.3	10
Co-60	0.5 ± 1.6	< 2.6	0.5 ± 1.6	< 2.0	-0.7 ± 1.5	< 1.9	-0.1 ± 1.7	< 2.2	10
Zn-65	0.5 ± 2.7	< 3.6	0.4 ± 2.4	< 3.0	-1.0 ± 3.3	< 3.5	-1.8 ± 3.8	< 3.6	30
Zr-Nb-95	0.3 ± 1.2	< 2.7	0.7 ± 1.4	< 3.1	0.6 ± 1.5	< 2.2	1.0 ± 1.8	< 3.0	15
Cs-134	-1.7 ± 1.8	< 2.0	0.0 ± 1.5	< 2.1	0.9 ± 1.4	< 2.7	-1.6 ± 1.8	< 3.3	10
Cs-137	-0.4 ± 1.4	< 2.3	-0.1 ± 1.7	< 2.6	-0.7 ± 1.5	< 1.8	2.0 ± 1.8	< 3.3	10
Ba-La-140	0.6 ± 1.8	< 6.1	-1.4 ± 1.7	< 2.8	-0.2 ± 2.0	< 4.3	-2.1 ± 2.0	< 3.0	15
Other (Ru-103)	-1.0 ± 1.1	< 2.2	0.5 ± 1.5	< 3.5	1.0 ± 1.2	< 3.0	-1.0 ± 1.8	< 2.3	30
Lab Code	ELW- 4942		ELW- 5639		ELW- 6349		ELW- 6878		
Date Collected	09-16-09		10-17-09		11-13-09		12-17-09		Req. LLD
Gross beta	1.1 ± 0.6	< 0.9	1.2 ± 0.6	< 0.9	2.8 ± 1.9	< 3.6	3.8 ± 1.6	< 2.6	4.0
I-131	0.06 ± 0.15	< 0.26	-0.05 ± 0.18	< 0.33	0.01 ± 0.14	< 0.25	0.07 ± 0.15	< 0.27	0.5
Be-7	-2.7 ± 12.4	< 18.4	19.7 ± 15.3	< 28.2	6.4 ± 12.1	< 24.5	-4.9 ± 13.1	< 19.7	
Mn-54	0.1 ± 1.7	< 2.4	0.4 ± 1.8	< 3.1	0.4 ± 1.3	< 2.1	0.1 ± 1.5	< 2.8	10
Fe-59	0.4 ± 2.8	< 5.2	1.7 ± 3.8	< 5.9	0.4 ± 2.5	< 2.9	-1.1 ± 3.1	< 5.6	30
Co-58	-1.2 ± 1.7	< 1.7	-1.0 ± 1.9	< 2.6	0.6 ± 1.5	< 2.4	0.1 ± 1.5	< 2.8	10
Co-60	-1.4 ± 1.8	< 1.4	0.5 ± 2.0	< 2.3	0.5 ± 1.2	< 2.3	0.3 ± 1.6	< 2.7	10
Zn-65	0.2 ± 2.9	< 2.8	-1.6 ± 3.5	< 3.8	1.1 ± 2.5	< 1.9	-0.5 ± 3.0	< 4.1	30
Zr-Nb-95	1.2 ± 1.7	< 3.8	1.2 ± 2.1	< 3.5	0.1 ± 1.4	< 2.2	-3.4 ± 2.0	< 2.2	15
Cs-134	0.3 ± 1.7	< 2.8	-0.1 ± 1.8	< 2.9	0.4 ± 1.3	< 2.1	0.5 ± 1.4	< 2.7	10
Cs-137	0.4 ± 1.9	< 2.7	-0.5 ± 1.9	< 3.1	-0.9 ± 1.4	< 1.9	0.4 ± 1.5	< 2.5	10
Ba-La-140	2.2 ± 1.9	< 2.9	-3.8 ± 2.2	< 1.4	0.1 ± 1.5	< 1.4	-1.0 ± 2.4	< 3.6	15
Other (Ru-103)	0.0 ± 1.6	< 2.9	-0.8 ± 1.9	< 2.9	-0.1 ± 1.5	< 3.2	-0.6 ± 1.6	< 3.4	30

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

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

		MDC		MDC		MDC		MDC	
Lab Code	ELW- 113		ELW- 493		ELW- 802		ELW- 1656		
Date Collected	01-13-09		02-12-09		03-10-09		04-16-09		Req. LLD
Gross beta	3.6 ± 1.2	< 1.6	3.1 ± 1.1	< 1.7	1.4 ± 0.8	< 1.3	1.2 ± 0.5	< 0.8	4.0
I-131	0.06 ± 0.20	< 0.35	0.37 ± 0.38	< 0.50	0.07 ± 0.18	< 0.31	-0.08 ± 0.17	< 0.31	0.5
Be-7	-0.7 ± 16.8	< 38.4	-10.2 ± 13.7	< 23.9	-3.7 ± 12.4	< 19.9	0.3 ± 13.3	< 22.2	
Mn-54	1.9 ± 2.0	< 3.6	1.4 ± 1.8	< 2.9	-1.3 ± 1.5	< 1.5	-0.5 ± 1.5	< 1.9	10
Fe-59	0.4 ± 3.8	< 3.7	0.9 ± 3.4	< 5.6	1.5 ± 2.0	< 3.2	-2.3 ± 2.8	< 2.5	30
Co-58	0.1 ± 2.1	< 2.3	-0.3 ± 1.6	< 2.4	-0.5 ± 1.2	< 1.5	-0.1 ± 1.8	< 3.4	10
Co-60	1.8 ± 2.3	< 4.0	0.2 ± 1.7	< 2.7	-0.4 ± 1.3	< 1.5	1.0 ± 1.7	< 2.5	10
Zn-65	-2.4 ± 5.0	< 5.8	-1.8 ± 2.8	< 3.1	1.4 ± 2.5	< 2.9	0.3 ± 3.5	< 4.6	30
Zr-Nb-95	0.7 ± 2.0	< 3.5	0.6 ± 1.5	< 3.9	-1.0 ± 1.2	< 1.7	0.8 ± 1.7	< 4.0	15
Cs-134	1.3 ± 1.9	< 3.7	0.8 ± 1.4	< 2.8	0.5 ± 1.3	< 2.3	-0.3 ± 1.5	< 2.3	10
Cs-137	-1.9 ± 2.4	< 3.5	0.2 ± 1.6	< 3.1	1.5 ± 1.4	< 2.7	1.2 ± 1.9	< 3.1	10
Ba-La-140	0.2 ± 3.1	< 7.2	1.1 ± 1.6	< 2.2	1.5 ± 1.5	< 2.8	-3.1 ± 2.0	< 2.3	15
Other (Ru-103)	0.9 ± 2.3	< 4.6	-0.7 ± 1.5	< 2.7	-1.7 ± 1.5	< 1.3	-0.2 ± 1.5	< 2.6	30
Lab Code	ELW- 2309		ELW- 3023		ELW- 3632		ELW- 4255		
Date Collected	05-14-09		06-17-09		07-16-09		08-12-09		Req. LLD
Gross beta	2.5 ± 1.1	< 1.9	1.8 ± 1.0	< 1.8	2.0 ± 0.6	< 0.7	2.0 ± 0.9	< 1.7	4.0
I-131	-0.01 ± 0.33	< 0.45	0.06 ± 0.18	< 0.27	0.09 ± 0.13	< 0.19	0.13 ± 0.23	< 0.33	0.5
Be-7	-13.6 ± 14.9	< 26.6	-4.0 ± 12.2	< 23.1	1.8 ± 16.2	< 27.2	2.2 ± 21.8	< 40.0	
Mn-54	0.9 ± 1.1	< 1.6	-0.2 ± 1.6	< 2.6	0.4 ± 1.5	< 2.5	-0.9 ± 2.0	< 3.3	10
Fe-59	1.5 ± 2.3	< 2.7	-0.2 ± 2.9	< 5.9	-1.5 ± 3.1	< 4.4	-0.5 ± 4.5	< 4.7	30
Co-58	0.0 ± 1.4	< 1.6	0.1 ± 1.6	< 2.6	0.2 ± 1.7	< 2.7	-0.9 ± 1.7	< 1.6	10
Co-60	-1.4 ± 1.6	< 2.1	0.3 ± 1.3	< 1.4	0.2 ± 1.9	< 2.4	0.1 ± 1.9	< 2.3	10
Zn-65	-0.6 ± 3.2	< 3.2	-0.1 ± 2.7	< 2.8	3.9 ± 3.7	< 5.0	1.6 ± 3.6	< 4.4	30
Zr-Nb-95	0.7 ± 1.5	< 3.9	0.0 ± 1.3	< 2.3	-1.3 ± 1.7	< 2.5	-0.5 ± 2.0	< 2.4	15
Cs-134	0.4 ± 1.6	< 2.6	-0.2 ± 1.4	< 2.8	-0.2 ± 1.8	< 2.9	-1.0 ± 2.1	< 3.3	10
Cs-137	1.0 ± 1.8	< 3.4	-0.6 ± 1.2	< 1.7	0.7 ± 2.0	< 3.4	0.9 ± 2.3	< 4.0	10
Ba-La-140	-1.1 ± 1.8	< 2.5	2.9 ± 1.5	< 3.5	0.5 ± 1.9	< 3.6	-1.4 ± 3.0	< 4.6	15
Other (Ru-103)	-0.4 ± 1.6	< 3.6	-0.7 ± 1.5	< 2.8	-0.9 ± 1.7	< 2.9	0.3 ± 2.2	< 4.0	30
Lab Code	ELW- 4943		ELW- 5640		ELW- 6350		ELW- 6879		
Date Collected	09-16-09		10-17-09		11-13-09		12-17-09		Req. LLD
Gross beta	1.3 ± 0.5	< 0.8	2.2 ± 1.0	< 1.6	7.6 ± 2.1 [a]	< 3.3	1.7 ± 1.9	< 3.7	4.0
I-131	0.10 ± 0.16	< 0.27	0.09 ± 0.16	< 0.28	-0.13 ± 0.16	< 0.30	0.00 ± 0.12	< 0.17	0.5
Be-7	-4.8 ± 16.3	< 29.0	9.8 ± 18.7	< 27.5	20.2 ± 19.2	< 36.6	4.5 ± 10.6	< 22.5	
Mn-54	0.3 ± 1.3	< 2.3	0.2 ± 1.8	< 2.4	0.9 ± 1.8	< 2.8	-0.2 ± 1.3	< 1.5	10
Fe-59	2.2 ± 3.1	< 3.7	-1.5 ± 3.9	< 3.7	2.7 ± 3.6	< 5.2	0.2 ± 2.2	< 3.9	30
Co-58	-0.1 ± 1.3	< 1.8	-1.3 ± 1.9	< 1.9	0.2 ± 1.8	< 2.7	-0.3 ± 1.4	< 2.0	10
Co-60	0.2 ± 1.8	< 1.6	-0.6 ± 1.5	< 1.1	0.2 ± 1.4	< 1.6	-0.2 ± 1.4	< 1.9	10
Zn-65	-5.0 ± 3.7	< 3.1	1.9 ± 4.2	< 5.2	-1.4 ± 3.4	< 3.9	-0.3 ± 2.6	< 3.9	30
Zr-Nb-95	-1.4 ± 1.6	< 2.6	-0.7 ± 1.9	< 1.8	-1.1 ± 2.0	< 1.7	-1.4 ± 1.4	< 2.5	15
Cs-134	1.2 ± 1.6	< 2.3	0.5 ± 1.9	< 3.0	0.7 ± 1.7	< 2.9	-0.8 ± 1.4	< 1.9	10
Cs-137	0.4 ± 1.7	< 2.9	-1.1 ± 2.1	< 3.0	-2.1 ± 2.3	< 2.6	-0.6 ± 1.5	< 1.7	10
Ba-La-140	0.3 ± 1.9	< 3.0	1.5 ± 1.9	< 2.5	-1.6 ± 2.1	< 1.3	1.5 ± 1.6	< 3.7	15
Other (Ru-103)	-2.2 ± 1.9	< 2.7	0.0 ± 2.1	< 3.0	1.9 ± 2.0	< 4.1	0.3 ± 1.2	< 2.6	30

[a] Gross beta recounted with a result of 6.3±1.7 pCi/L.

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

		MDC		MDC		MDC		MDC	
Lab Code									
Date Collected									Req. LLD
Gross beta									4.0
I-131									0.5
Be-7									
Mn-54									10
Fe-59									30
Co-58									10
Co-60									10
Zn-65									30
Zr-Nb-95									15
Cs-134									10
Cs-137									10
Ba-La-140									15
Other (Ru-103)									30
Lab Code									
Date Collected									
Gross beta									
I-131									
Be-7									
Mn-54									
Fe-59									
Co-58									
Co-60									
Zn-65									
Zr-Nb-95									
Cs-134									
Cs-137									
Ba-La-140									
Other (Ru-103)									
									All locations
Lab Code	ELW- 4944		ELW- 5641		ELW- 6351		NS[c]		Annual
Date Collected	09-16-09		10-17-09		11-13-09		12-17-09		Mean s.d.
Gross beta	1.7 ± 0.6	< 0.9	0.8 ± 0.5	< 0.9	5.6 ± 2.1 [b]	< 3.7	-		2.2 ± 1.3
I-131	0.13 ± 0.16	< 0.27	0.12 ± 0.18	< 0.34	-0.04 ± 0.17	< 0.30	-		0.04 ± 0.14
Be-7	-4.8 ± 16.3	< 31.1	6.7 ± 14.6	< 24.5	5.0 ± 15.5	< 20.4	-		0.5 ± 9.1
Mn-54	0.3 ± 1.3	< 2.2	-0.7 ± 1.6	< 2.3	-0.2 ± 1.7	< 2.5	-		0.2 ± 0.8
Fe-59	2.2 ± 3.1	< 5.7	-0.9 ± 3.0	< 3.1	0.9 ± 3.2	< 3.5	-		0.2 ± 1.6
Co-58	-0.1 ± 1.3	< 1.7	-1.5 ± 1.4	< 1.4	0.5 ± 1.5	< 2.9	-		-0.3 ± 0.8
Co-60	0.2 ± 1.8	< 3.4	0.5 ± 1.8	< 2.0	-1.1 ± 1.5	< 1.6	-		0.2 ± 0.8
Zn-65	-5.0 ± 3.7	< 2.7	-4.2 ± 3.7	< 2.5	-0.2 ± 3.8	< 6.0	-		-0.2 ± 2.3
Zr-Nb-95	-1.4 ± 1.6	< 2.3	-1.2 ± 1.7	< 1.9	-0.2 ± 1.6	< 2.0	-		-0.2 ± 1.0
Cs-134	1.2 ± 1.6	< 2.7	0.0 ± 1.5	< 2.4	1.0 ± 1.7	< 2.9	-		0.0 ± 0.8
Cs-137	0.4 ± 1.7	< 2.6	0.8 ± 2.1	< 3.7	0.9 ± 2.0	< 3.0	-		0.1 ± 1.1
Ba-La-140	0.3 ± 1.9	< 1.8	-2.4 ± 1.9	< 1.3	-0.4 ± 1.9	< 2.3	-		-0.1 ± 1.8
Other (Ru-103)	-2.2 ± 1.9	< 2.0	-0.9 ± 2.0	< 3.5	-1.5 ± 1.7	< 2.0	-		-0.3 ± 1.1

[a] New location as of September 2009.
[b] Gross beta recounted with a result of 4.5±1.5 pCi/L.
[c] "NS"= No sample; see Table 2.0, Listing of Missed Samples.

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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- 806		ELW- 3093		ELW- 4968		ELW- 6889		Req. LLDs
H-3	83 ± 82	< 149	82 ± 82	< 149	98 ± 95	< 149	120 ± 98	< 153	500
Sr-89	0.50 ± 0.68	< 0.60	0.05 ± 0.62	< 0.66	0.36 ± 0.82	< 0.77	0.19 ± 0.74	< 0.78	5.0
Sr-90	0.00 ± 0.32	< 0.70	0.33 ± 0.27	< 0.49	0.36 ± 0.33	< 0.62	0.18 ± 0.28	< 0.57	1.0

Location	E-05 (Two Creeks Park)								
Period	1st Qtr.		2nd Qtr.		3rd Qtr.		4th Qtr.		
Lab Code	ELW- 807		ELW- 3094		ELW- 4969		ELW- 6890		Req. LLDs
H-3	94 ± 83	< 149	223 ± 89	< 149	104 ± 95	< 149	89 ± 97	< 153	500
Sr-89	-0.07 ± 0.96	< 0.80	0.08 ± 0.61	< 0.72	0.66 ± 0.78	< 0.86	0.73 ± 0.73	< 0.89	5.0
Sr-90	0.87 ± 0.47	< 0.80	0.29 ± 0.26	< 0.50	0.38 ± 0.29	< 0.54	0.03 ± 0.26	< 0.56	1.0

Location	E-06 (Coast Guard Station)								
Period	1st Qtr.		2nd Qtr.		3rd Qtr.		4th Qtr.		
Lab Code	ELW- 808		ELW- 3095		ELW- 4970		ELW- 6891		Req. LLDs
H-3	-10 ± 78	< 149	124 ± 84	< 149	108 ± 95	< 149	306 ± 106 [a]	< 153	500
Sr-89	0.76 ± 0.80	< 0.61	-0.08 ± 0.61	< 0.65	-0.41 ± 1.04	< 1.05	0.13 ± 0.73	< 0.75	5.0
Sr-90	0.51 ± 0.38	< 0.69	0.28 ± 0.27	< 0.51	0.68 ± 0.42	< 0.69	0.25 ± 0.29	< 0.55	1.0

Location	E-33 (Nature Conservancy)								
Period	1st Qtr.		2nd Qtr.		3rd Qtr.		4th Qtr.		
Lab Code	ELW- 809		ELW- 3096		ELW- 4971		ELW- 6892		Req. LLDs
H-3	37 ± 80	< 149	64 ± 81	< 149	92 ± 94	< 149	157 ± 84	< 153	500
Sr-89	-0.46 ± 0.75	< 0.58	0.05 ± 0.60	< 0.65	0.05 ± 0.64	< 0.69	0.04 ± 0.67	< 0.78	5.0
Sr-90	0.64 ± 0.37	< 0.63	0.35 ± 0.26	< 0.46	0.36 ± 0.25	< 0.44	0.07 ± 0.26	< 0.55	1.0

Location	E-33a (Sandy Bay Pier)[b]								
Period					3rd Qtr.		4th Qtr.		
Lab Code					ELW- 4944		ELW- 6893		Req. LLDs
H-3					90 ± 94	< 149	285 ± 106 [c]	< 154	500
Sr-89					-0.10 ± 1.02	< 1.06	-0.01 ± 1.00	< 1.18	5.0
Sr-90					0.37 ± 0.27	< 0.49	0.09 ± 0.25	< 0.52	1.0

Tritium Annual Mean + s.d.	**119 ± 80**
Sr-89 Annual Mean + s.d.	**0.16 ± 0.35**
Sr-90 Annual Mean + s.d.	**0.32 ± 0.26**

[a] Tritium repeated with a result of 377±94 pCi/L.

[b] Location added September 2009; 3rd quarter result on one month sample (Sept) only.

[c] Tritium repeated with a result of 245±95 pCi/L. No December sample available for composite; see Table 2.0, page v.

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

	Sample Description and Concentration	MDC		MDC		MDC	Req. LLD
Collection Date	03-12-09		03-12-09		03-12-09		
Lab Code	EF- 1116		EF- 1117		EF- 1118		
Type	Fresh Water Drum		Sucker		Sucker		
Ratio (wet/dry wt.)	5.19		6.35		6.77		
Gross Beta	5.59 ± 0.18	< 0.057	1.53 ± 0.06	< 0.024	3.84 ± 0.14	< 0.054	0.5
K-40	3.21 ± 0.45	-	1.16 ± 1.16	-	2.59 ± 0.51	-	
Mn-54	0.005 ± 0.010	< 0.020	-0.010 ± 0.016	< 0.024	0.008 ± 0.011	< 0.024	0.13
Fe-59	0.012 ± 0.023	< 0.043	0.002 ± 0.034	< 0.070	-0.022 ± 0.025	< 0.034	0.26
Co-58	-0.001 ± 0.010	< 0.017	0.011 ± 0.012	< 0.023	-0.004 ± 0.011	< 0.014	0.13
Co-60	0.005 ± 0.007	< 0.014	-0.001 ± 0.018	< 0.028	0.009 ± 0.013	< 0.029	0.13
Zn-65	-0.021 ± 0.024	< 0.028	0.003 ± 0.037	< 0.039	-0.023 ± 0.031	< 0.039	0.26
Cs-134	-0.003 ± 0.010	< 0.015	0.022 ± 0.015	< 0.023	-0.006 ± 0.011	< 0.011	0.13
Cs-137	0.073 ± 0.022	-	0.008 ± 0.018	< 0.031	0.006 ± 0.014	< 0.023	0.15
Other (Ru-103)	-0.019 ± 0.011	< 0.020	0.009 ± 0.016	< 0.044	0.004 ± 0.009	< 0.022	0.5
Collection Date	06-20-09		06-20-09		07-27-09		
Lab Code	EF- 4295		EF- 4296		EF- 4297		
Type	Chinook		Chinook		Rainbow Trout		
Ratio (wet/dry wt.)	3.36		3.37		4.23		
Gross Beta	4.24 ± 0.09	< 0.032	4.24 ± 0.09	< 0.028	3.27 ± 0.06	< 0.021	0.5
K-40	2.88 ± 0.35	-	3.03 ± 0.34	-	3.08 ± 0.35	-	
Mn-54	0.003 ± 0.007	< 0.014	-0.001 ± 0.007	< 0.014	-0.005 ± 0.006	< 0.009	0.13
Fe-59	0.042 ± 0.016	< 0.064	0.013 ± 0.014	< 0.056	-0.010 ± 0.013	< 0.015	0.26
Co-58	0.002 ± 0.006	< 0.020	-0.001 ± 0.006	< 0.012	0.011 ± 0.007	< 0.015	0.13
Co-60	0.000 ± 0.009	< 0.015	-0.008 ± 0.008	< 0.010	0.002 ± 0.009	< 0.013	0.13
Zn-65	-0.028 ± 0.022	< 0.037	0.006 ± 0.016	< 0.032	-0.002 ± 0.016	< 0.029	0.26
Cs-134	-0.008 ± 0.007	< 0.010	-0.004 ± 0.005	< 0.009	-0.012 ± 0.006	< 0.009	0.13
Cs-137	0.035 ± 0.014	-	0.043 ± 0.016	-	0.029 ± 0.013	-	0.15
Other (Ru-103)	-0.021 ± 0.007	< 0.028	-0.008 ± 0.006	< 0.027	0.001 ± 0.006	< 0.020	0.5

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

	Sample Description and Concentration (pCi/g wet)	MDC		MDC		MDC	Req. LLD
Collection Date	07-20-09		06-20-09		12-09-09		
Lab Code	EF- 4298		EF- 4299		EF- 6880		
Type	Brown Trout		Catfish		Whitefish		
Ratio (wet/dry wt.)	3.37		5.25		4.35		
Gross Beta	2.89 ± 0.06	< 0.018	4.16 ± 0.09	< 0.033	5.22 ± 0.11	< 0.035	0.5
K-40	3.12 ± 0.33	-	2.60 ± 0.34	-	2.92 ± 0.33	-	
Mn-54	-0.003 ± 0.006	< 0.008	0.006 ± 0.007	< 0.012	0.002 ± 0.008	< 0.012	0.13
Fe-59	0.002 ± 0.015	< 0.030	0.010 ± 0.018	< 0.069	0.013 ± 0.014	< 0.023	0.26
Co-58	-0.001 ± 0.007	< 0.016	-0.010 ± 0.007	< 0.015	-0.007 ± 0.006	< 0.006	0.13
Co-60	-0.002 ± 0.009	< 0.015	-0.002 ± 0.008	< 0.010	0.001 ± 0.008	< 0.009	0.13
Zn-65	0.010 ± 0.015	< 0.013	0.006 ± 0.018	< 0.014	0.023 ± 0.020	< 0.030	0.26
Cs-134	-0.001 ± 0.007	< 0.014	0.002 ± 0.008	< 0.016	0.001 ± 0.006	< 0.011	0.13
Cs-137	0.039 ± 0.017	-	0.058 ± 0.017	-	0.011 ± 0.008	< 0.017	0.15
Other (Ru-103)	0.006 ± 0.007	< 0.015	0.015 ± 0.007	< 0.041	0.003 ± 0.007	< 0.014	0.5
Collection Date	12-09-09		12-09-09		12-09-09		
Lab Code	EF- 6881		EF- 6882		EF- 6883		
Type	Whitefish		Whitefish		Herring		
Ratio (wet/dry wt.)	3.37		2.86		4.34		
Gross Beta	4.43 ± 0.11	< 0.039	3.82 ± 0.09	< 0.032	4.99 ± 0.12	< 0.040	0.5
K-40	3.41 ± 0.35	-	2.60 ± 0.35	-	3.21 ± 0.35	-	
Mn-54	0.001 ± 0.007	< 0.011	-0.001 ± 0.010	< 0.012	0.003 ± 0.007	< 0.013	0.13
Fe-59	0.000 ± 0.014	< 0.019	-0.011 ± 0.014	< 0.023	-0.002 ± 0.017	< 0.021	0.26
Co-58	-0.008 ± 0.008	< 0.011	-0.008 ± 0.008	< 0.008	-0.003 ± 0.007	< 0.015	0.13
Co-60	0.003 ± 0.009	< 0.013	0.003 ± 0.010	< 0.010	0.003 ± 0.009	< 0.013	0.13
Zn-65	-0.001 ± 0.016	< 0.032	0.030 ± 0.017	< 0.015	-0.006 ± 0.017	< 0.021	0.26
Cs-134	-0.004 ± 0.007	< 0.011	0.000 ± 0.008	< 0.005	0.006 ± 0.007	< 0.012	0.13
Cs-137	0.014 ± 0.010	< 0.016	0.033 ± 0.013	-	0.014 ± 0.010	< 0.018	0.15
Other (Ru-103)	0.002 ± 0.006	< 0.014	-0.001 ± 0.008	< 0.011	0.005 ± 0.008	< 0.018	0.5

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

	Sample Description and Concentration (pCi/g wet)	MDC		Req. LLD
Collection Date	12-09-09			
Lab Code	EF- 6884		**Annual**	
Type	Herring			
Ratio (wet/dry wt.)	5.68		**Mean s.d.**	
Gross Beta	4.12 ± 0.10	< 0.037	**4.03 ± 1.05**	0.5
K-40	4.05 ± 0.52	-	**2.91 ± 0.66**	
Mn-54	0.001 ± 0.011	< 0.016	**0.001 ± 0.005**	0.13
Fe-59	-0.018 ± 0.021	< 0.030	**0.002 ± 0.017**	0.26
Co-58	-0.004 ± 0.010	< 0.010	**-0.002 ± 0.007**	0.13
Co-60	-0.001 ± 0.011	< 0.012	**0.001 ± 0.004**	0.13
Zn-65	0.002 ± 0.021	< 0.032	**0.000 ± 0.017**	0.26
Cs-134	-0.005 ± 0.009	< 0.017	**-0.001 ± 0.008**	0.13
Cs-137	0.034 ± 0.019	-	**0.031 ± 0.020**	0.15
Other (Ru-103)	-0.001 ± 0.010	< 0.023	**0.000 ± 0.010**	0.5

Table 8. Radioactivity in shoreline sediment samples

Collection: Semiannual

Sample Description and Concentration (pCi/g dry)

		MDC		MDC		MDC	
Collection Date	4/16/2009		4/16/2009		4/16/2009		Req.
Lab Code	ESS- 1667		ESS- 1668		ESS- 1669		LLD
Location	E-01		E-05		E-06		
Gross Beta	11.83 ± 2.22	< 3.14	14.51 ± 2.04	< 2.63	9.34 ± 1.87	< 2.72	4.0
Be-7	-0.040 ± 0.056	< 0.11	0.013 ± 0.078	< 0.19	0.044 ± 0.046	< 0.10	
K-40	6.87 ± 0.41	< 1.06	6.38 ± 0.64	-	5.10 ± 0.39	-	-
Cs-137	0.019 ± 0.009	< 0.016	0.000 ± 0.012	< 0.017	0.019 ± 0.009	< 0.015	0.15
Tl-208	0.034 ± 0.015	-	0.059 ± 0.022	-	0.037 ± 0.017	-	-
Pb-212	0.09 ± 0.019	-	0.13 ± 0.023	-	0.10 ± 0.018	-	-
Bi-214	0.06 ± 0.031	-	0.13 ± 0.035	-	0.15 ± 0.026	-	-
Ra-226	0.12 ± 0.16	< 0.33	0.48 ± 0.19	< 0.35	0.35 ± 0.14	< 0.28	-
Ac-228	0.14 ± 0.069	-	0.15 ± 0.065	-	0.17 ± 0.062	-	-
Collection Date	4/16/2009		4/16/2009				
Lab Code	ESS- 1670		ESS- 1671				
Location	E-12		E-33				
Gross Beta	10.64 ± 2.17	< 3.15	8.07 ± 1.77	< 2.66			4.0
Be-7	0.034 ± 0.058	< 0.11	0.025 ± 0.048	< 0.11			
K-40	6.92 ± 0.49	-	5.48 ± 0.34	-			-
Cs-137	0.027 ± 0.011	< 0.018	0.020 ± 0.009	-			0.15
Tl-208	0.032 ± 0.014	-	0.040 ± 0.014	-			-
Pb-212	0.09 ± 0.018	-	0.10 ± 0.015	-			-
Bi-214	0.12 ± 0.027	-	0.07 ± 0.021	-			-
Ra-226	0.29 ± 0.15	< 0.29	0.28 ± 0.15	-			-
Ac-228	0.16 ± 0.089	-	0.11 ± 0.042	-			-

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RADIOACTIVITY IN SHORELINE SEDIMENT SAMPLES

(Semiannual Collections)

Sample Description and Concentration (pCi/g dry)

