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POINT BEACH NUCLEAR PLANT
DOCKETS 50-266, 50-301 AND 72-005
ANNUAL MONITORING REPORT

Enclosed is the Annual Monitoring Report for Point Beach Nuclear Plant, Units 1 and 2, for the period January 1, 2002, through December 31, 2002. This report is submitted in accordance with Technical Specification 5.6.2. The Annual Monitoring Report contains information regarding plant releases, solid waste shipments, new and spent fuel shipments, results from the radiological environmental monitoring program, as well as miscellaneous reportable items from this reporting period.

This report also covers the results of the radiological monitoring of the Point Beach Nuclear Plant Independent Spent Fuel Storage Installation (ISFSI).

The Environmental Manual (EM) was revised in 2002; therefore, a copy of this manual is also enclosed.

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SLS/kmd

Enclosures

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1.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ADMINISTRATION

1.1 Definition and Basis

1.1.1 Definition

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

1.1.2 Basis

The REMP is part of the PBNP Radiological Effluent and Materials Control and Accountability Program (REMCAP). The REMP is designed to fulfill the requirements of 10 CFR 20.1302, PBNP GDC 17, GDC 64 of Appendix A to 10 CFR 50, and Sections IV.B.2 and IV.B.3 of Appendix I to 10 CFR 50.

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

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

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

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

1.2 Responsibilities for Program Implementation

1.2.1 Nuclear Safety Analysis (NSA) Functions

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

a. Program scope

The scope of the REMP is determined by the cognizant NSA Radiological Engineer based on sound radiological principles for the fulfillment of PBNP Technical Specifications (TS) and the applicable Federal Regulations. Based on the scope, the Environmental Manual (EM) is written to accomplish the collection and analyses of the necessary environmental samples. The EM is revised as necessary to conform to changes in procedures and scope. Nuclear Safety Analysis (NSA) monitors the REMP effectiveness and compliance with TS and with the procedures and directives in the EM. In order to verify compliance with TS, NSA or site quality assurance arranges for program audits and audits of the contracted radioanalytical laboratory.

b. Record keeping

The monthly radioanalytical results from the contracted laboratory are reviewed by NSA and one copy of the monthly radioanalytical results from the contracted laboratory is kept for the lifetime of the plant.

c. Data monitoring

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

d. Data summary

Results from the Radiological Environmental Monitoring Program shall be summarized annually for inclusion in the PBNP Annual Monitoring Report. This summary advises the Plant Manager of the radiological status of the environment in the vicinity of PBNP. The summary shall include the numbers and types of samples as well as the averages, statistical confidence limits and the ranges of analytical results. Methods used in summarizing data are at the discretion of NSA.

e. Contractor communications

Communication with the contractor regarding data, analytical procedures, lower limits of detection, notification levels and contractual matters are normally conducted by the NSA. Communication regarding sample shipment may be done by either RP or NSA as appropriate.

f. Reportable items

1. NSA shall generate all technically-specified reports related to the operation of the Radiological Environmental Monitoring Program. The material included shall be sufficient to fulfill the objectives outlined in Sections IV.B.2 and IV.B.3 of Appendix I to 10 CFR 50. The following items and occurrences, are required to be reported in the PBNP Annual Monitoring Report:

   (a) Summary and discussion of monitoring results including number and type of samples and measurements, and all detected radionuclides, except for naturally occurring radionuclides;

   (b) Unavailable, missing, and lost samples and plans to prevent recurrence and comments on any significant portion of the REMP not conducted as indicated in Tables 2-3 through 2-4.

   (c) New or relocated sampling locations and reason for change;

   (d) LLDs that are higher than specified in Table 2-2 and factors contributing to inability to achieve specified LLDs;

   (e) Notification that the analytical laboratory does not participate in an interlaboratory comparison program and corrective action taken to preclude a recurrence; and

   (f) Results of the annual milk sampling program land use census "milk survey" to visually verify that the location of grazing animals in the vicinity of the PBNP site boundary so as to ensure that the milk sampling program remains as conservative as practicable.

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

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

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

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

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

4. The Annual Monitoring Report for the previous 12 month period, or fraction thereof, ending December 31, shall be submitted to the NRC by April 30 of the following year.

1.2.2 Non-NSA Functions

The primary responsibility for the implementation of the Point Beach Nuclear Plant (PBNP) Radiological Environmental Monitoring Program and for any actions to be taken at PBNP, based on the results of the program, resides with the Plant Manager.

a. Manual control and distribution

The distribution of the PBNP Environmental Manual is the responsibility of RSL.

b. Program coordination

The daily operation of the program is conducted by PBNP Radiation Protection personnel, and other qualified personnel as required, under the supervision of a Radiation Protection Management Employee who consults, as needed, with NSA. The daily administrative functions of the Radiation Protection Management Employee address those functions required for the effective operation of the PBNP Radiological Environmental Monitoring Program. These administrative functions include the following:

1. Ensuring that samples are obtained in accordance with the type and frequency in Table 2-4 following procedures outlined in this manual;

2. Ensuring adequate sampling supplies and calibrated, operable equipment are available at all times;

3. Ensuring that air sampling pumps are maintained, repaired and calibrated as required and that an adequate number of backup pumps are readily available at all times;

4. Reporting lost or unavailable samples as well as other potential deviations from the sampling regime in Table 2-4 via the Corrective Action Program and notifying the cognizant NSA RE.

5. Assisting the State of Wisconsin in obtaining samples at co-located and other sampling sites based upon a yearly, renewable agreement; and

6. Assisting NSA, as necessary with investigations into elevated radioactivity levels in environmental samples.

1.3 Quality Assurance/Quality Control

Quality assurance considerations are an integral part of PBNP's Radiological Environmental Monitoring Program. The program involves the interaction of NSA, site quality assurance and the contracted analytical vendor. The contracted vendor shall be participating in an interlaboratory comparison program. The laboratory is audited periodically, either by PBNP or by an independent third party.

Quality control for the PBNP portion of the Radiological Environmental Monitoring Program is achieved by following the procedures contained in this manual. Health Physics Technologists (HPTs) collect, package and ship environmental samples under the supervision of Radiation Protection supervisors. They are advised by Radiation Protection Management who has immediate responsibility for the overall technical operation of the environmental sampling functions. The HPTs receive classroom training as well as on-the-job training in carrying out these procedures.

An audit of the PBNP Radiological Environmental Monitoring Program and its results shall be completed periodically as a means of monitoring program effectiveness and assuring compliance with program directives. The audit shall be performed by either NSA personnel, site quality assurance, or a qualified consulting firm and in accordance with ODCM section 1.4.

1.4 Program Revisions

This manual describes the current scope of the PBNP Radiological Environmental Monitoring Program. Program items or procedures periodically may be updated or changed, consistent with good radiologically monitoring practices, either to reflect new conditions or to improve program effectiveness. Technical and program features described in this manual may be changed with the approval of the Plant Manager pursuant to the ODCM.

2.0 RADIOLOGICAL ENVIRONMENTAL MONITORING

2.1 Program Overview

2.1.1 Purpose

No significant or unexpected radionuclide concentrations of plant origin are expected because each normal effluent pathway at PBNP is monitored at or before the release point. However, the Radiological Environmental Monitoring Program is conducted to verify that plant operations produce no significant radiological impact on the environment and to demonstrate compliance with applicable standards.

2.1.2 Samples

Samples for the Radiological Environmental Monitoring Program are obtained from the aquatic, terrestrial and atmospheric environment. The sample types represent key indicators or critical pathways identified by applying sound radiological principles to the PBNP environment.

2.1.3 Monitoring sensitivity

The effectiveness of the Radiological Environmental Monitoring Program in fulfilling its purpose depends upon the ability to accurately determine the nature and origins of fluctuations in low levels of environmental radioactivity. This requires a high degree of sensitivity so that it is possible to correctly discriminate between fluctuations in background radiation levels and levels of radioactivity that may be attributable to the operation of PBNP. Therefore, personnel actively participating in the monitoring program should make every effort to minimize the possibility of contaminating environmental samples and to obtain samples of the appropriate size.

2.2 Program Parameters

2.2.1 Contamination avoidance

Contamination prevents the accurate quantification of environmental radioactivity and the correct differentiation between fluctuating background radioactivity and levels of radioactivity attributable to the operation of PBNP. Therefore, it is necessary that all personnel associated with collecting and handling radiological environmental samples take the appropriate precautions to minimize the possibility of contaminating the samples. Some of the precautions that should be taken and which will help to minimize contamination are listed below:

a. Equipment which has been on the controlled side, even if released clean, should not normally be used in conjunction with radiological environmental monitoring. An exception to this is the HPTI equipment used to calibrate the air flow calibrator.

b. Store sampling equipment in radiologically clean areas only;

c. Store radiological environmental samples only in radiologically clean areas when samples cannot be shipped to the contractor on the same day they are collected;

d. Treat each sample as a possible source of contamination for other samples so as to minimize the possibility of cross-contamination;

e. Radiological environmental monitoring equipment should be repaired in clean-side shops;

f. Contamination avoidance for environmental TLDs is covered in Section 2.4.2; and

g. Avoid entering contaminated areas prior to collecting environmental samples.

2.2.2 Sample size

Sample size affects the sensitivity achievable in quantifying low levels of environmental radioactivity. Therefore, sampling personnel must attempt to attain the quantities of sample specified in Table 2-1. When a range is given, every effort should be made to obtain a quantity at the upper part of the range.

2.2.3 Lower limit of detection

The sensitivity required for a specific analysis of an environmental sample is defined in terms of the lower limit of detection (LLD). The LLD is the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with a 95% probability and have only a 5% probability of falsely concluding that a blank observation represents a real signal. Mathematically, the LLD is defined by the formula

$$LLD = \frac{4.66\, S_b}{E \times V \times 2.22 \times Y \times EXP(-\blacksquare T)}$$

Where

LLD = the a priori lower limit of detection in picocuries per unit volume or mass, as applicable;

S_b = the standard deviation of the background counting rate or the counting rate of a blank sample, as appropriate, in counts per minutes;

E = counting efficiency in counts per disintegration;

V = sample size in units of volume or mass, as applicable;

2.22 = number of disintegrations per minute per picocurie;

Y = the fractional chemical yield as applicable;

■ = the radioactive decay constant for the particular radionuclide; and

■T = the elapsed time between sample collection, or the end of the collection period, and the time of counting.

Typical values of E, V, Y, and ■T are used to calculate the LLD. As defined, the LLD is an a priori limit representing the capability of a measuring system and not an a posteriori limit for a particular measurement.

The required analysis for each environmental sample and the highest acceptable LLD associated with each analysis are listed in Table 2-2. Whenever LLD values lower than those specified in Table 2-2 are reasonably achievable, the analytical contractor for the radiological environmental samples will do so. When the LLDs listed in Table 2-2 are not achieved, a description of the factors contributing to the higher LLD shall be reported in the next PBNP Annual Monitoring Report.

2.2.4 Notification levels

The Notification Level (NL) is that measured quantity of radioactivity in an environmental sample which, when exceeded, requires a notification of such an occurrence be made to the appropriate party. Regulatory and administrative notification levels are listed in Table 2-2.

a. Regulatory notification levels

The regulatory notification levels listed in Table 2-2 represent the concentration levels at which NRC notification is required. If a measured level of radioactivity in any radiological environmental monitoring program sample exceeds the regulatory notification level listed in Table 2-2, resampling and/or reanalysis for confirmation shall be completed within 30 days of the determination of the anomalous result. If the confirmed measured level of radioactivity remains above the notification level, a written report shall be submitted to the NRC. If more than one of the radionuclides listed in Table 2-2 are detected in any environmental medium, a weighted sum calculation shall be performed if the measured concentration of a detected radionuclide is greater than 25% of the notification levels. For those radionuclides with LLDs in excess of 25% of the notification level, a weighted sum calculation needs to be performed only if the reported value exceeds the LLD. Radionuclide concentration levels, called Weighted Sum Action Levels, which trigger a weighted sum calculation are listed in Table 2-2.

The weighted sum is calculated as follows:

$$\frac{\text{concentration (1)}}{\text{notification level (1)}} + \frac{\text{concentration (2)}}{\text{notification level (2)}} + \ldots = \text{weighted sum}$$

If the calculated weighted sum is equal to or greater than 1, resampling and/or reanalysis for confirmation shall be completed within 30 days of the determination of the anomalous result. If the confirmed calculated weighted sum remains equal to or greater than 1, a written report shall be submitted to the NRC. This calculation requirement and report is not required if the measured level of radioactivity was not the result of plant effluents.

b. Administrative notification levels

The administrative notification levels are the concentration levels at which the contracted analytical laboratory promptly notifies NSA by phone, followed by a formal written communication. The administrative notification levels are set lower than the NRC regulatory notification levels and lower than, or equal to, the weighted sum action levels so that the nature and origin of the increased level of environmental radioactivity may be expeditiously ascertained and corrective actions taken if required.

2.2.5 Sampling locations

A list of sampling locations and the corresponding location codes appear in Table 2-3. The locations also are shown in Figures 2-1a, 2-1b, and 2-1c. It is conceivable that samples may become unavailable from specified sample locations. If this were to occur, new locations for obtaining replacement samples shall be identified and added to the Radiological Environmental Monitoring Program. If milk or vegetation samples become unavailable from the specified sampling locations, new sampling locations will be identified within 30 days. The specific locations where samples were unavailable may be deleted from the monitoring program. A formal, written reason for the new site and its location shall be transmitted to NSA who will make the appropriate changes to the Environmental Manual. Any significant changes in existing sampling location and the criteria for the change shall be reported in the Annual Monitoring Report for the period in which the change occurred. Additional sampling locations may be designated if deemed necessary by cognizant company personnel. Figures and tables in this manual shall be revised to reflect the changes.

2.2.6 Sampling media and frequency

The sampling frequency for the environmental media required by the PBNP REMP is found in Table 2-4. In addition to samples required by the former Technical Specifications, the Radiological Environmental Monitoring Program also includes the sampling of soil and shoreline sediment. To ensure that all samples are obtained at the appropriate times, a checklist is used. The checklist provides a month-by-month indication of all samples, to be obtained at each sampling location (PBF-4121a through 4121l). These checklists also identify the schedule for the annual milk survey and provides space for recording the date samples were shipped offsite for analysis. In addition, the checklist lists each sampling location to identify all samples, to be obtained and the collection date. Because the weekly air samples require additional information, a separate checklist is used for each individual air sampling location for calculations and other information as shown in PBF-4078.

It is recognized that on occasions samples will be lost or that samples cannot be collected at the specified frequency because of hazardous conditions, seasonable unavailability, automatic sampling equipment malfunctions and other legitimate reasons. Reasonable efforts will be made to recover lost or missed samples if warranted and appropriate. If samples are not obtained at the indicated frequency or location, the reasons or explanations for deviations from the sampling frequency specified in Table 2-4 shall be submitted to the PBNP Corrective Action Program.

2.2.7 Sample labeling

All samples must be properly labeled to ensure that the necessary information is conveyed to the analytical contractor and that the results are associated with the correct geographical location. Each label (PBF-4026) must contain the following:

a. Sample type;

b. Sample location from Table 2-3;

c. Date and time (as appropriate) collected;

d. Air samples must show the total volume in m^3; volumes for water and milk are in gallons; vegetation, sediment, soil, and algae are indicated as ■1000 grams; and fish ■1000 grams;

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

f. Name of person collecting the sample.

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

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

2.2.8 Sample shipping

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

2.2.9 Sample analyses and frequency

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

2.2.10 Analytical laboratory

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

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

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

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

2.3 Assistance to the State of Wisconsin

As a courtesy and convenience, PBNP personnel obtain certain environmental samples for the Section of Radiation Protection, Department of Health and Family Services of the State of Wisconsin as listed in Table 2-5. A checklist is used. In addition, a State of Wisconsin air sampling data sheet is submitted with each sample obtained at Wisconsin air sampling locations serviced by PBNP personnel.

State of Wisconsin precipitation samples collected twice a month (or as available) require a state sample tag to be placed in a box with the quart cubitainer. State supplied labels for air particulate filters require start and stop time, date and beginning and ending volume. Fish sent to the state identify only the quarter and the year using a PBNP label (PBF-4026). The monthly lake water sample may be picked up by state personnel and in which case these samples require only that the date and location be written on the box for the cubitainer. The well water samples, 2 times/year, may be picked similar to lake water samples.

Samples obtained for the State of Wisconsin are either given directly to state personnel or shipped as required. The department address is:

State Lab of Hygiene
Radiochemistry Unit
2601 Agriculture Dr.
PO Box 7996
Madison, Wisconsin 53707-7996

2.4 Specification of Sampling Procedures

General radiological environmental sampling procedures follow the directives presented in Sections 2.1 and 2.2. Specific information for handling individual sample types follow.

2.4.1 Vegetation

Vegetation samples consist of green, growing grasses and weeds and are obtained three times per year, as available, from specified locations. New growth, not dead vegetation, should be used because these samples are indicators of recent atmospheric deposition. Use a scissors or other sharp cutting tool to cut the grasses and weeds off as close to the ground as possible. Do not include plant roots and take care not to contaminate the sample with soil. Total sample collected should exceed 500 grams and ideally should be 1000 grams. Place entire sample in an appropriate container, such as a plastic bag (tape the bag shut) and label the container as described in Section 2.2.7.

2.4.2 Thermoluminescent dosimeters (TLDs)

TLDs capable of multiple, independent measurements of the same exposure are posted at locations specified in Table 2-4 and are changed quarterly. The utmost care in handling is required to minimize unnecessary exposure during transit, storage and posting because the TLDs begin recording all radiation from the moment they are annealed (heated to rezero) at the contractor's laboratory. Packages of TLDs in transit should be marked "DO NOT X-RAY."

Transportation control (TLDs) shall accompany the new batch in transit from the contractor's laboratory to the plant. The control TLDs shall accompany the batch during brief storage and subsequent posting. The same control TLDs shall accompany the "old" or exposed batch on its way back to the contractor. Therefore, each control represents the sum of approximately half the in-transit exposure of the two batches. This control system is able to identify any unusual in-transit exposure.

Environmental TLDs should never be brought into the plant RCA or any other area with elevated radiation, but may be stored for brief periods in a shielded enclosure in the RP Office Area or other low background area, such as the Energy Information Center or the Site Boundary Control Center. The contractor is to time shipments to coincide as closely as possible with the beginning of a calendar quarter. TLDs should be shipped back to the contractor immediately or within 24 hours of removal. The contractor is instructed to process the samples immediately upon receipt. The contractor shall report removal data and cumulative readings in mR for all locations and control, correct for in-transit exposure and express results in net mR/7 days. Labels of the exposed set for shipment to contractor should show both posting and removal dates.

2.4.3 Lake water

Lake water samples are obtained monthly at specified locations. The contractor is responsible for the compositing for quarterly analyses. Collect approximately 8000 ml of lake water in the required number of cubitainers, or other appropriate containers, at each location and label as directed in Section 2.2.7.

Also, lake water is collected for the State of Wisconsin pursuant to Table 2-5. The sample is collected, labeled, and forwarded to the appropriate State agency.

2.4.4 Well water

Well water samples are obtained quarterly from the single onsite well. Collect approximately 8000 ml of well water using the required number of cubitainers or other appropriate containers. Label as directed in Section 2.2.7.

2.4.5 Air

a. Sample collection

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

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

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

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

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

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

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

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

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

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

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

8. Record "date on."

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

10. Turn pump on (if necessary).

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

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

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

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

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

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

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

b. Air sampling system description

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

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

c. Calibration

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

d. Inspection and maintenance

Initially, and at quarterly intervals, not to exceed 16 weeks, thereafter, the assembled system should be checked for leaks by attaching the reference flow meter across the face of the filter holder with the filters in position. Leakage in this configuration is indicated by a higher reading on the built-in rotameter than on the reference flow meter. Because leakage is indicated by disagreement between the two flow measuring devices, remember to apply the calibration correction factor to the built-in rotameter reading. Leak tests are to be recorded on Form PBF-4020. Weekly gross leak checks and quarterly leak tests shall be accomplished as indicated in the appropriate PBNP procedure.

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

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

e. Pump repair and replacement

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

2.4.6 Milk

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

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

The following sequence should be followed:

a. After verifying the State milk pickup date with the Manitowoc Public Health Department (Mr. Mark Chatenka, phone number 683-4454), notify Mr. Leon Strutz (755-2060) of the pickup date. This must be done because the Strutz farm (PBNP sampling location E-21) is not a State of Wisconsin sampling site.

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

c. The milk from the Strutz farm (E-21) must be picked up before 0900 because that is the time the Strutz milk is shipped. A late arrival may mean a missed sample. Milk from sites E-11 and E-19 may be picked up any time after the Strutz pickup.

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

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

2.4.7 Algae

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

2.4.8 Fish

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

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

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

2.4.9 Soil

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

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

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

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

2.4.10 Shoreline Sediment

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

2.5 Milk Survey

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

TABLE 2-1
RECOMMENDED MINIMUM SAMPLE SIZES

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

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

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

Table 2-2

SAMPLE TYPE	REPORTING UNIT	PARAMETER	LLD[a]	NOTIFICATION LEVELS NRC (Regulatory)	NPBU[b] (Admin.)	WEIGHTED SUM ACTION LEVEL
Lakewater and Well Water (Continued)	pCi/L-T.S.[d]	Mn-54	15	1,000	100	250
		I-131	2	---	2	---
		Other	30	---	100	---
		H-3	3,000	30,000	3,000	7,500
		Sr-89	10	---	50	---
		Sr-90	2	---	20	---
Milk	pCi/L	Sr-89	5	---	100	---
		Sr-90	1	---	100	---
		I-131	0.5	3	0.5	0.75
		Cs-134	15	60	15	15
		Cs-137	18	70	18	18
		Ba-La-140	15	300	30	75
		Other[c]	15	---	30	---
Air Filter	pCi/m^3	Gross Beta	0.01	---	1.0	---
		I-131	0.07	0.9	0.09	0.2
		Cs-137	0.06	20	2.0	5.0
		Cs-134	0.05	10	1.0	2.5
		Other[c]	0.1	---	1.0	---

(a) The LLDs in this column are the maximum acceptable values.
(b) The values in this column are not technical specifications.
(c) Other refers to non-specified identifiable gamma emitters.
(d) T.S. = total solids.
(e) No drinking water

TABLE 2-3
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

Location Code	Location Description
E-01	Primary Meteorological Tower, South of the plant
E-02	Site Boundary Control Center - East Side of Building
E-03	Tapawingo Road, about 0.4 Miles West of Lakeshore Road
E-04	North Boundary
E-05	Two Creeks Park
E-06	Point Beach State Park - Water and shoreline sediment samples at the Coast Guard Station; soil and vegetation from the Point Beach State Park campground area N of the Coast Guard Station and on the W side of County Road O; TLD located South of lighthouse on telephone pole.
E-07	WPSC Substation on County Rt. V, about 0.5 Miles West of Hwy. 42
E-08	G. J. Francar Property, at the Southeast Corner of the Intersection of Cty. B and Zander Road
E-09	Nature Conservancy
E-10	PBNP Site Well
E-11	Dairy Farm (W. Funk), 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, Residence, about 0.25 miles North of Nuclear Road
E-17	North of Mishicot, Cty. B and Assman Road, Northeast Corner of Intersection
E-18	Northwest of Two Creeks at Zander and Tannery Roads
E-19	Local Dairy Farm, about 0.2 miles West of Hwy. 42 on the North Side of Two Creeks Road (L. Engelbrecht)
E-20	Reference Location, 17 miles Southwest, at Silver Lake College
E-21	Local Dairy Farm just South of Site (L. Strutz) on Lakeshore and Irish Roads
E-22	West Side of Hwy. 42, about 0.25 miles North of Johanek Road
E-23	Greenfield Lane, about 4.5 Miles South of Site, 0.5 Miles East of Hwy. 42
E-24	North Side of County Rt. V, near intersection of Saxonburg Road
E-25	South Side of County Rt. BB, about 0.5 miles West of Norman Road
E-26	804 Tapawingo Road, about 0.4 miles East of Cty. B. North Side of Road
E-27	Intersection of Saxonburg and Nuclear Roads, Southwest Corner, about 4 Miles WSW
E-28	TLD on westernmost pole between the 2nd and 3rd parking lots,
E-29	Area of North Meterological 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

Table 2-3

Location Code	Location Description
E-32	On a tree located at the junction of property lines, as indicated by trees and shrubs, about 500 feet east of the west gate in line with first designated treeline on Tapawingo Road and about 1200 feet south of Tapawingo Road. The location is almost under the power lines between the blue and gray transmission towers.
E-33	Lake Michigan shoreline accessed from SE corner of KNPP parking lot. Sample south of creek.
E-38	Retention Pond fence, W side.
E-39	Retention Pond fence, E side.
E-TC	Transportation Control; Reserved for TLDs

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

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

TABLE 2-5
SAMPLES COLLECTED FOR STATE OF WISCONSIN

	Sample Type	Location	Frequency
1.	Lake Water	E-01	Monthly
2.	Air Filters	E-07 E-08	Weekly
3.	Fish	E-13	Quarterly, As Available
4.	Precipitation	E-04 E-08	Twice a month, As Available
5.	Milk	E-11 E-19	Monthly
6.	Well Water	E-10	2 times/year

