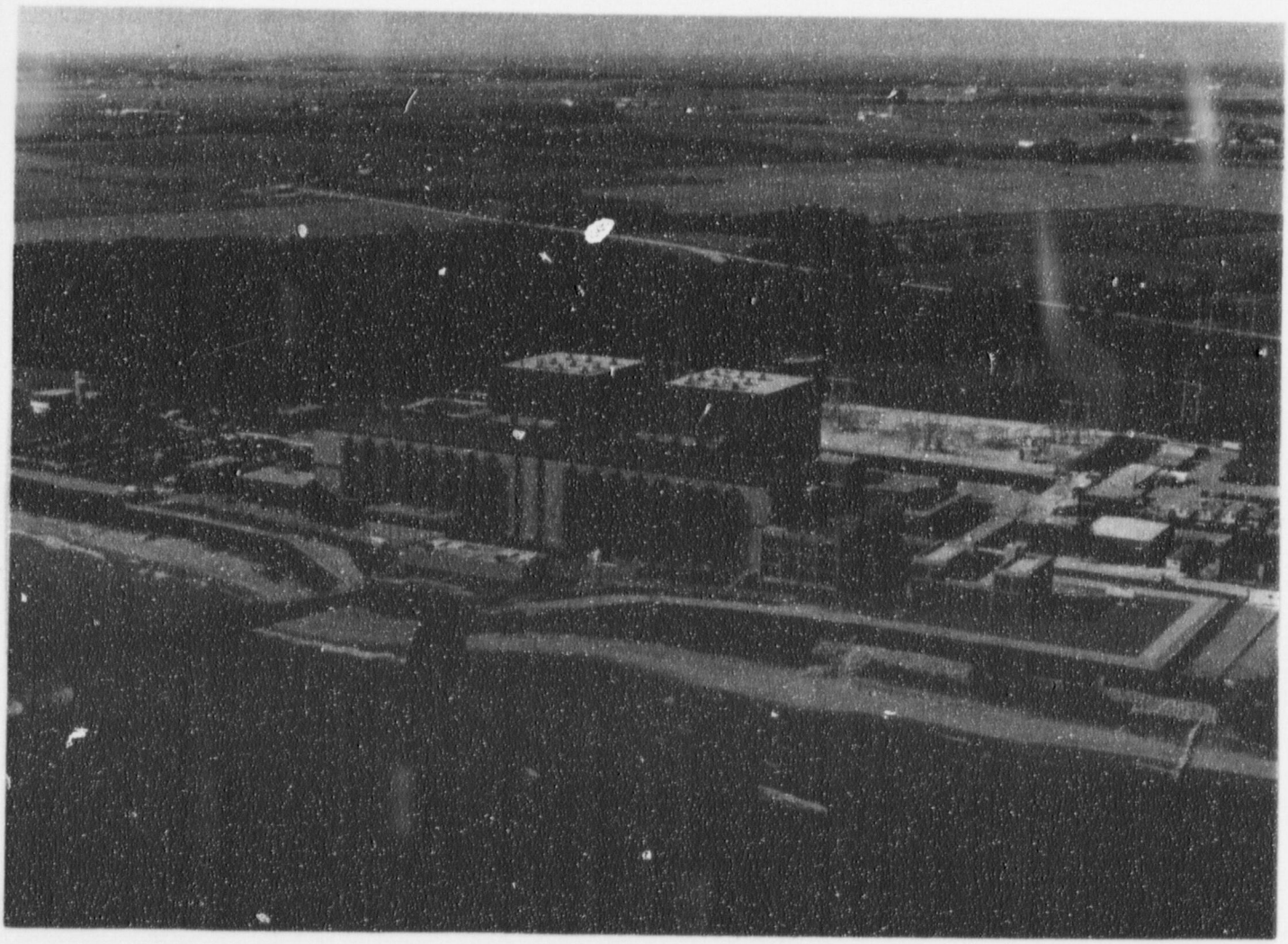
ANNUAL MONITORING REPORT 1998

WISCONSIN ELECTRIC POWER COMPANY
POINT BEACH NUCLEAR PLANT

January 1, 1998 through December 31, 1998

ANNUAL MONITORING REPORT
1998



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Part A: EFFLUENT MONITORING

Part B: MISCELLANEOUS REPORTING REQUIREMENTS

Part C: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

January 1, 1998 through December 31, 1998

April 1999

PREFACE

This Annual Monitoring Report for the period of January 1, 1998, through December 31, 1998, is submitted in accordance with Point Beach Nuclear Plant Unit Nos. 1 and 2 Technicai Specification 15.7.8.4 and filed under Docket Nos. 50-266 and 50-301 for Facility Operation License Nos. DPR-24 and DPR-27, respectively.

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EXECUTIVE SUMMARY

Pursuant to Part 50.34a of Title 10 of the Code of Federal Regulations (10 CFR 50.34a), the operation of the Point Beach Nuclear Plant (PBNP) should be conducted so as to keep the levels of radioactive material in effluents to unrestricted areas as low as reasonably achievable (ALARA). Furthermore, 10 CFR 20.1302 directs PBNP to make the appropriate surveys of radioactive materials in effluents released to unrestricted and controlled areas and of the environs around PBNP. Therefore, in addition to monitoring effluents, PBNP has a Radiological Environmental Monitoring Program (REMP) in order to verify that the appropriate controls have been applied to effluents prior to release. This Annual Monitoring Report for the period of January 1, 1998, through December 31, 1998, is submitted in accordance with Point Beach Nuclear Plant Unit Nos. 1 and 2 Technical Specification 15.7.8.4 and filed under Docket Nos. 50-266 and 50-301 for Facility Operation License Nos. 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 1998, liquids containing 299 curies of tritium and 0.377 curies of other radionuclides were released from PBNP. Airborne releases consisted of 73.4 curies of tritium, 6.46 curies of noble gases, and 0.295 millicuries of particulate radioactive material. 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) 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 ALARA. As such, the radiation exposure to the MEI is maximized with respect to occupancy, food consumption, and other uses of this area so that the MEI represents an individual with reasonable deviations from the average for the general population in the vicinity of PBNP. Doses are calculated for the adult, teen, child, and infant age groups. 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	0.004 millirem	6 millirem
Organ dose	0.004 millirem	20 millirem

ATMOSPHERIC RELEASES

Dose Category	Calculated Dose	Appendix I Dose
Organ dose	0.030 millirem	30 millirem
Noble gas dose to the skin	0.003 millirem	30 millirem
Noble gas dose to the whole body	0.002 millirem	10 millirem
Noble gas beta particle air dose	0.001 millirad	40 millirad
Noble gas gamma ray air dose	0.002 millirad	20 millirad

The results show that during 1998, the doses from PBNP effluents were a small fraction of the Appendix I dose objectives and therefore continue to be ALARA.

The 1998 REMP collected 808 samples for radiological analyses and 126 sets of thermoluminescent dosimeters were used to measure ambient radiation in the vicinity of PBNP. Samples collected consisted of lake and well water, soil, vegetation, milk, soil, shoreline sediments, algae, fish, as well as particulate and radioiodine air samples. Air monitoring from six different sites showed only background radioactivity from naturally occurring radionuclides. Terrestrial monitoring consisting of soil, vegetation, and milk found no influence from PBNP. Similarly, samples from the aquatic environment, lake and well water, fish, and algae, revealed no buildup of PBNP radionuclides released in liquid effluents.

Two lake water samples had higher than normal tritium concentrations. These samples were obtained during periods which coincided with the discharge of waste holdup tanks. Although the tritium results from these samples were higher than normal H-3 concentrations in the water, the results verified that the controls PBNP applies to discharges, to keep the resulting effluent concentrations to a small fraction of the applicable 10 CFR 20 limit, had been applied correctly. The highest measured concentration was at 0.1 % of the applicable limit. Fallout radionuclides from atmospheric weapons testing and from Chernobyl still are present at very low concentrations in some samples: Sr-90 in milk and Cs-137 in soil, vegetation, and fish. Therefore, based on the REMP radioanalytical results, PBNP effluents had a minimal impact upon the environment during 1998.

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 used in the evaluation of doses from PBNP effluents, that cattle graze at the site boundary, remains conservative.

Part A
EFFLUENT MONITORING

This picture shows the two Point Beach Nuclear Plant flumes used for the discharge of liquid effluent. In addition to monitoring the liquid prior to discharge, shoreline sediments, water, and fish are analyzed to verify that the appropriate controls have been applied to the discharge.

1.0 BASIS

The Point Beach Nuclear Plant's (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 so as 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) limit 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. This monitoring requirement (also found in General Design Criterion (GDC) 64 of Appendix A to 10 CFR 50 and in PBNP GDC 17) is implemented in order to control effluent releases as required by PBNP GDC 70 and GDC 60 of Appendix A to 10 CFR 50. PBNP GDC 70 and GDC 60 of Appendix A to 10 CFR 50 also address the need for control of solid waste material.

In order to accomplish the required monitoring, PBNP monitors liquid, airborne, and solid waste streams. 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. 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) so that the concentrations of radioactive material in the air and water beyond PBNP are below the regulatory concentration limits in Appendix B to 10 CFR 20. Solid wastes are shipped offsite for disposal at an NRC licensed facility. The amount of radioactivity in the solid waste is determined prior to shipment so that the material will comply with the applicable Department of Transportation regulations as well as NRC regulations.

2.0 RADIOACTIVE LIQUID RELEASES

The total radioactive liquid release, excluding tritium for this reporting period, was 3.77E-01 curies. This consisted entirely of processed radioactive waste. There were no detectable curies in either Unit 1 steam generator blowdown and in Unit 2 steam generator blowdown. The retention pond had a small amount of Sr-90 in March and some Na-24 in June.

The total tritium release for this reporting period was 2.99E+02 curies. This consisted entirely of processed radioactive waste. There was no detectable tritium measured either in Unit 1 steam generator blowdown, in Unit 2 steam generator blowdown, or in retention pond effluent.

2.1 1998 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 2-1

2.2 1998 Isotopic Composition of Circulating Water Discharges

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

2.3 Subsoil Drain System Releases of Tritium

The quarterly and annual results of monitoring the subsoil or "beach" drains is presented in Table 2-3. For the first time since 1986, tritium (1E-05 µCi/cc) was found in one of the monthly samples. No tritium was observed in any of the other drains during the same month or in the same drain the preceding and following months. These drains include rainwater runoff as well as ground water drainage. Therefore, it is unlikely that tritium would occur in only one drain if it were actually present. However, because we have no other data to refute the presence of tritium, the total amount, 2.87E-03 Ci, from this drainage system for a August 1998 is reported in Table 2-3. This small amount is 9.6E-04 percent of the total tritium released in PBNP liquids.

Table 2-1
SUMMARY OF CIRCULATING WATER DISCHARGE
JANUARY 1, 1998 THROUGH DECEMBER 31, 1998

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Total Activity Released (Ci)													
Gamma Scan + Fe-55	3.24E-03	5.42E-04	2.57E-03	3.91E-03	7.43E-04	2.59E-02	1.89E-04	2.97E-04	2.18E-05	3.23E-05	4.20E-05	1.04E-04	3.76E-02
Gross Alpha	5.60E-06	0.00E+00	2.42E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-07	5.95E-06
Tritium	1.81E+01	3.18E+01	2.89E+00	2.14E+01	1.14E+01	2.61E+01	3.73E+01	3.80E+00	5.01E+01	3.40E+01	2.03E+01	4.17E+01	2.99E+02
Strontium	1.16E-06	0.00E+00	5.03E-05	0.00E+00	7.88E-07	2.15E-06	1.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.56E-05
Total Volume Released (gal)													
Processed Waste	6.98E+04	1.20E+05	2.13E+04	1.20E+05	5.46E+04	1.16E+05	1.19E+05	2.22E+04	7.24E+04	9.39E+04	7.47E+04	5.43E+04	9.38E+05
U1 Steam Generator Blowdown	3.04E+06	1.18E+06	0.00E+00	0.00E+00	0.00E+00	3.46E+05	3.62E+06	2.68E+06	2.49E+06	2.68E+06	2.57E+06	2.85E+06	2.15E+07
U2 Steam Generator Blowdown	0.00E+00	2.77E+06	1.16E+06	2.75E+06	2.65E+06	2.50E+06	2.67E+06	2.63E+06	2.59E+06	2.66E+06	2.59E+06	4.01E+05	2.54E+07
Retention Pond	3.75E+06	3.30E+06	5.08E+06	3.61E+06	3.15E+06	3.42E+06	5.00E+06	4.47E+06	4.16E+06	3.71E+06	3.41E+06	4.04E+06	4.71E+07
Total (gal)	6.86E+06	7.37E+06	6.26E+06	6.48E+06	5.85E+06	6.38E+06	1.14E+07	9.80E+06	9.31E+06	9.14E+06	8.64E+06	7.35E+06	9.49E+07
Total (cc)	2.60E+10	2.79E+10	2.37E+10	2.45E+10	2.22E+10	2.42E+10	4.32E+10	3.71E+10	3.52E+10	3.46E+10	3.27E+10	2.78E+10	3.59E+11
Vol of Dilution Water (cc)	5.83E+12	3.05E+13	3.48E+13	5.29E+13	5.90E+13	5.70E+13	5.75E+13	5.75E+13	5.58E+13	5.64E+13	2.61E+13	4.52E+13	5.39E+14
Avg Diluted Discharge Conc (µCi/cc)													
Gamma Scan + Fe-55	5.56E-10	1.77E-11	7.37E-11	7.40E-11	1.26E-11	4.57E-10	3.28E-12	5.17E-12	3.91E-13	5.71E-13	1.61E-12	2.31E-13	
Gross Alpha	9.61E-13	0.00E+00	6.95E-15	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.27E-15	
Tritium	3.11E-06	1.04E-06	8.32E-08	4.05E-07	1.93E-07	4.58E-07	6.49E-07	6.62E-08	8.99E-07	6.03E-07	7.77E-07	9.21E-07	
Strontium	1.99E-13	0.00E+00	1.44E-12	0.00E+00	1.34E-14	4.07E-14	2.04E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Maximum Discharge Conc. (µCi/cc)													
Gross Gamma	5.06E-10	4.27E-10	4.86E-09	9.39E-09	1.12E-09	2.38E-06	2.58E-10	4.09E-10	6.39E-11	4.23E-11	1.02E-10	3.63E-11	
Tritium	8.49E-06	3.03E-05	4.68E-06	3.13E-05	2.75E-05	1.80E-05	1.92E-05	4.86E-06	2.86E-05	2.62E-05	2.07E-05	4.08E-05	

Table 2-2
ISOTOPIC COMPOSITION OF CIRCULATING WATER DISCHARGES
JANUARY 1, 1998 THROUGH DECEMBER 31, 1998

NUCLIDE	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)
H-3	1.81E+01	3.18E+01	2.89E+00	2.14E+01	1.14E+01	2.61E+01	3.73E+01	3.80E+00	5.01E+01	3.40E+01	2.03E+01	4.17E+01	2.99E+02
													0.00E+00
NA-24						2.26E-02							2.26E-02
CR-51			1.50E-04	6.94E-04									8.44E-04
MN-54	2.45E-05		1.82E-05	6.13E-05		1.33E-05							1.17E-04
FE-55	9.37E-04	3.18E-04	9.07E-04	1.08E-03	1.35E-04	1.33E-03							4.71E-03
CO-57	1.99E-05												1.99E-05
CO-58	1.52E-04	5.78E-06	7.02E-04	5.41E-04	9.18E-06	3.70E-04	3.91E-06					5.38E-06	1.79E-03
CO-60	9.99E-04	1.58E-04	3.78E-04	8.47E-04	8.58E-05	5.68E-04	1.51E-04	2.36E-04	1.84E-05	2.53E-05	3.83E-05	5.06E-06	3.51E-03
ZN-65	4.16E-05		1.33E-05										5.49E-05
SR-90	1.16E-06		5.03E-05		7.88E-07	2.15E-06	1.17E-06						5.56E-05
NB-95				7.96E-05									7.96E-05
NB-97				1.56E-05	5.53E-06								2.11E-05
ZR-95				5.10E-05									5.10E-05
ZR-97			1.82E-05										1.82E-05
AG-110m	2.02E-04	4.34E-05	2.87E-04	2.18E-04	1.6[illegible]-05	1.58E-04	3.07E-05	4.83E-05		6.94E-06			1.01E-03
SN-117m				2.32E-04	4.82E-04	7.18E-04							1.43E-03
SB-124			1.74E-05										1.74E-05
SB-125	7.79E-04		4.28E-05	7.33E-05		6.61E-05							9.61E-04
CS-137	8.36E-05	1.70E-05	2.85E-05	2.12E-05	9.08E-06	4.81E-05	2.51E-06	1.25E-05	3.43E-06		3.68E-06		2.30E-04
CE-141						5.37E-06							5.37E-06

Note: Dissolved noble gasses detected in liquid effluents are included in airborne release totals

TABLE 2-3

SUBSOIL SYSTEM DRAINS - TRITIUM SUMMARY
January 1, 1998 through December 31, 1998

	S-1	S-3	S-7	S-8	S-9	S-10	Total
First Quarter							Ci/GAL
H-3(uCi/cc)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ave. Flow (gpd)	2.49E+04	3.32E+03	1.16E+04	1.27E+02	5.07E+01	4.80E+03	4.03E+06
Second Quarter							
H-3(uCi/cc)	0.00E+00	0.00E+00	0.00E+00	-	0.00E+00	0.00E+00	0.00E+00
Ave. Flow (gpd)	1.15E+04	8.80E+03	1.20E+04	0.00E+00	4.80E+02	6.40E+03	3.57E+06
Third Quarter							
H-3(uCi/cc)	3.33E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.87E-03
Ave. Flow (gpd)	2.01E+03	1.14E+03	1.37E+04	5.28E+01	0.00E+00	1.01E+04	2.48E+06
Fourth Quarter							
H-3(uCi/cc)	0.00E+00	0.00E+00	0.00E+00	-	0.00E+00	0.00E+00	0.00E+00
Ave. Flow (gpd)	3.00E+03	1.20E+03	4.94E+03	-	4.68E+03	5.52E+03	1.78E+06
Annual Totals							
Released (Ci)	2.87E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.87E-03
Flow(gal)	3.75E+06	1.31E+06	3.85E+06	1.63E+04	4.79E+05	2.45E+06	1.19E+07

- Indicates no sample to analyze because of zero flow.

2.4 Doses From Liquid Effluent

Doses from liquid effluent are calculated using the methodology of the Offsite Dose Calculation Manual (ODCM). The ODCM methodology is based on the guidance of Regulatory Guide 1.109, "Calculation of annual doses to man from routine releases of reactor effluents for the purpose of evaluating compliance with 10 CFR Part 50, Appendix I." For compliance with 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 2-4.

TABLE 2-4

COMPARISON OF 1998 LIQUID EFFLUENT DOSES TO APPENDIX I DOSE OBJECTIVES

Annual Limit [mrem]	January-December Highest Total Calculated Dose [mrem]	% of 10 CFR 50, Appendix I, Dose Objective
6 (whole body)	4.0E-03 (infant)	6.6E-02
20 (any organ)	4.0E-03 (infant liver)	2.0E-02

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 the Point Beach Nuclear Plant. These sewage sludges, 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 LLD criteria, which found no byproduct radionuclides in the sludge after the controls and modifications were completed. Currently, the sludge is routinely monitored and no radionuclides attributable to PBNP have been found. There were no disposals of sewage by land application during 1998.

3.0 RADIOACTIVE AIRBORNE RELEASES

The release paths contributing to radioactive airborne release totals during this reporting period were the auxiliary building vent stack, drumming area vent stack, gas stripper building vent stack, Unit 1 containment purge stack, Unit 2 containment purge stack, combined air ejector decay duct exhaust and turbine building ventilation exhaust.

3.1 Radioactive Airborne Release Summary

Radioactivity released in airborne effluents for 1998 are summarized in Table 3-1.

3.2 Doses From Airborne Effluent

Doses from airborne effluent are calculated for the MEI following the methodology of Regulatory Guide 1.109. In addition to the MEI doses, the energy deposited by beta particles and gamma rays in air also 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 found in Table 3-2. The doses demonstrate the releases from PBNP to the atmosphere continue to be ALARA.

TABLE 3-1

1998 RADIOACTIVE AIRBORNE RELEASE SUMMARY
JANUARY 1, 1998 THROUGH DECEMBER 31, 1998

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Total Noble Gases (Ci) [1]	3.12E-02	2.16E-01	1.50E+00	8.99E-01	2.87E+00	2.78E-01	2.03E-01	1.26E-01	8.87E-02	1.15E-01	8.53E-02	8.08E-02	6.49E+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	9.38E-10	0.00E+00	2.69E-10	5.06E-10	7.12E-10	2.43E-09
Total Particulates (Ci)													
Alpha	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Strontium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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 Gammas	0.00E+00	3.02E-07	2.94E-04	0.00E+00	0.00E+00	5.54E-11	5.09E-08	3.81E-07	0.00E+00	0.00E+00	0.00E+00	1.14E-09	2.95E-04
Total Tritium (Ci)	6.44E+00	5.31E+00	1.11E+01	7.09E+00	5.47E+00	7.47E+00	2.91E+00	3.67E+00	2.81E+00	6.01E+00	3.61E+00	1.15E+01	7.34E+01
Max Hourly Release (Ci/sec)	5.05E-05	2.11E-05	4.48E-05	1.20E-06	1.09E-04	5.56E-05	1.25E-06	9.85E-08	6.00E-07	7.57E-07	8.62E-08	8.69E-08	

[1] Includes noble gas contribution from liquid releases

TABLE 3-2

COMPARISON OF 1998 AIRBORNE EFFLUENT DOSES TO APPENDIX I DOSE OBJECTIVES

Category	Annual Appendix I Dose Objective	January-December Calculated Dose [mrem]	Percent of Appendix I Dose Objective
Particulate	30 mrem/organ	2.9E-02	9.8E-02
Noble Gas	40 mrad (β air)	1.1E-03	2.7E-03
Noble Gas	20 mrad (γ air)	2.2E-03	1.1E-02
Noble Gas	30 mrem (skin)	3.4E-03	1.1E-02
Noble Gas	10 mrem (whole body)	2.1E-03	2.1E-02

3.3 Isotopic Airborne Releases

The monthly isotopic airborne releases for 1998 from which the airborne doses were calculated are presented in Table 3-3.

TABLE 3-3

ISOTOPIC COMPOSITION OF 1998 AIRBORNE RELEASES
JANUARY 1, 1998 THROUGH DECEMBER 31, 1998

NUCLIDE	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)	(Ci)
H-3	6.44E+00	5.31E+00	1.11E+01	7.09E+00	5.47E+00	7.47E+00	2.91E+00	3.67E+00	2.81E+00	6.01E+00	3.61E+00	1.15E+01	7.34E+01
AR-41	2.43E-02	4.49E-02	3.83E-01	2.47E-01	7.05E-01	7.19E-02	1.12E-01	9.53E-02	6.52E-02	1.08E-01	8.24E-02	7.19E-02	2.01E+00
KR-85	0.00E+00	8.41E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.41E-05
KR-85m	0.00E+00	4.33E-12	4.03E-02	2.67E-02	8.02E-02	7.28E-03	2.65E-03	3.01E-04	6.34E-05	7.37E-05	0.00E+00	0.00E+00	1.58E-01
KR-87	0.00E+00	3.99E-06	9.60E-02	6.14E-02	1.85E-01	1.77E-02	6.39E-03	7.18E-04	1.56E-04	1.79E-04	0.00E+00	0.00E+00	3.68E-01
KR-88	0.00E+00	1.11E-11	1.12E-01	6.42E-02	2.01E-01	1.81E-02	6.81E-03	7.65E-04	1.63E-04	1.87E-04	0.00E+00	0.00E+00	4.03E-01
XE-131m	0.00E+00	0.00E+00	0.00E+00	2.17E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.17E-04
XE-133	6.88E-03	1.59E-01	1.85E-02	1.50E-02	9.72E-02	1.49E-02	2.24E-02	2.26E-02	2.20E-02	5.52E-03	2.85E-03	8.94E-03	3.96E-01
XE-133m	0.00E+00	1.35E-04	4.67E-04	1.14E-03	4.61E-03	0.00E+00	2.08E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.56E-03
XE-135	0.00E+00	1.14E-02	2.04E-01	1.26E-01	4.66E-01	4.09E-02	1.42E-02	2.60E-03	3.00E-04	3.27E-04	0.00E+00	6.03E-06	8.66E-01
XE-135m	0.00E+00	1.59E-11	1.72E-01	9.59E-02	2.99E-01	3.29E-02	1.07E-02	1.04E-03	2.20E-04	2.55E-04	0.00E+00	0.00E+00	6.12E-01
XE-138	0.00E+00	4.57E-11	4.72E-01	2.61E-01	8.34E-01	7.48E-02	2.73E-02	3.07E-03	6.44E-04	8.33E-04	0.00E+00	0.00E+00	1.67E+00
MN-54	0.00E+00	0.00E+00	7.48E-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	7.48E-06
CO-60	0.00E+00	0.00E+00	2.86E-04	0.00E+00	0.00E+00	5.54E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.86E-04
BR-82	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-09	0.00E+00	0.00E+00	0.00E+00	1.14E-09	3.69E-09
I-131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.38E-10	0.00E+00	2.69E-10	5.06E-10	7.12E-10	2.43E-09
CS-137	0.00E+00	3.02E-07	1.70E-07	0.00E+00	0.00E+00	0.00E+00	5.09E-08	3.78E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.01E-07

4.0 RADIOACTIVE SOLID WASTE SHIPMENTS

4.1 Type, volume, and activity of shipped solid waste

The following types, volumes, and activity of solid waste was shipped from PBNP for offsite disposal or burial during 1998. No irradiated fuel was shipped offsite. The volume, activity, and type of waste is listed in Table 4-1.

Table 4-1
QUANTITIES and TYPES of WASTE SHIPPED from PBNP

Type of waste	Units	Quantity
A. Spent resins, filter sludges, evaporator bottoms, etc.	m^3 (ft^3)	1.91E+01 (6.74E+02)
	Ci	4.68E+00
B. Dry compressible waste, contaminated equip, etc.[1]	m^3 (ft^3)	1.47E+01 (5.18E+02)
	Ci	2.08E-01
C. Irradiated components, control rods, etc.	m^3 (ft^3)	None
	Ci	
D. Other (describe)		None

[1] Volume after incineration or compaction

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 Spent Resins, Filter Sludges, Etc.		TYPE B Dry Compressible Waste, Etc.	
Nuclide	Percent Abundance	Nuclide	Percent Abundance
Fe-55	4.48E+01	Fe-55	3.03E+01
H-3	2.40E+01	Co-58	2.97E+01
Co-60	1.08E+01	Ni-63	2.02E+01
Ni-63	9.83E+00	Co-60	1.22E+01
Co-58	5.66E+00	Sb-125	2.28E+00
Ag-110m	2.90E+00	Cs-137	1.49E+00
Cs-137	8.41E-01	Nb-95	1.33E+00
Sb-125	6.93E-01	Ag-110m	1.08E+00
Mn-54	3.53E-01	C-14	9.95E-01
C-14	1.49E-01	Pu-241	2.35E-01
Pu-241	1.23E-01	Ni-59	1.42E-01
Sr-90	1.60E-02	H-3	4.80E-02
Cm-242	6.00E-03	Sr-90	1.10E-02
Cm-243/244	5.00E-03	Am-241	1.10E-02
Pu-238	3.00E-03	Cm-242	6.00E-03
Am-241	3.00E-03	Cm-243/244	5.00E-03
Pu-239/240	2.00E-03	Pu-239/240	4.00E-03
		Pu-238	4.00E-03

4.3 Solid Waste Disposition

There were ten solid waste solid waste shipments from PBNP during 1998. The dates and destinations are shown below.

POINT BEACH RAD WASTE SHIPMENTS

DATE	DESTINATION	DATE	DESTINATION
03/03/98	Memphis , TN	06/10/98	Spartenburg, SC
04/01/98	Oak Ridge, TN	06/19/98	Oak Ridge, TN
05/06/98	Barnwell, SC	09/16/98	Barnwell, SC
05/07/98	Barnwell, SC	09/16/98	Barnwell, SC
05/11/98	Oak Ridge, TN	11/12/98	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, 1998, to December 31, 1998, included 7.09E+06 gallons of neutralized wastewater. The wastewater contained 3.01E+02 pounds of suspended solids and 5.95E+05 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, 1998, to December 31, 1998, included 4.71E+07 gallons of clarified wastewater. The wastewater contained 3.29E+03 pounds of suspended solids.

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from January 1, 1998, to December 31, 1998, included 2.91E+05 pounds of sodium bisulfite and 9.01E+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 1998

	UNIT	JAN	FEB	MAR	APR	MAY	JUN
Average Volume Cooling	1	294.1	280.2*	129.4*	269.0*	215.8*	262.3*
Water Discharge [Mgal/day]**	2	258.7*	288.0*	296.4*	466.3	502.7	501.7
Average Cooling Water	1	35	35*	40*	44*	48*	53*
Intake Temperature [°F]	2	34*	36*	35*	44	49	54
Average Cooling Water	1	64	55*	41*	44*	48*	55*
Discharge Temperature [°F]	2	34*	58*	42*	64	68	74
Average Ambient Lake Temperature [°F]		34	36	36	44	49	54

Table 6-1(continued)

CIRCULATING WATER SYSTEM OPERATION FOR 1998

	UNIT	JUL	AUG	SEP	OCT	NOV	DEC
Average Volume Cooling	1	471.4	489.6	475.1	481.3	377.2	385.5
Water Discharge [Mgal/day]**	2	490.3	489.6	489.8	474.9	407.6	266.7*
Average Cooling Water	1	59	66	62	53	46	41
Intake Temperature [°F]	2	59	66	62	53	46	44*
Average Cooling Water	1	78	86	81	72	64	65
Discharge Temperature [°F]	2	80	87	82	73	65	58*
Average Ambient Lake Temperature [°F]		58	66	62	56	52	40

* Unit 1 shutdown from February 17, 1998 to June 30,1998, with intermittent CW flow. Unit 2 shutdown from January 1-February 09. March 5-29, and December 6-31, 1998.

** For days with cooling water discharge flow.

Part B
Miscellaneous Reporting Requirements

7.0 NEW AND SPENT FUEL SHIPMENTS AND RECEIPTS

During 1998, several shipments of new fuel were received during the Unit 1 and 2 refueling outages. Table 7-1 below lists the receipt date and number of assemblies received.

Table 7-1
NEW FUEL RECIPTS DURING 1998

UNIT 1		UNIT 2	
Date	**Number**	**Date**	**Number**
January 14, 1998	12	November 16, 1998	12
January 17, 1998	12	November 18, 1998	12
January 21, 1998	12	November 20, 1998	12
January 24, 1998	6	November 25, 1998	12
May 9, 1998	3	December 2, 1998	5
Total	45	**Total**	53

There were no spent fuel shipments from PBNP during this reporting period.

8.0 LEAK TESTING OF RADIOACTIVE SOURCES

During 1998, 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 µCi.

9.0 ADDITIONAL REPORTING REQUIREMENTS

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

In the implementation of GL 89-01, *Implementation Of Programmatic And Procedural Controls for Radiological Effluent Technical Specifications*, procedural aspects of Radiological Effluent Technical Specifications (RETS) were transferred to the Environmental Manual (EM) and the Offsite Dose Calculation Manual (ODCM). In addition, a new manual, the Radiological Effluent Control Manual (RECM) was created. These documents were supplied to the NRC as part of the Technical Specification change submittal.

Subsequently changes were made to the EM and the ODCM during 1998. One complete copy of each revised manual is supplied with the submittal of this Annual Monitoring Report. The changes made are summarized below.

EM

1. Editorial changes,
2. Addition of new sampling sites (E-34-E-39),
3. Updated sampling site figures, and
4. Clarification text.

ODCM

1. Addition of new dose factors,
2. Correction of present dose factors,
3. Addition of descriptive material for dose factor calculations, and
4. Update the administrative process of effluent quantification.

9.2 Interlaboratory Comparison Program

The analytical laboratory contracted to perform the radioanalyses of the PBNP environmental samples participated in the EPA Interlaboratory Comparison Program during 1998.

9.3 Special Circumstances

No special circumstances report regarding operation of the explosive gas monitor for the waste gas holdup system was needed during 1998.

Part C
RADIOLOGICAL ENVIRONMENTAL MONITORING

Collecting air samples is an important part of the PBNP Radiological Environmental Monitoring Program. Air samples are collected at five sites close to PBNP and one background site some 17 miles away.

10.0 BASIS FOR RADIOLOGICAL ENVIRONMENTAL MONITORING

The objective of the PBNP REMP is to measure ambient radiation levels and to collect and analyze air, water, vegetation, fish, and soil samples for their radionuclide content in order to determine whether the operation of the PBNP has radiologically impacted the surrounding environment. These measurements also serve as a check of the efficacy of PBNP effluents 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. Therefore, the REMP collects samples from various environmental media in order to provide data on measurable levels of radiation and radioactive materials in the principal pathways of environmental exposure.

For the aquatic environment, the samples include water as well as the biological integrators, fish and filamentous algae. Because of their migratory behavior, fish are wide area integrators. In contrast, the filamentous algae periphyton are 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, where as analysis of fish and filamentous algae yield concentrations over time.

The terrestrial and atmospheric environments are united by the air-grass-cow-milk exposure pathway. 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 remains 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.

11.0 PROGRAM DESCRIPTION

11.1 Results Reporting Convention

The PBNP REMP results in this Annual Report are reported directly as measured by a detector which can meet the required Lower Level of Detection (LLD) as specified in Table 2-2 of the Environmental Manual, whether positive, negative or zero. No results are reported as <LLD. This reporting convention 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;" and DE91-013607, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance."

The LLD or Lower Limit of Detection 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.

When the radionuclide of interest is not present in the sample, the statistical nature of radioactive decay will produce negative and positive results centered about zero. 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 parameters (i.e., average, standard deviation) presented in this report.

11.2 Sampling Parameters

Samples are collected at the frequency indicated in Table 11-1 from the locations described in Table 11-2 and shown in Figures 11-1, 11-2, and 11-3. (The latter two figures show sampling locations not shown in preceding figures due to space limitations. The minimum acceptable sample size is found in Table 11-3.

11.3 Deviations from Required Collection Frequency

Deviations from the collection frequency given in Table 11-1 are allowed because of hazardous conditions, automatic sampler malfunction, seasonal unavailability, and other legitimate reasons (Section 2.2.6 of the Environmental Manual). The following deviations from the scheduled sampling and frequency occurred during 1998:

Two TLDs placed at E-28 and E-32 were lost in the field during the first quarter of 1998.

11.4 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 in order to confirm the results from the Kewaunee Nuclear Power Plant and PBNP REMPs. As a courtesy and a convenience to the State of Wisconsin, PBNP personnel also collect certain environmental samples (Table 11-4) for the State from sites which are near PBNP sampling sites or are co-located. A typical, co-located sampling site (E-04) where air particulate and iodine as well as vegetation samples are collected is shown in Figure 11-4. This also is a site where precipitation samples are collected for the State. The results of the State monitoring program are available from the Radiation Protection Unit of the WI Department of Health and Family Services.

TABLE 11-1

PBNP RADIOLOGICAL ENVIRONMENTAL SAMPLE COLLECTION FREQUENCY

Sample Type	Sample Codes	Collection 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, -34*, -35*, -36*, -38*,-39*, -TC*	Quarterly
Vegetation	E-01, -02, -03, -04, -06, -08, -09, -20, -37*	3x/yr as available
Algae	E-05, -12	3x/yr as available
Fish	E-13	3x/yr as available
Well Water	E-10	Quarterly
Lake Water	E-01, -05, -06, -12, -33	E-12 collected weekly for monthly composite. Others collected monthly.
Milk	E-11, -19, -21	Monthly
Air Filters	E-01, -02, -03, -04, -08, -20	Weekly particulate filters and charcoal canisters by continuous air sampler.
Soil	E-01, -02, -03, -04, -06, -08, -09, -20, -37*	2x/yr
Shoreline Sediment	E-01, -05, -06, -12, -33	2x/yr

* Newly added site in 1998.

