ANNUAL MONITORING REPORT 2000

NUCLEAR MANAGEMENT COMPANY, LLC
POINT BEACH NUCLEAR PLANT

January 1, 2000, through December 31, 2000

April 2001

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EXECUTIVE SUMMARY

This Annual Monitoring Report for the period of January 1, 2000, through December 31, 2000, is submitted in accordance with Point Beach Nuclear Plant (PBNP) Units 1 and 2 Technical Specification 15.7.8.4 and filed under Dockets 50-266 and 50-301 for Facility Operating Licenses DPR-24 and DPR-27, respectively. The report presents the results of effluent and environmental monitoring programs, solid waste shipments, new fuel shipments, non-radioactive chemical releases, circulating water system operation, and leak testing of radioactive sources.

During 2000, the following amounts of radioactive material were released via the liquid and atmospheric pathways:

	Liquid	Atmospheric
Tritium (Ci)	804	88.1
Particulate (Ci)	0.34	0.0001
Noble Gas (Ci)	-	2.82

- Noble gases in the liquids are added to the atmospheric.

For the purpose of regulatory compliance with the effluent dose 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 limits. 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 are shown below and compared to the corresponding dose objectives of 10 CFR 50, Appendix I.

LIQUID RELEASES

Dose Category	Calculated Dose	Appendix I Dose
Whole body dose	0.008 millirem	6 millirem
Organ dose	0.009 millirem	20 millirem

ATMOSPHERIC RELEASES

Dose Category	Calculated Dose	Appendix I Dose
Organ dose	0.04 millirem	30 millirem
Noble gas dose to the skin	0.001millirem	30 millirem
Noble gas dose to the whole body	0.0007 millirem	10 millirem
Noble gas beta air dose	0.0003 millirad	40 millirad
Noble gas gamma ray air dose	0.0007 millirad	20 millirad

The results show that during 2000, the doses from PBNP effluents were a small percentage (~ 0.15% at the most) of the Appendix I dose objectives and therefore continue to be ALARA.

In addition to collecting and analyzing environmental samples, a survey of land use with respect to the location of dairy cattle was made pursuant to Section 2.5 of the 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 2000 Radiological Environmental Monitoring Program (REMP) collected 470 samples for radiological analyses and 142 sets of thermoluminescent dosimeters (TLDs) to measure ambient radiation in the vicinity of PBNP and the independent spent fuel storage installation (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, lake and well water, fish, and algae, revealed no buildup of PBNP radionuclides released in liquid effluents. The data analysis shows no plant effect on its environs.

As of December 2000, the ISFSI contained a total of 12 ventilated storage casks (VSC-24). During 2000, 4 casks were transferred to the ISFSI. 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 2000 confirms that the effluent control program at PBNP ensures that its operations minimally impacts the environs.

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. 10 CFR 50.34a states that 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 dose 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.

Also operated at PBNP under the General License granted pursuant to 10 CFR 72.210 is 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 the part 50 Appendix I dose 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

[*] 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)

beyond the controlled area must not exceed 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any other organ. The dose from naturally occurring radon and its decay products are exempt. Because the loading of the storage casks occurs within the primary auxiliary building of PBNP, the doses from effluents due to the loading process will be assessed and quantified as part of the PBNP Radiological Effluent Control Program (RECM). Leakage of radionuclides from the fuel storage containers at the ISFSI is not expected due to the design of the containers.

2.0 RADIOACTIVE LIQUID RELEASES

The release path to the environment contributing to radioactive liquid releases is circulating water discharge. A liquid waste treatment system in conjunction with administrative controls are 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 factors such as the amount of radioactive material released, the total volume of liquid, the total volume of dilution water, and usage factors (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, 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 dose objectives is presented in Table 2-1. The conservatively calculated dose to the MEI is a very small fraction of the Appendix I dose objective.

Table 2-1

Comparison of 2000 Liquid Effluent Calculated Doses to 10 CFR 50 Appendix I Dose Objectives

Annual Limit [mrem]	Highest Total Calculated Dose [mrem]	% of Dose Objective
6 (whole body)	0.008	0.15 %
20 (any organ)	0.009	0.05%

2.2 2000 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.

2.3 2000 Isotopic Composition of Circulating Water Discharges

The isotopic composition of circulating water discharges during the current reporting period is presented in Table 2-3.