FIGURE 2-1a
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

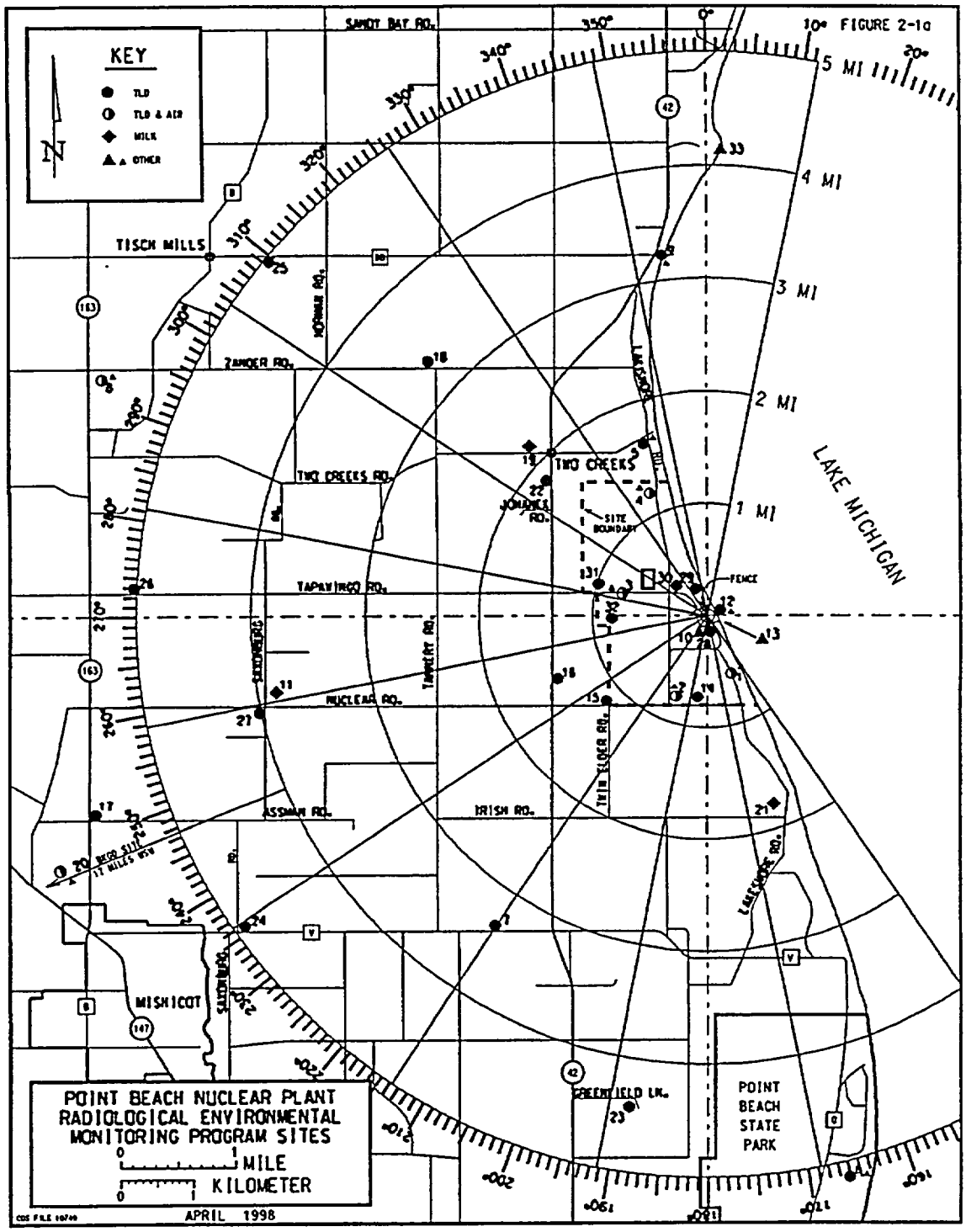


FIGURE 2-1b
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS

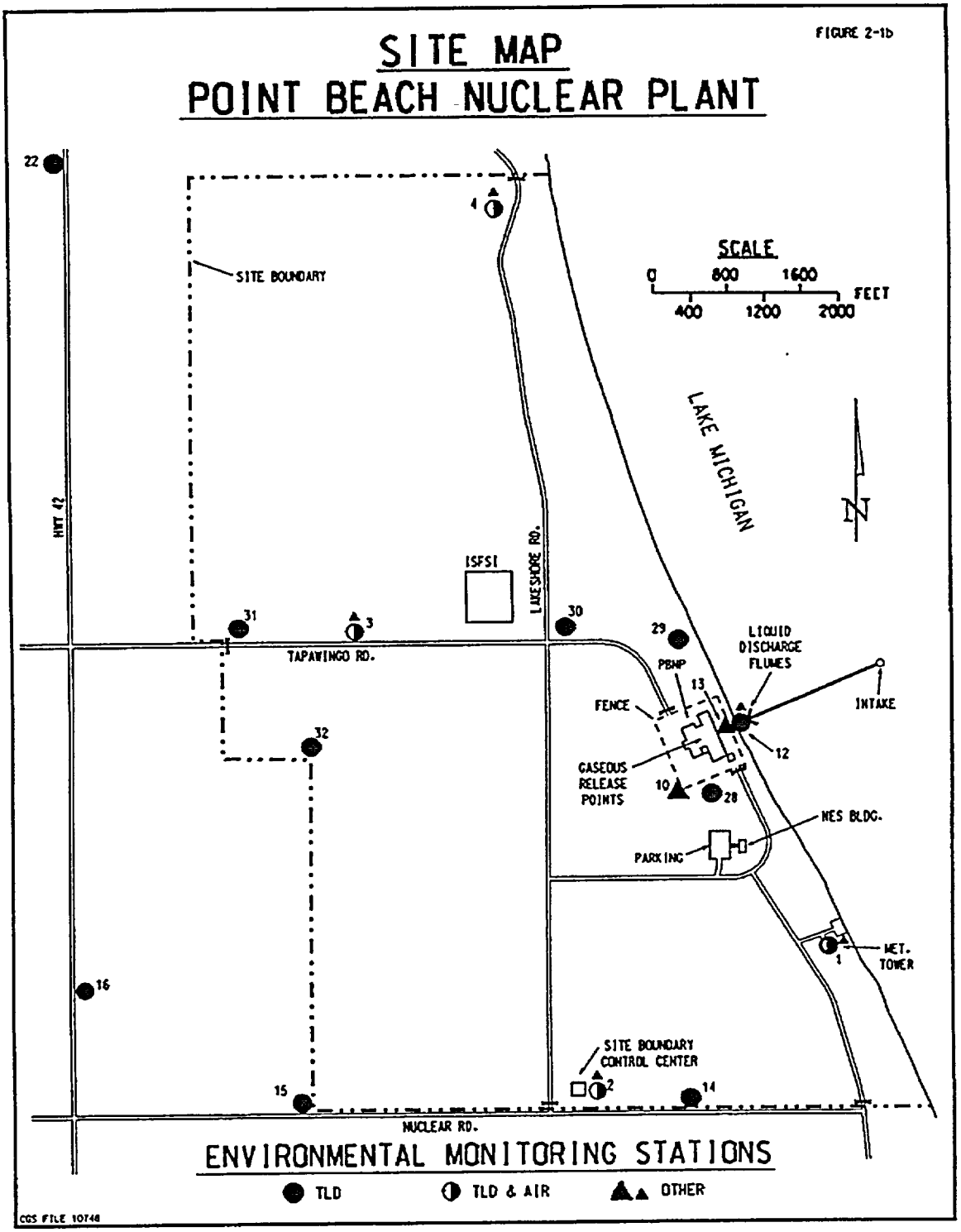
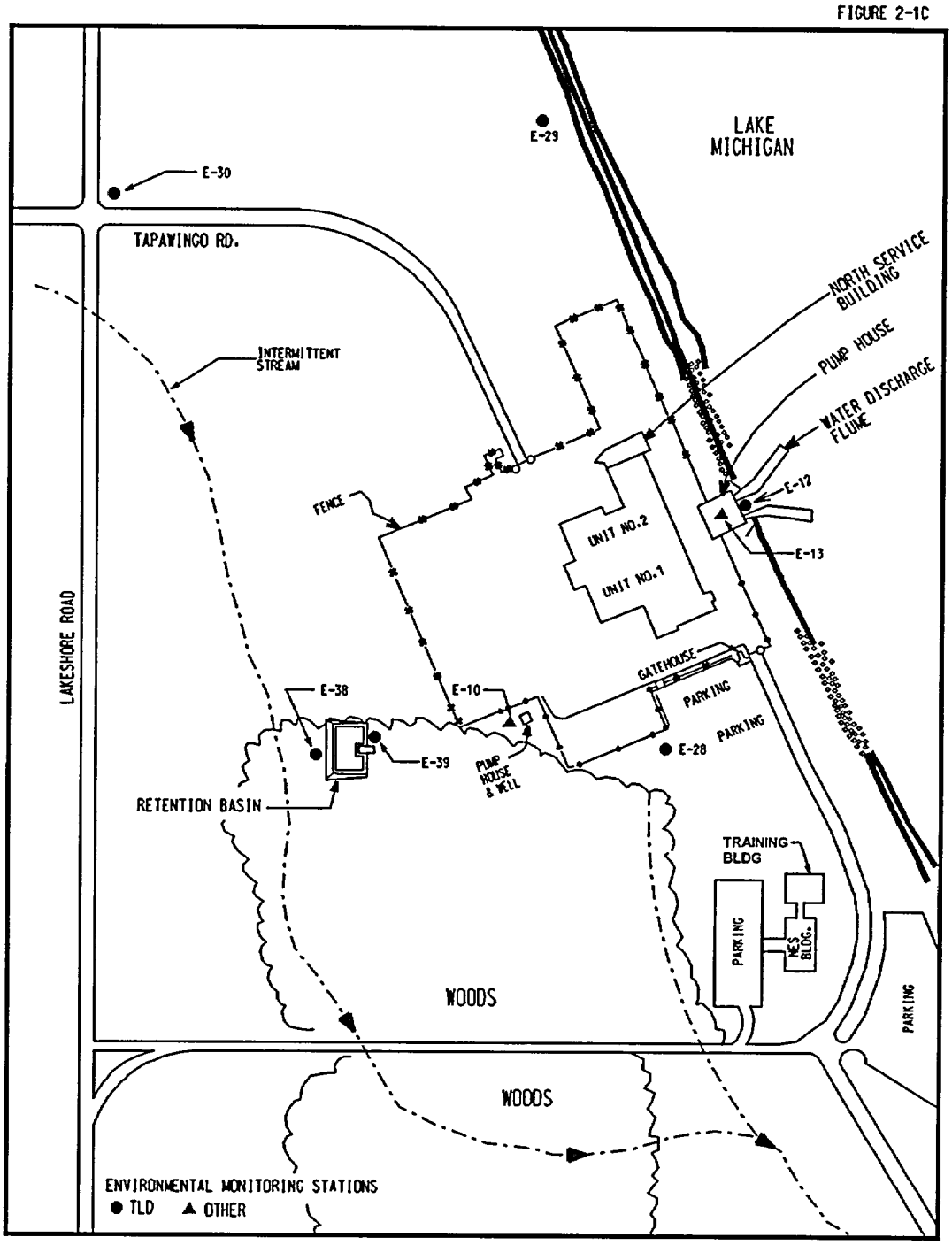


FIGURE 2-1c
RADIOLOGICAL ENVIRONMENTAL SAMPLING LOCATIONS



ANNUAL MONITORING REPORT 2002

NUCLEAR MANAGEMENT COMPANY, LLC
POINT BEACH NUCLEAR PLANT

January 1, 2002, through December 31, 2002
April 2003

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EXECUTIVE SUMMARY

This Annual Monitoring Report for the period of January 1, 2002, through December 31, 2002, is submitted in accordance with Point Beach Nuclear Plant (PBNP) Units 1 and 2 Technical Specification 5.6.2 and filed under Dockets 50-266 and 50-301 for Facility Operating Licenses DPR-24 and DPR-27, respectively. The report presents the results of effluent and environmental monitoring programs, solid waste shipments, non-radioactive chemical releases, and circulating water system operation.

During 2002, the following Curies (Ci) of radioactive material were released via the liquid and atmospheric pathways:

	Liquid	Atmospheric
Tritium (Ci)	560	58.3
Particulate (Ci)	0.08	0.00003
Noble Gas (Ci)	(-)	3.9

(-)Noble gases in the liquids are added to the atmospheric release totals.

For the purpose of regulatory compliance with the effluent design objectives of Appendix I to 10 CFR 50, doses from effluents are calculated for the hypothetical maximally exposed individual (MEI) for each age group and compared to the Appendix I objectives. Doses less than or equal to the Appendix I values are considered to be evidence that PBNP releases are as low as reasonably achievable (ALARA). The maximum annual calculated doses in millirem (mrem) or millirad (mrad) are shown below and compared to the corresponding design objectives of 10 CFR 50, Appendix I.

LIQUID RELEASES

Dose Category	Calculated Dose	Appendix I Dose
Whole body dose	0.006 mrem	6 mrem
Organ dose	0.007 mrem	20 mrem

ATMOSPHERIC RELEASES

Dose Category	Calculated Dose	Appendix I Dose
Organ dose	0.02 mrem	30 mrem
Noble gas beta air dose	0.0006 mrad	40 mrad
Noble gas gamma ray air dose	0.001 mrad	20 mrad
Noble gas dose to the skin	0.002 mrem	30 mrem
Noble gas dose to the whole body	0.001 mrem	10 mrem

The results show that during 2002, the doses from PBNP effluents were a small percentage

(~ 0.1% at the most) of the Appendix I design objectives and therefore operation of PBNP continues to be ALARA.

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

The 2002 Radiological Environmental Monitoring Program (REMP) collected 451 samples for radiological analyses and 136 sets of thermoluminescent dosimeters (TLDs) to measure ambient radiation in the vicinity of PBNP and the Independent Spent Fuel Storage Installation (ISFSI). Air monitoring from six different sites showed only background radioactivity from naturally occurring radionuclides. Terrestrial monitoring consisting of soil, vegetation, and milk found no influence from PBNP. Similarly, samples from the aquatic environment, consisting of lake and well water, fish, and algae, revealed no buildup of PBNP radionuclides released in liquid effluents. The data analysis shows no plant effect on its environs.

As of December 2002, the ISFSI contained a total of 15 ventilated storage casks (VSC-24). During 2002, two casks were transferred to the ISFSI. The subset of the PBNP REMP samples used to evaluate the environmental impact of the PBNP ISFSI showed no environmental impact from its operation.

The environmental monitoring conducted during 2002 confirms that the effluent control program at PBNP ensures that its operations minimally impact the environs.

Part A
EFFLUENT MONITORING

1.0 INTRODUCTION

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

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

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

Also operated at PBNP under the General License granted pursuant to 10 CFR 72.210 is an Independent Spent Fuel Storage Installation (ISFSI). The release of radioactive materials from the operation of the ISFSI must also comply with the limits of part 20 and the part 50 Appendix I design objectives. Per 10 CFR 72.44(d)(3), the results of radiological effluent monitoring are to be reported annually.* The dose criteria for effluents and direct radiation specified by 10 CFR 72.104 states that during normal operations and anticipated occurrences, the annual dose equivalent to any real individual

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

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

2.0 RADIOACTIVE LIQUID RELEASES

The release path to the environment contributing to radioactive liquid releases is circulating water discharge. A liquid waste treatment system in conjunction with administrative controls is used to minimize the impact on the environment and maintain doses to the public ALARA from the liquid releases.

2.1 Doses From Liquid Effluent

Doses from liquid effluent are calculated using the methodology of the Offsite Dose Calculation Manual (ODCM). These calculated doses use parameters such as the amount of radioactive material released, the total volume of liquid, the total volume of dilution water, and usage factors (e.g., water and fish consumption, shoreline and swimming factors). These calculations produce a conservative estimation of the dose. For compliance with 10 CFR 50, Appendix I design objectives, the annual dose is calculated to the hypothetical maximally exposed individual (MEI). The MEI is assumed to reside at the site boundary in the highest χ/Q sector and is maximized with respect to occupancy, food consumption, and other uses of this area. As such, the MEI represents an individual with reasonable deviations from the average for the general population in the vicinity of PBNP. A comparison of the calculated doses to the 10 CFR 50, Appendix I design objectives is presented in Table 2-1. The conservatively calculated dose to the MEI is a very small fraction of the Appendix I design objective.

Table 2-1
Comparison of 2002 Liquid Effluent Calculated Doses to 10 CFR 50 Appendix I Design Objectives

Annual Limit [mrem]	Highest Total Calculated Dose [mrem]	% of Design Objective
6 (whole body)	0.006	0.1 %
20 (any organ)	0.007	0.04 %

2.2 2002 Circulating Water Radionuclide Release Summary

Radioactive liquid releases via the circulating water discharge are summarized by individual source and total curies released on a monthly basis and presented in Table 2-2.

2.3 2002 Isotopic Composition of Circulating Water Discharges

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

2.4 Subsoil Drain System Releases Tritium Summary

The quarterly and annual results of monitoring the subsoil drains are presented in Table 2-4. No tritium was observed in any of the drains during 2002.

2.5 Changes to the Waste Liquid Treatment System in 2002

Conveyor type filtration units have replaced the function of the Retention Pond. The Retention Pond was originally designed to accept flows from systems such as the turbine hall floor drains, façade sumps, and sanitary waste. All flows attributed to the Retention Pond are now processed by paper-media filtration. This modification does not significantly affect the amount or rate of release in the liquid waste effluent from the various drains previously accepted by the Retention Pond. This change to the Waste Liquid Treatment System will be reported with the 2002 update to the PBNP Final Safety Analysis Report as directed by the PBNP RECM step 1.6.3, "Major Change to Radioactive Liquid, Gaseous and Solid Waste Treatment Systems."

Table 2-2
Summary of Circulating Water Discharge
January 1, 2002, through December 31, 2002

							Jan-Jun
Total Activity Released (Ci)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Totals**
Gamma Scan (includes Fe-55)	3.52E-04	4.06E-04	5.04E-03	3.35E-03	2.41E-03	8.21E-04	1.24E-02
Gross Alpha	0.00E+00	3.90E-07	4.65E-06	0.00E+00	2.00E-06	0.00E+00	7.04E-06
Tritium	7.35E+01	3.12E+01	1.34E+02	4.08E+01	3.75E+01	3.71E+01	3.55E+02
Strontium (Sr-89 and Sr-90)	0.00E+00	3.89E-05	2.90E-05	5.62E-05	0.00E+00	0.00E+00	1.24E-04
Total volume Released (gal)							
Processed Waste	4.95E+04	2.39E+04	1.54E+05	9.71E+04	1.65E+05	4.39E+04	5.33E+05
Retention Pond/Waste Water Effluent*	9.80E+06	6.43E+06	5.90E+06	5.71E+06	5.54E+06	4.66E+06	3.81E+07
U1 Steam Generator Blowdown	2.67E+06	2.40E+06	2.66E+06	2.54E+06	2.65E+06	2.58E+06	1.55E+07
U2 Steam Generator Blowdown	2.68E+06	2.37E+06	2.48E+06	1.14E+06	2.40E+06	2.74E+06	1.38E+07
Total (gal)	1.52E+07	1.12E+07	1.12E+07	9.49E+06	1.08E+07	1.00E+07	6.79E+07
Total (cc)	5.75E+10	4.25E+10	4.24E+10	3.59E+10	4.07E+10	3.80E+10	2.57E+11
Volume of Dilution Water (cc)**	6.62E+13	5.98E+13	6.62E+13	5.81E+13	9.52E+13	1.11E+14	4.57E+14
Average Diluted Discharge Concentration (uCi/cc)							
Gamma Scan (includes Fe-55)	5.31E-12	6.79E-12	7.62E-11	5.76E-11	2.54E-11	7.39E-12	-
Gross Alpha	0.00E+00	6.51E-15	7.02E-14	0.00E+00	2.11E-14	0.00E+00	-
Tritium	1.11E-06	5.21E-07	2.03E-06	7.02E-07	3.94E-07	3.34E-07	-
Strontium	0.00E+00	6.51E-13	4.38E-13	9.68E-13	0.00E+00	0.00E+00	-
Maximum Batch Discharge Concentration (uCi/cc)							
Tritium	1.88E-05	1.89E-05	2.26E-05	2.31E-05	6.48E-06	1.68E-05	-
Gross Gamma	2.44E-10	5.55E-10	3.91E-09	3.27E-09	1.06E-09	2.49E-10	-

* The Retention Pond was taken out of the liquid waste effluent stream in September 2002 and replaced with a filter system referred to as Waste Water Effluent.
**Circulating water discharge from both Units

Table 2-2 (continued)
Summary of Circulating Water Discharge
January 1, 2002, through December 31, 2002

							Jul-Dec	Annual
Total Activity Released (Ci)	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Totals**	**Totals**
Gamma Scan (includes Fe-55)	2.18E-03	6.37E-04	8.63E-03	5.12E-02	2.57E-03	1.07E-04	6.53E-02	7.77E-02
Gross Alpha	0.00E+00	0.00E+00	4.63E-06	0.00E+00	0.00E+00	3.18E-07	4.95E-06	1.20E-05
Tritium	5.95E+01	3.65E+01	4.17E+01	2.59E+01	2.96E+01	1.22E+01	2.05E+02	5.60E+02
Strontium (Sr-89 and Sr-90)	3.73E-05	0.00E+00	2.54E-05	2.75E-05	0.00E+00	0.00E+00	9.02E-05	2.14E-04
Total volume Released (gal)								
Processed Waste	7.76E+04	5.75E+04	1.32E+05	1.43E+05	4.62E+04	1.58E+04	4.72E+05	1.00E+06
Retention Pond/Waste Water Effluent*	5.47E+06	5.15E+06	4.20E+06	3.63E+06	4.05E+06	4.54E+06	2.70E+07	6.51E+07
U1 Steam Generator Blowdown	2.49E+06	2.62E+06	1.20E+06	2.17E+06	2.71E+06	2.68E+06	1.39E+07	2.94E+07
U2 Steam Generator Blowdown	2.45E+06	2.61E+06	2.53E+06	2.64E+06	2.49E+06	2.67E+06	1.54E+07	2.92E+07
Total (gal)	1.05E+07	1.04E+07	8.06E+06	8.58E+06	9.30E+06	9.91E+06	5.68E+07	1.25E+08
Total (cc)	3.97E+10	3.95E+10	3.05E+10	3.25E+10	3.52E+10	3.75E+10	2.15E+11	4.72E+11
Volume of Dilution Water (cc)**	1.15E+14	1.15E+14	8.19E+13	8.99E+13	1.01E+14	6.62E+13	5.68E+14	1.03E+15
Average Diluted Discharge Concentration (uCi/cc)								
Gamma Scan (includes Fe-55)	1.90E-11	5.55E-12	1.05E-10	5.70E-10	2.55E-11	1.62E-12	-	-
Gross Alpha	0.00E+00	0.00E+00	5.65E-14	0.00E+00	0.00E+00	4.79E-15	-	-
Tritium	5.18E-07	3.17E-07	5.09E-07	2.88E-07	2.94E-07	1.85E-07	-	-
Strontium	3.24E-13	0.00E+00	3.10E-13	3.06E-13	0.00E+00	0.00E+00	-	-
Maximum Batch Discharge Concentration (uCi/cc)								
Tritium	1.74E-05	1.20E-05	1.06E-05	7.10E-06	1.75E-05	1.64E-05	-	-
Gross Gamma	8.45E-10	2.52E-10	4.81E-09	1.53E-08	1.12E-09	5.27E-11	-	-

* The Retention Pond was taken out of the liquid waste effluent stream in September 2002 and replaced with a filter system referred to as Waste Water Effluent.
**Circulating water discharge from both Units.

Table 2-3
Isotopic Composition of Circulating Water Discharges (Curies)
January 1, 2002, through December 31, 2002

						Semi-Annual								
Nuclide	Jan	Feb	Mar	Apr	May	Jun	Total	Jul	Aug	Sep	Oct	Nov	Dec	Total
H-3	7.35E+01	3.12E+01	1.34E+02	4.08E+01	3.75E+01	3.71E+01	3.55E+02	5.95E+01	3.65E+01	4.17E+01	2.59E+01	2.96E+01	1.22E+01	5.60E+02
F-18	4.07E-05	0.00E+00	2.45E-05	0.00E+00	6.88E-05	0.00E+00	1.34E-04	1.19E-06	1.18E-04	5.33E-05	0 00E+00	2.43E-05	0.00E+00	3 31E-04
Cr-51	0.00E+00	0.00E+00	3.58E-04	0.00E+00	3.37E-04	0.00E+00	6.96E-04	1.12E-04	0.00E+00	4.87E-04	1.24E-02	4.02E-04	0 00E+00	1.41E-02
Mn-54	7.55E-06	1.29E-05	2.45E-05	6.82E-07	2.78E-06	8.62E-06	5.70E-05	1.81E-05	0.00E+00	1.88E-04	1.73E-04	5.53E-06	0.00E+00	4.42E-04
Fe-55	0.00E+00	1.54E-04	0 00E+00	3.34E-04	0.00E+00	2.66E-04	7.54E-04	2.58E-04	0.00E+00	1.44E-03	3.74E-03	5.42E-04	7.19E-05	6.82E-03
Fe-59	0.00E+00	0.00E+00	1.25E-05	0.00E+00	0.00E+00	0.00E+00	1.25E-05	6.45E-06	0.00E+00	1.33E-04	1.64E-03	5.23E-05	0.00E+00	1.85E-03
Co-57	0 00E+00	0.00E+00	4.74E-06	1.45E-05	9.52E-07	0.00E+00	2.02E-05	2.42E-06	9.49E-07	2.84E-05	5.70E-05	2.17E-06	0.00E+00	1.11E-04
Co-58	1.80E-04	4.53E-05	4.04E-03	2.88E-03	1.40E-03	4.01E-04	8.95E-03	1.10E-03	1.99E-04	4.20E-03	1.85E-02	8.51E-04	3.16E-05	3.39E-02
Co-60	1.04E-04	1.72E-04	3.02E-04	7.85E-05	9.54E-05	6.31E-05	8.15E-04	1.64E-04	1.68E-05	1.22E-03	1.29E-03	1.05E-04	3.57E-06	3.61E-03
Zn-65	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.81E-06	0.00E+00	1.49E-05	2.60E-05	0 00E+00	0.00E+00	4.57E-05
Sr-90	0.00E+00	3.89E-05	2.90E-05	5.62E-05	0.00E+00	0.00E+00	1.24E-04	3.73E-05	0.00E+00	2.54E-05	2.75E-05	0.00E+00	0.00E+00	2 14E-04
Sr-92	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.25E-05	0.00E+00	0.00E+00	4.25E-05
Nb-95	4.30E-06	9.29E-06	3.76E-05	6.81E-08	2.10E-05	2.46E-05	9.70E-05	6 67E-05	0.00E+00	1.88E-04	1.27E-03	4.94E-05	0.00E+00	1.67E-03
Nb-97	2.11E-06	0.00E+00	5.03E-06	0.00E+00	0.00E+00	0.00E+00	7.13E-06	4.40E-07	1.63E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.20E-06
Zr-95	0.00E+00	0.00E+00	2.10E-05	0.00E+00	0.00E+00	1.56E-05	3.66E-05	1.54E-05	0.00E+00	6.70E-05	6.88E-03	2.44E-05	0.00E+00	7.02E-03
Zr-97	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.31E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.31E-08
Ru-103	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.58E-06	0.00E+00	0.00E+00	9.58E-06
Ru-105	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.48E-06	7.28E-06	0.00E+00	0.00E+00	1.68E-05
Ru-106	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.31E-05	0.00E+00	0.00E+00	2.31E-05
Ag-110m	9.13E-06	1.25E-05	8.70E-05	2.01E-05	8.70E-05	1.90E-05	2.35E-04	3.17E-04	1.90E-05	3.39E-04	1.56E-03	3.32E-04	0 00E+00	2.80E-03
Sn-113	0.00E+00	0.00E+00	5.26E-05	0.00E+00	3.33E-06	1.22E-06	5.71E-05	3.37E-06	1.56E-06	8.00E-05	5.27E-04	2.18E-05	0.00E+00	6.91E-04
Sn-117m	0.00E+00	0.00E+00	3.00E-05	0.00E+00	3.86E-04	2.04E-05	4.37E-04	3.93E-05	1.38E-05	6.21E-05	6.51E-04	1.22E-04	0.00E+00	1.32E-03
Sb-122	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.14E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.14E-06
Sb-124	0.00E+00	0.00E+00	1.91E-05	1.73E-05	0.00E+00	0.00E+00	3.64E-05	2.91E-05	2.09E-05	2.43E-06	5.21E-04	0.00E+00	0.00E+00	6.09E-04
Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.40E-06	0.00E+00	8.40E-06	4.13E-05	1.59E-04	9.55E-05	1.74E-03	2 47E-05	0.00E+00	2.06E-03
I-131	0.00E+00	0.00E+00	9.93E-06	0.00E+00	0.00E+00	0.00E+00	9.93E-06	0.00E+00	8.31E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.30E-05
Te-132	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.79E-06	0.00E+00	1.79E-06	0.00E+00	0.00E+00	1.41E-05	2.14E-05	0.00E+00	0.00E+00	3.73E-05
Cs-134m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.09E-06	0.00E+00	4.09E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.09E-06
Cs-136	0 00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0 00E+00	6.94E-06	0.00E+00	6.94E-06
Cs-137	4.78E-06	0.00E+00	5.38E-06	1.26E-06	0.00E+00	1.46E-06	1.29E-05	1.68E-06	3.23E-06	7.34E-06	6.69E-07	2.60E-06	0.00E+00	2.84E-05
La-140	0.00E+00	0.00E+00	8.21E-06	0.00E+00	0.00E+00	0.00E+00	8.21E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.21E-06

Note: The Dissolved noble gases detected in liquid effluents (e.g., Xe-133 and Xe-135) are added to the atmospheric release summaries.

Table 2-4
Subsoil System Drains - Tritium Summary
January 1, 2002, through December 31, 2002

	S-1	S-3	S-7	S-8	S-9	S-10
First Quarter						
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	4.46E+05	2.19E+05	7.31E+05	0.00E+00	1.34E+03	1.76E+06
Second Quarter						
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	2.23E+06	1.61E+06	5.83E+05	0.00E+00	2.16E+04	1.16E+06
Third Quarter						
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	1.34E+05	1.22E+05	7.70E+05	0.00E+00	0.00E+00	1.92E+06
Fourth Quarter						
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	4.84E+05	1.14E+05	8.17E+05	0.00E+00	0.00E+00	2.29E+06
Annual Totals						
H-3 (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flow (gal)	3.30E+06	2.06E+06	2.90E+06	0.00E+00	2.29E+04	7.14E+06

2.6 Land Application of Sewage Sludge

The Wisconsin Department of Natural Resources has approved the disposal of PBNP sewage by land application on various Wisconsin Electric Power Company properties surrounding PBNP. This sewage sludge, which may contain trace amounts of radionuclides, are to be applied in accordance with methodologies approved by the NRC on January 13, 1988, pursuant to 10 CFR 20.302(a). The approved methodology requires analyses prior to every disposal. Based upon an investigation of the source of the radionuclides, a combination of engineering modifications and administrative controls has eliminated plant generated radiological inputs to the sewage. This was verified by sludge analyses using the environmental lower level of detection (LLD) criteria. No byproduct radionuclides were found in the sludge after the controls and modifications were completed. Sludge is routinely monitored and no radionuclides attributable to PBNP have been found.

There was no disposal of sewage by land application during 2002. All disposals were done at either the Green Bay Metropolitan Sewage Treatment Plant or the Manitowoc Sewage Treatment Plant.

3.0 RADIOACTIVE AIRBORNE RELEASES

The release paths to the environment contributing to radioactive airborne release totals during this reporting period were the Auxiliary Building Vent Stack, Drumming Area Vent Stack, Unit 1 Containment Purge Stack, and Unit 2 Containment Purge Stack. A gaseous radioactive effluent treatment system in conjunction with administrative controls is used to minimize the impact on the environment from the airborne releases and maintain doses to the public ALARA.

3.1 Doses From Airborne Effluent

Doses from airborne effluent are calculated for the maximum exposed individual (MEI) following the methodology contained in the PBNP ODCM. These calculated doses use parameters such as the amount of radioactive material released, the concentration at and beyond the site boundary, the average site weather conditions, the locations of the exposure pathways (e.g., cow milk, vegetable gardens and residences), and usage factors (e.g., breathing rates, food consumption). In addition to the MEI doses, the energy deposited by beta particles and gamma rays in air is calculated and compared to the corresponding Appendix I design objectives. A comparison of the annual Appendix I design objectives for atmospheric effluents to the highest organ dose and the noble gas doses calculated using ODCM methodology is listed in Table 3-1. The doses demonstrate that releases from PBNP to the atmosphere continue to be ALARA.

3.2 Radioactive Airborne Release Summary

Radioactivity released in airborne effluents for 2002 are summarized in Table 3-2.

3.3 Isotopic Airborne Releases

The monthly isotopic airborne releases for 2002, from which the airborne doses were calculated, are presented in Table 3-3.