		MDC		MDC		MDC	
Collection Date	10/17/2009		10/17/2009		10/17/2009		Req.
Lab Code	ESS- 5643		ESS- 5644		ESS- 5645		LLD
Location	E-01		E-05		E-06		
Gross Beta	9.97 ± 1.77	< 2.52	9.51 ± 1.58	< 2.25	13.72 ± 1.71	< 2.18	4.0
Be-7	-0.009 ± 0.072	< 0.10	0.045 ± 0.053	< 0.09	0.091 ± 0.069	< 0.13	
K-40	4.22 ± 0.34	-	7.33 ± 7.33	-	7.46 ± 0.44	-	-
Cs-137	0.022 ± 0.010	< 0.016	0.004 ± 0.008	< 0.010	0.025 ± 0.012	-	0.15
Tl-208	0.113 ± 0.023	-	0.056 ± 0.016	-	0.046 ± 0.019	-	-
Pb-212	0.33 ± 0.026	-	0.19 ± 0.059	-	0.11 ± 0.019	-	-
Bi-214	0.26 ± 0.041	-	0.17 ± 0.037	-	0.12 ± 0.027	-	-
Ra-226	0.70 ± 0.21	-	0.32 ± 0.18	-	0.41 ± 0.20	-	-
Ac-228	0.39 ± 0.064	-	0.21 ± 0.052	-	0.08 ± 0.037	< 0.070	-

								Annual
Collection Date	10/17/2009		10/17/2009		10/17/2009			
Lab Code	ESS- 5646		ESS- 5647		ESS- 5648			
Location	E-12		E-33		E-33A			Mean s.d.
Gross Beta	11.23 ± 2.14	< 3.03	12.26 ± 2.02	< 2.82	11.26 ± 1.94	< 2.69	4.0	11.12 ± 1.92
Be-7	0.11 ± 0.057	< 0.10	0.006 ± 0.059	< 0.11	0.12 ± 0.049	< 0.09		0.040 ± 0.050
K-40	5.55 ± 0.38	-	6.32 ± 0.43	-	7.25 ± 0.44	-	-	6.26 ± 1.05
Cs-137	0.025 ± 0.012	-	0.013 ± 0.008	< 0.012	0.010 ± 0.008	< 0.013	0.15	0.017 ± 0.009
Tl-208	0.057 ± 0.017	-	0.056 ± 0.017	-	0.059 ± 0.020	-	-	0.05 ± 0.02
Pb-212	0.17 ± 0.020	-	0.16 ± 0.025	-	0.10 ± 0.019	-	-	0.14 ± 0.07
Bi-214	0.16 ± 0.026	-	0.15 ± 0.041	-	0.08 ± 0.026	-	-	0.13 ± 0.06
Ra-226	0.43 ± 0.16	-	0.39 ± 0.14	< 0.28	0.43 ± 0.13	< 0.26	-	0.38 ± 0.14
Ac-228	0.19 ± 0.049	-	0.17 ± 0.049	-	0.13 ± 0.048	-	-	0.17 ± 0.08

Table 9. Radioactivity in soil samples

Collection: Semiannual

Sample Description and Concentration (pCi/g dry)							
		MDC		MDC		MDC	
Collection Date	5/28/2009		5/28/2009		5/28/2009		Req.
Lab Code	ESO- 2632		ESO- 2633		ESO- 2634 [a]		LLD
Location	E-01		E-02		E-03		
Gross Beta	27.21 ± 2.89	< 3.23	32.63 ± 2.74	< 2.72	37.16 ± 2.96	< 2.86	4.0
Be-7	0.007 ± 0.090	< 0.21	0.117 ± 0.10	< 0.20	-0.081 ± 0.31	< 0.29	
K-40	14.90 ± 0.74	-	18.99 ± 0.94	-	18.60 ± 1.49	-	-
Cs-137	0.18 ± 0.034	-	0.14 ± 0.033	-	0.43 ± 0.096	-	0.15
Tl-208	0.19 ± 0.028	-	0.17 ± 0.044	-	0.013 ± 0.046	< 0.095	-
Pb-212	0.46 ± 0.037	-	0.58 ± 0.58	-	0.20 ± 0.16	< 0.31	-
Bi-214	0.33 ± 0.049	-	0.43 ± 0.429	-	0.31 ± 0.10	< 0.20	-
Ra-226	0.87 ± 0.32	-	0.87 ± 0.33	-	1.63 ± 0.62	< 1.33	-
Ac-228	0.51 ± 0.10	-	0.69 ± 0.14	-	-0.033 ± 0.15	< 0.29	-
Collection Date	5/28/2009		5/28/2009		5/28/2009		
Lab Code	ESO- 2635		ESO- 2636		ESO- 2637		
Location	E-04		E-06		E-08		
Gross Beta	30.27 ± 2.36	< 2.32	22.76 ± 2.24	< 2.66	23.85 ± 2.09	< 2.20	4.0
Be-7	0.033 ± 0.27	< 0.44	-0.035 ± 0.13	< 0.20	0.034 ± 0.082	< 0.10	
K-40	16.58 ± 1.58	-	14.04 ± 1.12	-	14.91 ± 0.77	-	-
Cs-137	0.18 ± 0.10	-	0.12 ± 0.045	-	0.27 ± 0.034	-	0.15
Tl-208	0.18 ± 0.061	-	0.16 ± 0.034	-	0.11 ± 0.024	-	-
Pb-212	0.43 ± 0.079	-	0.35 ± 0.045	-	0.32 ± 0.318	-	-
Bi-214	0.29 ± 0.088	< 0.18	0.34 ± 0.061	-	0.18 ± 0.177	-	-
Ra-226	1.80 ± 0.61	< 1.31	0.70 ± 0.36	-	0.59 ± 0.21	< 0.44	-
Ac-228	0.60 ± 0.23	-	0.49 ± 0.13	-	0.40 ± 0.10	-	-
Collection Date	5/28/2009		5/28/2009				
Lab Code	ESO- 2638		ESO- 2639				
Location	E-09		E-20				
Gross Beta	30.50 ± 2.41	< 2.52	29.09 ± 2.40	< 2.51			4.0
Be-7	0.14 ± 0.11	< 0.18	0.024 ± 0.128	< 0.22			
K-40	18.82 ± 1.01	-	17.77 ± 1.11	-			-
Cs-137	0.16 ± 0.036	-	0.17 ± 0.046	-			0.15
Tl-208	0.19 ± 0.20	-	0.20 ± 0.048	-			-
Pb-212	0.67 ± 0.68	-	0.47 ± 0.046	-			-
Bi-214	0.52 ± 0.522	-	0.38 ± 0.060	-			-
Ra-226	1.34 ± 0.56	-	0.81 ± 0.36	-			-
Ac-228	0.65 ± 0.12	-	0.64 ± 0.16	-			-

[a] Sample recounted; revised data for K-40 and Cs-137.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN SOIL SAMPLES

(Semiannual Collections)

Sample Description and Concentration (pCi/g dry)

		MDC		**MDC**		**MDC**	
Collection Date	10/28/2009		10/29/2008		10/29/2008		Req.
Lab Code	ESO- 6048		ESO- 6049		ESO- 6050		LLD
Location	E-01		E-02		E-03		
Gross Beta	35.12 ± 3.08	< 3.04	42.39 ± 3.34	< 3.08	36.93 ± 2.90	< 2.86	4.0
Be-7	0.043 ± 0.114	< 0.23	0.071 ± 0.094	< 0.22	0.064 ± 0.263	< 0.48	
K-40	18.63 ± 0.97	-	20.79 ± 0.91	-	20.68 ± 1.84	-	-
Cs-137	0.22 ± 0.053	-	0.13 ± 0.033	-	0.22 ± 0.079	-	0.15
Tl-208	0.21 ± 0.041	-	0.22 ± 0.039	-	0.28 ± 0.092	-	-
Pb-212	0.58 ± 0.047	-	0.59 ± 0.050	-	0.66 ± 0.129	-	-
Bi-214	0.49 ± 0.060	-	0.44 ± 0.051	-	0.37 ± 0.135	-	-
Ra-226	1.24 ± 0.35	-	1.16 ± 0.31	-	1.86 ± 0.88	-	-
Ac-228	0.74 ± 0.12	-	0.69 ± 0.12	-	0.80 ± 0.25	-	-
Collection Date	10/29/2008		10/29/2008		10/29/2008		
Lab Code	ESO- 6051		ESO- 6052		ESO- 6053		
Location	E-04		E-06		E-08		
Gross Beta	31.63 ± 2.76	< 2.77	18.16 ± 2.24	< 2.81	29.53 ± 2.71	< 2.80	4.0
Be-7	-0.014 ± 0.100	< 0.13	0.060 ± 0.081	< 0.14	0.035 ± 0.144	< 0.29	
K-40	18.28 ± 0.93	-	11.96 ± 0.68	-	14.18 ± 1.08	-	-
Cs-137	0.16 ± 0.039	-	0.33 ± 0.035	-	0.31 ± 0.047	-	0.15
Tl-208	0.17 ± 0.033	-	0.075 ± 0.027	-	0.11 ± 0.040	-	-
Pb-212	0.54 ± 0.106	-	0.19 ± 0.033	-	0.24 ± 0.040	-	-
Bi-214	0.32 ± 0.053	-	0.20 ± 0.045	-	0.24 ± 0.058	-	-
Ra-226	0.79 ± 0.30	-	0.41 ± 0.23	-	0.70 ± 0.41	-	-
Ac-228	0.56 ± 0.11	-	0.28 ± 0.073	-	0.39 ± 0.16	-	-
Collection Date	10/29/2008		10/29/2008				
Lab Code	ESO- 6055		ESO- 6056		**Annual**		
Location	E-09		E-20		**Mean s.d.**		
Gross Beta	38.78 ± 2.93	< 2.82	31.53 ± 2.74	< 2.74	**31.10 ± 6.26**		4.0
Be-7	0.039 ± 0.27	< 0.24	0.174 ± 0.11	< 0.21	**0.045 ± 0.06**		
K-40	20.73 ± 1.72	-	16.14 ± 0.88	-	**18.81 ± 7.14**		-
Cs-137	0.20 ± 0.066	-	0.30 ± 0.040	-	**0.19 ± 0.08**		0.15
Tl-208	0.26 ± 0.076	-	0.13 ± 0.031	-	**0.17 ± 0.07**		-
Pb-212	0.67 ± 0.115	-	0.40 ± 0.042	-	**0.46 ± 0.16**		-
Bi-214	0.52 ± 0.186	-	0.43 ± 0.078	-	**0.36 ± 0.11**		-
Ra-226	1.77 ± 0.82	-	0.84 ± 0.42	-	**1.09 ± 0.47**		-
Ac-228	0.78 ± 0.24	-	0.37 ± 0.10	-	**0.54 ± 0.22**		-

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	5/28/2009		5/28/2009		5/28/2009		
Lab Code	EG- 2623		EG- 2624		EG- 2625		Req. LLD
Ratio (wet/dry)	5.45		6.49		5.45		-
Gross Beta	6.31 ± 0.22	< 0.081	5.75 ± 0.18	< 0.059	7.14 ± 0.20	< 0.064	0.25
Be-7	0.27 ± 0.08	< 0.19	0.35 ± 0.13	-	0.23 ± 0.13	-	-
K-40	5.10 ± 0.42	-	4.07 ± 0.38	-	4.69 ± 0.45	-	-
I-131	-0.007 ± 0.007	< 0.026	-0.011 ± 0.009	< 0.026	0.009 ± 0.008	< 0.033	0.060
Cs-134	0.003 ± 0.010	< 0.020	-0.009 ± 0.008	< 0.009	0.005 ± 0.010	< 0.020	0.060
Cs-137	-0.001 ± 0.009	< 0.008	0.005 ± 0.009	< 0.017	-0.002 ± 0.008	< 0.015	0.080
Other (Co-60)	-0.010 ± 0.009	< 0.012	-0.002 ± 0.008	< 0.008	0.003 ± 0.008	< 0.011	0.060
Location	E-04		E-06		E-08		
Collection Date	5/28/2009		5/28/2009		5/28/2009		
Lab Code	EG- 2626		EG- 2628		EG- 2629		Req. LLD
Ratio (wet/dry)	9.39		4.91		5.37		-
Gross Beta	6.32 ± 0.19	< 0.060	7.20 ± 0.24	< 0.087	6.21 ± 0.20	< 0.069	0.25
Be-7	0.33 ± 0.13	-	0.44 ± 0.21	-	0.27 ± 0.09	< 0.18	-
K-40	4.13 ± 0.35	-	4.39 ± 0.46	-	4.22 ± 0.46	-	-
I-131	-0.006 ± 0.008	< 0.016	-0.002 ± 0.010	< 0.036	0.001 ± 0.008	< 0.034	0.060
Cs-134	0.010 ± 0.008	< 0.011	0.000 ± 0.012	< 0.012	0.005 ± 0.011	< 0.018	0.060
Cs-137	0.003 ± 0.008	< 0.014	0.079 ± 0.025	-	0.011 ± 0.009	< 0.016	0.080
Other (Co-60)	0.005 ± 0.007	< 0.008	0.005 ± 0.011	< 0.017	-0.008 ± 0.009	< 0.012	0.060
Location	E-09		E-20				
Collection Date	5/28/2009		5/28/2009				
Lab Code	EG- 2630		EG- 2631				Req. LLD
Ratio (wet/dry)	4.52		4.02				-
Gross Beta	7.69 ± 0.23	< 0.072	8.87 ± 0.26	< 0.085			0.25
Be-7	0.67 ± 0.18	-	0.46 ± 0.20	-			-
K-40	5.40 ± 0.43	-	4.93 ± 0.42	-			-
I-131	0.014 ± 0.008	< 0.033	0.005 ± 0.008	< 0.036			0.060
Cs-134	-0.001 ± 0.009	< 0.015	-0.004 ± 0.009	< 0.015			0.060
Cs-137	0.002 ± 0.009	< 0.015	0.003 ± 0.010	< 0.017			0.080
Other (Co-60)	-0.002 ± 0.010	< 0.010	0.002 ± 0.007	< 0.010			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	7/30/2009		7/30/2009		7/30/2009		
Lab Code	EG- 4040		EG- 4041		EG- 4042		Req. LLD
Ratio (wet/dry)	2.55		3.41		3.99		-
Gross Beta	8.08 ± 0.27	< 0.124	8.88 ± 0.28	< 0.120	7.86 ± 0.19	< 0.071	0.25
Be-7	1.45 ± 0.27	-	1.22 ± 0.23	-	0.80 ± 0.16	-	-
K-40	4.93 ± 0.44	-	6.22 ± 0.46	-	6.57 ± 0.42	-	-
I-131	-0.013 ± 0.008	< 0.023	0.005 ± 0.008	< 0.023	0.001 ± 0.007	< 0.026	0.060
Cs-134	0.004 ± 0.008	< 0.016	-0.003 ± 0.008	< 0.011	-0.002 ± 0.006	< 0.009	0.060
Cs-137	0.002 ± 0.009	< 0.014	-0.003 ± 0.009	< 0.012	0.000 ± 0.007	< 0.013	0.080
Other (Co-60)	0.001 ± 0.009	< 0.010	-0.002 ± 0.010	< 0.015	0.000 ± 0.007	< 0.007	0.060
Location	E-04		E-06		E-08		
Collection Date	7/30/2009		7/30/2009		7/30/2009		
Lab Code	EG- 4043		EG- 4044		EG- 4045		Req. LLD
Ratio (wet/dry)	2.75		4.30		4.18		-
Gross Beta	7.23 ± 0.20	< 0.077	4.84 ± 0.10	< 0.039	3.49 ± 0.12	< 0.061	0.25
Be-7	1.24 ± 0.20	-	0.71 ± 0.18	-	1.54 ± 0.20	-	-
K-40	4.98 ± 0.46	-	3.04 ± 0.35	-	2.64 ± 0.30	-	-
I-131	0.012 ± 0.009	< 0.024	0.001 ± 0.008	< 0.026	0.006 ± 0.007	< 0.020	0.060
Cs-134	-0.005 ± 0.011	< 0.019	0.004 ± 0.007	< 0.012	-0.005 ± 0.006	< 0.011	0.060
Cs-137	0.000 ± 0.012	< 0.019	0.024 ± 0.011	< 0.018	0.008 ± 0.009	< 0.017	0.080
Other (Co-60)	0.001 ± 0.012	< 0.010	-0.001 ± 0.007	< 0.008	0.008 ± 0.008	< 0.013	0.060
Location	E-09		E-20				
Collection Date	7/30/2009		7/30/2009				
Lab Code	EG- 4046		EG- 4047				Req. LLD
Ratio (wet/dry)	2.72		3.28				-
Gross Beta	7.25 ± 0.20	< 0.091	5.29 ± 0.14	< 0.062			0.25
Be-7	1.42 ± 0.18	-	1.30 ± 0.22	-			-
K-40	4.65 ± 0.36	-	3.32 ± 0.45	-			-
I-131	0.000 ± 0.005	< 0.016	-0.004 ± 0.010	< 0.026			0.060
Cs-134	0.001 ± 0.006	< 0.008	-0.003 ± 0.008	< 0.014			0.060
Cs-137	0.003 ± 0.006	< 0.011	0.006 ± 0.010	< 0.016			0.080
Other (Co-60)	0.004 ± 0.007	< 0.014	-0.016 ± 0.014	< 0.013			0.060

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

Sample Description and Concentration (pCi/g wet)

		MDC		MDC		MDC	
Location	E-01		E-02		E-03		
Collection Date	9/30/2009		9/30/2009		9/30/2009		
Lab Code	EG- 5299		EG- 5300		EG- 5301		Req. LLD
Ratio (wet/dry)	2.30		3.73		4.05		-
Gross Beta	6.44 ± 0.12	< 0.049	8.25 ± 0.21	< 0.074	2.25 ± 0.06	< 0.014	0.25
Be-7	2.29 ± 0.26	-	1.51 ± 0.23	-	1.55 ± 0.19	-	-
K-40	5.31 ± 0.48	-	6.43 ± 0.47	-	6.24 ± 0.46	-	-
I-131	-0.004 ± 0.009	< 0.024	-0.010 ± 0.008	< 0.017	-0.011 ± 0.007	< 0.018	0.060
Cs-134	-0.002 ± 0.007	< 0.013	-0.007 ± 0.007	< 0.007	-0.004 ± 0.008	< 0.011	0.060
Cs-137	0.003 ± 0.008	< 0.015	0.001 ± 0.009	< 0.013	0.006 ± 0.007	< 0.013	0.080
Other (Co-60)	-0.007 ± 0.008	< 0.010	-0.010 ± 0.010	< 0.011	0.005 ± 0.009	< 0.008	0.060
Location	E-04		E-06		E-08		
Collection Date	9/30/2009		9/30/2009		9/30/2009		
Lab Code	EG- 5302		EG- 5303		EG- 5304		Req. LLD
Ratio (wet/dry)	2.56		2.41		2.48		-
Gross Beta	1.49 ± 0.04	< 0.011	1.10 ± 0.03	< 0.010	1.73 ± 0.04	< 0.008	0.25
Be-7	3.74 ± 0.29	-	3.06 ± 0.27	-	4.05 ± 0.28	-	-
K-40	3.90 ± 0.40	-	4.21 ± 0.41	-	4.04 ± 0.38	-	-
I-131	-0.002 ± 0.008	< 0.030	0.001 ± 0.008	< 0.027	0.001 ± 0.007	< 0.018	0.060
Cs-134	-0.007 ± 0.008	< 0.012	-0.005 ± 0.008	< 0.014	-0.005 ± 0.008	< 0.012	0.060
Cs-137	0.009 ± 0.009	< 0.013	0.009 ± 0.010	< 0.017	0.005 ± 0.009	< 0.015	0.080
Other (Co-60)	-0.002 ± 0.006	< 0.009	0.001 ± 0.008	< 0.005	0.002 ± 0.007	< 0.012	0.060
Location	E-09		E-20				
Collection Date	9/30/2009		9/30/2009				
Lab Code	EG- 5305		EG- 5306				Req. LLD
Ratio (wet/dry)	2.44		3.01				-
Gross Beta	2.16 ± 0.06	< 0.015	1.96 ± 0.05	< 0.011			0.25
Be-7	2.47 ± 0.23	-	1.85 ± 0.25	-			-
K-40	4.17 ± 0.38	-	5.62 ± 0.48	-			-
I-131	-0.004 ± 0.007	< 0.026	0.010 ± 0.009	< 0.028			0.060
Cs-134	-0.004 ± 0.007	< 0.010	0.004 ± 0.009	< 0.016			0.060
Cs-137	0.002 ± 0.008	< 0.015	0.006 ± 0.010	< 0.019			0.080
Other (Co-60)	-0.002 ± 0.008	< 0.011	-0.005 ± 0.008	< 0.007			0.060

Gross Beta Annual Mean + s.d 5.57 ± 2.55
Be-7 Annual Mean + s.d. 1.38 ± 1.08
K-40 Annual Mean + s.d. 4.72 ± 1.04
I-131 Annual Mean + s.d. 0.000 ± 0.007
Cs-134 Annual Mean + s.d. -0.001 ± 0.005
Cs-137 Annual Mean + s.d. 0.007 ± 0.016
Co-60 Annual Mean + s.d. -0.001 ± 0.006

POINT BEACH NUCLEAR PLANT

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

Collection: Semiannual
Units: pCi/g wet

Sample Description and Concentration							
Collection Date	06-12-09	MDC	06-12-09	MDC	Req.		
Lab Code	ESL- 2925		ESL- 2926		LLD		
Location	E-05		E-12				
Ratio (wet wt./dry wt.)	8.24		5.41				
Gross Beta	3.60 ± 0.17	< 0.11	4.20 ± 0.28	< 0.26	0.25		
Be-7	0.83 ± 0.31	-	1.43 ± 0.19	-	-		
K-40	2.62 ± 0.56	-	2.41 ± 0.31	-	-		
Co-58	0.003 ± 0.014	< 0.021	0.004 ± 0.007	< 0.015	0.25		
Co-60	-0.009 ± 0.018	< 0.022	0.005 ± 0.009	< 0.009	0.25		
Cs-134	-0.004 ± 0.015	< 0.023	-0.004 ± 0.008	< 0.014	0.25		
Cs-137	-0.002 ± 0.017	< 0.023	0.014 ± 0.009	< 0.017	0.25		
Collection Date	08-06-09		08-06-09		Req.		
Lab Code	ESL- 4164		ESL- 4166		LLD		
Location	E-05		E-12				
Ratio (wet wt./dry wt.)	6.37		4.54				
Gross Beta	2.82 ± 0.31	< 0.28	5.13 ± 0.47	< 0.40	0.25		
Be-7	0.59 ± 0.35	-	0.98 ± 0.26	-	-		
K-40	1.39 ± 0.50	-	2.00 ± 0.31	-	-		
Co-58	0.002 ± 0.017	< 0.036	0.001 ± 0.008	< 0.020	0.25		
Co-60	0.015 ± 0.018	< 0.033	0.006 ± 0.009	< 0.015	0.25		
Cs-134	-0.002 ± 0.019	< 0.037	0.007 ± 0.008	< 0.015	0.25		
Cs-137	0.030 ± 0.022	< 0.039	0.029 ± 0.017	-	0.25		
Collection Date	10-07-09		10-07-09		Req.		
Lab Code	ESL- 5403		ESL- 5404		LLD	**Annual**	
Location	E-05		E-12			**Mean**	**s.d.**
Ratio (wet wt./dry wt.)	3.99		3.58				
Gross Beta	7.22 ± 0.66	< 0.53	8.76 ± 0.80	< 0.69	0.25	**5.29 ± 2.28**	
Be-7	0.88 ± 0.23	-	0.63 ± 0.23	< 0.56	-	**0.89 ± 0.30**	
K-40	3.01 ± 0.41	-	4.70 ± 0.78	-	-	**2.69 ± 1.13**	
Co-58	0.004 ± 0.008	< 0.012	-0.025 ± 0.024	< 0.033	0.25	**-0.002 ± 0.011**	
Co-60	0.008 ± 0.010	< 0.016	-0.004 ± 0.027	< 0.052	0.25	**0.003 ± 0.009**	
Cs-134	-0.011 ± 0.009	< 0.013	-0.008 ± 0.024	< 0.041	0.25	**-0.004 ± 0.006**	
Cs-137	0.012 ± 0.011	< 0.020	0.014 ± 0.028	< 0.053	0.25	**0.016 ± 0.012**	

Table 12. Ambient Gamma Radiation

1st. Quarter, 2009

Date Annealed:	12-02-08	Days in the field	88
Date Placed:	01-09-09	Days from Annealing	
Date Removed:	04-07-09	to Readout:	139
Date Read:	04-20-09		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	88	17.4 ± 1.3	10.6 ± 1.5	0.84 ± 0.12
E-2	88	21.2 ± 0.3	14.4 ± 0.9	1.14 ± 0.07
E-3	88	23.1 ± 1.4	16.3 ± 1.6	1.29 ± 0.13
E-4	88	19.9 ± 1.5	13.1 ± 1.7	1.04 ± 0.14
E-5	88	18.9 ± 1.3	12.1 ± 1.5	0.96 ± 0.12
E-6	88	20.3 ± 1.1	13.5 ± 1.4	1.07 ± 0.11
E-7	88	20.5 ± 0.9	13.7 ± 1.2	1.09 ± 0.10
E-8	88	19.6 ± 0.6	12.8 ± 1.0	1.01 ± 0.08
E-9	88	22.1 ± 0.5	15.3 ± 1.0	1.21 ± 0.08
E-12	88	18.7 ± 0.7	11.9 ± 1.1	0.94 ± 0.09
E-14	88	20.4 ± 0.6	13.6 ± 1.0	1.08 ± 0.08
E-15	88	20.2 ± 0.8	13.4 ± 1.2	1.06 ± 0.09
E-16	88	19.8 ± 0.4	13.0 ± 0.9	1.03 ± 0.07
E-17	88	20.5 ± 0.6	13.7 ± 1.0	1.09 ± 0.08
E-18	88	20.2 ± 0.8	13.4 ± 1.2	1.06 ± 0.09
E-22	88	21.3 ± 1.2	14.5 ± 1.5	1.15 ± 0.12
E-23	88	19.4 ± 0.5	12.6 ± 1.0	1.00 ± 0.08
E-24	88	20.3 ± 0.7	13.5 ± 1.1	1.07 ± 0.09
E-25	88	19.2 ± 0.2	12.4 ± 0.9	0.98 ± 0.07
E-26	88	18.8 ± 0.4	12.0 ± 0.9	0.95 ± 0.07
E-27	88	21.6 ± 0.4	14.8 ± 0.9	1.17 ± 0.07
E-28	88	17.8 ± 0.5	11.0 ± 1.0	0.87 ± 0.08
E-29	88	18.1 ± 0.8	11.3 ± 1.2	0.89 ± 0.09
E-30	88	18.7 ± 0.9	11.9 ± 1.2	0.94 ± 0.10
E-31	88	20.3 ± 0.6	13.5 ± 1.0	1.07 ± 0.08
E-32	88	20.1 ± 0.7	13.3 ± 1.1	1.05 ± 0.09
E-38	88	19.5 ± 1.4	12.7 ± 1.6	1.01 ± 0.13
E-39	88	16.7 ± 0.7	9.9 ± 1.1	0.78 ± 0.09
E-41	88	14.6 ± 0.6	7.8 ± 1.0	0.62 ± 0.08
E-42	88	16.7 ± 0.3	9.9 ± 0.9	0.78 ± 0.07
E-43	88	15.4 ± 0.3	8.6 ± 0.9	0.68 ± 0.07
Control				
E-20	88	21.7 ± 1.5	14.9 ± 1.7	1.18 ± 0.14
Mean±s.d.		19.5 ± 1.9	12.6 ± 1.9	1.00 ± 0.15

In-Transit Exposure

Date Annealed	12-02-08	03-11-09
Date Read	01-15-09	04-20-09
	Total mR	
ITC-1	8.2 ± 0.4	5.6 ± 0.6
ITC-2	7.8 ± 0.3	5.8 ± 0.3

POINT BEACH NUCLEAR PLANT

Table 12. Ambient Gamma Radiation

2nd Quarter, 2009

	Date Annealed:	03-11-09	Days in the field	85
	Date Placed:	04-07-09	Days from Annealing	
	Date Removed:	07-01-09	to Readout:	118
	Date Read:	07-07-09		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	85	14.4 ± 0.8	10.2 ± 1.1	0.84 ± 0.09
E-2	85	19.9 ± 1.1	15.7 ± 1.3	1.30 ± 0.11
E-3	85	21.1 ± 1.5	16.9 ± 1.7	1.39 ± 0.14
E-4	85	17.2 ± 0.2	13.0 ± 0.8	1.07 ± 0.06
E-5	85	19.3 ± 0.4	15.1 ± 0.8	1.25 ± 0.07
E-6	85	17.3 ± 0.6	13.1 ± 1.0	1.08 ± 0.08
E-7	85	16.1 ± 0.5	11.9 ± 0.9	0.98 ± 0.07
E-8	85	17.2 ± 0.6	13.0 ± 1.0	1.07 ± 0.08
E-9	85	15.0 ± 0.7	10.8 ± 1.0	0.89 ± 0.08
E-12	85	18.9 ± 1.3	14.7 ± 1.5	1.21 ± 0.12
E-14	85	18.0 ± 1.3	13.8 ± 1.5	1.14 ± 0.12
E-15	85	21.1 ± 1.0	16.9 ± 1.2	1.39 ± 0.10
E-16	85	17.2 ± 0.3	13.0 ± 0.8	1.07 ± 0.07
E-17	85	17.4 ± 1.1	13.2 ± 1.3	1.09 ± 0.11
E-18	85	19.0 ± 0.4	14.8 ± 0.8	1.22 ± 0.07
E-22	85	18.9 ± 0.5	14.7 ± 0.9	1.21 ± 0.07
E-23	85	20.1 ± 0.7	15.9 ± 1.0	1.31 ± 0.08
E-24	85	18.3 ± 0.2	14.1 ± 0.8	1.16 ± 0.06
E-25	85	20.2 ± 0.5	16.0 ± 0.9	1.32 ± 0.07
E-26	85	16.5 ± 0.6	12.3 ± 1.0	1.02 ± 0.08
E-27	85	20.9 ± 0.5	16.7 ± 0.9	1.38 ± 0.07
E-28	85	14.5 ± 0.1	10.3 ± 0.7	0.85 ± 0.06
E-29	85	14.7 ± 0.5	10.5 ± 0.9	0.87 ± 0.07
E-30	85	17.1 ± 0.2	12.9 ± 0.8	1.06 ± 0.06
E-31	85	19.5 ± 0.2	15.3 ± 0.8	1.26 ± 0.06
E-32	85	16.6 ± 0.3	12.4 ± 0.8	1.02 ± 0.07
E-38	85	16.3 ± 0.5	12.1 ± 0.9	1.00 ± 0.07
E-39	85	15.4 ± 0.6	11.2 ± 1.0	0.92 ± 0.08
E-41	85	17.7 ± 0.5	13.5 ± 0.9	1.11 ± 0.07
E-42	85	19.5 ± 0.2	15.3 ± 0.8	1.26 ± 0.06
E-43	85	17.1 ± 0.3	12.9 ± 0.8	1.06 ± 0.07
Control				
E-20	85	16.6 ± 0.4	12.4 ± 0.8	1.02 ± 0.07
Mean±s.d.		17.8 ± 1.9	13.6 ± 1.9	1.12 ± 0.15