2.4 Subsoil Drain System Releases Tritium Summary

The quarterly and annual results of monitoring the subsoil or "beach" drains is presented in Table 2-4. No tritium was observed in any of the drains during 2000.

Table 2-2

Summary of Circulating Water Discharge
January 1, 2000, through December 31, 2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Total Activity Released (Ci)													
Gamma Isotopic	4.16E-03	2.98E-03	3.28E-03	2.22E-04	2.89E-04	8.48E-03	2.24E-03	1.20E-03	2.53E-03	3.33E-02	1.06E-02	2.64E-02	9.56E-02
Gross Alpha	3.83E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.30E-07	0.00E+00	0.00E+00	4.12E-07	0.00E+00	0.00E+00	0.00E+00	5.07E-06
Tritium	5.36E+01	3.48E+01	1.09E+02	8.32E+01	1.03E+02	2.92E+01	7.80E+01	4.13E+01	1.04E+02	5.83E+01	7.46E+01	3.54E+01	8.04E+02
Sr-89 / Sr-90	2.87E-05	2.98E-05	0.00E+00	4.56E-05	5.26E-05	6.23E-05	2.59E-05	1.46E-05	1.59E-05	2.20E-06	2.65E-06	1.61E-05	2.96E-04
Total volume Released (gal)													
Processed Waste	4.77E+04	2.93E+04	1.23E+05	4.41E+04	5.66E+04	3.48E+04	5.22E+04	4.51E+04	1.09E+05	1.29E+05	1.19E+05	1.48E+05	9.37E+05
Retention Pond	8.42E+06	7.09E+06	8.26E+06	8.03E+06	9.15E+06	8.42E+06	3.50E+06	2.90E+06	2.53E+06	2.09E+06	1.72E+06	2.80E+06	6.49E+07
U1 SG Blowdown	3.37E+06	2.60E+06	2.98E+06	3.02E+06	3.52E+06	2.92E+06	2.55E+06	2.94E+06	2.55E+06	6.54E+05	3.51E+06	2.60E+06	3.32E+07
U2 SG Blowdown	2.66E+06	2.51E+06	2.67E+06	2.41E+06	2.72E+06	2.49E+06	2.56E+06	2.68E+06	2.43E+06	1.32E+06	0.00E+00	2.83E+06	2.73E+07
Total (gal)	1.45E+07	1.22E+07	1.40E+07	1.35E+07	1.54E+07	1.39E+07	8.66E+06	8.57E+06	7.62E+06	4.19E+06	5.34E+06	8.37E+06	1.26E+08
Total (cc)	5.49E+10	4.63E+10	5.31E+10	5.11E+10	5.85E+10	5.25E+10	3.28E+10	3.24E+10	2.88E+10	1.58E+10	2.02E+10	3.17E+10	4.78E+11
Dilution Water (cc)*	6.53E+13	5.76E+13	7.90E+13	1.11E+14	1.05E+14	1.11E+14	1.15E+14	1.15E+14	1.11E+14	7.94E+13	4.82E+13	6.54E+13	1.06E+15
Average Diuluted Discharge Concentration (uCi/cc)													
Gamma Isotopic	6.37E-11	5.17E-11	4.15E-11	2.00E-12	2.75E-12	7.64E-11	1.94E-11	1.05E-11	2.28E-11	4.19E-10	2.20E-10	4.03E-10	
Gross Alpha	5.87E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.48E-15	0.00E+00	0.00E+00	3.71E-15	0.00E+00	0.00E+00	0.00E+00	
Tritium	8.21E-07	6.04E-07	1.38E-06	7.50E-07	9.81E-07	2.63E-07	6.78E-07	3.59E-07	9.37E-07	7.35E-07	1.55E-06	5.41E-07	
Sr-89 / Sr-90	4.40E-13	5.17E-13	0.00E+00	4.11E-13	5.01E-13	5.61E-13	2.25E-13	1.27E-13	1.43E-13	2.77E-14	5.50E-14	2.46E-13	
Maximum Discharge Concentration (uCi/cc) (based on one unit of dilution)													
Triutim	2.83E-05	1.94E-05	2.88E-05	3.54E-05	5.02E-05	2.20E-05	2.88E-05	2.82E-05	3.71E-05	2.06E-05	3.38E-05	2.71E-05	
Gross Gamma	2.76E-09	1.96E-09	2.43E-09	2.10E-10	1.62E-10	3.61E-09	2.15E-09	4.25E-10	4.16E-10	2.93E-08	8.05E-09	2.80E-08	