Table 3-1
Comparison of 2002 Airborne Effluent Calculated Doses to 10 CFR 50 Appendix I Design Objectives

Category	Annual Appendix I Design Objective	January-December Calculated Dose	Percent of Appendix I Design Objective
Particulate	30 mrem/organ	0.02 mrem	0.07 %
Noble Gas	40 mrad (beta air)	0.0006 mrad	0.002 %
Noble Gas	20 mrad (gamma air)	0.001 mrad	0.005 %
Noble Gas	30 mrem (skin)	0.002 mrem	0.007 %
Noble Gas	10 mrem (whole body)	0.001 mrem	0.01 %

Table 3-2
Radioactive Airborne Effluent Release Summary
January 1, 2002, through December 31, 2002

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total Noble Gas (Ci)[1]	9 59E-02	9.47E-02	8 15E-02	6.74E-02	9.71E-02	5.50E-02	5.49E-02	1.22E-01	4.44E-01	1.99E+00	6 56E-01	1.10E-01	3.87E+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	1.13E-05	2 95E-06	0 00E+00	0 00E+00	0 00E+00	1.42E-05
Total Particulates (Ci)[2]	0 00E+00	0 00E+00	0 00E+00	5.50E-06	4.08E-06	2.09E-10	0 00E+00	0.00E+00	1.25E-07	3.77E-06	3.04E-07	0.00E+00	1.38E-05
Alpha (Ci)	0 00E+00	0 00E+00	0 00E+00	0 00E+00	0.00E+00	0 00E+00	0 00E+00	0 00E+00	0 00E+00	0 00E+00	0 00E+00	0 00E+00	0 00E+00
Strontium (Ci)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0 00E+00	0 00E+00	0.00E+00	0 00E+00	0 00E+00	0 00E+00	0 00E+00	0 00E+00
All Others (gamma) (Ci)	0 00E+00	0 00E+00	0 00E+00	5.50E-06	4.08E-06	2.09E-10	0.00E+00	0.00E+00	1.25E-07	3.77E-06	3 04E-07	0 00E+00	1.38E-05
Total Tritium (Ci)	4.14E+00	4.29E+00	4 70E+00	6 46E+00	4.74E+00	3.35E+00	2.39E+00	3.62E+00	6.36E+00	5.11E+00	6 65E+00	6 47E+00	5 83E+01
Max Hourly Release (Ci/sec)	9 50E-08	1.18E-07	1.01E-07	2 32E-06	2.58E-06	4 87E-12	1.42E-07	7 45E-08	1 21E-06	1.43E-06	1.17E-06	4.72E-07	(-)

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

TABLE 3-3
Isotopic Composition of Airborne Releases
January 1, 2002 through December 31, 2002

Nuclide	Jan (Ci)	Feb (Ci)	Mar (Ci)	Apr (Ci)	May (Ci)	Jun (Ci)	Semi-Annual (Ci)	Jul (Ci)	Aug (Ci)	Sep (Ci)	Oct (Ci)	Nov (Ci)	Dec (Ci)	Total (Ci)
H-3	4.14E+00	4.29E+00	4.70E+00	6.46E+00	4.74E+00	3.35E+00	2.77E+01	2.39E+00	3.62E+00	6.36E+00	5.11E+00	6.65E+00	6.47E+00	5.83E+01
Ar-41	8.26E-02	5.16E-02	6.35E-02	5.63E-02	7.02E-02	5.15E-02	3.76E-01	5.34E-02	6.37E-02	1.43E-01	9.05E-01	2.53E-01	7.84E-02	1.87E+00
Kr-85	4.87E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.87E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.87E-03
Kr-85m	0.00E+00	8.30E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.30E-05	0.00E+00	1.40E-03	8.16E-03	3.70E-02	0.00E+00	0.00E+00	4.67E-02
Kr-87	0.00E+00	1.44E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.44E-05	0.00E+00	3.37E-03	2.17E-02	9.25E-02	4.81E-02	2.82E-03	1.68E-01
Kr-88	0.00E+00	5.36E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.36E-05	0.00E+00	3.33E-03	2.13E-02	8.96E-02	4.42E-02	2.65E-03	1.61E-01
Xe-133	7.51E-03	2.79E-02	1.32E-02	1.06E-02	8.20E-03	3.42E-03	7.08E-02	1.47E-03	1.06E-02	6.88E-02	6.91E-02	8.61E-03	7.57E-03	2.37E-01
Xe-133m	0.00E+00	3.21E-04	0.00E+00	6.80E-05	0.00E+00	0.00E+00	3.89E-04	0.00E+00	0.00E+00	7.95E-05	0.00E+00	0.00E+00	0.00E+00	4.68E-04
Xe-135	8.87E-04	1.46E-02	2.62E-03	8.87E-05	0.00E+00	0.00E+00	1.82E-02	0.00E+00	9.12E-03	4.13E-02	2.51E-01	8.46E-02	5.58E-03	4.10E-01
Xe-135m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-03	3.53E-02	1.38E-01	0.00E+00	0.00E+00	1.79E-01
Xe-138	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-02	1.03E-01	4.09E-01	2.17E-01	1.31E-02	7.57E-01
F-18	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.08E-06	2.09E-10	4.08E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.08E-06
Mn-54	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Co-58	0.00E+00	0.00E+00	0.00E+00	5.40E-06	1.25E-10	0.00E+00	5.40E-06	0.00E+00	0.00E+00	1.25E-07	3.56E-06	3.04E-07	0.00E+00	9.39E-06
Co-60	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.10E-07	0.00E+00	0.00E+00	2.10E-07
I-131	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E-05	2.95E-06	0.00E+00	0.00E+00	0.00E+00	1.42E-05
I-133	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs-137	0.00E+00	0.00E+00	0.00E+00	9.64E-08	0.00E+00	0.00E+00	9.64E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.64E-08

Note: The Noble Gases listed above do not include the liquid contribution.

4.0 RADIOACTIVE SOLID WASTE SHIPMENTS

4.1 Types, Volumes, and Activity of Shipped Solid Waste

The following types, volumes, and activity of solid waste were shipped from PBNP for offsite disposal or burial during 2002. No irradiated fuel was shipped offsite. The volume, activity, and type of waste are listed in Table 4-1.

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

Type of Waste	Quantity	Activity
A. Spent resins, filter sludge, evaporator bottoms, etc.	17.40 m^3	11.12 Ci
	614.45 ft^3	
B. Dry compressible waste, contaminated equipment, etc	135.50 m^3	0.45 Ci
	4785.00 ft^3	
C. Irradiated components, control rods, etc.	0.00 m^3	N/A Ci
	0.00 ft^3	
D. Other (describe) Retention pond soil	157.50 m^3	0.003 Ci
	5562.03 ft^3	

The retention pond adjacent areas were remediated in the fall of 2002. The remediated area, approximately 11,000 square feet, was excavated to a depth of 6 inches. Total soil removed from the site was 5562 cubic feet and weighed 437,980 pounds. The excavated soil was shipped to Duratek, Inc. for repackaging and release. The retention pond was solidified in place and covered with clay and topsoil.

4.2 Major Nuclide Composition (by Type of Waste)

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

Table 4-2
Estimated Solid Waste Major Radionuclide Composition

TYPE A		TYPE B		TYPE C		TYPE D	
	Percent		Percent		Percent		Percent
Nuclide	Abundance	Nuclide	Abundance	Nuclide	Abundance	Nuclide	Abundance
Co58	69.99%	Fe55	30.00%	NA		H3	59.48%
Fe55	14.30%	Co58	29.54%			Ni63	35.22%
H3	7.46%	Ni63	20.09%			Nb95	3.40%
Ni63	4.28%	Co60	12.16%			Cs137	1.58%
Co60	2.93%	Sb125	2.27%			Co60	0.26%
Ag110m	0.44%	Cs137	1.47%			Am241	0.03%
Cr-51	0.29%	Nb95	1.32%			Nb-94	0.01%
Cs137	0.21%	Ag110m	1.07%			Pu239	0.01%
C14	0.08%	C14	0.99%			Pu-240	0.01%
Pu241	0.01%	H3	0.68%				
Sr90	0.002%	Pu-240	0.23%				
Cm243	0.001%	Ni59	0.14%				
Am241	0.001%	Sr90	0.01%				
Pu238	0.001%	Am241	0.01%				
Pu239	0.0003%	Cm242	0.01%				
Cm242	0.0002%	Cm243	0.01%				
		Pu239	0.00%				
		Pu238	0.00%				
		Nb-94	0.00%				

4.3 Solid Waste Disposition

There were 19 solid waste shipments from PBNP during 2002. The dates and destinations were:

Table 4-3
PBNP Radioactive Waste Shipments

Date	Destination	Date	Destination
17-Jan	Wampum, PA	9-Oct	Oak Ridge,TN
6-Sep	Oak Ridge,TN	9-Oct	Oak Ridge,TN
12-Sep	Oak Ridge,TN	9-Oct	Oak Ridge,TN
7-Oct	Wampum, PA	9-Oct	Oak Ridge,TN
9-Oct	Oak Ridge,TN	9-Oct	Oak Ridge,TN
8-Oct	Oak Ridge,TN	9-Oct	Oak Ridge,TN
8-Oct	Oak Ridge,TN	17-Oct	Oak Ridge,TN
8-Oct	Oak Ridge,TN	17-Oct	Oak Ridge,TN
8-Oct	Oak Ridge,TN	25-Oct	Wampum, PA
8-Oct	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, 2002, to June 30, 2002, included 5.83E+05 gallons of neutralized wastewater. The wastewater contained 2.83E+00 pounds of suspended solids and 6.17E+02 pounds of dissolved solids.

Scheduled chemical waste releases to the circulating water system from July 1, 2002, to December 31, 2002, included 4.42E+05 gallons of neutralized wastewater. The wastewater contained 1.21E+01 pounds of suspended solids and 7.33E+03 pounds of dissolved solids.

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

5.2 Miscellaneous Chemical Waste Releases

Miscellaneous chemical waste releases from the Wastewater Effluent (based on effluent analyses) to the circulating water for January 1, 2002, to June 30, 2002, included 3.80E+07 gallons of clarified wastewater. The wastewater contained 4.58E+03 pounds of suspended solids.

Miscellaneous chemical waste releases from the Wastewater Effluent (based on effluent analyses) to the circulating water for July 1, 2002, to December 31, 2002, included 2.70E+07 gallons of clarified wastewater. The wastewater contained 5.09E+03 pounds of suspended solids.

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from January 1, 2002, to June 30, 2002, included 1.06E+05 pounds of sodium bisulfite and 2.98E+04 pounds of sodium hypochlorite.

Miscellaneous chemical waste released directly to the circulating water, based on amount of chemicals used from July 1, 2002, to December 31, 2002, included 1.16E+05 pounds of sodium bisulfite and 2.94E+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 2002

	UNIT	JAN	FEB	MAR	APR	MAY	JUN
Average Volume Cooling Water Discharge [million gal/day]**	1	282.2	282.2	282.2	379.2	494.4	489.6
	2	282.2	282.2	282.2	265.0	393.8	489.6
Average Cooling Water Intake Temperature [°F]	1	37	37	37	41	46	48
	2	38	37	37	39*	48*	49
Average Cooling Water Discharge Temperature [°F]	1	70	70	69	68	66	68
	2	74	68	73	66*	62*	69
Average Ambient Lake Temperature [°F]		35	34	34	41	46	46

*Unit 2 shutdown from Apr 15, 2002 to May 07, 2002.
** For days with cooling water discharge flow.

Table 6-1(continued)
Circulating Water System Operation for 2002

	UNIT	JUL	AUG	SEP	OCT	NOV	DEC
Average Volume Cooling Water Discharge [million gal/day]**	1	489.6	489.6	457.1	381.4	426.6	282.2
	2	489.6	489.6	492.0	495.8	457.3	282.2
Average Cooling Water Intake Temperature [°F]	1	59	57	61*	49*	44	40
	2	59	57	57	51	44	40
Average Cooling Water Discharge Temperature [°F]	1	77	76	77*	60*	66	70
	2	78	76	76	69	65	73
Average Ambient Lake Temperature [°F]		55	54	60	55	48	42

*Unit 1 shutdown from Sep 15, 2002 to Oct 10, 2002.
** For days with cooling water discharge flow.

Part B
Miscellaneous Reporting Requirements

7.0 ADDITIONAL REPORTING REQUIREMENTS

7.1 Revisions to the PBNP Effluent and Environmental Programs

There were no revisions to the PBNP Offsite Dose Calculation Manual or the Radiological Effluent Control Manual during 2002.

A revision to the Environmental Manual (EM) was performed in 2002. The most significant revision to this manual was performed to implement a process change to the reporting of sampling problems. Previously, a form was required to be filled out and sent to the program owner. The EM now directs that an item in the Corrective Action Program be entered to track resolution. In addition, the use of Kewaunee Nuclear Power Plant (KNPP) milk sample control data is included. KNPP collects and analyzes milk samples from a dairy in Green Bay, WI, which is located to the North-West of KNPP and PBNP. Because KNPP uses the same vendor for radiological analysis as PBNP and is located in the same vicinity as PBNP, these milk sample results could be used as a control for the PBNP REMP if deemed necessary. Other various editorial type revisions were made as well, such as the elimination of redundant information and the combination of related information.

7.2 Interlaboratory Comparison Program

Environmental, Inc, Midwest Laboratory, the analytical laboratory contracted to perform the radioanalyses of the PBNP environmental samples, participated in the interlaboratory comparison studies administered by Environmental Resources Associates during 2002. The results of this comparison can be found in Appendix A of the AMR.

7.3 Special Circumstances

No special circumstances report regarding operation of the explosive gas monitor for the waste gas holdup system was needed during 2002.

Part C
RADIOLOGICAL ENVIRONMENTAL MONITORING

8.0 INTRODUCTION

The objective of the PBNP Radiological Environmental Monitoring Program (REMP) is to determine whether the operation of PBNP or the ISFSI has radiologically impacted the environment. To this end, the REMP collects and analyzes air, water, milk, soil, vegetation, and fish samples for radionuclides and uses TLDs to determine the ambient radiation background. These measurements also serve as a check of the efficacy of PBNP effluent controls. The REMP fulfills the requirements of 10 CFR 20.1302, PBNP General Design Criterion (GDC) 17, GDC 64 of Appendix A to 10 CFR 50, and Sections IV.B.2 and IV.B.3 of Appendix I to 10 CFR 50 for the operation of the plant. 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.

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

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

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

collected and analyzed in order to monitor the potential for long-term buildup of radionuclides in the vicinity of PBNP.

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

9.0 PROGRAM DESCRIPTION

9.1 Results Reporting Convention

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

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

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

used to calculate, when applicable, the statistical parameters (i.e., average, standard deviation) presented in this report.

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

9.2 Sampling Parameters

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

9.3 Deviations from Required Collection Frequency

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

9.4 Assistance to the State of Wisconsin

The Radiation Protection Unit of the Wisconsin Department of Health and Family Services maintains a radiological environmental monitoring program 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 9-6) for the State from sites, which are near PBNP sampling sites or are co-located. During 2002, PBNP agreed to collect well water samples for the State of Wisconsin two times per year. The results of the State monitoring program are available from the Radiation Protection Unit of the Wisconsin Department of Health and Family Services.

9.5 Program Modifications

No sampling deletions or additions were made to the REMP during 2002.

Table 9-1
PBNP REMP Sample Analysis and Frequency

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

Table 9-2
PBNP REMP Sampling Locations

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

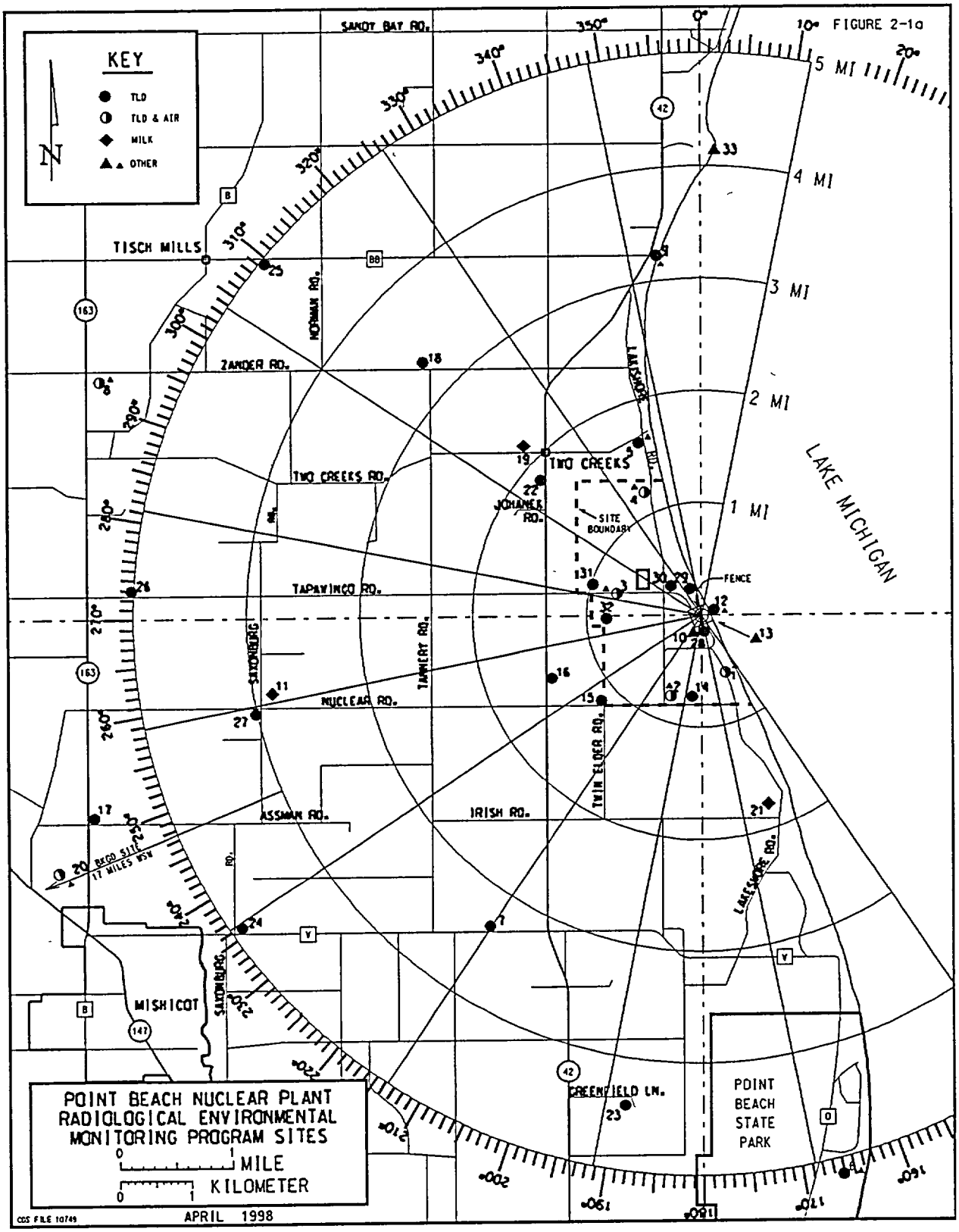

Figure 9-1
PBNP REMP Sampling Sites

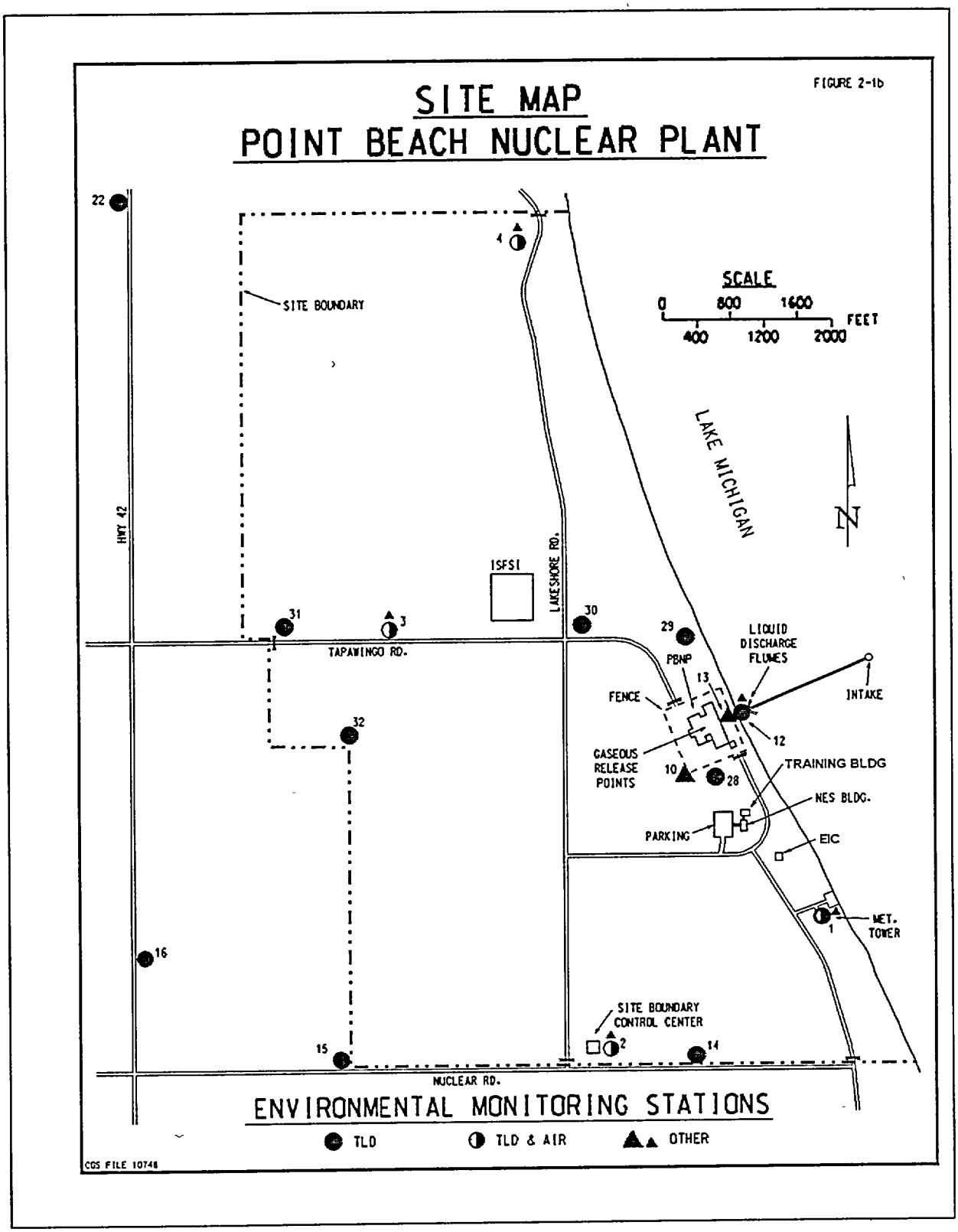

Figure 9-2
Map of REMP Sampling Sites Located Around PBNP

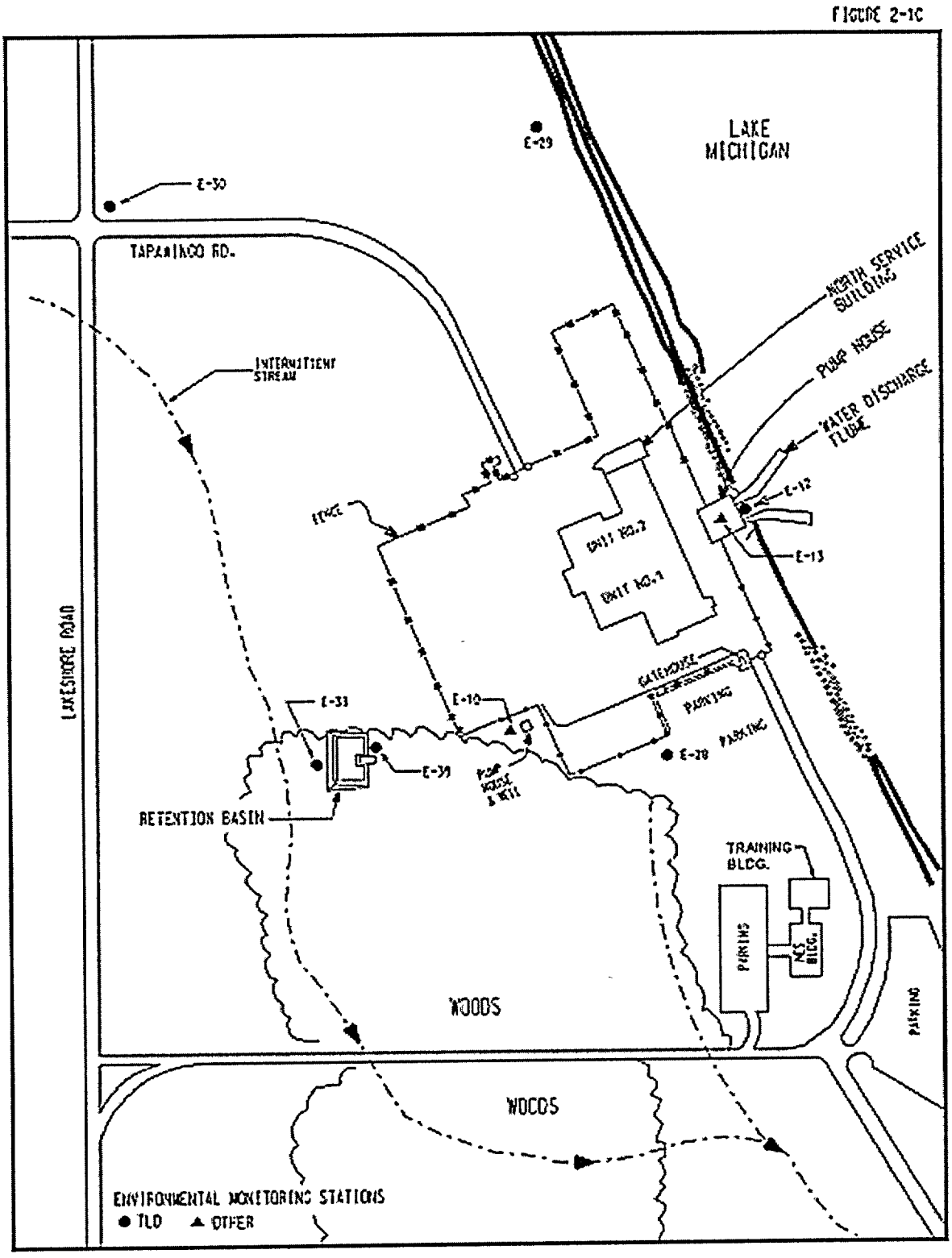

Figure 9-3
Enhanced Map Showing REMP Sampling Sites Closest to PBNP

Table 9-3
ISFSI Sampling Sites

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

Table 9-4
Minimum Acceptable Sample Size

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

Table 9-5
Deviations from Scheduled Sampling and Frequency

Sample Type	Location	Collection Date	Reason for not conducting REMP as required	Plans for Preventing Recurrence
AP/AI	E-01	8/21/2002 8/27/2002 9/4/2002 10/24/2002 10/30/2002	Sample unavailable due to loss of power to the pump attributed to moisture intrusion in GFI. The sampling volume could not be quantified.	The sampling collection at E-01 were reported in the PBNP Corrective Action Program. Various attempts to correct the moisture intrusion were made. In November of 2002, the power supply to the air sampler was taken from inside the meteorological tower instrument housing. Therefore, the GFI is no longer exposed to the weather.
AP/AI	E-02	3/27/2002	Sample unavailable due to loss of power to the pump The sampling volume could not be quantified.	Power loss at E-02 was an anomalous situation. However, due to the recurring problems experienced at sites E-01 and E-04, all locations are to be assessed to determine the type of work required to eliminate the power interruptions due to weather.
AP/AI	E-04	7/31/2002 11/20/2002 11/26/2002 12/03/2002 12/19/2002 12/26/2002	Sample unavailable due to loss of power to the pump attributed to moisture intrusion in GFI. The sampling volume could not be quantified.	The sampling collection at E-04 were reported in the PBNP Corrective Action Program. Various attempts to correct the moisture intrusion were made as well as changes to the GFI installed. In December of 2002, the circuit was replaced as well as a new breaker box installed.

Table 9-6
Sample Collections for State of Wisconsin

Sample Type	Location	Frequency
Lake Water	E-01	Weekly, Composited Monthly
Air Filters	E-07 E-08	Weekly
Fish	E-13	Quarterly, As Available
Precipitation	E-04 E-08	Twice a month, As Available
Milk	E-11 E-19	Monthly
Well Water	E-10	Twice per year

9.6 Analytical Parameters

The types of analyses and their frequencies are given in Table 9-1. The LLDs for the various analyses are found in the Section 10 (Table 10-1) with the summary of the REMP results. All environmental LLDs listed in Table 2-2 of the Environmental Manual (also in Table 10-1) were achieved during 2002.

9.7 Brief Description of Analytical Parameters in Table 9-1

9.7.1 Gamma isotopic analysis

Gamma isotopic analysis consists of a computerized scan of the gamma ray spectrum from 80 keV to 2048 keV. Specifically included in the scan are Mn-54, Fe-59, Co-58, Co-60, Zr-95, Nb-95, Ru-103, Ru-106, I-131, Ba-La-140, Cs-134, Cs-137, Ce-141, and Ce-144. However, 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.

9.7.2 Gross Beta Analysis

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

9.7.3 Water Samples

Water samples include both Lake Michigan and well water. The Lake Michigan samples are collected along the shoreline at four locations north and south of PBNP. The well water is sampled from the on-site PBNP well. Gross beta and gamma isotopic analytical results for water are obtained by measurements on the solids remaining after evaporation of the unfiltered sample to dryness. Hence, the results are indicated as "on total solids" in Table 10-1.

9.7.4 Air Samples

Particulate air filters are allowed to decay at least 72 hours before gross beta measurements are made in order for naturally occurring radionuclides to become negligible part of the total activity. Gross beta measurements serve as a quick check for any unexpected activity that may require

immediate investigation. Quarterly composites of the particulate air filters are analyzed for long-lived radionuclides such as Cs-134 and Cs-137. Charcoal filters are counted as soon as possible so the I-131 will undergo only minimal decay prior to analyses.

In order to ensure 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. 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 what can be accomplished in the field.

9.7.5 Vegetation

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

9.7.6 Environmental Radiation Exposure

Environmental radiation exposure measurements taken in 2002 were performed with thermoluminescent dosimeter (TLD) cards. The TLDs absorb the energy deposited in them by gamma rays. The TLD card is a small passive detector, which integrates exposure through the use of a crystalline phosphorus material, calcium sulfate containing dysprosium. Each TLD consists of a single Teflon sheet coated with calcium sulfate, which is read in four distinct quadrants to yield four values of exposure. This dosimeter design provides exposure information by averaging the four measured values. Prior to the third quarter of 2001, previous years' data were collected with TLDs that consisted of three lithium fluoride chips sealed in black plastic. The difference in material types can impact the amount of exposure measured. As seen in the 2001 Environmental Inc., typically the TLD cards produce a higher measured value, although within the uncertainty of that value recorded by the TLD chips.