In-Transit Exposure

Date Annealed	03-11-09	06-17-09
Date Read	04-20-09	07-08-09
	Total mR	
ITC-1	5.6 ± 0.6	2.7 ± 0.3
ITC-2	5.8 ± 0.3	2.6 ± 0.1

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Table 12. Ambient Gamma Radiation

3rd Quarter, 2009

	Date Annealed:	06-17-09	Days in the field	98
	Date Placed:	07-01-09	Days from Annealing	
	Date Removed:	10-07-09	to Readout:	119
	Date Read:	10-14-09		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	98	14.3 ± 0.6	11.2 ± 0.7	0.80 ± 0.05
E-2	98	20.2 ± 1.0	17.1 ± 1.1	1.22 ± 0.08
E-3	98	24.6 ± 1.6	21.5 ± 1.6	1.54 ± 0.12
E-4	98	19.4 ± 1.4	16.3 ± 1.4	1.17 ± 0.10
E-5	98	19.8 ± 1.3	16.7 ± 1.3	1.19 ± 0.10
E-6	98	18.6 ± 1.6	15.5 ± 1.6	1.11 ± 0.12
E-7	98	19.0 ± 0.7	15.9 ± 0.8	1.14 ± 0.06
E-8	98	17.9 ± 0.9	14.8 ± 1.0	1.06 ± 0.07
E-9	98	22.1 ± 0.7	19.0 ± 0.8	1.36 ± 0.06
E-12	98	15.4 ± 1.5	12.3 ± 1.5	0.88 ± 0.11
E-14	98	20.8 ± 0.3	17.7 ± 0.5	1.27 ± 0.03
E-15	98	21.6 ± 0.8	18.5 ± 0.9	1.32 ± 0.06
E-16	98	19.7 ± 0.4	16.6 ± 0.5	1.19 ± 0.04
E-17	98	20.4 ± 0.5	17.3 ± 0.6	1.24 ± 0.04
E-18	98	21.5 ± 1.1	18.4 ± 1.2	1.32 ± 0.08
E-22	98	21.6 ± 1.3	18.5 ± 1.3	1.32 ± 0.10
E-23	98	21.1 ± 0.6	18.0 ± 0.7	1.29 ± 0.05
E-24	98	20.2 ± 0.6	17.1 ± 0.7	1.22 ± 0.05
E-25	98	20.3 ± 0.5	17.2 ± 0.6	1.23 ± 0.04
E-26	98	18.1 ± 0.4	15.0 ± 0.5	1.07 ± 0.04
E-27	98	22.7 ± 0.4	19.6 ± 0.5	1.40 ± 0.04
E-28	98	14.3 ± 0.3	11.2 ± 0.5	0.80 ± 0.03
E-29	98	15.3 ± 0.7	12.2 ± 0.8	0.87 ± 0.06
E-30	98	18.0 ± 1.0	14.9 ± 1.1	1.07 ± 0.08
E-31	98	20.5 ± 0.8	17.4 ± 0.9	1.24 ± 0.06
E-32	98	20.2 ± 0.7	17.1 ± 0.8	1.22 ± 0.06
E-38	98	20.1 ± 1.4	17.0 ± 1.4	1.22 ± 0.10
E-39	98	17.7 ± 0.7	14.6 ± 0.8	1.04 ± 0.06
E-41	98	17.8 ± 0.5	14.7 ± 0.6	1.05 ± 0.04
E-42	98	19.5 ± 0.2	16.4 ± 0.4	1.17 ± 0.03
E-43	98	19.6 ± 0.2	16.5 ± 0.4	1.18 ± 0.03
Control				
E-20	98	19.3 ± 1.1	16.2 ± 1.2	1.16 ± 0.08
Mean±s.d.		19.4 ± 2.3	16.4 ± 2.3	1.17 ± 0.16

In-Transit Exposure

Date Annealed	06-17-09	09-13-09
Date Read	07-08-09	10-14-09
	Total mR	
ITC-1	2.7 ± 0.3	3.5 ± 0.1
ITC-2	2.6 ± 0.1	3.5 ± 0.1

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Table 12. Ambient Gamma Radiation

4th Quarter, 2009

Date Annealed:	09-13-09	Days in the field	91
Date Placed:	10-07-09	Days from Annealing	
Date Removed:	01-06-10	to Readout:	122
Date Read:	01-13-10		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	91	15.5 ± 0.9	10.6 ± 1.1	0.81 ± 0.08
E-2	91	21.1 ± 1.1	16.2 ± 1.3	1.24 ± 0.10
E-3	91	22.4 ± 1.6	17.5 ± 1.7	1.34 ± 0.13
E-4	91	18.2 ± 0.2	13.3 ± 0.6	1.02 ± 0.05
E-5	91	19.9 ± 0.4	15.0 ± 0.7	1.15 ± 0.06
E-6	91	17.9 ± 0.5	13.0 ± 0.8	1.00 ± 0.06
E-7	91	17.4 ± 0.5	12.5 ± 0.8	0.96 ± 0.06
E-8	91	18.0 ± 0.6	13.1 ± 0.8	1.01 ± 0.07
E-9	91	20.3 ± 1.0	15.4 ± 1.2	1.18 ± 0.09
E-12	91	15.0 ± 1.2	10.1 ± 1.3	0.78 ± 0.10
E-14	91	18.5 ± 1.3	13.6 ± 1.4	1.04 ± 0.11
E-15	91	21.3 ± 0.9	16.4 ± 1.1	1.26 ± 0.08
E-16	91	17.9 ± 0.3	13.0 ± 0.7	1.00 ± 0.05
E-17	91	18.5 ± 1.1	13.6 ± 1.3	1.04 ± 0.10
E-18	91	19.8 ± 0.4	14.9 ± 0.7	1.14 ± 0.06
E-22	91	19.0 ± 0.5	14.1 ± 0.8	1.08 ± 0.06
E-23	91	20.3 ± 0.8	15.4 ± 1.0	1.18 ± 0.08
E-24	91	18.7 ± 0.3	13.8 ± 0.7	1.06 ± 0.05
E-25	91	20.2 ± 0.3	15.3 ± 0.7	1.18 ± 0.05
E-26	91	17.6 ± 0.8	12.7 ± 1.0	0.98 ± 0.08
E-27	91	20.8 ± 0.7	15.9 ± 0.9	1.22 ± 0.07
E-28	91	14.5 ± 0.4	9.6 ± 0.7	0.74 ± 0.06
E-29	91	15.1 ± 0.6	10.2 ± 0.8	0.78 ± 0.07
E-30	91	17.5 ± 0.4	12.6 ± 0.7	0.97 ± 0.06
E-31	91	19.2 ± 1.4	14.3 ± 1.5	1.10 ± 0.12
E-32	91	16.5 ± 0.3	11.6 ± 0.7	0.89 ± 0.05
E-38	91	17.2 ± 0.5	12.3 ± 0.8	0.94 ± 0.06
E-39	91	16.5 ± 0.5	11.6 ± 0.8	0.89 ± 0.06
E-41	91	17.3 ± 0.5	12.4 ± 0.8	0.95 ± 0.06
E-42	91	19.6 ± 0.6	14.7 ± 0.8	1.13 ± 0.07
E-43	91	17.1 ± 0.2	12.2 ± 0.6	0.94 ± 0.05
Control				
E-20	91	17.7 ± 0.6	12.8 ± 0.8	0.98 ± 0.07
Mean±s.d.		18.3 ± 1.9	13.4 ± 1.9	1.03 ± 0.14

In-Transit Exposure

Date Annealed	09-13-09	12-01-09
Date Read	10-14-09	01-13-10
	Total mR	
ITC-1	3.5 ± 0.1	6.5 ± 0.5
ITC-2	3.5 ± 0.1	6.2 ± 0.3

Annual Indicator Mean±s.d.	**18.7 ± 2.1**	**14.0 ± 2.5**	**1.08 ±0.17**
Annual Control Mean±s.d.	**18.8 ± 2.2**	**14.1 ± 1.8**	**1.09 ±0.10**
Annual Indicator/Control Mean±s	**18.8 ± 2.1**	**14.0 ± 2.5**	**1.08 ±0.17**

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)
01-28-09		NS[a]		01-28-09		NS[a]	
02-28-09		NS[a]		02-28-09		NS[a]	
03-26-09	EWW-1015	80 ± 87	<158	03-26-09	EWW-1017	249 ± 95	<158
04-29-09	EWW-2001	158 ± 104	<160	04-29-09	EWW-2002	314 ± 94	<158
05-28-09	EWW-2616	118 ± 89	<158	05-28-09	EWW-2617	383 ± 101	<158
07-02-09	EWW-3361	47 ± 75	<147	07-02-09	EWW-3362	141 ± 80	<147
07-30-09		NS[b]		07-30-09	EWW-4050	64 ± 74	<149
09-30-09	EWW-5282	147 ± 98	<151	09-30-09	EWW-5283	86 ± 81	<154
10-28-09	EWW-6043	131 ± 96	<148	10-28-09	EWW-6044	301 ± 103	<148
11-25-09	EWW-6547	99 ± 83	<149	11-25-09	EWW-6548	204 ± 89	<149
12-23-09		NS[c]		12-23-09		NS[c]	
Mean + s.d.		111 ± 39		Mean + s.d.		218 ± 114	

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)
01-28-09		NS[a]		01-28-09		NS[a]	
02-28-09		NS[a]		02-28-09		NS[a]	
03-26-09	EWW-1018	144 ± 90	<158	03-26-09	EWW-1020	223 ± 94	<158
04-29-09	EWW-2003	34 ± 80	<158	04-29-09	EWW-2006	240 ± 91	<158
05-28-09	EWW-2618	66 ± 87	<158	05-28-09	EWW-2622	709 ± 115	<158
07-02-09	EWW-3363	108 ± 78	<147	07-02-09	EWW-3365	251 ± 86	<147
07-30-09	EWW-4051	119 ± 77	<149	07-30-09	EWW-4053	123 ± 77	<149
09-30-09	EWW-5284	196 ± 86	<154	08-26-09	EWW-4512	119 ± 79	<147
10-28-09	EWW-6045	66 ± 93	<148	09-30-09	EWW-5286	109 ± 82	<154
11-25-09	EWW-6549	145 ± 86	<149	10-28-09	EWW-6047	427 ± 108	<148
12-23-09		NS[c]		11-25-09	EWW-6551	346 ± 95	<149
				12-30-09	EWW-7271	141 ± 80	<150
Mean + s.d.		110 ± 53		Mean + s.d.		283 ± 192	

Wells

Sample ID	GW-04 (EIC Well)				GW-11 (MW-1)		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-28-09	EWW-274	-50 ± 72	<152	01-23-09	EWW-275	105 ± 81	<152
02-25-09	EWW-614	-11 ± 77	<148	02-26-09	EWW-733	108 ± 81	<151
03-26-09	EWW-1019	104 ± 89	<158	03-30-09	EWW-1165	123 ± 98	<152
04-29-09	EWW-2005	47 ± 81	<158	04-16-09	EWW-1660	90 ± 83	<157
05-28-09	EWW-2619	-9 ± 83	<158	05-26-09	EWW-2555	7 ± 81	<162
07-30-09	EWW-4052	-23 ± 69	<149	06-17-09	EWW-3024	76 ± 82	<149
08-26-09	EWW-4511	-26 ± 72	<147	07-30-09	EWW-4054	82 ± 75	<149
09-30-09	EWW-5285	6 ± 77	<154	08-17-09	EWW-4357	149 ± 80	<145
10-28-09	EWW-6046	19 ± 90	<148	09-16-09	EWW-5093	50 ± 78	<152
11-25-09	EWW-6550	45 ± 81	<149	11-05-09	EWW-6199	41 ± 96	<155
12-23-09		NS[c]		11-21-09	EWW-6472	145 ± 96	<147
				12-23-09	EWW-7113	140 ± 103	<161
Mean + s.d.		10 ± 45		Mean + s.d.		93 ± 44	

[a] "NS" = no sample; streams frozen.
[b] "NS" = no sample; creek dried up.
[c] "NS" = no sample; not sent.

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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)
01-23-09	EWW-276	59 ± 78	<152	01-23-09	EWW-277	36 ± 77	<152
02-26-09	EWW-734	14 ± 76	<151	02-26-09	EWW-735	60 ± 78	<151
03-30-09	EWW-1166	60 ± 79	<152	03-30-09	EWW-1167	131 ± 83	<152
04-16-09	EWW-1661	-51 ± 75	<157	04-16-09	EWW-1662	103 ± 83	<157
05-26-09	EWW-2557	-74 ± 76	<162	05-26-09	EWW-2558	66 ± 84	<162
06-17-09	EWW-3025	3 ± 78	<149	06-17-09	EWW-3026	116 ± 84	<149
07-30-09	EWW-4055	12 ± 71	<149	07-30-09	EWW-4056	137 ± 78	<149
08-17-09	EWW-4358	-25 ± 70	<145	08-17-09	EWW-4359	82 ± 76	<145
09-16-09	EWW-5094	-19 ± 74	<152	09-16-09	EWW-5095	52 ± 78	<152
11-05-09	EWW-6200	43 ± 96	<155	11-05-09	EWW-6201	94 ± 98	<155
11-21-09	EWW-6473	60 ± 92	<147	11-21-09	EWW-6474	93 ± 93	<147
12-23-09	EWW-7114	38 ± 99	<161	12-23-09	EWW-7115	127 ± 103	<161
Mean + s.d.		10 ± 45		Mean + s.d.		91 ± 33	

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)
01-23-09	EWW-278	173 ± 84	<152	01-23-09	EWW-279	423 ± 96	<152
02-26-09	EWW-736	101 ± 80	<151	02-26-09	EWW-737	566 ± 102	<151
03-30-09	EWW-1168	150 ± 84	<152	03-30-09	EWW-1170	615 ± 105	<152
04-16-09	EWW-1664	-10 ± 77	<157	04-16-09	EWW-1665	446 ± 100	<157
05-26-09	EWW-2559	70 ± 84	<162	05-26-09	EWW-2560	379 ± 99	<162
06-17-09	EWW-3028	50 ± 81	<149	06-17-09	EWW-3029	387 ± 96	<149
07-30-09	EWW-4058	56 ± 73	<149	07-30-09	EWW-4059	423 ± 91	<149
08-17-09	EWW-4360	70 ± 76	<145	08-17-09	EWW-4361	495 ± 96	<145
09-16-09	EWW-5096	22 ± 76	<152	09-16-09	EWW-5097	452 ± 97	<152
11-05-09	EWW-6202	174 ± 101	<155	11-05-09	EWW-6203	410 ± 109	<155
11-21-09	EWW-6476	114 ± 94	<147	11-21-09	EWW-6477	503 ± 110	<147
12-23-09	EWW-7116	144 ± 103	<161	12-23-09	EWW-7117	452 ± 114	<161
Mean + s.d.		93 ± 60		Mean + s.d.		463 ± 71	

Sample ID	GW-16 (MW-3)		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-23-09	EWW-280	131 ± 82	<152
03-30-09	EWW-1171	382 ± 95	<152
04-16-09	EWW-1666	244 ± 91	<157
05-26-09	EWW-2561	138 ± 88	<162
06-17-09	EWW-3030	175 ± 87	<149
07-30-09	EWW-4060	215 ± 82	<149
08-17-09	EWW-4362	216 ± 83	<145
09-16-09	EWW-5098	230 ± 87	<152
11-05-09	EWW-6204	272 ± 104	<155
11-21-09	EWW-6478	296 ± 102	<147
12-23-09	EWW-7118	325 ± 110	<161
Mean + s.d.		239 ± 77	

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)
01-09-09	EW-79	231 ± 81	<132	01-09-09		NS[a]	
02-09-09		NS[a]		02-09-09		NS[a]	
03-09-09		NS[a]		03-09-09		NS[a]	
04-09-09	EW-1340	395 ± 98	<158	04-09-09	EW-1341	240 ± 91	<158
05-07-09	EW-2163	336 ± 96	<161	05-07-09	EW-2164	375 ± 98	<161
06-12-09	EW-2927	200 ± 100	<152	06-12-09	EW-2928	362 ± 107	<152
07-09-09	EW-3439	362 ± 94	<147	07-09-09	EW-3440	534 ± 101	<147
08-06-09	EW-4178	270 ± 90	<146	08-06-09	EW-4179	422 ± 96	<146
09-10-09	EW-4742	3198 ± 183	<141	09-10-09	EW-4744	669 ± 113	<141
09-16-09	EW-4945	253 ± 101	<149	09-24-09	EW-5089	488 ± 98	<152
09-24-09	EW-5088	1691 ± 139	<152	09-30-09	EW-5281	241 ± 102	<151
09-30-09	EW-5280	312 ± 105	<151	10-08-09	EW-5422	235 ± 98	<144
10-08-09	EW-5421	357 ± 103	<144	10-22-09	EW-5856	3688 ± 193	<155
10-22-09	EW-5855	573 ± 107	<155	10-28-09	EW-6042	323 ± 90	<148
10-28-09	EW-6041	987 ± 116	<148	11-03-09	EW-6144	353 ± 109	<156
11-03-09	EW-6143	292 ± 106	<156	11-11-09	EW-6284	275 ± 106	<156
11-11-09	EW-6283	264 ± 106	<156	11-13-09	EW-6339	313 ± 108	<158
11-13-09	EW-6338	308 ± 107	<158	11-16-09	EW-6459	188 ± 91	<156
11-16-09	EW-6455	306 ± 96	<156	11-18-09	EW-6460	261 ± 94	<156
11-18-09	EW-6456	7598 ± 262	<156	11-20-09	EW-6461	371 ± 99	<156
11-20-09	EW-6457	2231 ± 158	<156	11-23-09	EW-6462	305 ± 96	<156
11-23-09	EW-6458	277 ± 95	<156	11-25-09	EW-6647	1370 ± 144	<159
11-25-09	EW-6645	370 ± 113	<164	11-27-09	EW-6648	301 ± 109	<158
11-27-09	EW-6646	309 ± 111	<164	11-30-09	EW-6697	389 ± 112	<158
11-30-09	EW-6694	2910 ± 183	<158	12-02-09	EW-6698	326 ± 109	<158
12-02-09	EW-6695	347 ± 110	<158	12-04-09	EW-6699	328 ± 109	<158
12-04-09	EW-6696	387 ± 112	<158	12-07-09	EW-6872	392 ± 107	<150
12-07-09	EW-6869	384 ± 107	<150	12-08-09	EW-6761	322 ± 95	<151
12-08-09	EW-6760	309 ± 94	<151	12-08-09	EW-6873	450 ± 109	<150
12-08-09	EW-6870	367 ± 106	<150	12-08-09	EW-6874	381 ± 107	<150
12-11-09	EW-6871	327 ± 105	<150	12-16-09	EW-6928	379 ± 108	<151
12-16-09	EW-6925	3227 ± 189	<151	12-18-09	EW-6929	377 ± 108	<151
12-18-09	EW-6926	2843 ± 180	<151	12-21-09	EW-6930	281 ± 104	<151
12-21-09	EW-6927	2603 ± 175	<151	12-30-09	EW-7031	287 ± 90	<153
12-30-09	EW-7030	536 ± 101	<153				
Mean + s.d.		1072 ± 1536		Mean + s.d.		491 ± 628	

12/11/09
KRJ 3/18/10

[a] "NS" = no sample; drains frozen.

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)
01-09-09		NS[a]		01-09-09		NS[a]	
02-09-09		NS[a]		02-09-09		NS[a]	
03-09-09		NS[a]		03-09-09		NS[a]	
04-09-09		NS[b]		04-09-09	EW-1342	575 ± 106	<158
05-07-09		NS[c]		05-07-09		NS[c]	
06-12-09		NS[c]		06-12-09		NS[c]	
07-09-09		NS[c]		07-09-09		NS[c]	
08-06-09		NS[c]		08-06-09		NS[c]	
09-10-09		NS[c]		09-10-09		NS[c]	
10-28-09		NS[c]		10-28-09		NS[c]	
11-30-09		NS[c]		11-30-09		NS[c]	
12-28-09	EW-7032	590 ± 103	<153	12-08-09		NS[b]	
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)
01-09-09		NS[a]		01-09-09		NS[a]	
02-09-09		NS[a]		02-09-09		NS[a]	
03-09-09		NS[a]		03-09-09		NS[a]	
04-09-09	EW-1343	482 ± 102	<158	04-09-09	EW-1344	304 ± 94	<158
05-07-09	EW-2165	458 ± 102	<161	05-07-09		NS[c]	
06-12-09		NS[c]		06-12-09		NS[c]	
07-09-09		NS[c]		07-09-09		NS[c]	
08-06-09		NS[c]		09-10-09	EW-4745	191 ± 94	<141
09-10-09		NS[c]		10-28-09		NS[c]	
10-08-09	EW-5423	229 ± 98	<144	11-30-09		NS[c]	
11-23-09	EW-6463	105 ± 87	<156	12-28-09	EW-7033	435 ± 97	<153
12-08-10		NS[b]					
Mean + s.d.		319 ± 182		Mean + s.d.		310 ± 122	

Sample ID		S-11[d]					
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)				
05-07-09	EW-2166	161 ± 88	<161	12-02-09	EW-6701	188 ± 104	<158
06-12-09	EW-2929	38 ± 94	<152	12-04-09	EW-6702	224 ± 105	<158
07-09-09	EW-3441	152 ± 85	<147	12-08-09		NS[b]	
09-10-09	EW-4746	212 ± 95	<141				
10-08-09	EW-5424	217 ± 97	<144				
11-11-09	EW-6285	219 ± 104	<156				
11-13-09	EW-6340	212 ± 104	<158				
11-16-09	EW-6464	162 ± 90	<156				
11-23-09	EW-6465	38 ± 84	<156				
11-25-09	EW-6649	59 ± 99	<159				
11-27-09	EW-6650	172 ± 104	<159				
11-30-09	EW-6700	147 ± 102	<158				
				Mean + s.d.		157 ± 66	

[a] "NS" = no sample; drains frozen.
[b] "NS = no sample; no flow.
[c] "NS" = No sample; sample not received.
[d] Location recently added.

POINT BEACH NUCLEAR PLANT

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

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)
01-02-09	EW-7544	510 ± 98	<144	11-13-09	EW-6403	831 ± 127	<158
02-11-09	EW-490	468 ± 96	<144	11-18-09	EW-6630	54050 ± 650 [a]	<164
03-06-09	EW-869	609 ± 109	<153	11-20-09	EW-6631	5114 ± 221	<164
04-07-09	EW-1390	533 ± 104	<159	11-23-09	EW-6632	1218 ± 138	<164
05-05-09	EW-2199	539 ± 105	<161	11-25-09	EW-6633	1204 ± 138	<164
06-01-09	EW-3016	541 ± 110	<145	11-27-09	EW-6635	946 ± 131	<158
07-02-09	EW-3709	473 ± 97	<149	11-30-09	EW-6636	1441 ± 146	<158
08-01-09	EW-4370	551 ± 98	<145	12-02-09	EW-6637	1017 ± 134	<158
09-02-09	EW-4779	1701 ± 149	<151	12-04-09	EW-261	1015 ± 120	<155
09-17-09	EW-5092	546 ± 101	<152	12-07-09	EW-263	848 ± 114	<155
09-28-09	EW-6395	421 ± 113	<159	12-09-09	EW-264	787 ± 112	<155
10-05-09	EW-6396	333 ± 110	<159	12-11-09	EW-265	919 ± 117	<155
10-07-09	EW-5923	1070 ± 131	<159	12-14-09	EW-266	1477 ± 135	<155
10-12-09	EW-6397	6162 ± 247	<159	12-16-09	EW-267	1388 ± 133	<155
10-19-09	EW-6398	853 ± 128	<159	12-18-09	EW-268	5166 ± 222	<155
10-26-09	EW-6399	2704 ± 178	<158	12-21-09	EW-269	4657 ± 212	<155
11-02-09	EW-6400	2040 ± 162	<158	12-23-09	EW-270	798 ± 112	<158
11-08-09	EW-6495	2638 ± 173	<147	12-25-09	EW-271	3724 ± 193	<155
11-09-09	EW-6401	2125 ± 164	<158	12-28-09	EW-272	1118 ± 123	<155
11-11-09	EW-6402	1473 ± 147	<158	12-30-09	EW-273	875 ± 115	<155
				Mean + s.d.		2872 ± 11354	

Manholes

Sample ID	MH-66D				MH-68		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
05-13-09	EW-2415	278 ±94	<153	05-13-09	EW-2416	126 ±102	<159
09-22-09	EW-5081	158 ±83	<152	09-21-09	EW-5077	170 ±84	<152
10-29-09	EW-6161	115 ±83	<147	11-01-09	EW-6165	306 ±92	<147
Mean + s.d.		184 ± 84		Mean + s.d.		201 ± 94	

Sample ID	MH-66B				MH-66C		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
09-22-09	EW-5079	122 ±81	<152	09-22-09	EW-5082	71 ±79	<152
10-29-09	EW-6158	49 ±80	<147	10-29-09	EW-6160	107 ±83	<147
Mean + s.d.		86 ± 52		Mean + s.d.		89 ± 25	

Sample ID	MH-66A				MH-67A		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
09-24-09	EW-5287	63 ±80	<155	09-24-09	EW-5288	260 ±90	<155
11-01-09	EW-6157	117 ±83	<147	11-01-09	EW-6162	224 ±88	<147
Mean + s.d.		90 ± 38		Mean + s.d.		242 ± 25	

Sample ID	MH-67C				MH-67D		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
10-29-09	EW-6163	109 ±83	<147	11-01-09	EW-6164	162 ±85	<147

[a] Tritium recounted with a result of 54,503±683 pCi/L; reanalyzed with a result of 55,731±655 pCi/L.

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

Quarterly Wells

Sample ID	GW-05 (WH 6 Well)				GW-06 (SBCC Well)		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
01-19-09	EWW-137	-24 ± 74	<143	01-19-09	EWW-138	-39 ± 73	<143
04-16-09	EWW-1658	42 ± 80	<157	04-16-09	EWW-1659	35 ± 80	<157
07-02-09	EWW-3364	-40 ± 70	<147	07-15-09	EWW-3635	-9 ± 69	<149
07-15-09	EWW-3634	-17 ± 69	<149	10-17-09	EWW-5634	-56 ± 81	<159
10-17-09	EWW-5633	-45 ± 81	<159				
Mean + s.d.		-17 ± 35		Mean + s.d.		-17 ± 40	

Quarterly Façade Wells

Sample ID	GW-09 1Z-361A				GW-09 1Z-361B		
Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)	Collection Date	Lab Code	Tritium (pCi/L)	MDC (pCi/L)
04-14-09	EWW-1990	780 ± 114	<159	04-14-09	EWW-1991	165 ± 87	<159
06-01-09	EWW-2730	705 ± 113	<154	06-01-09	EWW-2731	232 ± 93	<154
06-17-09	EWW-3190	633 ± 106	<150	06-17-09	EWW-3191	58 ± 82	<150
07-08-09	EWW-3435	466 ± 99	<147	07-08-09	EWW-3436	32 ± 79	<147
08-11-09	EWW-4780	548 ± 114	<151	08-11-09	EWW-4781	94 ± 96	<151
09-17-09	EWW-5090	535 ± 100	<152	09-17-09	EWW-5091	-50 ± 72	<152
10-21-09	EWW-5928	468 ± 110	<150	10-21-09	EWW-5929	182 ± 97	<146
11-26-09	EWW-6638	678 ± 122	<158	11-26-09	EWW-6639	201 ± 105	<158
12-14-09	EWW-6963	474 ± 112	<152	12-14-09	EWW-6964	83 ± 96	<152
Mean + s.d.		587 ± 116		Mean + s.d.		111 ± 91	

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)
04-14-09	EWW-1992	91 ± 84	<159	04-14-09	EWW-1993	91 ± 84	<159
06-01-09	EWW-2732	241 ± 93	<154	06-01-09	EWW-2734	219 ± 92	<154
06-17-09	EWW-3192	-46 ± 76	<150	06-17-09	EWW-3193	64 ± 82	<150
07-08-09	EWW-3437	-42 ± 75	<147	07-08-09		NS[a]	
08-11-09	EWW-4782	-16 ± 91	<151	08-11-09		NS[a]	
10-21-09	EWW-5930	25 ± 90	<146	10-21-09		NS[a]	
11-26-09	EWW-6640	136 ± 102	<158	11-26-09	EWW-6641	66 ± 99	<158
12-14-09	EWW-6965	66 ± 95	<152	12-14-09	EWW-6966	34 ± 94	<152
Mean + s.d.		57 ± 99		Mean + s.d.		95 ± 72	

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)
05-28-09	EWW-2620	44 ± 86	<158	05-28-09	EWW-2621	847 ± 120	<158

[a] "NS" = No sample; unable to open.