*Dual Unit Circ Water Flow

Table 2-3

Isotopic Composition of Circulating Water Discharges (Curies)
January 1, 2000, through December 31, 2000

Nuclide	Jan	Feb	Mar	Apr	May	Jun	Semi-Annual Total	Jul	Aug	Sep	Oct	Nov	Dec	Total
H-3	5.36E+01	3.48E+01	1.09E+02	8.32E+01	1.03E+02	2.92E+01	4.13E+02	7.80E+01	4.13E+01	1.04E+02	5.83E+01	7.46E+01	3.54E+01	8.04E+02
F-18			1.36E-04				1.36E-04				0.00E+00	0.00E+00	9.04E-05	2.26E-04
Cr-51	1.92E-04		4.08E-05			1.26E-04	3.59E-04				4.05E-03	8.52E-04	2.98E-03	8.24E-03
Mn-54	4.71E-06		6.14E-06	7.68E-06		1.53E-04	1.72E-04	3.91E-05	7.48E-06	1.07E-05	5.13E-05	7.96E-05	9.31E-05	4.53E-04
Fe-55	1.66E-04	0.00E+00	6.72E-04		1.67E-04	3.55E-03	4.56E-03	1.32E-03	8.40E-04	1.93E-03	1.42E-03	6.21E-04	4.98E-04	1.12E-02
Fe-59							0.00E+00				8.57E-05	0.00E+00	3.73E-05	1.23E-04
Co-57						1.61E-05	1.61E-05	2.76E-06			3.87E-05	1.30E-05	5.84E-05	1.29E-04
Co-58	3.86E-04	1.21E-04	5.72E-04	6.97E-05	2.69E-05	1.20E-03	2.38E-03	1.48E-04	4.97E-05	1.44E-04	2.60E-02	6.84E-03	2.00E-02	5.56E-02
Co-60	2.68E-04	3.14E-04	2.02E-04	1.19E-04	3.60E-05	2.66E-03	3.60E-03	6.01E-04	2.63E-04	2.57E-04	4.58E-04	1.47E-03	6.84E-04	7.33E-03
Zn-65							0.00E+00				8.01E-06	1.47E-05	1.21E-04	1.44E-04
Sr-89							0.00E+00						3.41E-06	3.41E-06
Sr-90	2.87E-05	2.98E-05		4.56E-05	5.26E-05	6.23E-05	2.19E-04	2.59E-05	1.46E-05	1.59E-05	2.20E-06	2.65E-06	1.27E-05	2.93E-04
Nb-95						1.07E-04	1.07E-04				2.50E-04	1.54E-04	5.61E-04	1.07E-03
Nb-97	4.47E-06		3.83E-06				8.30E-06			8.92E-06	1.23E-06	0.00E+00	1.08E-05	2.93E-05
Zr-95						5.93E-05	5.93E-05				1.11E-04	8.35E-05	2.56E-04	5.11E-04
Ag-110m	4.34E-04	3.01E-04	1.58E-04	1.66E-05	1.64E-05	4.68E-04	1.39E-03	1.06E-04	4.22E-05	3.90E-05	6.98E-04	2.94E-04	3.43E-04	2.92E-03
Sn-113	9.93E-06	1.62E-06	7.24E-06			4.35E-05	6.23E-05				2.25E-05	1.63E-05	1.93E-05	1.20E-04
Sn-117m	6.76E-05	1.71E-05	3.57E-05	1.01E-06	3.44E-05		1.56E-04	6.03E-06			3.03E-05	4.09E-05	1.14E-04	3.47E-04
Sb-122							0.00E+00				5.90E-06	0.00E+00	0.00E+00	5.90E-06
Sb-124							0.00E+00				3.75E-06	2.42E-05	1.75E-04	2.03E-04
Sb-125	2.32E-03	1.91E-03	1.22E-03	7.91E-06	6.29E-06	6.80E-05	5.53E-03	9.22E-06			1.50E-05	3.75E-05	1.10E-04	5.70E-03
Te-132							0.00E+00				9.39E-06	1.80E-05		2.73E-05
I-131							0.00E+00						1.65E-04	1.65E-04
I-133							0.00E+00						2.68E-06	2.68E-06
Cs-136							0.00E+00				1.73E-05	0.00E+00		1.73E-05
Cs-137	3.06E-04	3.16E-04	2.22E-04		2.12E-06	2.75E-05	8.74E-04	3.48E-06	1.68E-06			2.99E-05	6.21E-06	9.15E-04
Ba-139							0.00E+00		5.37E-07			0.00E+00		5.37E-07
La-140							0.00E+00			1.45E-04		0.00E+00		1.45E-04
alpha	3.83E-06					8.30E-07	4.66E-06			4.12E-07				5.07E-06

Note: The Dissolved noble gases detected in liquid effluents (e.g., Xe-133 and Xe-135) are included in airborne release totals.