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

The gamma rays may originate from PBNP produced radionuclides or from naturally occurring radionuclides. The TLDs remain at the monitoring site for roughly three months prior to analyses and the results are reported as mrem per seven days. Because the TLDs are constantly

bombarded by naturally occurring gamma radiation, even during shipment to and from PBNP, the amount of exposure during transportation is measured using transportation controls with each shipment of TLDs to and from the laboratory. The doses recorded on the transportation controls are subtracted from the monitoring TLDs in order to obtain the net *in situ* dose.

9.7.7 ISFSI Ambient Radiation Exposure

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

10.0 RESULTS

Summary of 2002 REMP Results

Radiological environmental monitoring conducted at PBNP from January 1, 2002, through December 31, 2002, consisted of analysis of air filters, milk, lake water, well water, soil, fish, shoreline sediments, algae, and vegetation as well as TLDs. The results are summarized in Table 10-1.

Table 10-1 contains the following information:

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

Table 10-2 contains the ISFSI fence TLD results.

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

assurance results and Interlaboratory Crosscheck Program results are presented in the Appendix.

Table 10-1
Summary of Radiological Environmental Monitoring Results for 2002

Sample	Description	N	LLD (a)	Average ± Standard Deviation (b)	High ± 2 sigma	Units
TLD	Environmental Radiation	112	1 mrem	1.17 ± 0.21	2.02 ± 0.16	mR/7days
	Control (E-20)	4	1 mrem	1.14 ± 0.1	1.28 ± 0.05	mR/7days
Air	Gross Beta	248	0 01	0.023 ± 0.008	0.052 ± 0.005	pCi/m3
	Control (E-20) Gross beta	52	0.01	0.024 ± 0.009	0.049 ± 0.005	pCi/m3
	I-131	248	0.030 (0.07)	ND	-	pCi/m3
	Cs-134	20	0.05	ND	-	pCi/m3
	Cs-137	20	0.06	ND	-	pCi/m3
	Other gamma emitters	20	0.1	ND	-	pCi/m3
Milk	Sr-89	36	5	ND	-	pCi/L
	Sr-90	36	1	1.1 ± 0.7	4.2 ± 0.8	pCi/L
	I-131	36	0.5	ND	-	pCi/L
	Cs-134	36	5 (15)	ND	-	pCi/L
	Cs-137	36	5 (15)	ND	-	pCi/L
	Ba-La-140	36	5 (15)	ND	-	pCi/L
	Other gamma emitters	36	15	ND	-	pCi/L
Well	Gross beta	4	4	ND	-	pCi/L
Water	H-3	4	500 (3000)	ND	-	pCi/L
	Sr-89	4	10	ND	-	pCi/L
	Sr-90	4	1 (2)	ND	-	pCi/L
	I-131	4	0.5 (2)	ND	-	pCi/L
	Mn-54	4	10 (15)	ND	-	pCi/L
	Fe-59	4	30	ND	-	pCi/L
	Co-58	4	15	ND	-	pCi/L
	Co-60	4	15	ND	-	pCi/L
	Zn-65	4	30	ND	-	pCi/L
	Zr-Nb-95	4	15	ND	-	pCi/L
	Cs-134	4	15	ND	-	pCi/L
	Cs-137	4	18	ND	-	pCi/L
	Ba-La-140	4	15	ND	-	pCi/L
	Other gamma emitters	4	30	ND	-	pCi/L
Algae	Gross beta	6	0.25	3.45 ± 1.21	5.10 ± 0.42	pCi/g
	Co-58	6	0.25	ND	-	pCi/g
	Co-60	6	0.25	ND	-	pCi/g
	Cs-134	6	0.25	ND	-	pCi/g
	Cs-137	6	0.25	ND	-	pCi/g

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

Table 10-1 (continued)
Summary of Radiological Environmental Monitoring Results for 2002

Sample	Description	N	LLD (a)	Average ± Standard Deviation (b)	High ± 2 sigma	Units
Lake Water	Gross beta	48	4	3.3 ± 1.0	6.8 ± 0.9	pCi/L
	I-131	48	0.5 (2)	ND	-	pCi/L
	Mn-54	48	10 (15)	ND	-	pCi/L
	Fe-59	48	30	ND	-	pCi/L
	Co-58	48	15	ND	-	pCi/L
	Co-60	48	15	ND	-	pCi/L
	Zn-65	48	30	ND	-	pCi/L
	Zr-Nb-95	48	15	ND	-	pCi/L
	Cs-134	48	10 (15)	ND	-	pCi/L
	Cs-137	48	10 (18)	ND	-	pCi/L
	Ba-La-140	48	15	ND	-	pCi/L
	Ru-103	48	30	ND	-	pCi/L
	Sr-89	16	5	ND	-	pCi/L
	Sr-90	16	1 (2)	ND	-	pCi/L
	H-3	16	500 (3000)	ND	-	pCi/L
Fish	Gross beta	7	0 5	3.54 ± 1.37	6.17 ± 0.17	pCi/g
	Mn-54	7	0.13	ND	-	pCi/g
	Fe-59	7	0.26	ND	-	pCi/g
	Co-58	7	0.13	ND	-	pCi/g
	Co-60	7	0.13	ND	-	pCi/g
	Zn-65	7	0.26	ND	-	pCi/g
	Cs-134	7	0.13	ND	-	pCi/g
	Cs-137	7	0.15	0.05 ± 0.08	0.224 ± 0.020	pCi/g
	Other gamma emitters	7	0.5	ND	-	pCi/g
Shoreline	Gross beta	10	2	7.63 ± 3 04	12.8 ± 2.06	pCi/g
Sediment	Cs-137	10	0.15	ND	-	pCi/g
Soil	Gross beta	16	2	21.92 ± 4.68	29.07 ± 2.15	pCi/g
	Cs-137	16	0.15	0.17 ± 0.09	0.31 ± 0.04	pCi/g
Vegetation	Gross beta	24	0.25	5 64 ± 0.93	7.94 ± 0.18	pCi/g
	I-131	24	0.06	ND	-	pCi/g
	Cs-134	24	0.06	ND	-	pCi/g
	Cs-137	24	0 08	ND	-	pCi/g

(a) The required LLD per the PBNP REMP is enclosed in the parentheses

(b) "ND" indicates that the sample result is Not Detectable, i e., all net sample concentrations were equal to or less than the LLD.

Table 10-2
ISFSI Fence TLD Results for 2002

Fence Location	Average ± Standard Deviation
North	2.79 ± 0.39 mR/7 days
East	2.74 ± 0.27 mR/7 days
South	1.42 ± 0.17 mR/7 days
West	6.46 ± 0.80 mR/7 days

11.0 DISCUSSION

11.1 TLD Cards

The ambient radiation was measured in the general area of the site boundary, at an outer ring four – five miles from the plant, at special interest areas, and at one control location, roughly 17 miles Southwest of the plant. The average of the indicator TLD cards is 1.17 mR/7-days and 1.14 mR/7-days at the control location. These results are not significantly different from each other nor from those observed from 1993 through 2001 (tabulated below in Table 11-1). A change in TLD types accounts for the increase in average TLD readings (i.e., prior to third quarter 2001 TLD chips were used versus the TLD cards – see section 9.7.6 for additional information). Therefore, the operation of the plant has had no effect on the ambient gamma radiation.

Table 11-1
Average Indicator TLD Results from 1993 – 2002

Year	Average	±	St. Dev*	Units
1993	0.82	±	0.15	mR/7 days
1994	0.90	±	0.12	mR/7 days
1995	0.87	±	0.13	mR/7 days
1996	0.85	±	0.12	mR/7 days
1997	0.87	±	0.11	mR/7 days
1998	0.79	±	0.13	mR/7 days
1999	0.79	±	0.21	mR/7 days
2000	0.91	±	0.15	mR/7 days
2001	1.06	±	0.19	mR/7 days
2002	1.17	±	0.21	mR/7 days

*St. Dev = Standard Deviation

The annual ISFSI fence TLD results listed in Table 11-2 show the anticipated slow trend upward due to the cask additions each year (one added in January and one added December 2002). The North and West fence TLDs continue to record

higher doses than the South and East fence TLDs (see Table 11-2) corresponding to the location of the storage units at the NW corner of the site. The overall increase in the West Fence TLD for the ISFSI was about 20%. Most of the indicator sites for the ISFSI (Table 11-3) show increases within the expected statistical variation. No impact on the ambient gamma radiation at or beyond the site boundary due to the operation of the ISFSI is indicated.

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

	Sampling Site			
	North	East	South	West
1995	1.29	1.28	1.10	1.26
1996	2.12	1.39	1.10	1.68
1997	2.05	1.28	1.00	1.66
1998	2.08	1.37	1.02	1.86
1999	2.57	1.84	1.11	3.26
2000	2.72	2.28	1.25	5.05
2001	2.78	2.54	1.36	6.08
2002	2.79	2.74	1.42	6.46

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

	E-03	E-28	E-30	E-31**	E-32**	E-20
Pre-Operation*	0.93	0.87	0.81	0.93	0.98	0.88
1996	0.87	0.78	0.79	0.93	1.00	0.78
1997	0.91	0.89	0.84	0.89	0.97	0.79
1998	0.82	0.68	0.82	0.91	0.85	0.77
1999	0.88	0.83	0.80	0.90	0.99	0.78
2000	0.98	0.88	0.99	0.98	1.06	0.90
2001	1.31	0.95	1.02	1.10	1.04	1.03
2002	1.45	0.91	1.10	1.26	1.25	1.14

*Pre-Operation data is the averages of the years 2/92 through 3/95.
**Sites E-31 and E-32 are located at the Site Boundary to the West and South-West of the ISFSI, respectively.

11.2 Milk

Radionuclide concentrations in milk continue to be less than the LLD except for Sr-90, which have results that are greater than the required LLD. This radionuclide as well as Cs-137, which are still cycling through the environment,

can be attributable to the large-scale atmospheric weapons tests of the 1960s, to the less frequent testing in the 70s and 80s, as well as the Chernobyl accident. These results are common throughout the Great Lakes region and North America. The PBNP 2002 average Sr-90 of 1.1 ± 0.7 pCi/L compares favorably with the 2001 average of 1.2 ± 0.5 pCi/L, 2000 average of 1.2 ± 0.6 pCi/L, 1999 average of 1.0 ± 0.3 pCi/L and with the 1997 and 1998 averages, 1.2 ± 0.5 pCi/L and 1.1 ± 0.5 pCi/L, respectively, indicating little change. The milk data for 2002 show no radiological effects of the plant operation.

11.3 Air

The average annual gross beta concentrations (plus/minus the two-sigma uncertainty) in weekly airborne particulates at the indicator and control locations were 0.023 ± 0.01 pCi/m^3 and 0.024 ± 0.01 pCi/m^3, respectively, and are similar to levels observed from 1993 through 2001. The results are tabulated below.

Table 11-4
Average Gross Beta Measurements in Air

Year	Average (pCi/m3)
1993	0.022
1994	0.022
1995	0.021
1996	0.021
1997	0.021
1998	0.022
1999	0.024
2000	0.022
2001	0.023
2002	0.023

No detectable amounts of I-131 were found.

Gamma spectroscopic analysis of quarterly composites of air particulate filters yielded similar results for indicator and control locations. Neither the indicator nor control locations show results, which on average are significantly different than zero. Be-7, a naturally occurring radionuclide, was measured in quarterly composites of all samples with an average of 0.062 pCi/m^3. This is comparable to the average of 0.063 pCi/m^3 at the control site. Naturally occurring radionuclides are not required to be measured by the PBNP REMP, however, quantification of such nuclides serve as a means to monitor the internal consistency of the vendor's analytical program.

In summary, the air data for 2002 demonstrate the operation of PBNP did not have an impact on the surrounding environment.

11.4 Lake Water

For the suite of REMP-specified gamma emitting radionuclides, reported concentrations continue to occur as small negative and positive values scattered around zero, indicating no radiological impact from the operation of PBNP. 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. The lake water samples collected and analyzed in 2002 for H-3 range from ND (non-detectable) to 321 pCi/L.

11.5 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. Typically, the only fission product observed is Cs-137 with averages over years 1995 –2001 of 0.034, 0.050, 0.030, 0.027, 0.031, 0.027, and 0.019; all of which are less than the LLD (0.25 pCi/g). Likewise, no observations above the LLD were made in 2002. The occurrence of Cs-137 in the environment can also be attributed to the fallout of events from the past such as weapons testing and nuclear accidents. Massive resuspension events due to wind stress redistribute 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. The concentrations of the naturally occurring radionuclides K-40 and Be-7 in the algae continue to be about 100 times higher than the Cs-137. The algae data indicate no plant effects during 2002.

11.6 Fish

No specified fission/corrosion radionuclide concentrations in fish greater than the required LLD were found in 2002. The highest Cs-137 value of 0.224 pCi/g is considerably less than the high of 2.8 pCi/g as seen in PBNP samples obtained in the mid-1970s during the Chinese weapons tests. The concentration of naturally occurring K-40 is about 50-100 times higher than the highest Cs-137 concentration. There is no indication of a plant effect.

11.7 Well Water

All of the isotopic well water results are less than the required LLD. This indicates that PBNP effluents are not getting into the aquifer supplying drinking water to PBNP.

11.8 Soil

Cs-137 from weapons testing and the Chernobyl accident fallout continue to be present in soil samples at about 1% of the levels of naturally occurring K-40. As seen in the following table the average gross beta result is not significantly different from those values observed in the past. There is no indication of a plant effect.

Table 11-5
Average Gross Beta Concentrations in Soil

Year	Activity (pCi/g)
1993	23.6
1994	19.4
1995	18.0
1996	19.4
1997	22.8
1998	20.0
1999	23.1
2000	22.1
2001	23.5
2002	21.9

11.9 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 and its concentration (pCi/g) is at 1% or less of the naturally occurring concentrations of K-40. The Cs-137 concentrations of the shoreline sediment are about one-tenth of that found in soils. The shoreline sediment data indicate no radiological effects of the plant operation.

11.10 Vegetation

Although the naturally occurring radionuclides Be-7 and K-40 are found in all of the vegetation samples, the programmatically specified radionuclides are all below the required LLD. The Be-7 and K-40 concentrations are about 100 times higher than the Cs-137 concentrations. The sampling data gives no indication of a plant effect.

11.11 Land Use Census

In accordance with the requirements of Section 2.5 of the Environmental Manual, a visual verification of animals grazing in the vicinity of the Point Beach Nuclear Plant site boundary was completed on June 26, 2002, to ensure that the milk sampling locations remain as conservative as practicable. No significant change in the use of pasturelands was noted. Therefore, the existing milk-sampling program continues to be acceptable.

12.0 REMP CONCLUSION

Based on the analytical results from the 451 environmental samples and from 136 sets of TLDs that comprised the PBNP REMP for 2002, PBNP effluents had no discernable, permanent effect on the surrounding environs. These results demonstrate that PBNP continues to have good controls on fuel integrity and on the waste processing. The control of effluents from PBNP continues to be acceptable pursuant to the ALARA criteria of 10 CFR 50.34a.

APPENDIX A

Environmental, Inc. Midwest Laboratory
Final Report for the Pont Beach Nuclear Plant
Reporting Period: January – December 2002

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FINAL 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
ENVIRONMENTAL, INC., MIDWEST LABORATORY

Project Number: 8006

Reporting Period: January - December, 2002

Reviewed and
Approved by _____ Date 02-10-2003
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POINT BEACH NUCLEAR PLANT

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POINT BEACH NUCLEAR PLANT

1.0 INTRODUCTION

The following constitutes the final 2002 Monthly Progress Report for the Environmental Radiological Monitoring Program conducted at the Point Beach Nuclear Plant, Two Rivers, Wisconsin. Results of analyses are presented in the attached tables. Data tables reflect sample analysis results for both Technical Specification requirements and Special Interest locations and samples are randomly selected within the Program monitoring area to provide additional data for cross-comparisons.

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

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

All samples were collected within the scheduled period unless noted otherwise in the Listing of Missed Samples.

POINT BEACH NUCLEAR PLANT

2.0 LISTING OF MISSED SAMPLES

Sample Type	Location	Expected Collection Date	Reason
AP/AI	E-02	3/27/2002	No power to sampler.
AP/AI	E-04	7/31/2002	Loss of power; unable to quantify volume.
AP/AI	E-01	8/21/2002	Sample unavailable.
AP/AI	E-01	8/27/2002	No power to sampler.
AP/AI	E-01	9/4/2002	Sample unavailable.
AP/AI	E-01	10/24/2002	Sampler not running; cord GFI tripped.
AP/AI	E-01	10/30/2002	Sampler not running; cord GFI tripped.
AP/AI	E-04	11/20/02	No electric power to pump.
AP/AI	E-04	11/26/02	No electric power to pump.
AP/AI	E-04	12/03/02	No electric power to pump.
AP/AI	E-04	12/19/02	No electric power to pump.
AP/AI	E-04	12/26/02	No electric power to pump.

NOTE: Page 3 is intentionally left out.

POINT BEACH NUCLEAR PLANT

Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
Location: E-01, Meteorological Tower
Units: pCi/m³
Collection: Continuous, weekly exchange.

Date Collected	Vol. (m³)	Gross Beta	I-131	Date Collected	Vol. (m³)	Gross Beta	I-131
Required LLD		0 010	0 030	Required LLD		0 010	0.030
01-08-02	267	0.044 ± 0.004	0.002 ± 0.008	07-10-02	356	0.017 ± 0.003	0.004 ± 0.006
01-15-02	293	0.022 ± 0.004	0.001 ± 0.007	07-16-02	250	0.023 ± 0.004	-0.004 ± 0.008
01-23-02	345	0.027 ± 0.003	-0.006 ± 0.006	07-23-02	304	0.026 ± 0.004	-0.003 ± 0.007
01-29-02	259	0.026 ± 0.004	-0.001 ± 0.008	07-31-02	313	0.023 ± 0.003	-0.006 ± 0.006
02-07-02	391	0.040 ± 0.004	0.005 ± 0.006	08-08-02	291	0.017 ± 0.003	-0.003 ± 0.006
02-13-02	258	0.040 ± 0.005	0.010 ± 0.008	08-14-02	365	0.019 ± 0.003	0.000 ± 0.006
02-20-02	303	0.019 ± 0.003	0.006 ± 0.008	08-21-02		NS[a]	
02-27-02	302	0.015 ± 0.003	0.009 ± 0.006	08-27-02		NS[a]	
03-07-02	348	0.025 ± 0.003	-0.006 ± 0.006	09-04-02		NS[a]	
03-13-02	257	0.028 ± 0.004	-0.010 ± 0.009	09-15-02	445	0.002 ± 0.001	0.004 ± 0.004 [b]
03-20-02	303	0.026 ± 0.003	0.000 ± 0.007	09-22-02	315	0.023 ± 0.003	0.005 ± 0.006
03-27-02	303	0.025 ± 0.004	-0.002 ± 0.007	09-28-02	265	0.017 ± 0.003	0.010 ± 0.006
1st Quarter				3rd Quarter			
Mean± s.d.		0.028 ± 0.009	0.001 ± 0.006	Mean± s.d.		0.019 ± 0.007	0.001 ± 0.005
04-03-02	309	0.018 ± 0.003	0.004 ± 0.005	10-04-02	267	0.029 ± 0.004	0.001 ± 0.007
04-03-02	309	0.018 ± 0.003	0.004 ± 0.005	10-11-02	307	0.017 ± 0.003	0.001 ± 0.005
04-03-02	309	0.018 ± 0.003	0.004 ± 0.005	10-18-02	324	0.017 ± 0.003	-0.003 ± 0.006
04-03-02	309	0.018 ± 0.003	0.004 ± 0.005	10-24-02		NS[c]	
04-28-02	302	0.021 ± 0.003	0.001 ± 0.007	10-30-02		NS[c]	
05-05-02	307	0.014 ± 0.003	-0.005 ± 0.007	11-06-02	348	0.032 ± 0.004	-0.004 ± 0.006
05-15-02	428	0.019 ± 0.003	-0.001 ± 0.006	11-12-02	261	0.035 ± 0.004	-0.004 ± 0.007
05-22-02	304	0.015 ± 0.003	0.006 ± 0.006	11-20-02	341	0.021 ± 0.003	-0.003 ± 0.005
05-29-02	302	0.016 ± 0.003	-0.006 ± 0.007	11-27-02	304	0.013 ± 0.003	-0.001 ± 0.005
				12-03-02	263	0.019 ± 0.004	0.003 ± 0.006
06-04-02	258	0.018 ± 0.003	-0.002 ± 0.008				
06-12-02	347	0.017 ± 0.003	0.003 ± 0.004	12-10-02	299	0.030 ± 0.004	0.003 ± 0.006
06-19-02	306	0.013 ± 0.003	-0.001 ± 0.006	12-19-02	391	0.036 ± 0.004	-0.007 ± 0.005
06-26-02	300	0.024 ± 0.003	0.002 ± 0.007	12-26-02	303	0.017 ± 0.003	-0 001 ± 0.005
07-02-02	257	0.023 ± 0.004	0.006 ± 0.004	01-02-03	304	0.045 ± 0.004	-0.005 ± 0.005
2nd Quarter				4th Quarter			
Mean± s.d.		0.018 ± 0.003	0.001 ± 0.004	Mean± s.d.		0.026 ± 0.010	-0.002 ± 0.003
				Cumulative Average		0.023 ± 0.009	0.000 ± 0.005

[a] "NS" = No sample; sample unavailable; no power.

[b] Filter very light.

[c] "NS" = No sample; sampler not running; cord GFI tripped.

POINT BEACH NUCLEAR PLANT

Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
Location: E-02, Site Boundary Control Center
Units: pCi/m³
Collection: Continuous, weekly exchange.

Date Collected	Vol. (m³)	Gross Beta	I-131
Required LLD		0 010	0.030
01-08-02	258	0.041 ± 0.004	-0.002 ± 0 010
01-15-02	283	0.019 ± 0.003	0.014 ± 0.007
01-23-02	336	0.027 ± 0.003	-0.011 ± 0.007
01-29-02	252	0.033 ± 0.004	-0.002 ± 0.009
02-07-02	379	0.043 ± 0.004	-0.009 ± 0.007
02-13-02	250	0.031 ± 0.004	-0.015 ± 0.007
02-20-02	295	0.017 ± 0.003	0.005 ± 0.007
02-27-02	293	0.014 ± 0.003	0.002 ± 0.008
03-07-02	335	0.026 ± 0.003	0.010 ± 0.007
03-13-02	250	0.021 ± 0.003	-0.003 ± 0.008
03-20-02	294	0.021 ± 0.003	0.012 ± 0.007
03-27-02		NS[a]	
1st Quarter Mean± s.d.		0.027 ± 0.010	0.000 ± 0.010
04-04-02	334	0.017 ± 0.003	0.005 ± 0.006
04-09-02	210	0.017 ± 0.004	-0.017 ± 0.012
04-14-02	209	0.019 ± 0.004	0.021 ± 0.010
04-21-02	313	0.023 ± 0.003	0.008 ± 0.006
04-28-02	312	0.018 ± 0.003	-0.004 ± 0.007
05-05-02	317	0.014 ± 0.003	-0.009 ± 0.007
05-15-02	443	0.016 ± 0.002	0.003 ± 0.005
05-22-02	314	0.011 ± 0.002	0.009 ± 0.005
05-29-02	312	0.015 ± 0.003	0.003 ± 0.007
06-04-02	259	0.016 ± 0.003	0.003 ± 0.007
06-12-02	336	0.018 ± 0.003	0.007 ± 0.004
06-19-02	292	0.011 ± 0.003	0.008 ± 0.006
06-26-02	296	0.026 ± 0.003	-0.005 ± 0.007
07-02-02	247	0.024 ± 0.004	0.028 ± 0.005
2nd Quarter Mean± s.d.		0.018 ± 0.004	0.004 ± 0.011

Date Collected	Vol. (m³)	Gross Beta	I-131
Required LLD		0.010	0.030
07-10-02	345	0.018 ± 0.003	0.002 ± 0.006
07-16-02	246	0.026 ± 0.004	0.002 ± 0.008
07-23-02	292	0.022 ± 0.004	0.000 ± 0.007
07-31-02	302	0.022 ± 0.003	0.001 ± 0.006
08-08-02	285	0.021 ± 0.003	-0.012 ± 0.007
08-14-02	351	0.019 ± 0.003	0.004 ± 0.006
08-21-02	294	0.016 ± 0.003	0.007 ± 0.006
08-27-02	252	0.019 ± 0.003	-0.001 ± 0.007
09-05-02	333	0.019 ± 0.003	0.006 ± 0.005
09-15-02	440	0.031 ± 0.003	-0.001 ± 0.004
09-22-02	299	0.025 ± 0.003	0.001 ± 0.006
09-28-02	258	0.022 ± 0.004	-0.004 ± 0.006
3rd Quarter Mean± s.d		0.022 ± 0.004	0.000 ± 0.005
10-04-02	259	0.039 ± 0.004	-0.002 ± 0.007
10-11-02	298	0.023 ± 0.003	-0.001 ± 0.007
10-18-02	315	0.023 ± 0.004	-0.002 ± 0.005
10-24-02	249	0.014 ± 0.004	0.003 ± 0.007
10-30-02	261	0.025 ± 0.004	0.001 ± 0.007
11-05-02	301	0.030 ± 0.004	0.008 ± 0.005
11-12-02	311	0 038 ± 0.004	0.007 ± 0.005
11-20-02	337	0.022 ± 0.003	0.003 ± 0.005
11-26-02	259	0.016 ± 0.004	-0.008 ± 0.006
12-03-02	305	0.022 ± 0.003	0.010 ± 0.005
12-10-02	299	0.032 ± 0.004	-0.020 ± 0.007
12-19-02	391	0.039 ± 0.004	0.002 ± 0.004
12-26-02	303	0.017 ± 0.003	-0.009 ± 0.011
01-02-03	304	0.045 ± 0.004	-0.003 ± 0.007
4th Quarter Mean± s.d.		0.028 ± 0.010	-0.001 ± 0.008
Cumulative Average		0.023 ± 0.008	0.001 ± 0.009

[a] "NS" = No sample; no power to sampler.

POINT BEACH NUCLEAR PLANT

Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
Location: E-03, West Boundary
Units: pCi/m³
Collection: Continuous, weekly exchange.

Date Collected	Vol. (m³)	Gross Beta	I-131
Required LLD		0.010	0.030
01-08-02	266	0.047 ± 0.004	0.002 ± 0.008
01-15-02	293	0.022 ± 0.004	0.004 ± 0.008
01-23-02	352	0.031 ± 0.003	-0.004 ± 0.007
01-29-02	267	0.027 ± 0.004	-0.001 ± 0.009
02-07-02	398	0.036 ± 0.003	0.006 ± 0.005
02-13-02	263	0.035 ± 0.004	-0.006 ± 0.010
02-20-02	297	0.017 ± 0.003	0.002 ± 0.008
02-27-02	303	0.012 ± 0.003	0.002 ± 0.008
03-07-02	346	0.027 ± 0.003	-0.002 ± 0.007
03-13-02	257	0.030 ± 0.004	0.010 ± 0.008
03-20-02	303	0.026 ± 0.003	0.015 ± 0.007
03-27-02	301	0.025 ± 0.004	-0.008 ± 0.007
1st Quarter Mean± s.d.		0.028 ± 0.009	0.002 ± 0.007
04-04-02	344	0.017 ± 0.003	0.001 ± 0.006
04-09-02	218	0.020 ± 0.004	-0.001 ± 0.010
04-14-02	216	0.015 ± 0.003	0.009 ± 0.009
04-21-02	302	0.026 ± 0.003	-0.002 ± 0.007
04-28-02	302	0.019 ± 0.003	0.006 ± 0.007
05-05-02	307	0.015 ± 0.003	-0.007 ± 0.007
05-15-02	428	0.020 ± 0.003	-0.004 ± 0.005
05-22-02	304	0.015 ± 0.003	-0.004 ± 0.006
05-29-02	302	0.015 ± 0.003	-0.006 ± 0.008
06-04-02	258	0.018 ± 0.003	-0.003 ± 0.008
06-12-02	347	0.018 ± 0.003	-0.001 ± 0.004
06-19-02	302	0.013 ± 0.003	-0.012 ± 0.007
06-26-02	304	0.029 ± 0.003	0.002 ± 0.007
07-02-02	256	0.024 ± 0.004	0.006 ± 0.005
2nd Quarter Mean± s.d.		0.019 ± 0.005	-0.001 ± 0.006

Date Collected	Vol. (m³)	Gross Beta	I-131
Required LLD		0.010	0.030
07-10-02	346	0.016 ± 0.003	-0.001 ± 0.006
07-16-02	260	0.029 ± 0.004	0.004 ± 0.009
07-23-02	304	0.023 ± 0.004	-0.001 ± 0.006
07-31-02	311	0.028 ± 0.003	0.002 ± 0.006
08-08-02	293	0.021 ± 0.003	-0.004 ± 0.007
08-14-02	352	0.020 ± 0.003	0.006 ± 0.005
08-21-02	295	0.017 ± 0.003	0.002 ± 0.007
08-27-02	252	0.020 ± 0.003	-0.012 ± 0.008
09-05-02	332	0.021 ± 0.003	-0.003 ± 0.006
09-15-02	441	0.030 ± 0.003	0.004 ± 0.004
09-22-02	299	0.019 ± 0.003	0.005 ± 0.005
09-28-02	258	0.019 ± 0.003	0.015 ± 0.006
3rd Quarter Mean± s.d.		0.022 ± 0.005	0.001 ± 0.007
10-04-02	259	0.036 ± 0.004	-0.013 ± 0.007
10-11-02	298	0.022 ± 0.003	0.006 ± 0.006
10-18-02	314	0.020 ± 0.004	0.005 ± 0.005
10-24-02	250	0.014 ± 0.004	-0.006 ± 0.007
10-30-02	259	0.026 ± 0.004	0.008 ± 0.006
11-05-02	301	0.034 ± 0.004	-0.001 ± 0.006
11-12-02	308	0.042 ± 0.004	0.005 ± 0.005
11-20-02	334	0.025 ± 0.003	0.002 ± 0.005
11-26-02	260	0.015 ± 0.004	0.006 ± 0.006
12-03-02	304	0.020 ± 0.003	0.004 ± 0.006
12-10-02	297	0.031 ± 0.004	0.002 ± 0.005
12-19-02	393	0.035 ± 0.004	-0.003 ± 0.005
12-26-02	303	0.017 ± 0.003	-0.002 ± 0.005
01-02-03	304	0.050 ± 0.005	-0.002 ± 0.006
4th Quarter Mean± s.d.		0.028 ± 0.011	0.001 ± 0.006
Cumulative Average		0.024 ± 0.009	0.001 ± 0.006

POINT BEACH NUCLEAR PLANT

Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
Location: E-04, North Boundary
Units: pCi/m³
Collection: Continuous, weekly exchange.