TABLE 11-2

RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

Location Code	Location Description
E-01	Meteorological Tower
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
E-07	WPSC Substation on County Rt. V, about 0.5 Miles West of Hwy. 42
E-08	Southeast Corner of the Intersection of Hwy. 163 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, Hwy. 163 and Assman Road, Northeast Corner of Intersection
E-18	Northwest of Two Creeks at Zander and Tannery Roads
E-19	Local Dairy Farm, about 0.2 miles West of Hwy. 42 on the North Side of Two Creeks Road
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 Hwy. 163, North Side of Road
E-27	Intersection of Saxonburg and Nuclear Roads, Southwest Corner, about 4 Miles WSW
E-28	Nature Trail sign in parking lot on West side of EIC.
E-29	On tree on bluff overlooking Lake Michigan NE of Microwave Tower and due East of MET 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 1000 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 S of creek.
E-34†	On a tree at the start of the former Nature Trail
E-35†	Former Nature Trail, on tree on W side of trail, near "Fossil Fuels: sign
E-36†	Former Nature Trail, on tree on W side of trail, near "Earth Home Building" sign
E-37†	Former Nature Trail, in clearing on NE side of trail, near "Brush Piles" sign
E-38†	Retention Pond fence, W side
E-39†	Retention Pond fence, E side
E-TC†	Transportation Control; Reserved for TLDs

† Newly added site from 1997.

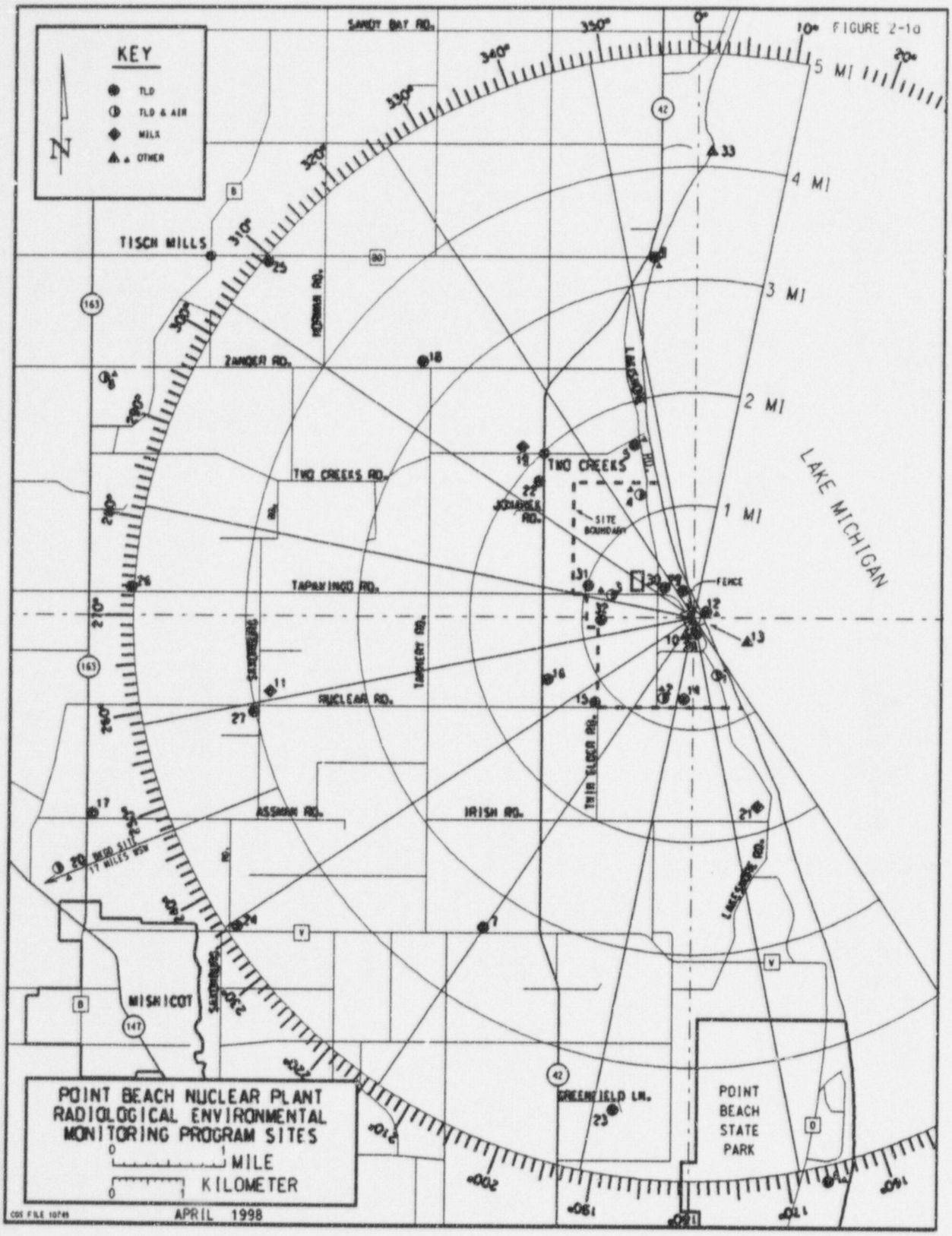

Figure 11-1
PBNP Radiological Environmental Monitoring Program sampling sites.

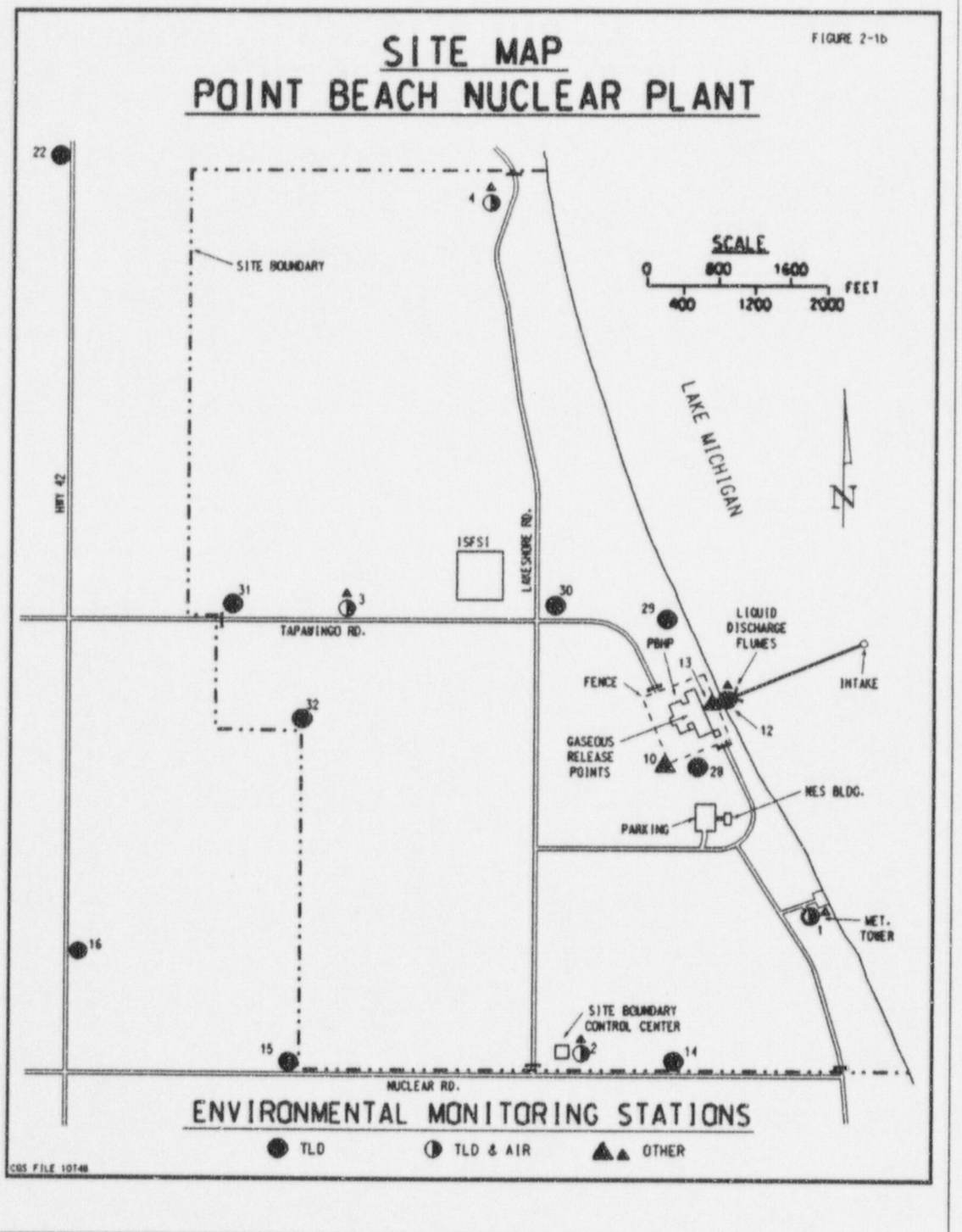

Figure 11-2
Map of Radiological Environmental Monitoring Program Sampling Sites Located Around PBNP.

FIGURE 2-1C

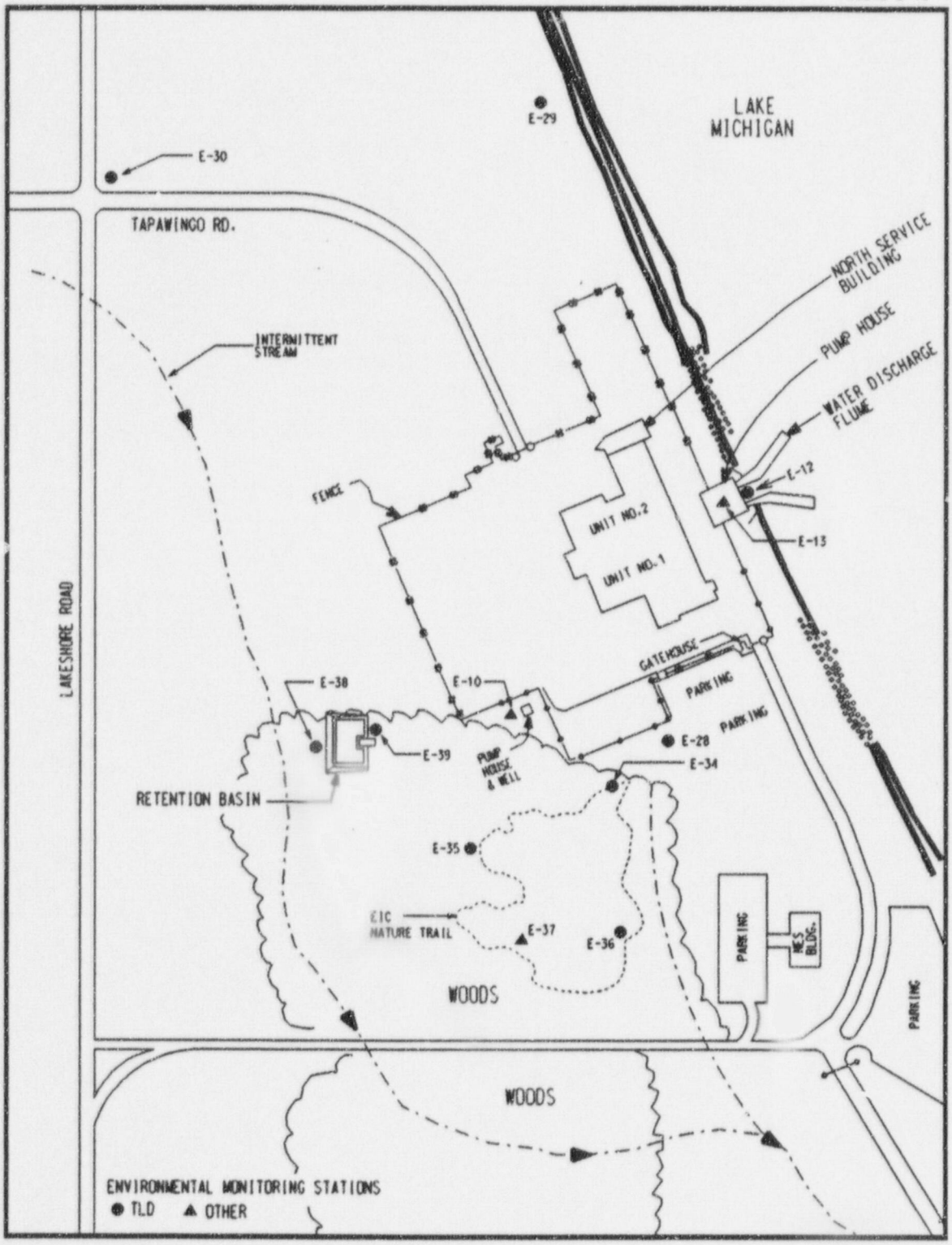

Figure 11-3
Enhanced Map Showing Radiological Environmental Monitoring Program Sampling Sites Closest to PBNP.

TABLE 11-3

MINIMUM ACCEPTABLE SAMPLE SIZE

Sample Type	Size
Vegetation	100-1000 grams
Lake Water	8 liters
Air Filters	250 m^3
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 11-4

SAMPLES COLLECTED FOR STATE OF WISCONSIN

	Sample Type	Location	Frequency
1.	Lake Water	E-12	Weekly, Composited Monthly
		E-05	Quarterly
2.	Air Filters	E-07	Weekly
		E-08	
3.	Fish	E-13	Quarterly
			As Available
4.	Precipitation	E-04	Twice a month,
		E-08	As Available
5.	Milk	E-11	Monthly
		E-19	

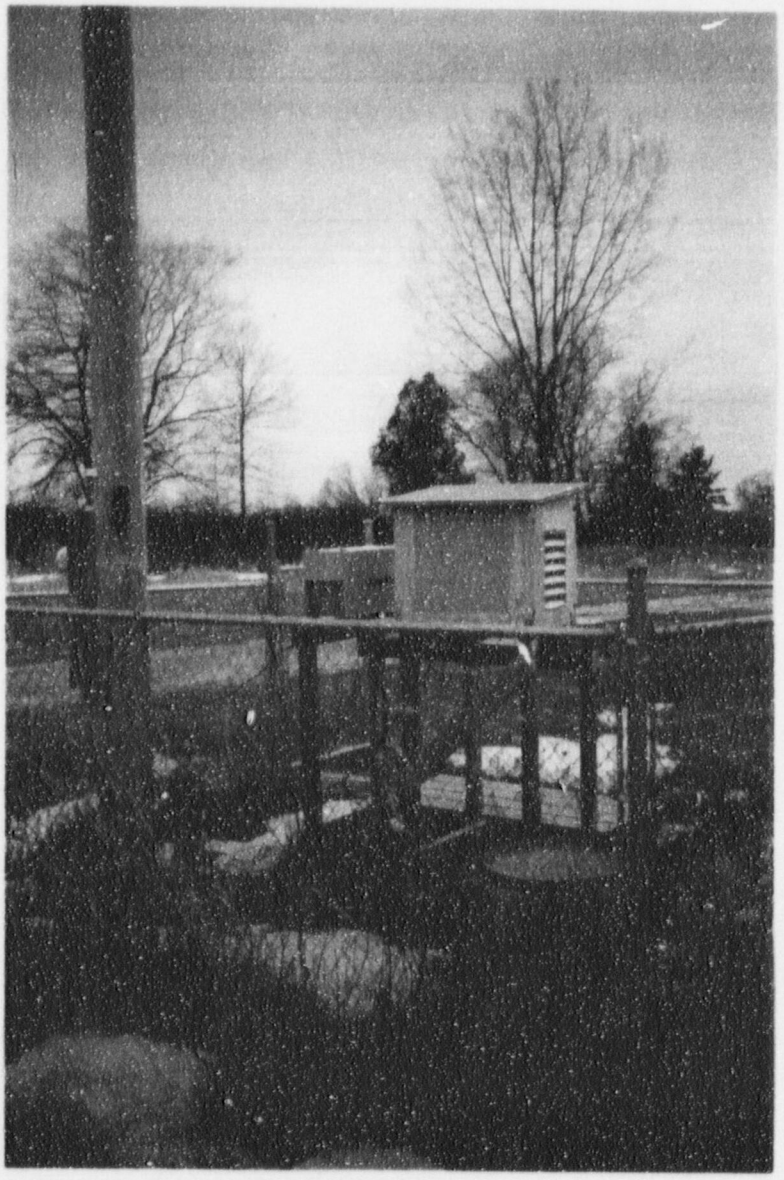

Figure 11-4 Co-located PBNP and State of Wisconsin Sampling Site.

At Site E-04 PBNP collects air, soil, and vegetation samples. Note also the black plastic mesh TLD cage located on the power pole. The State of Wisconsin collects air, vegetation, and precipitation. The State also has a TLD site approximately 30 feet from this location.

11.5 Analytical Parameters

The types of analyses and their frequencies are given in Table 11-5. The LLDs for the various analyses are found in the Results Section (12) of this report (Table 12-1) with the summary of the REMP results. All environmental LLDs listed in Table 2-2 of the Environmental Manual (and also in Table 12-1) were achieved during 1998.

11.6 Brief Description of Analytical Parameters in Table 11-5

11.6.1 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, any other nuclear power plant produced radionuclides which are detected also are noted. Naturally occurring radionuclides such as Ra-226, Bi-214, Pb-212, Tl-208, Ac-228, Be-7, and K-40 are frequently detected in soil, sediment, and vegetation but are not normally reported. All radionuclides detected by gamma isotopic analysis are decay corrected to the time of collection.

11.6.2 Gross Beta Analysis

Gross beta analysis is a non-specific analyses which 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 surveying samples for the presence of elevated activity which may require additional, immediate analyses.

11.6.3 Water Samples

Water samples include both Lake Michigan and well water. The Lake Michigan samples are collected along the shoreline (Figure 11-5) at five locations north and south of PBNP. The well is 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 11-5.

TABLE 11-5

PBNP RADIOLOGICAL ENVIRONMENTAL 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, -34, -35, -36, -38, -39, -TC	TLD	Quarterly
Vegetation	E-01, -02, -03, -04, -06, -08, -09, -20, -37	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, -12, -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, -19, -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, -37	Gross Beta Gamma Isotopic Analysis	2x/yr
Shoreline Sediment	E-01, -05, -06, -12, -33,	Gross Beta Gamma Isotopic Analysis	2x/yr

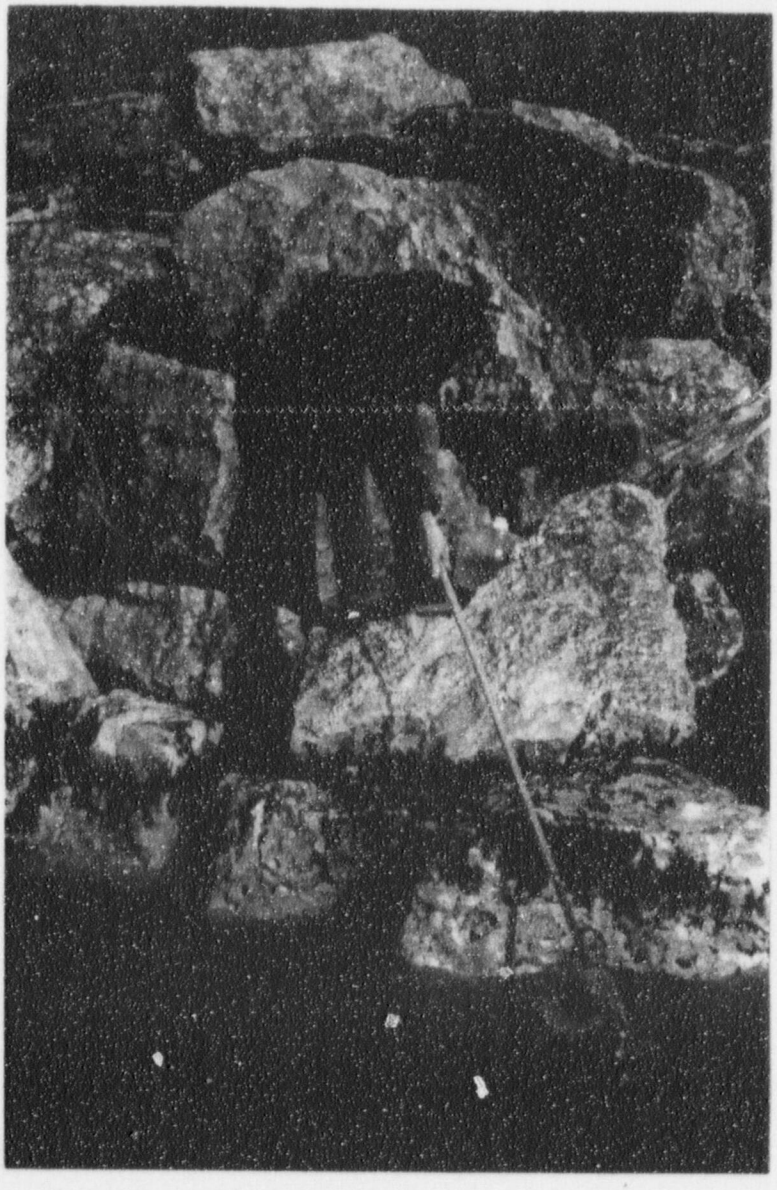

Figure 11-5

Water Collection Along the Lake Michigan Shoreline

11.6.4 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 negligible part of the total activity. Gross beta measurements serve as a quick check for any unexpected activity that may require further, immediate investigation. The particulate air filters are composited quarterly for analyses of long-lived radionuclides such as Cs-134 and Cs-137. Charcoal filters are counted as soon as possible so that the I-131 will undergo only minimal delay prior to analyses.

In order to insure that the air sampling pumps are operating satisfactorily, a gross leak check is performed weekly. On a quarterly frequency, a reference flow meter is connected across the face of the sampling pump with the particulate and charcoal filter in place (Figure 11-6). As necessary, the pump's flow rate is adjusted to correspond to that of the flow meter. The pumps are changed out annually for calibration and maintenance beyond that which can be accomplished in the field.

11.6.5 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 any dirt associated with roots by cutting the vegetation off above the soil line.

11.6.6 Environmental Radiation Exposure

Environmental radiation exposure measurements are made with thermoluminescent dosimeters (TLDs). Each TLD used in the PBNP REMP consists of three lithium fluoride chips sealed in black plastic. The TLDs absorb the energy deposited in them by gamma rays. 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 7 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 dose recorded on the transportation controls are subtracted from the monitoring TLDs in order to obtain the net *in situ* dose.

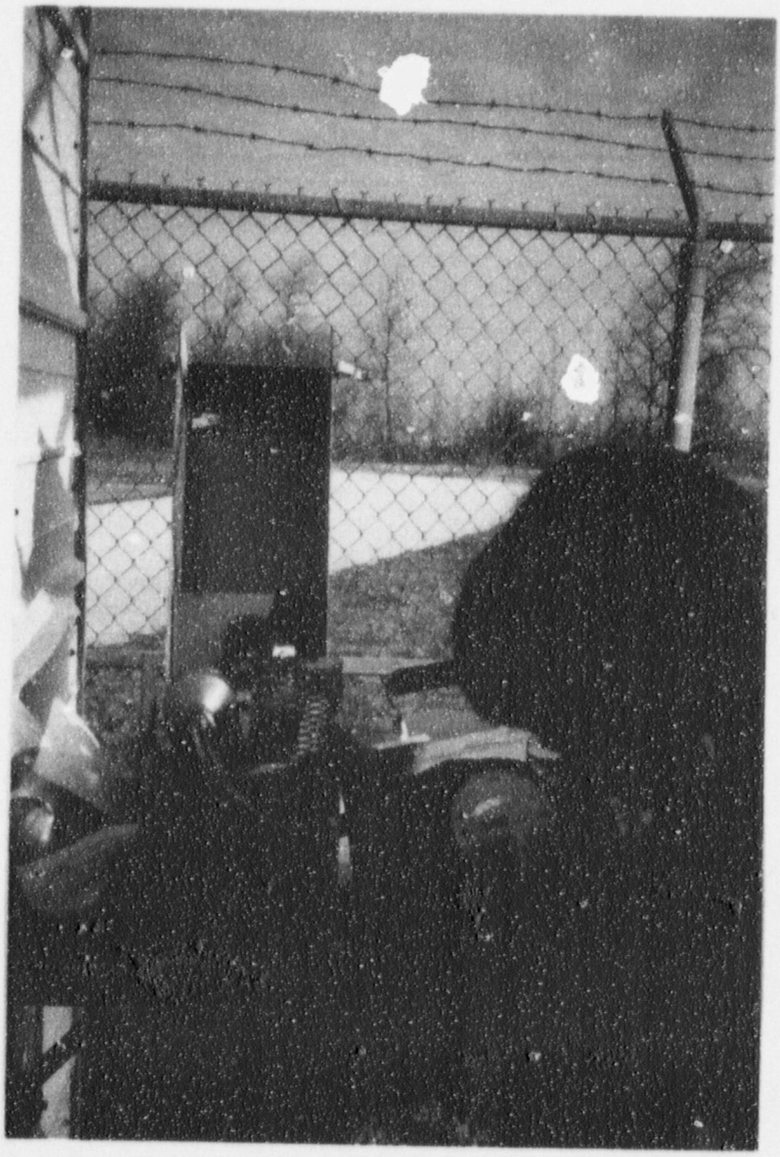

Figure 11-6

Quarterly Air Sampler Flow Rate Verification

12.0 RESULTS

Summary of 1998 REMP Results

Radiological environmental monitoring conducted at the Point Beach Nuclear Plant from January 1, 1998 through December 31, 1998 consisted of air filters, milk, lake water, well water, soil, fish, shoreline sediments, algae, vegetation, and TLDs. The results are summarized in Table 12-1.

Table 12-1 contains the following information:

Sample:	the type of the sample medium
Description:	the type of measurement
LLD:	the *a priori* lower limit of detection
N:	the number of samples analyzed
Low:	the lowest measured value ± its associated 2s counting error
Average:	the average value ± the standard deviation of N samples
High:	the highest measured value ± its associated 2s counting error
Units:	the units of measurement

Additional information also is presented in this table. Not all of the results in Table 12-1 were required by the current PBNP Radiological Environmental Monitoring Program (REMP). Non-REMP items and values are noted by an asterisk (*). For example, soil is not a good indicator for assessing small incremental releases which might occur during routine operation of PBNP (Regulatory Guide 4.5). However, soil is satisfactory for establishing long-term trends. Because soil was part of the pre-operational monitoring program, soil collection and analyses has continued for use as a long-term indicator. 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 13). Blank values have not been subtracted from the results presented in Table 12-1. A complete listing of all the individual results obtained from the contracted analytical laboratory and the laboratory's radioanalytical quality assurance results and EPA Interlaboratory Crosscheck Program results are presented in the Appendix.

TABLE 12-1

SUMMARY OF RADIOLOGICAL ENVIRONMENTAL MONITORING RESULTS FOR 1998

Sample	Description	LLD	N	Low	Average	High	Units
TLD	Environmental Radiation	1 mrem	126	0.47 ± 0.08	0.79 ± 0.13	1.25 ± 0.05	mR/7days
Air	Gross beta	0.01	312	0.005 ± 0.002	0.022 ± 0.007	0.041 ± 0.004	pCi/m^3
	Cs-137	0.01(0.06)	24	-0.0007 ± 0.0012	0.0001±0.0003	0.0009 ± 0.0005	pCi/m^3
	Cs-134	0.05	24	-0.0007 ± 0.0029	0.0001±0.0003	0.0005 ± 0.0011	pCi/m^3
	I-131	0.03(0.07)	312	-0.025 ± 0.020	0.0003 ± 0.007	0.032 ± 0.033	pCi/m^3
	Other gamma emitters(*)	0.1(*)	24	-0.0007 ± 0.0028	0.0001±0.0004	0.0012±0.0032	pCi/m^3
Milk	I-131	0.5	36	-0.23 ± 0.14	-0.04 ± 0.09	0.12 ± 0.19	pCi/l
	Sr-89(*)	5(*)	36	-2.9 ± 1.4	-0.1 ± 0.7	0.6 ± 1.2	pCi/l
	Sr-90(*)	1(*)	36	0.4 ± 0.3	1.1 ± 0.5	2.6 ± 0.5	pCi/l
	Cs-134	5(15)	36	-4.0 ± 12.6	-0.1 ± 1.1	1.8 ±1.8	pCi/l
	Cs-137	5(18)	36	-1.4 ± 2.1	0.5 ± 1.0	3.4 ± 1.7	pCi/l
	Ba-La-140	5(15)	36	-4.3 ± 3.2	-0.4 ± 1.6	3.2 ± 3.2	pCi/l
	Other gamma emitters(*)	15(*)	36	-12.7 ± 26.1	0.1 ± 2.5	2.6 ± 2.9	pCi/l
Lake water	Gross beta	4	60	1.2 ± 0.8	2.4 ± 0.6	4.2 ± 0.7	pCi/l
	I-131	0.5(2)	60	-0.33 ± 0.31	-0.03 ± 0.13	0.24 ± 0.26	pCi/l
	Mn-54	10(15)	60	-3.1 ± 3.1	-0.0 ± 1.0	2.0 ± 1.8	pCi/l
	Fe-59	30	60	-6.1 ± 17.2	0.3 ± 2.5	6.1 ± 16.7	pCi/l
	Co-58	10	60	-3.1 ± 2.7	-0.2 ± 1.0	1.8 ± 2.2	pCi/l
	Co-60	10	60	-0.8 ± 0.8	0.8 ± 1.3	6.8 ± 7.6	pCi/l
	Zn-65	30	60	-5.5 ± 5.1	-1.4 ± 2.1	2.6 ± 6.9	pCi/l
	Zr-Nb-95	15	60	-3.3 ± 3.6	-0.1 ± 1.3	3.9 ± 3.0	pCi/l
	Cs-134	10(15)	60	-4.5 ± 12.8	0.0 ± 1.3	2.9 ± 7.8	pCi/l
	Cs-137	10(18)	60	-1.8 ± 3.0	0.3 ± 1.0	3.4 ± 3.7	pCi/l
	Ba-La-140	15	60	-14.4 ± 31.1	-1.1 ± 4.1	7.7 ± 36.2	pCi/l
	Other gamma emitters(*)	30(*)	60	-3.0 ± 2.8	-0.5 ± 1.1	2.0 ± 1.5	pCi/l
	H-3	500(3000)	20	20 ± 81	271 ± 308	1264 ± 125	pCi/l
	Sr-89(*)	5(*)	20	-0.9 ± 0.8	0.1 ± 0.4	0.9 ± 0.8	pCi/l
	Sr-90(*)	1(*)	20	0.2 ± 0.3	0.5 ± 0.2	0.9 ± 0.5	pCi/l
Algae	Gross beta	0.25	8	2.29 ± 0.15	4.03 ± 1.42	6.49 ± 0.69	pCi/g
	Co-58	0.25	8	-0.004 ± 0.013	0.008 ± 0.010	0.026 ± 0.012	pCi/g
	Co-60	0.25	8	-0.003 ± 0.003	0.004 ± 0.004	0.009 ± 0.035	pCi/g
	Cs-134	0.25	8	-0.008 ± 0.004	0.002 ± 0.006	0.007 ± 0.021	pCi/g
	Cs-137	0.25	8	0.014 ± 0.010	0.027 ± 0.014	0.055 ± 0.025	pCi/g

(*) These measurements and/or associated LLDs are not required by the PBNP Radiological Environmental Monitoring Program (see above discussion).

TABLE 12-1(continued)

SUMMARY OF RADIOLOGICAL ENVIRONMENTAL MONITORING RESULTS FOR 1998

Sample	Description	LLD	N	Low	Average	High	Units
Fish	Gross beta(*)	0.5(*)	7	1.87 ± 0.11	2.98 ± 0.79	3.85 ± 0.12	pCi/g
	Mn-54	0.13	7	-0.005 ± 0.007	0.000 ± 0.004	0.006 ± 0.008	pCi/g
	Fe-59	0.26	7	-0.025 ± 0.023	-0.006 ± 0.011	0.010 ± 0.010	pCi/g
	Co-58	0.13	7	-0.020 ± 0.030	-0.003 ± 0.008	0.003 ± 0.009	pCi/g
	Co-60	0.13	7	-0.002 ± 0.003	0.004 ± 0.007	0.014 ± 0.323	pCi/g
	Zn-65	0.26	7	-0.016 ± 0.027	0.009 ± 0.016	0.034 ± 0.021	pCi/g
	Cs-134	0.13	7	-0.004 ± 0.083	0.002 ± 0.004	0.007 ± 0.008	pCi/g
	Cs-137	0.15	7	0.015 ± 0.016	0.055 ± 0.043	0.131 ± 0.022	pCi/g
	Other gamma emitters(*)	0.5(*)	7	-0.008 ± 0.006	0.000 ± 0.007	0.008 ± 0.007	pCi/g
Well water	Gross beta	4	4	0.8 ± 1.9	2.0 ± 0.8	2.7 ± 2.1	pCi/l
	I-131	0.5(2)	4	-0.13 ± 0.21	0.04 ± 0.15	0.18 ± 0.30	pCi/l
	Mn-54	10(15)	4	-2.4 ± 2.1	-0.1 ± 1.5	0.9 ± 3.0	pCi/l
	Fe-59	30	4	-4.0 ± 6.3	-2.4 ± 1.4	-0.9 ± 3.0	pCi/l
	Co-58	10	4	-1.2 ± 2.1	-0.7 ± 0.4	-0.2 ± 2.8	pCi/l
	Co-60	10	4	-1.9 ± 12.1	-0.1 ± 1.5	1.7 ± 13.5	pCi/l
	Zn-65	30	4	-5.3 ± 6.8	-4.7 ± 0.6	-4.0 ± 4.0	pCi/l
	Zr-Nb-95	15	4	0.3 ± 2.3	0.7 ± 0.5	1.4 ± 4.2	pCi/l
	Cs-134	10(15)	4	-2.3 ± 1.4	0.1 ± 2.1	2.7 ± 3.0	pCi/l
	Cs-137	10(18)	4	-1.4 ± 3.0	-0.3 ± 0.9	0.6 ± 2.2	pCi/l
	Ba-La-140	15	4	-6.1 ± 14.3	-0.9 ± 4.2	4.2 ± 34.9	pCi/l
	Other gamma emitters(*)	30(*)	4	-2.6 ± 16.2	-1.2 ± 1.0	-0.3 ± 0.1	pCi/l
	H-3	500	4	-89.8 ± 85.3	-2.9 ± 74.0	87.1 ± 80.0	pCi/l
	Sr-89(*)	5(*)	4	-0.6 ± 0.8	-0.0± 0.5	0.6 ± 0.6	pCi/l
	Sr-90(*)	1(*)	4	-0.1 ± 0.3	0.2 ± 0.2	0.3 ± 0.3	pCi/l
Soil(*)	Gross beta	2	16	10.30 ± 1.69	20.02 ± 6.09	28.54 ± 3.23	pCi/g
	Cs-137	0.15	16	0.00 ± 0.02	0.27 ± 0.23	0.93 ± 0.06	pCi/g
Shoreline sediment(*)	Gross beta	2	10	2.45 ± 1.48	6.02 ± 2.01	10.05 ± 2.32	pCi/g
	Cs-137	0.15	10	0.018 ± 0.013	0.029 ± 0.008	0.042 ± 0.018	pCi/g
Vegetation	Gross beta(*)	0.25(*)	24	3.32 ± 0.09	5.76 ± 1.48	10.83 ± 0.24	pCi/g
	Cs-134	0.06	24	-0.013 ± 0.052	0.000 ± 0.008	0.016 ± 0.023	pCi/g
	Cs-137	0.08	24	-0.007 ± 0.017	0.004 ± 0.010	0.048 ± 0.025	pCi/g
	I-131	0.06	24	-0.019 ± 0.052	0.001 ± 0.008	0.013 ± 0.190	pCi/g

(*) These measurements and associated LLDs are not specified by the PBNP Radiological Effluent Technical Specifications.