Table 2-4

Subsoil System Drains - Tritium Summary
January 1, 2000, through December 31, 2000

	S-1	S-3	S-7	S-8	S-9	S-10
First Quarter						
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	(-)	0.00E+00	0.00E+00
Flow (gal)	7.66E+05	7.22E+04	5.70E+05	0.00E+00	4.84E+05	6.22E+05
Second Quarter						
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	(-)	(-)	0.00E+00
Flow (gal)	4.24E+05	2.61E+05	3.13E+05	0.00E+00	0.00E+00	9.32E+05
Third Quarter						
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	(-)	(-)	0.00E+00
Flow (gal)	3.97E+05	5.79E+05	6.57E+05	0.00E+00	0.00E+00	1.11E+06
Fourth Quarter						
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	8.35E+05	1.98E+05	8.93E+04	4.46E+05	8.37E+05	6.41E+05
Annual Totals						
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	2.42E+06	1.11E+06	1.63E+06	4.46E+05	1.32E+06	3.31E+06

(-) Indicates no sample to analyze because of zero flow.

2.5 Land Application of Sewage Sludge

The Wisconsin Department of Natural Resources has approved the disposal of PBNP sewage by land application on various Wisconsin Electric Power Company properties surrounding PBNP. This sewage sludge, which may contain trace amounts of radionuclides, are applied in accordance with methodologies approved by the NRC on January 13, 1988, pursuant to 10 CFR 20.302(a). The approved methodology required analyses prior to every disposal. Based upon an investigation of the source of the radionuclides, a combination of engineering modifications and administrative controls have eliminated radiological inputs to the sewage system for all but naturally occurring radionuclides. This was verified by sludge analyses, using the environmental lower level of detection (LLD) criteria, which found no byproduct radionuclides 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 2000. All disposals were done at Green Bay Metropolitan 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, drumming area vent stack, Unit 1 containment purge stack, and Unit 2 containment purge stack. A gaseous radioactive effluent treatment system in conjunction with administrative controls are 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 factors such as the amount of radioactive material released, the concentration at and beyond the site boundary, the average site weather conditions, the locations of the exposure pathways (cow milk, vegetable gardens and residences), and usage factors (inhalation, food consumption). In addition to the MEI doses, the energy deposited by beta particles and gamma rays in air is calculated and compared to the corresponding Appendix I dose objectives. A comparison of the annual Appendix I dose limits 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 2000 are summarized in Table 3-2.

3.3 Isotopic Airborne Releases

The monthly isotopic airborne releases for 2000 from which the airborne doses were calculated are presented in Table 3-3.

3.4 Corrections to the 1999 Airborne Effluents

During a review of the 1999 airborne effluent data a calculation mistake was identified for the Unit 1 containment purge data for October and November. This mistake resulted in a 12% over-estimation of the tritium release. The tritium release for October 1999 was 7.51 Ci (as opposed to 10.6 Ci reported for 1999) and for November 1999, the tritium release was 14.5 Ci (as opposed to 29.8 Ci reported for 1999). The total airborne tritium release for 1999 was 91.1 Ci (110 Ci had been previously reported). Tritium is generally the driver for the gaseous organ dose. Due to the decrease in the estimated release, a decrease in the calculated organ dose from 4.33E-02 mrem to 3.59E-2 mrem is obtained.