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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, 2009 through December, 2009

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-1181	04/06/09	Sr-89	41.0 ± 5.8	48.3	37.8 - 55.7	Pass
STW-1181	04/06/09	Sr-90	32.4 ± 2.4	31.4	22.9 - 36.4	Pass
STW-1182	04/06/09	Ba-133	44.6 ± 3.1	52.7	43.4 - 58.3	Pass
STW-1182	04/06/09	Co-60	81.0 ± 3.1	88.9	80.0 - 100.0	Pass
STW-1182	04/06/09	Cs-134	65.6 ± 5.2	72.9	59.5 - 80.2	Pass
STW-1182 [d]	04/06/09	Cs-137	147.7 ± 5.3	168.0	151.0 - 187.0	Fail
STW-1182	04/06/09	Zn-65	79.8 ± 7.5	84.4	76.0 - 101.0	Pass
STW-1183	04/06/09	Gr. Alpha	47.6 ± 2.1	54.2	28.3 - 67.7	Pass
STW-1183	04/06/09	Gr. Beta	38.5 ± 1.3	43.5	29.1 - 50.8	Pass
STW-1184	04/06/09	I-131	24.4 ± 2.5	26.1	21.7 - 30.8	Pass
STW-1185	04/06/09	Ra-226	14.0 ± 0.7	15.1	11.2 - 17.3	Pass
STW-1185	04/06/09	Ra-228	14.3 ± 2.1	13.6	9.0 - 16.6	Pass
STW-1185	04/06/09	Uranium	25.0 ± 0.2	25.7	20.6 - 28.8	Pass
STW-1186 [e]	04/06/09	H-3	22819.0 ± 453.0	20300.0	17800.0 - 22300.0	Fail
STW-1193	10/05/09	Sr-89	53.0 ± 6.0	62.2	50.2 - 70.1	Pass
STW-1193	10/05/09	Sr-90	31.1 ± 2.2	30.7	22.4 - 35.6	Pass
STW-1194	10/05/09	Ba-133	82.5 ± 3.5	92.9	78.3 - 102.0	Pass
STW-1194	10/05/09	Co-60	116.8 ± 3.3	117.0	105.0 - 131.0	Pass
STW-1194	10/05/09	Cs-134	78.8 ± 5.7	78.8	65.0 - 87.3	Pass
STW-1194	10/05/09	Cs-137	54.2 ± 3.7	54.6	49.1 - 62.9	Pass
STW-1194	10/05/09	Zn-65	102.5 ± 6.2	99.5	89.6 - 119.0	Pass
STW-1195	10/05/09	Gr. Alpha	20.3 ± 2.0	23.2	11.6 - 31.1	Pass
STW-1195	10/05/09	Gr. Beta	23.7 ± 1.4	26.0	16.2 - 33.9	Pass
STW-1196	10/05/09	I-131	22.4 ± 1.4	22.2	18.4 - 26.5	Pass
STW-1197	10/05/09	Ra-226	15.0 ± 0.7	13.9	10.4 - 16.0	Pass
STW-1197	10/05/09	Ra-228	17.4 ± 2.0	14.9	10.0 - 18.0	Pass
STW-1197	10/05/09	Uranium	32.5 ± 0.4	33.8	27.3 - 37.8	Pass
STW-1198	10/05/09	H-3	17228.0 ± 694.0	16400.0	14300.0 - 18000.0	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] All gamma -emitters showed a low bias. A large plastic burr found on the base of the Marinelli kept the beaker from sitting directly on the detector. Result of recount in a different beaker, Cs-137, 155.33 ± 14.55 pCi/L.

[e] Samples were recounted and also reanalyzed. A recount of the original vials averaged 23,009 pCi/L. Reanalysis results were acceptable, 19,170 pCi/L.

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

		mR				
Lab Code	Date	Description	Known Value	Lab Result ± 2 sigma	Control Limits	Acceptance
Environmental, Inc.						
2009-1	7/6/2009	40 cm.	41.82	45.43 ± 3.66	29.27 - 54.37	Pass
2009-1	7/6/2009	50 cm.	26.76	32.17 ± 1.52	18.73 - 34.79	Pass
2009-1	7/6/2009	60 cm.	18.58	20.23 ± 1.60	13.01 - 24.15	Pass
2009-1	7/6/2009	70 cm.	13.65	15.28 ± 0.79	9.56 - 17.75	Pass
2009-1	7/6/2009	90 cm.	8.26	7.97 ± 0.40	5.78 - 10.74	Pass
2009-1	7/6/2009	90 cm.	8.26	7.37 ± 0.49	5.78 - 10.74	Pass
2009-1	7/6/2009	100 cm.	6.69	6.16 ± 0.64	4.68 - 8.70	Pass
2009-1	7/6/2009	110 cm.	5.53	4.38 ± 0.24	3.87 - 7.19	Pass
2009-1	7/6/2009	120 cm.	4.65	4.34 ± 0.23	3.26 - 6.05	Pass
2009-1	7/6/2009	150 cm.	2.97	2.92 ± 0.25	2.08 - 3.86	Pass
Environmental, Inc.						
2009-2	12/27/2009	40 cm.	44.83	51.38 ± 2.69	31.38 - 58.28	Pass
2009-2	12/27/2009	50 cm.	28.69	31.65 ± 2.81	20.08 - 37.30	Pass
2009-2	12/27/2009	60 cm.	19.92	21.38 ± 1.19	13.94 - 25.90	Pass
2009-2	12/27/2009	60 cm.	19.92	22.30 ± 0.50	13.94 - 25.90	Pass
2009-2	12/27/2009	75 cm.	12.75	13.48 ± 1.02	8.93 - 16.58	Pass
2009-2	12/27/2009	90 cm.	8.85	9.62 ± 0.74	6.20 - 11.51	Pass
2009-2	12/27/2009	90 cm.	8.85	8.39 ± 0.86	6.20 - 11.51	Pass
2009-2	12/27/2009	100 cm.	7.17	6.65 ± 0.96	5.02 - 9.32	Pass
2009-2	12/27/2009	120 cm.	4.98	4.89 ± 0.53	3.49 - 6.47	Pass
2009-2	12/27/2009	120 cm.	4.98	4.92 ± 0.58	3.49 - 6.47	Pass
2009-2	12/27/2009	150 cm.	3.19	2.74 ± 0.39	2.23 - 4.15	Pass
2009-2	12/27/2009	180 cm.	2.21	1.65 ± 0.33	1.55 - 2.87	Pass
2009-2	12/27/2009	180 cm.	2.21	2.12 ± 0.69	1.55 - 2.87	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]				
W-12009	1/20/2009	Ra-226	12.88 ± 0.41	12.69	8.88 - 16.50	Pass
W-12009	1/27/2009	Gr. Alpha	20.20 ± 0.40	20.08	10.04 - 30.12	Pass
W-12709	1/27/2009	Gr. Beta	46.26 ± 0.42	45.60	35.60 - 55.60	Pass
SPW-5553	1/27/2009	Ra-228	29.11 ± 2.53	28.66	20.06 - 37.26	Pass
SPW-217	1/29/2009	U-238	44.98 ± 2.30	41.70	29.19 - 54.21	Pass
SPW-539	2/24/2009	Ni-63	167.93 ± 3.79	211.00	147.70 - 274.30	Pass
SPW-718	3/6/2009	C-14	4893.50 ± 21.69	4740.20	2844.12 - 6636.28	Pass
SPMI-814	3/16/2009	Cs-134	34.91 ± 3.85	35.70	25.70 - 45.70	Pass
SPMI-814	3/16/2009	Cs-137	59.17 ± 6.70	55.60	45.60 - 65.60	Pass
SPMI-814	3/16/2009	Sr-90	40.82 ± 1.59	44.07	35.26 - 52.88	Pass
SPMI-815	3/16/2009	I-131	70.99 ± 0.62	69.60	55.68 - 83.52	Pass
SPMI-815	3/16/2009	I-131(G)	63.08 ± 7.12	69.60	59.60 - 79.60	Pass
SPW-817	3/16/2009	I-131	62.11 ± 0.59	69.60	55.68 - 83.52	Pass
SPW-817	3/16/2009	I-131(G)	64.55 ± 8.32	69.60	59.60 - 79.60	Pass
SPW-818	3/16/2009	Co-60	50.84 ± 4.70	51.99	41.99 - 61.99	Pass
SPW-818	3/16/2009	Cs-134	33.78 ± 3.42	35.70	25.70 - 45.70	Pass
SPW-818	3/16/2009	Cs-137	61.27 ± 7.18	55.64	45.64 - 65.64	Pass
SPW-818	3/16/2009	Sr-90	47.26 ± 1.89	44.07	35.26 - 52.88	Pass
SPAP-903	3/23/2009	Cs-134	13.29 ± 2.89	14.19	4.19 - 24.19	Pass
SPAP-903	3/23/2009	Cs-137	103.24 ± 7.54	111.23	100.11 - 122.35	Pass
SPCH-916	3/24/2009	I-131(G)	0.22 ± 0.02	0.22	0.13 - 0.31	Pass
SPVE-888	4/1/2009	I-131(G)	0.40 ± 0.08	0.35	0.21 - 0.49	Pass
SPF-820	4/7/2009	Cs-134	0.58 ± 0.02	0.56	0.34 - 0.78	Pass
W-40909	4/9/2009	Gr. Alpha	19.26 ± 0.40	20.08	10.04 - 30.12	Pass
W-40909	4/9/2009	Gr. Beta	48.04 ± 0.42	45.60	35.60 - 55.60	Pass
SPW-12641	4/10/2009	Ra-228	40.06 ± 2.79	40.54	28.38 - 52.70	Pass
SPW-1267	4/10/2009	U-238	41.71 ± 2.25	41.70	29.19 - 54.21	Pass
TWW-2124	4/21/2009	H-3	7932.00 ± 279.00	7063.00	5650.40 - 8475.60	Pass
W-42809	4/28/2009	Ra-226	14.49 ± 0.53	16.78	11.75 - 21.81	Pass
SPMI-2186	5/12/2009	Cs-134	32.55 ± 1.26	33.89	23.89 - 43.89	Pass
SPMI-2186	5/12/2009	Cs-137	54.27 ± 2.60	55.60	45.60 - 65.60	Pass
SPMI-2186	5/12/2009	I-131	60.81 ± 0.63	52.40	40.40 - 64.40	Pass
SPMI-2186	5/12/2009	I-131(G)	56.89 ± 2.56	52.40	42.40 - 62.40	Pass
SPMI-2186	5/12/2009	Sr-90	43.88 ± 1.68	52.40	41.92 - 62.88	Pass
SPW-2497	5/27/2009	Fe-55	2472.37 ± 10.76	2106.35	1685.08 - 2527.62	Pass
SPW-3448	7/14/2009	Cs-137	171.06 ± 9.21	166.10	149.49 - 182.71	Pass
SPW-3497	7/15/2009	Ni-63	179.99 ± 3.06	210.40	147.28 - 273.52	Pass
SPW-3499	7/15/2009	Tc-99	29.61 ± 0.81	32.34	20.34 - 44.34	Pass
SPMI-3582	7/17/2009	Cs-134	32.86 ± 3.72	31.89	21.89 - 41.89	Pass
SPMI-3582	7/17/2009	Cs-137	182.49 ± 10.54	166.10	149.49 - 182.71	Pass
SPAP-3595	7/17/2009	Cs-134	13.01 ± 3.00	12.75	2.75 - 22.75	Pass
SPAP-3595	7/17/2009	Cs-137	110.63 ± 6.58	110.73	99.66 - 121.80	Pass

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

		Concentration (pCi/L)[a]				
Lab Code [b]	Date	Analysis	Laboratory results 2s, n=1	Known Activity	Control Limits[c]	Acceptance
SPF-3597	7/17/2009	Cs-134	0.53 ± 0.03	0.51	0.31 - 0.71	Pass
SPF-3597	7/17/2009	Cs-137	2.43 ± 0.05	2.22	1.33 - 3.10	Pass
SPW-3599	7/17/2009	H-3	63246.00 ± 725.00	62495.00	49996.00 - 74994.00	Pass
SPW-12643	8/3/2009	Ra-228	38.18 ± 2.72	40.54	28.38 - 52.70	Pass
W-80709	8/7/2009	Ra-226	16.28 ± 0.41	16.77	11.74 - 21.80	Pass
W-81009	8/10/2009	Gr. Alpha	20.58 ± 0.44	20.08	10.04 - 30.12	Pass
W-81009	8/10/2009	Gr. Beta	44.44 ± 0.40	45.60	35.60 - 55.60	Pass
W-100109	10/1/2009	Ra-226	15.68 ± 0.41	16.77	11.74 - 21.80	Pass
W-102709	10/27/2009	Gr. Alpha	21.50 ± 0.43	20.08	10.04 - 30.12	Pass
W-102709	10/27/2009	Gr. Beta	44.83 ± 0.40	45.60	35.60 - 55.60	Pass
SPW-5964	10/28/2009	U-238	40.20 ± 1.87	41.70	29.19 - 54.21	Pass
SPW-12647	11/6/2009	Ra-228	44.49 ± 3.33	40.54	28.38 - 52.70	Pass
SPAP-6769	12/14/2009	Gr. Beta	45.43 ± 0.11	49.48	29.69 - 69.27	Pass
SPAP-6774	12/14/2009	Cs-134	10.32 ± 0.83	11.11	1.11 - 21.11	Pass
SPAP-6774	12/14/2009	Cs-137	106.58 ± 2.51	109.70	98.73 - 120.67	Pass
SPF-6776	12/14/2009	Cs-134	0.43 ± 0.02	0.44	0.26 - 0.62	Pass
SPF-6776	12/14/2009	Cs-137	2.33 ± 0.05	2.19	1.31 - 3.07	Pass
SPW-6780	12/14/2009	Tc-99	30.71 ± 1.09	32.34	20.34 - 44.34	Pass
SPMI-6782	12/14/2009	Co-60	74.30 ± 5.41	72.81	62.81 - 82.81	Pass
SPMI-6782	12/14/2009	Cs-134	58.82 ± 3.75	55.54	45.54 - 65.54	Pass
SPMI-6782	12/14/2009	Cs-137	178.18 ± 9.68	164.55	148.10 - 181.01	Pass
SPW-6784	12/14/2009	Co-60	74.03 ± 4.64	72.81	62.81 - 82.81	Pass
SPW-6784	12/14/2009	Cs-134	54.84 ± 3.83	55.54	45.54 - 65.54	Pass
SPW-6784	12/14/2009	Cs-137	180.06 ± 8.81	164.55	148.10 - 181.01	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).

[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 ± 2σ.

[e] Control limits based on the laboratory limit, Attachment A ("Other Analyses").

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)
W-12009	Water	1/20/2009	Ra-226	0.05	0.06 ± 0.04	1
SPW-5554	Water	1/27/2009	Ra-228	0.08	0.17 ± 0.40	2
W-12709	Water	1/27/2009	Gr. Alpha	0.35	0.22 ± 0.27	1
W-12709	Water	1/27/2009	Gr. Beta	0.74	-0.08 ± 0.51	3.2
SPW-218	Water	1/29/2009	U-238	0.19	-0.06 ± 0.09	1
SPW-538	Water	2/24/2009	Ni-63	7.91	4.96 ± 4.93	20
SPW-717	Water	3/6/2009	C-14	7.66	3.03 ± 4.71	200
SPMI-816	Milk	3/16/2009	Cs-134	3.24	-	10
SPMI-816	Milk	3/16/2009	Cs-137	3.38	-	10
SPMI-816	Milk	3/16/2009	I-131	0.31	0.04 ± 0.17	0.5
SPMI-816	Milk	3/16/2009	I-131(G)	3.65	-	20
SPMI-816	Milk	3/16/2009	Sr-90	0.48	0.41 ± 0.27	1
SPW-819	Water	3/16/2009	Co-60	3.02	-	10
SPW-819	Water	3/16/2009	Cs-134	2.25	-	10
SPW-819	Water	3/16/2009	Cs-137	2.03	-	10
SPW-819	Water	3/16/2009	I-131	0.42	-0.06 ± 0.19	0.5
SPW-819	Water	3/16/2009	I-131(G)	3.02	-	20
SPW-819	Water	3/16/2009	Sr-90	1.10	-0.63 ± 0.44	1
SPAP-902	Air Filter	3/23/2009	Gr. Beta	0.003	0.006 ± 0.002	3.2
SPAP-904	Air Filter	3/23/2009	Cs-134	1.68	-	100
SPAP-904	Air Filter	3/23/2009	Cs-137	2.62	-	100
SPW-32709	Water	3/23/2009	Ni-63	2.84	1.37 ± 1.75	20
SPF-821	Fish	4/7/2009	Cs-134	3.12	-	100
SPF-821	Fish	4/7/2009	Cs-137	3.93	-	100
W-40909	Water	4/9/2009	Gr. Alpha	0.40	-0.25 ± 0.26	1
W-40909	Water	4/9/2009	Gr. Beta	0.77	-0.30 ± 0.53	3.2
SPW-12651	Water	4/10/2009	Ra-228	0.77	0.77 ± 0.45	2
SPW-1268	Water	4/10/2009	U-238	0.11	0.24 ± 0.17	1
W-42809	Water	4/28/2009	Ra-226	0.04	0.09 ± 0.04	1
SPMI-2186	Milk	5/12/2009	Sr-90	0.43	0.52 ± 0.26	1
SPMI-2187	Milk	5/12/2009	Cs-134	3.61	-	10
SPMI-2187	Milk	5/12/2009	Cs-137	3.13	-	10
SPMI-2187	Milk	5/12/2009	I-131	0.15	-0.02 ± 0.10	0.5
SPMI-2187	Milk	5/12/2009	I-131(G)	3.77	-	20
SPW-2498	Water	5/27/2009	Ni-63	1.60	0.00 ± 0.97	20

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-3497	Water	7/15/2009	Ni-63	1.55	-0.24 ± 0.94	20
SPW-3500	Water	7/15/2009	Tc-99	0.90	-1.71 ± 0.53	10
SPMI-3589	Milk	7/17/2009	I-131(G)	5.75	-	20
SPAP-3594	Air Filter	7/17/2009	Cs-134	1.14	-	100
SPAP-3594	Air Filter	7/17/2009	Cs-137	2.47	-	100
SPF-3596	Fish	7/17/2009	Co-60	5.00	-	100
SPF-3596	Fish	7/17/2009	Cs-134	8.00	-	100
SPF-3596	Fish	7/17/2009	Cs-137	11.50	-	100
SPW-3598	Water	7/17/2009	H-3	148.40	0.69 ± 73.60	200
SPW-12653	Water	8/3/2009	Ra-228	0.76	1.46 ± 0.51	2
W-80709	Water	8/7/2009	Ra-226	0.04	0.08 ± 0.03	1
W-81009	Water	8/10/2009	Gr. Alpha	0.44	0.08 ± 0.31	1
W-81009	Water	8/10/2009	Gr. Beta	0.75	-0.31 ± 0.52	3.2
W-100109	Water	10/1/2009	Ra-226	0.04	0.09 ± 0.03	1
W-102709	Water	10/27/2009	Gr. Alpha	0.38	0.33 ± 0.30	1
W-102709	Water	10/27/2009	Gr. Beta	0.81	-0.59 ± 0.55	3.2
SPW-5965	Water	10/28/2009	U-238	0.15	0.09 ± 0.13	1
SPW-12657	Water	11/6/2009	Ra-228	0.86	0.80 ± 0.50	2
SPAP-6769	Air Filter	12/14/2009	Gr. Beta	0.003	0.010 ± 0.002	3.2
SPAP-6773	Air Filter	12/14/2009	Cs-137	1.31	-	100
SPF-6775	Fish	12/14/2009	Cs-134	5.70	-	100
SPF-6775	Fish	12/14/2009	Cs-137	4.18	-	100
SPW-6777	Water	12/14/2009	Ni-63	2.29	0.25 ± 1.38	20
SPW-6779	Water	12/14/2009	Tc-99	1.16	-0.98 ± 0.69	10
SPMI-6781	Milk	12/14/2009	Cs-134	2.62	-	10
SPMI-6781	Milk	12/14/2009	Cs-137	3.29	-	10
SPMI-6781	Milk	12/14/2009	I-131(G)	2.65	-	20
SPW-6783	Water	12/14/2009	Cs-134	2.18	-	10
SPW-6783	Water	12/14/2009	Cs-137	2.90	-	10
SPW-6783	Water	12/14/2009	I-131(G)	2.30	-	20

[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
AP-7464, 7465	1/1/2009	Be-7	0.063 ± 0.012	0.065 ± 0.010	0.064 ± 0.008	Pass
E-20, 21	1/5/2009	K-40	1.34 ± 0.21	1.13 ± 0.13	1.24 ± 0.12	Pass
CF-67, 68	1/5/2009	Be-7	0.34 ± 0.12	0.39 ± 0.08	0.37 ± 0.07	Pass
CF-67, 68	1/5/2009	Gr. Beta	4.34 ± 0.11	4.38 ± 0.12	4.36 ± 0.08	Pass
CF-67, 68	1/5/2009	K-40	3.16 ± 0.26	3.00 ± 0.16	3.08 ± 0.15	Pass
DW-90010, 90011	1/9/2009	Ra-226	2.97 ± 0.22	2.76 ± 0.21	2.87 ± 0.15	Pass
DW-90010, 90011	1/9/2009	Ra-228	3.13 ± 0.71	3.55 ± 0.81	3.34 ± 0.54	Pass
SG-198, 199	1/23/2009	Gr. Alpha	101.90 ± 6.50	101.70 ± 6.10	101.80 ± 4.46	Pass
SG-198, 199	1/23/2009	Gr. Beta	97.80 ± 3.50	94.00 ± 3.20	95.90 ± 2.37	Pass
SW-308, 309	1/27/2009	Gr. Beta	1.43 ± 0.58	1.41 ± 0.54	1.42 ± 0.40	Pass
LW-330, 331	1/27/2009	Gr. Beta	2.09 ± 0.58	2.33 ± 0.63	2.21 ± 0.43	Pass
SW-308, 309	1/29/2009	Gr. Beta	1.51 ± 0.56	1.61 ± 0.57	1.56 ± 0.40	Pass
DW-375, 376	2/4/2009	Gr. Beta	2.72 ± 0.65	3.06 ± 0.69	2.89 ± 0.47	Pass
SWU-606, 607	2/24/2009	Gr. Beta	2.66 ± 0.68	2.16 ± 0.67	2.41 ± 0.48	Pass
U-651, 652	2/27/2009	Beta-K40	3.90 ± 2.30	1.70 ± 2.50	2.80 ± 1.70	Pass
U-651, 652	2/27/2009	H-3	597.00 ± 292.00	507.00 ± 288.00	552.00 ± 205.07	Pass
SG-739, 740	3/2/2009	Ra-226	8.20 ± 0.20	8.30 ± 0.20	8.25 ± 0.14	Pass
MI-875, 876	3/17/2009	K-40	1286.50 ± 111.60	1471.70 ± 111.50	1379.10 ± 78.88	Pass
MI-875, 876	3/17/2009	Sr-90	0.67 ± 0.31	0.36 ± 0.36	0.52 ± 0.24	Pass
WW-970, 971	3/24/2009	Gr. Beta	13.59 ± 2.32	17.33 ± 2.69	15.46 ± 1.78	Pass
XWW-980, 981	3/24/2009	H-3	7143.00 ± 262.00	7262.00 ± 264.00	7202.50 ± 185.97	Pass
AP-1441, 1442	3/30/2009	Be-7	0.076 ± 0.012	0.075 ± 0.014	0.076 ± 0.009	Pass
SWT-1123, 1124	3/31/2009	Gr. Beta	1.40 ± 0.55	1.86 ± 0.62	1.63 ± 0.41	Pass
WW-1102, 1103	4/1/2009	Gr. Beta	2.13 ± 1.34	2.30 ± 1.32	2.22 ± 0.94	Pass
XWW-1174, 1175	4/1/2009	H-3	2814 ± 176	2787 ± 176	2801 ± 124	Pass
AP-1462, 1463	4/2/2009	Be-7	0.085 ± 0.014	0.10 ± 0.016	0.091 ± 0.011	Pass
SL-2024, 2025	5/4/2009	Be-7	0.80 ± 0.18	0.82 ± 0.13	0.81 ± 0.11	Pass
SL-2024, 2025	5/4/2009	Gr. Beta	2.41 ± 0.19	2.68 ± 0.21	2.55 ± 0.14	Pass
SL-2024, 2025	5/4/2009	K-40	1.20 ± 0.21	1.30 ± 0.15	1.25 ± 0.13	Pass
SO-2045, 2046	5/4/2009	Gr. Alpha	6.22 ± 2.87	6.50 ± 3.26	6.36 ± 2.17	Pass
SO-2045, 2046	5/4/2009	Gr. Beta	28.85 ± 3.15	30.39 ± 3.34	29.62 ± 2.30	Pass
SO-2045, 2046	5/4/2009	Sr-90	0.036 ± 0.010	0.024 ± 0.010	0.030 ± 0.007	Pass
mi-2251, 2252	5/14/2009	K-40	1220.60 ± 155.10	1455.50 ± 118.20	1338.05 ± 97.50	Pass
mi-2381, 2382	5/19/2009	K-40	1472.50 ± 122.90	1412.80 ± 117.40	1442.65 ± 84.98	Pass
SWT-2534, 2535	5/26/2009	Gr. Beta	1.12 ± 0.57	1.66 ± 0.58	1.39 ± 0.41	Pass
G-2626, 2627	5/28/2009	Gr. Beta	6.32 ± 0.19	6.18 ± 0.19	6.25 ± 0.13	Pass
G-2626, 2627	5/28/2009	K-40	4.13 ± 0.35	4.05 ± 0.34	4.09 ± 0.24	Pass
WW-2732, 2733	6/1/2009	H-3	240.73 ± 93.21	190.39 ± 90.81	215.56 ± 65.07	Pass

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

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
SO-3141, 3142	6/22/2009	Ac-228	1.07 ± 0.06	1.06 ± 0.05	1.07 ± 0.04	Pass
SO-3141, 3142	6/22/2009	Be-7	0.55 ± 0.14	0.62 ± 0.08	0.59 ± 0.08	Pass
SO-3141, 3142	6/22/2009	Bi-212	1.16 ± 0.17	1.14 ± 0.16	1.15 ± 0.12	Pass
SO-3141, 3142	6/22/2009	Bi-214	0.96 ± 0.03	1.01 ± 0.03	0.99 ± 0.02	Pass
SO-3141, 3142	6/22/2009	Cs-137	0.72 ± 0.07	0.76 ± 0.08	0.74 ± 0.05	Pass
SO-3141, 3142	6/22/2009	Pb-212	1.00 ± 0.02	1.03 ± 0.02	1.02 ± 0.01	Pass
SO-3141, 3142	6/22/2009	Pb-214	1.01 ± 0.03	1.04 ± 0.03	1.03 ± 0.02	Pass
SO-3141, 3142	6/22/2009	Pu-239/40	0.022 ± 0.008	0.030 ± 0.009	0.026 ± 0.006	Pass
SO-3141, 3142	6/22/2009	Th-232	0.51 ± 0.04	0.48 ± 0.05	0.50 ± 0.03	Pass
SO-3141, 3142	6/22/2009	Tl-208	0.35 ± 0.02	0.36 ± 0.02	0.36 ± 0.01	Pass
SO-3141, 3142	6/22/2009	U-233/4	0.16 ± 0.02	0.18 ± 0.02	0.17 ± 0.01	Pass
SO-3141, 3142	6/22/2009	U-238	0.14 ± 0.02	0.18 ± 0.03	0.16 ± 0.02	Pass
SG-3187, 3188	6/25/2009	Ac-228	11.07 ± 0.33	10.88 ± 0.33	10.97 ± 0.24	Pass
SG-3187, 3188	6/25/2009	Pb-214	26.54 ± 0.23	26.17 ± 0.25	26.36 ± 0.17	Pass
SL-3297, 3298	7/1/2009	Be-7	1.15 ± 0.13	1.15 ± 0.12	1.15 ± 0.09	Pass
SL-3297, 3298	7/1/2009	Gr. Beta	3.38 ± 0.23	3.37 ± 0.12	3.38 ± 0.13	Pass
SL-3297, 3298	7/1/2009	K-40	1.43 ± 0.18	1.50 ± 0.19	1.47 ± 0.13	Pass
AP-3944, 3945	7/1/2009	Be-7	0.064 ± 0.009	0.068 ± 0.010	0.066 ± 0.007	Pass
DW-90222, 90223	7/15/2009	Ra-226	5.36 ± 0.60	4.62 ± 0.51	4.99 ± 0.39	Pass
DW-90222, 90223	7/15/2009	Ra-228	2.91 ± 0.73	2.80 ± 0.70	2.86 ± 0.51	Pass
DW-90237, 90238	7/17/2009	Gr. Alpha	3.54 ± 0.99	4.22 ± 1.09	3.88 ± 0.74	Pass
F-3790, 3791	7/21/2009	K-40	1.10 ± 0.35	1.41 ± 0.44	1.26 ± 0.28	Pass
DW-90250, 90251	7/22/2009	Ra-226	14.58 ± 0.39	15.13 ± 0.40	14.86 ± 0.28	Pass
DW-90250, 90251	7/22/2009	Ra-228	6.71 ± 1.05	6.10 ± 1.01	6.41 ± 0.73	Pass
VE-3965, 3966	7/28/2009	K-40	1.48 ± 0.16	1.56 ± 0.19	1.52 ± 0.13	Pass
VE-4098, 4099	8/3/2009	Be-7	0.54 ± 0.16	0.58 ± 0.16	0.56 ± 0.11	Pass
VE-4098, 4099	8/3/2009	Gr. Beta	5.15 ± 0.17	5.07 ± 0.18	5.11 ± 0.12	Pass
VE-4098, 4099	8/3/2009	K-40	4.91 ± 0.49	5.17 ± 0.15	5.04 ± 0.26	Pass
SO-4325, 4326	8/14/2009	Be-7	0.59 ± 0.21	0.68 ± 0.28	0.64 ± 0.18	Pass
SO-4325, 4326	8/14/2009	Cs-137	0.29 ± 0.05	0.28 ± 0.05	0.28 ± 0.03	Pass
SO-4325, 4326	8/14/2009	K-40	13.41 ± 0.77	13.46 ± 0.80	13.43 ± 0.56	Pass
SG-4283, 4284	8/17/2009	Ac-228	7.16 ± 0.28	7.10 ± 0.26	7.13 ± 0.19	Pass
SG-4283, 4284	8/17/2009	Pb-214	6.27 ± 0.13	6.21 ± 0.13	6.24 ± 0.09	Pass
VE-4436, 4437	8/25/2009	K-40	2.28 ± 0.28	2.67 ± 0.26	2.48 ± 0.19	Pass
SL-4589, 4590	9/1/2009	Be-7	1.25 ± 0.22	1.25 ± 0.16	1.25 ± 0.14	Pass
SL-4589, 4590	9/1/2009	K-40	2.96 ± 0.30	2.70 ± 0.27	2.83 ± 0.20	Pass
AV-4882, 4883	9/8/2009	Be-7	0.93 ± 0.18	0.95 ± 0.17	0.94 ± 0.12	Pass
AV-4882, 4883	9/8/2009	K-40	2.50 ± 0.26	2.47 ± 0.29	2.49 ± 0.20	Pass