13.0 DISCUSSION

13.1 TLDs

All TLD results except first quarter E-39 for the reporting period were within the range of values recorded in previous years. Although the average for 1998 (0.79 ± 0.13) is lower than previous years, the difference is not statistically different from 1996 (0.85 ± 0.12) and 1997 (0.87 ± 0.11). Therefore, the TLD results indicate that the measured environmental doses are dominated by natural sources and not by PBNP effluents. The anomalous result of 1.25 ± 0.05 mR/7 days at E-39 occurred during the first quarter; however, no previous data exists for this site because it was added in 1998. All subsequent readings from this site resulted in within the reported values for the other TLD monitoring sites.

13.2 Milk

Radionuclide concentrations in milk continue to be indistinguishable from zero except for Sr-90 and Cs-137. These two radionuclide, which are still cycling through the environments, are attributable to the large scale atmospheric weapons tests of the 1960's, to the less frequent testing in the 70's and 80's, and to the Chernobyl accident. That these results are common throughout the Great Lakes region and North America. The PBNP average Sr-90 of 1.1 ± 0.5 pCi/l compares well with the 1997 average (1.2 ± 0.5 pCi/.l), indicating little change

13.3 Air

The 1998 low, average, and high values are not statistically different from the corresponding 1997 values. The I-131 concentration distribution for 1998 also is similar to that of 1997, with the average concentration being roughly zero. Figure 13-1 shows that the 1998 frequency distribution for the measured I-131 concentrations in air are symmetrical around zero with the highest frequency falling in the -2 to +2 pCi per 1000 m^3 interval. As discussed in Section 11.1, the statistical nature of radioactive decay produces this type of distribution when no I-131 activity is present or well below the lower level of detection.

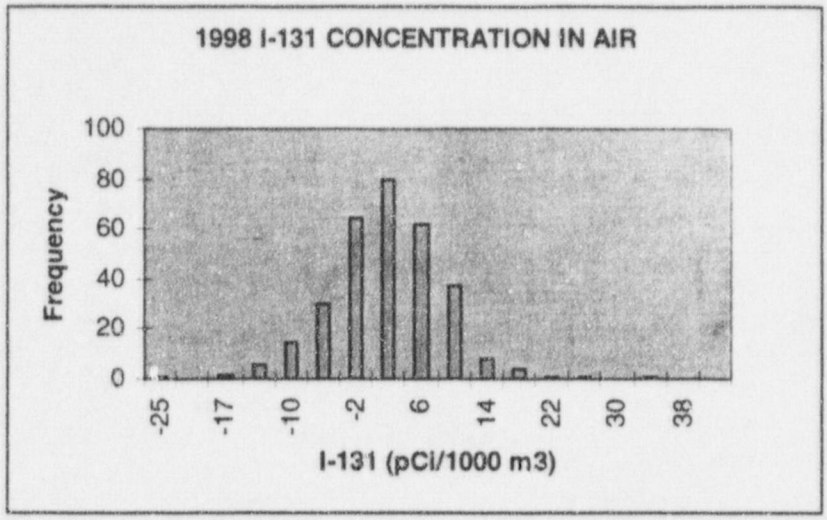

Figure 13-1 I-131 Concentration (pCi per 1000 m^3) Frequency Distribution.

Be-7, a naturally occurring radionuclide produced in the air by the collision of cosmic rays with atoms of oxygen (^{16}O), nitrogen (^{14}N), and carbon (^{12}C) was found in all of the air samples (see Appendix). About 180,000 curies of Be-7 are produced in the air over the State of Wisconsin each year based on the production rate found in Table 3.3 of NCRP Report No. 94, *Exposure of the Population in the United States and Canada from Natural Background Radiation* (1987).

13.4 Lake Water

For the suite of REMP specified gamma emitting radionuclides, measured concentrations continue to occur as small negative and positive values scattered around zero. Sr-90 still persists from radioactive fallout. Tritium, in addition to being produced by water-cooled reactors such as PBNP, also is a naturally occurring radionuclide. Many of these are within the upper range of positive results obtained from water "blanks" in past years, 148 ± 101 pCi/l. Two of the 20 analyses produced considerably higher results than the others, both occurring within the fourth quarter: E-01 (1264 ± 125 pCi/l) and E-12 (882 ± 113 pCi/l). As in the past, this type of result occurs when environmental sampling occurs during or within a short period of time following the discharge of a waste holdup tank. Note that E-12 is in the discharge channel and E-01 is about one mile south of PBNP. These sampling sites are the ones most affected by these discharges.

13.5 Algae

Filamentous algae attached to rocks along the Lake Michigan shoreline are known to concentrate radionuclides from the water with concentration factor over a

thousand for certain radionuclides. The algae obtained from the vicinity of the discharge flume, E-12, have minute concentrations of Cs-137, Co-60, and Co-58, all of which were discharged from PBNP during 1998. The highest measured concentration of Cs-137 at 0.055 ± 0.025 pCi/g is similar to the 1997 concentration of 0.038 ± 0.012 pCi/g which is consistent with the cycling of this radionuclide within the Great Lakes. Massive resuspension events due to wind stress redistributes Cs-137 throughout Lake Michigan and make the Cs-137 more available to the algae. These events are visible on satellite photographs of the Lake. In 1976 after a Chinese weapons test, Cs-137 concentrations in algae reached 1.2 pCi/g compared to the 1998 PBNP average result of 0.027 ± 0.014 pCi/g.

13.6 Fish

The only specified radionuclide statistically different from zero in fish is Cs-137. Cs-137 was identified at the low levels given in Table 12-1 in the edible portions of all eight analyzed. The highest value of 0.131 pCi/g is slightly elevated from 1997 (0.082 pCi/g); however, it is down significantly from the high of 2.8 pCi/g as seen in PBNP samples obtained in the mid-1970s during the Chinese weapons tests.

13.7 Well Water

All of the isotopic well water results are small positive and negative values indistinguishable from zero.

13.8 Soil

Cs-137 from weapons testing and Chernobyl incident fallout continue to be present in soil samples collected as part of the PBNP REMP.

13.9 Shoreline Sediment

Shoreline sediment consists of beach 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.

13.10 Vegetation

Although the naturally occurring radionuclides Be-7 and K-40 are found in all of the vegetation samples, the only programmatically specified radionuclide found is Cs-137. This result is from a sample obtained at the campground area of Point Beach State Park. Fallout Cs-137 from the 1960s which had been incorporated in the trees growing at that time period now is being recycled as the trees are being used in campfires and the ashes are scattered on the ground. The occurrence of Cs-137 in wood ash has been reported in Wisconsin and other states.

13.11 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 Point Beach Nuclear Plant site boundary was completed on September 1, 1998 to ensure that the milk sampling locations remain as conservative as practicable. No significant change in the use of pasture lands was noted. Therefore, the existing milk sampling program continues to be acceptable.

14.0 CONCLUSION

Based on the analytical results from the 808 environmental samples and from 126 sets of TLDs that comprised the PBNP REMP for 1998, PBNP effluents had a minimal, if any, measurable affect on the PBNP environs. These results demonstrate that the control of effluents from PBNP continues to be acceptable pursuant to the ALARA criteria of 10CFR50.34a.

APPENDIX

INDIVIDUAL SAMPLE RESULTS

AND

QA/QC RESULTS

FROM

TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
MIDWEST LABORATORY
NORTHBROOK, ILLINOIS

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MONTHLY PROGRESS REPORT
TO
WISCONSIN ELECTRIC POWER COMPANY
MILWAUKEE, WISCONSIN

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)
FOR
THE POINT BEACH NUCLEAR PLANT
TWO RIVERS, WISCONSIN

PREPARED AND SUBMITTED
BY
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
MIDWEST LABORATORY

Project Number: 8006

Reporting Period: January - December, 1998

Reviewed and
Approved by _____ Date 02-01-99
B. Grob
Technical Lead

Distribution: K. Johansen, WEPCo (4 copies)

POINT BEACH NUCLEAR PLANT

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POINT BEACH NUCLEAR PLANT

1.0 INTRODUCTION

The following constitutes the current, 1998 Monthly Progress Report for the Environmental Radiological Monitoring Program conducted at the Point Beach Nuclear Plant, Two Rivers, Wisconsin. Results of completed analyses are presented in the attached tables. Missing entries indicate analyses that are not completed. These results will appear in subsequent reports. 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.

Data obtained in the program are well within the ranges previously encountered in the program and to be expected in the environmental media sampled. None of the media sampled during the current month contained radioactivity attributable to the operation of Point Beach Nuclear Plant.

For all gamma isotopic analyses, the spectrum is computer scanned 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
TLD	E-28	1st Qtr. ,98	TLD lost in the field.
TLD	E-32	1st Qtr. ,98	TLD lost in the field.

NOTE: Page 3 is intentionally left out.

POINT BEACH NUCLEAR PLANT

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

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
01-06-98	349	0.014 ± 0.002	0.018 ± 0.010
01-13-98	299	0.022 ± 0.003	-0.004 ± 0.012
01-20-98	304	0.023 ± 0.003	0.007 ± 0.011
01-27-98	301	0.021 ± 0.003	-0.001 ± 0.011
02-03-98	301	0.030 ± 0.003	0.005 ± 0.008
02-10-98	305	0.023 ± 0.003	-0.009 ± 0.012
02-17-98	302	0.027 ± 0.003	-0.001 ± 0.008
02-24-98	301	0.012 ± 0.003	-0.001 ± 0.010
03-03-98	305	0.014 ± 0.003	-0.001 ± 0.017
03-10-98	302	0.009 ± 0.003	0.015 ± 0.013
03-17-98	300	0.024 ± 0.003	0.002 ± 0.010
03-24-98	303	0.021 ± 0.003	-0.003 ± 0.011
03-31-98	302	0.020 ± 0.003	0.003 ± 0.007
1st Quarter Mean± s.d.		0.020 ± 0.006	0.002 ± 0.007
04-07-98	304	0.013 ± 0.002	0.010 ± 0.011
04-14-98	301	0.023 ± 0.003	0.005 ± 0.009
04-21-98	302	0.013 ± 0.003	-0.001 ± 0.011
04-28-98	304	0.017 ± 0.003	0.003 ± 0.011
05-05-98	305	0.020 ± 0.003	-0.007 ± 0.008
05-12-98	299	0.017 ± 0.003	0.003 ± 0.009
05-19-98	306	0.023 ± 0.003	-0.002 ± 0.011
05-26-98	300	0.015 ± 0.003	-0.002 ± 0.011
06-02-98	302	0.016 ± 0.003	-0.004 ± 0.012
06-09-98	304	0.009 ± 0.002	0.007 ± 0.011
06-16-98	300	0.018 ± 0.003	0.000 ± 0.009
06-23-98	306	0.014 ± 0.003	0.002 ± 0.011
06-30-98	298	0.012 ± 0.003	0.003 ± 0.010
2nd Quarter Mean± s.d.		0.016 ± 0.004	0.001 ± 0.005
07-07-98	304	0.019 ± 0.003	0.001 ± 0.012
07-14-98	303	0.026 ± 0.003	-0.001 ± 0.011
07-21-98	299	0.026 ± 0.003	0.006 ± 0.009
07-28-98	306	0.021 ± 0.003	0.005 ± 0.009
08-04-98	300	0.021 ± 0.003	-0.009 ± 0.010
08-11-98	303	0.035 ± 0.004	-0.003 ± 0.008
08-18-98	301	0.022 ± 0.003	0.001 ± 0.009
08-25-98	303	0.037 ± 0.004	-0.004 ± 0.008
09-01-98	301	0.032 ± 0.004	-0.004 ± 0.010
09-08-98	305	0.028 ± 0.003	-0.004 ± 0.011
09-15-98	301	0.031 ± 0.004	0.004 ± 0.013
09-22-98	304	0.031 ± 0.004	0.009 ± 0.012
09-29-98	301	0.021 ± 0.004	0.003 ± 0.014
3rd Quarter Mean± s.d.		0.027 ± 0.006	0.000 ± 0.005
10-06-98	302	0.017 ± 0.003	0.003 ± 0.010
10-12-98	260	0.013 ± 0.003	0.007 ± 0.013
10-20-98	307	0.024 ± 0.003	0.015 ± 0.018
10-27-98	303	0.031 ± 0.004	0.004 ± 0.014
11-02-98	254	0.026 ± 0.004	0.004 ± 0.015
11-10-98	346	0.011 ± 0.002	0.002 ± 0.011
11-17-98	303	0.029 ± 0.004	0.001 ± 0.010
11-23-98	261	0.026 ± 0.004	0.005 ± 0.019
12-01-98	343	0.031 ± 0.003	0.003 ± 0.012
12-09-98	346	0.033 ± 0.004	-0.002 ± 0.015
12-15-98	261	0.027 ± 0.004	-0.005 ± 0.013
12-23-98	342	0.017 ± 0.003	0.002 ± 0.009
12-30-98	304	0.034 ± 0.004	0.014 ± 0.014
4th Quarter Mean± s.d.		0.025 ± 0.008	0.004 ± 0.006
Cumulative Average		0.022 ± 0.007	0.002 ± 0.006

POINT BEACH NUCLEAR PLANT

Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131a.
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
01-06-98	350	0.015 ± 0.002	0.002 ± 0.010
01-13-98	297	0.024 ± 0.003	0.006 ± 0.011
01-20-98	306	0.024 ± 0.003	-0.010 ± 0.012
01-27-98	300	0.022 ± 0.003	-0.003 ± 0.011
02-03-98	301	0.027 ± 0.003	0.005 ± 0.009
02-10-98	306	0.022 ± 0.003	0.007 ± 0.012
02-17-98	301	0.028 ± 0.004	0.008 ± 0.009
02-24-98	301	0.012 ± 0.003	0.006 ± 0.012
03-03-98	305	0.015 ± 0.003	0.025 ± 0.017
03-10-98	302	0.005 ± 0.002	-0.001 ± 0.013
03-17-98	300	0.024 ± 0.004	0.006 ± 0.011
03-24-98	304	0.024 ± 0.003	0.002 ± 0.011
03-31-98	302	0.018 ± 0.003	-0.001 ± 0.008
1st Quarter Mean± s.d.		0.020 ± 0.007	0.004 ± 0.008
04-07-98	304	0.011 ± 0.002	-0.005 ± 0.011
04-14-98	302	0.024 ± 0.003	0.007 ± 0.008
04-21-98	301	0.014 ± 0.003	-0.010 ± 0.010
04-28-98	303	0.019 ± 0.003	-0.014 ± 0.011
05-05-98	306	0.019 ± 0.003	-0.007 ± 0.008
05-12-98	297	0.014 ± 0.003	0.008 ± 0.007
05-19-98	306	0.025 ± 0.003	-0.007 ± 0.012
05-26-98	300	0.014 ± 0.003	-0.001 ± 0.011
06-02-98	302	0.016 ± 0.003	-0.012 ± 0.013
06-09-98	304	0.009 ± 0.002	0.004 ± 0.010
06-16-98	291	0.016 ± 0.003	0.004 ± 0.011
06-23-98	292	0.015 ± 0.003	-0.007 ± 0.012
06-30-98	302	0.015 ± 0.003	0.005 ± 0.010
2nd Quarter Mean± s.d.		0.016 ± 0.005	-0.003 ± 0.008
07-07-98	300	0.023 ± 0.003	0.003 ± 0.010
07-14-98	301	0.028 ± 0.003	-0.003 ± 0.010
07-21-98	290	0.027 ± 0.003	0.002 ± 0.012
07-28-98	295	0.020 ± 0.003	-0.018 ± 0.010
08-04-98	300	0.027 ± 0.003	-0.003 ± 0.010
08-11-98	302	0.026 ± 0.003	0.006 ± 0.007
08-18-98	301	0.021 ± 0.003	-0.005 ± 0.009
08-25-98	304	0.039 ± 0.004	-0.001 ± 0.007
09-01-98	300	0.034 ± 0.004	0.003 ± 0.011
09-08-98	305	0.026 ± 0.003	0.009 ± 0.011
09-15-98	301	0.037 ± 0.004	0.001 ± 0.013
09-22-98	304	0.040 ± 0.004	-0.001 ± 0.011
09-29-98	301	0.034 ± 0.004	0.000 ± 0.010
3rd Quarter Mean± s.d.		0.029 ± 0.007	-0.001 ± 0.006
10-06-98	302	0.012 ± 0.003	-0.005 ± 0.010
10-12-98	260	0.019 ± 0.003	0.005 ± 0.009
10-20-98	307	0.026 ± 0.003	-0.005 ± 0.015
10-27-98	307	0.031 ± 0.004	0.009 ± 0.013
11-02-98	253	0.025 ± 0.004	-0.001 ± 0.016
11-10-98	335	0.015 ± 0.003	0.004 ± 0.008
11-17-98	303	0.029 ± 0.004	-0.001 ± 0.010
11-23-98	261	0.026 ± 0.004	-0.008 ± 0.018
12-01-98	343	0.029 ± 0.003	0.007 ± 0.010
12-09-98	352	0.034 ± 0.004	-0.011 ± 0.012
12-15-98	259	0.028 ± 0.004	0.007 ± 0.014
12-23-98	344	0.017 ± 0.003	0.000 ± 0.009
12-30-98	305	0.037 ± 0.004	-0.017 ± 0.014
4th Quarter Mean± s.d.		0.025 ± 0.007	-0.001 ± 0.008
Cumulative Average		0.023 ± 0.008	0.000 ± 0.008

POINT BEACH NUCLEAR PLANT

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

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
01-06-98	373	0.017 ± 0.002	-0.010 ± 0.009
01-13-98	318	0.025 ± 0.003	0.007 ± 0.011
01-20-98	326	0.024 ± 0.003	-0.012 ± 0.011
01-27-98	315	0.021 ± 0.003	0.010 ± 0.010
02-03-98	306	0.032 ± 0.003	-0.003 ± 0.008
02-10-98	325	0.026 ± 0.003	-0.002 ± 0.011
02-17-98	322	0.029 ± 0.003	0.003 ± 0.008
02-24-98	321	0.014 ± 0.003	0.012 ± 0.011
03-03-98	326	0.013 ± 0.003	-0.014 ± 0.018
03-10-98	321	0.007 ± 0.002	0.001 ± 0.012
03-17-98	320	0.023 ± 0.003	-0.001 ± 0.011
03-24-98	324	0.021 ± 0.003	0.007 ± 0.010
03-31-98	384	0.022 ± 0.003	-0.010 ± 0.008
1st Quarter Mean± s.d.		0.021 ± 0.007	-0.001 ± 0.009
04-07-98	314	0.012 ± 0.002	-0.001 ± 0.010
04-14-98	302	0.023 ± 0.003	-0.001 ± 0.007
04-21-98	300	0.013 ± 0.003	-0.005 ± 0.010
04-28-98	303	0.018 ± 0.003	0.001 ± 0.012
05-05-98	306	0.022 ± 0.003	0.001 ± 0.007
05-12-98	298	0.014 ± 0.003	0.007 ± 0.007
05-19-98	305	0.024 ± 0.003	0.006 ± 0.011
05-26-98	303	0.014 ± 0.003	-0.010 ± 0.011
06-02-98	300	0.017 ± 0.003	0.006 ± 0.011
06-09-98	304	0.010 ± 0.002	0.009 ± 0.007
06-16-98	301	0.019 ± 0.003	-0.007 ± 0.013
06-23-98	283	0.015 ± 0.003	0.003 ± 0.011
06-30-98	277	0.013 ± 0.003	-0.007 ± 0.011
2nd Quarter Mean± s.d.		0.016 ± 0.004	0.000 ± 0.006
07-07-98	306	0.023 ± 0.003	-0.004 ± 0.011
07-14-98	271	0.033 ± 0.004	-0.012 ± 0.011
07-21-98	264	0.031 ± 0.004	0.005 ± 0.014
07-28-98	280	0.022 ± 0.003	0.000 ± 0.010
08-04-98	280	0.025 ± 0.003	0.008 ± 0.010
08-11-98	280	0.038 ± 0.004	-0.001 ± 0.009
08-18-98	280	0.022 ± 0.003	-0.001 ± 0.010
08-25-98	283	0.036 ± 0.004	0.000 ± 0.009
09-01-98	280	0.032 ± 0.004	0.009 ± 0.011
09-08-98	282	0.030 ± 0.004	-0.004 ± 0.013
09-15-98	280	0.034 ± 0.004	-0.004 ± 0.014
09-22-98	283	0.040 ± 0.004	-0.001 ± 0.012
09-29-98	280	0.033 ± 0.004	0.003 ± 0.012
3rd Quarter Mean± s.d.		0.031 ± 0.006	0.000 ± 0.006
10-06-98	281	0.015 ± 0.003	0.008 ± 0.010
10-12-98	242	0.016 ± 0.004	-0.009 ± 0.[illegible]
10-20-98	285	0.026 ± 0.004	-0.009 ± 0.018
10-29-98	356	0.031 ± 0.003	-0.006 ± 0.011
11-02-98	162	0.020 ± 0.005	0.002 ± 0.015
11-10-98	321	0.012 ± 0.003	-0.003 ± 0.010
11-17-98	282	0.030 ± 0.004	0.008 ± 0.011
11-23-98	261	0.027 ± 0.004	-0.009 ± 0.019
12-01-98	319	0.029 ± 0.003	0.008 ± 0.014
12-09-98	327	0.036 ± 0.004	-0.003 ± 0.013
12-15-98	258	0.027 ± 0.004	-0.004 ± 0.012
12-23-98	321	0.017 ± 0.003	0.001 ± 0.009
12-30-98	282	0.038 ± 0.004	-0.005 ± 0.016
4th Quarter Mean± s.d.		0.025 ± 0.008	-0.002 ± 0.006
Cumulative Average		0.023 ± 0.008	-0.001 ± 0.007

POINT BEACH NUCLEAR PLANT

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

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
01-06-98	360	0.013 ± 0.002	-0.004 ± 0.009
01-13-98	307	0.025 ± 0.003	-0.005 ± 0.012
01-20-98	318	0.023 ± 0.003	-0.012 ± 0.011
01-27-98	306	0.020 ± 0.003	-0.006 ± 0.011
02-03-98	311	0.026 ± 0.003	0.002 ± 0.008
02-10-98	298	0.018 ± 0.003	0.013 ± 0.013
02-17-98	310	0.028 ± 0.003	0.004 ± 0.009
02-24-98	296	0.012 ± 0.003	-0.002 ± 0.007
03-03-98	314	0.008 ± 0.003	-0.005 ± 0.017
03-10-98	311	0.006 ± 0.002	0.006 ± 0.015
03-17-98	328	0.023 ± 0.003	-0.010 ± 0.010
03-24-98	313	0.020 ± 0.003	-0.003 ± 0.008
03-31-98	311	0.018 ± 0.003	0.009 ± 0.008
1st Quarter Mean± s.d.		0.018 ± 0.007	-0.001 ± 0.007
04-07-98	316	0.011 ± 0.002	0.001 ± 0.011
04-14-98	311	0.021 ± 0.003	-0.002 ± 0.007
04-21-98	309	0.013 ± 0.003	-0.015 ± 0.011
04-28-98	313	0.016 ± 0.003	0.004 ± 0.010
05-05-98	305	0.020 ± 0.003	-0.004 ± 0.008
05-12-98	307	0.015 ± 0.003	0.004 ± 0.009
05-19-98	314	0.024 ± 0.003	-0.006 ± 0.012
05-26-98	312	0.014 ± 0.003	0.000 ± 0.011
06-02-98	300	0.017 ± 0.003	-0.005 ± 0.012
06-09-98	304	0.009 ± 0.002	-0.001 ± 0.011
06-16-98	311	0.015 ± 0.003	-0.007 ± 0.009
06-23-98	302	0.014 ± 0.003	0.001 ± 0.012
06-30-98	300	0.012 ± 0.003	0.001 ± 0.010
2nd Quarter Mean± s.d.		0.015 ± 0.004	-0.002 ± 0.005

Date Collected	Vol. (m^3)	Gross Beta	I-131
		0.010	0.030
07-07-98	306	0.020 ± 0.003	-0.001 ± 0.011
07-14-98	301	0.025 ± 0.003	0.003 ± 0.011
07-21-98	299	0.028 ± 0.003	0.003 ± 0.011
07-28-98	305	0.023 ± 0.003	-0.002 ± 0.007
08-04-98	301	0.024 ± 0.003	0.005 ± 0.010
08-11-98	302	0.037 ± 0.004	0.001 ± 0.008
08-18-98	301	0.023 ± 0.003	0.000 ± 0.008
08-25-98	304	0.038 ± 0.004	0.003 ± 0.008
09-01-98	301	0.031 ± 0.004	-0.005 ± 0.012
09-08-98	305	0.025 ± 0.003	-0.007 ± 0.012
09-15-98	301	0.030 ± 0.004	-0.009 ± 0.012
09-22-98	304	0.037 ± 0.004	-0.007 ± 0.011
09-29-98	301	0.031 ± 0.004	-0.005 ± 0.014
3rd Quarter Mean± s.d.		0.029 ± 0.006	-0.002 ± 0.005
10-06-98	302	0.013 ± 0.003	0.005 ± 0.010
10-12-98	260	0.016 ± 0.003	-0.002 ± 0.009
10-20-98	307	0.023 ± 0.003	-0.002 ± 0.018
10-29-98	383	0.029 ± 0.003	0.003 ± 0.009
11-02-98	174	0.022 ± 0.005	0.009 ± 0.025
11-10-98	345	0.010 ± 0.002	-0.001 ± 0.011
11-17-98	304	0.028 ± 0.004	-0.002 ± 0.010
11-23-98	260	0.028 ± 0.004	-0.007 ± 0.020
12-01-98	343	0.028 ± 0.003	-0.006 ± 0.013
12-09-98	352	0.033 ± 0.004	0.005 ± 0.011
12-15-98	257	0.027 ± 0.004	0.008 ± 0.014
12-23-98	346	0.018 ± 0.003	-0.005 ± 0.009
12-30-98	303	0.035 ± 0.004	-0.004 ± 0.015
4th Quarter Mean± s.d.		0.024 ± 0.008	0.000 ± 0.005
Cumulative Average		0.022 ± 0.008	-0.001 ± 0.006

POINT BEACH NUCLEAR PLANT

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

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
01-06-98	351	0.014 ± 0.002	-0.002 ± 0.010
01-13-98	300	0.026 ± 0.003	0.008 ± 0.010
01-20-98	313	0.026 ± 0.003	-0.005 ± 0.012
01-27-98	305	0.019 ± 0.003	0.001 ± 0.011
02-03-98	319	0.028 ± 0.003	0.001 ± 0.007
02-10-98	328	0.023 ± 0.003	0.008 ± 0.011
02-17-98	309	0.031 ± 0.004	0.001 ± 0.007
02-24-98	296	0.012 ± 0.003	-0.005 ± 0.013
03-03-98	300	0.015 ± 0.003	-0.002 ± 0.019
03-10-98	296	0.008 ± 0.003	0.011 ± 0.015
03-17-98	295	0.026 ± 0.004	-0.003 ± 0.011
03-24-98	297	0.018 ± 0.003	0.009 ± 0.012
03-31-98	296	0.020 ± 0.003	0.009 ± 0.007
1st Quarter Mean± s.d.		0.020 ± 0.007	0.002 ± 0.006
04-07-98	300	0.013 ± 0.003	0.020 ± 0.011
04-14-98	277	0.022 ± 0.003	0.003 ± 0.010
04-21-98	276	0.019 ± 0.003	-0.001 ± 0.009
04-28-98	279	0.019 ± 0.003	0.008 ± 0.011
05-05-98	302	0.020 ± 0.003	0.001 ± 0.008
05-12-98	274	0.018 ± 0.003	-0.010 ± 0.009
05-19-98	281	0.023 ± 0.003	0.006 ± 0.012
05-26-98	278	0.015 ± 0.003	-0.011 ± 0.013
06-02-98	304	0.017 ± 0.003	-0.009 ± 0.012
06-09-98	276	0.008 ± 0.003	-0.008 ± 0.012
06-16-98	279	0.017 ± 0.003	-0.011 ± 0.011
06-23-98	300	0.012 ± 0.003	0.012 ± 0.010
06-30-98	301	0.014 ± 0.003	0.004 ± 0.011
2nd Quarter Mean± s.d.		0.017 ± 0.004	0.000 ± 0.010
07-07-98	308	0.023 ± 0.003	-0.003 ± 0.010
07-14-98	300	0.025 ± 0.003	-0.008 ± 0.011
07-21-98	300	0.030 ± 0.003	-0.014 ± 0.012
07-28-98	304	0.024 ± 0.003	0.003 ± 0.008
08-04-98	302	0.027 ± 0.003	-0.007 ± 0.008
08-11-98	303	0.040 ± 0.004	-0.001 ± 0.008
08-18-98	299	0.024 ± 0.003	0.000 ± 0.009
08-25-98	305	0.041 ± 0.004	0.002 ± 0.008
09-01-98	344	0.030 ± 0.004	-0.001 ± 0.010
09-08-98	260	0.031 ± 0.004	0.002 ± 0.015
09-15-98	300	0.033 ± 0.004	-0.003 ± 0.012
09-22-98	304	0.037 ± 0.004	-0.007 ± 0.010
09-29-98	300	0.029 ± 0.004	0.005 ± 0.013
3rd Quarter Mean± s.d.		0.030 ± 0.006	-0.002 ± 0.005
10-06-98	302	0.016 ± 0.003	0.006 ± 0.009
10-12-98	261	0.021 ± 0.004	0.004 ± 0.007
10-20-98	310	0.027 ± 0.003	-0.014 ± 0.020
10-29-98	330 *	0.027 ± 0.003	0.007 ± 0.012
11-02-98	151	0.014 ± 0.005	0.032 ± 0.033
11-10-98	322	0.010 ± 0.003	-0.007 ± 0.011
11-17-98	273	0.030 ± 0.004	0.003 ± 0.011
11-23-98	260	0.026 ± 0.004	0.009 ± 0.019
12-01-98	318	0.025 ± 0.003	-0.005 ± 0.012
12-09-98	326	0.031 ± 0.004	0.001 ± 0.011
12-15-98	237	0.027 ± 0.004	-0.002 ± 0.016
12-23-98	317	0.017 ± 0.003	0.000 ± 0.011
12-30-98	287	0.029 ± 0.004	-0.003 ± 0.014
4th Quarter Mean± s.d.		0.023 ± 0.007	0.002 ± 0.011
Cumulative Average		0.023 ± 0.008	0.001 ± 0.008

* Air sampler change-out 10-30-98. Volume 31.4 m^3; Gross beta result 0.035±0.022 pCi/m^3

POINT BEACH NUCLEAR PLANT

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

Date Collected	Vol. (m^3)	Gross Beta	I-131
Required LLD		0.010	0.030
01-06-98	351	0.015 ± 0.002	0.013 ± 0.010
01-13-98	303	0.024 ± 0.003	-0.005 ± 0.013
01-20-98	303	0.023 ± 0.003	0.002 ± 0.010
01-27-98	297	0.018 ± 0.003	0.004 ± 0.013
02-03-98	303	0.023 ± 0.003	-0.001 ± 0.008
02-10-98	301	0.011 ± 0.003	-0.005 ± 0.011
02-17-98	300	0.026 ± 0.003	0.001 ± 0.008
02-24-98	303	0.014 ± 0.003	0.002 ± 0.011
03-03-98	292	0.014 ± 0.003	0.002 ± 0.020
03-10-98	284	0.009 ± 0.003	0.001 ± 0.014
03-17-98	296	0.022 ± 0.003	-0.001 ± 0.011
03-24-98	293	0.021 ± 0.003	0.006 ± 0.012
03-31-98	276	0.021 ± 0.003	0.000 ± 0.009
1st Quarter Mean± s.d.		0.019 ± 0.005	0.001 ± 0.005
04-07-98	305	0.013 ± 0.003	-0.002 ± 0.012
04-14-98	299	0.022 ± 0.003	-0.003 ± 0.008
04-21-98	304	0.013 ± 0.003	0.004 ± 0.010
04-28-98	300	0.019 ± 0.003	0.005 ± 0.011
05-05-98	307	0.021 ± 0.003	-0.002 ± 0.008
05-12-98	290	0.016 ± 0.003	0.009 ± 0.008
05-19-98	292	0.024 ± 0.003	0.011 ± 0.013
05-26-98	304	0.015 ± 0.003	0.005 ± 0.010
06-02-98	299	0.019 ± 0.003	-0.006 ± 0.012
06-09-98	305	0.010 ± 0.002	0.002 ± 0.011
06-16-98	303	0.017 ± 0.003	0.010 ± 0.010
06-23-98	292	0.017 ± 0.003	-0.002 ± 0.010
06-30-98	298	0.013 ± 0.003	0.003 ± 0.011
2nd Quarter Mean± s.d.		0.017 ± 0.004	0.003 ± 0.005
07-07-98	309	0.021 ± 0.003	0.001 ± 0.009
07-14-98	292	0.030 ± 0.004	0.002 ± 0.011
07-21-98	279	0.030 ± 0.003	-0.007 ± 0.013
07-28-98	293	0.022 ± 0.003	0.001 ± 0.009
08-04-98	304	0.017 ± 0.003	-0.003 ± 0.009
08-11-98	301	0.032 ± 0.003	0.001 ± 0.009
08-18-98	298	0.020 ± 0.003	-0.002 ± 0.008
08-25-98	308	0.034 ± 0.004	-0.001 ± 0.008
09-01-98	344	0.027 ± 0.003	0.005 ± 0.009
09-08-98	263	0.030 ± 0.004	-0.001 ± 0.013
09-15-98	300	0.034 ± 0.004	0.000 ± 0.011
09-22-98	305	0.037 ± 0.004	0.009 ± 0.012
09-29-98	297	0.027 ± 0.004	0.011 ± 0.011
3rd Quarter Mean± s.d.		0.028 ± 0.006	0.001 ± 0.005
10-06-98	304	0.015 ± 0.003	0.000 ± 0.010
10-12-98	260	0.016 ± 0.003	0.015 ± 0.014
10-20-98	306	0.031 ± 0.004	-0.002 ± 0.018
10-29-98	385	0.029 ± 0.003	-0.012 ± 0.010
11-02-98	172	0.024 ± 0.005	0.007 ± 0.023
11-10-98	345	0.009 ± 0.002	-0.016 ± 0.015
11-17-98	305	0.028 ± 0.004	0.003 ± 0.010
11-23-98	259	0.027 ± 0.004	-0.025 ± 0.020
12-01-98	342	0.028 ± 0.003	0.003 ± 0.012
12-09-98	352	0.032 ± 0.004	-0.006 ± 0.011
12-15-98	252	0.024 ± 0.004	-0.002 ± 0.015
12-23-98	345	0.018 ± 0.003	0.006 ± 0.009
12-30-98	304	0.035 ± 0.004	0.001 ± 0.012
4th Quarter Mean± s.d.		0.024 ± 0.008	-0.002 ± 0.011
Cumulative Average		0.022 ± 0.007	0.001 ± 0.007

POINT BEACH NUCLEAR PLANT

GAMMA EMITTERS IN QUARTERLY COMPOSITES OF

AIR PARTICULATE FILTERS

(Concentration pCi/m^3)

Location	Lab Code	Be-7	Cs-134	Cs-137	Other Gammas[a]
			1st Quarter, 1998		
E-01	EAP- 2193	0.077 ± 0.011	0.0000 ± 0.0000	-0.0002 ± 0.0005	0.0002 ± 0.0001
E-02	- 2194	0.071 ± 0.010	-0.0001 ± 0.0005	0.0009 ± 0.0005	0.0012 ± 0.0032
E-03	- 2195	0.067 ± 0.010	-0.0001 ± 0.0017	0.0003 ± 0.0004	0.0004 ± 0.0012
E-04	- 2196	0.072 ± 0.010	0.0002 ± 0.0005	0.0006 ± 0.0005	0.0002 ± 0.0001
E-08	- 2197	0.072 ± 0.013	-0.0007 ± 0.0029	0.0002 ± 0.0005	-0.0007 ± 0.0028
E-20	- 2198	0.068 ± 0.009	0.0002 ± 0.0001	0.0001 ± 0.0003	0.0000 ± 0.0001
			2nd Quarter, 1998		
E-01	EAP- 5194	0.070 ± 0.012	0.0002 ± 0.0003	0.0001 ± 0.0005	0.0002 ± 0.0002
E-02	- 5195	0.091 ± 0.012	0.0000 ± 0.0001	0.0002 ± 0.0005	0.0002 ± 0.0030
E-03	- 5196	0.084 ± 0.012	0.0003 ± 0.0010	0.0001 ± 0.0004	-0.0002 ± 0.0020
E-04	- 5197	0.079 ± 0.012	0.0005 ± 0.0010	0.0001 ± 0.0004	-0.0002 ± 0.0003
E-08	- 5198	0.095 ± 0.013	0.0001 ± 0.0001	0.0001 ± 0.0005	0.0005 ± 0.0025
E-20	- 5199	0.092 ± 0.023	0.0005 ± 0.0011	-0.0007 ± 0.0012	0.0000 ± 0.0005
			3rd Quarter, 1998		
E-01	EAP- 8124	0.076 ± 0.013	0.0001 ± 0.0001	-0.0002 ± 0.0005	0.0002 ± 0.0003
E-02	- 8125	0.097 ± 0.015	0.0002 ± 0.0004	-0.0002 ± 0.0004	0.0004 ± 0.0036
E-03	- 8126	0.104 ± 0.016	0.0001 ± 0.0003	0.0005 ± 0.0005	0.0002 ± 0.0004
E-04	- 8127	0.089 ± 0.017	-0.0002 ± 0.0003	-0.0001 ± 0.0005	0.0001 ± 0.0005
E-08	- 8128	0.100 ± 0.015	0.0000 ± 0.0001	-0.0002 ± 0.0004	-0.0002 ± 0.0020
E-20	- 8129	0.086 ± 0.013	-0.0004 ± 0.0005	0.0003 ± 0.0004	0.0002 ± 0.0016
			4th Quarter, 1998		
E-01	EAP- 11176	0.057 ± 0.009	-0.0003 ± 0.0003	0.0001 ± 0.0003	-0.0002 ± 0.0005
E-02	- 11177	0.062 ± 0.011	0.0003 ± 0.0005	-0.0001 ± 0.0004	0.0001 ± 0.0004
E-03	- 11178	0.056 ± 0.015	-0.0002 ± 0.0002	-0.0001 ± 0.0006	-0.0002 ± 0.0007
E-04	- 11179	0.057 ± 0.011	-0.0001 ± 0.0001	-0.0002 ± 0.0004	-0.0003 ± 0.0014
E-08	- 11180	0.056 ± 0.011	0.0004 ± 0.0004	0.0000 ±-0.0005	0.0002 ± 0.0006
E-20	- 11181	0.059 ± 0.012	0.0001 ± 0.0003	-0.0002 ± 0.0006	-0.0004 ± 0.0005

[a] See Introduction

POINT BEACH NUCLEAR PLANT

Airborne particulates, analysis for beryllium-7.