Table 3-1

Comparison of 2000 Airborne Effluent Calculated Doses to 10 CFR 50 Appendix I Dose Objectives

Category	Annual Appendix I Dose Objective	January-December Calculated Dose	Percent of Appendix I Dose Objective
Particulate	30 mrem/organ	3.52E-02	0.12 %
Noble Gas	40 mrad (beta air)	3.39E-04	0.0008 %
Noble Gas	20 mrad (gamma air)	7.36E-04	0.004 %
Noble Gas	30 mrem (skin)	1.07E-03	0.004 %
Noble Gas	10 mrem (whole body)	6.99E-04	0.007 %

Table 3-2

Radioactive Airborne Effluent Release Summary
January 1, 2000, through December 31, 2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total Noble Gases[1] (Ci)	5.81E-01	4.68E-01	9.02E-02	1.86E-01	1.23E-01	1.58E-01	2.98E-01	2.59E-01	1.80E-01	1.72E-01	1.61E-01	1.36E-01	2.82E+00
Total Radioiodines (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	4.36E-06	2.81E-05	3.25E-05
Total Particulates[2] (Ci)	2.91E-05	4.34E-06	2.06E-06	0.00E+00	0.00E+00	1.10E-08	0.00E+00	0.00E+00	6.35E-11	2.33E-05	8.67E-06	6.38E-11	6.68E-05
Alpha (Ci)	0.00E+00	0.00E+00	2.04E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.94E-07
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
Gamma Emitters (Ci)	2.91E-05	4.34E-06	1.99E-08	0.00E+00	0.00E+00	1.10E-08	0.00E+00	0.00E+00	6.35E-11	2.33E-05	8.67E-06	6.38E-11	6.58E-05
Total Tritium (Ci)	7.97E+00	1.32E+01	6.34E+00	6.76E+00	4.89E+00	4.63E+00	5.73E+00	6.87E+00	4.19E+00	9.47E+00	9.25E+00	8.83E+00	8.81E+01
Max Hourly Release (Ci/sec)	2.05E-06	2.06E-06	1.43E-06	6.59E-06	1.40E-07	1.43E-07	2.88E-07	2.28E-07	3.01E-07	1.82E-07	1.66E-07	1.62E-06	

[1] Includes noble gas contribution form liquid releases.
[2] Total is the sum of alpha, strontium, and others.

TABLE 3-3

Isotopic Composition of Airborne Releases
January 1, 2000 through December 31, 2000

Nuclide	Jan (Ci)	Feb (Ci)	Mar (Ci)	Apr (Ci)	May (Ci)	Jun (Ci)	Semi-Annual	Jul (Ci)	Aug (Ci)	Sep (Ci)	Oct (Ci)	Nov (Ci)	Dec (Ci)	Total (Ci)
H-3	7.97E+00	1.32E+01	6.34E+00	6.76E+00	4.89E+00	4.63E+00	4.38E+01	5.73E+00	6.87E+00	4.19E+00	9.47E+00	9.25E+00	8.83E+00	8.81E+01
Ar-41	1.72E-01	7.92E-02	7.71E-02	1.20E-01	9.68E-02	1.21E-01	6.66E-01	1.87E-01	1.87E-01	1.23E-01	8.84E-02	4.23E-02	6.00E-02	1.35E+00
Kr-85m	1.26E-02	1.41E-09	1.03E-04	1.20E-03	1.10E-04		1.40E-02			7.17E-04		9.62E-06		1.47E-02
Kr-87	2.97E-02	3.28E-09	2.58E-04	3.08E-03	3.31E-04		3.34E-02			1.67E-03				3.51E-02
Kr-88	3.02E-02	3.28E-09	2.58E-04	2.81E-03	2.76E-04		3.35E-02			1.67E-03				3.52E-02
Xe-133	6.82E-02	3.88E-01	1.02E-02	3.36E-02	1.78E-02	3.04E-02	5.48E-01	9.81E-02	5.55E-02	3.48E-02	7.53E-02	1.05E-01	6.87E-02	9.86E-01
Xe-133m						2.89E-03	2.89E-03							2.89E-03
Xe-135	9.45E-02	9.57E-04	1.03E-03	7.73E-03	5.82E-03	3.88E-03	1.14E-01	1.33E-02	1.65E-02	8.18E-03	8.58E-03	1.39E-02	1.09E-03	1.75E-01
Xe-135m	4.68E-02	6.10E-09	8.76E-04	4.82E-03	7.16E-04		5.32E-02			2.63E-03			4.85E-03	6.07E-02
Xe-138	1.28E-01	1.36E-08	4.12E-04	1.24E-02	1.43E-03		1.42E-01			6.93E-03			1.60E-03	1.50E-01
I-131							0.00E+00						1.12E-05	1.12E-05
I-133							0.00E+00					4.36E-06	1.69E-05	2.13E-05
F-18		4.76E-09	4.89E-09				9.65E-09							9.65E-09
Co-57						1.10E-08	1.10E-08				6.10E-09			1.71E-08
Co-58	2.24E-05	4.33E-06	1.50E-08				2.67E-05				2.33E-05	8.67E-06		5.87E-05
Co-60	6.72E-06	2.72E-10					6.73E-06							6.73E-06
Nb-95		5.14E-11					5.14E-11							5.14E-11
Cs-137							0.00E+00			6.35E-11			6.38E-11	1.27E-10
Alpha			9.94E-07				9.94E-07							9.94E-07