Date Collected	Vol. (m³)	Gross Beta	I-131
Required LLD		0 010	0 030
01-08-02	266	0.043 ± 0.004	-0.005 ± 0.009
01-15-02	293	0.018 ± 0.003	-0.003 ± 0.007
01-23-02	346	0.028 ± 0.003	0.001 ± 0.007
01-29-02	260	0.028 ± 0.004	0.011 ± 0.009
02-07-02	390	0.039 ± 0.004	-0.004 ± 0.006
02-13-02	263	0.035 ± 0.004	-0.010 ± 0 010
02-20-02	297	0.018 ± 0.003	0.007 ± 0.007
02-27-02	304	0.015 ± 0.003	-0.002 ± 0.007
03-06-02	306	0.031 ± 0.003	0.009 ± 0.007
03-13-02	297	0.033 ± 0.003	-0.003 ± 0.008
03-20-02	303	0.027 ± 0.003	0.004 ± 0.007
03-27-02	301	0.028 ± 0.004	0.011 ± 0.007
1st Quarter Mean± s.d.		0.029 ± 0.009	0.001 ± 0.007
04-04-02	344	0.019 ± 0 003	0.000 ± 0.007
04-09-02	217	0.021 ± 0.004	-0.010 ± 0.009
04-14-02	216	0.018 ± 0.004	-0.022 ± 0 012
04-21-02	302	0.026 ± 0.003	-0.001 ± 0.008
04-28-02	302	0.023 ± 0.004	0.022 ± 0.008
05-05-02	307	0.015 ± 0.003	0.005 ± 0.007
05-15-02	428	0.019 ± 0.003	-0.005 ± 0 005
05-22-02	304	0.015 ± 0.003	-0.007 ± 0.006
05-29-02	302	0.017 ± 0.003	0.008 ± 0.006
06-04-02	258	0.017 ± 0.003	0.001 ± 0.008
06-12-02	345	0.022 ± 0.003	-0.001 ± 0.004
06-19-02	302	0.012 ± 0.003	0.004 ± 0.006
06-26-02	304	0.029 ± 0.003	-0.003 ± 0.005
07-02-02	256	0.025 ± 0 004	0.013 ± 0.006
2nd Quarter Mean± s.d.		0.020 ± 0.005	0.000 ± 0.010

Date Collected	Vol. (m³)	Gross Beta	I-131
Required LLD		0 010	0 030
07-10-02	356	0.020 ± 0.003	0.010 ± 0.005
07-16-02	260	0.027 ± 0.004	-0.002 ± 0.009
07-23-02	305	0.023 ± 0.004	-0.010 ± 0.007
07-31-02		NS[a]	
08-08-02	298	0.021 ± 0.003	0.006 ± 0.007
08-14-02	352	0.022 ± 0.003	-0.001 ± 0.006
08-21-02	294	0.017 ± 0.003	0.000 ± 0.007
08-27-02	261	0.022 ± 0.003	-0.023 ± 0.006
09-04-02	311	0.023 ± 0.004	0.003 ± 0.005
09-15-02	473	0.027 ± 0.003	0.001 ± 0.004
09-22-02	299	0.021 ± 0.003	-0.003 ± 0.006
09-28-02	258	0.017 ± 0.003	0.001 ± 0.006
3rd Quarter Mean± s.d.		0.022 ± 0.003	-0.002 ± 0.009
10-04-02	259	0.033 ± 0 004	0.002 ± 0.006
10-11-02	298	0.018 ± 0.003	-0.002 ± 0.006
10-18-02	313	0.020 ± 0.004	-0.007 ± 0.006
10-24-02	251	0.011 ± 0.004	-0.006 ± 0.007
10-30-02	261	0.024 ± 0.004	0.001 ± 0.006
11-05-02	301	0.031 ± 0.004	-0 010 ± 0.005
11-12-02	307	0.039 ± 0.004	-0.003 ± 0.006
11-20-02		NS[b]	
11-26-02		NS[b]	
12-03-02		NS[b]	
12-10-02	297	0.027 ± 0.003	-0.016 ± 0.006
12-19-02		NS[b]	
12-26-02		NS[b]	
01-02-03	304	0.050 ± 0.005	0.001 ± 0.006
4th Quarter Mean± s.d.		0.028 ± 0 012	-0.004 ± 0.006
Cumulative Average		0.024 ± 0.008	-0.001 ± 0.008

[a] "NS" = No sample; loss of power; couldn't quantify volume.

[b] "NS" = No sample; no electric power to pump.

POINT BEACH NUCLEAR PLANT

Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
Location: E-08, G.J. Francar Residence
Units: pCi/m³
Collection: Continuous, weekly exchange.

Date Collected	Vol. (m³)	Gross Beta	I-131
Required LLD		0 010	0 030
01-08-02	302	0.043 ± 0.004	0.007 ± 0.007
01-15-02	258	0.016 ± 0.004	-0.008 ± 0.009
01-23-02	344	0.028 ± 0.003	-0.009 ± 0.007
01-29-02	261	0.024 ± 0.004	0.001 ± 0.010
02-07-02	390	0.041 ± 0.004	0.001 ± 0.005
02-13-02	263	0.031 ± 0.004	0.018 ± 0.008
02-20-02	297	0.018 ± 0.003	0.012 ± 0.007
02-27-02	303	0.015 ± 0.003	-0.003 ± 0.008
03-06-02	306	0.026 ± 0.003	-0.007 ± 0.007
03-13-02	297	0.034 ± 0.004	-0.012 ± 0.007
03-20-02	303	0.025 ± 0.003	0.005 ± 0.008
03-27-02	307	0.027 ± 0.004	-0.001 ± 0.008
1st Quarter			
Mean± s.d.		0.027 ± 0.009	0.000 ± 0.009
04-03-02	307	0.020 ± 0.003	-0.002 ± 0 006
04-09-02	250	0.018 ± 0.004	0.001 ± 0.009
04-14-02	216	0.020 ± 0.004	-0.009 ± 0.009
04-21-02	302	0.027 ± 0.003	-0.003 ± 0 006
04-28-02	301	0.017 ± 0.003	-0.004 ± 0.008
05-05-02	311	0.013 ± 0.003	-0.001 ± 0.007
05-15-02	423	0.016 ± 0.002	0.001 ± 0.006
05-22-02	303	0.011 ± 0.002	-0.001 ± 0.005
05-29-02	302	0.016 ± 0.003	-0.007 ± 0.007
06-04-02	259	0.018 ± 0.003	0.002 ± 0.007
06-12-02	346	0.017 ± 0.003	0.001 ± 0.004
06-19-02	302	0.014 ± 0.003	0.003 ± 0.007
06-26-02	304	0.024 ± 0.003	0.001 ± 0.006
07-02-02	258	0.027 ± 0.004	0.011 ± 0.005
2nd Quarter			
Mean± s d.		0.018 ± 0.005	0.000 ± 0.005

Date Collected	Vol. (m³)	Gross Beta	I-131
Required LLD		0 010	0 030
07-10-02	348	0.020 ± 0.003	-0.007 ± 0.005
07-16-02	259	0.028 ± 0.004	0.004 ± 0.007
07-23-02	303	0.021 ± 0.004	-0.007 ± 0.008
07-31-02	314	0.024 ± 0.003	0.002 ± 0.006
08-08-02	300	0.019 ± 0.003	-0.001 ± 0.007
08-14-02	347	0.019 ± 0.003	-0.003 ± 0.005
08-21-02	303	0.018 ± 0.003	-0.005 ± 0.008
08-27-02	261	0.022 ± 0.003	-0.003 ± 0.007
09-04-02	309	0.020 ± 0.003	0.001 ± 0.006
09-15-02	475	0.028 ± 0.003	-0.001 ± 0.004
09-22-02	299	0.022 ± 0.003	-0.004 ± 0.006
09-28-02	258	0.015 ± 0.003	-0.002 ± 0.008
3rd Quarter			
Mean± s d.		0.021 ± 0.004	-0.002 ± 0.003
10-04-02	258	0.033 ± 0.004	-0.001 ± 0.007
10-11-02	298	0.020 ± 0.003	-0.002 ± 0.007
10-18-02	312	0.019 ± 0.003	0.017 ± 0.009
10-24-02	252	0.013 ± 0.004	0.008 ± 0.007
10-30-02	261	0.023 ± 0.003	0.001 ± 0.007
11-05-02	302	0.033 ± 0.004	-0.003 ± 0.007
11-12-02	302	0.037 ± 0.004	0.005 ± 0.006
11-20-02	345	0.024 ± 0.003	0.001 ± 0.005
11-26-02	259	0.015 ± 0.004	0.011 ± 0.007
12-03-02	305	0.019 ± 0.003	0.001 ± 0.006
12-10-02	296	0.027 ± 0.003	0.007 ± 0.006
12-19-02	393	0.040 ± 0.004	0.005 ± 0.005
12-26-02	304	0.016 ± 0.003	-0.002 ± 0.005
01-02-03	304	0.052 ± 0.005	-0.005 ± 0.006
4th Quarter			
Mean± s.d.		0.027 ± 0.011	0.003 ± 0.006
Cumulative Average		0.023 ± 0.009	0.000 ± 0.006

POINT BEACH NUCLEAR PLANT

Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131.
Location: E-20, Silver Lake
Units: pCi/m³
Collection: Continuous, weekly exchange.

Date Collected	Vol. (m³)	Gross Beta	I-131
Required LLD		0.010	0.030
01-08-02	259	0.047 ± 0.004	0.006 ± 0.007
01-15-02	284	0.023 ± 0.004	-0.007 ± 0.008
01-23-02	326	0.032 ± 0.004	0.007 ± 0.007
01-29-02	249	0.027 ± 0.004	0.002 ± 0.008
02-07-02	369	0.038 ± 0.004	-0.005 ± 0.006
02-13-02	245	0.032 ± 0.004	-0.011 ± 0.009
02-20-02	289	0.018 ± 0.003	-0.002 ± 0.008
02-27-02	297	0.015 ± 0.003	0.008 ± 0.008
03-07-02	350	0.027 ± 0.003	0.004 ± 0.007
03-13-02	261	0.030 ± 0.004	-0.007 ± 0.010
03-20-02	308	0.024 ± 0.003	-0.004 ± 0.007
03-27-02	301	0.028 ± 0.004	0.001 ± 0.006
1st Quarter Mean± s.d.		0.028 ± 0.009	-0.001 ± 0.006
04-04-02	352	0.019 ± 0.003	0.008 ± 0.006
04-09-02	212	0.020 ± 0.004	0.011 ± 0.010
04-14-02	223	0.018 ± 0.003	0.016 ± 0.010
04-21-02	303	0.023 ± 0.003	0.005 ± 0.006
04-28-02	305	0.017 ± 0.003	0.002 ± 0.008
05-05-02	316	0.015 ± 0.003	0.000 ± 0.006
05-15-02	430	0.015 ± 0.002	-0.001 ± 0.005
05-22-02	356	0.011 ± 0.002	-0.009 ± 0.004
05-29-02	259	0.018 ± 0.003	-0.003 ± 0.007
06-04-02	256	0.016 ± 0.003	-0.009 ± 0.007
06-12-02	341	0.020 ± 0.003	-0.003 ± 0.004
06-19-02	298	0.009 ± 0.003	0.001 ± 0.006
06-26-02	297	0.023 ± 0.003	0.012 ± 0.007
07-02-02	251	0.024 ± 0.004	-0.011 ± 0.006
2nd Quarter Mean± s.d.		0.018 ± 0.004	0.001 ± 0.008

Date Collected	Vol. (m³)	Gross Beta	I-131
Required LLD		0.010	0.030
07-10-02	335	0.018 ± 0.003	-0.004 ± 0.006
07-16-02	247	0.026 ± 0.004	0.008 ± 0.007
07-23-02	288	0.021 ± 0.004	-0.004 ± 0.007
07-31-02	285	0.025 ± 0.003	-0.001 ± 0.009
08-08-02	297	0.045 ± 0.004	-0.015 ± 0.007
08-14-02	343	0.020 ± 0.003	-0.001 ± 0.006
08-21-02	281	0.016 ± 0.003	0.007 ± 0.008
08-27-02	247	0.022 ± 0.003	-0.004 ± 0.008
09-04-02	295	0.023 ± 0.004	-0.008 ± 0.005
09-15-02	481	0.031 ± 0.003	0.001 ± 0.004
09-22-02	303	0.018 ± 0.003	-0.011 ± 0.006
09-28-02	257	0.018 ± 0.003	-0.003 ± 0.008
3rd Quarter Mean± s.d.		0.024 ± 0.008	-0.003 ± 0.007
10-04-02	258	0.026 ± 0.004	-0.019 ± 0.007
10-11-02	296	0.023 ± 0.003	0.000 ± 0.006
10-18-02	309	0.018 ± 0.003	-0.001 ± 0.005
10-24-02	257	0.016 ± 0.004	-0.014 ± 0.007
10-30-02	257	0.022 ± 0.003	-0.009 ± 0.007
11-05-02	301	0.033 ± 0.004	-0.006 ± 0.006
11-12-02	298	0.039 ± 0.004	-0.006 ± 0.006
11-20-02	352	0.023 ± 0.003	0.001 ± 0.005
11-27-02	299	0.014 ± 0.003	0.002 ± 0.006
12-03-02	260	0.019 ± 0.003	-0.011 ± 0.007
12-10-02	293	0.029 ± 0.004	0.005 ± 0.006
12-19-02	377	0.041 ± 0.004	-0.006 ± 0.005
12-26-02	298	0.021 ± 0.004	0.003 ± 0.006
01-02-03	293	0.049 ± 0.005	0.007 ± 0.005
4th Quarter Mean± s.d.		0.027 ± 0.010	-0.004 ± 0.008
Cumulative Average		0.024 ± 0.009	-0.001 ± 0.007

POINT BEACH NUCLEAR PLANT

GAMMA EMITTERS IN QUARTERLY COMPOSITES OF

AIR PARTICULATE FILTERS

(Concentration pCi/m³)

Locatic	Lab Code	Be-7	Cs-134	Cs-137	Other Gammas[a]	Volume
	Req. LLD	-	(0 05)	(0.06)	(0.10)	
			1st Quarter			
E-01	EAP- 2445	0.064 ± 0.017	-0 0001 ± 0.0005	-0 0003 ± 0.0007	-0.0005 ± 0.0008	3629
E-02	- 2446	0.063 ± 0.017	0.0007 ± 0.0006	-0.0006 ± 0.0007	0.0002 ± 0.0006	3225
E-03	- 2447	0.069 ± 0.017	0.0006 ± 0.0007	0.0003 ± 0.0007	-0.0005 ± 0.0012	3646
E-04	- 2448	0.070 ± 0.020	0.0005 ± 0.0007	-0.0002 ± 0.0009	-0.0010 ± 0.0012	3626
E-08	- 2449	0.072 ± 0.024	-0.0002 ± 0.0007	0.0004 ± 0.0007	0.0006 ± 0.0009	3631
E-20	- 2450	0.077 ± 0.019	0.0003 ± 0.0006	-0.0001 ± 0.0006	0.0002 ± 0.0005	3538
			2nd Quarter			
E-01	EAP- 4856	0.054 ± 0.013	0.0004 ± 0.0006	0.0002 ± 0.0006	-0.0007 ± 0.0007	4347
E-02	- 4857	0.078 ± 0.020	-0.0001 ± 0.0007	0.0009 ± 0.0007	-0.0001 ± 0.0006	4194
E-03	- 4858	0.068 ± 0.017	0.0003 ± 0.0005	0.0000 ± 0.0005	-0.0003 ± 0.0007	4190
E-04	- 4859	0.074 ± 0.016	-0.0003 ± 0.0007	0.0001 ± 0.0006	0.0005 ± 0.0006	4187
E-08	- 4860	0.062 ± 0.014	0.0005 ± 0.0005	0.0000 ± 0.0005	-0.0002 ± 0.0009	4184
E-20	- 4861	0.061 ± 0.014	0.0002 ± 0.0006	-0.0004 ± 0.0006	-0.0007 ± 0.0007	4199
			3rd Quarter			
E-01	EAP- 6632	0.043 ± 0.018	-0.0003 ± 0.0008	-0 0003 ± 0.0009	0.0001 ± 0.0009	2904
E-02	- 6633	0.057 ± 0.015	0.0008 ± 0.0007	0.0003 ± 0.0008	0.0001 ± 0.0006	3697
E-03	- 6634	0.055 ± 0.011	0.0007 ± 0.0007	0.0000 ± 0.0006	0.0006 ± 0.0005	3743
E-04	- 6635	0.071 ± 0.015	-0.0007 ± 0.0006	-0.0004 ± 0.0007	-0.0004 ± 0.0008	3467
E-08	- 6636	0.073 ± 0.017	0.0003 ± 0.0006	0.0006 ± 0.0007	-0.0002 ± 0.0007	3776
E-20	- 6637	0.063 ± 0.018	0.0004 ± 0.0008	0.0025 ± 0.0013	0.0002 ± 0.0009	3659
			4th Quarter			
E-01	EAP- 8817	0 058 ± 0.015	0.0003 ± 0.0006	0.0003 ± 0.0006	0.0000 ± 0.0007	3712
E-02	- 8818	0.050 ± 0.014	-0.0002 ± 0.0007	0.0000 ± 0.0005	0.0004 ± 0.0003	4192
E-03	- 8819	0.052 ± 0.014	0.0005 ± 0 0006	0.0002 ± 0.0005	-0.0003 ± 0.0007	4184
E-04	- 8820	0.057 ± 0.016	-0.0003 ± 0.0007	0.0001 ± 0.0008	0.0003 ± 0.0008	2591
E-08	- 8821	0.051 ± 0.014	-0.0003 ± 0.0005	-0.0001 ± 0.0005	0.0002 ± 0.0006	4191
E-20	- 8822	0.052 ± 0.014	-0.0002 ± 0.0006	-0.0002 ± 0.0006	0.0009 ± 0.0006	4148

[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	01-09-02	02-06-02	03-06-02	Required LLD
Lab Code	EMI-121	EMI-646	EMI-1411	
Sr-89	-0.4 ± 0.9	-0.2 ± 0.7	-0.3 ± 0.8	5.0
Sr-90	1.1 ± 0.4	1.0 ± 0.3	1.7 ± 0.4	1.0
I-131	-0.13 ± 0.18	0.03 ± 0.16	-0.15 ± 0 22	0.5
K-40	1394 ± 101	1416 ± 127	1414 ± 118	
Cs-134	2.0 ± 5.9	0.6 ± 2.5	0.2 ± 2.6	5.0
Cs-137	-0.9 ± 1.9	-1.2 ± 2.6	2.0 ± 2.5	5.0
Ba-La-140	0.1 ± 1.8	-0.3 ± 1.2	-0.1 ± 1.5	5.0
Other Gammas*	1.2 ± 0.8	0.9 ± 2.5	0.8 ± 2.2	15.0

Collection Date	04-03-02	05-05-02	06-05-02	Required LLD
Lab Code	EMI-2052,3	EMI-2971,2	EMI-3593	
Sr-89	0.2 ± 0.8	-0.1 ± 1.1	-0.5 ± 0.9	5.0
Sr-90	0.8 ± 0.3	1.2 ± 0.3	0.8 ± 0.4	1.0
I-131	-0.13 ± 0.23	-0.08 ± 0.24	-0.08 ± 0.19	0.5
K-40	1359 ± 90	1342 ± 65	1346 ± 108	
Cs-134	-1.1 ± 2.2	-0.8 ± 1.9	1.2 ± 2.2	5.0
Cs-137	-0.7 ± 2.1	1.4 ± 1.7	1.0 ± 2.2	5.0
Ba-La-140	-0.3 ± 1.8	-1.8 ± 1.9	0.1 ± 1.6	5.0
Other Gammas*	-1.8 ± 2.2	-1.0 ± 1.8	0.9 ± 1.8	15.0

* 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	07-03-02	08-07-02	09-04-02	Required LLD
Lab Code	EMI-4392	EMI-5214	EMI-5705	
Sr-89	0.0 ± 0.8	-1.5 ± 1.2	0.9 ± 1.0	5.0
Sr-90	1.1 ± 0.4	1.6 ± 0.4	1.0 ± 0.4	1.0
I-131	0.03 ± 0.17	0.08 ± 0.15	0.01 ± 0.19	0.5
K-40	1309 ± 117	1293 ± 109	1404 ± 118	
Cs-134	0.6 ± 2.2	3.2 ± 2.5	0.3 ± 2.6	5.0
Cs-137	0.8 ± 2.0	-1.1 ± 2.4	1.5 ± 2.1	5.0
Ba-La-140	-1.2 ± 1.7	0.4 ± 1.5	-1.3 ± 2.2	5.0
Other Gammas*	-0.3 ± 2.7	-0.1 ± 2.2	-0.4 ± 2.4	15.0

Collection Date	10-02-02	11-06-02	12-04-02	Required LLD
Lab Code	EMI-6445	EMI-7566	EMI-8105,6	
Sr-89	0.6 ± 1.0	0.5 ± 1.4	-0.4 ± 1.1	5.0
Sr-90	1.0 ± 0.4	0.5 ± 0.3	1.0 ± 0.4	1.0
I-131	-0.03 ± 0.16	-0.10 ± 0.16	0.13 ± 0.20	0.5
K-40	1481 ± 135	1351 ± 115	1308 ± 78	
Cs-134	0.6 ± 3.0	1.2 ± 2.3	0.1 ± 1.9	5.0
Cs-137	-0.3 ± 2.7	-2.0 ± 2.5	0.2 ± 1.9	5.0
Ba-La-140	0.8 ± 2.2	-0.1 ± 2.0	-3.2 ± 2.1	5.0
Other Gammas*	1.5 ± 2.5	-1.4 ± 2.2	-2.1 ± 2.5	15.0

* See Introduction.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN MILK SAMPLES

(Monthly Collections)

Sample Description and Concentration (pCi/L)

E-19 Engelbrecht Dairy

Collection Date	01-09-02	02-06-02	03-06-02	Required LLD
Lab Code	EMI-122	EMI-647	EMI-1412	
Sr-89	-0.6 ± 0.9	-0.2 ± 0.9	0.1 ± 0.8	5.0
Sr-90	1.3 ± 0.3	1.6 ± 0.4	1.8 ± 0.4	1.0
I-131	-0.07 ± 0.17	0.04 ± 0.16	-0.09 ± 0.21	0.5
K-40	1315 ± 147	1327 ± 114	1319 ± 113	
Cs-134	0.6 ± 2.8	-0.7 ± 2.5	-0.1 ± 2.3	5.0
Cs-137	-0.2 ± 3.4	1.8 ± 2.0	1.2 ± 2.3	5.0
Ba-La-140	0.5 ± 3.1	-0.3 ± 1.2	0.8 ± 1.9	5.0
Other Gammas[a]	-1.1 ± 4.1	0.2 ± 2.4	-2.9 ± 2.4	15.0

Collection Date	04-03-02	05-05-02	06-05-02	Required LLD
Lab Code	EMI-2054	EMI-2973	EMI-3594	
Sr-89	0.3 ± 0.8	0.8 ± 1.0	0.2 ± 0.9	5.0
Sr-90	1.1 ± 0.3	1.2 ± 0.4	0.9 ± 0.3	1.0
I-131	-0.03 ± 0.18	-0.06 ± 0.15	-0.22 ± 0.21	0.5
K-40	1328 ± 111	1318 ± 85	1351 ± 118	
Cs-134	-2.1 ± 2.0	0.2 ± 1.6	1.6 ± 2.2	5.0
Cs-137	0.7 ± 2.1	-0.1 ± 1.7	-0.8 ± 2.1	5.0
Ba-La-140	-1.9 ± 1.5	1.1 ± 1.3	-3.0 ± 1.9	5.0
Other Gammas[a]	-0.1 ± 2.5	0.7 ± 1.7	0.4 ± 2.0	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	07-03-02	08-07-02	09-04-02	Required LLD
Lab Code	EMI-4393	EMI-5215,6	EMI-5706	
Sr-89	0.0 ± 0.8	-0.4 ± 1.2	0.3 ± 1.1	5.0
Sr-90	1.1 ± 0.4	1.9 ± 0.4	1.0 ± 0.4	1.0
I-131	-0.07 ± 0.19	-0.12 ± 0.20	0.02 ± 0.16	0.5
K-40	1407 ± 104	1360 ± 81	1234 ± 209	
Cs-134	1.1 ± 2.1	0.7 ± 2.1	0.5 ± 1.8	5.0
Cs-137	0.8 ± 1.9	-2.0 ± 2.2	-2.3 ± 2.0	5.0
Ba-La-140	1.8 ± 2.0	-0.6 ± 1.6	-0.4 ± 1.5	5.0
Other Gammas[a]	0.9 ± 2.3	-0.7 ± 2.2	0.8 ± 2.0	15.0

Collection Date	10-02-02	11-06-02	12-04-02	Required LLD
Lab Code	EMI-6446	EMI-7567	EMI-8107	
Sr-89	-1.0 ± 1.3	-0.7 ± 1.5	0.7 ± 1.2	5.0
Sr-90	2.5 ± 0.5	1.3 ± 0.4	0.9 ± 0.4	1.0
I-131	0.07 ± 0.15	-0.07 ± 0.18	0.02 ± 0.13	0.5
K-40	1305 ± 119	1284 ± 116	1326 ± 122	
Cs-134	0.3 ± 2.0	-0.4 ± 2.2	0.1 ± 2.4	5.0
Cs-137	0.3 ± 2.1	0.5 ± 2.2	-1.7 ± 2.4	5.0
Ba-La-140	-0.2 ± 2.5	-1.0 ± 1.8	0.6 ± 1.8	5.0
Other Gammas[a]	-0.9 ± 2.5	-1.3 ± 2.1	-1.5 ± 2.5	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	01-09-02	02-06-02	03-06-02	Required LLD
Lab Code	EMI-123	EMI-648	EMI-1413	
Sr-89	-0.2 ± 0.8	-0.4 ± 0.7	0.1 ± 0.6	5.0
Sr-90	0.8 ± 0.3	0.7 ± 0.3	0.8 ± 0.3	1.0
I-131	-0.06 ± 0.18	-0.07 ± 0.16	-0.16 ± 0.23	0.5
K-40	1472 ± 114	1450 ± 116	1358 ± 125	
Cs-134	0.2 ± 2.0	-0.1 ± 2.1	0.4 ± 2.3	5.0
Cs-137	0.3 ± 2.2	-2.4 ± 2.5	-2.1 ± 2.1	5.0
Ba-La-140	0.4 ± 1.5	-1.4 ± 1.9	-1.5 ± 2.5	5.0
Other Gammas[a]	0.3 ± 1.9	-0.4 ± 2.0	-1.0 ± 2.4	15.0

Collection Date	04-03-02	05-05-02	06-05-02	Required LLD
Lab Code	EMI-2055	EMI-2974[b]	EMI-3595	
Sr-89	0.6 ± 0.6	-1.1 ± 1.7	0.5 ± 1.1	5.0
Sr-90	0.3 ± 0.3	4.2 ± 0 8	0.7 ± 0.4	1.0
I-131	-0.03 ± 0.21	-0.13 ± 0.14	-0.20 ± 0.24	0.5
K-40	1431 ± 117	1373 ± 91	1354 ± 111	
Cs-134	0.7 ± 2.2	1.4 ± 1.8	-1.2 ± 2.4	5.0
Cs-137	0.0 ± 2.5	0.5 ± 1.8	1.8 ± 2.1	5.0
Ba-La-140	-0.4 ± 1.9	-0.6 ± 1.6	3.3 ± 2.4	5.0
Other Gammas[a]	1.9 ± 2.4	-0.8 ± 1.9	1.5 ± 1.9	15.0

[a] See Introduction.

[b] Sr-90 repeated with a result of 3.7±0.6 pCi/L.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN MILK SAMPLES

(Monthly Collections)

Sample Description and Concentration (pCi/L)

E-21 Strutz Dairy Farm

Collection Date	07-03-02	08-07-02	09-04-02	Required LLD
Lab Code	EMI-4394	EMI-5217	EMI-5707	
Sr-89	-0.1 ± 0.7	0.4 ± 0.9	0.7 ± 0.7	5.0
Sr-90	0.6 ± 0.3	0.4 ± 0.3	0.2 ± 0.3	1.0
I-131	0.02 ± 0.16	0.07 ± 0.20	0.03 ± 0.15	0.5
K-40	1262 ± 111	1364 ± 113	1310 ± 155	
Cs-134	0.4 ± 2.2	0.2 ± 2.0	-0.2 ± 2.9	5.0
Cs-137	1.7 ± 2.3	0.5 ± 2.3	0.5 ± 3.3	5.0
Ba-La-140	-1.0 ± 1.4	0.9 ± 1.5	1.2 ± 2.7	5.0
Other Gammas*	-0.7 ± 2.3	2.8 ± 2.2	-0.3 ± 3.7	15.0

Collection Date	10-02-02	11-06-02	12-04-02	Required LLD
Lab Code	EMI-6447	EMI-7568	EMI-8108	
Sr-89	0.1 ± 0.8	1.1 ± 1.2	-1.2 ± 0.9	5.0
Sr-90	0.8 ± 0.3	0.5 ± 0.3	0.7 ± 0.3	1.0
I-131	-0.07 ± 0.13	0.01 ± 0.21	-0.04 ± 0.15	0.5
K-40	1357 ± 114	1372 ± 127	1346 ± 116	
Cs-134	-1.4 ± 2.4	-0.8 ± 2.8	1.4 ± 2.1	5.0
Cs-137	0.3 ± 2.1	-1.4 ± 2.4	-0.7 ± 2.3	5.0
Ba-La-140	-0.7 ± 1.9	-3.4 ± 2 9	1.9 ± 2.0	5.0
Other Gammas*	-0.5 ± 2.2	-0.4 ± 2.2	1.9 ± 2.2	15.0

* See Introduction.