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

			Concentration (pCi/L)[a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
WW-4721, 4722	9/9/2009	H-3	19191.00 ± 404.00	18677.00 ± 399.00	18934.00 ± 283.91	Pass
WW-4903, 4904	9/11/2009	H-3	1075.00 ± 130.00	1281.00 ± 136.00	1178.00 ± 94.07	Pass
BS-5119, 5120	9/16/2009	Be-7	2067.50 ± 327.90	2225.40 ± 371.10	2146.45 ± 247.61	Pass
BS-5119, 5120	9/16/2009	Cs-137	86.24 ± 35.40	145.10 ± 31.54	115.67 ± 23.71	Pass
BS-5119, 5120	9/16/2009	K-40	16.85 ± 0.90	17.27 ± 0.79	17.06 ± 0.60	Pass
SS-5188, 5189	9/23/2009	Be-7	1.02 ± 0.31	1.04 ± 0.43	1.03 ± 0.26	Pass
SS-5188, 5189	9/23/2009	K-40	10.21 ± 0.65	9.94 ± 0.93	10.07 ± 0.57	Pass
AP-3944, 3945	9/29/2009	Be-7	0.09 ± 0.02	0.09 ± 0.02	0.09 ± 0.01	Pass
E-5251, 5252	10/1/2009	Gr. Beta	2.30 ± 0.10	2.10 ± 0.10	2.20 ± 0.07	Pass
E-5251, 5252	10/1/2009	K-40	1.18 ± 0.24	1.15 ± 0.18	1.17 ± 0.15	Pass
G-5272, 5273	10/1/2009	Be-7	3.31 ± 0.29	3.60 ± 0.26	3.46 ± 0.19	Pass
G-5272, 5273	10/1/2009	Gr. Alpha	19.81 ± 0.80	21.10 ± 0.74	20.46 ± 0.54	Pass
G-5272, 5273	10/1/2009	K-40	16.47 ± 0.75	17.00 ± 0.74	16.74 ± 0.53	Pass
F-5690, 5691	10/15/2009	H-3	8895.00 ± 250.00	9051.00 ± 252.00	8973.00 ± 177.49	Pass
F-5690, 5691	10/15/2009	K-40	3.62 ± 0.40	3.09 ± 0.48	3.36 ± 0.31	Pass
DW-90396, 90397	10/16/2009	Ra-226	0.54 ± 0.09	0.42 ± 0.08	0.48 ± 0.06	Pass
DW-90396, 90397	10/16/2009	Ra-228	1.44 ± 0.56	0.94 ± 0.51	1.19 ± 0.38	Pass
DW-90408, 90409	10/19/2009	Ra-226	0.99 ± 0.12	1.10 ± 0.14	1.05 ± 0.09	Pass
DW-90408, 90409	10/19/2009	Ra-228	2.76 ± 0.66	1.38 ± 0.92	2.07 ± 0.57	Pass
DW-90420, 90421	10/21/2009	Ra-226	1.95 ± 0.17	1.77 ± 0.15	1.86 ± 0.11	Pass
DW-90420, 90421	10/21/2009	Ra-228	3.10 ± 0.73	3.32 ± 0.80	3.21 ± 0.54	Pass
SG-5962, 5963	10/22/2009	Ac-228	16.39 ± 0.79	16.51 ± 0.63	16.45 ± 0.51	Pass
SG-5962, 5963	10/22/2009	Pb-214	18.03 ± 0.41	17.74 ± 0.42	17.89 ± 0.29	Pass
DW-90423, 90424	10/27/2009	Gr. Alpha	12.04 ± 1.68	15.28 ± 1.97	13.66 ± 1.29	Pass
ME-6116, 6117	11/3/2009	Gr. Beta	0.86 ± 0.03	0.83 ± 0.03	0.85 ± 0.02	Pass
ME-6116, 6117	11/3/2009	K-40	2.57 ± 0.08	2.65 ± 0.08	2.61 ± 0.06	Pass
F-6567, 6568	11/6/2009	Gr. Beta	2.72 ± 1.05	3.04 ± 0.92	2.88 ± 0.70	Pass
F-6567, 6568	11/6/2009	Sr-90	0.09 ± 0.03	0.12 ± 0.04	0.11 ± 0.02	Pass
W-6495, 6496	11/8/2009	H-3	2638.00 ± 173.00	2451.00 ± 168.00	2544.50 ± 120.57	Pass
WW-6313, 6314	11/9/2009	H-3	1514.00 ± 137.00	1483.00 ± 136.00	1498.50 ± 96.52	Pass
SWU-6611, 6612	11/24/2009	Gr. Beta	1.88 ± 0.60	1.67 ± 0.59	1.78 ± 0.42	Pass
DW-90446, 90447	12/30/2009	Ra-226	0.30 ± 0.10	0.54 ± 0.14	0.42 ± 0.09	Pass
DW-90446, 90447	12/30/2009	Ra-228	2.60 ± 0.64	2.65 ± 0.65	2.63 ± 0.46	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-1170 [f]	01/01/09	Am-241	1.15 ± 0.06	0.64	0.45 - 0.83	Fail
STW-1170	01/01/09	Co-57	19.60 ± 0.40	18.90	13.20 - 24.60	Pass
STW-1170	01/01/09	Co-60	16.60 ± 0.30	17.21	12.05 - 22.37	Pass
STW-1170	01/01/09	Cs-134	20.40 ± 0.50	22.50	15.80 - 29.30	Pass
STW-1170 [e]	01/01/09	Cs-137	0.10 ± 0.20	0.00	0.00 - 1.00	Pass
STW-1170	01/01/09	Fe-55	51.60 ± 20.60	48.20	33.70 - 62.70	Pass
STW-1170	01/01/09	H-3	359.90 ± 33.90	330.90	231.60 - 430.20	Pass
STW-1170	01/01/09	Mn-54	15.00 ± 0.40	14.66	10.26 - 19.06	Pass
STW-1170	01/01/09	Ni-63	50.50 ± 3.25	53.50	37.45 - 69.55	Pass
STW-1170	01/01/09	Pu-238	1.17 ± 0.04	1.18	0.83 - 1.53	Pass
STW-1170	01/01/09	Pu-239/40	0.74 ± 0.03	0.85	0.60 - 1.11	Pass
STW-1170	01/01/09	Sr-90	7.87 ± 1.39	7.21	5.05 - 9.37	Pass
STW-1170	01/01/09	Tc-99	12.70 ± 0.80	14.46	10.12 - 18.80	Pass
STW-1170	01/01/09	U-233/4	2.78 ± 0.07	2.77	1.94 - 3.60	Pass
STW-1170	01/01/09	U-238	2.87 ± 0.07	2.88	2.02 - 3.74	Pass
STW-1170	01/01/09	Zn-65	14.00 ± 0.70	13.60	9.50 - 17.70	Pass
STW-1171	01/01/09	Gr. Alpha	0.56 ± 0.06	0.64	0.00 - 1.27	Pass
STW-1171	01/01/09	Gr. Beta	1.29 ± 0.05	1.27	0.64 - 1.91	Pass
STSO-1172 [e]	01/01/09	Co-57	0.00 ± 0.00	0.00	0.00 - 1.00	Pass
STSO-1172	01/01/09	Cs-134	458.60 ± 7.40	467.00	327.00 - 607.00	Pass
STSO-1172	01/01/09	Cs-137	652.30 ± 3.50	605.00	424.00 - 787.00	Pass
STSO-1172	01/01/09	K-40	636.40 ± 9.50	570.00	360.40 - 669.40	Pass
STSO-1172	01/01/09	Mn-54	346.40 ± 3.10	307.00	215.00 - 399.00	Pass
STSO-1172	01/01/09	Pu-238	28.60 ± 2.20	25.30	17.70 - 32.90	Pass
STSO-1172 [e]	01/01/09	Pu-239/40	0.50 ± 0.40	0.00	0.00 - 1.00	Pass
STSO-1172	01/01/09	Sr-90	180.60 ± 12.10	257.00	180.00 - 334.00	Pass
STSO-1172	01/01/09	U-233/4	152.20 ± 4.30	149.00	104.00 - 194.00	Pass
STSO-1172	01/01/09	U-238	154.90 ± 4.40	155.00	109.00 - 202.00	Pass
STSO-1172	01/01/09	Zn-65	268.30 ± 4.00	242.00	169.00 - 315.00	Pass
STVE-1173	01/01/09	Co-57	2.75 ± 0.11	2.36	1.65 - 3.07	Pass
STVE-1173 [e]	01/01/09	Co-60	0.06 ± 0.09	0.00	0.00 - 1.00	Pass
STVE-1173	01/01/09	Cs-134	3.49 ± 0.22	3.40	2.38 - 4.42	Pass
STVE-1173	01/01/09	Cs-137	1.01 ± 0.11	0.93	0.65 - 1.21	Pass
STVE-1173	01/01/09	Mn-54	2.52 ± 0.14	2.30	1.61 - 2.99	Pass
STVE-1173	01/01/09	Zn-65	1.52 ± 0.18	1.35	0.95 - 1.76	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-1174 [g]	01/01/09	Am-241	0.29 ± 0.03	0.21	0.14 - 0.27	Fail
STAP-1174	01/01/09	Co-57	1.25 ± 0.05	1.30	0.91 - 1.69	Pass
STAP-1174	01/01/09	Co-60	1.17 ± 0.06	1.22	0.85 - 1.59	Pass
STAP-1174	01/01/09	Cs-134	2.67 ± 0.14	2.93	2.05 - 3.81	Pass
STAP-1174	01/01/09	Cs-137	1.53 ± 0.08	1.52	1.06 - 1.98	Pass
STAP-1174	01/01/09	Mn-54	2.34 ± 0.09	2.27	1.59 - 2.95	Pass
STAP-1174 [h]	01/01/09	Sr-90	0.93 ± 0.14	0.64	0.45 - 0.83	Fail
STAP-1174	01/01/09	Zn-65	1.44 ± 0.14	1.36	0.95 - 1.77	Pass
STAP-1175	01/01/09	Gr. Alpha	0.22 ± 0.03	0.35	0.00 - 0.70	Pass
STAP-1175	01/01/09	Gr. Beta	0.36 ± 0.04	0.28	0.14 - 0.42	Pass
STSO-1188	07/01/09	Co-57	674.60 ± 9.00	586.00	410.00 - 762.00	Pass
STSO-1188	07/01/09	Co-60	356.40 ± 6.30	327.00	229.00 - 425.00	Pass
STSO-1188	07/01/09	Cs-134	0.20 ± 1.90	0.00	0.00 - 1.00	Pass
STSO-1188	07/01/09	Cs-137	767.50 ± 12.00	669.00	468.00 - 870.00	Pass
STSO-1188	07/01/09	K-40	433.00 ± 37.20	375.00	263.00 - 488.00	Pass
STSO-1188	07/01/09	Mn-54	931.60 ± 14.10	796.00	557.00 - 1035.00	Pass
STSO-1188	07/01/09	Pu-238	53.10 ± 9.00	63.20	44.20 - 82.20	Pass
STSO-1188	07/01/09	Pu-239/40	107.10 ± 12.60	116.30	81.40 - 151.20	Pass
STSO-1188 [i]	07/01/09	Sr-90	310.50 ± 12.20	455.00	319.00 - 592.00	Fail
STSO-1188	07/01/09	U-233/4	188.20 ± 11.90	209.00	146.00 - 272.00	Pass
STSO-1188	07/01/09	U-238	197.40 ± 12.20	217.00	152.00 - 282.00	Pass
STSO-1188	07/01/09	Zn-65	1433.90 ± 25.20	1178.00	825.00 - 1531.00	Pass
STAP-1189	07/01/09	Gr. Alpha	0.33 ± 0.04	0.66	0.00 - 1.32	Pass
STAP-1189	07/01/09	Gr. Beta	1.57 ± 0.07	1.32	0.66 - 1.98	Pass
STAP-1190	07/01/09	Am-241	0.01 ± 0.02	0.00	0.01 - 0.05	Pass
STAP-1190	07/01/09	Co-57	6.78 ± 0.27	6.48	4.54 - 8.42	Pass
STAP-1190	07/01/09	Co-60	1.06 ± 0.18	1.03	0.72 - 1.34	Pass
STAP-1190	07/01/09	Cs-134	0.01 ± 0.06	0.00	0.01 - 0.05	Pass
STAP-1190	07/01/09	Cs-137	1.49 ± 0.27	1.40	0.98 - 1.82	Pass
STAP-1190	07/01/09	Mn-54	6.00 ± 0.45	5.49	3.84 - 7.14	Pass
STAP-1190	07/01/09	Sr-90	0.79 ± 0.13	0.84	0.59 - 1.09	Pass
STAP-1190	07/01/09	Zn-65	4.55 ± 0.66	3.93	2.75 - 5.11	Pass
STVE-1190	07/01/09	Co-57	8.90 ± 0.60	8.00	5.60 - 10.40	Pass
STVE-1190	07/01/09	Co-60	2.50 ± 0.36	2.57	1.80 - 3.34	Pass
STVE-1190	07/01/09	Cs-134	0.01 ± 0.11	0.00	0.00 - 0.10	Pass
STVE-1190	07/01/09	Cs-137	2.42 ± 0.16	2.43	1.70 - 3.16	Pass
STVE-1190	07/01/09	Mn-54	8.35 ± 0.70	7.90	5.50 - 10.30	Pass
STVE-1190	07/01/09	Zn-65	0.01 ± 0.26	0.00	0.00 - 0.10	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
STW-1191	07/01/09	Gr. Alpha	0.88 ± 0.07	1.05	0.00 - 2.09	Pass
STW-1191	07/01/09	Gr. Beta	7.29 ± 0.10	7.53	3.77 - 11.30	Pass
STW-1192	07/01/09	Am-241	0.88 ± 0.08	1.04	0.73 - 1.35	Pass
STW-1192	07/01/09	Co-57	37.20 ± 1.50	36.60	25.60 - 47.60	Pass
STW-1192	07/01/09	Co-60	15.10 ± 0.90	15.40	10.80 - 20.00	Pass
STW-1192	07/01/09	Cs-134	30.30 ± 2.10	32.20	22.50 - 41.90	Pass
STW-1192	07/01/09	Cs-137	41.90 ± 1.80	41.20	28.80 - 53.60	Pass
STW-1192	07/01/09	Fe-55	54.50 ± 15.50	60.80	42.60 - 79.00	Pass
STW-1192	07/01/09	H-3	680.30 ± 33.60	634.10	443.90 - 824.30	Pass
STW-1192 [e]	07/01/09	Mn-54	0.01 ± 0.26	0.00	0.00 - 1.00	Pass
STW-1192	07/01/09	Ni-63	38.70 ± 2.60	44.20	30.90 - 57.50	Pass
STW-1192	07/01/09	Pu-238	0.02 ± 0.01	0.02	0.00 - 0.05	Pass
STW-1192	07/01/09	Pu-239/40	1.70 ± 0.10	1.64	1.15 - 2.13	Pass
STW-1192	07/01/09	Sr-90	12.90 ± 1.70	12.99	9.09 - 16.89	Pass
STW-1192	07/01/09	Tc-99	7.60 ± 0.40	10.00	7.00 - 13.00	Pass
STW-1192	07/01/09	Tc-99	7.60 ± 0.40	10.00	7.00 - 13.00	Pass
STW-1192	07/01/09	U-233/4	2.90 ± 0.10	2.96	2.07 - 3.85	Pass
STW-1192	07/01/09	U-238	3.00 ± 0.10	3.03	2.12 - 3.94	Pass
STW-1192	07/01/09	Zn-65	28.50 ± 2.40	26.90	18.80 - 35.00	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.

[e] Included in the testing series as a "false positive".

[f] No errors were found in procedure or calculation. There was not enough sample for a reanalysis. Americium-241 in water was included in the ERA studies (Tbl. A-7) and also in the second round of MAPEP testing. Both analysis results were acceptable.

[g] One determination was eliminated from the average, due to poor recovery. Average of three determinations, 0.25 ± 0.03 pCi/filter.

[h] No reason was determined for the initial high results. The analysis was repeated; result of reanalysis; 0.54 ± 0.12 Bq/filter.

[i] Incomplete separation of strontium from calcium could result in a higher recovery percentage and consequently lower reported activity. The analysis was repeated; result of reanalysis 363.3 ± 28.6 Bq/kg.

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

			Concentration (pCi/L)			
Lab Code [b]	Date	Analysis	Laboratory Result [c]	ERA Result [d]	Control Limits	Acceptance
STAP-1176	03/23/09	Am-241	47.20 ± 3.10	55.4	32.4 - 76.0	Pass
STAP-1176	03/23/09	Co-60	543.60 ± 8.90	490.0	379.0 - 612.0	Pass
STAP-1176	03/23/09	Cs-134	941.30 ± 30.70	865.0	563.0 - 1070.0	Pass
STAP-1176	03/23/09	Cs-137	850.60 ± 19.40	724.0	544.0 - 951.0	Pass
STAP-1176 [e]	03/23/09	Mn-54	0.00 ± 0.00	0.0	0.0 - 0.0	Pass
STAP-1176	03/23/09	Pu-238	64.50 ± 3.60	57.4	39.4 - 75.5	Pass
STAP-1176	03/23/09	Pu-239/40	88.50 ± 4.20	78.2	56.7 - 101.0	Pass
STAP-1176	03/23/09	Sr-90	93.90 ± 10.00	95.3	41.9 - 148.0	Pass
STAP-1176	03/23/09	U-233/4	50.00 ± 2.47	53.5	33.7 - 79.3	Pass
STAP-1176	03/23/09	U-238	50.40 ± 2.48	53.1	34.0 - 75.4	Pass
STAP-1176	03/23/09	Uranium	101.60 ± 5.30	109.0	55.7 - 173.0	Pass
STAP-1176	03/23/09	Zn-65	237.30 ± 23.70	185.0	128.0 - 256.0	Pass
STAP-1177	03/23/09	Gr. Alpha	76.30 ± 3.47	63.8	33.1 - 96.0	Pass
STAP-1177	03/23/09	Gr. Beta	98.50 ± 3.04	80.7	49.7 - 118.0	Pass
STSO-1178	03/23/09	Ac-228	1370.00 ± 121.00	1330.0	860.0 - 1880.0	Pass
STSO-1178	03/23/09	Am-241	1853.00 ± 185.50	1660.0	992.0 - 2130.0	Pass
STSO-1178	03/23/09	Bi-212	1449.00 ± 308.80	1550.0	406.0 - 2310.0	Pass
STSO-1178	03/23/09	Bi-214	1355.00 ± 66.20	1420.0	872.0 - 2050.0	Pass
STSO-1178	03/23/09	Co-60	7475.00 ± 46.40	7520.0	5470.0 - 10100.0	Pass
STSO-1178	03/23/09	Cs-134	5073.00 ± 74.70	5170.0	3330.0 - 6220.0	Pass
STSO-1178	03/23/09	Cs-137	5040.00 ± 49.70	4970.0	3800.0 - 6460.0	Pass
STSO-1178	03/23/09	K-40	10884.00 ± 292.70	11200.0	8060.0 - 15100.0	Pass
STSO-1178	03/23/09	Mn-54	0.00 ± 0.00	0.0	0.0 - 20.0	Pass
STSO-1178	03/23/09	Pb-212	1259.00 ± 28.40	1260.0	820.0 - 1780.0	Pass
STSO-1178	03/23/09	Pb-214	1464.00 ± 56.80	1510.0	902.0 - 2260.0	Pass
STSO-1178	03/23/09	Pu-238	1853.00 ± 185.50	1590.0	910.0 - 2240.0	Pass
STSO-1178	03/23/09	Pu-239/40	1516.50 ± 168.30	1360.0	928.0 - 1800.0	Pass
STSO-1178	03/23/09	Sr-90	5270.90 ± 290.20	5750.0	2080.0 - 9380.0	Pass
STSO-1178	03/23/09	U-233/4	1452.30 ± 114.40	1600.0	1010.0 - 1990.0	Pass
STSO-1178	03/23/09	Uranium	3013.70 ± 131.10	3270.0	1860.0 - 4410.0	Pass
STSO-1178	03/23/09	Zn-65	2083.00 ± 59.00	1940.0	1540.0 - 2600.0	Pass

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

			Concentration (pCi/L)			
Lab Code [b]	Date	Analysis	Laboratory Result [c]	ERA Result [d]	Control Limits	Acceptance
STVE-1179	03/23/09	Am-241	2849.70 ± 237.60	3660.0	2090.0 - 5030.0	Pass
STVE-1179	03/23/09	Cm-244	808.00 ± 85.70	954.0	470.0 - 1480.0	Pass
STVE-1179	03/23/09	Co-60	1546.80 ± 31.60	1710.0	1160.0 - 2460.0	Pass
STVE-1179	03/23/09	Cs-134	1706.00 ± 59.20	1880.0	1080.0 - 2600.0	Pass
STVE-1179	03/23/09	Cs-137	1940.50 ± 44.80	1800.0	1320.0 - 2500.0	Pass
STVE-1179	03/23/09	K-40	30107.30 ± 598.00	30800.0	22300.0 - 43700.0	Pass
STVE-1179	03/23/09	Mn-54	0.00 ± 0.00	0.0	0.0 - 0.0	Pass
STVE-1179	03/23/09	Sr-90	6604.80 ± 440.10	8860.0	4950.0 - 11800.0	Pass
STVE-1179	03/23/09	U-233/4	1718.00 ± 128.90	2040.0	1400.0 - 2710.0	Pass
STVE-1179	03/23/09	U-238	1718.30 ± 128.80	2020.0	1420.0 - 2550.0	Pass
STVE-1179	03/23/09	Uranium	3499.40 ± 371.00	4150.0	2850.0 - 5360.0	Pass
STVE-1179	03/23/09	Zn-65	869.40 ± 63.60	878.0	634.0 - 1200.0	Pass
STW-1180	03/23/09	Am-241	127.50 ± 5.10	132.0	90.4 - 178.0	Pass
STW-1180	03/23/09	Co-60	1174.10 ± 11.70	1230.0	1070.0 - 1450.0	Pass
STW-1180	03/23/09	Cs-134	742.20 ± 18.30	790.0	584.0 - 907.0	Pass
STW-1180	03/23/09	Cs-137	887.50 ± 14.00	913.0	776.0 - 1090.0	Pass
STW-1180	03/23/09	Fe-55	323.00 ± 362.00	492.0	286.0 - 657.0	Pass
STW-1180	03/23/09	Mn-54	0.00 ± 0.00	0.0	0.0 - 0.0	Pass
STW-1180	03/23/09	Pu-238	96.60 ± 2.20	108.0	81.7 - 134.0	Pass
STW-1180	03/23/09	Pu-239/40	89.50 ± 2.10	86.3	66.8 - 107.0	Pass
STW-1180	03/23/09	Sr-90	763.20 ± 12.90	834.0	530.0 - 1120.0	Pass
STW-1180	03/23/09	U-233/4	95.00 ± 1.80	96.6	72.8 - 124.0	Pass
STW-1180	03/23/09	U-238	97.40 ± 1.80	95.8	73.2 - 119.0	Pass
STW-1180	03/23/09	Uranium	195.50 ± 3.70	197.0	142.0 - 262.0	Pass
STW-1180	03/23/09	Zn-65	653.10 ± 24.10	631.0	535.0 - 786.0	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).

[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.

[e] Included in the testing series as a "false positive". No activity expected.

[f] The analysis was repeated by leaching and total dissolution methods. Total dissolution yielded results within expected range. Results of the reanalysis: U-233,4, 1655 ± 95 pCi/kg. U-238 1805 ± 97 pCi/kg.

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 = 2s 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 4.66s uncertainty for a background sample.

3.0. Duplicate analyses

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 number s 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

POINT BEACH NUCLEAR PLANT

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

	SPECIAL COLLECTIONS AND ANALYSES	
Airborne Filters	4 per month 1 per quarter	Sr-89, Sr-90 Sr-89, Sr-90 (comp.)
Liquid	1 per month	GA, Sr-89, Sr-90
Subsoil Water	4 per quarter	GA, GB, H-3, GS
Miscellaneous Water Samples	4-5 per year	Sr-89, Sr-90

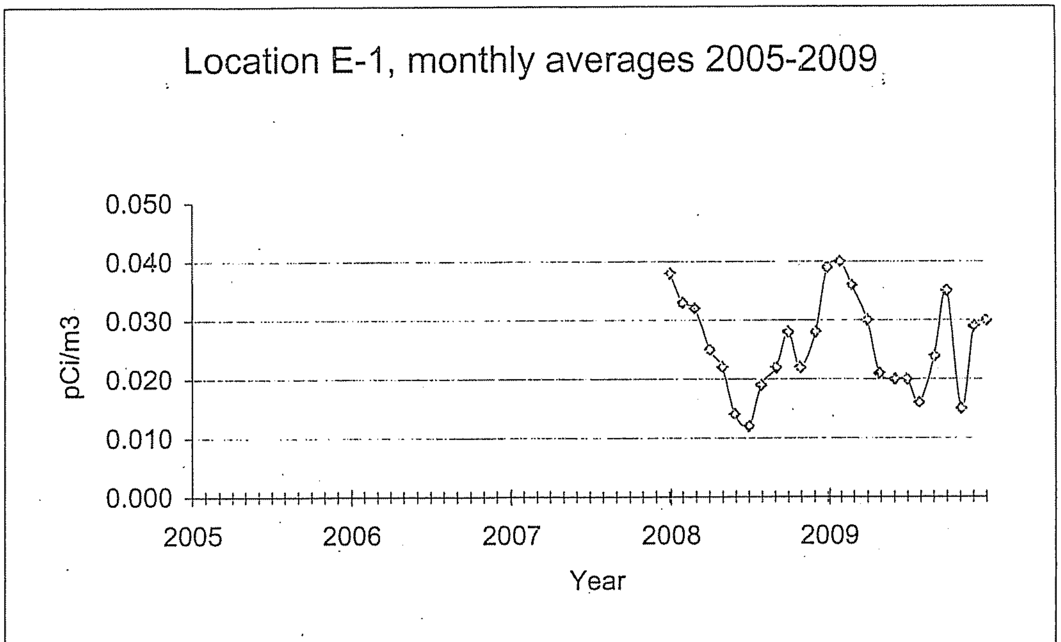
[a] Locations codes are defined in Table 2. Control Stations are indicated by (C). All other stations are indicators.

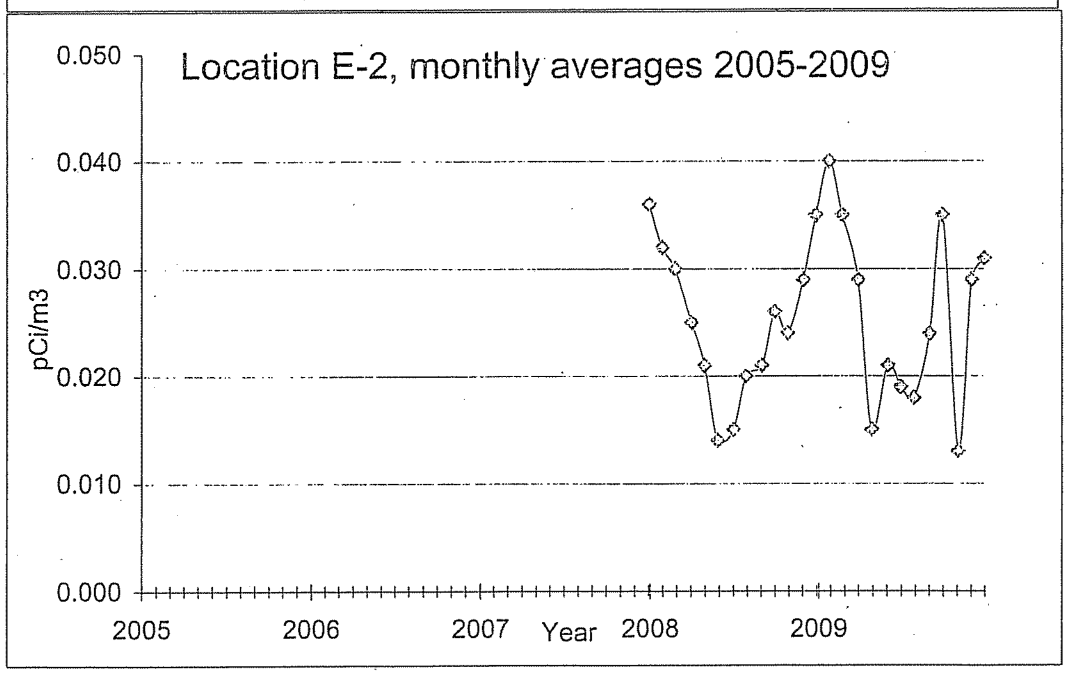
[b] Analysis type is coded as follows: GB = gross beta, GA = gross alpha, GS = gamma spectroscopy, H-3 = tritium, Sr-89 = strontium-89, Sr-90 = strontium-90, I-131 = iodine-131. Analysis frequency is coded as follows: MC = monthly composite, QC = quarterly composite.