Units: pCi/m^3
Collection: Continuous, weekly exchange.

Location	E-01 Met. Tower	E-02 Site Boundary	E-03 West Boundary	E-04 North Boundary	E-08 G. J. Francar Residence	E-20 Silver Lake
Week Ending			Be-7			
05-05-98	0.31 ± 0.11	0.23 ± 0.08	0.19 ± 0.10	0.28 ± 0.08	0.25 ± 0.07	0.22 ± 0.09
05-12-98	0.21 ± 0.09	0.16 ± 0.08	0.21 ± 0.07	0.17 ± 0.06	0.18 ± 0.08	0.24 ± 0.11
05-19-98	0.27 ± 0.10	0.28 ± 0.09	0.18 ± 0.07	0.32 ± 0.09	0.22 ± 0.10	0.31 ± 0.12
05-26-98	0.22 ± 0.09	0.42 ± 0.13	0.22 ± 0.05	0.28 ± 0.10	0.34 ± 0.11	0.21 ± 0.13
06-02-98	0.23 ± 0.07	0.28 ± 0.10	0.30 ± 0.14	0.31 ± 0.15	0.25 ± 0.11	0.28 ± 0.11
06-09-98	0.18 ± 0.09	0.21 ± 0.09	0.18 ± 0.08	0.23 ± 0.09	0.17 ± 0.08	0.26 ± 0.11
06-16-98	0.25 ± 0.10	0.19 ± 0.10	0.23 ± 0.09	0.19 ± 0.06	0.20 ± 0.11	0.24 ± 0.09
06-23-98	0.16 ± 0.12	0.20 ± 0.10	0.21 ± 0.10	0.24 ± 0.07	0.21 ± 0.07	0.22 ± 0.13
06-30-98	0.19 ± 0.12	0.17 ± 0.10	0.11 ± 0.09	0.17 ± 0.10	0.19 ± 0.11	0.19 ± 0.07
07-07-98	0.13 ± 0.12	0.24 ± 0.12	0.29 ± 0.11	0.27 ± 0.10	0.22 ± 0.08	0.20 ± 0.08
07-14-98	0.25 ± 0.09	0.27 ± 0.07	0.32 ± 0.12	0.29 ± 0.11	0.22 ± 0.09	0.30 ± 0.12
07-21-98	0.20 ± 0.08	0.30 ± 0.09	0.28 ± 0.14	0.22 ± 0.09	0.30 ± 0.07	0.27 ± 0.09
07-28-98	0.21 ± 0.07	0.21 ± 0.07	0.22 ± 0.08	0.23 ± 0.07	0.21 ± 0.07	0.21 ± 0.09
08-04-98	0.28 ± 0.09	0.27 ± 0.10	0.16 ± 0.12	0.26 ± 0.11	0.25 ± 0.13	0.21 ± 0.08
08-11-98	0.25 ± 0.10	0.24 ± 0.10	0.21 ± 0.17	0.30 ± 0.09	0.22 ± 0.08	0.17 ± 0.11
08-18-98	0.19 ± 0.07	0.14 ± 0.13	0.21 ± 0.09	0.15 ± 0.08	0.15 ± 0.08	0.22 ± 0.10
08-25-98	0.31 ± 0.09	0.25 ± 0.11	0.29 ± 0.11	0.31 ± 0.09	0.29 ± 0.08	0.31 ± 0.09
09-01-98	0.15 ± 0.08	0.23 ± 0.12	0.22 ± 0.11	0.29 ± 0.11	0.19 ± 0.09	0.14 ± 0.10
09-08-98	0.25 ± 0.18	0.19 ± 0.10	0.13 ± 0.12	0.21 ± 0.08	0.20 ± 0.12	0.16 ± 0.08
09-15-98	0.25 ± 0.06	0.13 ± 0.10	0.24 ± 0.12	0.31 ± 0.14	0.21 ± 0.08	0.14 ± 0.07
09-22-98	0.14 ± 0.09	0.21 ± 0.10	0.20 ± 0.08	0.26 ± 0.11	0.21 ± 0.15	0.28 ± 0.12
09-29-98	0.15 ± 0.09	0.22 ± 0.11	0.13 ± 0.11	0.18 ± 0.08	0.16 ± 0.08	0.17 ± 0.07
10-06-98	0.16 ± 0.08	0.10 ± 0.08	0.15 ± 0.09	0.08 ± 0.07	0.08 ± 0.04	0.07 ± 0.09
10-12-98	0.14 ± 0.06	0.16 ± 0.11	0.06 ± 0.06	0.16 ± 0.14	0.15 ± 0.09	0.13 ± 0.11
10-20-98	0.10 ± 0.05	0.21 ± 0.11	0.12 ± 0.09	0.20 ± 0.10	0.15 ± 0.09	0.16 ± 0.09
10-27-98	0.14 ± 0.10	0.16 ± 0.11	0.14 ± 0.08	0.13 ± 0.10	0.14 ± 0.10	0.21 ± 0.11
11-02-98	0.13 ± 0.06	0.13 ± 0.08	0.18 ± 0.14	0.07 ± 0.06	0.33 ± 0.25	0.10 ± 0.09
11-10-98	0.15 ± 0.06	0.18 ± 0.06	0.17 ± 0.08	0.07 ± 0.07	0.11 ± 0.07	0.18 ± 0.09
11-17-98	0.14 ± 0.08	0.18 ± 0.05	0.16 ± 0.06	0.17 ± 0.09	0.16 ± 0.10	0.15 ± 0.07
11-23-98	0.18 ± 0.13	0.22 ± 0.09	0.13 ± 0.08	0.13 ± 0.07	0.13 ± 0.08	0.21 ± 0.13
12-01-98	0.20 ± 0.10	0.17 ± 0.07	0.21 ± 0.10	0.15 ± 0.06	0.14 ± 0.09	0.13 ± 0.07
12-09-98	0.15 ± 0.08	0.11 ± 0.07	0.18 ± 0.09	0.18 ± 0.07	0.14 ± 0.07	0.13 ± 0.07
12-15-98	0.08 ± 0.07	0.11 ± 0.08	0.09 ± 0.06	0.16 ± 0.10	0.11 ± 0.07	0.11 ± 0.08
12-23-98	0.11 ± 0.06	0.13 ± 0.07	0.12 ± 0.05	0.09 ± 0.05	0.12 ± 0.07	0.12 ± 0.06
12-30-98	0.13 ± 0.06	0.18 ± 0.09	0.24 ± 0.09	0.18 ± 0.05	0.19 ± 0.07	0.25 ± 0.07
Means±s.d.	0.18 ± 0.06	0.20 ± 0.07	0.19 ± 0.06	0.20 ± 0.07	0.19 ± 0.06	0.19 ± 0.06

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN MILK SAMPLES

(Monthly Collections)

Sample Description and Concentration (pCi/L)

E-11 Funk Dairy Farm

Collection Date	01-14-98	02-17-98	03-11-98	Required LLD
Lab Code	EMI-220	EMI-972	EMI-1469	
Sr-89	0.3 ± 1.0	0.4 ± 0.6	0.4 ± 0.8	5.0
Sr-90	1.1 ± 0.4	1.1 ± 0.3	1.0 ± 0.4	1.0
I-131	0.08 ± 0.19	-0.06 ± 0.16	-0.10 ± 0.18	0.5
K-40	1430 ± 100	1530 ± 80	1470 ± 70	
Cs-134	0.9 ± 9.3	0.0 ± 0.1	-0.3 ± 0.3	5.0
Cs-137	-1.4 ± 2.1	3.4 ± 1.7	0.9 ± 1.7	5.0
Ba-La-140	3.2 ± 44.2	-0.6 ± 5.2	-1.2 ± 3.7	5.0
Other Gammas[a]	-1.3 ± 8.3	0.8 ± 3.8	1.3 ± 9.3	15.0

Collection Date	04-08-98	05-13-98	06-10-98	
Lab Code	EMI-2107	EMI-3281	EMI-4231	
Sr-89	-1.0 ± 1.1	0.3 ± 0.8	0.4 ± 1.1	5.0
Sr-90	1.4 ± 0.4	0.9 ± 0.3	1.0 ± 0.3	1.0
I-131	-0.16 ± 0.12	0.10 ± 0.16	-0.04 ± 0.12	0.5
K-40	1360 ± 100	1440 ± 120	1420 ± 120	
Cs-134	-0.9 ± 1.1	-0.3 ± 0.2	-0.9 ± 5.1	5.0
Cs-137	0.4 ± 2.1	-0.3 ± 2.5	2.0 ± 2.5	5.0
Ba-La-140	-0.6 ± 2.6	0.7 ± 1.0	3.2 ± 3.2	5.0
Other Gammas[a]	2.2 ± 7.4	1.4 ± 2.9	0.2 ± 0.3	15.0

[a] See Introduction.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN MILK SAMPLES

(Monthly Collections)

Sample Description and Concentration (pCi/L)

E-11 Funk Dairy Farm

Collection Date	01-14-98	02-17-98	03-11-98	Required LLD
Lab Code	EMI-220	EMI-972	EMI-1469	
Sr-89	0.3 ± 1.0	0.4 ± 0.6	0.4 ± 0.8	5.0
Sr-90	1.1 ± 0.4	1.1 ± 0.3	1.0 ± 0.4	1.0
I-131	0.08 ± 0.19	-0.06 ± 0.16	-0.10 ± 0.18	0.5
K-40	1430 ± 100	1530 ± 80	1470 ± 70	
Cs-134	0.9 ± 9.3	0.0 ± 0.1	-0.3 ± 0.3	5.0
Cs-137	-1.4 ± 2.1	3.4 ± 1.7	0.9 ± 1.7	5.0
Ba-La-140	3.2 ± 44.2	-0.6 ± 5.2	-1.2 ± 3.7	5.0
Other Gammas[a]	-1.3 ± 8.3	0.8 ± 3.8	1.3 ± 9.3	15.0

Collection Date	04-08-98	05-13-98	06-10-98	
Lab Code	EMI-2107	EMI-3281	EMI-4231	
Sr-89	-1.0 ± 1.1	0.3 ± 0.8	0.4 ± 1.1	5.0
Sr-90	1.4 ± 0.4	0.9 ± 0.3	1.0 ± 0.3	1.0
I-131	-0.16 ± 0.12	0.10 ± 0.16	-0.04 ± 0.12	0.5
K-40	1360 ± 100	1440 ± 120	1420 ± 120	
Cs-134	-0.9 ± 1.1	-0.3 ± 0.2	-0.9 ± 5.1	5.0
Cs-137	0.4 ± 2.1	-0.3 ± 2.5	2.0 ± 2.5	5.0
Ba-La-140	-0.6 ± 2.6	0.7 ± 1.0	3.2 ± 3.2	5.0
Other Gammas[a]	2.2 ± 7.4	1.4 ± 2.9	0.2 ± 0.3	15.0

[a] See Introduction.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN MILK SAMPLES

(Monthly Collections)

Sample Description and Concentration (pCi/L)

E-11 Funk Dairy Farm

Collection Date	07-15-98	08-05-98	09-09-98	Required LLD
Lab Code	EMI-5350	EMI-5501	EMI-7068	
Sr-89	0.2 ± 0.9	0.6 ± 1.2	0.1 ± 0.9	5.0
Sr-90	0.8 ± 0.3	0.8 ± 0.4	1.0 ± 0.3	1.0
I-131	-0.03 ± 0.15	-0.10 ± 0.13	-0.15 ± 0.15	0.5
K-40	1460 ± 90	1420 ± 110	1350 ± 170	
Cs-134	-0.2 ± 0.7	-0.6 ± 1.0	-4.0 ± 12.6	5.0
Cs-137	1.4 ± 1.7	-1.0 ± 2.3	-1.4 ± 3.4	5.0
Ba-La-140	-0.6 ± 25.6	-1.1 ± 4.7	-2.0 ± 20.4	5.0
Other Gammas[a]	0.8 ± 14.6	1.6 ± 2.6	0.4 ± 1.3	15.0

Collection Date	10-07-98	11-11-98	12-09-98	
Lab Code	EMI-8027	EMI-9661	EMI-10507	
Sr-89	-0.3 ± 0.8	-1.1 ± 1.0	0.2 ± 0.8	5.0
Sr-90	0.8 ± 0.3	1.5 ± 0.4	0.8 ± 0.3	1.0
I-131	-0.23 ± 0.14	-0.01 ± 0.15	0.12 ± 0.19	0.5
K-40	1360 ± 110	1310 ± 100	1410 ± 120	
Cs-134	0.4 ± 9.2	0.6 ± 3.1	1.0 ± 0.9	5.0
Cs-137	1.7 ± 2.4	0.5 ± 2.0	1.1 ± 2.7	5.0
Ba-La-140	0.8 ± 1.3	0.9 ± 23.9	-0.1 ± 1.9	5.0
Other Gammas[a]	0.8 ± 2.1	1.5 ± 44.8	1.2 ± 24.7	15.0

[a] See Introduction.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN MILK SAMPLES

(Monthly Collections)

Sample Description and Concentration (pCi/L)

E-19 Engelbrecht Dairy

Collection Date	01-14-98	02-17-98	03-11-98	Required LLD
Lab Code	EMI-221	EMI-973	EMI-1470	
Sr-89	0.2 ± 1.0	0.2 ± 0.7	-1.6 ± 1.3	5.0
Sr-90	1.4 ± 0.4	1.6 ± 0.4	2.0 ± 0.6	1.0
I-131	0.02 ± 0.17	-0.05 ± 0.17	-0.16 ± 0.17	0.5
K-40	1620 ± 160	1340 ± 70	1490 ± 90	
Cs-134	-0.8 ± 15.2	0.6 ± 2.8	0.1 ± 4.6	5.0
Cs-137	0.2 ± 3.0	-0.3 ± 1.5	-0.3 ± 1.6	5.0
Ba-La-140	-1.4 ± 4.0	-1.0 ± 4.1	0.9 ± 3.3	5.0
Other Gammas[a]	-0.6 ± 0.8	1.3 ± 1.7	1.0 ± 1.5	15.0

Collection Date	04-08-98	05-13-98	06-10-98	
Lab Code	EMI-2108	EMI-3282	EMI-4232	
Sr-89	-2.9 ± 1.4	0.1 ± 1.0	-0.8 ± 1.1	5.0
Sr-90	2.6 ± 0.5	1.6 ± 0.4	1.7 ± 0.4	1.0
I-131	-0.04 ± 0.13	0.11 ± 0.13	-0.05 ± 0.11	0.5
K-40	1410 ± 110	1390 ± 150	1330 ± 110	
Cs-134	0.1 ± 0.5	-1.7 ± 3.8	-0.3 ± 0.7	5.0
Cs-137	0.1 ± 2.3	-1.0 ± 3.1	0.4 ± 2.3	5.0
Ba-La-140	1.4 ± 3.5	-1.0 ± 3.1	-1.0 ± 3.2	5.0
Other Gammas[a]	0.5 ± 0.9	1.6 ± 28.4	0.6 ± 2.6	15.0

[a] See Introduction.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN MILK SAMPLES

(Monthly Collections)

Sample Description and Concentration (pCi/L)

E-19 Engelbrecht Dairy

Collection Date	07-15-98	08-05-98	09-09-98	Required LLD
Lab Code	EMI-5351	EMI-5962	EMI-7069	
Sr-89	0.1 ± 1.0	0.1 ± 0.9	0.1 ± 1.0	5.0
Sr-90	1.4 ± 0.4	0.6 ± 0.3	1.4 ± 0.4	1.0
I-131	0.02 ± 0.16	-0.06 ± 0.15	-0.14 ± 0.15	0.5
K-40	1490 ± 90	1400 ± 130	1430 ± 120	
Cs-134	-0.9 ± 6.2	1.0 ± 0.8	1.0 ± 8.9	5.0
Cs-137	0.1 ± 1.8	0.7 ± 2.6	0.4 ± 2.5	5.0
Ba-La-140	-2.0 ± 3.1	-1.4 ± 2.1	-1.1 ± 8.1	5.0
Other Gammas[a]	-0.2 ± 0.3	1.5 ± 6.9	0.6 ± 3.1	15.0

Collection Date	10-07-98	11-11-98	12-09-98	
Lab Code	EMI-8028	EMI-9662	EMI-10508	
Sr-89	-0.1 ± 0.8	0.4 ± 1.0	0.3 ± 1.0	5.0
Sr-90	0.9 ± 0.4	1.3 ± 0.4	1.8 ± 0.4	1.0
I-131	-0.17 ± 0.15	0.11 ± 0.16	0.07 ± 0.22	0.5
K-40	1340 ± 80	1380 ± 100	1410 ± 120	
Cs-134	1.7 ± 10.0	-1.4 ± 0.8	0.2 ± 0.2	5.0
Cs-137	2.1 ± 1.8	0.3 ± 2.1	-0.5 ± 2.4	5.0
Ba-La-140	0.1 ± 0.3	-0.3 ± 0.7	-0.7 ± 2.2	5.0
Other Gammas[a]	-0.7 ± 1.4	0.2 ± 0.4	-2.7 ± 6.0	15.0

[a] See Introduction.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN MILK SAMPLES

(Monthly Collections)

Sample Description and Concentration (pCi/L)

E-21 Strutz Dairy Farm

Collection Date	01-14-98	02-17-98	03-11-98	Required LLD
Lab Code	EMI-222	EMI-974	EMI-1471	
Sr-89	-0.2 ± 0.8	0.4 ± 0.7	-0.2 ± 0.9	5.0
Sr-90	0.9 ± 0.3	0.8 ± 0.4	1.0 ± 0.4	1.0
I-131	-0.02 ± 0.17	-0.19 ± 0.16	-0.10 ± 0.16	0.5
K-40	1490 ± 110	1460 ± 70	1520 ± 100	
Cs-134	-0.5 ± 1.2	0.8 ± 1.2	0.1 ± 0.2	5.0
Cs-137	0.7 ± 2.5	1.3 ± 1.4	-0.4 ± 1.9	5.0
Ba-La-140	-4.3 ± 3.2	-0.2 ± 1.1	0.3 ± 0.9	5.0
Other Gammas[a]	2.6 ± 2.9	0.0 ± 0.1	0.1 ± 0.2	15.0

Collection Date	04-08-98	05-13-98	06-10-98	
Lab Code	EMI-2109	EMI-3283	EMI-4233	
Sr-89	-0.7 ± 0.9	0.3 ± 0.9	-0.5 ± 1.0	5.0
Sr-90	0.9 ± 0.4	1.0 ± 0.4	0.9 ± 0.4	1.0
I-131	0.06 ± 0.11	-0.10 ± 0.13	-0.03 ± 0.11	0.5
K-40	1400 ± 90	1390 ± 110	1490 ± 90	
Cs-134	0.9 ± 1.8	-1.4 ± 1.3	0.9 ± 1.1	5.0
Cs-137	0.1 ± 1.8	0.9 ± 2.2	1.6 ± 1.9	5.0
Ba-La-140	-3.4 ± 6.6	-1.2 ± 1.7	-3.1 ± 4.7	5.0
Other Gammas[a]	-0.1 ± 0.1	1.2 ± 1.2	-12.7 ± 26.1	15.0

[a] See Introduction.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN MILK SAMPLES

(Monthly Collections)

Sample Description and Concentration (pCi/L)

E-21 Strutz Dairy Farm

Collection Date	07-15-98	08-05-98	09-09-98	Required LLD
Lab Code	EMI-5352	EMI-5963	EMI-7070	
Sr-89	0.0 ± 0.8	-0.6 ± 0.8	0.6 ± 1.0	5.0
Sr-90	0.7 ± 0.3	0.9 ± 0.3	0.4 ± 0.3	1.0
I-131	-0.10 ± 0.19	-0.02 ± 0.15	-0.03 ± 0.16	0.5
K-40	1390 ± 120	1520 ± 120	1430 ± 110	
Cs-134	-2.3 ± 6.0	-1.0 ± 3.1	1.8 ± 1.8	5.0
Cs-137	0.9 ± 2.5	1.2 ± 2.5	1.3 ± 2.1	5.0
Ba-La-140	-0.4 ± 13.7	-0.2 ± 1.0	2.0 ± 33.4	5.0
Other Gammas[a]	-0.2 ± 8.6	-0.1 ± 0.2	2.1 ± 6.6	15.0

Collection Date	10-07-98	11-11-98	12-09-98	
Lab Code	EMI-8029	EMI-9663	EMI-10509	
Sr-89	0.0 ± 0.7	-0.3 ± 0.9	-0.1 ± 0.7	5.0
Sr-90	0.5 ± 0.3	0.9 ± 0.3	0.8 ± 0.3	1.0
I-131	-0.14 ± 0.16	-0.02 ± 0.15	0.04 ± 0.18	0.5
K-40	1370 ± 130	1350 ± 120	1620 ± 120	
Cs-134	0.1 ± 0.6	0.6 ± 2.5[b]	0.2 ± 0.2	5.0
Cs-137	0.2 ± 2.4	0.7 ± 2.1	1.6 ± 2.6	5.0
Ba-La-140	-2.3 ± 14.8	1.7 ± 5.9	1.0 ± 1.7	5.0
Other Gammas[a]	-1.1 ± 3.6	-0.3 ± 0.5	-1.5 ± 2.6	15.0

[a] See Introduction.

[b] Error recalculated for single peak (795 KeV).

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN WELL WATER SAMPLES, E-10

(Quarterly Collections)

	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	Req. LLD
Collection Date	01-06-98	04-14-98	07-08-98	12-30-98	
Lab Code	EWW-97	EWW-2404	EWW-5086	EWW-11068	
Gross Beta	0.8 ± 1.9	2.2 ± 1.9	2.7 ± 2.1	2.3 ± 1.3	4.0
H-3	15.4 ± 82.1	-24.3 ± 75.2	-89.8 ± 85.3		500
Sr-89	-0.6 ± 0.8	-0.1 ± 0.6	0.0 ± 0.7		5.0
Sr-90	0.3 ± 0.3	0.2 ± 0.3	0.2 ± 0.2		1.0
I-131	-0.13 ± 0.21	-0.04 ± 0.18	0.13 ± 0.18	0.18 ± 0.30	0.5
Mn-54	-2.4 ± 2.1	0.8 ± 2.3	0.9 ± 3.0	0.2 ± 2.1	10.0
Fe-59	-4.0 ± 6.3	-3.2 ± 13.9	-0.9 ± 3.0	-1.5 ± 12.1	30.0
Co-58	-0.2 ± 2.8	-0.8 ± 2.2	-0.6 ± 3.8	-1.2 ± 2.1	10.0
Co-60	0.1 ± 0.2	-0.1 ± 0.5	1.7 ± 13.5	-1.9 ± 12.1	10.0
Zn-65	-4.0 ± 4.0	-4.3 ± 4.5	-5.3 ± 6.8	-5.0 ± 4.6	30.0
Zr-Nb-95	1.4 ± 4.2	0.3 ± 2.3	0.6 ± 3.7	0.4 ± 2.5	15.0
Cs-134	0.2 ± 0.3	-2.3 ± 1.4	2.7 ± 3.0	-0.4 ± 2.7	10.0
Cs-137	-0.4 ± 2.3	0.6 ± 2.2	-1.4 ± 3.0	0.1 ± 2.0	10.0
Ba-La-140	-1.3 ± 30.1	-0.4 ± 6.2	-6.1 ± 14.3	4.2 ± 34.9	15.0
Other Gammas[a]	-1.0 ± 0.5	-0.3 ± 0.1	-2.6 ± 16.2	-0.7 ± 0.1	30.0

[a] Ru-103

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN LAKE WATER SAMPLES
(Monthly Collections)
(pCi/L)

Collection Period	E-01 Met. Tower	E-05 Two Creeks Park	E-06 Coast Guard Station	E-33 Nature Conservancy	E-12 Unit-1 Discharge Flume[a]
	Gross Beta (Required LLD 4.0)				
January	2.2 ± 0.6	3.1 ± 0.6	1.7 ± 0.6	2.4 ± 0.6	2.2 ± 0.6
February	2.5 ± 0.6	2.3 ± 0.6	2.6 ± 0.6	2.4 ± 0.6	3.3 ± 0.6
March	3.7 ± 0.7	3.4 ± 0.7	3.5 ± 0.7	2.8 ± 0.6	2.5 ± 0.5
April	2.9 ± 0.7	3.0 ± 0.6	4.2 ± 0.7	3.3 ± 0.6	2.2 ± 0.6
May	2.6 ± 0.7	2.2 ± 0.7	1.9 ± 0.7	2.0 ± 0.5	2.1 ± 0.7
June	2.5 ± 0.6	3.1 ± 0.6	4.2 ± 0.7	2.8 ± 0.7	2.0 ± 0.6
July	3.6 ± 0.7	2.5 ± 0.6	2.7 ± 0.6	2.4 ± 0.6	1.8 ± 0.5
August	2.3 ± 0.6	2.2 ± 0.6	2.5 ± 0.6	2.3 ± 0.6	2.4 ± 0.6
September	1.7 ± 0.6	1.6 ± 0.6	1.8 ± 0.7	1.3 ± 0.6	2.2 ± 0.6
October	2.1 ± 0.6	2.0 ± 0.6	2.2 ± 0.6	1.8 ± 0.6	1.9 ± 0.8
November	2.1 ± 0.8	2.6 ± 0.8	2.4 ± 0.8	2.5 ± 0.8	2.0 ± 0.8
December	1.2 ± 0.8	2.1 ± 0.8	2.0 ± 0.8	2.5 ± 0.7	2.5 ± 0.7
	Iodine-131 (Required LLD 0.5)				
January	0.21 ± 0.24	-0.14 ± 0.23	-0.08 ± 0.22	-0.21 ± 0.24	0.03 ± 0.16
February	-0.05 ± 0.22	-0.06 ± 0.22	-0.33 ± 0.31	0.15 ± 0.24	0.06 ± 0.19
March	-0.11 ± 0.19	0.24 ± 0.26	0.06 ± 0.24	0.02 ± 0.25	-0.07 ± 0.15
April	-0.05 ± 0.20	0.02 ± 0.19	0.20 ± 0.23	0.17 ± 0.22	-0.03 ± 0.18
May	-0.06 ± 0.20	-0.10 ± 0.19	-0.03 ± 0.19	0.06 ± 0.16	-0.14 ± 0.17
June	-0.13 ± 0.19	-0.03 ± 0.22	-0.09 ± 0.18	-0.32 ± 0.20	0.10 ± 0.21
July	0.09 ± 0.22	0.15 ± 0.22	0.01 ± 0.19	-0.08 ± 0.20	0.08 ± 0.18
August	-0.11 ± 0.18	0.00 ± 0.20	-0.11 ± 0.20	-0.31 ± 0.18	-0.02 ± 0.19
September	0.04 ± 0.19	-0.13 ± 0.18	-0.01 ± 0.18	-0.05 ± 0.18	-0.09 ± 0.16
October	-0.12 ± 0.26	-0.08 ± 0.24	-0.03 ± 0.26	-0.28 ± 0.26	-0.06 ± 0.34
November	-0.14 ± 0.17	0.00 ± 0.17	0.17 ± 0.19	0.06 ± 0.18	-0.12 ± 0.20
December	-0.04 ± 0.18	0.18 ± 0.18	-0.18 ± 0.19	0.02 ± 0.18	0.00 ± 0.24

[a] E-12 Unit-1 Discharge Flume is a monthly composite of weekly grab samples.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN LAKE WATER SAMPLES
(Monthly Collections)
(pCi/L)

Collection Period	E-01 Met. Tower	E-05 Two Creeks Park	E-06 Coast Guard Station	E-33 Nature Conservancy	E-12 Unit-1 Discharge Flume[a]
			Be-7		
January	-6.5 ± 32.4	-11.9 ± 34.3	-26.1 ± 24.5	0.7 ± 24.2	-3.0 ± 24.8
February	4.3 ± 20.2	-9.7 ± 11.4	1.4 ± 13.5	0.6 ± 16.0	7.2 ± 19.1
March	3.0 ± 16.5	-4.2 ± 22.1	0.3 ± 9.6	2.2 ± 17.3	5.6 ± 15.5
April	-2.0 ± 15.7	14.5 ± 17.7	7.6 ± 9.2	-1.5 ± 15.4	1.8 ± 15.2
May	8.9 ± 29.2	-12.6 ± 31.6	12.3 ± 32.6	12.1 ± 25.9	23.7 ± 21.3
June	27.2 ± 25.6	3.7 ± 12.8	-2.1 ± 17.9	10.2 ± 13.0	-7.4 ± 16.0
July	9.5 ± 26.7	2.8 ± 13.7	8.4 ± 26.0	28.7 ± 26.4	1.8 ± 23.9
August	-0.6 ± 20.9	-3.0 ± 20.7	1.9 ± 23.3	6.2 ± 27.1	4.7 ± 24.8
September	4.2 ± 19.2	-1.9 ± 21.1	3.0 ± 32.3	0.3 ± 17.4	4.9 ± 23.9
October	2.0 ± 37.8	-1.7 ± 16.5	11.7 ± 21.7	-12.3 ± 27.5	-10.6 ± 27.8
November	-9.7 ± 27.0	14.2 ± 20.5	-5.2 ± 25.0	-15.7 ± 31.5	-3.9 ± 24.0
December	-7.6 ± 18.0	6.6 ± 22.1	7.8 ± 15.2	0.6 ± 11.9	1.0 ± 19.0
			Mn-54 (Required LLD 10.0)		
January	0.4 ± 3.3	-3.1 ± 3.1	-1.4 ± 2.1	-0.2 ± 2.0	-0.2 ± 2.2
February	1.2 ± 2.4	0.8 ± 1.2	-0.2 ± 1.5	1.2 ± 1.9	0.8 ± 1.6
March	0.8 ± 1.6	0.4 ± 2.5	-1.1 ± 1.7	-0.1 ± 1.0	0.5 ± 1.4
April	0.2 ± 1.8	-0.8 ± 2.0	-0.7 ± 0.8	0.8 ± 1.7	1.3 ± 1.9
May	-1.0 ± 3.1	-2.1 ± 3.3	0.9 ± 3.1	0.2 ± 3.1	-1.9 ± 2.3
June	1.2 ± 2.7	0.3 ± 1.2	-1.0 ± 1.5	-0.1 ± 1.1	-0.6 ± 1.6
July	2.0 ± 1.8	0.8 ± 1.6	0.9 ± 2.5	1.3 ± 2.8	0.4 ± 2.7
August	-0.1 ± 1.9	-0.9 ± 1.8	0.2 ± 2.6	-0.4 ± 2.6	0.4 ± 1.8
September	0.8 ± 1.8	-0.6 ± 2.0	0.1 ± 2.8	-1.3 ± 1.5	0.5 ± 2.0
October	-2.5 ± 3.2	-0.4 ± 1.3	0.1 ± 1.6	0.9 ± 2.1	-0.6 ± 2.7
November	1.8 ± 2.4	0.3 ± 2.0	-1.5 ± 2.2	0.4 ± 2.4	0.8 ± 2.4
December	0.3 ± 2.1	-0.9 ± 2.1	-0.8 ± 1.3	-1.1 ± 1.2	0.3 ± 1.9
			Fe-59 (Required LLD 30.0)		
January	-4.5 ± 32.2	-3.1 ± 40.7	-0.7 ± 1.3	5.2 ± 21.6	5.0 ± 80.2
February	1.2 ± 2.6	-0.5 ± 2.4	-2.3 ± 5.7	0.5 ± 1.1	-0.2 ± 0.4
March	-0.7 ± 4.0	0.7 ± 7.3	-1.9 ± 8.5	0.0 ± 0.2	0.6 ± 2.5
April	2.7 ± 2.7	0.6 ± 5.1	0.1 ± 1.7	-2.8 ± 28.0	1.5 ± 28.2
May	-0.7 ± 1.1	-3.7 ± 7.7	-0.1 ± 0.2	-1.9 ± 3.3	0.4 ± 0.6
June	4.7 ± 20.5	2.8 ± 4.0	0.6 ± 12.4	-1.4 ± 19.8	1.9 ± 18.6
July	-0.2 ± 0.4	0.4 ± 0.8	2.9 ± 2.5	-0.3 ± 0.3	0.1 ± 0.1
August	-1.3 ± 2.3	0.1 ± 0.1	1.4 ± 5.5	3.8 ± 6.6	-2.2 ± 16.5
September	0.5 ± 1.9	0.5 ± 2.2	0.7 ± 1.0	-0.9 ± 1.7	2.0 ± 9.8
October	6.1 ± 16.7	4.9 ± 200.0	-2.0 ± 2.1	-2.3 ± 8.1	1.5 ± 1.4
November	-4.6 ± 98.2	-6.1 ± 17.2	-0.3 ± 1.6	3.3 ± 68.4	-2.0 ± 23.8
December	-1.1 ± 5.0	3.3 ± 4.6	0.9 ± 2.6	1.7 ± 9.5	1.3 ± 8.9

[a] E-12 Unit-1 Discharge Flume is a monthly composite of weekly grab samples.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN LAKE WATER SAMPLES
(Monthly Collections)
(pCi/L)