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	01-16-02	04-09-02	07-10-02	10-18-02	
Lab Code	EWW-358	EWW-2197	EWW-4775	EWW-7402	
Gross Beta	1.1 ± 1.2	-0.1 ± 1.6	1.0 ± 1.7	0.9 ± 1.5	4.0
H-3	-89.2 ± 59.6	-105.4 ± 61.2	-8.4 ± 65.1	34.8 ± 76.4	500
Sr-89	0.05 ± 0.90	-0.04 ± 0.67	0.66 ± 0.93	-0.29 ± 0.83	5.0
Sr-90	1.27 ± 0.36	-0.10 ± 0.35	-0.20 ± 0.28	0.14 ± 0.27	1.0
I-131	0.04 ± 0.18	-0.12 ± 0.15	-0.15 ± 0.27	-0 06 ± 0.30	0.5
Mn-54	-2.4 ± 4.5	1.1 ± 2.2	2.3 ± 2.6	0.5 ± 2.1	10
Fe-59	-9.8 ± 13.3	-3.0 ± 3.7	-2.7 ± 4.0	2.6 ± 3.5	30
Co-58	-1.9 ± 4.3	0.4 ± 2.1	0.4 ± 2.1	-0.3 ± 1.6	10
Co-60	0.8 ± 5.2	-1.7 ± 2.4	-0.8 ± 2.5	0.3 ± 1.3	10
Zn-65	8.4 ± 7.7	-2.3 ± 3.6	-0.3 ± 3.2	-3.8 ± 4.3	30
Zr-Nb-95	-2.5 ± 4.4	0.2 ± 2.2	0.4 ± 2.3	-1.9 ± 2.2	15
Cs-134	1.6 ± 4.9	-0.4 ± 2.2	-0.1 ± 2.9	-1.0 ± 1.8	10
Cs-137	1.4 ± 5.3	-1.6 ± 2.6	1.1 ± 2.7	1.7 ± 2.1	10
Ba-La-140	-9.2 ± 8.1	-4.4 ± 2.7	5.3 ± 1.9	2.1 ± 1.6	15
Other Gammas[a]	-2.3 ± 4.1	0.6 ± 1.7	-3.3 ± 2.4	-0.2 ± 1.9	30

[a] Ru-103

POINT BEACH

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

Lab Code	ELW-355	ELW-987	ELW-1651,2	ELW-2193	
Date Collected	1/16/2002	2/14/2002	3/14/2002	4/10/2002	Req. LLD
Gross beta	2.2 ± 0.6	6.0 ± 0.9	2.7 ± 0.4	5.9 ± 0.7	4.0
I-131	0.10 ± 0.18	-0.02 ± 0.19	0.08 ± 0.17	-0.15 ± 0.16	0.5
Be-7	3.2 ± 27.7	6.6 ± 35.8	4.9 ± 23.3	-18.5 ± 28.3	
Mn-54	1.4 ± 2.9	0.3 ± 2.2	-0.3 ± 2.0	-0.9 ± 3.0	10
Fe-59	-2.2 ± 6.9	0.5 ± 5.8	-5.6 ± 5.5	1.9 ± 6.5	30
Co-58	-0.5 ± 3.2	1.6 ± 1.3	0.1 ± 1.9	-0.1 ± 3.0	10
Co-60	3.7 ± 3.8	2.0 ± 3.2	-1.0 ± 2.9	-1.4 ± 3.9	10
Zn-65	-1.0 ± 7.3	0.3 ± 4.6	-1.9 ± 3.6	2.6 ± 6.7	30
Zr-Nb-95	-3.7 ± 3.4	3.1 ± 2.7	0.9 ± 2.1	-0.8 ± 2.6	15
Ru-103	1.9 ± 3.2	-1.2 ± 2.5	0.0 ± 2.2	0.7 ± 3.0	15
Cs-134	-2.4 ± 3.9	-1.9 ± 2.8	-0.8 ± 2.7	-0.3 ± 3.8	10
Cs-137	0.9 ± 3.8	1.1 ± 2.7	0.9 ± 2.8	0.9 ± 3.3	10
Ba-La-140	2.1 ± 5.4	1.5 ± 2.2	-7.1 ± 3.5	0.8 ± 2.1	15

Lab Code	ELW-3248	ELW-3923	ELW-4776	ELW-5488	
Date Collected	5/15/2002	6/12/2002	7/11/2002	8/15/2002	Req. LLD
Gross beta	2.7 ± 0.6	2.5 ± 0.5	2.0 ± 0.5	2.6 ± 0.6	4.0
I-131	0.03 ± 0.21	-0.05 ± 0.24	0.14 ± 0.24	0.14 ± 0.22	0.5
Be-7	-4.6 ± 18.0	5.7 ± 25.2	-1.1 ± 17.9	2.1 ± 23.7	
Mn-54	1.3 ± 2.2	0.4 ± 3.3	0.3 ± 2.2	-1.0 ± 2.5	10
Fe-59	1.7 ± 4.0	-3.4 ± 6.4	10.0 ± 3.5	-0.9 ± 4.5	30
Co-58	-0.2 ± 2.3	-1.4 ± 3.4	0.3 ± 2.1	0.1 ± 2.8	10
Co-60	1.7 ± 2.6	-1.1 ± 3.5	-0.7 ± 2.7	0.6 ± 3.0	10
Zn-65	-3.3 ± 4.6	0.9 ± 7.3	5.4 ± 5.1	-2.9 ± 5.0	30
Zr-Nb-95	-0.6 ± 5.0	-0.6 ± 2.5	-1.0 ± 2.1	1.3 ± 3.0	15
Ru-103	-1.7 ± 2.0	-0.9 ± 2.9	-0.4 ± 2.1	-0.9 ± 2.4	15
Cs-134	-0 6 ± 2.6	2.4 ± 3.6	1.8 ± 2.5	-1.0 ± 3.2	10
Cs-137	0.5 ± 2.6	-2.1 ± 2.8	-0.4 ± 2.2	1.2 ± 3.2	10
Ba-La-140	0.9 ± 2.8	-1.4 ± 4.2	-4.4 ± 3.0	-2.5 ± 3.9	15

Lab Code	ELW-6089	ELW-7403	ELW-7827	ELW-8313	
Date Collected	9/15/2002	10/19/2002	11/12/2002	12/11/2002	Req. LLD
Gross beta	2.8 ± 0.6	2.3 ± 0.6	1.8 ± 0.5	3.5 ± 0.6	4.0
I-131	-0.05 ± 0.18	0.24 ± 0.24	0.12 ± 0.19	0.04 ± 0.15	0.5
Be-7	-9.7 ± 17.0	19.4 ± 32.8	11.3 ± 16.0	19.4 ± 23.2	
Mn-54	0.6 ± 1.6	-1.7 ± 3.8	0.4 ± 1.6	-0.7 ± 3.2	10
Fe-59	1.7 ± 3.4	-3.0 ± 7.8	3.2 ± 2.9	-0.7 ± 4.8	30
Co-58	0.3 ± 1.6	0.6 ± 3.6	-1.0 ± 1.6	-1.3 ± 2.9	10
Co-60	0 8 ± 1.2	0.1 ± 5.7	-0.3 ± 1.7	-1.3 ± 3.4	10
Zn-65	-2.1 ± 4.6	-5.9 ± 9.7	-4.2 ± 4.9	-1.6 ± 5.6	30
Zr-Nb-95	-0.2 ± 1.7	-7.3 ± 4.9	-0.6 ± 2.0	2.4 ± 3.4	15
Ru-103	0.7 ± 2.0	-0.8 ± 3.8	1.6 ± 1.9	0 4 ± 2.7	15
Cs-134	0.0 ± 1.3	1.2 ± 4.8	0.1 ± 2.1	-0.9 ± 3 2	10
Cs-137	0.5 ± 2.1	-3.6 ± 4.4	-0.7 ± 2.0	-1.0 ± 3.9	10
Ba-La-140	0.7 ± 2.3	-12.8 ± 6.0	-0.6 ± 2.4	0.4 ± 3.4	15

POINT BEACH

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

Lab Code	ELW-376	ELW-988	ELW-1653	ELW-2194	
Date Collected	1/16/2002	2/14/2002	3/14/2002	4/10/2002	Req. LLD
Gross beta	2.4 ± 0.6	3.5 ± 0.7	3.8 ± 0.6	5.8 ± 0.7	4.0
I-131	0.00 ± 0.22	0.01 ± 0.19	-0.06 ± 0.19	-0.24 ± 0.19	0.5
Be-7	-2.2 ± 17.7	-5.2 ± 12.5	3.0 ± 9.6	-4.2 ± 26.1	
Mn-54	-0.8 ± 1.9	-1.3 ± 2.0	-0.1 ± 0.9	0.7 ± 2.9	10
Fe-59	0.2 ± 4.6	2.6 ± 2.6	-2.9 ± 1.9	-0.9 ± 5.3	30
Co-58	1.0 ± 1.7	-0.5 ± 1.9	-0.2 ± 0.9	-1.3 ± 3.0	10
Co-60	-1.7 ± 1.9	0.3 ± 1.8	1.1 ± 1.0	-2.6 ± 3.8	10
Zn-65	0.6 ± 4.2	-1.8 ± 3.6	-4.1 ± 2.3	5.4 ± 6.0	30
Zr-Nb-95	-0.1 ± 1.9	1.1 ± 1.7	-6.1 ± 1.1	-0.1 ± 3.0	15
Ru-103	-1.5 ± 2.1	0.7 ± 1.8	-1.1 ± 1.1	-0.3 ± 2.8	15
Cs-134	0.5 ± 1.9	-0.2 ± 1.9	1.1 ± 1.1	0.6 ± 3.7	10
Cs-137	0.2 ± 2.5	0.5 ± 1.9	0.1 ± 1.1	0.6 ± 3.1	10
Ba-La-140	-2.4 ± 2.4	-2.5 ± 2.2	-13.2 ± 1.1	-2.6 ± 3.3	15

Lab Code	ELW-3249	ELW-3924,5	ELW-4777	ELW-5489	
Date Collected	5/15/2002	6/13/2002	7/11/2002	8/14/2002	Req. LLD
Gross beta	3.0 ± 0.5	3.2 ± 0.5	2.5 ± 0.5	3.2 ± 0.6	4.0
I-131	-0.07 ± 0.19	-0.01 ± 0.22	-0.31 ± 0.22	0.15 ± 0.19	0.5
Be-7	-16.4 ± 13.0	-5.5 ± 14.9	1.1 ± 17.0	0.8 ± 6.1	
Mn-54	0.1 ± 1.2	-0.3 ± 1.8	0.8 ± 1.9	0.1 ± 0.8	10
Fe-59	-2.9 ± 2.5	1.7 ± 4.8	1.3 ± 3.2	0.2 ± 1.4	30
Co-58	0.0 ± 1.3	-0.3 ± 1.6	-0.2 ± 1.9	-0.7 ± 0.7	10
Co-60	2.1 ± 1.7	-0.9 ± 1.7	-2.3 ± 2.5	0.2 ± 0.8	10
Zn-65	-2.6 ± 3.1	1.0 ± 3.2	3.8 ± 3.5	-0.3 ± 1.4	30
Zr-Nb-95	0.2 ± 1.5	-1.8 ± 2.0	-2.3 ± 2.0	-0.4 ± 0.8	15
Ru-103	-1.0 ± 1.4	-1.6 ± 1.6	-1.8 ± 2.0	-0.4 ± 0.7	15
Cs-134	-1.5 ± 1.6	-0.2 ± 2.0	0.9 ± 2.1	-0.2 ± 0.9	10
Cs-137	0.3 ± 1.7	-2.3 ± 2.2	0.1 ± 2.4	0.8 ± 0.9	10
Ba-La-140	0.6 ± 1.4	1.3 ± 1.3	0.7 ± 2.5	-0.8 ± 1.1	15

Lab Code	ELW-6090	ELW-7404	ELW-7828	ELW-8314	
Date Collected	9/15/2002	10/19/2002	11/12/2002	12/11/2002	Req. LLD
Gross beta	3.4 ± 0.6	3.2 ± 0.7	2.5 ± 0.6	2.2 ± 0.5	4.0
I-131	-0.16 ± 0.17	0.31 ± 0.31	-0.03 ± 0.17	-0.01 ± 0.16	0.5
Be-7	-15.0 ± 20.8	23.7 ± 22.0	-9.2 ± 18.1	38.0 ± 26.7	
Mn-54	1.4 ± 2.3	-0.5 ± 2.6	1.1 ± 1.9	-1.6 ± 3.0	10
Fe-59	-2.3 ± 4.1	-1.9 ± 5.1	5.0 ± 4.5	3.9 ± 5.9	30
Co-58	1.0 ± 2.5	3.3 ± 3.1	0.7 ± 2.0	2.5 ± 3.3	10
Co-60	1.3 ± 2.1	-1.7 ± 2.5	0.1 ± 1.8	-4.6 ± 4.5	10
Zn-65	3.0 ± 4.5	-3.3 ± 5.3	-2.7 ± 5.6	-3.0 ± 7.5	30
Zr-Nb-95	0.6 ± 2.5	-2.4 ± 3.5	0.4 ± 1.9	0.9 ± 2.9	15
Ru-103	0.5 ± 2.0	2.3 ± 2.7	1.4 ± 2.3	1.9 ± 3.2	15
Cs-134	-0.1 ± 2.8	-2.3 ± 3.7	-0.4 ± 2.0	-2.9 ± 3.6	10
Cs-137	1.7 ± 3.0	-3.2 ± 3.3	0.6 ± 2.2	-1.2 ± 3.5	10
Ba-La-140	0.9 ± 2.8	-2.6 ± 3.5	0.8 ± 1.5	-2.4 ± 4.3	15

POINT BEACH

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

Lab Code	ELW-356,7	ELW-989	ELW-1654	ELW-2195	
Date Collected	1/16/2002	2/14/2002	3/14/2002	4/10/2002	Req. LLD
Gross beta	3.2 ± 0.4	3.6 ± 0.6	3.1 ± 0.6	3.7 ± 0.6	4.0
I-131	0.05 ± 0.21	0.03 ± 0.22	0.23 ± 0.24	-0.06 ± 0.22	0.5
Be-7	-3.3 ± 17.9	16.8 ± 17.8	8.8 ± 18.3	-16.2 ± 24.3	
Mn-54	0.5 ± 0.7	-0.3 ± 1.6	1.7 ± 2.7	0.7 ± 3.5	10
Fe-59	1.0 ± 3.4	0.6 ± 3.9	-6 2 ± 5.6	2.8 ± 7.0	30
Co-58	-0.3 ± 1.5	-0.8 ± 2.0	-2.5 ± 2.5	-1.2 ± 2.7	10
Co-60	-0.4 ± 2.0	0.3 ± 2.1	-0.6 ± 2.7	0.4 ± 3.2	10
Zn-65	-0.2 ± 3.8	2.0 ± 3.5	2.3 ± 5.0	-3.4 ± 6.6	30
Zr-Nb-95	-0.1 ± 2.0	-0.2 ± 1.7	0.9 ± 2.5	0.8 ± 2.6	15
Ru-103	0.1 ± 2.3	0.6 ± 2.1	1.6 ± 2.2	-1.3 ± 2.5	15
Cs-134	0.3 ± 2.1	-0.8 ± 2.0	0.3 ± 2.7	-0.2 ± 3.5	10
Cs-137	-0.9 ± 2.0	1.6 ± 1.9	-1.7 ± 2.8	2.4 ± 3.0	10
Ba-La-140	-3.4 ± 1.8	-3.0 ± 1.8	-1.0 ± 2.6	2.0 ± 3.5	15

Lab Code	ELW-3250,1	ELW-3926	ELW-4778	ELW-5490	
Date Collected	5/15/2002	6/13/2002	7/11/2002	8/15/2002	Req. LLD
Gross beta	3.2 ± 0.4	2.5 ± 0.6	1.7 ± 0.5	2.7 ± 0.5	4.0
I-131	0.05 ± 0.25	-0.16 ± 0.15	-0.07 ± 0.24	-0.23 ± 0.16	0.5
Be-7	-0.2 ± 13.1	3.5 ± 10.7	22.2 ± 18.3	0.8 ± 26.0	
Mn-54	0.4 ± 1.5	0.7 ± 1.0	0.3 ± 2.3	-1.4 ± 2.6	10
Fe-59	-4.1 ± 3.3	-0.6 ± 2.0	4.3 ± 4.6	2.6 ± 5.9	30
Co-58	0.5 ± 1.5	0.5 ± 1.2	0.9 ± 1.6	-0.5 ± 2.6	10
Co-60	-0.3 ± 1.6	0.2 ± 1.2	0.5 ± 2.0	1.2 ± 2.2	10
Zn-65	0.9 ± 3.1	-2.5 ± 2.9	2.4 ± 2.9	3.4 ± 6.9	30
Zr-Nb-95	0.4 ± 1.3	-2 3 ± 1.4	-0.6 ± 2.2	-1.7 ± 3.1	15
Ru-103	0.6 ± 1.6	-1.8 ± 1.3	1.7 ± 2.3	0.9 ± 3.1	15
Cs-134	0.1 ± 1.4	-0.1 ± 1.4	1.1 ± 2.0	1.9 ± 4.0	10
Cs-137	-0.5 ± 1.7	0.1 ± 1.3	-0.7 ± 2.3	-0.8 ± 3.6	10
Ba-La-140	0.3 ± 2.2	-2.8 ± 1.3	1.3 ± 2.1	-1.8 ± 4.4	15

Lab Code	ELW-6091	ELW-7405	ELW-7829	ELW-8315	
Date Collected	9/15/2002	10/19/2002	11/13/2002	12/11/2002	Req. LLD
Gross beta	2.5 ± 0.5	2.6 ± 0.6	2.9 ± 0.6	2.9 ± 0.6	4.0
I-131	-0.23 ± 0.19	0.12 ± 0 26	-0.03 ± 0.27	0.08 ± 0.14	0.5
Be-7	3.6 ± 25.1	10.1 ± 17.4	5.1 ± 24.0	-5.2 ± 23.1	
Mn-54	1.4 ± 3.1	-1.2 ± 1.5	-1.8 ± 2.4	-0.8 ± 2.8	10
Fe-59	-0.7 ± 6.2	-6.1 ± 3.9	0.3 ± 4.7	-4.2 ± 5.9	30
Co-58	-1.6 ± 3.2	-0.3 ± 1.8	3.1 ± 3.1	-1.0 ± 3.1	10
Co-60	1.1 ± 3.6	0.6 ± 1.7	0.5 ± 1.0	2.7 ± 3.7	10
Zn-65	5.0 ± 6.2	-3.5 ± 3.8	-0.6 ± 5.0	-2 7 ± 6.2	30
Zr-Nb-95	1.8 ± 2.6	-0.8 ± 1.8	0.1 ± 3.0	1.5 ± 3.1	15
Ru-103	-0.8 ± 2.8	0.4 ± 1.9	-2.0 ± 2.4	0.8 ± 2.9	15
Cs-134	-1.6 ± 3.6	-0.3 ± 2.0	0.4 ± 2.9	3.7 ± 4.0	10
Cs-137	-0.1 ± 3.4	0.3 ± 2.1	0.5 ± 3.0	1.9 ± 3.0	10
Ba-La-140	-4.0 ± 4.0	4.7 ± 2.1	-1.7 ± 2.5	1.5 ± 3.1	15

POINT BEACH

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

Lab Code	ELW-377,8	ELW-990	ELW-1655	ELW-2196	
Date Collected	1/16/2002	2/14/2002	3/14/2002	4/9/2002	Req. LLD
Gross beta	2.8 ± 0.5	5.0 ± 0.8	3.2 ± 0.6	4.0 ± 0.6	4.0
I-131	-0.13 ± 0.24	0.08 ± 0.20	0.11 ± 0.25	-0.14 ± 0.20	0.5
Be-7	-5.1 ± 16.7	-4.7 ± 16.8	11.0 ± 18.5	-2.4 ± 21.1	
Mn-54	0.3 ± 1.7	-0.6 ± 1.8	2.2 ± 2.1	0.6 ± 2.5	10
Fe-59	-0.5 ± 2.6	0.4 ± 2.2	4.5 ± 4.1	-5.6 ± 4.6	30
Co-58	0.2 ± 1.4	-0.6 ± 1.6	0.7 ± 2.0	-0.1 ± 2.4	10
Co-60	0.6 ± 1.6	2.0 ± 1.7	0.2 ± 3.1	1.3 ± 3.0	10
Zn-65	-0.6 ± 3.2	1.8 ± 1.9	-3.9 ± 4.3	1.7 ± 4.5	30
Zr-Nb-95	0.2 ± 1.7	1.4 ± 1.7	0.6 ± 2.2	0.7 ± 2.8	15
Ru-103	-2.7 ± 1.9	-1.0 ± 1.8	0.2 ± 1.8	1.6 ± 2.4	15
Cs-134	0.5 ± 1.6	-0.1 ± 1.9	1.3 ± 2.2	4.9 ± 3.0	10
Cs-137	-0.1 ± 1.8	0.8 ± 1.7	-0.9 ± 2.8	-0.8 ± 3.4	10
Ba-La-140	1.5 ± 1.8	-2.1 ± 2.0	-1.1 ± 3.0	-3.2 ± 2.9	15

Lab Code	ELW-3252	ELW-3927	ELW-4779	ELW-5491	
Date Collected	5/15/2002	6/13/2002	7/11/2002	8/14/2002	Req. LLD
Gross beta	3.4 ± 0.6	4.2 ± 0.7	2.5 ± 0.5	6.8 ± 0.9	4.0
I-131	0.06 ± 0.19	0.04 ± 0.15	0.04 ± 0.26	-0.17 ± 0.20	0.5
Be-7	23.9 ± 24.2	-6.4 ± 17.7	16.5 ± 18.9	5.4 ± 23.7	
Mn-54	-0.6 ± 3.3	-1.8 ± 1.6	-2.6 ± 2.4	0.7 ± 2.6	10
Fe-59	4.1 ± 6.0	2.8 ± 3.3	1.9 ± 4.6	-4.2 ± 4.8	30
Co-58	-1.6 ± 2.7	-0.9 ± 1.7	-2.6 ± 2.2	-1.1 ± 2.5	10
Co-60	-0.1 ± 4.2	1.2 ± 1.7	-0.3 ± 2.4	-1.2 ± 3.8	10
Zn-65	0.3 ± 6.1	1.5 ± 4.0	0.7 ± 5.4	1.6 ± 7.3	30
Zr-Nb-95	1.4 ± 2.2	-1.5 ± 1.8	-3.9 ± 2.0	2.6 ± 3.1	15
Ru-103	-0.9 ± 2.5	0.1 ± 1.9	0.3 ± 2.1	-1.7 ± 2.6	15
Cs-134	-2.0 ± 3.2	-0 5 ± 2.0	1.3 ± 2.6	0.5 ± 3.7	10
Cs-137	-1.0 ± 3.3	-2.3 ± 2.2	1.7 ± 2.9	-2.7 ± 3.1	10
Ba-La-140	-1.9 ± 3.5	6.8 ± 1.9	5.1 ± 1.7	-4.4 ± 2.9	15

Lab Code	ELW-6092	ELW-7406	ELW-7830	ELW-8316	
Date Collected	9/15/2002	10/19/2002	11/13/2002	12/11/2002	Req. LLD
Gross beta	3.7 ± 0.6	2.8 ± 0.7	2.7 ± 0.7	3.3 ± 0.6	4.0
I-131	-0.03 ± 0.18	0.24 ± 0.25	0.07 ± 0.18	0 01 ± 0.16	0.5
Be-7	14.4 ± 19.8	14.3 ± 20.6	7.9 ± 28.1	10.5 ± 23.2	
Mn-54	-0.4 ± 2.1	-1.4 ± 2.2	0.3 ± 3.5	-0.1 ± 2.8	10
Fe-59	3.4 ± 3.6	0.2 ± 4.8	-1.1 ± 6.6	1.8 ± 5.6	30
Co-58	-0.7 ± 2.3	-1.0 ± 2.2	-1.6 ± 3.7	2.1 ± 2.9	10
Co-60	-1.9 ± 2.2	-0.4 ± 2.2	-0.9 ± 3.9	-0.9 ± 3.2	10
Zn-65	-5.5 ± 5.2	-0.1 ± 6.7	1.5 ± 6 6	-0.1 ± 6.8	30
Zr-Nb-95	-4.7 ± 2.7	-5.8 ± 3.0	-1.4 ± 3.1	-1.3 ± 2.9	15
Ru-103	-1.0 ± 2.2	0.7 ± 2.0	1.5 ± 3.2	-0.4 ± 2.2	15
Cs-134	-2.1 ± 2.2	1.2 ± 2.8	-2.4 ± 3.5	-0.3 ± 3.6	10
Cs-137	-1.3 ± 2.3	-0.4 ± 2.7	4.8 ± 3.3	-4.1 ± 3.3	10
Ba-La-140	3.1 ± 3.3	-4.6 ± 3.3	-7.6 ± 4.3	-3.4 ± 3.5	15

POINT BEACH

Lake water, analyses for tritium, strontium-89 and strontium-90.
Collection: Quarterly composites of weekly grab samples
Units: pCi/L

Location	E-01 (Meteorological Tower)			
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	ELW-1814	ELW-4197	ELW-6556	ELW-8733
H-3	1 ± 69	140 ± 73	-139 ± 83	129 ± 93
Sr-89	0.11 ± 0.69	-0.15 ± 0.70	0.56 ± 0.69	-0.97 ± 1.11
Sr-90	0.65 ± 0.34	0.69 ± 0 34	0.19 ± 0.29	0.62 ± 0.45

Location	E-05 (Two Creeks Park)			
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	ELW-1815	ELW-4198	ELW-6557	ELW-8734
H-3	62 ± 72	229 ± 78	-127 ± 84	321 ± 101
Sr-89	-0.31 ± 0.71	-0.21 ± 0.78	0.47 ± 0.69	0.24 ± 1.06
Sr-90	0.66 ± 0.35	0.87 ± 0.38	1.36 ± 2.70	0.56 ± 0.39

Location	E-06 (Coast Guard Station)			
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	ELW-1816	ELW-4199	ELW-6558	ELW-8735
H-3	-36 ± 67	215 ± 77	-60 ± 87	-6 ± 87
Sr-89	-0.61 ± 0.61	0.15 ± 0.73	0.65 ± 0.79	-0.50 ± 0.92
Sr-90	0.67 ± 0.31	0.58 ± 0.35	0.03 ± 0.27	0.65 ± 0.36

Location	E-33 (Nature Conservancy)			
Period	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Lab Code	ELW-1817	ELW-4200,01	ELW-6559	ELW-8736
H-3	-20 ± 68	65 ± 69	-71 ± 86	-28 ± 86
Sr-89	-0.52 ± 0.63	-0.33 ± 1.19	0.29 ± 0.65	-0.18 ± 0.86
Sr-90	0.82 ± 0.32	0.78 ± 0.58	0.22 ± 0.28	0.43 ± 0.34

Note: pages 23 and 24 are intentionally left out.

POINT BEACH NUCLEAR PLANT

Fish, analyses for gross beta and gamma emitting isotopes.
Location: E-13
Collection: 3x / year Units: pCi/g wet

	Sample Description and Concentration				Required LLD
Collection Date	02-12-02	01-30-02	08-15-02	08-15-02	
Lab Code	EF-1601	EF-1602	EF-5413,4	EF-5415	
Type	Freshwater Drum	Whitefish	Sucker	Rainbow Trout	
Ratio (wet/dry wt.)	1.62	1.33	4.25	3.84	
Gross Beta	6.17 ± 0.17	4.47 ± 0.11	2.46 ± 0.07	3.22 ± 0.09	0.5
K-40	3.09 ± 0.31	3.15 ± 0.40	1.60 ± 0.27	2.47 ± 0.24	
Mn-54	-0.003 ± 0.005	-0.007 ± 0.008	0.007 ± 0.008	0.005 ± 0.005	0.13
Fe-59	-0.004 ± 0.010	-0.005 ± 0.017	0.001 ± 0.015	-0.011 ± 0.010	0.26
Co-58	-0.002 ± 0.004	-0.010 ± 0.007	0.002 ± 0.007	0.007 ± 0.004	0.13
Co-60	-0.003 ± 0.005	0.003 ± 0.009	0.001 ± 0.009	0.004 ± 0.005	0.13
Zn-65	0.001 ± 0.013	0.011 ± 0.020	-0.006 ± 0.018	-0.023 ± 0.014	0.26
Ru-103	0.000 ± 0.005	0.010 ± 0.009	-0.007 ± 0.008	-0.006 ± 0.004	0.5
Cs-134	-0.006 ± 0.006	0.011 ± 0.009	-0.004 ± 0.009	-0.002 ± 0.005	0.13
Cs-137	0.224 ± 0.020	0.028 ± 0.015	0.008 ± 0.010	0.026 ± 0.009	0.15

Collection Date	08-15-02	12-10-02	12-10-02	
Lab Code	EF-5416	EF-8206	EF-8207	
Type	Salmon	Sucker	Whitefish	
Ratio (wet/dry wt.)	4.82	4.45	2.62	
Gross Beta	3.22 ± 0.10	2.12 ± 0.05	3.15 ± 0.13	0.5
K-40	1.95 ± 0.88	1.97 ± 0.32	2.68 ± 0.27	
Mn-54	-0.008 ± 0.025	-0.006 ± 0.006	-0.001 ± 0.005	0.13
Fe-59	-0.049 ± 0.047	0.001 ± 0.015	-0.016 ± 0.013	0.26
Co-58	-0.042 ± 0.025	-0.003 ± 0.006	0.001 ± 0.005	0.13
Co-60	0.020 ± 0.027	0.006 ± 0.010	0.002 ± 0.006	0.13
Zn-65	-0.044 ± 0.063	-0.003 ± 0.021	-0.013 ± 0.015	0.26
Ru-103	0.002 ± 0.020	-0.006 ± 0.007	0.004 ± 0.005	0.5
Cs-134	0.011 ± 0.023	-0 002 ± 0.008	0.003 ± 0.005	0.13
Cs-137	0.016 ± 0.027	0.020 ± 0.010	0.014 ± 0.006	0.15

NOTE: Pages 26 and 27 are intentionally left out.