APPENDIX D

Graphs of Data Trends

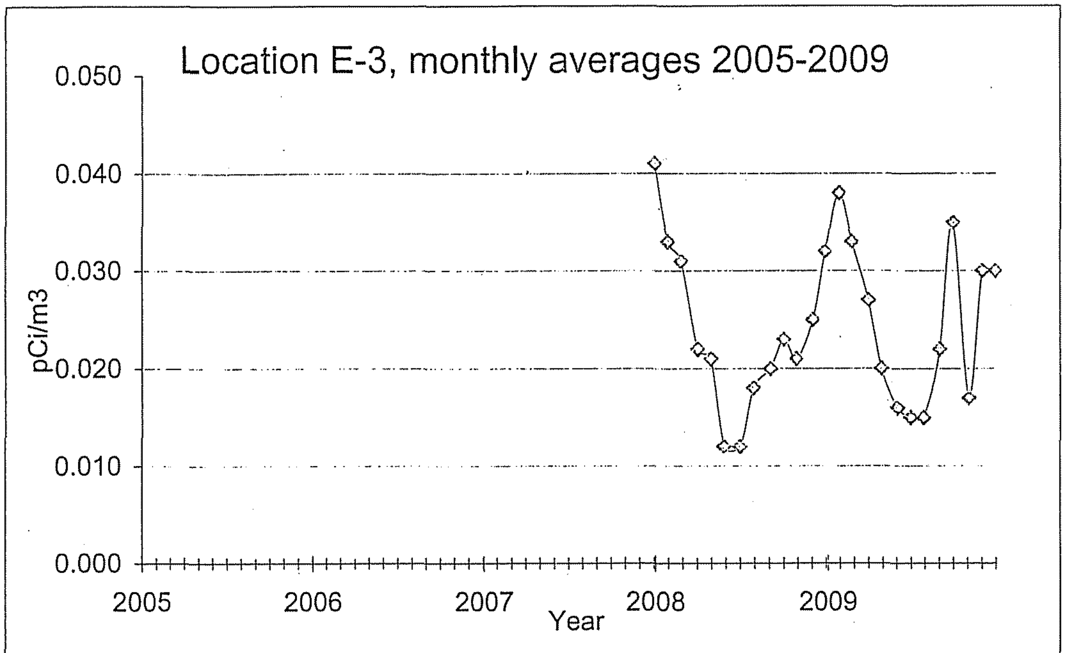
Air Particulates - Gross Beta

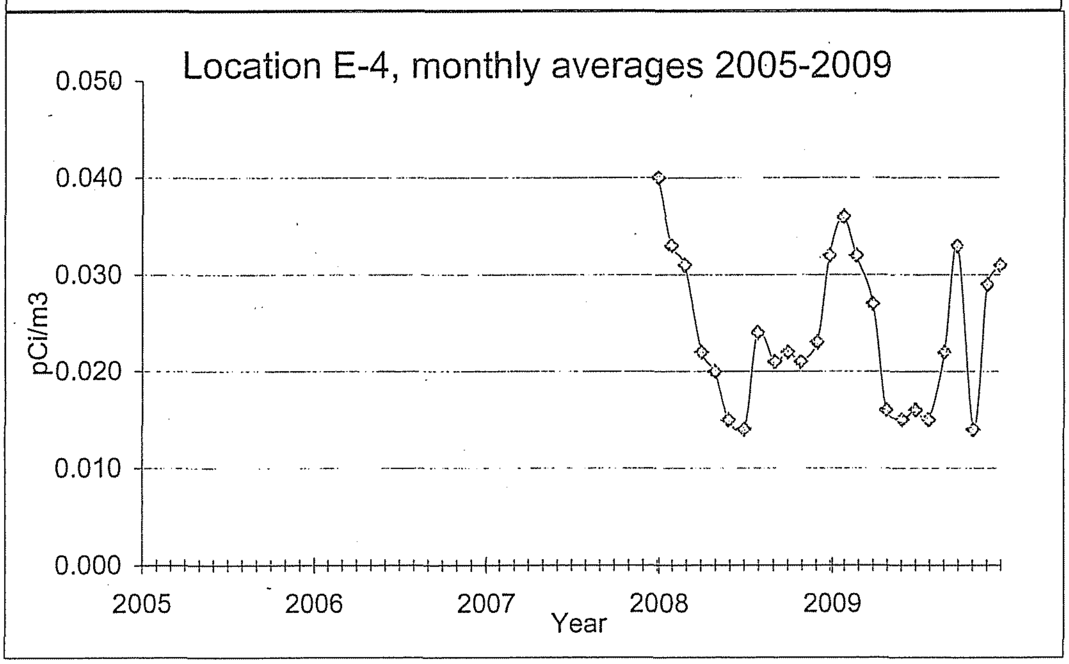




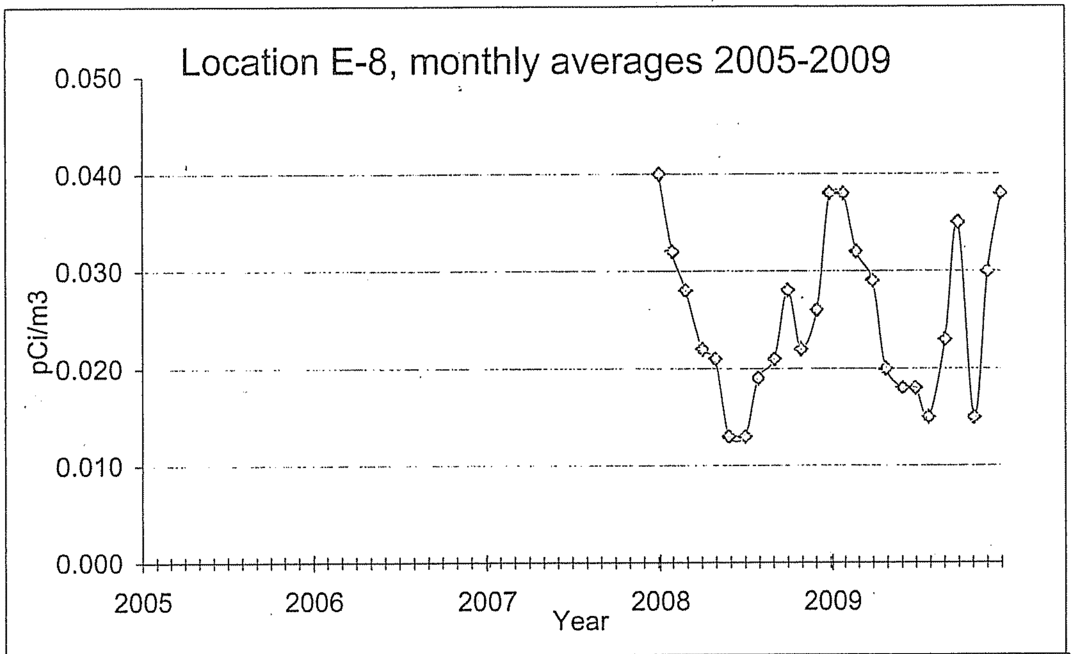
POINT BEACH

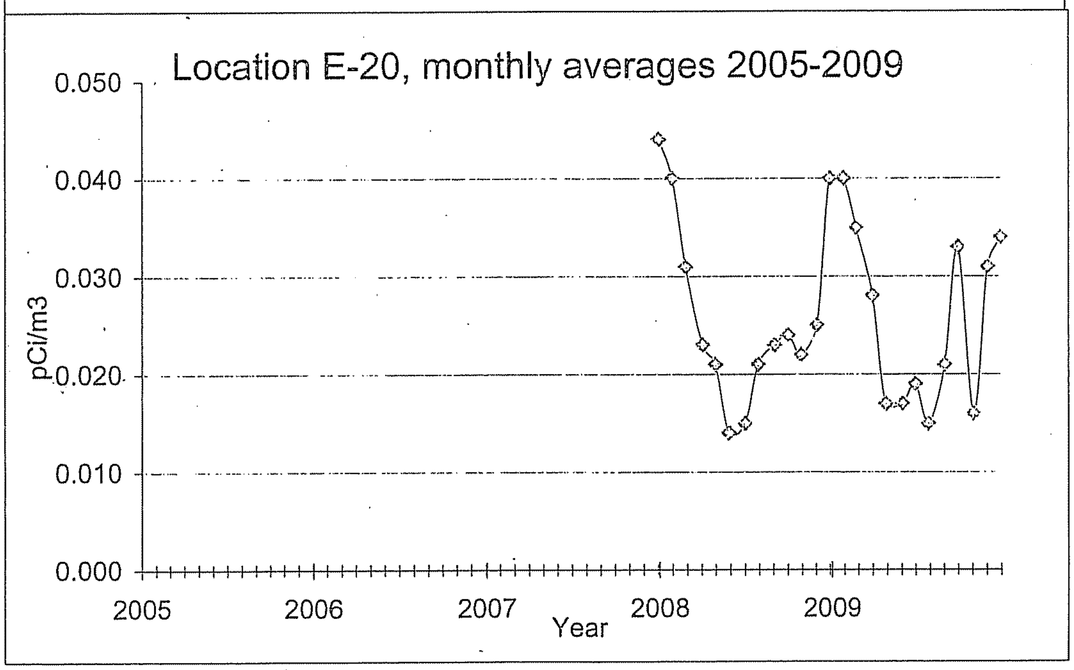
Air Particulates - Gross Beta





Air Particulates - Gross Beta





APPENDIX E

Supplemental Analyses

POINT BEACH NUCLEAR PLANT

Supplemental Analyses

Location	U2FSSD		U2FSSD		U2FSSD	
Collection Date	10-12-09		10-26-09		10-26-09	
Lab Code	ELW- 6397	MDC	ELW- 6399	MDC	ELW- 6630	MDC
Sr-89[b]	1.5 ± 9.7	< 10.8			-4.3 ± 5.1	< 6.6
Sr-90[b]	0.5 ± 2.1	< 4.4			1.5 ± 2.0	< 3.9
Be-7	18.7 ± 17.0	< 56.0	21.1 ± 20.2	< 56.6		
Mn-54	1.0 ± 2.2	< 4.8	0.3 ± 2.5	< 5.5		
Fe-59	-8.6 ± 4.0	< 9.7	-6.4 ± 5.0	< 10.0		
Co-58	-2.2 ± 2.1	< 3.9	-1.1 ± 2.3	< 4.7		
Co-60	0.6 ± 2.2	< 4.3	2.0 ± 2.8	< 4.3		
Zn-65	-1.5 ± 4.2	< 9.7	-5.3 ± 5.5	< 7.4		
Zr-Nb-95	-1.1 ± 2.4	< 10.7	-0.2 ± 2.5	< 6.6		
Cs-134	-0.8 ± 2.1	< 3.9	-2.1 ± 2.4	< 3.2		
Cs-137	1.7 ± 2.5	< 4.6	3.3 ± 2.4	< 4.4		
Ba-La-140	-4.8 ± 2.4	< 27.1	-16.8 ± 2.8	< 10.3		
Other Gammas[a]	0.3 ± 1.9	< 8.7	-0.2 ± 2.4	< 5.1		

[a] RU-103

[b] LLDs not reached due to small sample size; only 200 mL available for analysis.

APPENDIX F

DUPLICATE ANALYSES

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

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Location	Date Collected	Volume (m^3)	Gross Beta
E-02	01-21-09	279	0.034 ± 0.004
E-04	01-28-09	330	0.047 ± 0.004
E-01	02-18-09	293	0.033 ± 0.004
E-08	03-18-09	300	0.034 ± 0.004
E-02	04-08-09	284	0.010 ± 0.003
E-08	05-06-09	301	0.021 ± 0.003
E-04	05-20-09	310	0.007 ± 0.002
E-02	06-03-09	281	0.011 ± 0.003
E-04	06-10-09	314	0.013 ± 0.002
E-03	06-17-09	292	0.014 ± 0.003
E-02	07-15-09	279	0.020 ± 0.003
E-02	09-30-09	303	0.021 ± 0.003
E-01	11-11-09	353	0.028 ± 0.003
E-08	11-25-09	304	0.041 ± 0.004
E-04	12-16-09	309	0.046 ± 0.004
E-04	12-23-09	310	0.036 ± 0.004

NOTE: Page F-3 is intentionally left out.

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

Units: pCi/L

Collection: Monthly

Location	E-21	E-21	E-11
Lab Code	EMI- 3388	EMI- 4680	EMI- 5523
Date Collected	07-08-09	09-09-09	10-14-09
Sr-89	-1.1 ± 1.1	-0.7 ± 0.8	-0.2 ± 1.0
Sr-90	0.7 ± 0.3	0.9 ± 0.3	0.5 ± 0.4
I-131	0.02 ± 0.14	0.13 ± 0.24	0.08 ± 0.20
K-40	1538 ± 116	1349 ± 99	1426 ± 126
Cs-134	0.4 ± 1.9	-1.1 ± 1.7	-0.4 ± 1.5
Cs-137	0.9 ± 2.3	0.1 ± 2.1	-0.1 ± 1.8
Ba-La-140	-2.2 ± 2.0	-0.5 ± 1.2	-0.4 ± 1.9
Co-60	-1.6 ± 2.3	0.3 ± 2.1	-0.4 ± 2.1

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

Units: pCi/L

Collections: Monthly, quarterly, quarterly composites

Location	GW-01	GW-14	GW-03
Collection Date	03-26-09	03-30-09	04-29-09
Lab Code	EWW-1016	EWW-1169	EWW-2004
H-3	98 ± 88	126 ± 83	95 ± 84
Location	GW-13	GW-11	GW-10 2Z-361A
Collection Date	04-16-09	05-26-09	06-01-09
Lab Code	EWW-1663	EWW-2556	EWW-2733
H-3	35 ± 80	13 ± 81	190 ± 91
Location	GW-13	GW-10 2Z-361A	GW-13
Collection Date	06-17-09	07-08-09	07-30-09
Lab Code	EWW-3027	EWW-3438	EWW-4057
H-3	90 ± 83	1 ± 77	32 ± 72
Location	GW-16	S-1	MH-68
Collection Date	09-16-09	09-10-09	09-16-09
Lab Code	EWW-5099	ESW-4743	ESW-5078
H-3	191 ± 85	3340 ± 186	201 ± 85
Location	MH-66B	U2FSSD	GW-13
Collection Date	10-29-09	11-08-09	11-21-09
Lab Code	EWW-6159	EWW-6496	EWW-6475
H-3	129 ± 84	2451 ± 168	141 ± 95
Location	U2FSSD	U2FSSD	
Collection Date	11-25-09	12-04-09	
Lab Code	EWW-6634	EWW-262	
H-3	1191 ± 138	981 ± 119	

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

	Units: pCi/g dry
	Collection: Semiannual
Location	E-08
Collection Date	10/29/2008
Lab Code	ESO- 6054
Gross Beta	30.19 ± 2.95
Be-7	0.10 ± 0.099
K-40	13.35 ± 0.80
Cs-137	0.30 ± 0.035
Tl-208	0.10 ± 0.026
Pb-212	0.34 ± 0.088
Bi-214	0.22 ± 0.046
Ra-226	0.65 ± 0.29
Ac-228	0.34 ± 0.11

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

	Units: pCi/g dry
	Collection: Semiannual
Location	E-04
Collection Date	5/28/2009
Lab Code	EG- 2627
Ratio (wet/dry)	9.39
Gross Beta	6.18 ± 0.19
Be-7	0.32 ± 0.12
K-40	4.05 ± 0.34
I-131	0.000 ± 0.005
Cs-134	0.000 ± 0.006
Cs-137	0.000 ± 0.006
Co-60	0.008 ± 0.008

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

Units: pCi/g wet
Collection: Semiannual

Collection Date	08-06-09	10-07-09
Lab Code	ESL- 4165	ESL- 5405
Location	E-12	E-12
Ratio (wet/dry)	6.37	3.58
Gross Beta	2.77 ± 0.28	8.85 ± 0.80
Be-7	0.83 ± 0.35	0.52 ± 0.28
K-40	1.27 ± 0.41	4.06 ± 1.03
Co-58	0.010 ± 0.013	0.044 ± 0.030
Co-60	0.005 ± 0.015	0.030 ± 0.034
Cs-134	0.004 ± 0.015	0.042 ± 0.031
Cs-137	0.002 ± 0.017	0.046 ± 0.033

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

Collection Period	4th quarter
Lab Code	EAP- 7167
Location	E-03
Be-7	0.075 ± 0.016
Cs-134	-0.0004 ± 0.000
Cs-137	-0.0001 ± 0.001
Co-60	-0.0004 ± 0.001

Environmental, Inc
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Dr. Kjell Johansen
Point Beach Nuclear Plant
6610 Nuclear Road
Two Rivers, Wisconsin 54241

LABORATORY REPORT NO.: 8006-100 -890
DATE: 11-19-09
SAMPLES RECEIVED: 10-12-09

Analyses for tritium, strontium-90 and gamma emitting isotopes.

Lab Code: EXWW-5420
Date Collected: 10-06-09
Location: MH R-4

about 25' west of the NW corner of the switchyard. KAJ 3/19/10

Isotope	Concentration (pCi/L)	MDA	Concentration (pCi/L)[a]	MDA[a]
H-3	85 ± 91	< 144		
Sr-90	-0.1 ± 0.3	< 0.6		
Mn-54	2.2 ± 1.5	< 2.7	-0.1 ± 0.6	< 0.5
Co-58	-0.7 ± 1.6	< 2.5	-0.1 ± 0.5	< 0.6
Co-60	-1.1 ± 1.6	< 1.9	-0.5 ± 0.6	< 0.6
Fe-59	1.8 ± 2.3	< 4.2	0.2 ± 1.1	< 1.4
Zn-65	-2.9 ± 3.2	< 5.4	0.8 ± 1.1	< 1.2
Zr-Nb-95	-0.8 ± 1.5	< 2.8	0.1 ± 0.6	< 1.2
Ru-103	-1.1 ± 1.4	< 2.6	-1.9 ± 4.7	< 1.1
I-131	0.2 ± 1.6	< 4.9	0.1 ± 0.5	< 1.8
Cs-134	0.1 ± 1.5	< 2.9	0.1 ± 0.4	< 1.0
Cs-137	-1.0 ± 1.9	< 3.1	0.1 ± 0.5	< 0.8
Ba-La-140	0.1 ± 1.7	< 2.1	-0.4 ± 0.5	< 0.8
Ce-141	-0.9 ± 2.6	< 4.2	-0.2 ± 0.6	< 1.4
Ce-144	-8.2 ± 13.0	< 16.1	-0.1 ± 2.6	< 3.2

[a] 2 liters of sample were filtered and suspended solids were gamma scanned as per your request.

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

Approved:
Tony Coorlim
Quality Assurance

Sincerely,
Bronia Grob
Laboratory Manager

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an Allegheny Technologies Co.

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

LABORATORY REPORT NO.:	8006-100-885
DATE:	09-28-2009
SAMPLES RECEIVED:	09-25-2009
PURCHASE ORDER NO.:	

Below are the results of the analyses for tritium in five AC Condensate samples.

Sample Description	Collection Date	Lab Code	Concentration / MDA (pCi/L) H-3
OPS Office	09-08-09	EXW-5083	1,024 ± 118 / < 152
U2 Control Room	09-08-09	EXW-5084	79 ± 79 / < 152
North Service Bldg	09-08-09	EXW-5085	175 ± 84 / < 152
South Service Bldg	09-10-09	EXW-5086	3,013 ± 174 / < 152
TB	09-10-09	EXW-5087	38 ± 77 / < 152

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

E-mail: kjell.johansen@NextERAEnergy.com

Sincerely,

Bronia Grob, M. S.
Laboratory Manager

APPROVED BY: Tony Coorlim
Tony Coorlim,
Quality Assurance

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Dr. Kjell Johansen
Point Beach Nuclear Plant
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Two Rivers, Wisconsin 54241

LABORATORY REPORT NO.: 8006-100 -905
DATE: 12-10-09
SAMPLES RECEIVED: 12-04-09

Well Water, analyses for gamma emitting isotopes.

Lab Code	EXWW- 6643		EXWW- 6644	
Collection Date	10-02-09		10-02-09	
Location	U2, Tendon Gallery		U1, Tendon Gallery	
Isotope	Activity / MDC (pCi/L)		Activity / MDC (pCi/L)	
Mn-54	1.2 ± 1.2	< 2.9	-0.4 ± 1.7	< 3.0
Fe-59	5.2 ± 2.6	< 15.5	-0.2 ± 3.6	< 15.8
Co-58	-0.1 ± 1.2	< 3.8	-0.6 ± 1.7	< 4.2
Co-60	23.6 ± 3.0	-	3.2 ± 2.3	< 5.0
Zn-65	-2.1 ± 2.9	< 6.6	-5.2 ± 4.3	< 7.4
Zr-Nb-95	2.2 ± 1.2	< 10.7	-4.7 ± 1.9	< 10.4
Cs-134	2.0 ± 1.5	< 2.9	-0.1 ± 1.8	< 3.6
Cs-137	793.7 ± 10.4	-	43.3 ± 5.3	-
Ba-La-140	-44.2 ± 1.5	< 67.4	-36.2 ± 1.9	< 84.9
Ru-103	-4.9 ± 1.8	< 8.9	1.5 ± 1.8	< 9.6

For those isotopes where both an activity and an MDC value are given, the MDC value should be considered as the reportable value (based on a 4.66 sigma counting error for the background sample) and the activity is presented for information only. For isotopes where an activity is given, but no MDC value, the activity is considered the reportable value and the error given is the probable counting error at the 95% confidence level.

Approved:
B. Grob
Laboratory Manager

Sincerely,
SA Coorlim
Quality Assurance

Environmental, Inc.
Midwest Laboratory
an Allegheny Technologies Co.

Dr. Kjell Johansen
Point Beach Nuclear Plant
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6610 Nuclear Road
Two Rivers, WI 54241

LABORATORY REPORT NO.: 8006-100
DATE: 12/08/2009
SAMPLES RECEIVED: 12/04/2009
PURCHASE ORDER NO.:

PRELIMINARY

Ground water, analyses for tritium.

Sample ID	Lab Code	Collection Date	H-3 (pCi/L)	LLD
GW-09 1Z-361A	EW-6638	11/26/09	678 ± 122	< 158
GW-09 1Z-361B	EW-6639	11/26/09	201 ± 105	< 158
GW-09 2Z-361A	EW-6640	11/26/09	136 ± 102	< 158
GW-09 2Z-361B	EW-6641	11/26/09	66 ± 99	< 158
U-1 TENDON GALLERY SUMP	EXWW-6644	10/2/09	1293 ± 141	< 165
U-2 TENDON GALLERY SUMP KAJ 3-19-10	EXWW-6643	10/2/09	4747 ± 216	< 165
S-1	ESW-6645	11/25/09	370 ± 113	< 164
S-1	ESW-6646	11/27/09	309 ± 111	< 164
S-3	ESW-6647	11/25/09	1370 ± 144	< 159
S-3	ESW-6648	11/27/09	301 ± 109	< 158
S-11	ESW-6649	11/25/09	59 ± 99	< 159

The error given is the probable counting error at the 95% confidence level.
Less than (<) values are based on a 4.66 sigma counting error for the background sample.

SA Coorlim
Quality Assurance

APPROVED:

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Laboratory Manager

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Mr. Richard Farrell
Radiation Protection Mgr.
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LABORATORY REPORT NO.: 8006-100-861
DATE: 4/24/2009
SAMPLES RECEIVED: 4/10/2009
PURCHASE ORDER NO.:

Dear Mr. Farrell:

Below are the results of the readout of supplemental TLDs deployed during the first quarter, 2009.

Period:	1st Quarter, 2009
Date Annealed:	12/02/08
Date Placed:	01/09/09
Date Removed:	04/07/09
Date Read:	04/20/09
Days in the Field:	88
Days from Annealing to Readout:	139
In-transit exposure:	7.88 ± 0.73

Location	Total mR	Net mR	Net mR per 7 days
SGSF-North	16.8 ± 0.7	9.0 ± 0.4	0.71 ± 0.07
SGSF-East	16.6 ± 0.9	8.7 ± 0.7	0.69 ± 0.08
SGSF-South	18.5 ± 0.3	10.6 ± 0.1	0.85 ± 0.06
SGSF-West	17.9 ± 0.5	10.0 ± 0.3	0.80 ± 0.06
ISFSI-North	35.3 ± 1.0	27.4 ± 1.0	2.18 ± 0.10
ISFSI-East	32.0 ± 0.6	24.1 ± 0.4	1.92 ± 0.07
ISFSI-South	21.0 ± 0.6	13.1 ± 0.3	1.04 ± 0.06
ISFSI-West	61.7 ± 2.2	53.8 ± 4.8	4.28 ± 0.39
Control	18.9 ± 0.5	11.1 ± 0.3	0.88 ± 0.06

Sincerely,

SA Coorlim,
Quality Assurance

APPROVED

Bronia Grob, M. S.
Laboratory Manager

cc: K. Johansen

Environmental, Inc.
Midwest Laboratory
an Allegheny Technologies Co.

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

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

LABORATORY REPORT NO.:	8006-100-874
DATE:	7/30/2009
SAMPLES RECEIVED:	7/6/2009
PURCHASE ORDER NO.:	-

Dear Mr. Farrell:

Below are the results of the readout of supplemental TLDs deployed during the second quarter, 2009.

Period:	2nd Quarter, 2009
Date Annealed:	03/11/09
Date Placed:	04/07/09
Date Removed:	07/02/09
Date Read:	07/08/09
Days in the Field:	86
Days from Annealing to Readout:	119
In-transit exposure:	4.39 ± 0.39

Location	Total mR	Net mR	Net mR per 7 days
SGSF-North	15.7 ± 0.4	11.3 ± 0.2	0.92 ± 0.03
SGSF-East	15.7 ± 0.3	11.3 ± 0.1	0.92 ± 0.03
SGSF-South	16.7 ± 0.3	12.3 ± 0.1	1.00 ± 0.03
SGSF-West	16.7 ± 0.9	12.3 ± 0.8	1.00 ± 0.07
ISFSI-North	33.6 ± 1.1	29.2 ± 1.2	2.37 ± 0.11
ISFSI-East	30.5 ± 1.1	26.1 ± 1.1	2.13 ± 0.10
ISFSI-South	19.7 ± 0.9	15.3 ± 0.7	1.25 ± 0.07
ISFSI-West	63.2 ± 1.6	58.8 ± 2.7	4.79 ± 0.22
Control	17.1 ± 0.7	12.8 ± 0.5	1.04 ± 0.05

Sincerely,

SA Coorlim,
Quality Assurance

APPROVED

Bronia Grob, M. S.
Laboratory Manager

cc: K. Johansen

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Midwest Laboratory
an Allegheny Technologies Co.
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Mr. Richard Farrell
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Point Beach Nuclear Plant
NextEraEnergy
6610 Nuclear Road
Two Rivers, WI 54241

LABORATORY REPORT NO.: 8006-100-897
DATE: 11/2/2009
SAMPLES RECEIVED: 10/12/2009
PURCHASE ORDER NO.:

Dear Mr. Farrell:

Below are the results of the readout of supplemental TLDs deployed during the third quarter, 2009.

Period:	3rd Quarter, 2009
Date Annealed:	06/17/09
Date Placed:	07/02/09
Date Removed:	10/07/09
Date Read:	10/14/09
Days in the Field:	97
Days from Annealing to Readout:	119
In-transit exposure:	3.03 ± 0.22

Location	Total mR	Net mR	Net mR per 7 days
SGSF-North	15.3 ± 0.9	12.3 ± 0.8	0.88 ± 0.06
SGSF-East	15.1 ± 0.9	12.1 ± 0.9	0.87 ± 0.07
SGSF-South	17.4 ± 0.4	14.3 ± 0.1	1.03 ± 0.02
SGSF-West	15.8 ± 0.5	12.8 ± 0.3	0.92 ± 0.02
ISFSI-North	39.7 ± 0.7	36.7 ± 0.5	2.65 ± 0.04
ISFSI-East	42.2 ± 1.5	39.1 ± 2.2	2.82 ± 0.16
ISFSI-South	22.0 ± 0.9	18.9 ± 0.9	1.37 ± 0.07
ISFSI-West	75.6 ± 3.2	72.5 ± 9.9	5.24 ± 0.72
Control	17.3 ± 0.8	14.3 ± 0.6	1.03 ± 0.05

Sincerely,

SA Coorlim,
Quality Assurance

APPROVED

Bronia Grob, M. S.
Laboratory Manager

cc: K. Johansen

Environmental, Inc.
Midwest Laboratory
an Allegheny Technologies Co.

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

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

LABORATORY REPORT NO.: 8006-100-909
DATE: 1/21/2010
SAMPLES RECEIVED: 1/11/2010
PURCHASE ORDER NO.:

Dear Mr. Farrell:

Below are the results of the readout of supplemental TLDs deployed during the fourth quarter, 2009.

Period:	4th Quarter, 2009
Date Annealed:	09/13/09
Date Placed:	10/07/09
Date Removed:	01/07/10
Date Read:	01/13/10
Days in the Field:	92
Days from Annealing to Readout:	122
In-transit exposure:	4.07 ± 0.36

Location	Total mR	Net mR	Net mR per 7 days
SGSF-North	14.5 ± 0.5	10.5 ± 0.2	0.80 ± 0.03
SGSF-East	14.7 ± 0.2	10.6 ± 0.0	0.81 ± 0.03
SGSF-South	15.2 ± 0.3	11.2 ± 0.1	0.85 ± 0.03
SGSF-West	15.2 ± 0.6	11.1 ± 0.4	0.85 ± 0.04
ISFSI-North	33.3 ± 1.6	29.2 ± 2.6	2.22 ± 0.20
ISFSI-East	37.0 ± 1.1	32.9 ± 1.1	2.51 ± 0.09
ISFSI-South	19.0 ± 0.7	14.9 ± 0.5	1.13 ± 0.05
ISFSI-West	59.5 ± 2.8	55.4 ± 7.8	4.21 ± 0.60
Control	15.6 ± 0.6	11.5 ± 0.4	0.88 ± 0.04

Sincerely,

SA Coorlim,
Quality Assurance

APPROVED

Bronia Grob, M.S.
Laboratory Manager

cc: K. Johansen

APPENDIX 2

University of Waterloo (Ontario)
Environmental Isotope Laboratory
Precipitation Monitoring Results for the Point Beach Nuclear Plant
Reporting Period: January – December 2009

Client: Johansen
FPL Energy Point Beach Nuclear Plant

ISO# 2009072
Location: T-3 for 3H

Environmental Isotope Lab
3/19/2010

Contract #15872

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ
1	E-02 (SBCC Rain Water) 02/04/09	201886	X	29.6	8.0		
2	E-03 (Tapawingo Rd West of Lakeshore Rd) 02/04/09	201887	X	40.0	8.0		
3	E-04 (North Boundary) 02/04/09	201888	X	28.9	8.0		

pCi/l
9.534E+01±25
1.288E+02 "
9.309E+01 "

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

Jan '09
precip sample
KAJ 3-19-10

Robert J. Drimmie
uwEILAB Manager
rdrimmie@uwaterloo.ca
519 888 4567 ext 32580

To Contact uwEILAB:
519 888 4732

Client: Johansen
FPL Energy
Point Beach Nuclear Plant
Contract #25473
NPL 2009-0053

ISO# 2009136
Location: T - 8
3 for 3H

Environmental Isotope Lab
3/19/2010

#	Sample		Lab#	^3H	Result	± 1σ	Repeat	± 1σ	
1	E-02 (SBCC Rain Water)	03/04/09	204063	X	15.4	8.0			49.60 ± 25.8
2	E-03 (Tapawingo Rd West of Lakeshore Rd)	03/04/09	204064	X	22.0	8.0			70.86 ± 25.8
3	E-04 (North Boundary)	03/04/09	204065	X	15.4	8.0	13.9	8.0	49.60 ± 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.