Collection Period	E-01 Met. Tower	E-05 Two Creeks Park	E-06 Coast Guard Station	E-33 Nature Conservancy	E-12 Unit-1 Discharge Flume[a]
			Co-58 (Required LLD 10.0)		
January	-2.2 ± 4.1	-0.3 ± 3.4	0.1 ± 2.5	0.8 ± 2.3	-0.6 ± 2.6
February	1.8 ± 2.2	-0.4 ± 1.3	-0.5 ± 1.4	0.3 ± 2.0	0.5 ± 2.0
March	0.3 ± 1.8	1.3 ± 2.9	0.7 ± 2.0	-0.3 ± 1.0	-0.9 ± 1.7
April	0.0 ± 1.8	-0.1 ± 2.0	0.2 ± 0.9	0.7 ± 1.8	-0.7 ± 1.6
May	-1.8 ± 3.2	0.8 ± 3.5	0.6 ± 3.1	-1.0 ± 2.7	-2.0 ± 2.7
June	0.6 ± 2.7	0.7 ± 1.2	0.4 ± 1.7	0.4 ± 1.4	-0.3 ± 1.7
July	-3.1 ± 2.7	0.3 ± 1.3	-0.3 ± 2.7	-0.1 ± 3.1	0.8 ± 2.6
August	-0.6 ± 2.0	-1.0 ± 1.9	-1.3 ± 3.1	-1.5 ± 3.3	0.3 ± 2.4
September	0.5 ± 1.9	-1.8 ± 2.2	1.6 ± 3.3	0.3 ± 1.7	1.2 ± 2.0
October	1.2 ± 3.3	-0.9 ± 1.8	-0.6 ± 1.9	-0.7 ± 2.4	-1.2 ± 2.8
November	0.1 ± 2.4	-0.9 ± 2.3	-1.3 ± 2.7	-1.0 ± 3.5	-1.1 ± 2.5
December	0.3 ± 1.9	0.3 ± 2.3	0.2 ± 1.4	-0.6 ± 1.4	0.3 ± 2.0
			Co-60 (Required LLD 10.0)		
January	0.2 ± 0.3	0.5 ± 2.0	-0.5 ± 1.1	0.6 ± 1.1	0.7 ± 0.8
February	1.0 ± 1.1	-0.2 ± 1.8	-0.2 ± 0.4	0.7 ± 2.6	0.6 ± 6.0
March	1.2 ± 3.0	2.2 ± 5.5	1.1 ± 5.1	-0.1 ± 1.3	1.2 ± 28.7
April	1.9 ± 2.4	1.4 ± 5.3	0.6 ± 3.1	-0.4 ± 0.5	2.0 ± 2.5
May	1.9 ± 8.1	6.8 ± 7.6	-0.4 ± 0.7	0.7 ± 1.7	2.5 ± 3.5
June	1.5 ± 4.1	0.5 ± 13.9	0.7 ± 2.9	0.2 ± 0.3	-0.1 ± 1.6
July	1.5 ± 9.3	0.9 ± 2.2	0.6 ± 0.8	-0.3 ± 0.7	1.8 ± 13.1
August	0.6 ± 2.5	0.1 ± 1.0	0.2 ± 0.5	-0.8 ± 0.6	0.0 ± 0.1
September	-0.2 ± 0.4	0.2 ± 0.3	1.7 ± 2.2	-0.8 ± 0.8	-0.3 ± 2.7
October	3.8 ± 7.6	0.5 ± 0.6	0.8 ± 1.7	0.2 ± 0.4	-0.8 ± 0.6
November	1.6 ± 9.2	0.2 ± 0.6	0.2 ± 0.5	1.7 ± 26.1	1.9 ± 5.4
December	-0.7 ± 2.6	3.1 ± 11.4	0.9 ± 9.3	0.0 ± 0.1	-0.8 ± 1.0
			Zn-65 (Required LLD 30.0)		
January	2.2 ± 6.5	-1.7 ± 7.5	-4.2 ± 3.8	0.8 ± 3.9	-2.3 ± 5.4
February	-2.3 ± 4.2	0.1 ± 2.3	-1.0 ± 2.9	1.4 ± 3.7	-2.6 ± 3.5
March	-0.6 ± 3.3	-2.5 ± 5.1	-3.7 ± 4.3	-0.9 ± 2.0	0.3 ± 2.9
April	-4.8 ± 4.0	1.9 ± 3.7	-0.5 ± 1.9	0.5 ± 3.8	-2.8 ± 3.7
May	-3.9 ± 5.6	2.6 ± 6.9	-0.4 ± 9.1	-3.2 ± 6.8	-3.6 ± 4.8
June	-1.2 ± 5.3	1.9 ± 2.2	0.7 ± 2.9	-2.3 ± 2.3	-1.0 ± 2.8
July	-2.8 ± 5.3	-0.9 ± 3.5	-0.3 ± 5.1	-5.0 ± 5.8	-2.2 ± 5.5
August	-0.5 ± 3.7	-3.5 ± 4.0	1.2 ± 4.5	-0.3 ± 6.7	-4.7 ± 4.1
September	-2.0 ± 3.6	0.3 ± 3.9	2.3 ± 5.4	-1.5 ± 3.4	-4.4 ± 5.1
October	-4.9 ± 5.9	-1.8 ± 2.9	-1.2 ± 3.6	-0.7 ± 3.3	-1.2 ± 6.5
November	-5.5 ± 5.1	0.6 ± 4.0	-4.5 ± 4.4	-1.5 ± 4.8	0.6 ± 5.0
December	-0.3 ± 3.8	-0.4 ± 4.9	-3.9 ± 3.3	-1.9 ± 2.9	-1.2 ± 4.0

[a] E-12 Unit-1 Discharge Flume is a monthly composite of weekly grab samples.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN LAKE WATER SAMPLES
(Monthly Collections)
(pCi/L)

Collection Period	E-01 Met. Tower	E-05 Two Creeks Park	E-06 Coast Guard Station	E-33 Nature Conservancy	E-12 Unit-1 Discharge Flume*
	Zr-Nb-95 (Required LLD 15.0)				
January	-0.4 ± 5.3	-2.0 ± 4.8	0.3 ± 3.4	0.6 ± 3.5	0.4 ± 3.4
February	0.0 ± 2.4	0.7 ± 1.4	-0.6 ± 1.6	-0.2 ± 2.0	-1.7 ± 2.1
March	-1.7 ± 1.9	-0.2 ± 3.1	0.2 ± 2.4	-0.1 ± 1.2	-0.1 ± 1.6
April	0.0 ± 2.0	-0.3 ± 2.4	0.2 ± 1.1	-0.4 ± 1.9	-0.6 ± 2.0
May	-3.3 ± 3.6	1.2 ± 4.0	1.0 ± 3.5	0.9 ± 3.1	-1.2 ± 2.9
June	1.0 ± 3.7	-0.1 ± 2.0	-0.8 ± 2.3	0.2 ± 1.9	0.2 ± 2.5
July	-1.9 ± 3.5	0.5 ± 1.7	-0.6 ± 3.7	0.1 ± 3.1	3.9 ± 3.0
August	1.3 ± 2.9	-0.5 ± 2.4	1.5 ± 3.3	0.4 ± 3.3	-2.7 ± 3.3
September	3.0 ± 2.6	-0.6 ± 2.4	0.4 ± 4.7	0.0 ± 2.2	0.2 ± 2.9
October	-2.7 ± 5.6	0.4 ± 2.5	-0.5 ± 3.0	1.1 ± 4.4	0.3 ± 3.5
November	-0.5 ± 3.1	-1.5 ± 3.2	-1.0 ± 3.2	1.2 ± 4.5	-2.6 ± 2.9
December	-1.0 ± 2.5	-0.3 ± 2.5	1.2 ± 1.7	0.1 ± 1.7	-0.3 ± 2.1
	Cs-134 (Required LLD 10.0)				
January	1.5 ± 2.3	-1.7 ± 4.2	0.4 ± 0.8	-0.6 ± 1.4	-0.1 ± 0.2
February	0.5 ± 0.5	0.3 ± 0.5	-0.7 ± 13.1	-0.2 ± 1.3	-0.6 ± 0.8
March	1.2 ± 1.2	-0.8 ± 1.0	-0.7 ± 4.9	-0.3 ± 0.5	-0.7 ± 8.7
April	0.5 ± 1.9	-0.1 ± 0.3	-1.3 ± 1.2	0.7 ± 1.8	0.6 ± 1.7
May	-4.5 ± 12.8	-2.0 ± 46.7	-0.2 ± 1.3	0.6 ± 1.2	-0.3 ± 0.3
June	1.5 ± 2.6	0.8 ± 1.0	1.4 ± 55.8	0.7 ± 0.8	-2.0 ± 2.9
July	-1.7 ± 1.4	0.5 ± 2.3	-1.8 ± 2.8	0.7 ± 1.7	2.9 ± 7.8
August	-1.1 ± 1.3	-1.0 ± 1.0	-0.2 ± 0.2	1.8 ± 10.0	0.2 ± 0.1
September	0.2 ± 0.2	0.3 ± 0.5	0.4 ± 2.5	1.8 ± 1.4	0.7 ± 0.7
October	2.7 ± 3.9	-2.5 ± 25.3	-0.3 ± 0.3	-0.5 ± 11.2	1.3 ± 1.0
November	-0.3 ± 0.5	0.7 ± 3.0	-0.7 ± 2.2	1.3 ± 1.6	-0.6 ± 0.5
December	0.1 ± 0.1	0.3 ± 2.5	0.5 ± 1.6	0.3 ± 1.5	1.4 ± 6.1
	Cs-137 (Required LLD 10.0)				
January	0.2 ± 3.4	-0.3 ± 3.2	1.6 ± 1.9	0.9 ± 2.3	-0.6 ± 3.0
February	0.3 ± 2.3	0.8 ± 1.4	0.3 ± 1.7	-1.3 ± 1.7	-0.4 ± 1.9
March	1.4 ± 1.8	-0.7 ± 3.0	-0.2 ± 2.0	0.2 ± 1.1	1.6 ± 1.6
April	-0.6 ± 1.7	0.3 ± 2.2	0.9 ± 1.1	0.1 ± 1.6	-0.2 ± 1.8
May	1.6 ± 3.2	3.4 ± 3.7	1.0 ± 2.7	0.6 ± 2.6	1.4 ± 2.6
June	1.9 ± 2.5	0.3 ± 1.3	0.4 ± 1.9	0.7 ± 1.2	-1.3 ± 1.9
July	-0.6 ± 2.3	-0.7 ± 1.4	-0.2 ± 2.6	0.2 ± 3.5	0.9 ± 2.9
August	0.1 ± 2.2	1.4 ± 1.8	1.8 ± 2.4	1.5 ± 2.4	-0.4 ± 1.9
September	-0.3 ± 1.6	0.3 ± 1.8	0.6 ± 2.7	0.2 ± 1.5	0.5 ± 2.1
October	-0.1 ± 2.4	0.2 ± 1.3	-0.5 ± 1.5	-0.4 ± 2.0	0.9 ± 3.1
November	-0.3 ± 2.5	2.2 ± 2.2	-0.6 ± 2.4	-1.8 ± 3.0	-0.9 ± 2.2
December	0.9 ± 2.1	-0.8 ± 2.3	1.1 ± 1.5	0.7 ± 1.4	-0.5 ± 1.9

* E-12 Unit-1 Discharge Flume is a monthly composite of weekly grab samples.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN LAKE WATER SAMPLES
(Monthly Collections)
(pCi/L)

Collection Period	E-01 Met. Tower	E-05 Two Creeks Park	E-06 Coast Guard Station	E-33 Nature Conservancy	E-12 Unit-1 Discharge Flume[a]
	Ba-La-140 (Required LLD 15.0)				
January	-5.2 ± 12.1	-8.0 ± 13.3	2.7 ± 3.3	-0.6 ± 1.1	7.7 ± 36.2
February	3.7 ± 11.9	0.2 ± 0.3	0.3 ± 1.7	-3.7 ± 6.4	-1.3 ± 2.9
March	-0.9 ± 4.1	-1.9 ± 7.4	3.0 ± 3.1	-1.9 ± 13.4	-0.3 ± 2.1
April	-1.5 ± 4.4	0.5 ± 2.7	1.3 ± 8.9	0.9 ± 4.5	-2.1 ± 4.6
May	-1.0 ± 3.0	-0.7 ± 1.4	0.8 ± 2.2	2.8 ± 7.4	-5.2 ± 27.1
June	1.2 ± 2.5	0.1 ± 0.4	0.6 ± 2.0	-0.9 ± 5.0	0.2 ± 17.9
July	-5.7 ± 26.2	0.3 ± 0.6	-5.2 ± 9.6	-1.0 ± 2.2	-3.1 ± 4.9
August	0.6 ± 0.8	-12.5 ± 32.3	7.3 ± 14.9	7.3 ± 10.1	0.8 ± 4.1
September	5.0 ± 17.7	-6.3 ± 12.7	-14.4 ± 31.1	1.5 ± 2.6	-0.5 ± 0.9
October	-3.7 ± 22.3	-2.3 ± 3.2	-6.8 ± 14.9	-10.3 ± 27.1	4.4 ± 22.8
November	-1.2 ± 1.7	-1.4 ± 22.0	0.6 ± 1.1	-1.9 ± 8.1	-3.7 ± 3.5
December	-1.3 ± 3.4	-0.9 ± 3.3	-0.7 ± 2.4	-0.4 ± 0.5	-1.9 ± 4.7
	Other Gammas[b] (Required LLD 30.0)				
January	2.0 ± 1.5	-2.3 ± 3.4	0.1 ± 0.1	-1.2 ± 1.3	0.2 ± 0.2
February	-3.0 ± 2.8	-0.5 ± 0.2	-0.3 ± 0.1	0.0 ± 0.1	-1.2 ± 0.7
March	0.9 ± 0.5	-1.6 ± 1.5	0.6 ± 0.2	-0.3 ± 0.1	-1.0 ± 0.6
April	0.9 ± 2.1	-1.1 ± 2.2	-0.6 ± 0.2	-0.8 ± 0.6	-1.8 ± 1.3
May	-2.2 ± 12.3	-0.4 ± 0.8	-1.1 ± 2.7	0.8 ± 0.8	-0.7 ± 1.1
June	1.4 ± 6.3	-0.8 ± 0.5	-1.1 ± 1.5	-0.2 ± 0.1	0.4 ± 0.2
July	-0.9 ± 0.4	-0.4 ± 0.2	0.0 ± 0.1	0.4 ± 0.3	-2.4 ± 3.7
August	1.0 ± 0.9	-1.8 ± 1.1	0.3 ± 0.5	-1.3 ± 1.0	-0.6 ± 0.2
September	-0.9 ± 0.4	-1.0 ± 0.6	-1.0 ± 0.8	-1.1 ± 0.3	-0.1 ± 0.1
October	1.9 ± 2.1	0.3 ± 0.2	1.3 ± 0.6	-1.4 ± 0.6	0.6 ± 0.3
November	1.2 ± 0.7	-1.3 ± 0.5	-0.4 ± 0.2	-2.5 ± 1.5	1.3 ± 0.5
December	-0.8 ± 0.3	-1.1 ± 0.9	-0.5 ± 0.1	-2.0 ± 0.4	-0.6 ± 0.5

[a] E-12 Unit-1 Discharge Flume is a monthly composite of weekly grab samples.
[b] Ru-103

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN LAKE WATER SAMPLES

(Monthly Collections)

(pCi/L)

Collection Period	E-01 Met. Tower	E-05 Two Creeks Park	E-06 Coast Guard Station	E-33 Nature Conservancy	E-12 Unit-1 Discharge Flume*
	Sr-89 (Required LLD 5.0)				
1st Quarter	0.0 ± 0.8	0.4 ± 0.8	-0.2 ± 0.8	0.9 ± 0.8	-0.9 ± 0.8
2nd Quarter	-0.3 ± 0.7	0.1 ± 0.8	0.0 ± 0.7	-0.4 ± 0.8	0.2 ± 0.9
3rd Quarter	0.0 ± 1.3	-0.5 ± 1.2	0.5 ± 1.2	0.3 ± 1.1	-0.3 ± 0.9
4th Quarter	0.0 ± 0.7	0.4 ± 0.7	0.6 ± 0.7	0.3 ± 0.7	
	Sr-90 (Required LLD 1.0)				
1st Quarter	0.4 ± 0.3	0.4 ± 0.3	0.6 ± 0.3	0.2 ± 0.3	0.9 ± 0.5
2nd Quarter	0.4 ± 0.3	0.4 ± 0.3	0.3 ± 0.3	0.5 ± 0.3	0.4 ± 0.2
3rd Quarter	0.7 ± 0.3	0.6 ± 0.3	0.4 ± 0.3	0.5 ± 0.3	0.6 ± 0.3
4th Quarter	0.4 ± 0.3	0.4 ± 0.3	0.2 ± 0.3	0.3 ± 0.3	
	H-3 (Required LLD 500)				
1st Quarter	482 ± 100	179 ± 88	543 ± 102	138 ± 86	257 ± 89
2nd Quarter	50 ± 80	79 ± 81	200 ± 86	151 ± 84	144 ± 84
3rd Quarter	158 ± 88	194 ± 90	171 ± 89	181 ± 90	139 ± 87
4th Quarter	1264 ± 125	20 ± 81	68 ± 83	132 ± 86	882 ± 113

* E-12 Unit-1 Discharge Flume is a monthly composite of weekly grab samples.

Note: Page 24 is intentionally left out.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN FISH SAMPLES

EDIBLE PORTIONS ONLY - COLLECTED AT E-13
(Collected 3x / year)

Sample Description and Concentration (pCi/g wet)				Required LLD
Collection Date	03-04-98	03-04-98	03-04-98	
Lab Code	EF-1340	EF-1341	EF-1342	
Type	Lake Trout	Lake Trout	Chinook Salmon	
Ratio (wet wt./dry wt.)	4.11	5.52	3.03	
Gross Beta	3.46 ± 0.11	1.90 ± 0.07	3.85 ± 0.12	0.5
K-40	2.45 ± 0.341	2.43 ± 0.62	3.20 ± 0.40	
Mn-54	0.002 ± 0.008	-0.004 ± 0.021	0.001 ± 0.008	0.13
Fe-59	0.004 ± 0.009	-0.025 ± 0.023	-0.008 ± 0.011	0.26
Co-58	0.002 ± 0.010	-0.020 ± 0.030	-0.002 ± 0.010	0.13
Co-60	-0.002 ± 0.003	0.014 ± 0.323	-0.001 ± 0.012	0.13
Zn-65	0.034 ± 0.021	0.015 ± 0.051	0.014 ± 0.023	0.26
Cs-134	-0.002 ± 0.012	0.007 ± 0.009	0.001 ± 0.003	0.13
Cs-137	0.131 ± 0.022	0.034 ± 0.024	0.092 ± 0.020	0.15
Other Gammas[a]	-0.003 ± 0.002	0.008 ± 0.007	-0.008 ± 0.006	0.5

Collection Date	03-04-98	
Lab Code	EF-1343	
Type	Whitefish	
Ratio (wet wt./dry wt.)	6.37	
Gross Beta	3.22 ± 0.10	0.5
K-40	2.19 ± 0.51	
Mn-54	0.001 ± 0.013	0.13
Fe-59	0.010 ± 0.010	0.26
Co-58	-0.002 ± 0.018	0.13
Co-60	-0.002 ± 0.012	0.13
Zn-65	0.010 ± 0.035	0.26
Cs-134	0.007 ± 0.008	0.13
Cs-137	0.015 ± 0.016	0.15
Other Gammas[a]	0.008 ± 0.012	0.5

[a] Ru-103

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN FISH SAMPLES

EDIBLE PORTIONS ONLY - COLLECTED AT E-13

(Collected 3x / year)

Sample Description and Concentration (pCi/g wet)			Required LLD
Collection Date	08-13-98	08-13-98	
Lab Code	EF-6252	EF-6253	
Type	Lake Trout[b]	Carp[b]	
Ratio (wet wt./dry wt.)	5.34	5.51	
Gross Beta	1.87 ± 0.11	3.08 ± 0.08[c]	0.5
K-40	2.17 ± 0.39	2.89 ± 0.36	
Mn-54	-0.001 ± 0.013	-0.005 ± 0.007	0.13
Fe-59	-0.011 ± 0.011	-0.007 ± 0.044	0.26
Co-58	0.002 ± 0.013	0.003 ± 0.009	0.13
Co-60	0.013 ± 0.078	0.002 ± 0.022	0.13
Zn-65	-0.016 ± 0.027	-0.006 ± 0.024	0.26
Cs-134	0.000 ± 0.001	0.002 ± 0.006	0.13
Cs-137	0.056 ± 0.024	0.016 ± 0.010	0.15
Other Gammas[a]	-0.002 ± 0.011	0.004 ± 0.003	0.5
Collection Date	12-16-98		
Lab Code	EF-10679		
Type	Lake Trout		
Ratio (wet wt./dry wt.)	2.95		
Gross Beta	3.49 ± 0.11		0.5
K-40	3.42 ± 0.37		
Mn-54	0.006 ± 0.008		0.13
Fe-59	-0.008 ± 0.029		0.26
Co-58	-0.006 ± 0.008		0.13
Co-60	0.006 ± 0.048		0.13
Zn-65	0.010 ± 0.019		0.26
Cs-134	-0.004 ± 0.083		0.13
Cs-137	0.038 ± 0.014		0.15
Other Gamma[a]	-0.006 ± 0.004		0.5

[a] Ru-103

[b] Collected at location E-12.

[c] Result of reanalysis.

Note: Page 27 is intentionally left out.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN SHORELINE SEDIMENT SAMPLES

(Semiannual Collections)

Sample Description and Concentration (pCi/g dry)

Collection Date Lab Code	04-22-98 ESS-2666,7	04-22-98 ESS-2668	04-22-98 ESS-2669	Required LLD
Location	E-01	E-05	E-06	
Gross Beta	7.90 ± 1.42	6.13 ± 1.87	6.73 ± 1.90	2.0
Be-7	0.029 ± 0.045	-0.005 ± 0.049	0.001 ± 0.047	
K-40	5.64 ± 0.25	5.99 ± 0.31	6.62 ± 0.32	-
Cs-137	0.035 ± 0.012	0.023 ± 0.010	0.024 ± 0.009	0.15
Tl-208	0.047 ± 0.011	0.051 ± 0.015	0.060 ± 0.017	-
Pb-212	0.13 ± 0.04	0.15 ± 0.03	0.16 ± 0.02	-
Bi-214	0.12 ± 0.02	0.14 ± 0.02	0.13 ± 0.02	-
Ra-226	0.32 ± 0.12	0.56 ± 0.12	0.41 ± 0.12	-
Ac-228	0.17 ± 0.07	0.18 ± 0.05	0.14 ± 0.05	-

Collection Date Lab Code	04-22-98 ESS-2670	04-22-98 ESS-2671	
Location	E-12	E-33	
Gross Beta	6.32 ± 1.79	2.45 ± 1.48	2.0
Be-7	0.023 ± 0.045	0.049 ± 0.044	
K-40	5.48 ± 0.31	4.50 ± 0.29	-
Cs-137	0.025 ± 0.014	0.029 ± 0.012	0.15
Tl-208	0.054 ± 0.014	0.042 ± 0.014	-
Pb-212	0.12 ± 0.02	0.15 ± 0.02	-
Bi-214	0.11 ± 0.02	0.13 ± 0.02	-
Ra-226	0.45 ± 0.13	0.34 ± 0.15	-
Ac-228	0.11 ± 0.05	0.17 ± 0.05	-

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN SHORELINE SEDIMENT SAMPLES

(Semiannual Collections)

Sample Description and Concentration (pCi/g dry)

Collection Date	10-07-98	10-07-98	10-07-98	Required
Lab Code	ESS-8202,3	ESS-8204	ESS-8205	LLD
Location	E-01	E-05	E-06	
Gross Beta	5.48 ± 1.44	5.41 ± 2.03	10.05 ± 2.32	2.0
Be-7	0.005 ± 0.079	0.067 ± 0.15	-0.028 ± 0.10	
K-40	7.08 ± 0.33	7.92 ± 0.57	9.36 ± 0.48	-
Cs-137	0.037 ± 0.015	0.018 ± 0.013	0.042 ± 0.018	0.15
Tl-208	0.039 ± 0.014	0.058 ± 0.032	0.051 ± 0.019	-
Pb-212	0.13 ± 0.022	0.17 ± 0.045	0.12 ± 0.027	-
Bi-214	0.14 ± 0.026	0.37 ± 0.050	0.12 ± 0.029	-
Ra-226	0.35 ± 0.13	0.93 ± 0.24	0.52 ± 0.17	-
Ac-228	0.17 ± 2.28	0.27 ± 0.075	0.18 ± 0.059	-

Collection Date	10-07-98	10-07-98	
Lab Code	ESS-8206	ESS-8207	
Location	E-12	E-33	
Gross Beta	4.61 ± 1.98	5.16 ± 2.02	2.0
Be-7	0.028 ± 0.16	0.079 ± 0.096	
K-40	6.84 ± 0.68	4.64 ± 0.40	-
Cs-137	0.022 ± 0.017	0.035 ± 0.014	0.15
Tl-208	0.061 ± 0.41	0.070 ± 0.018	-
Pb-212	1.27 ± 0.043	0.17 ± 0.030	-
Bi-214	0.11 ± 0.21	0.20 ± 0.033	-
Ra-226	0.27 ± 0.27	0.39 ± 0.21	-
Ac-228	0.10 ± 0.32	0.22 ± 0.060	-

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN SOIL SAMPLES

(Semiannual Collections)

Sample Description and Concentration (pCi/g dry)					
Collection Date	05-14-98	05-14-98	05-14-98	05-14-98	Required
Lab Code	ESO-3550	ESO-3551	ESO-3552	ESO-3553	LLD
Location	E-01	E-02	E-03	E-04	
Gross Beta	24.28 ± 2.18	24.59 ± 2.19	24.48 ± 2.18	12.05 ± 1.77	2.0
Be-7	0.49 ± 0.28	0.99 ± 0.30	0.84 ± 0.31	0.94 ± 0.45	
K-40	17.98 ± 0.81	19.96 ± 0.86	19.73 ± 0.93	12.47 ± 0.85	-
Cs-137	0.26 ± 0.04	0.15 ± 0.04	0.15 ± 0.03	0.00 ± 0.02	0.15
Tl-208	0.22 ± 0.04	0.21 ± 0.03	0.17 ± 0.04	0.13 ± 0.05	-
Pb-212	0.64 ± 0.06	0.58 ± 0.06	0.51 ± 0.06	0.41 ± 0.06	-
Bi-214	0.44 ± 0.07	0.43 ± 0.06	0.38 ± 0.06	0.39 ± 0.09	-
Ra-226	1.48 ± 0.39	1.02 ± 0.51	0.74 ± 0.44	1.29 ± 0.36	-
Ac-228	0.70 ± 0.12	0.64 ± 0.12	0.55 ± 0.12	0.35 ± 0.12	-
Collection Date	05-14-98	05-14-98	05-14-98	05-14-98	
Lab Code	ESO-3554	ESO-3555	ESO-3556	ESO-3557	
Location	E-06	E-08	E-09	E-20	
Gross Beta	10.30 ± 1.69	16.96 ± 1.94	17.02 ± 1.94	10.54 ± 1.70	2.0
Be-7	0.57 ±0.26	0.36 ± 0.17	1.14 ± 0.45	0.65 ± 0.32	
K-40	9.45 ±0.54	12.82 ± 0.59	13.79 ± 0.83	6.95 ± 0.56	-
Cs-137	0.47 ±0.04	0.02 ± 0.01	0.93 ± 0.06	0.07 ± 0.02	0.15
Tl-208	0.06 ±0.02	0.10 ± 0.02	0.15 ± 0.05	0.09 ± 0.03	-
Pb-212	0.19 ±0.03	0.33 ± 0.04	0.35 ± 0.06	0.22 ± 0.05	-
Bi-214	0.21 ±0.05	0.23 ± 0.04	0.34 ± 0.07	0.15 ± 0.05	-
Ra-226	0.53 ±0.21	0.55 ± 0.25	0.91 ± 0.46	0.83 ± 0.27	-
Ac-228	0.21 ±0.07	0.32 ± 0.06	0.41 ± 0.15	0.32 ± 0.08	-

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN SOIL SAMPLES

(Semiannual Collections)

Sample Description and Concentration (pCi/g dry)

Location	E-01	E-02	E-03	E-04	Required
Lab Code	ESO-8194	ESO-8195	ESO-8196	ESO-8197	LLD
Collection Date	10-08-98	10-08-98	10-08-98	10-08-98	
Gross Beta	22.37 ± 2.98	26.13 ± 3.13	28.34 ± 3.31	14.99 ± 2.59	2.0
Be-7	0.097 ± 0.11	0.075 ± 0.12	1.80 ± 0.28	0.044 ± 0.13	
K-40	15.51 ± 0.69	18.86 ± 0.73	20.82 ± 0.81	13.80 ± 0.73	-
Cs-137	0.31 ± 0.030	0.19 ± 0.034	0.20 ± 0.031	0.42 ± 0.040	0.15
Tl-208	0.18 ± 0.030	0.22 ± 0.038	0.20 ± 0.038	0.14 ± 0.031	-
Pb-212	0.60 ± 0.051	0.53 ± 0.22	0.61 ± 0.053	0.38 ± 0.054	-
Bi-214	0.42 ± 0.048	0.46 ± 0.055	0.42 ± 0.050	0.29 ± 0.053	-
Ra-226	1.22 ± 0.31	1.19 ± 0.44	1.23 ± 0.36	0.69 ± 0.36	-
Ac-228	0.60 ± 0.089	0.67 ± 0.10	0.65 ± 0.12	0.52 ± 0.10	-

Location	E-06	E-08	E-09	E-20	
Lab Code	ESO-8198	ESO-8199	ESO-8200	ESO-8201	
Collection Date	10-08-98	10-08-98	10-08-98	10-08-98	
Gross Beta	18.93 ± 2.79	17.30 ± 2.72	28.54 ± 3.23	23.50 ± 3.01	2.0
Be-7	0.22 ±0.13	0.081 ± 0.11	-0.069 ± 0.18	0.080 ± 0.17	
K-40	12.96 ± 0.61	13.10 ± 0.62	24.03 ± 1.00	18.33 ± 0.92	-
Cs-137	0.42 ± 0.034	0.13 ± 0.023	0.23 ± 0.036	0.43 ± 0.044	0.15
Tl-208	0.077 ± 0.020	0.10 ± 0.027	0.23 ± 0.035	0.22 ± 0.047	-
Pb-212	0.32 ± 0.043	0.28 ± 0.037	0.81 ± 0.075	0.52 ± 0.066	-
Bi-214	0.27 ± 0.039	0.31 ± 0.047	0.48 ± 0.066	0.54 ± 0.069	-
Ra-226	0.66 ± 0.21	0.72 ± 0.28	1.57 ± 0.45	1.15 ± 0.46	-
Ac-228	0.30 ± 0.080	0.36 ± 0.088	0.91 ± 0.14	0.66 ± 0.14	-

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN VEGETATION SAMPLES

(Tri-Annual Collections)

Sample Description and Concentration (pCi/g wet)

Location	E-01	E-02	E-03	E-04	
Collection Date	05-14-98	05-14-98	05-14-98	05-14-98	
Lab Code	EG-3541	EG-3542	EG-3543	EG-3544	Req. LLD
Ratio (wet/dry)	6.23	5.44	3.99	5.16	-
Gross Beta	5.67 ± 0.19	5.96 ± 0.19	5.88 ± 0.19	4.66 ± 0.15	0.25
Be-7	0.32 ± 0.15	0.91 ± 0.19	0.53 ± 0.09	0.79 ± 0.20	0.25
K-40	4.93 ± 0.47	6.43 ± 0.54	5.73 ± 0.30	4.74 ± 0.40	0.25
I-131	-0.009 ± 0.013	0.008 ± 0.078	0.000 ± 0.003	-0.019 ± 0.052	0.060
Cs-134	0.001 ± 0.036	0.005 ± 0.012	-0.002 ± 0.018	-0.001 ± 0.001	0.060
Cs-137	-0.001 ± 0.010	0.003 ± 0.010	0.005 ± 0.005	-0.002 ± 0.008	0.080
Other Gammas[a]	0.007 ± 0.011	0.005 ± 0.029	-0.002 ± 0.005	-0.003 ± 0.011	0.060

Location	E-06	E-08	E-09	E-20	
Collection Date	05-14-98	05-14-98	05-14-98	05-14-98	
Lab Code	EG-3545	EG-3546,7	EG-3548	EG-3549	Req. LLD
Ratio (wet/dry)	2.76	3.61	8.38	4.31	-
Gross Beta	4.96 ± 0.15	10.83 ± 0.24	4.61 ± 0.14	8.63 ± 0.28	0.25
Be-7	0.31 ± 0.11	0.70 ± 0.15	0.23 ± 0.12	1.01 ± 0.20	0.25
K-40	5.51 ± 0.36	7.71 ± 0.44	4.91 ± 0.55	8.84 ± 0.86	0.25
I-131	0.000 ± 0.010	0.007 ± 0.019	0.008 ± 0.021	0.007 ± 0.020	0.060
Cs-134	-0.006 ± 0.012	0.001 ± 0.005	-0.005 ± 0.013	0.016 ± 0.023	0.060
Cs-137	0.005 ± 0.008	0.009 ± 0.009	0.001 ± 0.011	-0.001 ± 0.018	0.080
Other Gammas[a]	-0.007 ± 0.017	0.009 ± 0.019	0.004 ± 0.005	0.011 ± 0.025	0.060

[a] See Introduction.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN VEGETATION SAMPLES

(Tri-Annual Collections)

Sample Description and Concentration (pCi/g wet)

Location	E-01	E-02	E-03	E-04	
Collection Date	07-14-98	07-14-98	07-14-98	07-14-98	
Lab Code	EG-5341	EG-5342	EG-5343	EG-5344	Req. LLD
Ratio (wet/dry)	4.90	3.73	2.49	2.50	-
Gross Beta	6.11 ± 0.22	6.68 ± 0.22	5.47 ± 0.23	5.41 ± 0.21	0.25
Be-7	0.70 ± 0.31	1.06 ± 0.35	1.43 ± 0.33	1.99 ± 0.39	0.25
K-40	5.95 ± 0.70	5.72 ± 0.67	5.37 ± 0.73	4.94 ± 0.75	0.25
I-131	-0.013 ± 0.043	-0.008 ± 0.013	0.005 ± 0.020	-0.005 ± 0.018	0.060
Cs-134	-0.006 ± 0.006	-0.002 ± 0.004	-0.006 ± 0.015	-0.005 ± 0.008	0.060
Cs-137	0.010 ± 0.018	0.003 ± 0.015	-0.007 ± 0.017	-0.003 ± 0.019	0.080
Other Gammas[a]	0.004 ± 0.014	0.005 ± 0.018	0.014 ± 0.039	0.011 ± 0.029	0.060

Location	E-06	E-08	E-09	E-20	
Collection Date	07-14-98	07-14-98	07-14-98	07-14-98	
Lab Code	EG-5345	EG-5346,7	EG-5348	EG-5349	Req. LLD
Ratio (wet/dry)	3.47	2.51	2.70	3.30	-
Gross Beta	3.32 ± 0.09	5.54 ± 0.14	6.31 ± 0.26	6.56 ± 0.23	0.25
Be-7	1.03 ± 0.28	1.13 ± 0.21	1.34 ± 0.32	1.02 ± 0.33	0.25
K-40	3.77 ± 0.39	6.13 ± 0.48	6.08 ± 0.65	7.58 ± 0.64	0.25
I-131	0.008 ± 0.210	0.005 ± 0.095	0.004 ± 0.022	0.001 ± 0.003	0.060
Cs-134	-0.013 ± 0.062	-0.011 ± 0.017	0.004 ± 0.034	-0.010 ± 0.065	0.060
Cs-137	0.009 ± 0.011	0.008 ± 0.012	-0.002 ± 0.012	0.002 ± 0.013	0.080
Other Gammas[a]	0.002 ± 0.003	0.001 ± 0.004	-0.017 ± 0.037	-0.002 ± 0.005	0.060