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN SHORELINE SEDIMENT SAMPLES

(Semiannual Collections)

Sample Description and Concentration (pCi/g dry)				
Collection Date	04-10-02	04-10-02	04-10-02	Required
Lab Code	ESS-2198	ESS-2199	ESS-2200	LLD
Location	E-01	E-05	E-06	
Gross Beta	6.00 ± 1.14	9.29 ± 1.56	8.28 ± 1.34	2.0
Be-7	0.060 ± 0.071	0.084 ± 0.073	0.056 ± 0.072	
K-40	5.77 ± 0.52	8.05 ± 0.61	7.92 ± 0.57	-
Cs-137	0.040 ± 0.016	0.016 ± 0.011	0.025 ± 0.013	0.15
Tl-208	0.057 ± 0.017	0.054 ± 0.021	0.056 ± 0.020	-
Pb-212	0.10 ± 0.020	0.14 ± 0.021	0.14 ± 0.020	-
Bi-214	0.12 ± 0.044	0.13 ± 0.034	0.12 ± 0.031	-
Ra-226	0.40 ± 0.143	0.31 ± 0.150	0.37 ± 0.133	-
Ac-228	0.12 ± 0.065	0.15 ± 0.055	0.18 ± 0.068	-
Collection Date	04-10-02	04-09-02		
Lab Code	ESS-2201	ESS-2202,3		
Location	E-12	E-33		
Gross Beta	4.63 ± 1.00	5.67 ± 0.83		2.0
Be-7	0 088 ± 0.065	0 063 ± 0.068		
K-40	5.80 ± 0.50	5.93 ± 0.35		-
Cs-137	0.020 ± 0.011	0.023 ± 0.010		0.15
Tl-208	0.037 ± 0.018	0 052 ± 0.020		-
Pb-212	0.10 ± 0.019	0.12 ± 0.019		-
Bi-214	0.094 ± 0.031	0.074 ± 0.029		-
Ra-226	0.21 ± 0.122	0.24 ± 0.131		-
Ac-228	0.21 ± 0.083	0.12 ± 0.067		-

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN SHORELINE SEDIMENT SAMPLES

(Semiannual Collections)

Sample Description and Concentration (pCi/g dry)				
Collection Date	10-19-02	10-19-02	10-19-02	Required
Lab Code	ESS-7095	ESS-7096	ESS-7097	LLD
Location	E-01	E-05	E-06	
Gross Beta	9.43 ± 1.89	8.75 ± 1.84	9.30 ± 2.15	2.0
Be-7	0.028 ± 0.044	0.052 ± 0.043	0.031 ± 0.054	
K-40	10.14 ± 0.49	9.12 ± 0.35	7.47 ± 0.49	-
Cs-137	0.025 ± 0.014	-0.002 ± 0.006	0.028 ± 0.014	0.15
Tl-208	0.034 ± 0.012	0.044 ± 0.012	0.043 ± 0.014	-
Pb-212	0 13 ± 0.016	0.13 ± 0.014	0.12 ± 0.016	-
Bi-214	0.14 ± 0 027	0.31 ± 0.027	0.14 ± 0.024	-
Ra-226	0.23 ± 0.12	0.31 ± 0.12	0.33 ± 0.12	-
Ac-228	0.14 ± 0.058	0.16 ± 0.040	0.13 ± 0.058	-
Collection Date	10-19-02	10-19-02		
Lab Code	ESS-7098	ESS-7099		
Location	E-12	E-33		
Gross Beta	2.11 ± 1.33	12.80 ± 2.06		2.0
Be-7	0.038 ± 0.053	0.053 ± 0.046		
K-40	4.12 ± 0.34	9.45 ± 0.37		-
Cs-137	0.035 ± 0.013	0.029 ± 0.011		0.15
Tl-208	0.055 ± 0.018	0.053 ± 0.015		-
Pb-212	0.15 ± 0.017	0.14 ± 0.015		-
Bi-214	0.17 ± 0.033	0.24 ± 0.030		-
Ra-226	0.29 ± 0.14	0.46 ± 0.13		-
Ac-228	0.17 ± 0.047	0.16 ± 0.053		-

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN SOIL SAMPLES

(Semiannual Collections)

	Sample Description and Concentration (pCi/g dry)			
Collection Date	05-30-02	05-30-02	05-30-02	Required
Lab Code	ESO-3497	ESO-3498	ESO-3499	LLD
Location	E-01	E-02	E-03	
Gross Beta	20.13 ± 1.85	29.07 ± 2.15	16.91 ± 1.85	2.0
Be-7	0.01 ± 0.10	0.01 ± 0.11	-0.02 ± 0.07	
K-40	15.44 ± 0.90	18.65 ± 1.13	11.20 ± 0.77	-
Cs-137	0.20 ± 0.04	0.13 ± 0.04	0.03 ± 0.02	0.15
Tl-208	0.16 ± 0.04	0.21 ± 0.04	0.09 ± 0.02	-
Pb-212	0.50 ± 0.04	0.66 ± 0.05	0.26 ± 0.03	-
Bi-214	0.27 ± 0.05	0.41 ± 0.06	0.18 ± 0.05	-
Ra-226	1.14 ± 0.31	1.09 ± 0.36	0.63 ± 0.22	-
Ac-228	0.50 ± 0.11	0.63 ± 0.14	0.29 ± 0.08	-
Collection Date	05-30-02	05-29-02	05-29-02	
Lab Code	ESO-3500	ESO-3501	ESO-3502	
Location	E-04	E-06	E-08	
Gross Beta	21.24 ± 2.05	20.03 ± 1.85	19.13 ± 1.94	2.0
Be-7	0.02 ± 0.11	0.08 ± 0.08	-0.01 ± 0.10	
K-40	14.58 ± 0.90	14.75 ± 0.86	14.47 ± 0.86	-
Cs-137	0.27 ± 0.05	0.09 ± 0.03	0.29 ± 0.04	0.15
Tl-208	0.13 ± 0.03	0.14 ± 0.03	0.09 ± 0.03	-
Pb-212	0.44 ± 0.04	0.42 ± 0.04	0.25 ± 0.03	-
Bi-214	0.27 ± 0.05	0.27 ± 0.06	0.21 ± 0.04	-
Ra-226	0.63 ± 0.28	0.72 ± 0.27	0.74 ± 0.27	-
Ac-228	0.45 ± 0.11	0.49 ± 0.10	0.25 ± 0.10	-
Collection Date	05-29-02	05-29-02		
Lab Code	ESO-3503,4	ESO-3505		
Location	E-09	E-20		
Gross Beta	26.58 ± 1.52	18.34 ± 1.81		2.0
Be-7	0.02 ± 0.14	0.05 ± 0.11		
K-40	20.39 ± 0.86	14.25 ± 0.89		-
Cs-137	0.18 ± 0.03	0.22 ± 0.04		0.15
Tl-208	0.20 ± 0.03	0.10 ± 0.03		-
Pb-212	0.49 ± 0.03	0 32 ± 0.04		-
Bi-214	0.37 ± 0.04	0.27 ± 0.05		-
Ra-226	0.89 ± 0.25	0.79 ± 0.27		-
Ac-228	0.55 ± 0.08	0.41 ± 0.11		-

POINT BEACH NUCLEAR PLANT

RADIOACTIVITY IN SOIL SAMPLES

(Semiannual Collections)

Sample Description and Concentration (pCi/g dry)				
Collection Date Lab Code	10-29-02 ESO-7407,8	10-29-02 ESO-7409	10-29-02 ESO-7410	Required LLD
Location	E-01	E-02	E-03	
Gross Beta	16.68 ± 1.59	26.71 ± 2.74	23.83 ± 2.62	2.0
Be-7	0.031 ± 0.08	0.14 ± 0.12	0.055 ± 0.14	
K-40	12.16 ± 0.51	21.77 ± 1.10	17.12 ± 1.14	-
Cs-137	0.15 ± 0.02	0.18 ± 0.04	0.03 ± 0.02	0.15
Tl-208	0.15 ± 0.02	0.24 ± 0.04	0.20 ± 0.05	-
Pb-212	0.34 ± 0.02	0.58 ± 0.05	0.58 ± 0.05	-
Bi-214	0 27 ± 0.04	0.44 ± 0.06	0.49 ± 0.10	-
Ra-226	0.65 ± 0.19	1.14 ± 0.32	0.88 ± 0 34	-
Ac-228	0.40 ± 0.06	0.66 ± 0.11	0.49 ± 0.12	-
Collection Date Lab Code	10-29-02 ESO-7411	10-29-02 ESO-7412	10-29-02 ESO-7413	
Location	E-04	E-06	E-08	
Gross Beta	24.23 ± 2.59	13.08 ± 2.08	19.99 ± 2.34	2.0
Be-7	0.12 ± 0.13	-0.019 ± 0.12	0.084 ± 0.06	
K-40	16.65 ± 1.20	11.52 ± 0.83	12.45 ± 0.61	-
Cs-137	0.22 ± 0.03	0.07 ± 0.02	0.29 ± 0.03	0.15
Tl-208	0.17 ± 0.04	0.08 ± 0.03	0.08 ± 0.02	-
Pb-212	0.54 ± 0.05	0.28 ± 0.04	0.25 ± 0.03	-
Bi-214	0.48 ± 0.08	2.22 ± 0.12	0.19 ± 0.04	-
Ra-226	0.79 ± 0.35	0.27 ± 0.25	0 45 ± 0.21	-
Ac-228	0.63 ± 0.18	0.36 ± 0.17	0.23 ± 0.05	-
Collection Date Lab Code	10-29-02 ESO-7414	10-29-02 ESO-7415		
Location	E-09	E-20		
Gross Beta	28.60 ± 2.84	26.10 ± 2.93		2.0
Be-7	0.065 ± 0.09	0.17 ± 0.10		
K-40	17.64 ± 0.80	19.28 ± 0.91		-
Cs-137	0 12 ± 0.03	0.31 ± 0.04		0.15
Tl-208	0.19 ± 0.04	0.19 ± 0.04		-
Pb-212	0.61 ± 0.10	0.61 ± 0.05		-
Bi-214	0.35 ± 0.05	0.36 ± 0.06		-
Ra-226	0.96 ± 0.29	1.03 ± 0.33		-
Ac-228	0.60 ± 0.10	0.61 ± 0.09		-

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	
Collection Date	05-30-02	05-30-02	05-30-02	
Lab Code	EG-3489	EG-3490	EG-3491	Req. LLD
Ratio (wet/dry)	5.03	6.13	4.06	-
Gross Beta	4.70 ± 0.11	4.81 ± 0.11	6.27 ± 0.14	0.25
Be-7	0.61 ± 0.20	0.79 ± 0.18	0.62 ± 0.23	0.25
K-40	4.88 ± 0.63	5.02 ± 0.48	5.76 ± 0.69	0.25
I-131	-0.007 ± 0.007	0.003 ± 0.008	0.001 ± 0.013	0.060
Cs-134	0.005 ± 0.014	-0.004 ± 0.009	-0.002 ± 0.017	0.060
Cs-137	-0.003 ± 0.014	0.004 ± 0.009	0.010 ± 0.015	0.080
Other Gammas[a]	-0.017 ± 0.019	-0.004 ± 0.009	0.015 ± 0.019	0.060

Location	E-04	E-06	E-08	
Collection Date	05-30-02	05-29-02	05-29-02	
Lab Code	EG-3492	EG-3493	EG-3494	Req. LLD
Ratio (wet/dry)	4.49	3.10	3.41	-
Gross Beta	5.10 ± 0.12	5.08 ± 0.12	6.00 ± 0.13	0.25
Be-7	0.46 ± 0.15	0.12 ± 0.10	0.58 ± 0.25	0.25
K-40	4.97 ± 0.55	5.31 ± 0.62	5.51 ± 0.53	0.25
I-131	-0.010 ± 0.009	0.006 ± 0.010	-0 010 ± 0.009	0.060
Cs-134	0.006 ± 0.012	0.005 ± 0.014	-0.002 ± 0.011	0.060
Cs-137	0.005 ± 0.010	-0.002 ± 0.012	0.006 ± 0.011	0.080
Other Gammas[a]	0.003 ± 0.012	-0.008 ± 0.015	-0.004 ± 0.012	0.060

Location	E-09	E-20		
Collection Date	05-29-02	05-29-02		
Lab Code	EG-3495	EG-3496		Req LLD
Ratio (wet/dry)	5.36	5.39		-
Gross Beta	5.75 ± 0.13	5.44 ± 0.11		0.25
Be-7	0.31 ± 0.15	0.53 ± 0.18		0.25
K-40	5.61 ± 0.64	5.04 ± 0.62		0.25
I-131	0 000 ± 0.009	-0.004 ± 0.009		0.060
Cs-134	0.004 ± 0.012	0.000 ± 0.012		0.060
Cs-137	0.010 ± 0.013	0.001 ± 0.011		0.080
Other Gammas[a]	-0.014 ± 0.016	-0.004 ± 0.014		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	
Collection Date	07-30-02	07-31-02	07-30-02	
Lab Code	EG-5073	EG-5074	EG-5075,6	Req. LLD
Ratio (wet/dry)	2.47	3.14	2.42	-
Gross Beta	5.94 ± 0.07	5.92 ± 0.07	7.05 ± 0.05	0.25
Be-7	1.39 ± 0.30	2.18 ± 0.27	1.47 ± 0.22	0.25
K-40	4.51 ± 0.60	5.92 ± 0.46	5.36 ± 0.45	0.25
I-131	-0.019 ± 0.012	-0.012 ± 0.011	-0.002 ± 0.007	0.060
Cs-134	-0.002 ± 0.014	0.007 ± 0.010	-0.007 ± 0.008	0.060
Cs-137	0.009 ± 0.013	0.013 ± 0.010	-0.004 ± 0.009	0.080
Other Gammas[a]	-0.009 ± 0.012	0.006 ± 0.009	-0.004 ± 0.009	0.060
Location	E-04	E-06	E-08	
Collection Date	07-30-02	07-31-02	07-30-02	
Lab Code	EG-5077	EG-5078	EG-5079	Req. LLD
Ratio (wet/dry)	2.64	3.89	2.05	-
Gross Beta	5.37 ± 0.07	5.14 ± 0.12	5.67 ± 0.14	0.25
Be-7	2.04 ± 0.36	1.30 ± 0.28	2.05 ± 0.40	0.25
K-40	4.92 ± 0.60	4.47 ± 0.56	5.43 ± 0.83	0.25
I-131	-0.002 ± 0.011	-0.007 ± 0.013	0.002 ± 0.013	0.060
Cs-134	-0.013 ± 0.014	-0.003 ± 0.017	0.015 ± 0.018	0.060
Cs-137	0.020 ± 0.014	0.001 ± 0.015	0.002 ± 0.019	0.080
Other Gammas[a]	0.002 ± 0.011	0.005 ± 0.015	0.021 ± 0.023	0.060
Location	E-09	E-20		
Collection Date	07-30-02	07-30-02		
Lab Code	EG-5080	EG-5081		Req. LLD
Ratio (wet/dry)	2.32	3.05		-
Gross Beta	6 57 ± 0.17	7.94 ± 0.18		0.25
Be-7	1.51 ± 0.22	0.61 ± 0.14		0.25
K-40	5.75 ± 0.47	7.67 ± 0.49		0.25
I-131	0.001 ± 0.008	0.002 ± 0.007		0.060
Cs-134	0.007 ± 0.009	0 009 ± 0.009		0.060
Cs-137	0.003 ± 0.010	-0.007 ± 0.009		0.080
Other Gammas[a]	0.016 ± 0.012	-0.006 ± 0.009		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	
Collection Date	10-23-02	10-23-02	10-23-02	
Lab Code	EG-7245	EG-7246	EG-7247	Req. LLD
Ratio (wet/dry)	4.48	4.57	3.53	-
Gross Beta	4.38 ± 0.15	5 67 ± 0.17	5.85 ± 0.18	0.25
Be-7	3.12 ± 0.33	2.13 ± 0.33	2.18 ± 0.39	0.25
K-40	5.64 ± 0 59	5.33 ± 0.72	5.38 ± 0.78	0.25
I-131	-0.005 ± 0.010	0.011 ± 0.010	-0.007 ± 0.012	0.060
Cs-134	0.005 ± 0.013	-0.006 ± 0.013	-0.012 ± 0.016	0.060
Cs-137	-0.006 ± 0.013	0.002 ± 0.012	-0.008 ± 0.017	0.080
Other Gammas[a]	0.001 ± 0.012	0.002 ± 0.015	0.008 ± 0.014	0.060
Location	E-04	E-06	E-08	
Collection Date	10-23-02	10-24-02	10-24-02	
Lab Code	EG-7248	EG-7249	EG-7250	Req LLD
Ratio (wet/dry)	4.67	3.96	3.55	-
Gross Beta	5.71 ± 0.17	3.42 ± 0.14	4.79 ± 0.16	0.25
Be-7	2.04 ± 0.26	2.25 ± 0.42	1.69 ± 0.34	0.25
K-40	6.25 ± 0.59	3.54 ± 0.82	5.11 ± 0.73	0.25
I-131	0.005 ± 0.008	-0 017 ± 0.016	0.008 ± 0.012	0.060
Cs-134	0.001 ± 0.010	-0.013 ± 0.020	-0.005 ± 0.017	0.060
Cs-137	0.004 ± 0.008	0.013 ± 0.026	0.014 ± 0.016	0.080
Other Gammas[a]	0.011 ± 0.010	0.030 ± 0.018	0.005 ± 0.016	0.060
Location	E-09	E-20		
Collection Date	10-23-02	10-24-02		
Lab Code	EG-7251	EG-7252		Req. LLD
Ratio (wet/dry)	3.36	3.58		-
Gross Beta	6.14 ± 0.22	6.64 ± 0.25		0.25
Be-7	2.66 ± 0.39	2.31 ± 0.46		0.25
K-40	5.14 ± 0.59	4.21 ± 0.77		0.25
I-131	-0.021 ± 0.015	-0.013 ± 0.015		0 060
Cs-134	-0.005 ± 0.015	0 021 ± 0.017		0.060
Cs-137	0.002 ± 0.013	0.010 ± 0.017		0.080
Other Gammas[a]	-0.007 ± 0.013	-0.015 ± 0.021		0.060

[a] See Introduction.

POINT BEACH NUCLEAR PLANT

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

Collection: Semiannual Units: pCi/g wet

Sample Description and Concentration			
Collection Date	06-05-02	06-05-02	Required
Lab Code	ESL-3596	ESL-3597	LLD
Location	E-05	E-12	
Ratio (wet wt./dry wt.)	5.09	4.29	
Gross Beta	1.55 ± 0.18	2.96 ± 0.34	0.25
Be-7	0.67 ± 0.15	0.71 ± 0.24	-
K-40	0 64 ± 0.30	1.56 ± 0.37	-
Co-58	-0.008 ± 0.009	-0.022 ± 0.011	0.25
Co-60	-0.007 ± 0.010	0.015 ± 0.012	0.25
Cs-134	0.005 ± 0.010	-0.003 ± 0.013	0.25
Cs-137	0.014 ± 0.010	0.020 ± 0.013	0.25
Collection Date	08-07-02	08-07-02	Required
Lab Code	ESL-5218	ESL-5219	LLD
Location	E-05	E-12	
Ratio (wet wt./dry wt.)	5.98	3.83	
Gross Beta	3.25 ± 0.17	4.25 ± 0.28	0.25
Be-7	0.85 ± 0.19	0.44 ± 0.23	-
K-40	2.38 ± 0.38	2.11 ± 0.38	-
Co-58	0.002 ± 0.009	0.004 ± 0.010	0.25
Co-60	0.007 ± 0.010	0.010 ± 0.012	0.25
Cs-134	0.001 ± 0.009	0.003 ± 0.012	0.25
Cs-137	0.019 ± 0.011	0.023 ± 0.013	0.25
Collection Date	10-11-02	10-11-02	
Lab Code	ESL-7005	ESL-7006	
Location	E-05	E-12	
Ratio (wet wt./dry wt.)	3.10	3.55	
Gross Beta	5.10 ± 0.42	3.59 ± 0.31	
Be-7	0 41 ± 0.15	0.64 ± 0.16	
K-40	1.85 ± 0 24	1.23 ± 0.22	
Co-58	0 011 ± 0.006	0.042 ± 0.017	
Co-60	0.001 ± 0.007	0.010 ± 0.008	
Cs-134	0.003 ± 0.007	0.007 ± 0.008	
Cs-137	0.017 ± 0.008	0.020 ± 0.007	

POINT BEACH NUCLEAR PLANT

AMBIENT GAMMA RADIATION (TLD)

1st Quarter, 2002

	Date Annealed:	12-26-01	Days in the field	88
	Date Placed.	01-09-02	Days from Annealing	
	Date Removed:	04-07-02	to Readout:	112
	Date Read:	04-17-02		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	88	19.9 ± 0.1	14.0 ± 0.3	1.12 ± 0.02
E-2	88	22.4 ± 0.3	16.5 ± 0 4	1.32 ± 0.03
E-3	88	24.1 ± 0.2	18.2 ± 0 4	1 45 ± 0.03
E-4	88	20.0 ± 0.2	14.1 ± 0.4	1.12 ± 0.03
E-5	88	22.2 ± 0.6	16.3 ± 0.7	1.30 ± 0.05
E-6	88	21.2 ± 0.2	15.3 ± 0.4	1.22 ± 0.03
E-7	88	19.5 ± 0.3	13.6 ± 0.4	1 08 ± 0.03
E-8	88	19.4 ± 0.2	13.5 ± 0.4	1.08 ± 0.03
E-9	88	23.6 ± 0.1	17.7 ± 0.3	1.41 ± 0.02
E-12	88	17.8 ± 0.4	11.9 ± 0.5	0.95 ± 0.04
E-14	88	20.8 ± 0.2	14.9 ± 0.4	1.19 ± 0.03
E-15	88	22.6 ± 0.5	16.7 ± 0 6	1.33 ± 0.05
E-16	88	19.9 ± 0.2	14 0 ± 0 4	1.12 ± 0.03
E-17	88	21.7 ± 0.2	15.8 ± 0.4	1.26 ± 0.03
E-18	88	22.5 ± 0.5	16.6 ± 0.6	1.32 ± 0.05
E-22	88	22.0 ± 0.5	16.1 ± 0.6	1.28 ± 0.05
E-23	88	22.3 ± 0.5	16.4 ± 0.6	1.31 ± 0.05
E-24	88	21.1 ± 0.3	15.2 ± 0 4	1.21 ± 0.03
E-25	88	20.5 ± 0.2	14.6 ± 0.4	1.16 ± 0.03
E-26	88	19.3 ± 0.1	13.4 ± 0.3	1.07 ± 0 02
E-27	88	20 4 ± 0.1	14.5 ± 0 3	1.16 ± 0.02
E-28	88	18 0 ± 0.3	12.1 ± 0 4	0.97 ± 0 03
E-29	88	21.7 ± 0.3	15.8 ± 0.4	1.26 ± 0 03
E-30	88	19 8 ± 0.2	13.9 ± 0.4	1.11 ± 0.03
E-31	88	21.9 ± 0.3	16.0 ± 0.4	1.28 ± 0.03
E-32	88	21.1 ± 0.3	15.2 ± 0.4	1.21 ± 0.03
E-38	88	27.1 ± 0.5	21.2 ± 0.6	1.69 ± 0.05
E-39	88	18.1 ± 0.1	12.2 ± 0.3	0.97 ± 0 02
Control				
E-20	88	19.5 ± 0.3	13.6 ± 0.4	1.08 ± 0 03
Mean±s.d.		21.0 ± 2.0	15.2 ± 2.0	1.21 ± 0 16

In-Transit Exposure

Date Annealed	12-26-01	03-28-02
Date Read	01-14-02	04-17-02
	Total mR	
ITC-1	5.7 ± 0.2	6.0 ± 0 1
ITC-2	5 8 ± 0.1	5.9 ± 0.1

POINT BEACH NUCLEAR PLANT

AMBIENT GAMMA RADIATION (TLD)
2nd Quarter, 2002

	Date Annealed:	03-28-02	Days in the field	80
	Date Placed:	04-07-02	Days from Annealing	
	Date Removed:	06-26-02	to Readout:	102
	Date Read:	07-08-02		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	80	15.7 ± 1.6	10.2 ± 1.6	0.89 ± 0.14
E-2	80	19.7 ± 1.3	14.2 ± 1.3	1.24 ± 0.12
E-3	80	20.4 ± 1.7	14.9 ± 1.7	1.30 ± 0.15
E-4	80	16.4 ± 0.4	10.9 ± 0.5	0.95 ± 0.04
E-5	80	18.4 ± 0.8	12.9 ± 0.9	1.13 ± 0.07
E-6	80	15.5 ± 0.4	10.0 ± 0.5	0.88 ± 0.04
E-7	80	14.9 ± 0.6	9.4 ± 0.7	0.82 ± 0.06
E-8	80	15.9 ± 0.9	10.4 ± 0.9	0.91 ± 0.08
E-9	80	17.9 ± 1.3	12.4 ± 1.3	1.09 ± 0.12
E-12	80	13.4 ± 1.1	7.9 ± 1.1	0.69 ± 0.10
E-14	80	16.8 ± 1.0	11.3 ± 1.0	0.99 ± 0.09
E-15	80	20.5 ± 0.4	15.0 ± 0.5	1.31 ± 0.04
E-16	80	15.6 ± 0.4	10.1 ± 0.5	0.88 ± 0.04
E-17	80	16.0 ± 0.8	10.5 ± 0.9	0.92 ± 0.07
E-18	80	18.1 ± 0.8	12.6 ± 0.9	1.10 ± 0.07
E-22	80	17.6 ± 0.5	12.1 ± 0.6	1.06 ± 0.05
E-23	80	18.1 ± 0.2	12.6 ± 0.4	1.10 ± 0.03
E-24	80	17.0 ± 0.4	11.5 ± 0.5	1.01 ± 0.04
E-25	80	18.0 ± 0.4	12.5 ± 0.5	1.09 ± 0.04
E-26	80	14.7 ± 0.4	9.2 ± 0.5	0.81 ± 0.04
E-27	80	17.2 ± 1.0	11.7 ± 1.0	1.02 ± 0.09
E-28	80	14.0 ± 0.3	8.5 ± 0.4	0.74 ± 0.04
E-29	80	17.1 ± 0.5	11.6 ± 0.6	1.02 ± 0.05
E-30	80	16.2 ± 0.3	10.7 ± 0.4	0.94 ± 0.04
E-31	80	17.6 ± 1.7	12.1 ± 1.7	1.06 ± 0.15
E-32	80	17.6 ± 0.8	12.1 ± 0.9	1.06 ± 0 07
E-38	80	22.1 ± 0.7	16.6 ± 0.8	1.45 ± 0.07
E-39	80	15.4 ± 0 5	9.9 ± 0.6	0.87 ± 0.05
Control				
E-20	80	18.7 ± 1.7	13.2 ± 1.7	1.16 ± 0.15
Mean±s.d.		17.1 ± 2.0	11.6 ± 2.0	1.02 ± 0.17

In-Transit Exposure

Date Annealed	03-28-02	06-05-02
Date Read	04-17-02	07-08-02
	Total mR	
ITC-1	6.0 ± 0.1	4.8 ± 0.4
ITC-2	5.9 ± 0.1	5.2 ± 0.5