Feb '09 precip
KAJ 3-19-10

To Contact uwEILAB:
519 888 4732

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uwEILAB Manager
rdrimmie@uwaterloo.ca
519 888 4567 ext 32580

Client: Johansen
FPL Engergy Point Point Nuclear Plant
Contract # 25473
NPL 2009-0096

ISO# 2009234
Location: T - 9
3 for 3H

Environmental Isotope Lab
3/19/2010

#	Sample		Lab#	^3H	Result	± 1σ	Repeat	± 1σ
1	E-02 (SBCC Rain Water)	04/08/09	208012	X	16.5	8.0		
2	E-03 (Tapawingo Rd West of Lakeshore Rd)	04/08/09	208013	X	41.5	8.0		
3	E-04 (North Boundary)	04/08/09	208014	X	16.1	8.0		

53.14 ± 25.8
133.47 ± 25.8
51.85 ± 25.8
109
March prep
KAD 3-19-10

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

Robert J. Drimmie
uwEILAB Manager
rdrimmie@uwaterloo.ca
519 888 4567 ext 32580

To Contact uwEILAB:
519 888 4732

Client: Johansen
NextEra Energy Point Beach
Contract #25473
NPL 2009-0140

ISO# 2009310
Location: T - 1
3 for 3H

Environmental Isotope Lab
3/19/2010

#	Sample		Lab#	^3H	Result	± 1σ	Repeat	± 1σ		pH	Conductivity	pCi/l ± 1σ
											μS/cm	
1	E-02	05/06/09	210024	X	31.1	8.0			1-litre bottle			100.2 ± 25.8
2	E-03	05/06/09	210025	X	17.0	8.0			1-litre bottle			54.76 ± 25.8
3	E-04	05/06/09	210026	X	12.0	8.0			1-litre bottle			38.65 ± 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.

April '09
prog.
KAO 3-19-10

To Contact uwEILAB:
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uwEILAB Manager
rdrimmie@uwaterloo.ca
519 888 4567 ext 32580

Client:Johansen
FPL Energy Point Beach
Contract#: 25473
NPL 2009-0173

ISO# 2009398
Location: T - 9
3 for 3H

Environmental Isotope Lab
3/19/2010

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ		
1	E-02 (SBCC Rain Water) 06/11/09 1155	212018	X	23.5	8.0			125ml bottle	75.69 ± 25.8
2	E-03 (Tapawingo Rd West of Lakeshore Rd) 06/11/09 1145	212019	X	18.4	8.0			125ml bottle	59.27 ± 25.8
3	E-04 (North Boundary) 06/10/09 1050	212020	X	16.2	8.0	13.4	8.0	125ml bottle	52.18 ± 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.

May prep
KAJ 3-19-10

To Contact uwEILAB:
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rdrimmie@uwaterloo.ca
519 888 4567 ext 32580

Client: Johansen
FPL Energy Point Beach
Contract #: 25473
NPL 2009-0205

ISO# 2009444
Location: T-9
3 for 3H

Environmental Isotope Lab
3/19/2010

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ		pH	Conductivity	
										µS/cm	
1	E-02 (SBCC Rain Water) 07/08/09 0950	213538	X	16.5	8.0			125ml bottle			53.15 ± 25.8
2	E-03 (Tapawingo Rd West of Lakeshore Rd) 07/08/09 1015	213539	X	27.6	8.0			125ml bottle			88.90 ± 25.8
3	E-04 (North Boundary) 07/08/09 1023	213540	X	20.2	8.0			125ml bottle			65.06 ± 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.

June '09 precip
KO 3-19-10

To Contact uwEILAB:
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rdrimmie@uwaterloo.ca
519 888 4567 ext 32580

Client: Johansen
FPL Energy Point Beach
Contract #: 25473
NPL 2009-0238

ISO# 2009488
Location: T-
3 for 3H

Environmental Isotope Lab
3/19/2010

#	Sample			Lab#	^{3}H	Result	± 1σ	Repeat	± 1σ		pH	Conductivity
												µS/cm
1	E-02	8--5-09	0915	214718	X	23.0	8.0			74.08± 25.8		
2	E-03	8--5-09	0935	214719	X	12.8	8.0			41.23 "		
3	E-04	8--5-09	0955	214720	X	12.8	8.0	10.9	8.0	41.23 "		

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

July '09
prep
KAJ 3-19-10

To Contact uwEILAB:
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rdrimmie@uwaterloo.ca
519 888 4567 ext 32580

Client: Johansen
FPL Energy Point Beach Nuclear Plant
Contract: 25473

ISO# 2009537
Location: T-
3 for 3H

Environmental Isotope Lab
3/19/2010

Results for ~~Sept.~~ Aug. '09
KAJ 3-19-10
28.99 ± 25.6
58.94 ± "
70.22 ± "

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ
1	E-02	216028	X	9.0	8.0		
2	E-03	216029	X	18.3	8.0		
3	E-04	216030	X	21.8	8.0	23.1	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.

To Contact uwEILAB:
519 888 4732

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519 888 4567 ext 32580

Client: Johansen
FPLE Point Beach Nuclear Plant
Contract #: 25473
NPL 2009-0310

ISO# 2009633
Location: T -
3for 3H

Environmental Isotope Lab
3/19/2010

#	Sample	Lab#	^{3}H	Result	± 1σ	Repeat	± 1σ
	Oct. 7, 2009						
1	E-02 10/07/09	219847	X	9.5	8.0		
2	E-03 10/07/09	219848	X	14.6	8.0		
3	E-04 10/07/09	219849	X	18.9	8.0	20.9	8.0

30.60 ± 25.8
47.03 ± "
60.88 ± "

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

Sept '09 precip
KAB 3/19/10

To Contact uwEILAB:
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519 888 4567 ext 32580

Client: Johansen
FPLE Point Beach Nuclear Plant
Contract#: 25473
NPL 2009-0350

ISO# 2009703
Location: T -
3 for 3H

Environmental Isotope Lab
3/19/2010

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ		Conductivity
	November 3, 2009								
1	E-02 11-03-09	221884	X	18.8	8.0			60.56±25.8	
2	E-03 11-03-09	221885	X	14.1	8.0			45.42±25.8	
3	E-04 11-03-09	221886	X	17.9	8.0	22.0	8.0	57.66±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.

Oct '09 precip
KAJ 3-19-10

To Contact uwEILAB:
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rkhmskrk@uwaterloo.ca
519 888 4567 ext 35838

Client: Johansen
FPLE Point Beach Nuclear Plant
Contract#: 25473
NPL 2009-0393

ISO# 2009792
Location: T-
3 for 3H

Environmental Isotope Lab
3/19/2010

#	Sample	Lab#	^3H	Result	± 1σ	Repeat	± 1σ
	December 9, 2009						
1	E-02 12/09/09	224345	X	<6.0	8.0		
2	E-03 12/09/09	224346	X	9.4	8.0		
3	E-04 12/09/09	224347	X	9.7	8.0	8.0	8.0

< 19.35 ± 25.8
30.28 ± "
31.24 ± "

Nov '09 precip
KJJ 3-19-10

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

To Contact uwEILAB:
519 888 4732

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519 888 4567 ext 35838

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

ISO# 2010030
Location: T -
3 for 3H

Environmental Isotope Lab
3/19/2010
1 of 1

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

Dec '09 precip
KO 3-19-10

55.08 ± 25.8
137.54 ± 25.8
41.23 ± 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.

Rick Heemskerk
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To Contact uwEILAB:
519 888 4732

ENCLOSURE 2

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

2009 ANNUAL MONITORING REPORT

ENVIRONMENTAL MANUAL
REVISION 21
MAY 9, 2009

36 pages follow

EM

ENVIRONMENTAL MANUAL

DOCUMENT TYPE:	Controlled Reference
CLASSIFICATION:	N/A
REVISION:	21
EFFECTIVE DATE:	May 1, 2009
REVIEWER:	Plant Operation's Review Committee (PORC)
APPROVAL AUTHORITY:	PORC Chair
PROCEDURE OWNER (title):	Group Head
OWNER GROUP:	Chemistry

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1.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ADMINISTRATION

1.1 Definition and Basis

1.1.1 Definition

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

1.1.2 Basis

The REMP is designed to fulfill the requirements of 10 CFR 20.1302, PBNP GDC 17, 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.

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 inplant 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 sound 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.

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.

c. Data monitoring

Chemistry reviews and interprets all program analytical results on a monthly basis as they are reported. Trends, if any, are noted. Any resulting corrections, modifications and additions to the data are made by Chemistry . . Inconsistencies are investigated by Chemistry with the cooperation of Radiation Protection (RP) and contractor personnel, as required. Unusual results as evidenced by radioactivity levels exceeding administrative notification levels are also investigated. Results of the investigation will be conveyed to the Plant Manager. Chemistry will promptly inform the Plant Manager of any sample exceeding Nuclear Regulatory Commission (NRC) regulatory notification levels and will initiate an investigation. A formal report shall be provided to the Plant Manager upon completion of the investigation.

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 all technically-specified 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.

2. The following items are required to be reported to the NRC within 30 days of occurrence pursuant to the criteria of Section 2.2.4:

   (a) Confirmed environmental radionuclide concentrations, attributable to PBNP effluents, in excess of notification levels;

   (b) Confirmed results of weighted sum calculations involving radionuclide concentrations, attributable to PBNP effluents, in environmental samples in excess of the specified notification level; and

(c) The report shall, to the extent possible, identify the cause(s) for exceeding the limit(s) and define the corrective actions taken to reduce radioactivity in effluents so that the potential dose to a member of the public will not exceed the annual limits.

3. The annual results from the contracted REMP analytical laboratory as well as the laboratories analytical QA/QC results, in-house blanks, interlaboratory comparisons, etc., shall be transmitted to the NRC, Region III, with, or as a separate concurrent submittal, the Annual Monitoring Report.

4. 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 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 may be changed with the approval of the PORC and Plant Manager 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 identified by applying sound radiological principles 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

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

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, a written report shall be submitted to the NRC. 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 set lower than the NRC regulatory notification levels and lower than, or equal to, the weighted sum action levels so that the nature and origin of the increased level of environmental radioactivity may be expeditiously 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. A formal, written reason for the new site and its location shall be transmitted to Chemistry who will make the appropriate changes to the Environmental Manual. 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 submitted to the PBNP Corrective Action Program.

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.

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 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 of well water using the required number of cubitainers or other appropriate containers. Label as directed in Section 2.2.7.

2.4.5 Air

a. Sample collection

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

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

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

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

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

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

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

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

5. Remove particulate filter being careful to handle filter only by edges, place in the glassine envelope.

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

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

8. Record "date on."

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

10. Turn pump on (if necessary).

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

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

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

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

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

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

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

b. Air sampling system description

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

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

c. Calibration

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

d. Inspection and maintenance

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

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

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

e. Pump repair and replacement

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

2.4.6 Milk

Because of iodine decay and protein binding of iodine in aging milk samples, speed is imperative in processing and samples must be kept cool to avoid degradation and spoilage of the samples. Milk samples are obtained monthly in conjunction with the State of Wisconsin Milk Sampling Program from three individual dairy farmers located north, south, and west of the site. Milk sampling data can also be obtained from the Kewaunee Nuclear Power Plant, 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 first 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.

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 a clean-side refrigerator 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. 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

Fish are obtained three times per year (March, August and December) as available either from the traveling screens as washed into the fish basket or by other methods as required. For any given sampling period, three fish, or a sufficient number to yield at least 1000 gm of fillets, should be provided.

Place fish in plastic bags and tape and/or tie tightly closed. Fish are stored briefly in a radiologically clean freezer. It may be desirable in warm weather to coordinate milk and fish sampling, thereby allowing simultaneous shipment in insulated containers. Pack fish samples with ice if needed. Label bags as directed in Section 2.2.7, being sure to indicate fish species when possible. Following packaging of fish, remove and discard any fish left in the freezer. This avoids sending fish that are not representative of the sampling period.

Fish are obtained four times per year (March, June, September and December) for the State of Wisconsin. Fish sampling for the State is performed in the same manner as that for the plant. Approximately four fish should be sent to the state at each sampling period.

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, RP personnel will notify Chemistry in writing. To ensure performance of the annual verification, "milk review" is identified on the sampling checklist (i.e., the PBF-4121a-l series).

TABLE 2-1
RECOMMENDED MINIMUM SAMPLE SIZES

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

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

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

TABLE 2-2

Lakewater and Well Water (Continued)	pCi/L-T.S.[(d)]	Mn-54	15	1,000	100	250
		I-131	2	---	2	---
		Other	30	---	100	---
		H-3	3,000	30,000	3,000	7,500
		Sr-89	10	---	50	---
		Sr-90	2	---	20	---
Milk	pCi/L	Sr-89	5	---	100	---
		Sr-90	1	---	100	---
		I-131	0.5	3	0.5	0.75
		Cs-134	15	60	15	15
		Cs-137	18	70	18	18
		Ba-La-140	15	300	30	75
		Other[(c)]	15	---	30	---
Air Filter	pCi/m^3	Gross Beta	0.01	---	1.0	---
		I-131	0.07	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.
(b) The values in this column are not technical specifications.
(c) Other refers to non-specified identifiable gamma emitters.
(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	Southwest Corner of Site
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 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, Southwest Corner, 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

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 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.
E-33	Lake Michigan shoreline accessed from SE corner of KNPP parking lot. Sample South of creek.
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, 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

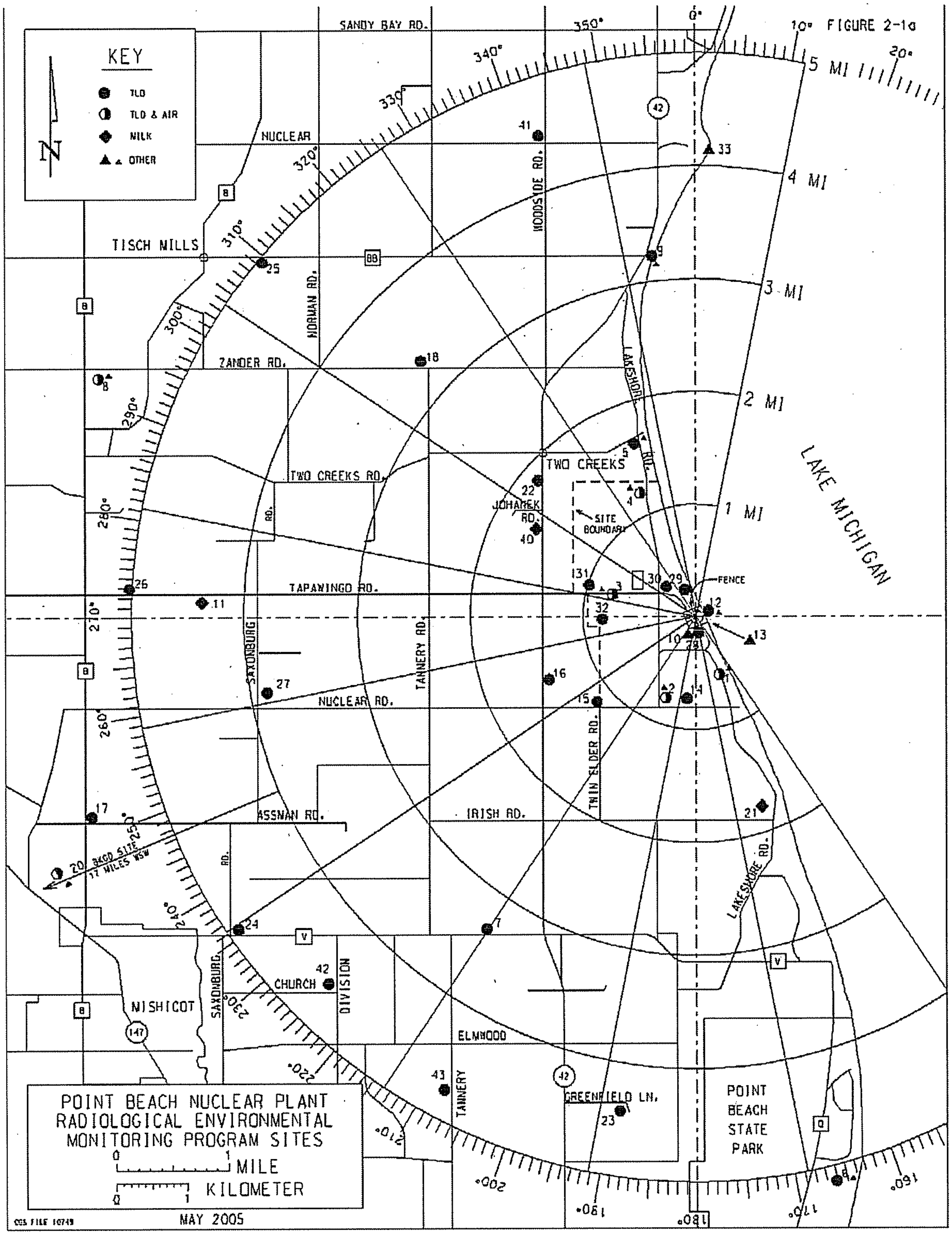
TABLE 2-4
PBNP RADIOLOGICAL ENVIRONMENTAL SAMPLE COLLECTION AND ANALYSIS FREQUENCY

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, -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 (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	Quarterly, As Available
4.	Precipitation	E-04 E-08	Twice a month, As Available
5.	Milk	E-11 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

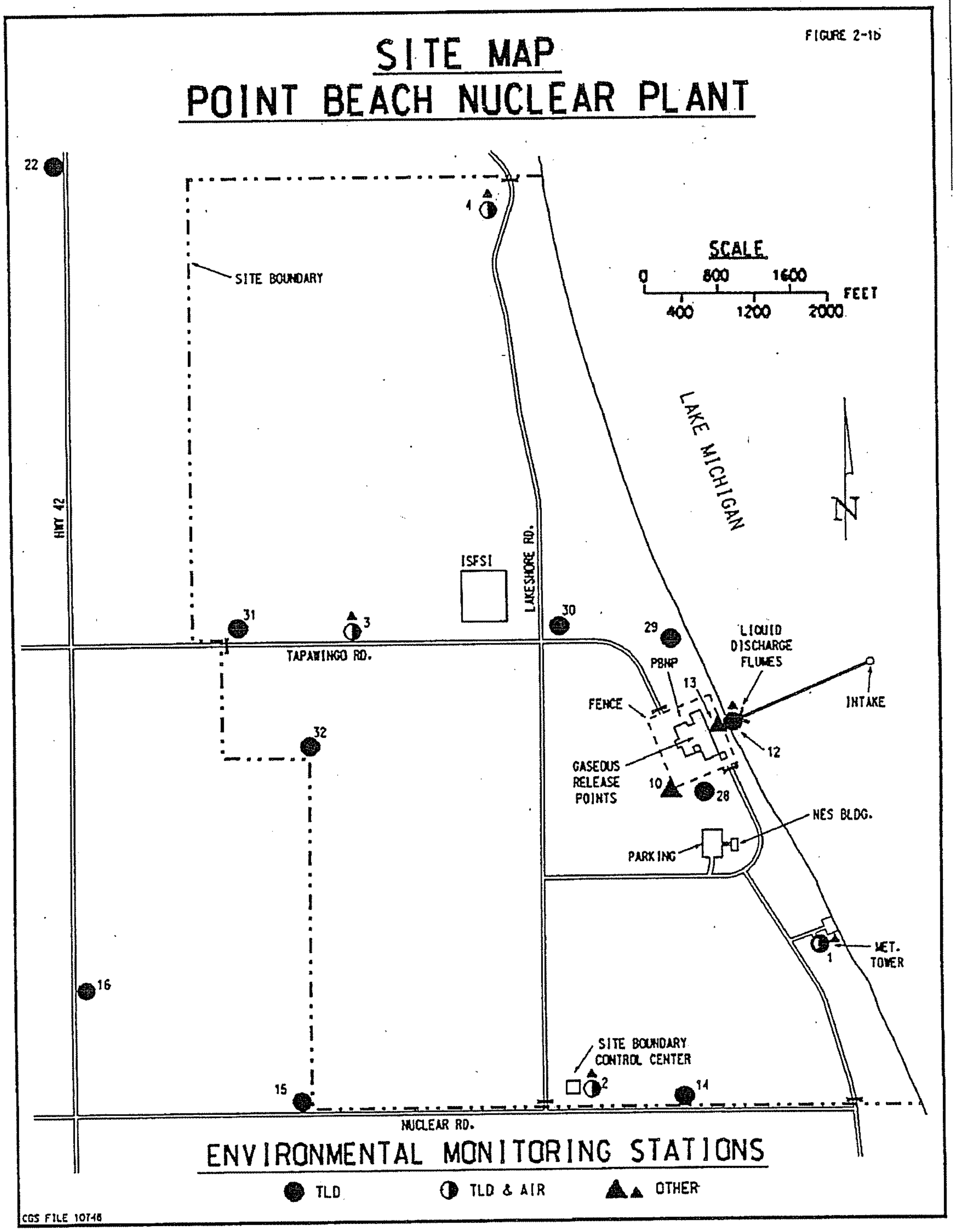
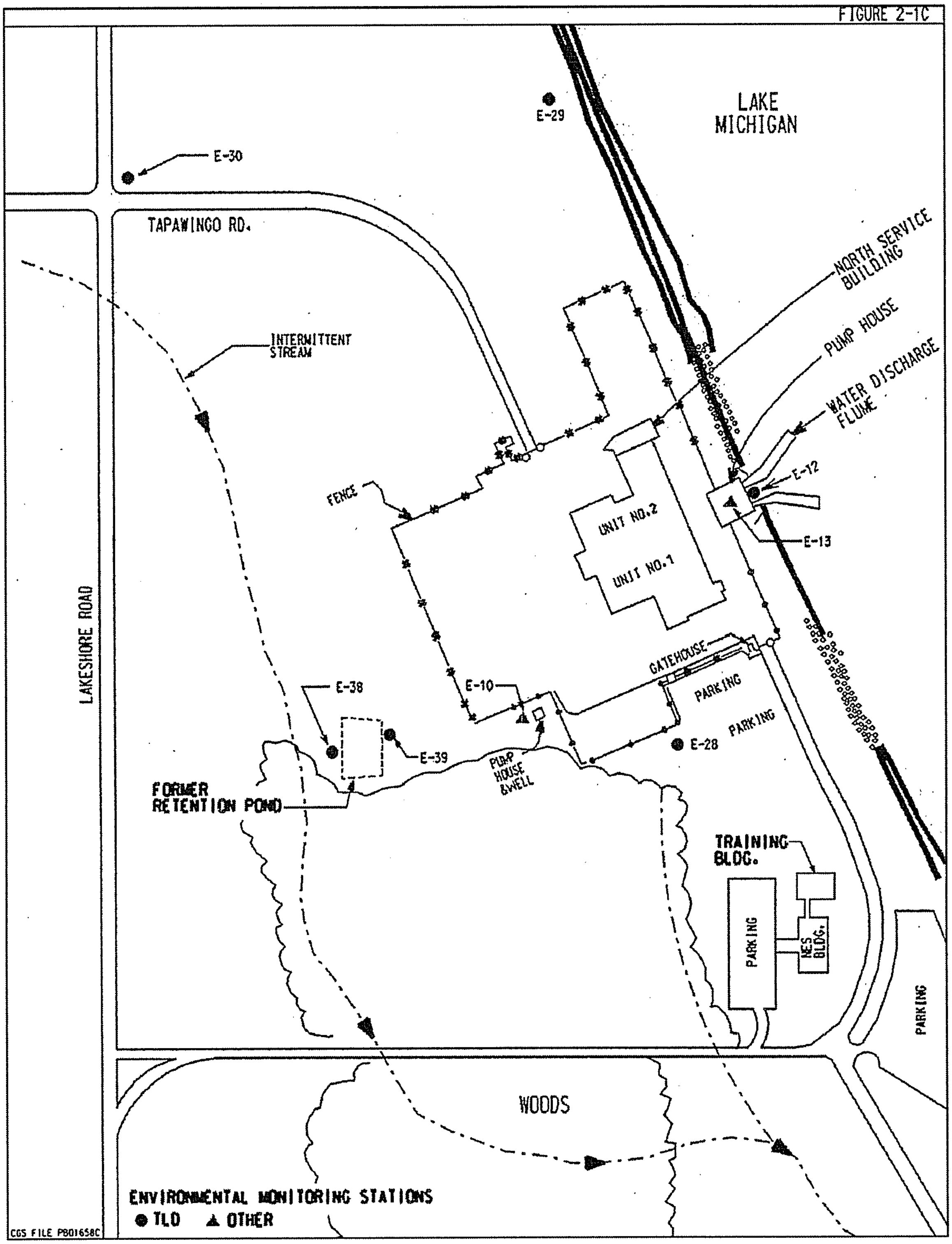


FIGURE 2-1c
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS



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ENCLOSURE 3

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

2009 ANNUAL MONITORING REPORT

RADILOGICAL EFFLUENT CONTROL MANUAL
REVISION 5
JANUARY 13, 2009

34 pages follow

RECM

RADIOLOGICAL EFFLUENT CONTROL MANUAL

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1.0 RADIOLOGICAL EFFLUENT CONTROL PROGRAM

1.1 Basis

The Radiological Effluent Control Program (RECP) shall conform to 10 CFR 50.36a for the control of radioactive effluents and maintaining doses to members of the public from radioactive effluents as low as reasonably achievable (ALARA). The RECP also is established to control the amount and concentrations of radioactivity in PBNP effluent pursuant to the following documents:

1.1.1 10 CFR 50.34a-Design objectives for equipment to control releases of radioactive material in effluents-nuclear power reactors,

1.1.2 10 CFR 50, Appendix A, Criterion 60-Control of releases of radioactive material to the environment,

1.1.3 10 CFR 50, Appendix A, Criterion 63-Monitoring fuel and waste storage,

1.1.4 10 CFR 50, Appendix A, Criterion 64-Monitoring radioactivity releases,

1.1.5 10 CFR 20.1302-Compliance with dose limits for individual members of the public,

1.1.6 10 CFR 20.1501-General,

1.1.7 PBNP General Design Criterion 17-Monitoring Radioactivity Releases, and

1.1.8 PBNP General Design Criterion 70-Control of releases of radioactivity to the environment.

1.2 Basis Statement

Liquid effluent from the radioactive waste disposal system is diluted by the circulating water system prior to release to Lake Michigan. With two pumps operating per unit, the flow of the circulating water system is approximately 340,000 gpm per unit. Operation of a single circulating water pump per unit reduces the nominal flow rate by about 40%. Liquid waste from the waste disposal system may be discharged to the circulating water system of either unit via the service water return header. Because of the low radioactivity levels in the circulating water discharge, the concentrations of liquid radioactive effluents at this point are not measured directly. Instead, the concentrations in the circulating water discharge are calculated from the measured concentration of the liquid effluent, the discharge flow rate of the effluent and the nominal flow in the circulating water system.

The release of radioactive materials in liquid effluents to unrestricted areas is monitored and controlled to conform to the dose objectives in Section II.A of Appendix I to 10 CFR 50 and will be as low as reasonably achievable (ALARA) in accordance with the requirements of 10 CFR Parts 50.34a and 50.36a. The monitoring and control also is undertaken to keep the concentrations of radionuclides in PBNP liquid effluent released to unrestricted areas conforming to ten times the maximum effluent concentration (MEC) values specified in Table 2, Column 2 of Appendix B to 10 CFR 20.1001-20.2402. Furthermore, the appropriate portions of the liquid radwaste treatment systems will be used as required to keep the releases ALARA.

These actions provide reasonable assurance that the resulting average annual dose or dose commitment from liquid effluent from each unit of the Point Beach Nuclear Plant for any individual in an unrestricted area from all pathways of exposure will not exceed the 10 CFR 50, Appendix I dose objectives. Thus, discharge of liquid wastes not exceeding these release limits will not result in significant exposure to members of the public because of consumption of drinking water from the lake, even if the effect of potable water treatment systems on reducing radioactive concentrations of the water supply is conservatively neglected.

Prior to release to the atmosphere, gaseous wastes are mixed in the auxiliary building vent with the flow from at least one of two auxiliary building exhaust fans. Further dilution then occurs in the atmosphere. Release of radionuclides to the atmosphere is monitored and controlled so that effluents to unrestricted areas conform to the dose objectives of Sections II.B and C of Appendix I to 10 CFR 50. Monitoring and control also is undertaken to ensure that at the point of maximum ground concentration at the site boundary, the radionuclide concentrations in the atmosphere will conform to the limits specified in Table 2, Column 1 of Appendix B to 10 CFR 20. Furthermore, the appropriate portions of the gaseous radwaste treatment system are used as required to keep the radioactive releases to the atmosphere ALARA.

In order to achieve the dose objectives of Appendix I to 10 CFR 50 and the aforementioned concentration limits, the setpoints for releases to the atmosphere and to Lake Michigan utilize the methodology found in the Offsite Dose Calculation Manual. Setpoints for releases to the atmosphere are based on the dilution provided by building vents as well as the highest annual average χ/Q at the site boundary. Setpoints for releases to Lake Michigan are based only on dilution by circulation water. Together, control and monitoring provide reasonable assurance that the annual dose from each unit's effluents, to an individual in an unrestricted area will not exceed the dose objectives of Appendix I to 10 CFR 50.

Implementation of the RECP will keep average annual releases of radioactive material in PBNP effluents and their resultant committed effective dose equivalents at small percentages of the dose limits specified in 10 CFR 20.1301. At the same time, the methodology of implementing the RECP permits the flexibility of operation, compatible with considerations of health and safety, to assure that the public is provided with a dependable source of power even under unusual operating conditions which may temporarily result in releases higher than such numerical guides for design objectives set forth in Appendix I but still within levels that assure that the average population exposure is equivalent to small fractions of doses from natural background radiation.

Compliance with the provisions of Appendix I to 10 CFR Part 50 constitutes adequate demonstration of conformance to the standards set forth in 40 CFR Part 190 regarding the dose commitment to individuals from the uranium fuel cycle.

1.3 Responsibilities

All required actions of the Radiological Effluent Control Program shall be conducted using approved procedures. The responsibility for the implementation of the approved procedures resides with the Manager-PBNP.

1.4 Manual Revisions

Revisions to this manual shall be performed in accordance with the ODCM Section 1.3.

1.5 RECP Parameters Reportable in the Annual Monitoring Report

Information relative to the monthly quantities of liquid, gaseous, and solid radioactive effluents released from PBNP and effluent volumes used in maintaining the releases within 10 CFR 20 limits shall be reported in the Annual Monitoring Report as follows:

1.5.1 Liquid Releases

a. Total radioactivity in curies released and average diluted discharge concentrations of the following release categories: gamma isotopic, gross alpha, tritium, and strontium (beta emitters other than tritium).

b. Total volume (in gallons) of liquid waste released into circulating water discharge.

c. Total volume (in gallons) of dilution water used.

d. The maximum concentration of tritium and gross gamma radioactivity released (averaged over the period of a single release).

e. Estimated monthly total radioactivity in curies of individual radionuclides released based on representative isotopic analyses.

f. Semiannual and annual totals of monthly quantities of individual radionuclides, as determined by isotopic analyses.