[a] See Introduction.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN VEGETATION SAMPLES

(Tri-Annual Collections)

Sample Description and Concentration (pCi/g wet)

Location	E-01	E-02	E-03	E-04	
Collection Date	10-08-98	10-08-98	10-08-98	10-08-98	
Lab Code	EG-8183	EG-8184	EG-8185	EG-8186	Req. LLD
Ratio (wet/dry)	2.35	3.04	3.04	4.78	-
Gross Beta	4.40 ± 0.22	4.58 ± 0.22	5.74 ± 0.22	5.86 ± 0.20	0.25
Be-7	5.10 ± 0.38	2.75 ± 0.24	2.65 ± 0.22	4.32 ± 0.28	0.25
K-40	3.49 ± 0.43	4.07 ± 0.35	6.11 ± 0.39	3.83 ± 0.23	0.25
I-131	0.011 ± 0.024	-0.003 ± 0.009	0.006 ± 0.024	0.004 ± 0.004	0.060
Cs-134	0.014 ± 0.011	0.002 ± 0.008	0.000 ± 0.008	0.000 ± 0.008	0.060
Cs-137	0.002 ± 0.010	-0.002 ± 0.007	-0.003 ± 0.008	0.006 ± 0.008	0.080
Other Gammas[a]	0.003 ± 0.005	-0.005 ± 0.011	-0.008 ± 0.011	0.001 ± 0.011	0.060

Location	E-06	E-08	E-09	E-20	
Collection Date	10-08-98	10-08-98	10-08-98	10-08-98	
Lab Code	EG-8187	EG-8188	EG-8189	EG-8190	Req. LLD
Ratio (wet/dry)	2.33	1.92	1.75	2.89	-
Gross Beta	5.35 ± 0.26	5.55 ± 0.26	4.48 ± 0.47	5.74 ± 0.24	0.25
Be-7	3.32 ± 0.31	8.87 ± 0.62	7.25 ± 0.46	1.74 ± 0.30	0.25
K-40	3.77 ± 0.45	3.70 ± 0.59	3.27 ± 0.49	5.54 ± 0.64	0.25
I-131	0.001 ± 0.002	0.013 ± 0.19	-0.004 ± 0.044	-0.014 ± 0.034	0.060
Cs-134	0.005 ± 0.013	0.011 ± 0.027	0.011 ± 0.014	0.000 ± 0.001	0.060
Cs-137	0.048 ± 0.025	0.003 ± 0.019	0.004 ± 0.012	0.002 ± 0.017	0.080
Other Gammas[a]	-0.002 ± 0.005	0.003 ± 0.025	-0.006 ± 0.014	0.006 ± 0.026	0.060

[a] See Introduction.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN AQUATIC VEGETATION

(Semiannual Collections)

Sample Description and Concentration (pCi/g wet)				
Collection Date	06-02-98	06-02-98		Required
Lab Code	ESL-4134	ESL-4135		LLD
Location	E-5	E-12		
Ratio (wet wt./dry wt.)	5.36	8.48		
Gross Beta	3.20 ± 0.28	2.29 ± 0.15		0.25
Be-7	0.78 ± 0.26	0.10 ± 0.09		-
K-40	2.04 ± 0.44	1.67 ± 0.29		-
Co-58	0.007 ± 0.015	-0.002 ± 0.010		0.25
Co-60	-0.003 ± 0.003	0.008 ± 0.007		0.25
Cs-134	0.004 ± 0.003	-0.004 ± 0.003		0.25
Cs-137	0.027 ± 0.014	0.014 ± 0.010		0.25
Collection Date	08-12-98	08-12-98		
Lab Code	ESL-6254	ESL-6255		
Location	E-5	E-12		
Ratio (wet wt./dry wt.)	2.74	3.33		
Gross Beta	5.35 ± 0.71	6.49 ± 0.69		0.25
Be-7	0.92 ± 0.18	0.51 ± 0.15		-
K-40	2.64 ± 0.42	4.35 ± 0.67		-
Co-58	0.026 ± 0.012	0.007 ± 0.016		0.25
Co-60	0.005 ± 0.005	0.001 ± 0.002		0.25
Cs-134	0.003 ± 0.006	-0.008 ± 0.004		0.25
Cs-137	0.030 ± 0.010	0.025 ± 0.016		0.25
Collection Date	10-07-98	10-07-98	10-07-98	
Lab Code	ESL-8191	ESL-8192	ESL-8193	
Location	E-5	E-12	E-33	
Ratio (wet wt./dry wt.)	3.28	4.09	3.18	
Gross Beta	3.70 ± 0.47	3.75 ± 0.39	3.41 ± 0.51	0.25
Be-7	0.61 ± 0.32	1.41 ± 0.36	0.83 ± 0.23	-
K-40	1.92 ± 0.58	2.52 ± 0.35	2.37 ± 0.51	-
Co-58	-0.004 ± 0.013	0.010 ± 0.012	0.018 ± 0.014	0.25
Co-60	0.009 ± 0.035	0.006 ± 0.035	0.004 ± 0.005	0.25
Cs-134	0.007 ± 0.012	0.003 ± 0.003	0.007 ± 0.021	0.25
Cs-137	0.019 ± 0.012	0.055 ± 0.025	0.019 ± 0.015	0.25

POINT BEACH NUCLEAR PLANT

AMBIENT GAMMA RADIATION (TLD)

1st. Quarter, 1998

Date Annealed:	01-02-98	Days in the field	91
Date Placed:	01-08-98	Days from Annealing	
Date Removed:	04-09-98	to Readout:	111
Date Read:	04-23-98		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	91	12.6 ± 0.7	9.0 ± 0.8	0.69 ± 0.06
E-2	91	14.7 ± 0.4	11.1 ± 0.5	0.85 ± 0.04
E-3	91	15.2 ± 0.5	11.6 ± 0.6	0.89 ± 0.05
E-4	91	13.8 ± 0.9	10.2 ± 1.0	0.78 ± 0.07
E-5	91	14.6 ± 0.5	11.0 ± 0.6	0.84 ± 0.05
E-6	91	13.4 ± 0.2	9.8 ± 0.4	0.75 ± 0.03
E-7	91	14.6 ± 0.3	11.0 ± 0.4	0.84 ± 0.03
E-8	91	14.9 ± 0.6	11.3 ± 0.7	0.87 ± 0.05
E-9	91	12.7 ± 0.7	9.1 ± 0.8	0.70 ± 0.06
E-12	91	15.3 ± 0.7	11.7 ± 0.8	0.90 ± 0.06
E-14	91	14.2 ± 0.5	10.6 ± 0.7	0.81 ± 0.05
E-15	91	15.5 ± 0.6	11.9 ± 0.7	0.91 ± 0.05
E-16	91	13.5 ± 0.4	9.9 ± 0.5	0.76 ± 0.04
E-17	91	13.4 ± 0.4	9.8 ± 0.5	0.75 ± 0.04
E-18	91	15.1 ± 0.4	11.5 ± 0.5	0.88 ± 0.04
E-22	91	14.9 ± 0.5	11.3 ± 0.6	0.87 ± 0.05
E-23	91	15.9 ± 0.7	12.3 ± 0.8	0.94 ± 0.06
E-24	91	15.9 ± 0.8	12.3 ± 0.9	0.94 ± 0.07
E-25	91	15.1 ± 0.4	11.5 ± 0.5	0.88 ± 0.04
E-26	91	14.1 ± 0.5	10.5 ± 0.6	0.80 ± 0.05
E-27	91	14.8 ± 0.2	11.2 ± 0.4	0.86 ± 0.03
E-28	91	ND[a]	ND[a]	ND[a]
E-29	91	14.3 ± 0.9	10.7 ± 1.0	0.82 ± 0.07
E-30	91	14.9 ± 0.4	11.3 ± 0.5	0.87 ± 0.04
E-31	91	15.3 ± 0.4	11.7 ± 0.5	0.90 ± 0.04
E-32	91	ND[a]	ND[a]	ND[a]
E-34	91	11.7 ± 0.2	8.1 ± 0.4	0.62 ± 0.03
E-35	91	14.6 ± 0.3	11.0 ± 0.4	0.84 ± 0.03
E-36	91	15.2 ± 0.4	11.6 ± 0.5	0.89 ± 0.04
E-38[b]	91	12.3 ± 0.8	8.7 ± 0.9	0.67 ± 0.07
E-39[b]	91	19.9 ± 0.5	16.3 ± 0.6	1.25 ± 0.05
Control				
E-20	91	13.7 ± 0.4	10.1 ± 0.5	0.77 ± 0.04
Mean±S.D.		14.5 ± 1.5	10.9 ± 1.5	0.84 ± 0.11

In-Transit Exposure

Date Annealed	01-02-98	03-30-98
Date Read	01-19-98	04-23-98
	Total mR	
ITC-1	2.1 ± 0.1	5.2 ± 0.2
ITC-2	2.1 ± 0.1	5.2 ± 0.2

[a] ND = No data; TLD lost in the field.

[b] Corrected location number.

POINT BEACH NUCLEAR PLANT

AMBIENT GAMMA RADIATION (TLD)

2nd Quarter, 1998

Date Annealed:	03-30-98	Days in the field	91
Date Placed:	04-09-98	Days from Annealing	
Date Removed:	07-09-98	to Readout:	118
Date Read:	07-26-98		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	91	11.8 ± 0.6	7.4 ± 0.7	0.57 ± 0.05
E-2	91	13.3 ± 0.6	8.9 ± 0.7	0.69 ± 0.06
E-3	91	13.7 ± 0.3	9.4 ± 0.5	0.72 ± 0.04
E-4	91	11.8 ± 0.6	7.4 ± 0.7	0.57 ± 0.05
E-5	91	12.7 ± 0.4	8.4 ± 0.6	0.64 ± 0.04
E-6	91	12.4 ± 0.3	8.0 ± 0.5	0.62 ± 0.04
E-7	91	11.5 ± 0.8	7.2 ± 0.8	0.55 ± 0.06
E-8	91	11.3 ± 0.5	7.0 ± 0.6	0.54 ± 0.05
E-9	91	13.4 ± 0.7	9.1 ± 0.8	0.70 ± 0.06
E-12	91	10.9 ± 0.4	6.6 ± 0.5	0.51 ± 0.04
E-14	91	14.0 ± 0.3	9.7 ± 0.5	0.74 ± 0.04
E-15	91	14.6 ± 0.5	10.3 ± 0.6	0.79 ± 0.05
E-16	91	13.8 ± 0.3	9.5 ± 0.5	0.73 ± 0.04
E-17	91	11.9 ± 0.7	7.6 ± 0.8	0.58 ± 0.06
E-18	91	14.3 ± 0.6	9.9 ± 0.7	0.77 ± 0.05
E-22	91	14.1 ± 0.3	9.7 ± 0.5	0.75 ± 0.04
E-23	91	14.6 ± 1.0	10.3 ± 1.0	0.79 ± 0.08
E-24	91	15.0 ± 0.8	10.6 ± 0.9	0.82 ± 0.07
E-25	91	14.3 ± 0.5	10.0 ± 0.6	0.77 ± 0.05
E-26	91	11.4 ± 0.8	7.0 ± 0.9	0.54 ± 0.07
E-27	91	14.5 ± 0.5	10.1 ± 0.6	0.78 ± 0.05
E-28	91	10.5 ± 1.0	6.1 ± 1.1	0.47 ± 0.08
E-29	91	13.0 ± 0.9	8.7 ± 1.0	0.67 ± 0.08
E-30	91	13.9 ± 0.2	9.6 ± 0.4	0.74 ± 0.03
E-31	91	14.4 ± 0.7	10.1 ± 0.8	0.78 ± 0.06
E-32	91	10.8 ± 0.5	6.5 ± 0.6	0.50 ± 0.05
E-34	91	12.1 ± 0.1	7.8 ± 0.4	0.60 ± 0.03
E-35	91	11.3 ± 0.5	6.9 ± 0.6	0.53 ± 0.05
E-36	91	10.4 ± 0.7	6.1 ± 0.7	0.47 ± 0.06
E-38[a]	91	11.5 ± 0.6	7.1 ± 0.7	0.55 ± 0.05
E-39[a]	91	15.1 ± 0.5	10.7 ± 0.6	0.83 ± 0.05
Control				
E-20	91	12.6 ± 0.3	8.2 ± 0.5	0.63 ± 0.04
Mean±s.d.		12.8 ± 1.5	8.5 ± 1.5	0.65 ± 0.11

In-Transit Exposure

Date Annealed	03-30-98	06-30-98
Date Read	04-23-98	07-26-98
	Total mR	
ITC-1	5.2 ± 0.2	3.4 ± 0.1
ITC-2	5.2 ± 0.2	3.5 ± 0.2

[a] Corrected location number.

POINT BEACH NUCLEAR PLANT

AMBIENT GAMMA RADIATION (TLD)

3rd Quarter, 1998

Date Annealed:	06-30-98	Days in the field	85
Date Placed:	07-09-98	Days from Annealing	
Date Removed:	10-02-98	to Readout:	109
Date Read:	10-17-98		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	85	13.1 ± 0.5	10.2 ± 0.6	0.84 ± 0.05
E-2	85	13.4 ± 0.7	10.5 ± 0.8	0.87 ± 0.07
E-3	85	13.3 ± 0.5	10.4 ± 0.6	0.86 ± 0.05
E-4	85	12.8 ± 0.1	9.9 ± 0.4	0.82 ± 0.03
E-5	85	14.3 ± 0.3	11.4 ± 0.5	0.94 ± 0.04
E-6	85	10.9 ± 0.5	8.0 ± 0.6	0.66 ± 0.05
E-7	85	13.2 ± 0.4	10.3 ± 0.5	0.85 ± 0.05
E-8	85	13.7 ± 0.6	10.8 ± 0.7	0.89 ± 0.06
E-9	85	14.7 ± 0.4	11.8 ± 0.5	0.98 ± 0.05
E-12	85	12.1 ± 0.5	9.2 ± 0.6	0.76 ± 0.05
E-14	85	14.8 ± 0.4	11.9 ± 0.5	0.98 ± 0.05
E-15	85	13.5 ± 0.9	10.6 ± 1.0	0.88 ± 0.08
E-16	85	13.6 ± 0.4	10.7 ± 0.5	0.89 ± 0.05
E-17	85	14.4 ± 0.3	11.5 ± 0.5	0.95 ± 0.04
E-18	85	14.8 ± 0.5	11.9 ± 0.6	0.98 ± 0.05
E-22	85	14.7 ± 0.2	11.8 ± 0.4	0.98 ± 0.04
E-23	85	15.3 ± 0.8	12.4 ± 0.9	1.03 ± 0.07
E-24	85	14.3 ± 1.0	11.4 ± 1.1	0.94 ± 0.09
E-25	85	13.4 ± 0.4	10.5 ± 0.5	0.87 ± 0.05
E-26	85	12.9 ± 0.3	10.0 ± 0.5	0.83 ± 0.04
E-27	85	13.1 ± 0.2	10.2 ± 0.4	0.84 ± 0.04
E-28	85	11.7 ± 0.5	8.8 ± 0.6	0.73 ± 0.05
E-29	85	13.1 ± 0.3	10.2 ± 0.5	0.84 ± 0.04
E-30	85	13.7 ± 0.9	10.8 ± 1.0	0.89 ± 0.08
E-31	85	15.0 ± 0.5	12.1 ± 0.6	1.00 ± 0.05
E-32	85	15.0 ± 0.4	12.1 ± 0.5	1.00 ± 0.05
E-34	85	10.8 ± 0.1	7.9 ± 0.4	0.65 ± 0.03
E-35	85	11.1 ± 0.5	8.2 ± 0.6	0.68 ± 0.05
E-36	85	13.1 ± 0.3	10.2 ± 0.5	0.84 ± 0.04
E-38	85	11.6 ± 0.2	8.7 ± 0.4	0.72 ± 0.04
E-39	85	14.8 ± 0.4	11.9 ± 0.5	0.98 ± 0.05
Control				
E-20	85	13.5 ± 0.8	10.6 ± 0.9	0.88 ± 0.07
Mean±s.d.		13.4 ± 1.2	10.6 ± 1.2	0.87 ± 0.11

In-Transit Exposure

Date Annealed	06-30-98	09-28-98
Date Read	07-26-98	10-17-98
	Total mR	
ITC-1	3.4 ± 0.1	2.2 ± 0.2
ITC-2	3.5 ± 0.2	2.2 ± 0.2

APPENDIX A

INTERLABORATORY COMPARISON PROGRAM RESULTS

NOTE: Teledyne's Midwest Laboratory participates in intercomparison studies administered by U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. The results are reported in Appendix A. Also reported are results of International Intercomparison and Teledyne testing of TLD's, as well as, in-house spikes, blanks, duplicates and mixed analyte performance evaluation program results. Appendix A is updated four times a year; the complete Appendix is included in March, June, September and December monthly progress reports only.

January, 1998 through December, 1998

Appendix A

Interlaboratory Comparison Program Results

Teledyne Brown Engineering Environmental Services Midwest Laboratory (formerly Hazleton Environmental Sciences) 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 (e.g., milk or water) 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 the laboratory's analytical procedures and to alert it to 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.

The results in Table A-1 were obtained through participation in the environmental sample crosscheck program for milk, water and air filters during the past twelve months. Data for previous years is available upon request.

This program is conducted by the U.S. Environmental Protection Agency Office of Research and Developement National Exposure Research Laboratory Characterization Research Division-Las Vegas, Nevada.

The results in Table A-2 were obtained for Thermoluminescent Dosimeters (TLDs), via various International Intercomparisons of Environmental Dosimeters under the sponsorships listed in Table A-2. Also Teledyne testing results are listed.

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 list results of 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. Data for previous years available upon request.

The results in Table A-6 were obtained through participation in the mixed analyte performance evaluation program.

The results in Table A-7 were obtained through participation in the Environmental Measurement Laboratory Quality Assessment Program.

Attachment A lists acceptance criteria for "spiked" samples.

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

12-31-98

ATTACHMENT A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

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

Analysis	Level	One Standard Deviation for single determinations
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	1s = (pCi/liter) = $169.85 \times (\text{known})^{0.0933}$ 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	6.0 pCi/liter 10% of known value
Uranium-238, Nickel-63[b] Technetium-99[b]	≤35 pCi/liter >35 pCi/liter	6.0 pCi/liter 15% of known value
Iron-55[b]	50 to 100 pCi/liter >100 pCi/liter	10 pCi/liter 10% of known value
Others[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] Teledyne limit.

Table A-1. U.S. Environmental Protection Agency's crosscheck program, comparison of EPA and Teledyne's Midwest Laboratory results[a].

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[b] Teledyne Results ±2 Sigma[c]	EPA Result[d] 1s, N=1	Control Limits
STW-815	WATER	Jan, 1998	Sr-89	6.0 ± 1.0	8.0 ± 5.0	2.2 - 13.8
STW-815	WATER	Jan, 1998	Sr-90	27.3 ± 1.2	32.0 ± 5.0	26.2 - 37.8
STW-816	WATER	Jan, 1998	Gr. Alpha	31.2 ± 2.3	30.5 ± 7.6	21.7 - 39.3
STW-816	WATER	Jan, 1998	Gr. Beta	6.6 ± 0.6	3.9 ± 5.0	0.0 - 9.7
STW-817	WATER	Feb, 1998	I-131	111.1 ± 0.9	104.9 ± 10.5	86.7 - 123.1
STW-818	WATER	Feb, 1998	Ra-226	14.9 ± 1.3	16.0 ± 2.4	11.8 - 20.2
STW-818	WATER	Feb, 1998	Ra-228	30.9 ± 1.9	33.3 ± 8.3	18.9 - 47.7
STW-818	WATER	Feb, 1998	U	25.8 ± 1.1	32.0 ± 3.0	26.8 - 37.2
The presence of U-232 in the sample interfered with the recovery calculation. Result of recalculation; 28.2±1.2 pCi/L.						
STW-823	WATER	Mar, 1998	H-3	2,151.0 ± 75.2	2,155.0 ± 348.0	1,551.2 - 2,758.8
STW-824	WATER	Apr, 1998	Gr. Alpha	48.3 ± 1.5	54.4 ± 13.6	30.8 - 70.8
STW-824	WATER	Apr, 1998	Ra-226	15.3 ± 0.9	15.0 ± 2.3	11.0 - 19.0
STW-824	WATER	Apr, 1998	Ra-228	7.8 ± 1.0	9.3 ± 2.3	5.3 - 13.3
STW-824	WATER	Apr, 1998	Uranium	5.1 ± 0.1	5.0 ± 3.0	0.0 - 10.2
STW-825	WATER	Apr, 1998	Co-60	50.0 ± 1.7	50.0 ± 5.0	41.3 - 58.7
STW-825	WATER	Apr, 1998	Cs-134	20.7 ± 1.2	22.0 ± 5.0	13.3 - 30.7
STW-825	WATER	Apr, 1998	Cs-137	9.0 ± 1.0	10.0 ± 5.0	1.3 - 18.7
STW-825	WATER	Apr, 1998	Gr. Beta	92.1 ± 3.2	94.7 ± 10.0	77.4 - 112.0
STW-825	WATER	Apr, 1998	Sr-89	5.3 ± 1.5	6.0 ± 5.0	0.0 - 14.7
STW-825	WATER	Apr, 1998	Sr-90	17.3 ± 1.5	18.0 ± 5.0	9.3 - 26.7
STW-826	WATER	Jun, 1998	Ba-133	36.0 ± 1.0	40.0 ± 5.0	31.3 - 48.7
STW-826	WATER	Jun, 1998	Co-60	14.0 ± 1.0	12.0 ± 5.0	3.3 - 20.7
STW-826	WATER	Jun, 1998	Cs-134	26.7 ± 1.2	31.0 ± 5.0	22.3 - 39.7
STW-826	WATER	Jun, 1998	Cs-137	32.7 ± 3.8	35.0 ± 5.0	26.3 - 43.7
STW-826	WATER	Jun, 1998	Zn-65	99.0 ± 11.8	104.0 ± 10.0	86.7 - 121.3
STW-827	WATER	Jun, 1998	Ra-226	4.7 ± 0.4	4.9 ± 0.7	3.7 - 6.1
STW-827	WATER	Jun, 1998	Ra-228	2.6 ± 0.7	2.1 ± 0.5	1.2 - 3.0
STW-827	WATER	Jun, 1998	Uranium	3.0 ± 0.1	3.0 ± 3.0	0.0 - 8.2
STW-831	WATER	Jul, 1998	Sr-89	19.0 ± 3.0	21.0 ± 5.0	12.3 - 29.7
STW-831	WATER	Jul, 1998	Sr-90	7.0 ± 0.0	7.0 ± 5.0	0.0 - 15.7
STW-832	WATER	Jul, 1998	Gr. Alpha	5.8 ± 0.4	7.2 ± 5.0	0.0 - 15.9
STW-832	WATER	Jul, 1998	Gr. Beta	12.4 ± 0.4	12.8 ± 5.0	4.1 - 21.5
STW-833	WATER	Aug, 1998	H-3	17,732.0 ± 31.0	17,996.0 ± 1,800.0	14,873.0 - 21,119.0
STW-840	WATER	Sep, 1998	I-131	5.9 ± 0.1	6.1 ± 2.0	2.6 - 9.6
STW-841	WATER	Sep, 1998	Ra-226	1.7 ± 0.1	1.7 ± 0.3	1.2 - 2.2
STW-841	WATER	Sep, 1998	Ra-228	6.1 ± 0.6	5.7 ± 1.4	3.3 - 8.1

Table A-1. U.S. Environmental Protection Agency's crosscheck program, comparison of EPA and Teledyne's Midwest Laboratory results[a].

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[b] Teledyne Results ±2 Sigma[c]	EPA Result[d] 1s, N=1	Control Limits
STW-841	WATER	Sep, 1998	Uranium	8.2 ± 0.5	9.1 ± 3.0	3.9 - 14.3

[a] Results obtained by Teledyne Brown Engineering Environmental Services Midwest Laboratory as a participant in the environmental sample crosscheck program operated by the Intercomparison and Calibration Section, Quality Assurance Branch, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency (EPA), Las Vegas, Nevada.

[b] All results are in pCi/L, except for elemental potassium (K) data in milk, which are in mg/L; air filter samples, which are in pCi/Filter.

[c] Unless otherwise indicated, the TBEESML results are given as the mean ± 2 standard deviations for three determinations.

[d] USEPA results are presented as the known values and expected laboratory precision (1s, 1 determination) and control limits as defined by the EPA.

Table A-2. Crosscheck program results; Thermoluminescent Dosimeters. (TLDs).

Lab Code	TLD Type	Date	Measurement	mR: Teledyne Results ± 2 Sigma	mR: Known Value	mR: Average ± 2 Sigma (All Participants)
11th International Intercomparison						
115-11A	LiF-100 Chips	Apr, 1997	Field	13.2 ± 1.0	19.0	17.8 ± 8.4
115-11A	LiF-100 Chips	Apr, 1997	Lab, Cs	32.1 ± 2.0	58.1	55.2 ± 9.9
The readings for LiF chips were low in both field and Lab Cs tests. No errors found in efficiency or test calculations, however the reader setting is suspect. Interlaboratory test comparisons for LiF were satisfactory.						
11th International Intercomparison						
115-11B	$CaSO_4$: Dy Cards	Apr, 1997	Field	19.1 ± 1.4	19.1	18.9 ± 8.7
115-11B	$CaSO_4$: Dy Cards	Apr, 1997	Lab, Cs	55.7 ± 4.1	58.3	55.2 ± 14.9
The Eleventh International Intercomparison of Environmental Dosimeters was conducted in 1997 and was organized by the Department of Energy's Environmental Measurements Laboratory in collaboration with Brookhaven National Laboratory and the National Institute of Standards and Technology.						
Teledyne Testing						
96-1	LiF-100 Chips	Mar, 1996	Lab, 1	15.9 ± 0.3	15.4	
96-1	LiF-100 Chips	Mar, 1996	Lab, 2	29.4 ± 0.3	30.8	
96-1	LiF-100 Chips	Mar, 1996	Lab, 3	62.5 ± 1.3	62.5	
96-1	$CaSO_4$: Dy Cards	Mar, 1996	Reader 1, #1	14.4 ± 0.1	15.4	ND
96-1	$CaSO_4$: Dy Cards	Mar, 1996	Reader 1, #2	31.8 ± 0.1	30.8	ND
96-1	$CaSO_4$: Dy Cards	Mar, 1996	Reader 1, #3	64.7 ± 0.4	62.5	ND
Teledyne Testing						
96-2	$CaSO_4$: Dy Cards	Mar, 1996	Reader 2, #1	14.3 ± 0.4	15.4	ND
96-2	$CaSO_4$: Dy Cards	Mar, 1996	Reader 2, #2	31.8 ± 0.1	30.8	ND
96-2	$CaSO_4$: Dy Cards	Mar, 1996	Reader 2, #3	68.6 ± 0.1	62.5	ND
ND = No Data; Teledyne Testing was only performed by Teledyne. Chips and Cards were irradiated by Teledyne Isotopes, Inc., Westwood, New Jersey, in March, 1996.						
Teledyne Testing						
97-1	LiF-100 Chips	Mar, 1997	Lab, 1	13.4 ± 1.4	15.0	
97-1	LiF-100 Chips	Mar, 1997	Lab, 2	29.8 ± 0.6	30.1	
97-1	LiF-100 Chips	Mar, 1997	Lab, 3	63.4 ± 0.9	60.2	

Table A-2. Crosscheck program results; Thermoluminescent Dosimeters. (TLDs).

				mR		
Lab Code	TLD Type	Date	Measurement	Teledyne Results ± 2 Sigma	Known Value	Average ± 2 Sigma (All Participants)
97-1	$CaSO_4$: Dy Cards	Mar, 1997	Reader 1, #1	15.5 ± 0.1	15.0	ND
97-1	$CaSO_4$: Dy Cards	Mar, 1997	Reader 1, #2	34.0 ± 0.1	30.1	ND
97-1	$CaSO_4$: Dy Cards	Mar, 1997	Reader 1, #3	68.3 ± 2.1	60.2	ND
Teledyne Testing						
97-2	$CaSO_4$: Dy Cards	Mar, 1997	Reader 2, #1	16.8 ± 0.3	15.0	ND
97-2	$CaSO_4$: Dy Cards	Mar, 1997	Reader 2, #2	36.2 ± 0.2	30.1	ND
97-2	$CaSO_4$: Dy Cards	Mar, 1997	Reader 2, #3	69.6 ± 0.2	60.2	ND

ND = No Data; Teledyne Testing was only performed by Teledyne.
Chips and Cards were irradiated by Teledyne Isotopes, Inc., Westwood, New Jersey, in March, 1997.

Teledyne Testing						
98-1	LiF-100 Chips	May, 1998	Lab, 1	15.5 ± 1.3	16.7	
98-1	LiF-100 Chips	May, 1998	Lab, 2	23.9 ± 0.9	32.4	
98-1	LiF-100 Chips	May, 1998	Lab, 3	59.8 ± 1.9	60.2	
98-1	$CaSO_4$: Dy Cards	May, 1998	Reader 1, #1	18.5 ± 0.8	16.7	ND
98-1	$CaSO_4$: Dy Cards	May, 1998	Reader 1, #2	27.3 ± 1.7	32.4	ND
98-1	$CaSO_4$: Dy Cards	May, 1998	Reader 1, #3	70.0 ± 4.7	60.2	ND

ND = No Data; Teledyne Testing was only performed by Teledyne.
Chips and Cards were irradiated by Teledyne Isotopes, Inc., Westwood, New Jersey, in May, 1998.

Table A-3. In-house "spike" samples.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[a] Teledyne Results 2s, n=1[b]	Known Activity	Control[c] Limits
SPW-77	WATER	Jan, 1998	Cs-137	78.64 ± 7.76	77.23	67.23 - 87.23
SPW-129	WATER	Jan, 1998	Am-241	16.96 ± 1.24	20.64	12.38 - 28.90
SPW-130	WATER	Jan, 1998	Ra-226	9.39 ± 0.14	10.35	7.25 - 13.46
SPW-130	WATER	Jan, 1998	Ra-226	12.74 ± 3.05	14.03	9.82 - 18.24
SPMI-498	MILK	Jan, 1998	Co-60	41.40 ± 3.61	36.92	26.92 - 46.92
SPMI-498	MILK	Jan, 1998	Cs-134	31.78 ± 3.15	32.52	22.52 - 42.52
SPMI-498	MILK	Jan, 1998	Cs-137	37.03 ± 4.57	38.56	28.56 - 48.56
SPW-499	WATER	Jan, 1998	Co-60	44.38 ± 7.85	36.92	26.92 - 46.92
SPW-499	WATER	Jan, 1998	Cs-134	34.97 ± 7.78	32.52	22.52 - 42.52
SPW-499	WATER	Jan, 1998	Cs-137	39.15 ± 10.40	38.56	28.56 - 48.56
SPW-594	WATER	Jan, 1998	H-3	45125.00 ± 568.00	45598.00	36478.40 - 54717.60
SPAP-5330	AIR FILTER	Jan, 1998	Cs-137	1.68 ± 0.02	1.90	1.14 - 2.66
SPW-664	WATER	Feb, 1998	U-234	2.63 ± 0.40	3.00	1.80 - 4.20
SPW-664	WATER	Feb, 1998	U-238	3.26 ± 0.49	3.00	0.00 - 15.00
SPCH-746	CHARCOAL CANISTER	Feb, 1998	I-131(g)	1.73 ± 0.06	2.03	1.22 - 2.84
SPVE-750	VEGETATION	Feb, 1998	I-131(g)	6.16 ± 0.14	5.43	0.00 - 15.43
SPW-790	WATER	Feb, 1998	I-131	136.35 ± 1.33	137.03	109.62 - 164.44
SPMI-791	MILK	Feb, 1998	I-131	132.63 ± 1.63	137.03	109.62 - 164.44
SPW-497	WATER	Feb, 1998	Gr. Alpha	43.73 ± 7.61	41.27	20.64 - 61.91
SPW-497	WATER	Feb, 1998	Gr. Beta	59.45 ± 2.90	61.70	51.70 - 71.70
SPW-9854	WATER	Feb, 1998	Gr. Alpha	62.60 ± 5.10	53.88	26.94 - 80.82
SPAP-748	AIR FILTER	Feb, 1998	Gr. Beta	1.72 ± 0.02	1.66	0.00 - 11.66
SPW-1663	WATER	Feb, 1998	Ra-226	14.44 ± 0.50	13.80	9.66 - 17.94
SPW-1663	WATER	Feb, 1998	Ra-228	18.79 ± 1.58	18.29	12.80 - 23.78
SPW-1665	WATER	Mar, 1998	Ra-226	14.16 ± 0.29	13.80	9.66 - 17.94
SPW-1665	WATER	Mar, 1998	Ra-228	18.06 ± 1.70	18.29	12.80 - 23.78
SPW-1666	WATER	Mar, 1998	Sr-89	65.40 ± 2.70	75.94	60.75 - 91.13
SPW-1666	WATER	Mar, 1998	Sr-90	28.04 ± 1.22	32.65	26.12 - 39.18
SPAP-1728	AIR FILTER	Mar, 1998	Gr. Beta	8.15 ± 0.03	7.98	0.00 - 17.98
SPW-1998	WATER	Apr, 1998	Ra-226	13.70 ± 0.33	13.80	9.66 - 17.94
SPW-1998	WATER	Apr, 1998	Ra-228	14.65 ± 1.38	18.20	12.74 - 23.66
SPW-792	WATER	Apr, 1998	Th-230	18.62 ± 2.85	17.39	10.43 - 24.35
SPW-2278	WATER	Apr, 1998	H-3	41641.00 ± 552.00	43287.00	34629.60 - 51944.40
SPW-2284	WATER	Apr, 1998	Gr. Alpha	41.09 ± 1.83	41.26	20.63 - 61.89
SPW-2284	WATER	Apr, 1998	Gr. Beta	32.01 ± 1.10	30.72	20.72 - 40.72
SPMI-5451	MILK	Apr, 1998	Cs-137	80.78 ± 6.60	76.68	66.68 - 86.68
SPW-5459	WATER	Apr, 1998	Co-60	48.50 ± 3.74	44.65	34.65 - 54.65
SPW-5459	WATER	Apr, 1998	Cs-137	42.31 ± 4.32	38.34	28.34 - 48.34
SPW-2977	WATER	May, 1998	Ra-226	11.91 ± 0.27	13.80	9.66 - 17.94

Table A-3. In-house "spike" samples

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[a] Teledyne Results 2s, n=1[b]	Known Activity	Control[c] Limits
SPW-2977	WATER	May, 1998	Ra-228	16.26 ± 1.67	18.00	12.60 - 23.40
SPAP-3041	AIR FILTER	May, 1998	Cs-137	2.00 ± 0.02	1.89	1.13 - 2.65
SPW-3043	WATER	May, 1998	Gr. Alpha	40.49 ± 2.57	41.25	20.63 - 61.88
SPW-3043	WATER	May, 1998	Gr. Beta	35.79 ± 1.52	30.66	20.66 - 40.66
SPSO-3898	SOIL	May, 1998	Cs-134	0.11 ± 0.01	0.10	0.06 - 0.14
SPSO-3898	SOIL	May, 1998	Cs-137	0.48 ± 0.02	0.43	0.26 - 0.61
SPF-3900	FISH	May, 1998	Cs-134	0.36 ± 0.03	0.38	0.23 - 0.53
SPF-3900	FISH	May, 1998	Cs-137	0.29 ± 0.03	0.31	0.18 - 0.43
SPW-4162	WATER	Jun, 1998	Ra-226	12.98 ± 0.18	13.80	9.66 - 17.94
SPW-4162	WATER	Jun, 1998	Ra-228	16.73 ± 1.62	17.80	12.46 - 23.14
SPW-5340	WATER	Jun, 1998	Gr. Alpha	41.38 ± 1.87	41.25	20.62 - 61.87
SPW-5340	WATER	Jun, 1998	Gr. Beta	61.92 ± 1.51	64.92	54.92 - 74.92
SPW-4718	WATER	Jul, 1998	Ra-226	12.93 ± 0.12	13.80	9.66 - 17.94
SPW-4718	WATER	Jul, 1998	Ra-228	13.13 ± 1.59	17.67	12.37 - 22.97
SPCH-5129	CHARCOAL CANISTER	Jul, 1998	I-131(g)	0.61 ± 0.05	0.57	0.34 - 0.80
SPMI-5131	MILK	Jul, 1998	Cs-137	83.87 ± 9.09	76.36	66.36 - 86.36
SPMI-5131	MILK	Jul, 1998	I-131	63.98 ± 0.77	61.03	48.82 - 73.24
SPMI-5131	MILK	Jul, 1998	I-131(g)	62.05 ± 11.00	61.03	36.62 - 71.03
SPMI-5131	MILK	Jul, 1998	Sr-89	52.66 ± 2.13	62.05	49.64 - 74.46
SPMI-5131	MILK	Jul, 1998	Sr-90	29.78 ± 1.39	32.41	25.93 - 38.89
SPW-5134	WATER	Jul, 1998	H-3	20918.00 ± 396.00	21666.00	17332.80 - 25999.20
SPW-5137	WATER	Jul, 1998	Co-60	44.96 ± 4.00	43.56	33.56 - 53.56
SPW-5137	WATER	Jul, 1998	Cs-137	72.03 ± 5.84	76.36	66.36 - 86.36
SPW-5137	WATER	Jul, 1998	I-131	52.07 ± 0.69	61.03	48.82 - 73.24
SPW-5137	WATER	Jul, 1998	I-131(g)	58.78 ± 7.69	61.03	36.62 - 71.03
SPW-5136	WATER	Jul, 1998	Gr. Alpha	50.02 ± 2.28	41.24	20.62 - 61.86
SPW-5136	WATER	Jul, 1998	Gr. Beta	70.19 ± 1.88	64.80	54.80 - 74.80
SPAP-5611	AIR FILTER	Jul, 1998	Cs-137	1.68 ± 0.02	1.86	1.12 - 2.60
SPF-5453	FISH	Jul, 1998	Cs-137	0.33 ± 0.03	0.31	0.18 - 0.43
SPAP-5611	AIR FILTER	Jul, 1998	Cs-137	1.96 ± 0.02	1.86	1.12 - 2.60
SPW-6091	WATER	Aug, 1998	Gr. Alpha	30.59 ± 1.69	41.23	20.62 - 61.85
SPW-6091	WATER	Aug, 1998	Gr. Beta	30.28 ± 1.17	30.48	20.48 - 40.48
SPW-6092	WATER	Aug, 1998	Ra-226	6.29 ± 0.19	6.90	4.83 - 8.97
SPW-6092	WATER	Aug, 1998	Ra-228	7.85 ± 1.28	8.72	6.10 - 11.34
SPW-7143	WATER	Sep, 1998	Ra-226	12.31 ± 0.48	13.79	9.65 - 17.93
SPW-7143	WATER	Sep, 1998	Ra-228	15.70 ± 1.68	17.25	12.08 - 22.43
SPW-7144	WATER	Sep, 1998	Gr. Alpha	35.48 ± 1.65	33.97	16.99 - 50.96
SPW-7144	WATER	Sep, 1998	Gr. Beta	33.06 ± 1.11	30.41	20.41 - 40.41

Table A-3. In-house "spike" samples.