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 2000. 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.	36.9282 m^3	249.55 Ci
	1304.1 ft^3	
B. Dry compressible wate, contaminated equipment, etc	462.077 m^3	0.92 Ci
	16318 ft^3	
C. Irradiated components, control rods, etc.	N/A m^3	N/A Ci
	N/A ft^3	
D. Other (describe)	N/A m^3	N/A Ci
	N/A ft^3	

4.2 Major Nuclide Composition (by Type of Waste)

The major radionuclide content of the solid waste was determined by gamma isotopic analysis and by scaling to certain indicator radionuclides based on the measured isotopic content of representative waste stream samples. The estimated isotopic content is presented in Table 4-2 in decreasing order of activity.

Table 4-2

Estimated Solid Waste Major Radionuclide Composition

TYPE A		TYPE B		TYPE C	
Nuclide	Percent Abundance	Nuclide	Percent Abundance	Nuclide	Percent Abundance
Fe-55	30.19%	Co-58	43.41%	N/A	N/A
Co-58	17.40%	Co-60	29.13%	N/A	N/A
Ni-63	16.50%	Ni-63	13.44%	N/A	N/A
Co-60	14.12%	Fe-55	5.84%	N/A	N/A
H-3	8.90%	Fe-59	1.95%	N/A	N/A
Sb-125	5.27%	Cs-137 D	1.87%	N/A	N/A
Mn-54	3.33%	Mn-54	1.65%	N/A	N/A
Ag-110m	1.18%	Ce-144 D	0.86%	N/A	N/A
Cs-137 D	0.70%	Sb-125	0.69%	N/A	N/A
Nb-95	0.55%	Ni-59	0.48%	N/A	N/A
Ce-144 D	0.40%	Co-57	0.45%	N/A	N/A
Cr-51	0.30%	Sr-90 D	0.06%	N/A	N/A
Zr-95	0.23%	Sb-124	0.05%	N/A	N/A
Sn-113	0.22%	Zn-65	0.04%	N/A	N/A
C-14	0.14%	Ag-110m	0.03%	N/A	N/A
Co-57	0.13%	Pu-241	0.02%	N/A	N/A
Ni-59	0.12%	Cr-51	0.01%	N/A	N/A
Zn-65	0.11%	C-14	0.01%	N/A	N/A
Pu-241	0.10%	Am-241	0.001%	N/A	N/A
Sb-124	0.06%	Pu-238	0.001%	N/A	N/A
Sr-90 D	0.02%	Cm-243	0.001%	N/A	N/A
Cs-134	0.01%	Pu-239	0.001%	N/A	N/A
Cm-242	0.004%			N/A	N/A
Ru-103	0.004%			N/A	N/A
Cm-243	0.004%			N/A	N/A
I-131	0.003%			N/A	N/A
Am-241	0.002%			N/A	N/A
Pu-238	0.002%			N/A	N/A
Pu-239	0.001%			N/A	N/A

4.4 Solid Waste Disposition

There were 20 solid waste solid waste shipments from PBNP during 2000. The dates and destinations were:

Table 4-3

PBNP Radioactive Waste Shipments

Date	Destination	Date	Destination
02/11/00	Oak Ridge, TN	08/01/00	Oak Ridge, TN
02/17/00	Oak Ridge, TN	08/02/00	Oak Ridge, TN
02/22/01	Oak Ridge, TN	09/28/00	Oak Ridge, TN
02/29/00	Oak Ridge, TN	10/04/00	Oak Ridge, TN
04/27/00	Erwin, TN	11/01/00	Oak Ridge, TN
04/18/00	Erwin, TN	11/24/00	Oak Ridge, TN
05/03/00	Oak Ridge, TN	12/06/00	Oak Ridge, TN
05/05/00	Oak Ridge, TN	12/14/00	Oak Ridge, TN
06/21/00	Erwin, TN	12/28/00	Oak Ridge, TN
07/21/00	Oak Ridge, TN	12/28/00	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, 2000, to June 30, 2000, included 4.24E+05 gallons of neutralized wastewater. The wastewater contained 2.95E+01 pounds of suspended solids and 4.02E+04 pounds of dissolved solids.