1.5.2 Releases to the Atmosphere

a. Total gross radioactivity (in Curies), by month, released of:

1. Noble Gases.

2. Halogens.

3. Particulates, subdivided into beta emitters (strontium, etc.), gross alpha, and gamma emitters.

4. Tritium.

b. Maximum release rate (for any one-hour period).

c. Estimated monthly total radioactivity (in Curies) released, by nuclide, for I-131, I-133, H-3, and radioactive particulates with half-lives greater than eight days, based on representative analyses performed by beta and by gamma isotopic analyses.

d. Semiannual and annual totals of monthly isotopic radionuclide quantities.

1.5.3 Solid Waste

a. The total amount of solid waste shipped, buried, or stored (in cubic feet).

b. Estimated total radioactivity and isotopic content (in Curies) determined by scaling factors, gamma isotopic and/or other suitable analyses.

c. The dates of shipment and burial site if shipped for burial.

d. The type of waste shall be indicated, i.e., dry activated waste, resins, evaporator concentrates, filters, scrap metal, asbestos, etc.

1.5.4 Doses

The air doses and the doses to the hypothetical maximum exposed individual calculated following the ODCM methodology shall be reported.

1.5.5 Meteorological Data

Meteorological data shall be kept in file on site for review by the NRC upon request. The data available will include wind speed, wind direction and atmospheric stability. The data will be stored in an electronic form for each of the parameters.

1.6 Other RECP Reportable Events

1.6.1 Radioactive Effluent Non-Treatment

If the effluent treatment system for radioactive liquids or for releases to the atmosphere is inoperable and effluents are being discharged for 31 consecutive days without the treatment required to meet the release limits specified in Section 5.0, a special report shall be prepared and submitted to the Commission within thirty days which includes the following information:

a. Identification of the inoperable equipment or subsystem and the reason for inoperability.

b. Actions taken to restore the inoperable equipment to operable status.

c. Summary description of actions taken to prevent a recurrence.

1.6.2 Radioactive Effluent Release Limit Exceedence

If the quantity of radioactive material actually released in liquid or gaseous effluents during any calendar quarter exceeds twice the quarterly limit as specified in Section 5.0, a special report shall be prepared and submitted to the Commission within thirty days of determination of the release quantity.

The report must describe the extent of exposure of individuals to radiation and radioactive material, including as appropriate:

a. the corrective action(s) to be taken to reduce subsequent releases to prevent recurrence of exceeding the limits, including the schedule for achieving conformance with applicable limits, ALARA constraints, generally applicable environmental standards, and associated license conditions,

b. estimates of exposures to a member of the public, including the dose from any external storage units, such as the ISFSI and the SGSF, for compliance with 40 CFR 190 limits,

c. the levels of radiation and concentrations of radioactive materials involved, and

d. the cause of the elevated exposures, dose rates, or concentrations.

If the dose to any member of the public exceeds 75 mrem to the thyroid or 25 mrem to the whole body or any organ other than the thyroid, pursuant to 40 CFR 190, the report shall also contain a request for a variance from this standard pursuant to 40 CFR 190.11.

1.6.3 Major Change to Radioactive Liquid, Gaseous and Solid Waste Treatment Systems

Licensee initiated major changes to the radioactive waste treatment systems (liquid, gaseous, and solid) shall be reported to the U.S. Nuclear Regulatory Commission with the periodic update to the FSAR for the period for which the updates are submitted. The discussion of each change shall include:

a. A summary of the evaluation that led to the determination that the change could be made in accordance with 10 CFR Part 50.59;

b. Information necessary to support the reason for the change;

c. A description of the equipment, components and processes involved and the interfaces with other plant systems;

d. An evaluation of the change, which shows how the predicted releases of radioactive materials in liquid effluents and gaseous effluents and/or quantity of solid waste will differ from those previously predicted in the license application and amendments thereto;

e. An evaluation of the change, which shows the expected maximum exposures to an individual in the unrestricted area and to the general population that differ from those previously estimated in the license application and amendments thereto;

f. An estimate of the exposure to plant operating personnel because of the change.

1.7 Audits

The activities of the Radiological Effluent Controls Program as described in this manual and its implementing procedures shall be audited in accordance with ODCM Section 1.4.

2.0 RADIOACTIVE EFFLUENT CONTROL

2.1 Liquid Radioactive Effluent Treatment System

The liquid radioactive effluent treatment system consists of those components or devices used to reduce radioactive material in liquid effluent. The system consists of the following:

2.1.1 blowdown evaporator or waste evaporator,

2.1.2 polishing demineralizers,

2.1.3 boric acid evaporator feed demineralizers,

2.1.4 boric acid evaporators,

2.1.5 boric acid evaporator condensate demineralizers.

2.1.6 Advanced Liquid Processing System (ALPS)

2.2 Gaseous Radioactive Effluent Treatment System

The gaseous radioactive effluent treatment system consists of those components or devices utilized to reduce radioactive material in effluent released to the atmosphere. The system consists of the following:

2.2.1 gas decay tanks,

2.2.2 drumming area ventilation exhaust duct filter assembly,

2.2.3 Unit 1 and 2 containment purge exhaust filter assemblies,

2.2.4 air ejector decay duct filter assembly,

2.2.5 auxiliary building ventilation filter assembly (nominal 11,214 cfm exhaust pathway),

2.2.6 chemistry laboratory exhaust duct filter assembly,

2.2.7 service building ventilation exhaust duct filter assembly,

2.2.8 auxiliary building ventilation filter assemblies (nominal 34,150 cfm exhaust pathway).

2.3 Effluent Control and Accountability

2.3.1 Radiation Monitoring System

a. Description

The computerized Radiation Monitoring System (RMS) at Point Beach Nuclear Plant consists of area and process monitors. The effluent monitors are those process monitors that are designed to detect and measure radioactivity in liquid and gaseous releases from PBNP. A description of the liquid and gaseous effluent monitors and associated isolation and control functions are presented in the ODCM.

b. Calibration

Calibration of the RMS detectors is accomplished according to the procedures of the PBNP Health Physics Calibration Manual.

c. Setpoints

The methodology for determining effluent RMS detector setpoints is described in the ODCM.

d. Alarms

Response to alarms received from RMS effluent detectors is described in the PBNP RMS Alarm Setpoint and Response Book.

e. Effluent Detector Operability and Surveillance

Detector operability and surveillance requirements are addressed in Sections 3.0 and 4.0 of this manual.

2.3.2 Effluent Treatment Schematic

The liquid and gaseous waste processing flow paths, equipment, and radiation monitors are depicted in the ODCM.

2.3.3 Release Accountability

Control and accountability of radioactivity in PBNP effluents is accomplished by the RMS in conjunction with the characterization of radionuclide distributions by laboratory analyses of grab samples from the various waste streams. Sampling frequencies and analysis requirements are set forth in Section 6.0 of this manual. Additional aspects of grab sampling and release accountability are described in the PBNP Release Accountability Manual.

3.0 RADIOACTIVE EFFLUENT MONITORING INSTRUMENTATION OPERABILITY REQUIREMENTS

3.1 Objective

The operability of detectors is specified in order to ensure that liquid and gaseous radioactive effluents are adequately monitored and to ensure that alarm or trip setpoints are established such that effluent releases do not exceed the values cited in Section 5.0.

3.2 Operability Specifications

3.2.1 The radioactive effluent monitoring instrumentation channels listed in Tables 3-1 and 3-2 shall be operable. The alarm or trip setpoints of these channels shall be determined and adjusted in accordance with the methodology and parameters in the ODCM.

3.2.2 If fewer than the minimum number of radioactive effluent monitoring channels are operable, the action statement listed in either Table 3-1 or 3-2 opposite the channel shall be taken. Best effort shall be made to return an inoperable channel to operable status within 30 days. If the channel is not returned to an operable status within 30 days, the circumstances of the instrument failure and schedule for repair shall be reported to the NRC Resident Inspector.

3.2.3 If a radioactive effluent monitoring instrumentation channel alarm or trip setpoint is found less conservative than required by the ODCM, the channel shall be declared inoperable or the setpoint shall be changed to the ODCM value or a more conservative value.

TABLE 3-1
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

Instrument			Minimum Channels Operable	Action
1.	Liquid Radwaste System			
	a.	RE-223, Waste Distillate Tank Discharge	1	Note 9
	b.	RE-218, Waste Condensate Tank Discharge	1	Note 9
	c.	Waste Condensate Tank Discharge Flow Meter	1	Note 4
	d.	Waste Distillate Tank Flow Rate Recorder	1	Note 4
2.	Steam Generator Blowdown System			
	a.	For Each Unit; RE-219, Steam Generator Blowdown Liquid Discharge, or RE-222, Blowdown Tank Monitor, or RE-229, Service Water Discharge	1	Note 2
	b.	Steam Generator Blowdown Flow Indicators (1 per steam generator)	1	Note 8
3.	Service Water System			
	a.	RE-229, Service Water Discharge (1 per unit)	1	Note 3
	b.	For Each Unit; RE-216, Containment Cooling Fan Service Water Return, or RE-229, Service Water Discharge	1	Note 3
	c.	RE-220, Spent Fuel Pool Heat Exchanger Service Water Outlet or RE-229, Service Water Discharge (for applicable unit)	1	Note 3

4. Waste Water Effluent

a.	RE-230, Waste Water Effluent	1	Note 3
b.	Waste Water Effluent Composite Sampler	1	Note 7
c.	Waste Water Effluent Flow Determination	NA	*

* Waste water effluent flow may be determined from the waste water effluent flow meter.

TABLE 3-2
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Instrument			Minimum Channels Operable	Action
1.	Gas Decay Tank System			
	a.	RE-214, Noble Gas (Auxiliary Building Vent Stack), or RE-315 Noble Gas (Auxiliary Building Vent SPING)	1	Note 1
	b.	Gas Decay Tank Flow Measuring Meter	1	Note 4
2.	Auxiliary Building Ventilation System			
	a.	RE-214, Noble Gas (Auxiliary Building Vent Stack) or Re-315, Noble Gas (Auxiliary Building Vent SPING)	1	Note 6
	b.	Isokinetic Iodine and Particulate - Continuous Air Sampling System or SPING 23	1	Note 5
3.	Condenser Air Ejector System			
	a.	RE-225, Noble Gas (Combined Air Ejector Discharge Monitor); or RE-215, Noble gas (Air Ejector Monitors - 1 per unit); or RE-214, Noble Gas (Auxiliary Building Vent Stack); or RE-315, Noble Gas (Auxiliary Building Vent SPING)	1	Note 6
	b.	Flow Rate Monitor - Air Ejectors	1	Note 8

TABLE 3-2

4.	Containment Purge and Vent System			
	a.	RE-212, Noble Gas Monitors (1 per unit); or RE-305, Noble Gas (Purge Exhaust SPING - 1 per unit)	1	Note 6
	b.	30 cfm Forced Vent Path Flow Indicators	1	Note 8
	c.	Iodine and Particulate - Continuous Air Samplers or SPING 21/22	1	Note 5
	d.	Sampler Flow Rate Measuring Device	1	Note 6
5.	Fuel Storage and Drumming Area Ventilation System			
	a.	RE-221, Noble Gas (Drumming Area Stack), or RE-325, Noble Gas (Drumming Area SPING)	1	Note 6
	b.	Isokinetic Iodine and Particulate - Continuous Air Sampling System or SPING 24	1	Note 5
6.	Gas Stripper Building Ventilation			
	a.	RE-224, Noble Gas (Gas Stripper Building), or RE-305, (Unit 2 Purge Exhaust SPING)	1	Note 6
	b.	Iodine and Particulate - Continuous Air Sampler or SPING 22	1	Note 5
	c.	Sampler Flow Rate Measuring Device	1	Note 8

NOTATIONS FOR TABLES 3-1 AND 3-2

Note 1: If the number of channels operable is fewer than the minimum required, effluent releases via this pathway may continue provided that prior to initiating a release, two separate samples are analyzed by two technically qualified people in accordance with the applicable part of Table 6-2 and the release rate is reviewed by two technically qualified people.

Note 2: If the number of channels operable is fewer than the minimum required, effluent releases via this pathway may continue provided grab samples are analyzed for gamma radioactivity in accordance with Table 6-1 at least once every 24 hours when the secondary coolant specific activity is less than 0.01 μCi/cc dose equivalent I-131 or once every 12 hours when the activity is greater than 0.01 μCi/cc dose equivalent I-131.

Note 3: If the number of channels operable is fewer than the minimum required, effluent releases via this pathway may continue provided that at least once every 12 hours grab samples are collected and analyzed in accordance with Table 6-1.

Note 4: If the number of channels operable is fewer than the minimum required, effluent releases via this pathway may continue provided the flow rate is estimated at least once every four hours during actual gaseous or liquid batch releases.

Note 5: If the number of channels operable is fewer than the minimum required, effluent releases via the affected pathway may continue provided samples are continuously collected with auxiliary sampling equipment, (e.g., any low volume sampler which meets the requirements of Table 6-2).

Note 6: If the number of channels operable is fewer than the minimum required, effluent releases via this pathway may continue provided grab samples are collected at least once per 12 hours and are analyzed in accordance with Table 6-2.

Note 7: If the number of channels operable is fewer than the minimum required, effluent releases via this pathway may continue provided grab samples are collected twice per week and analyzed in accordance with Table 6-1.

Note 8: If the number of channels operable is fewer than the minimum required, effluent releases via this pathway may continue provided the flow is estimated or determined with auxiliary indication at least once every 24 hours.

Note 9: If the number of channels operable is fewer than the minimum required, efflent releases via this pathway shall be discontinued immediately (reference TRM 3.3.1).

4.0 RADIOACTIVE EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

4.1 Objective

To verify that radioactive liquid and gaseous effluent monitoring instrumentation is demonstrated to be operable by periodic inspection, testing, and calibration.

4.2 Radioactive Monitoring Instrumentation Surveillance Requirements

Each radioactive effluent monitoring instrumentation channel shall be demonstrated operable by performance of the channel check, calibration, functional test, and source check at the frequencies shown in Tables 4-1 and 4-2.

4.3 Definitions

4.3.1 Source Check

The assessment of channel response by exposing the channel detector to a source of increased radiation.

4.3.2 Channel Check

A qualitative determination of acceptable operability by observing channel behavior during operation. This shall include, where possible, a comparison of the channel with other independent channels measuring the same variable.

4.3.3 Functional Test

The injection of a simulated signal into the channel to verify that it is operable, including alarm and/or trip initiating action.

TABLE 4-1
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Instrument Description	Channel Check	Calibrate	Functional Test	Source Check
1. Liquid Radwaste System				
a. RE-223, Waste Distillate Tank Discharge	D	R	Q	P
b. RE-218, Waste Condensate Tank Discharge	D	R	Q	P
c. Waste Condensate Tank Discharge Flow Meter	P/D	R	NA	NA
d. Waste Distillate Tank Flow Rate Recorder	P/D	R	NA	NA
2. Steam Generator Blowdown System				
a. RE-219, Steam Generator Blowdown Liquid Discharge (1 per unit)	D	R	Q	M
b. RE-222, Blowdown Tank Monitor (1 per unit)	D	R	Q	M
c. Steam Generator Blowdown Flow Indicator (1 per steam generator)	D	R	NA	NA

TABLE 4-1 (continued)
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Instrument Description	Channel Check	Calibrate	Functional Test	Source Check
3. Service Water System				
a. RE-229, Service Water Discharge (1 per unit)	D	R	Q	M
b. RE-216, Containment Cooling Fan Service Water Return (1 per unit)	D	R	Q	M
c. RE-220, Spent Fuel Pool Heat Exchanger Service Water Outlet	D	R	Q	M
4. Waste Water Effluent				
a. RE-230, Waste Water Effluent	D	R	Q	M
b. Waste Water Effluent Composite Sampler	W	NA	NA	NA
c. Waste Water Effluent Flow Meter	W	R	NA	NA

TABLE 4-2
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Channel Description	Channel Check	Calibrate	Functional Test	Source Check
1. Gas Decay Tank System				
a. RE-214, Noble Gas (Auxiliary Building Vent Stack	D	R	Q	M
b. Gas Decay Tank Flow Measuring Device	P	R	NA	NA
2. Auxiliary Building Ventilation System				
a. RE-214, Noble Gas (Auxiliary Building Vent Stack)	D	R	Q	M
b. RE-315, Noble Gas (Auxiliary Building SPING	D	R	Q	M
c. Isokinetic Iodine and Particulate Continuous Air Sampling System	W	R	NA	NA

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TABLE 4-2 (continued)
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Channel Description	Channel Check	Calibrate	Functional Test	Source Check
3. Condenser Air Ejector System				
a. RE-225, Noble Gas (Combined Air Ejector Discharge)	D	R	Q	M
b. RE-215, Noble Gas (Air Ejectors - 1 per unit)	D	R	Q	M
c. Flow Rate Monitor - Air Ejectors (1 per unit)	D	R	NA	NA
4. Containment Purge and Vent System				
a. RE-212, Noble Gas (1 per unit)	D	R	Q	M*
b. 30 cfm Vent Path Flow Indicator	P/D	R	NA	NA
c. RE-305, Noble Gas (Purge Exhaust SPING - 1 per unit)	D	R	Q	M*
d. Iodine and Particulate Continuous Air Sampler	P/W	NA	NA	NA
e. Sampler Flow Rate Measuring Device	P/D	R	NA	NA

TABLE 4-2 (continued)

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Channel Description	Channel Check	Calibrate	Functional Test	Source Check
5. Fuel Storage and Drumming Area Ventilation Stack				
a. RE-221, Noble Gas (Drumming Area Vent Stack)	D	R	Q	M
b. RE-325, Noble Gas (Drumming Area SPING)	D	R	Q	M
c. Isokinetic Iodine and Particulate Continuous Air Sampling System	W	NA	NA	NA
6. Gas Stripper Building Ventilation System				
a. RE-224 Noble Gas	D	R	Q	M
b. Iodine and Particulate Continuous Air Sampler	W	NA	NA	NA
c. Sampler Flow Rate Measuring Device	W	R	NA	NA

NOTATIONS FOR TABLES 4-1 AND 4-2

D	=	Daily
W	=	Weekly
M	=	Monthly
Q	=	Quarterly
R	=	Each Refueling Interval
P/D	=	Prior to or immediately upon initiation of a release or daily if a release continues for more than one day
P/W	=	Prior to or immediately upon initiation of a release or weekly if a release continues for more than one week
P	=	Prior to or immediately upon initiation of a release
*	=	Source check required prior to containment purge
**	=	The channel calibration shall include the use of standard gas samples appropriate to the recommendations of the manufacturer of the gas analyzer equipment in use and include calibration points in the range of interest.
NA	=	not applicable

5.0 RADIOACTIVE EFFLUENT RELEASE LIMITS

5.1 Objective

To ensure controlled releases of radioactive materials in liquid and gaseous effluents to unrestricted areas are within applicable 10 CFR 20 concentration limits and to ensure the quantities of radioactive material released during any calendar year are such that resulting radiation exposures do not exceed the dose objectives of 10 CFR 50, Appendix I.

5.2 Radioactive Liquid Effluent Concentrations

5.2.1 Alarm setpoints for liquid effluent monitors shall be determined and adjusted utilizing the methodologies and parameters given in the ODCM.

5.2.2 The liquid effluent monitor setpoints shall be established to ensure that radioactive materials released as effluents shall not result in concentrations to unrestricted areas in excess of ten times the concentration values specified in Appendix B, Table 2, Column 2, of 10 CFR 20.1001-20.2402.

5.2.3 During release of radioactive liquid effluents, at least one condenser circulating water pump shall be in operation and the service water return header shall be lined up only to the unit whose circulating water pump is operating.

5.3 Radioactive Liquid Effluent Release Limits

5.3.1 The annual calculated total quantity of radioactive material above background released from PBNP in liquid effluents shall not result in an unrestricted area estimated annual dose or dose commitment from all exposure pathways to any individual in excess of 6 millirem to the total body or 20 millirem to any organ.

5.3.2 For the purpose of initiating the use of the liquid effluent treatment system whenever the projected dose for a period of 31 days will exceed 2% of the dose guidelines of Appendix I to 10 CFR 50. The 2% of the Appendix I values, as given in Section 5.3.1, are 0.12 mrem for the whole body and 0.4 mrem for any organ.

5.3.3 Quarterly limits are defined as one-half of the annual limits.

5.3.4 Compliance with these release limits will be demonstrated by periodic dose calculations utilizing the methodology of the ODCM.

5.4 Radioactive Gaseous Effluent Concentrations

5.4.1 Alarm setpoints for the gaseous effluent monitors shall be determined and adjusted utilizing the methodologies and parameters given in the ODCM.

5.4.2 The gaseous effluent monitor setpoints are established to ensure that radioactive materials released shall not result in concentrations to unrestricted areas in excess of the values specified in 10 CFR 20, Appendix B, Table 2.

5.4.3 During the release of radioactive gaseous effluents from the gas decay tanks through the auxiliary building vent, at least one auxiliary building exhaust fan shall be in operation.

5.5 Radioactive Gaseous Effluent Release Limits

5.5.1 The annual calculated total quantity of radioactive materials above background released from PBNP to the atmosphere shall not result in an unrestricted area estimated annual dose or dose commitment from all exposure pathways to any individual in excess of the following:

a. 10 millirem to the total body or 30 millirem to the skin from gaseous effluents near ground level;

b. 30 millirem to any organ from all I-131, I-133, H-3 and radioactive materials in particulate form whose half-life is > 8 days; and

c. Furthermore, the annual air dose from gaseous effluents at any location near ground level, which could be occupied by individuals in unrestricted areas, shall not exceed 20 millirads for gamma radiation or 40 millirads for beta radiation.

5.5.2 For the purpose of initiating the use of the atmospheric effluent treatment system whenever the projected dose for a period of 31 days will exceed 2% of the dose guidelines of Appendix I to 10 CFR 50, the 2% of the Appendix I values, as given in Section 5.5.1, are:

a. 0.2 mrem to the total body and 0.6 mrem to the skin, and

b. 0.6 mrem to any organ.

5.5.3 Quarterly limits are defined as one-half of the annual limits.

5.5.4 Compliance with these release limits will be demonstrated by periodic dose calculations utilizing the methodology of the ODCM.

5.6 Atmospheric Release Rate Limitations

The rate of release of radioactive effluents to the atmosphere from the site, which if continued for one year, shall not result in dose rates at or beyond the site boundary that exceed the following values.

5.6.1 For noble gases:

a. 500 mrem/yr to the total body

b. 3000 mrem/yr to the skin

5.6.2 For I-131, I-133, H-3, and all particulate form radionuclides with a half-life > 8 days:

1500 mrem/yr to any organ

5.6.3 The instantaneous, limiting release rates for the above annual rates, are calculated in Section 3.10 of the ODCM for various release types. Below are default values for various releases. Check the ODCM for the methodology to calculate release rates for more specific radionuclide mixtures or contact the cognizant Radiological Engineer.

a. For noble gases, the whole body dose is limiting yielding a rate of 1.22E-01 Ci/sec.

b. For particulates, radioiodines and H-3, as described above, the release rates are

1.14E-06 Ci/sec for radioiodines

1.30E-06 Ci/sec for cesiums

2.16E-05 Ci/sec for cobalts

3.62E-01 Ci/sec for H-3

As a conservative measure, the limiting release rate should be applied to the whole radionuclide mixture based upon the presence or absence of the above major dose contributors.

5.7 Cumulative and Projected Doses

5.7.1 Determination of cumulative and projected dose contributions from radioactive effluents for the current calendar quarter and current calendar year, in accordance with the methodology and parameters of the ODCM, shall be made at least every 31 days.

5.7.2 Because of the length of time required to complete all facets of the required calculations and to obtain the radioanalytical results for effluent samples sent to a contracted analytical laboratory, the determination of the current quarter dose may not be finished until the following quarter.

5.7.3 If the calculations required by Sections 5.3.4 or 5.5.4 exceed the corresponding quarterly limit during any calendar quarter, a special report will be prepared and submitted.

5.7.4 If the calculations required by Sections 5.3.4 or 5.5.4 demonstrate that quarterly releases exceed the quarterly limit, corrective actions shall be taken to ensure that subsequent releases in that calendar year will comply with quarterly and annual limits.

5.8 Radioactive Effluent Treatment

5.8.1 The gaseous radioactive effluent treatment system shall be operated whenever the projected dose for a 31 day period, from I-131, I-133, H-3, and radioactive particulates with a half-life > 8 days, exceeds the values of Section 5.5.2 (2% of the Appendix I values). If the gaseous effluent treatment system becomes inoperable, the effluent reporting requirements of Section 1.6 shall apply.

a. A gas decay tank(s) shall be operated whenever required to maintain gaseous releases within the limits of Section 5.5.2.a.

b. The auxiliary building ventilation exhaust charcoal filter shall be operated when required to maintain gaseous releases within the limit of Section 5.5.2.b for radioiodines.

c. The air ejector charcoal filter shall be operated when required to maintain releases within the limit of Section 5.5.2.b for radioiodines.

5.8.2 The liquid radioactive effluent treatment system shall be operated whenever the projected dose for a 31 day period exceeds the values of Section 5.3.4 (2% of the Appendix I values). If the liquid effluent treatment system becomes inoperable, the effluent reporting requirements of Section 1.6 shall apply.

5.9 Total Dose

5.9.1 Compliance with the provisions of Appendix I to 10 CFR 50 is adequate demonstration of conformance to the standards set forth in 40 CFR 190.

5.9.2 If the calculations required by 5.3.4 or 5.5.4 exceed twice the annual dose objectives of Sections 5.3 and 5.5 , dose calculations shall be performed as described in the ODCM and shall include direct radiation contributions from reactor units and from any outside storage tanks in addition to effluent pathways.

5.9.3 A report will be submitted to the Commission within 30 days upon completion of the dose calculations required by Section 5.9.2, if the calculated dose to any member of the general public exceeds the 40 CFR 190 annual dose limits.

5.10 Solid Radioactive Waste

The solid radwaste system shall be used in accordance with the Process Control Program to process radioactive wastes to meet all shipping and burial ground requirements. If the provisions of the Process Control Program are not satisfied, shipments of defectively processed or defectively packaged radioactive waste from the site will be suspended. The Process Control Program shall be used to verify solidification of radwaste.

6.0 RADIOACTIVE EFFLUENT SAMPLING AND ANALYSIS REQUIREMENTS

6.1 Purpose

Pursuant to the requirements of 10 CFR 20.1302, the purpose of this section is to specify the sampling frequency, the analysis frequency, and analysis requirements for radioactive liquid and gaseous effluents in order to verify that the concentrations and quantities of radioactive material released from the site in liquid and gaseous effluents do not exceed the objectives specified in Section 5.0.

6.2 Radioactive Liquid Waste Sampling and Analysis

The concentration of radioactivity in liquid waste shall be determined by sampling and analysis in accordance with Table 6-1.

6.3 Radioactive Gaseous Waste Sampling and Analysis

The concentration of radioactivity in gaseous wastes shall be determined by sampling and analyses in accordance with Table 6-2.

TABLE 6-1
RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis[5]	Lower Level of Detection[1] (μCi/cc)
1. Batch Releases[2] a. Waste Condensate Tank b. Waste Distillate Tank c. Monitor Tanks d. Other tanks containing radioactivity to be discharged	Prior to Release	Prior to Release	Gamma Emitters I-131	5×10^{-7} 1×10^{-6}
		Monthly on composites obtained from batches released during the current month	Gross Alpha Tritium	1×10^{-7} 1×10^{-5}
		Quarterly on composites obtained from batches released during the current quarter	Sr-89/90	5×10^{-8}

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TABLE 6-1

2. Continuous Releases[3]				
a. Steam Generator Blowdown	Grab Samples Twice Weekly	Twice Weekly	Gamma Emitters I-131	5×10^{-7} 1×10^{-6}
b. Service Water		Monthly on Grab Composites	Gross Alpha Tritium	1×10^{-7} 1×10^{-5}
		Quarterly on Grab Composites	Sr-89/90	5×10^{-8}
c. Waste Water Effluent	Continuous Composite[4]	Weekly	Gamma Emitters I-131	5×10^{-7} 1×10^{-6}
		Monthly on Weekly Composite	Gross Alpha Tritium	1×10^{-7} 1×10^{-5}
		Quarterly on Monthly Composite	Sr-89/90	5×10^{-8}

NOTES FOR TABLE 6-1

1. The principal gamma emitter for which the gamma isotopic LLD applies is Cs-137. Because gamma isotopic analyses are performed, the LLDs for all other gamma emitters are inherently determined by the operating characteristics of the counting system. All identifiable gamma emitters will be reported in the Annual Monitoring Report.

2. A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated and mixed to assure representative sampling.

3. A continuous release is the discharge of liquid wastes of a non-discrete volume; e.g., from a volume of a system that has an input flow during the release.

4. A continuous composite is one in which the method of sampling employed results in a specimen that is representative of the liquids released.

5. Identified entrained noble gases shall be reported as gaseous effluents.

TABLE 6-2
RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

Gaseous Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Level of Detection[1] (μCi/cc)
1. Gas Decay Tank	Prior to Release	Prior to Release	Gamma Emitters	1×10^{-4}
2. Containment Purge or Continuous Vent	Prior to Purge[2] or Vent	Prior to Purge or Vent	Gamma Emitters Tritium	1×10^{-4} 1×10^{-6}
3. Continuous Releases: a. Unit 1 Containment Purge and Vent b. Unit 2 Containment Purge and Vent c. Drumming Area Vent d. Gas Stripper Building Vent e. Auxiliary Building Vent	Continuous[3]	Weekly Analysis of Charcoal and Particulate Samples	Gamma Emitters I-131	1×10^{-11} 1×10^{-12}
		Monthly Composite of Particulate Sample	Gross Alpha	1×10^{-11}
		Quarterly Composite of Particulate Sample	Sr-89/90	1×10^{-11}
		Noble Gas Monitor	Noble gases Gross Beta or gamma	1×10^{-6}
	Monthly[4] (Grab)	Monthly	Gamma Emitters	1×10^{-4}
		Monthly	Tritium	1×10^{-6}

NOTES FOR TABLE 6-2

1. The principal gamma emitters for which the LLD specification applies are Cs-137 in particulates and Xe-133 in gases. Because gamma isotopic analyses are performed, the LLDs for all other gamma emitters are inherently determined by the operating characteristics of the counting system. All identifiable gamma emitters will be reported in the Annual Monitoring Report.

2. Tritium grab samples will be taken every 24 hours when the refueling cavity is flooded.

3. The ratio of the sample flow rate to the release flow rate shall be known or estimated for the time period covered by each sampling interval.

4. Tritium grab samples will be taken every seven days from the drumming area ventilation exhaust/spent fuel pool area whenever there is spent fuel in the spent fuel pool.