Lab Code	Sample Type	Date Collected	Analysis	Concentration in pCi/L[a] Teledyne Results 2s, n=1[b]	Known Activity	Control[c] Limits
SPMI-7592	MILK	Sep, 1998	I-131	58.15 ± 0.90	61.55	49.24 - 73.86
SPW-7594	WATER	Sep, 1998	Co-60	46.15 ± 8.78	42.34	32.34 - 52.34
SPW-7594	WATER	Sep, 1998	I-131	77.97 ± 0.81	82.07	65.66 - 98.48
SPW-7594	WATER	Sep, 1998	I-131(g)	80.62 ± 13.90	82.07	49.24 - 92.07
SPVE-7596	VEGETATION	Sep, 1998	I-131(g)	2.61 ± 0.08	2.46	1.48 - 3.44
SPCH-7615	CHARCOAL CANISTER	Sep, 1998	I-131(g)	1.41 ± 0.06	1.28	0.77 - 1.79
SPF-1602	FISH	Oct, 1998	Cs-137	0.56 ± 0.04	0.61	0.37 - 0.85
SPW-8178	WATER	Oct, 1998	Gr. Alpha	25.22 ± 1.90	33.96	16.98 - 50.94
SPW-8178	WATER	Oct, 1998	Gr. Beta	30.20 ± 1.31	30.36	20.36 - 40.36
SPW-8179	WATER	Oct, 1998	Ra-226	11.12 ± 0.16	13.80	9.66 - 17.94
SPW-8179	WATER	Oct, 1998	Ra-228	17.83 ± 1.87	17.09	11.96 - 22.22
SPAP-8457	AIR FILTER	Oct, 1998	Cs-137	1.78 ± 0.02	1.84	1.10 - 2.58
SPAP-8567	AIR FILTER	Oct, 1998	Gr. Beta	6.54 ± 0.10	6.47	0.00 - 16.47
SPSO-9953	SOIL	Oct, 1998	Cs-134	0.08 ± 0.01	0.09	0.05 - 0.12
SPSO-9953	SOIL	Oct, 1998	Cs-137	0.45 ± 0.01	0.43	0.26 - 0.60
SPW-9386	WATER	Nov, 1998	Ra-226	14.75 ± 0.47	13.80	9.66 - 17.94
SPW-9386	WATER	Nov, 1998	Ra-228	15.67 ± 1.59	16.95	11.87 - 22.04
SPW-9387	WATER	Nov, 1998	Gr. Alpha	27.49 ± 2.38	33.97	16.99 - 50.96
SPW-9387	WATER	Nov, 1998	Gr. Beta	36.04 ± 2.14	30.31	20.31 - 40.31
SPW-10347	WATER	Nov, 1998	Sr-90	4.30 ± 1.10	3.20	0.00 - 13.20
SPW-10345	WATER	Nov, 1998	H-3	38980.00 ± 548.00	38848.00	31078.40 - 46617.60
SPW-10340	WATER	Dec, 1998	Ra-226	6.73 ± 0.25	6.89	4.82 - 8.96
SPW-10340	WATER	Dec, 1998	Ra-228	7.44 ± 1.77	8.40	5.88 - 10.92
SPW-10341	WATER	Dec, 1998	Gr. Alpha	49.30 ± 3.35	33.97	16.99 - 50.96
SPW-10341	WATER	Dec, 1998	Gr. Beta	33.63 ± 1.70	30.25	20.25 - 40.25
SPW-10389	WATER	Dec, 1998	U	4.10 ± 0.25	4.17	2.50 - 5.84
SPW-10390	WATER	Dec, 1998	U	4.29 ± 0.25	4.17	2.50 - 5.84

[a] All results are in pCi/L, except for elemental potassium (K) in milk, which are in mg/L.; air filter samples, which are in pCi/Filter; and food products, which are in mg/kg.

[b] All samples are the results of single determinations.

[c] Control limits are based on Attachment A, page A2 of this report.

NOTE: For fish, Jello is used for the spike matrix. For vegetation, Sawdust is used for the spike matrix.

Table A-4. In-house "blank" samples.

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L[a]. Teledyne Results (4.66 Sigma) LLD	Teledyne Results (4.66 Sigma) Activity[b]	Acceptance Criteria (4.66 Sigma)
RA-1	WATER	Jan 1998	Ra-226	<0.015	0.02 ± 0.01	< 1.00
RA-1	WATER	Jan 1998	Ra-228	<0.8745	0.66 ± 0.49	< 1.00
SPW-333	WATER	Jan 1998	Am-241	<0.0934	0.01 ± 0.07	< 1.00
SPW-495	WATER	Jan 1998	Gr. Alpha	<0.3138	0.00 ± 0.21	< 1.00
SPW-495	WATER	Jan 1998	Gr. Beta	<0.8107	1.47 ± 0.61	< 3.20
SPW-495	WATER	Jan 1998	Sr-90	<0.8595	0.55 ± 0.46	< 1.00
SPMI-496	MILK	Jan 1998	Sr-89	<0.9576	0.60 ± 0.86	< 5.00
SPMI-496	MILK	Jan 1998	Sr-90	N/A	0.81 ± 0.30	< 1.00
Low level of Sr-90 concentration in milk (1-5 pCi/L) is not unusual.						
SPW-593	WATER	Jan 1998	H-3	<156.02	10.41 ± 77.82	< 200.00
SPAP-5331	AIR FILTER	Jan 1998	Cs-137	<0.0009	0.00 ± 0.00	< 10.00
SPW-1662	WATER	Feb 1998	Ra-226	<0.0134	0.04 ± 0.01	< 1.00
SPW-1662	WATER	Feb 1998	Ra-228	<0.889	0.39 ± 0.55	< 1.00
SPW-793	WATER	Feb 1998	I-131	<0.3448	-0.35 ± 0.14	< 0.50
SPMI-794	MILK	Feb 1998	I-131	<0.3849	-0.01 ± 0.19	< 0.50
SPAP-749	AIR FILTER	Feb 1998	Gr. Beta	<0.6	0.11 ± 0.38	< 3.20
SPW-1664	WATER	Mar 1998	Ra-226	<0.0197	0.03 ± 0.01	< 1.00
SPAP-1729	AIR FILTER	Mar 1998	Gr. Beta	<0.0014	0.00 ± 0.00	< 3.20
SPW-1997	WATER	Apr 1998	Ra-226	<0.0139	0.01 ± 0.01	< 1.00
SPW-2279	WATER	Apr 1998	H-3	<156.87	54.22 ± 80.20	< 200.00
SPW-2285	WATER	Apr 1998	Gr. Alpha	<0.3124	-0.06 ± 0.20	< 1.00
SPW-2285	WATER	Apr 1998	Gr. Beta	<0.8822	-0.36 ± 0.57	< 3.20
SPMI-5450	MILK	Apr 1998	Cs-137	<5.27	0.53 ± 2.64	< 10.00
SPW-5458	WATER	Apr 1998	Co-60	<1.63	-1.93 ± 15.90	< 10.00
SPW-5458	WATER	Apr 1998	Cs-137	<4.01	0.46 ± 3.07	< 10.00
SPW-2976	WATER	May 1998	Ra-226	<0.0115	0.01 ± 0.01	< 1.00
SPW-2976	WATER	May 1998	Ra-228	<0.865	0.15 ± 0.42	< 1.00
SPAP-3042	AIR FILTER	May 1998	Cs-137	<0.0010	0.00 ± 0.00	< 10.00
SPW-3044	WATER	May 1998	Gr. Alpha	<0.5036	-0.18 ± 0.25	< 1.00
SPW-3044	WATER	May 1998	Gr. Beta	<1.1494	0.14 ± 0.64	< 3.20
SPW-4161	WATER	Jun 1998	Ra-226	<0.0203	0.05 ± 0.01	< 1.00
SPW-4161	WATER	Jun 1998	Ra-228	<0.802	0.22 ± 0.40	< 1.00
SPW-5339	WATER	Jun 1998	Gr. Alpha	<0.4785	0.10 ± 0.32	< 1.00
SPW-5339	WATER	Jun 1998	Gr. Beta	<1.0833	1.04 ± 0.74	< 3.20

Table A-4. In-house "blank" samples.

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L[a]. Teledyne Results (4.66 Sigma) LLD	Teledyne Results (4.66 Sigma) Activity[b]	Acceptance Criteria (4.66 Sigma)
SPW-4719	WATER	Jul 1998	Ra-226	<0.0117	0.05 ± 0.01	< 1.00
SPW-4719	WATER	Jul 1998	Ra-228	<0.435	0.39 ± 0.25	< 1.00
SPCH-5128	CHARCOAL CANISTER	Jul 1998	I-131(g)	<0.0088	-0.00 ± 0.01	< 9.60
SPMI-5130	MILK	Jul 1998	Co-60	<2.60	-1.09 ± 25.30	< 10.00
SPMI-5130	MILK	Jul 1998	Cs-137	<4.43	-1.51 ± 2.69	< 10.00
SPMI-5130	MILK	Jul 1998	I-131	<0.444	-0.14 ± 0.24	< 0.50
SPMI-5130	MILK	Jul 1998	I-131(g)	<6.94	-1.71 ± 7.03	< 20.00
SPMI-5130	MILK	Jul 1998	Sr-90	N/A	1.32 ± 0.37	< 1.00
Low level of Sr-90 concentration in milk (1-5 pCi/L) is not unusual.						
SPW-5132	WATER	Jul 1998	H-3	<157	-81.70 ± 74.15	< 200.00
SPW-5135	WATER	Jul 1998	I-131	<0.2796	-0.06 ± 0.15	< 0.50
SPW-5135	WATER	Jul 1998	Co-60	<1.90	3.26 ± 3.92	< 10.00
SPW-5135	WATER	Jul 1998	Cs-137	<3.29	1.11 ± 2.93	< 10.00
SPW-5135	WATER	Jul 1998	I-131(g)	<8.41	2.66 ± 7.66	< 20.00
SPW-5135	WATER	Jul 1998	Gr. Alpha	<0.3589	0.49 ± 0.27	< 1.00
SPW-5135	WATER	Jul 1998	Gr. Beta	<0.8127	0.79 ± 0.55	< 3.20
SPW-6093	WATER	Aug 1998	Gr. Alpha	<0.3766	0.10 ± 0.32	< 1.00
SPW-6093	WATER	Aug 1998	Gr. Beta	<1.741	-0.34 ± 0.84	< 3.20
SPW-6093	WATER	Aug 1998	Ra-226	<0.0166	0.05 ± 0.01	< 1.00
SPW-6093	WATER	Aug 1998	Ra-228	<0.670	-0.05 ± 0.30	< 1.00
SPW-7145	WATER	Sep 1998	Gr. Alpha	<0.2485	0.19 ± 0.19	< 1.00
SPW-7145	WATER	Sep 1998	Gr. Beta	<0.7483	0.39 ± 0.53	< 3.20
SPW-7145	WATER	Sep 1998	Ra-226	<0.0192	0.02 ± 0.01	< 1.00
SPW-7145	WATER	Sep 1998	Ra-228	<0.997	0.03 ± 0.56	< 1.00
SPAP-7395	AIR FILTER	Sep 1998	Gr. Beta (ss)	<0.002	-0.00 ± 0.00	< 0.00
SPMI-7593	MILK	Sep 1998	Cs-137	<5.41	1.47 ± 3.56	< 10.00
SPMI-7593	MILK	Sep 1998	I-131	<0.4127	-0.26 ± 0.22	< 0.50
SPMI-7593	MILK	Sep 1998	I-131(g)	<9.60	4.12 ± 24.90	< 20.00
SPW-7595	WATER	Sep 1998	Co-60	<4.60	2.32 ± 1.34	< 10.00
SPW-7595	WATER	Sep 1998	I-131	<0.2981	-0.22 ± 0.15	< 0.50
SPW-7595	WATER	Sep 1998	I-131(g)	<8.71	2.82 ± 6.66	< 20.00
SPVE-7597	VEGETATION	Sep 1998	I-131(g)	<0.0166	-0.00 ± 0.00	< 20.00
SPW-8180	WATER	Oct 1998	Ra-226	N/A	0.05 ± 0.01	< 1.00
SPW-8180	WATER	Oct 1998	Ra-226	< 0.0209	0.05 ± 0.01	< 1.00

Table A-4. In-house "blank" samples.

Lab Code	Sample Type	Sample Date	Analysis	Concentration pCi/L[a]. Teledyne Results (4.66 Sigma) LLD	Teledyne Results (4.66 Sigma) Activity[b]	Acceptance Criteria (4.66 Sigma)
SPW-8180	WATER	Oct 1998	Ra-228	< 0.840	0.67 ± 0.47	< 1.00
SPW-9388	WATER	Nov 1998	Gr. Alpha	<0.74	0.27 ± 0.48	< 1.00
SPW-9388	WATER	Nov 1998	Gr. Beta	<1.99	1.04 ± 1.24	< 3.20
SPW-9388	WATER	Nov 1998	Ra-226	< 0.0203	0.04 ± 0.01	< 1.00
SPW-9388	WATER	Nov 1998	Ra-228	<0.932	0.32 ± 0.56	< 1.00
SPW-10344	WATER	Nov 1998	H-3	<175	-8.13 ± 86.41	< 200.00
SPW-10339	WATER	Dec 1998	Gr. Alpha	<0.95	-0.65 ± 0.57	< 1.00
SPW-10339	WATER	Dec 1998	Gr. Beta	<1.80	-0.28 ± 1.18	< 3.20
SPW-10339	WATER	Dec 1998	Ra-226	<0.0261	0.02 ± 0.01	< 1.00
SPW-10339	WATER	Dec 1998	Ra-228	<0.83	0.24 ± 0.42	< 1.00

[a] Liquid sample results are reported in pCi/Liter, air filter sample results are in pCi/filter, charcoal sample results are in pCi/charcoal, and solid sample results are in pCi/kilogram.

[b] The activity reported is the net activity result.

Table A-5. In-house "duplicate" samples.

Lab Codes[b]	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
WW-10052, 10053	Jan, 1998	Gr. Beta	1.1720 ± 0.6030	2.1820 ± 0.6630	1.6770 ± 0.4481
CF-20, 21	Jan, 1998	Gr. Beta	17.5458 ± 0.5866	17.6346 ± 0.5614	17.5902 ± 0.4060
CF-20, 21	Jan, 1998	K-40	21.1870 ± 0.6570	20.8610 ± 0.7520	21.0240 ± 0.4993
CF-20, 21	Jan, 1998	Sr-90	0.0302 ± 0.0085	0.0298 ± 0.0071	0.0300 ± 0.0055
WW-195, 196	Jan, 1998	Gr. Beta	2.9349 ± 0.6584	2.9020 ± 0.6291	2.9185 ± 0.4553
SW-298, 299	Jan, 1998	H-3	144.2200 ± 93.5400	92.1100 ± 91.4500	118.1650 ± 65.4080
SW-349, 350	Jan, 1998	Co-60	1.1100 ± 9.1700	1.7900 ± 2.4700	1.4500 ± 4.7484
SW-349, 350	Jan, 1998	Cs-137	-2.4900 ± 3.2300	-0.6700 ± 1.9400	-1.5800 ± 1.8839
CW-737, 738	Jan, 1998	H-3	559.2800 ± 100.4400	524.8100 ± 99.1900	542.0450 ± 70.5812
PW-607, 608	Jan, 1998	Co-60	0.3400 ± 0.0340	0.7200 ± 4.6200	0.5300 ± 2.3101
PW-607, 608	Jan, 1998	Cs-137	1.1700 ± 1.8100	-0.0400 ± 1.8700	0.5650 ± 1.3012
SWU-531, 532	Jan, 1998	Gr. Beta	3.4928 ± 0.6902	3.9923 ± 0.7129	3.7426 ± 0.4961
LW-653, 654	Jan, 1998	Gr. Beta	2.3404 ± 0.5778	1.6742 ± 0.5968	2.0073 ± 0.4153
SW-587, 588	Feb, 1998	Gr. Beta	3.2097 ± 0.7915	2.1021 ± 0.7800	2.6559 ± 0.5556
WW-897, 898	Feb, 1998	Co-60	0.2600 ± 0.4800	0.4700 ± 4.5900	0.3650 ± 2.3075
WW-897, 898	Feb, 1998	Cs-137	0.2800 ± 1.8700	0.3200 ± 2.5200	0.3000 ± 1.5690
WW-897, 898	Feb, 1998	H-3	4,582.7400 ± 197.9300	5,013.4400 ± 205.6500	4,798.0900 ± 142.7132
CW-920, 921	Feb, 1998	Gr. Beta	8.1600 ± 1.3000	8.5200 ± 1.3000	8.3400 ± 0.9192
CW-920, 921	Feb, 1998	Gr. Beta	0.2500 ± 1.2100	0.0000 ± 1.2000	0.1250 ± 0.8521
CW-1378, 1379	Mar, 1998	Gr. Beta	2.6100 ± 1.3700	4.1400 ± 1.5800	3.3750 ± 1.0456
CW-1378, 1379	Mar, 1998	Gr. Beta	-0.1000 ± 1.1000	0.0000 ± 1.2000	-0.0500 ± 0.8139
MI-1552, 1553	Mar, 1998	K-40	1,392.5000 ± 133.0000	1,280.8000 ± 204.0000	1,336.6500 ± 121.7631
WW-1406, 1407	Mar, 1998	Gr. Beta	7.0991 ± 0.8467	7.0712 ± 0.5658	7.0852 ± 0.5092
LW-1921, 1922	Mar, 1998	Gr. Beta	2.9722 ± 0.6466	2.5972 ± 0.6466	2.7847 ± 0.4572
AP-2599, 2600	Mar, 1998	Co-60	-0.0003 ± 0.0004	-0.0003 ± 0.0002	-0.0003 ± 0.0002
AP-2599, 2600	Mar, 1998	Cs-137	-0.0001 ± 0.0004	0.0001 ± 0.0005	0.0000 ± 0.0003
SW-2040, 2041	Mar, 1998	H-3	6,004.3600 ± 224.0000	6,322.4700 ± 229.1400	6,163.4150 ± 160.2195
SW - 2040, 2041	Mar, 1998	H-3	6,322.4678 ± 229.1356	6,004.3639 ± 224.0020	6,163.4158 ± 160.2186
AP-2620, 2621	Mar, 1998	Co-60	0.0005 ± 0.0004	0.0009 ± 0.0027	0.0007 ± 0.0013
AP-2620, 2621	Mar, 1998	Cs-137	0.0005 ± 0.0005	-0.0000 ± 0.0006	0.0002 ± 0.0004
LW-2253, 2254	Mar, 1998	Gr. Beta	1.9075 ± 0.7042	2.1691 ± 0.7478	2.0383 ± 0.5136
AP-2487, 2488	Mar, 1998	Be-7	0.0569 ± 0.0071	0.0601 ± 0.0008	0.0585 ± 0.0035
E-1966, 1967	Apr, 1998	Gr. Beta	1.1740 ± 0.0530	1.1530 ± 0.0530	1.1635 ± 0.0375
E-1966, 1967	Apr, 1998	K-40	1.3100 ± 0.1300	1.2422 ± 0.1700	1.3161 ± 0.1070
AP-2466, 2467	Apr, 1998	Be-7	0.0693 ± 0.0158	0.0605 ± 0.0113	0.0649 ± 0.0097
WW-2012, 2013	Apr, 1998	Co-60	0.6300 ± 0.6200	2.6700 ± 2.3500	1.6500 ± 1.2152

Table A-5. In-house "duplicate" samples.

Lab Codes[b]	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
WW-2012, 2013	Apr, 1998	Cs-137	0.5800 ± 1.5600	1.2800 ± 2.2800	0.9300 ± 1.3813
WW-2012, 2013	Apr, 1998	H-3	616.5800 ± 100.3800	646.9400 ± 101.4600	631.7600 ± 71.3622
MI-2112, 2113	Apr, 1998	I-131	-0.0500 ± 0.1600	-0.0500 ± 0.1700	-0.0500 ± 0.1167
CW-2225, 2226	Apr, 1998	Gr. Beta	1.8900 ± 1.4200	2.6400 ± 1.4100	2.2650 ± 1.0006
CW-2225, 2226	Apr, 1998	Gr. Beta	-1.2600 ± 1.0300	0.1500 ± 1.2500	-0.5550 ± 0.8098
SWU-2302, 2303	Apr, 1998	Gr. Beta	3.4606 ± 0.6485	3.2027 ± 0.6811	3.3317 ± 0.4702
SWU-2302, 2303	Apr, 1998	H-3	435.3500 ± 96.3410	593.3260 ± 102.1870	514.3380 ± 70.2207
CW-2325, 2326	Apr, 1998	Gr. Beta	16.1700 ± 2.4300	14.3400 ± 2.1600	15.2550 ± 1.6256
CW-2325, 2326	Apr, 1998	Gr. Beta	5.0100 ± 1.5900	5.9000 ± 1.7300	5.4550 ± 1.1748
BS-2508, 2509	Apr, 1998	Cs-137	0.3186 ± 0.0538	0.2849 ± 0.0601	0.3018 ± 0.0403
BS-2508, 2509	Apr, 1998	Gr. Alpha	15.5814 ± 2.8742	15.4353 ± 5.7607	15.5084 ± 3.2190
BS-2508, 2509	Apr, 1998	Gr. Beta	26.4292 ± 2.2859	30.1462 ± 4.3906	28.2877 ± 2.4750
BS-2508, 2509	Apr, 1998	K-40	18.6870 ± 1.2400	17.6740 ± 0.9500	18.1805 ± 0.7810
BS-2508, 2509	Apr, 1998	Sr-90	0.0490 ± 0.0150	0.0280 ± 0.0130	0.0385 ± 0.0099
G-2531, 2532	Apr, 1998	Cs-137	0.2387 ± 0.0353	0.2089 ± 0.0182	0.2238 ± 0.0199
G-2531, 2532	Apr, 1998	K-40	10.2470 ± 0.5750	9.3951 ± 0.3670	9.8211 ± 0.3411
W-2790, 2791	Apr, 1998	Gr. Alpha	0.3001 ± 0.2051	0.1634 ± 0.2668	0.2318 ± 0.1683
DW-2790, 2791	Apr, 1998	Gr. Beta	0.5947 ± 0.2942	0.7350 ± 0.3478	0.6649 ± 0.2278
MI-2368, 2369	Apr, 1998	K-40	1,176.4000 ± 162.0000	1,374.6000 ± 108.0000	1,275.5000 ± 97.3499
MI-2368, 2369	Apr, 1998	Sr-89	0.2160 ± 1.0300	-0.3060 ± 1.2300	-0.0450 ± 0.8022
MI-2368, 2369	Apr, 1998	Sr-90	1.5430 ± 0.4910	1.1744 ± 0.4060	1.3587 ± 0.3186
CW-2411, 2412	Apr, 1998	Gr. Beta	2.2800 ± 1.0500	3.0100 ± 1.5100	2.6450 ± 0.9196
SWU-2067, 2068	Apr, 1998	Gr. Beta	2.4865 ± 0.7089	3.3197 ± 0.6627	2.9031 ± 0.4852
SS-2666, 2667	Apr, 1998	Cs-137	0.0395 ± 0.0194	0.0299 ± 0.0133	0.0347 ± 0.0118
SS-2666, 2667	Apr, 1998	Gr. Beta	9.0977 ± 2.0893	6.7058 ± 1.9219	7.9018 ± 1.4194
SS-2666, 2667	Apr, 1998	K-40	5.3384 ± 0.2820	5.9439 ± 0.4020	5.6412 ± 0.2455
WW-2701, 2702	Apr, 1998	H-3	184.5500 ± 86.5200	223.1700 ± 88.1500	203.8600 ± 61.7579
WW-2850, 2851	Apr, 1998	Co-60	-0.1700 ± 1.6000	-0.3400 ± 6.3800	-0.2550 ± 3.2888
WW-2850, 2851	Apr, 1998	Cs-137	0.2900 ± 2.4800	2.1600 ± 2.0300	1.2250 ± 1.6024
WW-2850, 2851	Apr, 1998	H-3	5,665.6200 ± 217.4400	5,770.5600 ± 219.2100	5,718.0900 ± 154.3804
SS-3004, 3005	Apr, 1998	Gr. Alpha	6.6840 ± 4.0000	6.9820 ± 4.4020	6.8330 ± 2.9740
SS-3004, 3005	Apr, 1998	Gr. Beta	19.9460 ± 3.1700	20.7720 ± 3.1970	20.3590 ± 2.2511
SS-3004, 3005	Apr, 1998	K-40	15.1560 ± 0.9910	13.9010 ± 0.5860	14.5285 ± 0.5756
BS-3240, 3241	Apr, 1998	Gr. Beta	7.5126 ± 1.9277	8.4047 ± 1.9386	7.9587 ± 1.3669
BS-3240, 3241	Apr, 1998	K-40	10.2890 ± 0.5380	10.1520 ± 0.3430	10.2205 ± 0.3190
MI-2941, 2942	May, 1998	K-40	1,209.3000 ± 152.0000	1,422.5000 ± 193.0000	1,315.9000 ± 122.8342

Table A-5. In-house "duplicate" samples.

Lab Codes[b]	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
SO-2962, 2963	May, 1998	Cs-137	0.1835 ± 0.0463	0.1531 ± 0.0261	0.1683 ± 0.0266
SO-2962, 2963	May, 1998	Gr. Alpha	9.7590 ± 3.4730	10.3360 ± 3.5720	10.0475 ± 2.4910
SO-2962, 2963	May, 1998	Gr. Beta	27.2230 ± 2.8430	31.4690 ± 3.0280	29.3460 ± 2.0767
SO-2962, 2963	May, 1998	K-40	23.0890 ± 1.1600	21.6540 ± 0.8142	22.3715 ± 0.7086
SO-2962, 2963	May, 1998	Sr-90	0.0421 ± 0.0117	0.0396 ± 0.0146	0.0408 ± 0.0094
LW-3048, 3049	May, 1998	Gr. Beta	1.9020 ± 0.6920	2.0920 ± 0.7010	1.9970 ± 0.4925
WW-3097, 3098	May, 1998	Gr. Beta	4.6000 ± 0.6640	4.4740 ± 0.6600	4.5370 ± 0.4681
WW - 3173, 3174	May, 1998	H-3	155.2485 ± 83.4086	153.4076 ± 83.3273	154.3280 ± 58.9500
F-3305, 3306	May, 1998	Gr. Beta	2.9966 ± 0.1303	2.8744 ± 0.1364	2.9355 ± 0.0943
F-3305, 3306	May, 1998	K-40	2.5354 ± 0.3690	2.5317 ± 0.4260	2.5336 ± 0.2818
SS-3463, 3464	May, 1998	K-40	13.2060 ± 0.6940	12.1740 ± 0.5670	12.6900 ± 0.4481
F - 3284, 3285	May, 1998	Co-60	0.0073 ± 0.0286	-0.0054 ± 0.0097	0.0009 ± 0.0151
F - 3284, 3285	May, 1998	Cs-137	-0.0001 ± 0.0047	0.0080 ± 0.0095	0.0039 ± 0.0053
CW - 3439, 3440	May, 1998	Gr. Beta	2.1268 ± 1.3641	2.0093 ± 1.1263	2.0681 ± 0.8845
G-3546, 3547	May, 1998	Be-7	0.7130 ± 0.2340	0.6940 ± 0.1850	0.7035 ± 0.1491
G-3546, 3547	May, 1998	Gr. Beta	10.7190 ± 0.3340	10.9340 ± 0.3370	10.8265 ± 0.2372
G-3546, 3547	May, 1998	K-40	7.5468 ± 0.5310	7.8713 ± 0.6930	7.7091 ± 0.4365
BS-3669, 3670	May, 1998	Cs-137	0.2010 ± 0.0535	0.2022 ± 0.0215	0.2016 ± 0.0288
BS-3669, 3670	May, 1998	K-40	14.9080 ± 0.4820	16.1580 ± 1.0800	15.5330 ± 0.5913
F-3694, 3695	May, 1998	K-40	1.7695 ± 0.2850	1.6797 ± 0.3440	1.7246 ± 0.2234
PW - 3572, 3573	May, 1998	H-3	49.8073 ± 97.6829	83.0122 ± 98.9291	66.4098 ± 69.5142
WW - 3763, 3764	May, 1998	Co-60	0.0478 ± 0.0234	0.0551 ± 0.0311	0.0515 ± 0.0195
WW - 3790, 3791	May, 1998	Co-60	-0.0847 ± 0.6250	0.5220 ± 10.9000	0.2187 ± 5.4590
WW - 3790, 3791	May, 1998	Cs-137	0.9210 ± 1.9700	1.1200 ± 1.5000	1.0205 ± 1.2380
WW - 3790, 3791	May, 1998	H-3	723.8914 ± 114.0882	705.2824 ± 113.4795	714.5869 ± 80.4576
F - 3715, 3716	May, 1998	Co-60	-0.0048 ± 0.0567	0.0077 ± 0.0214	0.0015 ± 0.0303
F - 3715, 3716	May, 1998	Cs-137	0.0015 ± 0.0090	0.0127 ± 0.0137	0.0071 ± 0.0082
BS - 3763, 3764	May, 1998	Cs-137	0.0884 ± 0.0206	0.0754 ± 0.0257	0.0819 ± 0.0165
SWU-3882, 3883	May, 1998	Gr. Beta	2.9052 ± 0.6786	3.7390 ± 0.6595	3.3221 ± 0.4731
SWU-3882, 3883	May, 1998	H-3	43.3000 ± 79.9590	34.1540 ± 79.5400	38.7270 ± 56.3916
CW - 4314, 4315	May, 1998	H-3	441.3905 ± 96.6703	424.7922 ± 96.0349	433.0913 ± 68.1319
F-3861, 3862	May, 1998	K-40	3.2973 ± 0.5280	3.6404 ± 0.3530	3.4689 ± 0.3176
CW - 4044, 4045	May, 1998	Gr. Beta	4.6775 ± 1.6138	4.8186 ± 1.6342	4.7481 ± 1.1484
CW - 4044, 4045	May, 1998	Gr. Beta	-0.7495 ± 1.2072	-0.6833 ± 1.0704	-0.7164 ± 0.8067
SW-4020, 4021	Jun, 1998	K-40 (FP)	1.0380	1.0380	1.0380
SP-4111, 4112	Jun, 1998	Be-7	0.1860 ± 0.0833	0.2650 ± 0.1120	0.2255 ± 0.0698

Table A-5. In-house "duplicate" samples.