Scheduled chemical waste releases to the circulating water system from July 1, 2000, to December 31, 2000, included 5.76E+05 gallons of neutralized wastewater. The wastewater contained 2.52E+01 pounds of suspended solids and 9.01E+03 pounds of dissolved solids.

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

5.2 Miscellaneous Chemical Waste Releases

Miscellaneous chemical waste releases from the retention pond (based on effluent analyses) to the circulating water for January 1, 2000, to June 30, 2000, included 4.94E+07 gallons of clarified wastewater. The wastewater contained 4.32E+03 pounds of suspended solids.

Miscellaneous chemical waste releases from the retention pond (based on effluent analyses) to the circulating water for July 1, 2000, to December 31, 2000, included 1.55E+07 gallons of clarified wastewater. The wastewater contained 1.00E+03 pounds of suspended solids.

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from January 1, 2000, to June 30, 2000, included 1.35E+05 pounds of sodium bisulfite and 3.70E+04 pounds of sodium hypochlorite.

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from July 1, 2000, to December 31, 2000, included 1.27E+05 pounds of sodium bisulfite and 3.60E+04 pounds of sodium hypochlorite.

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 2000

	UNIT	JAN	FEB	MAR	APR	MAY	JUN
Average Volume Cooling	1	274.2	278.5	311.0	489.6	475.2	489.6
Water Discharge [million gal/day]**	2	282.7	284.4	363.2	489.6	449.9	489.6
Average Cooling Water	1	39	42*	41	43	47	51
Intake Temperature [°F]	2	39	41	41	43	47	51
Average Cooling Water	1	68	66*	66	62	67	70
Discharge Temperature [°F]	2	73	76	69	65	66	71
Average Ambient Lake Temperature [°F]		34	34	40	42	46	48

*Unit 1 shutdown from February 25, 2000, to February 28, 2000.
** For days with cooling water discharge flow.

Table 6-1(continued)

Circulating Water System Operation for 2000

	UNIT	JUL	AUG	SEP	OCT	NOV	DEC
Average Volume Cooling	1	489.6	489.6	489.6	454.7	424.1	282.6
Water Discharge [million gal/day]**	2	489.6	489.6	489.6	428.6*	105.8	275.4
Average Cooling Water	1	59	66	58	50	44	44
Intake Temperature [°F]	2	59	66	58	48*	40*	44
Average Cooling Water	1	78	86	78	70	67	77
Discharge Temperature [°F]	2	80	88	79	65*	40*	56
Average Ambient Lake Temperature [°F]		57	65	56	49	43	35

*Unit 2 shutdown from October 16, 2000, to November 28, 2000.
** For days with cooling water discharge flow.

Part B
Miscellaneous Reporting Requirements

7.0 NEW AND SPENT FUEL SHIPMENTS AND RECEIPTS

During 2000, 40 Westinghouse 14x14 assemblies were received all for the Unit 2 Fall refueling. There were no spent fuel shipments from PBNP during the reporting period.

8.0 LEAK TESTING OF RADIOACTIVE SOURCES

During 2000, all applicable sealed radioactive sources were leak tested in accordance with Technical Specification 15.4.12. As in the previous year, the leak test results were all <0.005 mCi.

9.0 ADDITIONAL REPORTING REQUIREMENTS

9.1 Revisions to the PBNP Radiological Effluent and Materials Control and Accountability Program (REMCAP)

Changes were subsequently made to the EM (Revision 15), RECM (Revision 2) and ODCM (Revision 13) during 2000. One complete copy of each revised manual is supplied with the submittal of this Annual Monitoring Report.

9.2 Interlaboratory Comparison Program

Environmental, Inc, Midwest Laboratory, the analytical laboratory contracted to perform the radioanalyses of the PBNP environmental samples, participated in the interlaboratory comparison studies administered by Environmental Resources Associates during 2000.

9.3 Special Circumstances

No special circumstances report regarding operation of the explosive gas monitor for the waste gas holdup system was needed during 2000.