Lab Codes[b]	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
P-4183, 4184	Jun, 1998	H-3	22.7850 ± 81.0520	44.7120 ± 81.6170	33.7485 ± 57.5125
CW - 4195, 4196	Jun, 1998	Gr. Beta	2.9189 ± 1.4811	2.8922 ± 1.4740	2.9055 ± 1.0448
CW - 4195, 4196	Jun, 1998	Gr. Beta	-0.4892 ± 1.0638	-0.4909 ± 1.1091	-0.4900 ± 0.7684
WW-4410, 4411	Jun, 1998	Gr. Beta	4.9907 ± 0.7658	5.7601 ± 0.8338	5.3754 ± 0.5661
WW-4410, 4411	Jun, 1998	H-3	-5.3910 ± 77.2770	66.4880 ± 80.5500	30.5485 ± 55.8123
MI - 4389, 4390	Jun, 1998	Co-60	0.1420 ± 0.2080	1.4200 ± 13.6000	0.7810 ± 6.8008
MI - 4389, 4390	Jun, 1998	Cs-137	0.1810 ± 2.7600	0.6020 ± 4.0700	0.3915 ± 2.4588
MI - 4389, 4390	Jun, 1998	I-131	-0.0469 ± 0.2433	-0.1152 ± 0.2559	-0.0811 ± 0.1765
AP-4664, 4665	Jun, 1998	Be-7	0.1539 ± 0.0750	0.2627 ± 0.1220	0.2083 ± 0.0716
MI - 4685, 4686	Jun, 1998	I-131	-0.1010 ± 0.1620	-0.0221 ± 0.1728	-0.0616 ± 0.1184
SW - 4901, 4902	Jun, 1998	H-3	2,541.2239 ± 156.4571	2,510.5125 ± 155.7462	2,525.8682 ± 110.3808
AP-5188, 5189	Jun, 1998	Be-7	0.0844 ± 0.0163	0.0733 ± 0.0117	0.0789 ± 0.0100
SWU-4798, 4799	Jun, 1998	Gr. Beta	1.9402 ± 0.5398	1.8412 ± 0.5411	1.8907 ± 0.3822
LW-4993, 4994	Jun, 1998	Gr. Beta	3.1224 ± 0.6129	2.0740 ± 0.5328	2.5982 ± 0.4061
LW-4993, 4994	Jun, 1998	H-3	3,543.4600 ± 184.5020	3,482.0770 ± 183.2600	3,512.7685 ± 130.0242
WW-4819, 4820	Jul, 1998	Gr. Beta	1.2760 ± 0.6431	0.7313 ± 0.6161	1.0037 ± 0.4453
WW-4819, 4820	Jul, 1998	K-40	0.8650 ± 0.0865	0.9515 ± 0.0950	0.9083 ± 0.0642
AP-5209, 5210	Jul, 1998	Be-7	0.1079 ± 0.0180	0.0901 ± 0.0107	0.0990 ± 0.0105
AP-5392, 5393	Jul, 1998	Be-7	0.0782 ± 0.0143	0.0885 ± 0.0144	0.0833 ± 0.0101
AP-5413, 5414	Jul, 1998	Be-7	0.0625 ± 0.0072	0.0718 ± 0.0091	0.0671 ± 0.0058
WW-4848, 4849	Jul, 1998	Co-60	0.2220 ± 0.1290	0.5080 ± 0.8150	0.3650 ± 0.4126
WW-4848, 4849	Jul, 1998	Cs-134	0.9310 ± 2.0500	0.8130 ± 0.8130	0.8720 ± 1.1027
WW-4848, 4849	Jul, 1998	Cs-137	0.7040 ± 1.8700	-0.1190 ± 1.8300	0.2925 ± 1.3082
WW-4848, 4849	Jul, 1998	H-3	37.2000 ± 89.2000	-13.0000 ± 87.0000	12.1000 ± 62.3010
CW-4947, 4948	Jul, 1998	Gr. Beta	5.2400 ± 1.5700	5.1900 ± 1.5700	5.2150 ± 1.1102
SW-7804, 7805	Jul, 1998	Gr. Alpha	0.3147 ± 0.6025	1.7030 ± 0.5568	1.0089 ± 0.4102
SW-7804, 7805	Jul, 1998	Gr. Beta	2.0032 ± 0.7183	2.5489 ± 0.6474	2.2761 ± 0.4835
WW-4880, 4881	Jul, 1998	Co-60	0.2540 ± 0.6210	-0.4430 ± 0.8250	-0.0945 ± 0.5163
WW-4880, 4881	Jul, 1998	Cs-137	1.4600 ± 1.2800	1.1400 ± 2.0000	1.3000 ± 1.1873
WW-4880, 4881	Jul, 1998	H-3	308.5000 ± 102.7000	328.9000 ± 103.5000	318.7000 ± 72.9033
G-5090, 5091	Jul, 1998	Be-7	1.5334 ± 0.2310	1.5696 ± 0.2550	1.5515 ± 0.1720
G-5090, 5091	Jul, 1998	K-40	6.2521 ± 0.4900	6.0430 ± 0.4800	6.1476 ± 0.3430
SW-5281, 5282	Jul, 1998	Gr. Alpha	5.7564 ± 1.0355	5.4517 ± 0.9702	5.6041 ± 0.7095
SW-5281, 5282	Jul, 1998	Gr. Beta	8.8798 ± 0.7835	9.9157 ± 0.8418	9.3978 ± 0.5750
SW-5281, 5282	Jul, 1998	H-3	12.9950 ± 87.9900	46.4090 ± 89.3890	29.7020 ± 62.7149
WE-5323, 5324	Jul, 1998	K-40	9.4179 ± 0.7440	8.3494 ± 0.4700	8.8837 ± 0.4400

Table A-5. In-house "duplicate" samples.

Lab Codes[b]	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
SWU-5744, 5745	Jul, 1998	Gr. Beta	2.0648 ± 0.5650	2.4432 ± 0.6352	2.2540 ± 0.4251
VE-5302, 5303	Jul, 1998	Gr. Alpha	0.1233 ± 0.0458	0.0816 ± 0.0381	0.1025 ± 0.0298
VE-5302, 5303	Jul, 1998	Gr. Beta	3.8738 ± 0.1201	3.4382 ± 0.1081	3.6560 ± 0.0808
VE-5302, 5303	Jul, 1998	K-40	3,845.0000 ± 384.0000	3,561.0000 ± 419.0000	3,703.0000 ± 284.1729
G-5346, 5347	Jul, 1998	Be-7	1.0649 ± 0.3460	1.1877 ± 0.2220	1.1263 ± 0.2055
G-5346, 5347	Jul, 1998	Gr. Beta	5.5890 ± 0.2200	5.4932 ± 0.1571	5.5411 ± 0.1352
G-5346, 5347	Jul, 1998	K-40	5.8497 ± 0.7760	6.4013 ± 0.5600	6.1255 ± 0.4785
AP-5371, 5372	Jul, 1998	Be-7	0.2899 ± 0.0987	0.2565 ± 0.0949	0.2732 ± 0.0685
AP-5530, 5531	Jul, 1998	Be-7	0.2559 ± 0.0941	0.3365 ± 0.0984	0.2962 ± 0.0681
SO-5556, 5557	Jul, 1998	Gr. Beta	17.8997 ± 2.6057	15.8321 ± 2.3577	16.8659 ± 1.7570
CW-6134, 6135	Jul, 1998	Gr. Beta	4.8400 ± 1.2300	4.0700 ± 1.0900	4.4550 ± 0.8217
AP-5721, 5722	Jul, 1998	Be-7	0.2175 ± 0.0616	0.2461 ± 0.1180	0.2318 ± 0.0666
SWU-5744, 5745	Jul, 1998	H-3	223.9760 ± 86.8830	209.4480 ± 86.2730	216.7120 ± 61.2203
WW-5836, 5837	Jul, 1998	H-3	80.4980 ± 80.6500	65.9720 ± 79.9940	73.2350 ± 56.7967
WW-6176, 6177	Jul, 1998	H-3	31.0590 ± 81.2420	1.8270 ± 79.9170	16.4430 ± 56.9802
WW-6176, 6177	Jul, 1998	Gr. Beta	0.6954 ± 0.5544	1.3234 ± 0.5462	1.0094 ± 0.3891
LW-5965, 5966	Aug, 1998	Gr. Beta	3.1093 ± 0.6160	2.2762 ± 0.6288	2.6928 ± 0.4401
LW-5965, 5966	Aug, 1998	H-3	80.4580 ± 82.3350	36.9020 ± 80.3920	58.6800 ± 57.5368
G-5986, 5987	Aug, 1998	Be-7	2.2321 ± 0.3670	1.9885 ± 0.3010	2.1103 ± 0.2373
G-5986, 5987	Aug, 1998	K-40	5.4909 ± 0.6280	6.3514 ± 0.7550	5.9212 ± 0.4910
CW-6013, 6014	Aug, 1998	Gr. Beta	0.5400 ± 1.2300	0.9900 ± 1.2500	0.7650 ± 0.8768
CW-6134, 6135	Aug, 1998	Gr. Beta	3.2200 ± 1.5200	4.1200 ± 1.1600	3.6700 ± 0.9560
F-,	Aug, 1998	Gr. Beta	2.1416 ± 0.0774	1.9173 ± 0.0791	2.0295 ± 0.0553
F-6447, 6448	Aug, 1998	K-40	2.1309 ± 0.2570	1.8657 ± 0.1280	1.9983 ± 0.1436
AP-6467, 6468	Aug, 1998	Be-7	0.1612 ± 0.0873	0.1293 ± 0.1260	0.1453 ± 0.0766
VE-6489, 6490	Aug, 1998	Cs-134	1.0300 ± 1.8700	0.1500 ± 0.1000	0.5900 ± 0.9363
VE-6489, 6490	Aug, 1998	Cs-137	0.9500 ± 1.4300	0.6800 ± 2.0400	0.8150 ± 1.2456
AP-6722, 6723	Aug, 1998	Be-7	0.3063 ± 0.1591	0.3100 ± 0.0937	0.3082 ± 0.0923
VE-6774, 6775	Aug, 1998	Be-7	0.5894 ± 0.2720	0.4208 ± 0.1520	0.5051 ± 0.1558
VE-6774, 6775	Aug, 1998	Gr. Beta	5.9406 ± 0.1789	5.6841 ± 0.1706	5.8124 ± 0.1236
CW-6800, 6801	Aug, 1998	Gr. Beta	2.2300 ± 1.4400	2.1300 ± 1.3100	2.1800 ± 0.9734
LW-7129, 7130	Aug, 1998	Gr. Alpha	0.6433 ± 0.3557	0.5551 ± 0.3614	0.5992 ± 0.2535
LW-7129, 7130	Aug, 1998	Gr. Beta	2.4016 ± 0.4281	2.3041 ± 0.4447	2.3529 ± 0.3086
LW-7129, 7130	Aug, 1998	H-3	170.2100 ± 87.3900	37.4100 ± 81.5000	103.8100 ± 59.7479
LW-7129, 7130	Aug, 1998	H-3	154.7950 ± 94.8090	104.6950 ± 92.7500	129.7450 ± 66.3161
SO-6943, 6944	Sep, 1998	Co-60	0.1466 ± 0.0399	0.1452 ± 0.0303	0.1459 ± 0.0251

Table A-5. In-house "duplicate" samples.

Lab Codes[b]	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
SO-6943, 6944	Sep, 1998	Cs-137	15.1000 ± 0.2000	15.7000 ± 0.3000	15.4000 ± 0.1803
SO-6943, 6944	Sep, 1998	K-40	16.5680 ± 0.7660	17.3780 ± 1.1000	16.9730 ± 0.6702
CW-7043, 7044	Sep, 1998	Gr. Beta	4.5000 ± 1.6000	4.9000 ± 1.5000	4.7000 ± 1.0966
VE-7250, 7251	Sep, 1998	Cs-134	0.0800 ± 1.1800	0.4600 ± 0.5100	0.2700 ± 0.6427
VE-7250, 7251	Sep, 1998	Cs-137	0.1300 ± 0.7200	0.0100 ± 0.3400	0.0700 ± 0.3981
VE-7064, 7065	Sep, 1998	Cs-134	-0.1100 ± 0.0800	0.1200 ± 1.4900	0.0050 ± 0.7461
VE-7064, 7065	Sep, 1998	Cs-137	-0.3600 ± 0.7600	0.0200 ± 0.8200	-0.1700 ± 0.5590
VE-7171, 7172	Sep, 1998	Cs-134	0.0600 ± 0.5200	-0.1300 ± 13.1000	-0.0350 ± 6.5552
VE-7171, 7172	Sep, 1998	Cs-137	0.6300 ± 0.5200	0.6800 ± 0.8000	0.6550 ± 0.4771
CW-7204, 7205	Sep, 1998	Gr. Beta	2.6900 ± 1.4300	1.5600 ± 1.3000	2.1250 ± 0.9663
SW-6363, 6364	Sep, 1998	Gr. Beta	4.3450 ± 0.7618	4.1456 ± 0.7464	4.2453 ± 0.5333
SW-6363, 6364	Sep, 1998	H-3	133.9370 ± 82.9580	148.6820 ± 83.6110	141.3095 ± 58.8915
VE-7279, 7280	Sep, 1998	K-40	2.1575 ± 0.2580	2.3167 ± 0.3420	2.2371 ± 0.2142
SWU-7452, 7453	Sep, 1998	Gr. Beta	4.1567 ± 0.6600	4.1515 ± 0.7395	4.1541 ± 0.4956
F-7819, 7820	Sep, 1998	K-40	3.0166 ± 0.3920	2.7430 ± 0.5190	2.8798 ± 0.3252
CW-7375, 7376	Sep, 1998	Gr. Beta	1.7100 ± 1.1500	2.2000 ± 1.1900	1.9550 ± 0.8274
S-7598, 7599	Sep, 1998	K-40	9.5919 ± 0.7430	8.9290 ± 0.4590	9.2605 ± 0.4367
AP-7598, 7599	Sep, 1998	Be-7	0.0639 ± 0.0188	0.0815 ± 0.0156	0.0727 ± 0.0122
VE-7397, 7398	Sep, 1998	Cs-134	0.1900 ± 2.6800	0.6300 ± 1.3500	0.4100 ± 1.5004
VE-7397, 7398	Sep, 1998	Cs-137	-0.0900 ± 0.9400	0.5200 ± 0.9500	0.2150 ± 0.6682
SWU-7452, 7453	Sep, 1998	H-3	23.7170 ± 81.6810	-19.3480 ± 79.6820	2.1845 ± 57.0548
SWT-7765, 7766	Sep, 1998	Gr. Beta	3.2443 ± 0.6638	2.9078 ± 0.6593	3.0761 ± 0.4678
SW-7857, 7858	Oct, 1998	Gr. Beta	2.3410 ± 0.7265	2.1443 ± 0.7591	2.2427 ± 0.5254
SO-7878, 7879	Oct, 1998	Gr. Beta	19.3527 ± 4.1969	23.2850 ± 4.0731	21.3189 ± 2.9242
SO-7878, 7879	Oct, 1998	Sr-90	0.0034 ± 0.0110	0.0080 ± 0.0130	0.0057 ± 0.0085
AP-,	Oct, 1998	Be-7	0.0680 ± 0.0527	0.0931 ± 0.0702	0.0806 ± 0.0439
WW-8073, 8074	Oct, 1998	Gr. Beta	2.4196 ± 0.5973	3.1890 ± 0.6509	2.8043 ± 0.4417
WW-8073, 8074	Oct, 1998	H-3	90.5270 ± 84.1470	113.3172 ± 85.1690	101.9221 ± 59.8633
SS-,	Oct, 1998	Cs-137	0.0509 ± 0.0284	0.0222 ± 0.0102	0.0365 ± 0.0151
SS-,	Oct, 1998	K-40	7.2289 ± 0.6170	7.1271 ± 0.4380	7.1780 ± 0.3783
SS-8202, 8203	Oct, 1998	Gr. Beta	4.5670 ± 1.9890	6.3930 ± 2.0860	5.4800 ± 1.4411
SS-8202, 8203	Oct, 1998	K-40	6.9700 ± 0.5400	7.1800 ± 0.3800	7.0750 ± 0.3302
WW-,	Oct, 1998	Gr. Beta	1.0464 ± 0.5347	1.4246 ± 0.5276	1.2355 ± 0.3756
WW-,	Oct, 1998	H-3	16.2810 ± 81.9530	53.8530 ± 83.6580	35.0670 ± 58.5554
AP-,	Oct, 1998	Be-7	0.1094 ± 0.0878	0.1708 ± 0.0934	0.1401 ± 0.0641
O-7878, 7879	Oct, 1998	K-40	16.3430 ± 0.9100	18.2150 ± 1.1000	17.2790 ± 0.7138

Table A-5. In-house "duplicate" samples.

Lab Codes[b]	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
SL-8624, 8625	Oct, 1998	K-40	2.0091 ± 0.4260	1.9401 ± 0.3310	1.9746 ± 0.2697
SS-8689, 8690	Oct, 1998	K-40	14.8820 ± 0.8900	16.8160 ± 1.2200	15.8490 ± 0.7551
BS-8864, 8865	Oct, 1998	Co-60	0.1424 ± 0.0225	0.1313 ± 0.0199	0.1368 ± 0.0150
BS-8864, 8865	Oct, 1998	Cs-137	0.0972 ± 0.0204	0.1081 ± 0.0207	0.1026 ± 0.0145
BS-8864, 8865	Oct, 1998	K-40	9.5076 ± 0.4940	10.4040 ± 0.5000	9.9558 ± 0.3514
SO-10497, 10498	Oct, 1998	K-40	19.0930 ± 1.0800	19.7410 ± 0.9100	19.4170 ± 0.7061
SO-9098, 9099	Oct, 1998	Cs-137	0.5240 ± 0.0580	0.5300 ± 0.0390	0.5270 ± 0.0349
SO-9098, 9099	Oct, 1998	K-40	17.7200 ± 1.0700	18.4100 ± 0.8000	18.0650 ± 0.6680
BS-11122, 11123	Oct, 1998	Be-7	0.4800 ± 0.2700	0.3700 ± 0.2200	0.4250 ± 0.1741
BS-11122, 11123	Oct, 1998	Co-60	0.0263 ± 0.0084	0.0291 ± 0.0090	0.0277 ± 0.0062
BS-11122, 11123	Oct, 1998	Cs-137	0.2714 ± 0.0179	0.2747 ± 0.0167	0.2730 ± 0.0122
BS-11122, 11123	Oct, 1998	K-40	9.0446 ± 0.2600	8.9737 ± 0.2760	9.0092 ± 0.1896
VE-9182, 9183	Oct, 1998	Be-7	2.1684 ± 0.4480	1.8643 ± 0.4300	2.0164 ± 0.3105
VE-9182, 9183	Oct, 1998	K-40	4.9628 ± 0.6160	5.4867 ± 0.6600	5.2248 ± 0.4514
VE-9203, 9204	Oct, 1998	Be-7	1.9163 ± 0.6090	1.9606 ± 0.3870	1.9385 ± 0.3608
VE-9203, 9204	Oct, 1998	Cs-137	0.2744 ± 0.0568	0.2623 ± 0.0361	0.2684 ± 0.0337
VE-9203, 9204	Oct, 1998	K-40	3.9727 ± 0.6770	4.0116 ± 0.4430	3.9922 ± 0.4045
SO-9119, 9120	Oct, 1998	Cs-137	0.5500 ± 0.0397	0.5500 ± 0.0480	0.5500 ± 0.0311
SO-9119, 9120	Oct, 1998	K-40	20.2600 ± 1.0200	20.5090 ± 0.8050	20.3845 ± 0.6497
SO-9161, 9162	Oct, 1998	Cs-137	0.7715 ± 0.0584	0.7532 ± 0.0525	0.7624 ± 0.0393
SO-9161, 9162	Oct, 1998	K-40	18.1200 ± 1.1200	20.0600 ± 1.2000	19.0900 ± 0.8207
AP-,	Oct, 1998	Gr. Beta	0.0246 ± 0.0034	0.0262 ± 0.0035	0.0254 ± 0.0024
SWU-,	Oct, 1998	H-3	161.5360 ± 85.8760	157.8370 ± 85.7160	159.6865 ± 60.6670
SWU-9014, 9015	Oct, 1998	Gr. Beta	2.7210 ± 0.6386	3.3308 ± 0.6187	3.0259 ± 0.4446
MI-9035, 9036	Oct, 1998	K-40	1,531.4000 ± 129.0000	1,426.0000 ± 188.0000	1,478.7000 ± 114.0011
LW-9479, 9480	Oct, 1998	Gr. Beta	2.0720 ± 0.5550	1.9860 ± 0.5500	2.0290 ± 0.3907
BS-9349, 9350	Nov, 1998	Cs-137	0.0239 ± 0.0156	0.0277 ± 0.0151	0.0258 ± 0.0109
BS-9349, 9350	Nov, 1998	Gr. Beta	8.4550 ± 2.1970	6.4700 ± 2.0840	7.4625 ± 1.5141
BS-9349, 9350	Nov, 1998	K-40	6.9294 ± 0.4400	6.4650 ± 0.4290	6.6972 ± 0.3073
MI-9437, 9438	Nov, 1998	I-131	-0.1516 ± 0.2458	-0.0769 ± 0.2776	-0.1143 ± 0.1854
MI-9437, 9438	Nov, 1998	K-40	681.2300 ± 128.0000	714.6700 ± 122.0000	697.9500 ± 88.4138
VE-9667, 9668	Nov, 1998	Gr. Beta	4.4810 ± 0.1970	4.3670 ± 0.1940	4.4240 ± 0.1382
VE-9667, 9668	Nov, 1998	K-40	4.2338 ± 0.2840	3.7245 ± 0.4880	3.9792 ± 0.2823
SWT-10167, 10168	Nov, 1998	Gr. Beta	2.1779 ± 0.5699	1.9517 ± 0.5841	2.0648 ± 0.4080
WW-9667, 9668	Nov, 1998	Gr. Beta	2.2847 ± 0.6184	1.7189 ± 0.5495	2.0018 ± 0.4136
SW-10069, 10070	Nov, 1998	Gr. Alpha	1.6469 ± 0.5301	1.5758 ± 0.5574	1.6114 ± 0.3846

Table A-5. In-house "duplicate" samples.

Lab Codes[b]	Sample Date	Analysis	Concentration in pCi/L[a] First Result	Second Result	Averaged Result
SW-10069, 10070	Nov, 1998	Gr. Beta	3.4363 ± 0.4683	3.5768 ± 0.4928	3.5066 ± 0.3399
MI-10146, 10147	Dec, 1998	K-40	1,403.6000 ± 178.0000	1,372.9000 ± 149.0000	1,388.2500 ± 116.0657
SO-10573, 10574	Dec, 1998	Cs-137	367.0300 ± 80.5000	337.1100 ± 32.8000	352.0700 ± 43.4629
SO-10573, 10574	Dec, 1998	K-40	17,459.0000 ± 1,260.0000	16,004.0000 ± 716.0000	16,731.5000 ± 724.6130
MI-10686, 10687	Dec, 1998	K-40	1,320.3000 ± 160.0000	1,350.3000 ± 166.0000	1,335.3000 ± 115.2779
AP-,	Dec, 1998	Gr. Beta	0.0180 ± 0.0030	0.0158 ± 0.0029	0.0169 ± 0.0021
AP-9119, 9120	Dec, 1998	Be-7	0.1386 ± 0.0876	0.1016 ± 0.0396	0.1201 ± 0.0481
AP-10948, 10949	Dec, 1998	Be-7	0.1379 ± 0.0647	0.2164 ± 0.0753	0.1772 ± 0.0496
SW-10920, 10921	Dec, 1998	H-3	364.3700 ± 93.2290	364.3700 ± 93.2290	364.3700 ± 65.9229
AP-11079, 11080	Dec, 1998	Be-7	0.0680 ± 0.0120	0.0680 ± 0.0120	0.0680 ± 0.0085

Table A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP), comparison of MAPEP and Teledyne's Midwest Laboratory results for various sample media[a].

Lab Code	Sample Type	Date Collected	Analysis	Concentration[b] Teledyne Results ±Standard Deviation[c]	MAPEP Result[d] 1s, N=1	Control Limits
SPSO-828	SOIL	Jan, 1998	Co-57	862.20 ± 86.22	1,190.00	833.00 - 1,547.00
SPSO-828	SOIL	Jan, 1998	Co-60	886.60 ± 88.66	1,110.00	777.00 - 1,443.00
SPSO-828	SOIL	Jan, 1998	Cs-137	442.80 ± 44.28	552.00	386.40 - 717.60
SPSO-828	SOIL	Jan, 1998	K-40	540.30 ± 54.03	652.00	456.40 - 847.60
SPSO-828	SOIL	Jan, 1998	Mn-54	867.40 ± 86.74	1,090.00	763.00 - 1,417.00
SPSO-828	SOIL	Jan, 1998	Ni-63	326.10 ± 32.61	405.00	283.50 - 526.50
SPSO-828	SOIL	Jan, 1998	Pu-238	52.30 ± 5.23	50.60	35.42 - 65.78
SPSO-828	SOIL	Jan, 1998	Sr-90	587.60 ± 58.76	624.00	436.80 - 811.20
SPSO-828	SOIL	Jan, 1998	U-234/233	38.20 ± 3.82	51.40	35.98 - 66.82
SPSO-828	SOIL	Jan, 1998	U-238	105.40 ± 10.54	120.00	84.00 - 156.00
SPSO-828	SOIL	Jan, 1998	Zn-65	2,256.80 ± 225.70	2,780.00	1,946.00 - 3,614.00
STW-814	WATER	Jan, 1998	Am-241	2.05 ± 0.21	2.13	1.49 - 2.77
STW-814	WATER	Jan, 1998	Co-57	253.00 ± 25.30	277.50	194.25 - 360.75
STW-814	WATER	Jan, 1998	Co-60	133.00 ± 13.30	132.46	92.72 - 172.20
STW-814	WATER	Jan, 1998	Cs-137	218.00 ± 2.18	213.12	149.18 - 277.06
STW-814	WATER	Jan, 1998	Fe-55	397.80 ± 39.80	492.10	344.47 - 639.73
STW-814	WATER	Jan, 1998	Mn-54	221.00 ± 22.10	221.63	155.14 - 288.12
STW-814	WATER	Jan, 1998	Ni-63	265.50 ± 26.50	358.90	251.23 - 466.57
STW-814	WATER	Jan, 1998	Pu-238	1.27 ± 0.13	1.40	0.98 - 1.82
STW-814	WATER	Jan, 1998	Pu-239/240	3.16 ± 0.32	3.44	2.41 - 4.47
STW-814	WATER	Jan, 1998	Sr-90	33.40 ± 3.34	32.12	22.48 - 41.76
STW-814	WATER	Jan, 1998	U-234/233	3.24 ± 0.32	3.60	2.52 - 4.68
STW-814	WATER	Jan, 1998	U-238	0.09 ± 0.01	0.00	0.00 - 0.10
STW-814	WATER	Jan, 1998	Zn-65	612.00 ± 61.20	588.30	411.81 - 764.79

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

[b] All results are in Bq/kg or Bq/L as requested by the Department of Energy.

[c] Unless otherwise indicated, the TBEESML results are given as the mean ± 1 standard deviations for three determinations.

[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.

Table A-7. Environmental Measurements Laboratory Quality Assessment Program (EML), comparison of EML and Teledyne's Midwest Laboratory results for various sample media[a].

Lab Code	Sample Type	Date Collected	Analysis	Concentration in Bq/L[b] Teledyne Result[c]	EML Result[d]	Control Limits[e]
STW-819	WATER	Mar, 1998	Co-60	14.80 ± 0.60	13.60 ± 1.20	0.92 - 1.18
STW-819	WATER	Mar, 1998	Cs-137	51.20 ± 1.20	46.00 ± 1.70	0.90 - 1.28
STW-819	WATER	Mar, 1998	Fe-55	243.00 ± 29.40	257.00 ± 2.50	0.31 - 1.54
STW-819	WATER	Mar, 1998	Gr. Alpha	1,592.90 ± 63.80	1,421.00 ± 100.00	0.50 - 1.29
STW-819	WATER	Mar, 1998	Gr. Beta	2,509.00 ± 67.10	2,200.00 ± 100.00	0.60 - 1.64
STW-819	WATER	Mar, 1998	H-3	399.70 ± 32.50	218.30 ± 6.51	0.65 - 1.91
The sample was acidic, causing a breakdown of resin in the tritium column. The sample was neutralized to pH 7 and reanalyzed. Result of reanalysis: 178.3±15.5 Bq/L.						
STW-819	WATER	Mar, 1998	Mn-54	61.70 ± 1.30	57.00 ± 1.90	0.87 - 1.22
STW-819	WATER	Mar, 1998	Pu-238	2.61 ± 0.27	2.53 ± 0.06	0.78 - 1.42
STW-819	WATER	Mar, 1998	Pu-239	1.79 ± 0.21	1.65 ± 0.06	0.78 - 1.42
STW-819	WATER	Mar, 1998	U-238	0.50 ± 0.20	0.40 ± 0.04	0.77 - 1.35
STSO-820	SOIL	Mar, 1998	Am-241	1.67 ± 1.11	2.68 ± 0.21	0.52 - 2.65
STSO-820	SOIL	Mar, 1998	Cs-137	322.59 ± 4.57	329.50 ± 9.26	0.80 - 1.34
STSO-820	SOIL	Mar, 1998	K-40	322.10 ± 24.32	313.50 ± 10.15	0.73 - 1.67
STSO-820	SOIL	Mar, 1998	Pu-239	4.65 ± 1.66	5.31 ± 0.25	0.66 - 1.93
STSO-820	SOIL	Mar, 1998	Sr-90	9.89 ± 3.83	13.09 ± 0.28	0.46 - 2.84
STSO-820	SOIL	Mar, 1998	U-238	13.44 ± 2.49	31.90 ± 2.55	0.35 - 1.55
STVE-821	VEGETATION	Mar, 1998	Cm-244	1.78 ± 0.33	2.17 ± 0.07	0.49 - 1.69
STVE-821	VEGETATION	Mar, 1998	Co-60	10.17 ± 1.54	10.58 ± 0.21	0.62 - 1.42
STVE-821	VEGETATION	Mar, 1998	Cs-137	166.03 ± 3.46	181.50 ± 7.14	0.81 - 1.45
STVE-821	VEGETATION	Mar, 1998	K-40	677.16 ± 31.47	707.50 ± 24.99	0.79 - 1.50
STVE-821	VEGETATION	Mar, 1998	Sr-90	315.31 ± 15.06	359.01 ± 6.02	0.48 - 1.29
STAF-822	AIR FILTER	Mar, 1998	Am-241	0.07 ± 0.01	0.07 ± 0.00	0.68 - 2.01
STAF-822	AIR FILTER	Mar, 1998	Ce-144	7.77 ± 0.62	8.21 ± 0.80	0.60 - 1.50
STAF-822	AIR FILTER	Mar, 1998	Co-57	10.15 ± 0.11	11.11 ± 0.85	0.62 - 1.22
STAF-822	AIR FILTER	Mar, 1998	Co-60	9.24 ± 0.16	9.09 ± 0.73	0.74 - 1.24
STAF-822	AIR FILTER	Mar, 1998	Cs-134	18.98 ± 0.20	19.74 ± 1.38	0.72 - 1.21
STAF-822	AIR FILTER	Mar, 1998	Cs-137	12.88 ± 0.20	11.86 ± 0.96	0.72 - 1.32
STAF-822	AIR FILTER	Mar, 1998	Mn-54	6.18 ± 0.20	5.44 ± 0.49	0.75 - 1.27
STAF-822	AIR FILTER	Mar, 1998	Pu-238	0.07 ± 0.02	0.07 ± 0.00	0.62 - 1.46
STAF-822	AIR FILTER	Mar, 1998	Pu-239	0.07 ± 0.02	0.06 ± 0.00	0.62 - 1.46
STAF-822	AIR FILTER	Mar, 1998	Sb-125	13.54 ± 0.56	12.16 ± 1.15	0.62 - 1.39
STAF-822	AIR FILTER	Mar, 1998	Sr-90	1.82 ± 0.21	1.76 ± 0.04	0.66 - 2.65
STSO-834	SOIL	Sep, 1998	Ac-228	54.10 ± 3.30	52.60 ± 2.90	0.50 - 1.50
STSO-834	SOIL	Sep, 1998	Bi-212	55.40 ± 10.30	58.30 ± 5.90	0.50 - 1.50
STSO-834	SOIL	Sep, 1998	Bi-214	28.50 ± 6.50	28.80 ± 0.50	0.50 - 1.50
STSO-834	SOIL	Sep, 1998	Cs-137	915.70 ± 8.20	954.00 ± 38.00	0.80 - 1.34

Table A-7. Environmental Measurements Laboratory Quality Assessment Program (EML), comparison of EML and Teledyne's Midwest Laboratory results for various sample media[a].

Lab Code	Sample Type	Date Collected	Analysis	Concentration in Bq/L[b] Teledyne Result[c]	EML Result[d]	Control Limits[e]
STSO-834	SOIL	Sep, 1998	K-40	296.20 ± 39.90	314.00 ± 13.00	0.73 - 1.67
STSO-834	SOIL	Sep, 1998	Pb-212	53.60 ± 1.50	52.80 ± 3.70	0.50 - 1.50
STSO-834	SOIL	Sep, 1998	Pb-214	31.00 ± 5.90	29.10 ± 1.20	0.50 - 1.50
STSO-834	SOIL	Sep, 1998	Sr-90	37.40 ± 1.90	39.63 ± 0.00	0.46 - 2.84
STSO-834	SOIL	Sep, 1998	Tl-208	20.10 ± 3.10	18.30 ± 1.10	0.50 - 1.50
STW-835	WATER	Sep, 1998	Co-60	49.30 ± 2.80	49.40 ± 1.20	0.92 - 1.18
STW-835	WATER	Sep, 1998	Cs-137	50.10 ± 3.20	50.00 ± 1.70	0.90 - 1.28
STW-835	WATER	Sep, 1998	Fe-55	140.60 ± 9.20	139.00 ± 2.00	0.31 - 1.54
STW-835	WATER	Sep, 1998	Gr. Alpha	1,178.30 ± 47.20	1,030.00 ± 60.00	0.50 - 1.29
STW-835	WATER	Sep, 1998	Gr. Beta	1,613.60 ± 171.80	1,420.00 ± 60.00	0.60 - 1.64
STW-835	WATER	Sep, 1998	H-3	102.20 ± 4.50	76.20 ± 2.90	0.65 - 1.91
STW-835	WATER	Sep, 1998	Mn-54	35.90 ± 3.40	32.40 ± 1.40	0.87 - 1.22
STW-835	WATER	Sep, 1998	Sr-90	3.00 ± 0.90	2.11 ± 0.18	0.72 - 1.66
STAF-837	AIR FILTER	Sep, 1998	Co-60	9.30 ± 0.30	9.16 ± 0.58	0.74 - 1.24
STAF-837	AIR FILTER	Sep, 1998	Cs-137	22.40 ± 0.50	22.47 ± 1.03	0.72 - 1.32
STAF-837	AIR FILTER	Sep, 1998	Mn-54	5.30 ± 0.30	4.92 ± 0.40	0.75 - 1.27
STAF-837	AIR FILTER	Sep, 1998	Sb-125	10.00 ± 0.80	8.89 ± 0.55	0.60 - 1.39
STAF-838	AIR FILTER	Sep, 1998	Gr. Alpha	2.20 ± 0.10	1.65 ± 0.16	0.83 - 1.55
STAF-838	AIR FILTER	Sep, 1998	Gr. Beta	2.80 ± 0.10	2.16 ± 0.07	0.73 - 1.84
STAF-838	AIR FILTER	Sep, 1998	Sr-90	1.10 ± 0.10	1.12 ± 0.05	0.66 - 2.65
STVE-839	VEGETATION	Sep, 1998	Co-60	18.10 ± 1.50	20.00 ± 1.00	0.62 - 1.42
STVE-839	VEGETATION	Sep, 1998	Cs-137	340.40 ± 4.80	390.00 ± 20.00	0.81 - 1.45
STVE-839	VEGETATION	Sep, 1998	K-40	417.50 ± 28.20	460.00 ± 20.00	0.79 - 1.50
STVE-839	VEGETATION	Sep, 1998	Sr-90	672.50 ± 32.50	606.00 ± 40.00	0.48 - 1.29

[a] The Environmental Measurements Laboratory provides the following nuclear species : Air Filters, Soil, Tissue, Vegetation and Water. Teledyne does not participate in the Tissue program.

[b] Results are reported in Bq/L^{-1} with the following exceptions: Air Filter results are reported in $Bq/Filter^{-1}$, Soil results are reported in Bq/Kg^{-1}, Vegetation results are reported in Bq/Kg^{-1}. The results of elemental Uranium are reported in $ug/filter^{-1}$, g, or ml.

[c] Teledyne results are reported as the mean of three determinations±standard deviation.

[d] The EML result listed is the mean of replicate determinations for each nuclide±the standard error of the mean.

[e] The control limits are reported by EML and are established from percentiles of historic data distributions (1978-1992). The evaluation of this historic data and the development of the control limits is presented in DOE report EML-564.

APPENDIX B

DATA REPORTING CONVENTIONS

Data Reporting Conventions

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

2.0. Single Measurements

Each single measurement is reported as follows:

$$x \pm s$$

where x = value of the measurement;

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

In cases where the activity is found to be below the lower limit of detection L it is reported as

$$<L$$

where L = the lower limit of detection based on 4.66σ uncertainty for a background sample.

3.0. Duplicate analyses

3.1 Individual results: $x_1 \pm s_1$
$x_2 \pm s_2$

Reported result: $x \pm s$

where $x = (1/2)(x_1 + x_2)$

$$s = (1/2)\sqrt{s_1^2 + s_2^2}$$

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:

$$\bar{x} = \frac{1}{n} \Sigma x$$

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

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

4.3 If all of the 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 figure following those to be retained is less than 5, the figure is dropped, and the retained figures are kept unchanged. As an example, 11.443 is rounded off to 11.44.

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