POINT BEACH NUCLEAR PLANT

AMBIENT GAMMA RADIATION (TLD)
3rd Quarter, 2002

Date Annealed:	06-05-02	Days in the field	92
Date Placed:	06-26-02	Days from Annealing	
Date Removed:	09-26-02	to Readout:	119
Date Read:	10-02-02		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	92	19.0 ± 1.4	15.7 ± 1.5	1.19 ± 0.12
E-2	92	21.3 ± 1.0	18.0 ± 1.2	1 37 ± 0.09
E-3	92	24.3 ± 1.7	21.0 ± 1.8	1.60 ± 0.14
E-4	92	19.1 ± 1.4	15.8 ± 1.5	1.20 ± 0.12
E-5	92	22.5 ± 1.1	19.2 ± 1.3	1 46 ± 0.10
E-6	92	18 4 ± 1.2	15.1 ± 1.4	1.15 ± 0.10
E-7	92	21.3 ± 0.5	18.0 ± 0.8	1.37 ± 0.06
E-8	92	19.9 ± 1.6	16.6 ± 1.7	1.26 ± 0.13
E-9	92	23.9 ± 1.7	20.6 ± 1.8	1.57 ± 0.14
E-12	92	16.5 ± 0.2	13.2 ± 0.7	1.00 ± 0.05
E-14	92	21.7 ± 0.7	18.4 ± 1.0	1.40 ± 0.07
E-15	92	23.2 ± 0.8	19.9 ± 1.0	1.51 ± 0.08
E-16	92	20.6 ± 0.5	17.3 ± 0.8	1.32 ± 0.06
E-17	92	20.7 ± 0.7	17.4 ± 1.0	1.32 ± 0 07
E-18	92	22.5 ± 1.1	19.2 ± 1.3	1 46 ± 0 10
E-22	92	21.5 ± 1.7	18.2 ± 1.8	1.38 ± 0.14
E-23	92	21.4 ± 0.6	18.1 ± 0.9	1.38 ± 0.07
E-24	92	20.2 ± 1.1	16.9 ± 1.3	1 29 ± 0.10
E-25	92	19.0 ± 0.1	15.7 ± 0.7	1.19 ± 0.05
E-26	92	17.5 ± 0.2	14.2 ± 0.7	1.08 ± 0.05
E-27	92	19.5 ± 0.2	16 2 ± 0.7	1.23 ± 0.05
E-28	95	17.1 ± 0.4	13.8 ± 0.8	1.02 ± 0.06
E-29	92	21.7 ± 1.0	18.4 ± 1.2	1.40 ± 0.09
E-30	92	20.0 ± 1.2	16.7 ± 1.4	1.27 ± 0.10
E-31	92	22.5 ± 1.0	19.2 ± 1.2	1 46 ± 0.09
E-32	92	20.9 ± 0.5	17.6 ± 0.8	1.34 ± 0.06
E-38	92	29 9 ± 2.0	26.6 ± 2 1	2.02 ± 0.16
E-39	92	18.7 ± 0.6	15.4 ± 0.9	1.17 ± 0.07
Control				
E-20	92	20.1 ± 0.2	16 8 ± 0.7	1.28 ± 0.05
Mean±s d.		20.9 ± 2.6	17.6 ± 2.6	1 33 ± 0 20

In-Transit Exposure

Date Annealed	06-05-02	09-20-02
Date Read	07-08-02	10-02-02
	Total mR	
ITC-1	4.8 ± 0.4	1.7 ± 0.1
ITC-2	5.2 ± 0.5	1.5 ± 0.1

POINT BEACH NUCLEAR PLANT

AMBIENT GAMMA RADIATION (TLD)
4th Quarter, 2002

	Date Annealed:	09-20-02	Days in the field	91
	Date Placed:	09-26-02	Days from Annealing	
	Date Removed:	12-26-02	to Readout:	112
	Date Read:	01-10-03		

Location	Days in Field	Total mR	Net mR	Net mR per 7 days
Indicator				
E-1	91	14.7 ± 0.7	12.4 ± 0.7	0.95 ± 0.06
E-2	91	19.7 ± 1.3	17.4 ± 1.3	1.34 ± 0.10
E-3	91	21.0 ± 1.8	18.7 ± 1.8	1.44 ± 0.14
E-4	91	16.8 ± 0.6	14.5 ± 0.6	1.11 ± 0.05
E-5	91	18.9 ± 0.6	16.6 ± 0.6	1.28 ± 0.05
E-6	91	15.4 ± 0.6	13.1 ± 0.6	1.01 ± 0.05
E-7	91	14.8 ± 0.6	12.5 ± 0.6	0.96 ± 0.05
E-8	91	15.9 ± 0.8	13.6 ± 0.8	1.04 ± 0.06
E-9	91	19.1 ± 1.3	16.8 ± 1.3	1.29 ± 0.10
E-12	91	13.3 ± 0.9	11.0 ± 0.9	0.84 ± 0.07
E-14	91	17.6 ± 1.1	15.3 ± 1.1	1.18 ± 0.09
E-15	91	21.1 ± 1.4	18.8 ± 1.4	1.44 ± 0.11
E-16	91	16.1 ± 0.3	13.8 ± 0.4	1.06 ± 0.03
E-17	91	16.9 ± 1.4	14.6 ± 1.4	1.12 ± 0.11
E-18	91	18 2 ± 0.2	15.9 ± 0.3	1.22 ± 0.02
E-22	91	18.1 ± 0.5	15.8 ± 0.5	1.21 ± 0.04
E-23	91	18.9 ± 0.2	16.6 ± 0.3	1.28 ± 0.02
E-24	91	17.6 ± 0.4	15.3 ± 0.4	1.18 ± 0.03
E-25	91	19.5 ± 0.8	17.2 ± 0.8	1.32 ± 0.06
E-26	91	14.9 ± 0.5	12.6 ± 0.5	0.97 ± 0.04
E-27	91	16.8 ± 0.5	14.5 ± 0.5	1.11 ± 0.04
E-28	91	14.4 ± 0.2	12.1 ± 0.3	0.93 ± 0.02
E-29	91	15.3 ± 0.6	13.0 ± 0.6	1.00 ± 0.05
E-30	91	16.3 ± 0.3	14.0 ± 0.4	1.08 ± 0.03
E-31	91	18.5 ± 1.2	16.2 ± 1.2	1.24 ± 0.09
E-32	91	17.7 ± 0.8	15.4 ± 0.8	1.18 ± 0.06
E-38	91	16.5 ± 0.7	14.2 ± 0.7	1.09 ± 0.06
E-39	91	15.3 ± 0.3	13.0 ± 0.4	1.00 ± 0.03
Control				
E-20	91	16.0 ± 0.9	13.7 ± 0.9	1.05 ± 0.07
Mean±s.d.		17.1 ± 2.0	14.8 ± 2.0	1.13 ± 0.15

In-Transit Exposure

Date Annealed	09-20-02	12-17-02
Date Read	10-02-02	10-10-03
	Total mR	
ITC-1	1.7 ± 0.1	3.2 ± 0.1
ITC-2	1.5 ± 0.1	2.9 ± 0 1

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APPENDIX A

INTERLABORATORY COMPARISON PROGRAM RESULTS

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

January, 2002 through December, 2002

Appendix A

Interlaboratory Comparison Program Results

Environmental, Inc., Midwest Laboratory, formerly Teledyne Brown Engineering Environmental Services Midwest Laboratory has participated in interlaboratory comparison (crosscheck) programs since the formulation of it's quality control program in December 1971. These programs are operated by agencies which supply environmental type samples (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 a laboratory's analytical procedures and to alert it of any possible problems.

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

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

The results in Table A-2 were obtained for Thermoluminescent Dosimeters (TLDs), via International Intercomparison of Environmental Dosimeters under the sponsorships listed in Table A-2. Results of internal laboratory testing is also 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. 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.

Attachment A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

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

Analysis	Level	One standard deviation for single determination
Gamma Emitters	5 to 100 pCi/liter or kg > 100 pCi/liter or kg	5.0 pCi/liter 5% of known value
Strontium-89[b]	5 to 50 pCi/liter or kg > 50 pCi/liter or kg	5.0 pCi/liter 10% of known value
Strontium-90[b]	2 to 30 pCi/liter or kg > 30 pCi/liter or kg	5.0 pCi/liter 10% of known value
Potassium-40	> 0.1 g/liter or kg	5% of known value
Gross alpha	20 pCi/liter > 20 pCi/liter	5.0 pCi/liter 25% of known value
Gross beta	100 pCi/liter > 100 pCi/liter	5.0 pCi/liter 5% of known value
Tritium	4,000 pCi/liter > 4,000 pCi/liter	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 Intercompanson Studies Program, Fiscal Year, 1981-1982, EPA-600/4-81-004.

[b] Laboratory limit.

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

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result[b]	ERA Result[c]	Control Limits
STW-940	02/20/02	Sr-89	53.0 ± 2.5	55.3 ± 5.0	46.6 - 64.0
STW-940	02/20/02	Sr-90	16.6 ± 0.5	15.9 ± 5 0	7.2 - 24.6
STW-942	02/20/02	Gr. Alpha	6.5 ± 0.6	8.0 ± 5.0	0.0 - 16.7
STW-942	02/20/02	Gr. Beta	45.7 ± 3.1	48.3 ± 5.0	39.6 - 57.0
STW-944	02/20/02	Ba-133	25 8 ± 1.5	28.9 ± 5 0	20.2 - 37.6
STW-944	02/20/02	Co-60	76.9 ± 2.7	73.4 ± 5.0	64.7 - 82.1
STW-944	02/20/02	Cs-134	38.7 ± 1.6	42.1 ± 5.0	33.4 - 50.8
STW-944	02/20/02	Cs-137	92.9 ± 2.7	88.8 ± 5.0	80.1 - 97.5
STW-944	02/20/02	Ra-226	15.3 ± 0.7	14.3 ± 2.2	10.6 - 18.0
STW-944	02/20/02	Ra-228	17.5 ± 0.4	16.9 ± 4.2	9.6 - 24.2
STW-944	02/20/02	Uranium	23.8 ± 1.1	28.3 ± 3.0	23.1 - 33.5
STW-944	02/20/02	Zn-65	361.0 ± 9.2	359.0 ± 35.9	298.0 - 420.0
STW-951	05/22/02	Gr. Alpha	23.9 ± 2.5	22.8 ± 5.7	13.0 - 32.6
STW-951	05/22/02	Ra-226	5.9 ± 0.5	6.1 ± 0.9	4.5 - 7.7
STW-951	05/22/02	Ra-228	5.6 ± 0.9	4.5 ± 1.1	2.6 - 6.5
STW-951	05/22/02	Uranium	7.6 ± 0.2	9.3 ± 3.0	4.1 - 14.5
STW-952	05/22/02	Co-60	37.9 ± 0.7	39.1 ± 5.0	30.4 - 47.8
STW-952	05/22/02	Cs-134	14.5 ± 0.8	17.1 ± 5 0	8.4 - 25.8
STW-952	05/22/02	Cs-137	50 0 ± 2.0	52.1 ± 5 0	43.4 - 60.8
STW-952	05/22/02	Gr. Beta	171.0 ± 2.5	189.0 ± 28.4	140.0 - 238.0
STW-952	05/22/02	Sr-89	28.4 ± 4.8	31.7 ± 5.0	23.0 - 40.4
STW-952	05/22/02	Sr-90	32.4 ± 3.1	28.3 ± 5.0	19.6 - 37.0
STW-953[d]	05/22/02	H-3	13900.0 ± 100.0	17400.0 ± 1740.0	14400.0 - 20400.0
STW-954	05/22/02	I-131	14.6 ± 0.3	14.7 ± 2.0	11.2 - 18.2
STW-965	08/21/02	Ba-133	71.9 ± 2.1	80 0 ± 8.0	66.4 - 93.6
STW-965	08/21/02	Co-60	23.8 ± 1.0	23.3 ± 5.0	14.6 - 32.0
STW-965	08/21/02	Cs-134[e]	62.9 ± 1.2	71.7 ± 5 0	63.0 - 80.4
STW-965	08/21/02	Cs-137	219.3 ± 10.7	214.0 ± 10.7	195.0 - 233.0
STW-965	08/21/02	Gr. Alpha	74.4 ± 0.6	58.8 ± 14.7	33.5 - 84.1
STW-965	08/21/02	Gr. Beta	26.7 ± 0.4	21.9 ± 2.2	13.2 - 30.6
STW-965	08/21/02	Ra-226	5.0 ± 0.5	5.0 ± 0.8	3.7 - 6.3
STW-965	08/21/02	Ra-228	6.0 ± 0.7	4.7 ± 1.2	2.7 - 6.7
STW-965	08/21/02	Sr-89	28.4 ± 1.5	29 0 ± 5.0	20.3 - 37.7
STW-965	08/21/02	Sr-90	36.5 ± 1.1	36.4 ± 5.0	27.7 - 45.1
STW-965	08/21/02	Uranium	4.1 ± 0.1	5.0 ± 3.0	0.0 - 10.2
STW-965	08/21/02	Zn-65	92.4 ± 2.2	95.7 ± 9.6	79.4 - 112.0
STW-966	11/20/02	Gr. Alpha	9.3 ± 0.4	12.2 ± 5.0	3.5 - 20.9
STW-966	11/20/02	Gr. Beta	44.7 ± 1.0	47.0 ± 5.0	38.3 - 55.7
STW-967	11/20/02	H-3	10100.0 ± 38.7	10200.0 ± 1020.0	8440.0 - 12000.0
STW-968	11/20/02	Ra-226	11.6 ± 0.1	12.1 ± 1.8	9.0 - 15 2
STW-968	11/20/02	Ra-228	16.0 ± 1.4	15.1 ± 3.8	8.6 - 21.6
STW-968	11/20/02	Uranium	15.5 ± 0.5	19.2 ± 3.0	14.0 - 24.4
STW-969	11/20/02	I-131	6.0 ± 0.4	6.8 ± 2.0	3.3 - 10.2

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

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result[b]	ERA Result[c]	Control Limits
STW-970	11/20/02	Co-60	104.0 ± 7.1	104.0 ± 5.2	95.0 - 113.0
STW-970	11/20/02	Cs-134	48.2 ± 2.3	55.5 ± 5.0	46.8 - 64.2
STW-970	11/20/02	Cs-137	109.0 ± 12.6	117.0 ± 5.9	107.0 - 127.0
STW-970	11/20/02	Gr. Beta	252.0 ± 26.8	288.0 ± 49.5	244.0 - 416.0
STW-970	11/20/02	Sr-89	43.2 ± 0.7	47.6 ± 5.0	38.9 - 56.3
STW-970	11/20/02	Sr-90	7.5 ± 0 2	7.6 ± 5.0	0.0 - 16.2
STW-971	11/20/02	Gr. Alpha	74.9 ± 1.5	103.0 ± 25.8	58.4 - 148.0
STW-971	11/20/02	Ra-226	8.9 ± 0.0	9.1 ± 1.4	6.7 - 11.5
STW-971	11/20/02	Ra-228	15.3 ± 0.1	17.8 ± 4.5	10.1 - 25.5
STW-971	11/20/02	Uranium	51.7 ± 1.6	61.7 ± 6.2	51.0 - 72.4

[a] Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the environmental samples crosscheck program operated by Environmental Resources Associates (ERA).

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

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

[d] Analysis was repeated, result of reanalysis: 16114±487 pCi/L.

[e] ERA acknowledged an unacceptably high percentage of failure for Cs-134 and questioned its own control limits. No problems were identified in the analysis.

TABLE A-2. Crosscheck program results; Thermoluminescent Dosimetry, (TLDs).

Lab Code	TLD Type	Date	Measurement	mR Known Value	mR Lab Result ± 2 sigma	Control Limits
Environmental, Inc						
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #1	3.98	3.71 ± 0.12	2.79 - 5.17
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #1	3.98	3.38 ± 0.09	2.79 - 5.17
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #2	7.07	7.89 ± 0.18	4.95 - 9.19
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #2	7.07	7.64 ± 0.25	4.95 - 9.19
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #3	15.9	18.62 ± 0.40	11.13 - 20.67
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #3	15.9	19.58 ± 0.12	11.13 - 20.67
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #4	63.61	78.24 ± 1.23	44.53 - 82.69
2001-1	CaSO4: Dy Cards	12/24/2001	Reader 1, #4	63.61	79.89 ± 2.47	44.53 - 82.69
Environmental, Inc.						
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #1	4.84	4.44 ± 0.16	3.39 - 6.29
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #1	4.84	4.37 ± 0.20	3.39 - 6.29
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #2	8.60	9.08 ± 0.14	6.02 - 11.18
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #2	8.60	8.76 ± 0.16	6.02 - 11.18
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #3	19.34	22.14 ± 0.27	13.54 - 25.14
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #3	19.34	24.03 ± 0.30	13.54 - 25.14
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #4	77.36	92.77 ± 0.58	54.15 - 100.57
2002-1	CaSO4: Dy Cards	5/28/2002	Reader 1, #4	77.36	85.25 ± 0.37	54.15 - 100.57
Environmental, Inc.						
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 30	56.73	71.61 ± 1.79	39.71 - 73.75
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 45[a]	25.21	33.49 ± 1.38	17.65 - 32.77
[a] Precision of the distance (cm) measurement can significantly increase the error. The placement of the card holder on the table could account for the higher error.						
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 60	14.18	17.37 ± 1.24	9.93 - 18.43
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 75	9.08	10.65 ± 1.02	6.36 - 11.80
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 90	6.30	6 37 ± 0.54	4.41 - 8.19
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 120	3 55	4.60 ± 0.41	2.49 - 4.62
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 135	2.80	2.51 ± 0.23	1.96 - 3.64
2002-2	CaSO4: Dy Cards	12/13/2002	Reader 1, 150	2.28	2.22 ± 0.28	1.60 - 2.96

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

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

Lab Code	Sample Type	Date	Concentration (pCi/L)[a]			
			Analysis	Laboratory results 2s, n=1[b]	Known Activity	Control Limits[c]
SPW-11552	Water	1/7/2002	Gr. Alpha	35.33 ± 1.83	34.57	17.29 - 51.86
SPW-11552	Water	1/7/2002	Gr. Beta	112.62 ± 2.44	107.70	96.93 - 118.47
SPMI-595	Milk	1/31/2002	Cs-134	29.63 ± 4.98	27.10	17.10 - 37.10
SPMI-595	Milk	1/31/2002	Cs-137	51.31 ± 7.55	50.89	40.89 - 60.89
SPMI-597	Milk	1/31/2002	Co-60	44.18 ± 7.76	41.36	31.36 - 51.36
SPMI-597	Milk	1/31/2002	Cs-134	20.15 ± 5.08	22.59	12.59 - 32.59
SPMI-597	Milk	1/31/2002	Cs-137	54.88 ± 8.32	50.89	40.89 - 60.89
SPAP-594	Air Filter	2/6/2002	Gr. Beta	1.58 ± 0.02	1.55	0.00 - 11.55
SPW-599	Water	2/19/2002	H-3	47607 ± 595	50189	40151 ± 60227
SPMI-1446	Milk	3/8/2002	I-131(G)	87.84 ± 11.47	85.20	75.20 - 95.20
SPW-1446	Water	3/8/2002	I-131	82.98 ± 1.20	85.20	68.16 - 102.24
SPW-1446	Water	3/8/2002	I-131(G)	92.75 ± 12.87	85.20	75.20 - 95.20
SPMI-1448	Milk	3/8/2002	I-131	88.00 ± 1.13	85.20	68.16 - 102.24
SPVE-1444	Vegetation	3/11/2002	I-131(G)	0.39 ± 0.04	0.42	0.25 - 0.58
SPAP-2078	Air Filter	4/8/2002	Gr. Beta	1.43 ± 0.01	1.55	0.00 - 11.55
SPW-2080	Water	4/5/2002	H-3	49121 ± 608	46912	37530 ± 56294
SPF-2082	Fish	4/5/2002	Cs-134	0.83 ± 0.04	0.83	0.50 - 1.16
SPF-2082	Fish	4/5/2002	Cs-137	1.29 ± 0.07	1.35	0.81 - 1.89
SPMI-2084	Milk	4/8/2002	Cs-134	20.93 ± 5.82	24.69	14.69 - 34.69
SPMI-2084	Milk	4/8/2002	Cs-137	51.83 ± 10.23	50.56	40.56 - 60.56
SPMI-2084	Milk	4/8/2002	I-131	87.72 ± 1.28	88.37	70.70 - 106.04
SPMI-2084	Milk	4/8/2002	I-131(G)	84.08 ± 10.75	88.37	78.37 - 98.37
SPMI-2084	Milk	4/8/2002	Sr-90	62.81 ± 1.99	66.85	53.48 - 80.22
SPW-2115	Water	4/8/2002	I-131	82.42 ± 1.27	88.37	70.70 - 106.04
SPW-2116	Water	4/8/2002	Co-60	32.47 ± 5.78	33.09	23.09 - 43.09
SPW-2116	Water	4/8/2002	Cs-134	30.80 ± 3.60	28.80	18.80 - 38.80
SPW-2116	Water	4/8/2002	Cs-137	53.85 ± 7.07	50.56	40.56 - 60.56
SPW-2116	Water	4/8/2002	I-131(G)	79.09 ± 7.58	88.37	78.37 - 98.37
SPW-2116	Water	4/8/2002	Sr-90	70 35 ± 2.32	66.85	53.48 - 80.22
SPW-2019	Water	5/3/2002	Gr. Alpha	25 89 ± 1.71	34.57	17.29 - 51.86
SPW-2019	Water	5/3/2002	Gr. Beta	101.19 ± 2.37	107.70	96.93 - 118.47
SPCH-3064	Charcoal	5/11/2002	I-131(G)	0 74 ± 0.04	0.85	0.51 - 1.18
SPW-4682	Water	7/17/2002	H-3	40856 ± 548	46179	36943 ± 55415
SPAP-4685	Air Filter	7/17/2002	Gr. Beta	1.58 ± 0.02	1.55	0.00 - 11.55
W-71702S	Water	7/17/2002	Fe-55	10463.00 ± 126.00	12200.60	9760.48 - 14640.72
W-71702S	Water	07/17/02	H-3	45779 ± 583	46179	36943 ± 55415
W-71702S	Water	07/17/02	Ni-63	17.02 ± 1.50	17.10	10.26 - 23.94
SPVE-4910	Vegetation	07/22/02	Sr-90	10.22 ± 0.80	9.04	0.00 - 19.04
W-72302S	Water	07/23/02	Sr-90	21.43 ± 0.97	26.55	16.55 - 36.55
W-80102S	Water	08/01/02	Gr. Alpha	41.25 ± 4.58	34.45	17.23 - 51.68
W-80102S	Water	08/01/02	Gr. Beta	113.66 ± 5.30	107.70	96.93 - 118.47
W-80202S	Water	08/02/02	Tc-99	16.39 ± 0.72	14.13	2.13 - 26.13
SPW-7188	Water	10/25/02	Fe-55	20396 ± 265	22778	18222 - 27334
SPW-7190	Water	10/25/02	Ni-63	227.18 ± 11.60	170.80	102.48 - 239.12

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

Lab Code	Sample Type	Date	Concentration (pCi/L)			
			Analysis	Laboratory results 2s, n=1[b]	Known Activity	Control Limits[c]
SPW-7192	Water	10/25/02	H-3	96310 ± 871	90963	72770 - 109156
SPW-7194	Water	10/25/02	C-14	42938 ± 167	49661	29796 - 69525
SPAP-7198	Air Filter	10/25/02	Gr. Beta	1.65 ± 0 02	1.53	0.00 - 11.53
SPW-7335	Water	10/30/02	Co-60	39.67 ± 7.38	37.05	27.05 - 47.05
SPW-7335	Water	10/30/02	Cs-134	33.09 ± 5.96	34.11	24.11 - 44.11
SPW-7335	Water	10/30/02	Cs-137	46.80 ± 10.39	49.90	39.90 - 59.90
SPMI-7336	Milk	10/30/02	Cs-134	34.40 ± 4.99	34.11	24.11 - 44.11
SPMI-7336	Milk	10/30/02	Cs-137	46.52 ± 8.52	49.91	39.91 - 59.91
SPF-7340	Fish	10/30/02	Cs-134	0.66 ± 0.03	0.68	0.41 - 0.95
SPF-7340	Fish	10/30/02	Cs-137	1.35 ± 0.05	1.33	0.80 - 1.86
SPS-8102	Sediment	11/01/02	Sr-90	14.69 ± 0.67	13.45	3.45 - 23.45

[a] Results are reported in units of pCi/L, except for air filters (pCi/Filter), food products, vegetation, soil, sediment (pCi/g).
[b] Results are based on 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, cabbage is used for the Spike matrix.

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

Lab Code	Sample Type	Date	Analysis	Concentration (pCi/L)[a]		
				Laboratory results (4.66σ)		Acceptance
				LLD	Activity[b]	Criteria (4.66 σ)
SPW-11551	water	1/7/2002	Gr. Alpha	0.47	0.45 ± 0.39	1
SPW-11551	water	1/7/2002	Gr. Beta	1.37	0.55 ± 1.03	3.2
SPAP-590	Air Filter	1/31/2002	Co-60	1.78		100
SPAP-590	Air Filter	1/31/2002	Cs-134	3.42		100
SPAP-590	Air Filter	1/31/2002	Cs-137	2.33		100
SPAP-590	Air Filter	1/31/2002	Gr. Beta	0.74	-0.096 ± 0.38	3.2
SPMI-596	Milk	1/31/2002	Co-60	3.54		10
SPMI-596	Milk	1/31/2002	Cs-134	3 24		10
SPMI-596	Milk	1/31/2002	Cs-137	3.89		10
SPMI-596	Milk	1/31/2002	K-40		1472.1 ± 101.50	0
SPW-598	water	1/31/2002	Co-60	2.30		10
SPW-598	water	1/31/2002	Cs-134	3.74		10
SPW-598	water	1/31/2002	Cs-137	3.23		10
SPW-600	water	1/31/2002	H-3	138.80	-96.5 ± 63.40	200
SPMI-1447	Milk	3/7/2002	I-131(G)	7.63		20
SPVE-1443	Vegetation	3/8/2002	I-131(G)	0.02		20
SPW-1445	water	3/8/2002	Co-60	2.76		10
SPW-1445	water	3/8/2002	Cs-134	2.87		10
SPW-1445	water	3/8/2002	Cs-137	4.34		10
SPW-1445	water	3/8/2002	I-131	0.45	0.17 ± 0.31	0.5
SPW-1445	water	3/8/2002	I-131(G)	6.50		20
SPMI-1447	Milk	3/8/2002	I-131	0.31	0.15 ± 0.22	0.5
SPAP-2077	Air Filter	4/8/2002	Gr. Beta	0.32	-0.055 ± 0.19	3.2
SPW-2079	water	4/5/2002	H-3	134.17	16.13 ± 67.39	200
SPF-2081	Fish	4/5/2002	Cs-134	7.67		100
SPF-2081	Fish	4/5/2002	Cs-137	9.54		100
SPMI-2083	Milk	4/8/2002	Cs-134	2.90		10
SPMI-2083	Milk	4/8/2002	Cs-137	3.03		10
SPMI-2083	Milk	4/8/2002	I-131	0.52	-0.38 ± 0.34	0.5
SPMI-2083	Milk[c]	4/8/2002	Sr-90	0.48	1.29 ± 0.36	1
SPW-2115	water	4/8/2002	Co-60	1.49		10
SPW-2115	water	4/8/2002	Cs-134	2.09		10
SPW-2115	water	4/8/2002	Cs-137	3.78		10
SPW-2115	water	4/8/2002	I-131	0.50	-0.16 ± 0.33	0.5
SPW-2115	water	4/8/2002	I-131(G)	3.30		20
SPW-2115	water	4/8/2002	Sr-90	0.66	0.10 ± 0.32	1
SPW-2018	water	4/22/2002	Gr. Alpha	0.56	-0.24 ± 0.38	1
SPW-2018	water	4/22/2002	Gr. Beta	1.38	3.19 ± 1.03	3.2
SPch-3063	Charcoal	5/11/2002	I-131(G)	8.27		9.6
SPW-4683	water	7/17/2002	H-3	129.00	-62.8 ± 60.30	200
W-71702	water	7/17/2002	Fe-55	33.61	-1.72 ± 15.63	1000
W-71702	water	7/17/2002	Ni-63	2.56	0.71 ± 1.37	20
W-71802B	water	7/18/2002	Gr. Alpha	0.48	0.31 ± 0.36	1
W-71802B	water	7/18/2002	Gr. Beta	1.33	0.9 ± 0.95	3.2

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

Lab Code	Sample Type	Date	Analysis	Concentration (pCi/L)[a]		
				Laboratory results (4.66σ)		Acceptance
				LLD	Activity[b]	Criteria (4.66 σ)
W-72302	water	7/23/2002	Sr-90	0.27	0.027 ± 0.13	1
W-80202	water	8/2/2002	Tc-99	0.34	-0.051 ± 0.16	10
SPW-7189	water	10/25/2002	Fe-55	978.21	21.77 ± 595.33	1000
SPW-7191	water	10/25/2002	Ni-63	11.74	4.47 ± 7.24	20
SPW-7193	water	10/25/2002	H-3	146.00	-92 ± 65.00	200
SPAP-7199	Air Filter	10/25/2002	Gr. Beta	0.00	-0.0024 ± 0.00	3.2
SPMI-7333	Milk	10/30/2002	Cs-134	5 30		10
SPMI-7333	Milk	10/30/2002	Cs-137	4 80		10
SPW-7334	water	10/30/2002	Co-60	3.69		10
SPW-7334	water	10/30/2002	Cs-134	5.37		10
SPW-7334	water	10/30/2002	Cs-137	3.90		10
SPF-7339	Fish	10/30/2002	Cs-134	4.69		100
SPF-7339	Fish	10/30/2002	Cs-137	11.18		100

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

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

[c] Low levels of Sr-90 are still detected in the environment. A concentration of (1-5 pCi/L) in milk is not unusual.

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result
CF-20, 21	1/2/2002	Be-7	0.47 ± 0.25	0.37 ± 0.12	0.42 ± 0.14
CF-20, 21	1/2/2002	Gr. Beta	7.82 ± 0.20	7.95 ± 0.21	7.89 ± 0.14
CF-20, 21	1/2/2002	K-40	6.65 ± 0.55	6.53 ± 0.36	6.59 ± 0.33
CF-20, 21	1/2/2002	Sr-90	0.01 ± 0.01	0.01 ± 0.01	0.01 ± 0.00
AP-11804, 11805	1/2/2002	Be-7	0.054 ± 0.011	0.049 ± 0.019	0.052 ± 0.011
AP-11825, 11826	1/2/2002	Be-7	0.053 ± 0.013	0.043 ± 0.013	0.048 ± 0.009
AP-11846, 11847	1/2/2002	Be-7	0.054 ± 0.018	0.048 ± 0.016	0.051 ± 0.012
WW-150, 151	1/7/2002	Gr. Beta	1.26 ± 0.50	1.04 ± 0.46	1.15 ± 0.34
MI-124, 125	1/8/2002	K-40	1332.30 ± 158.90	1271.70 ± 151.50	1302.00 ± 109.77
W-172, 173	1/8/2002	H-3	153.00 ± 68.00	148.00 ± 68.00	150.50 ± 48.08
SW-11698, 11699	1/8/2002	Gr. Alpha	2.51 ± 1.36	3.71 ± 1.80	3.11 ± 1.13
SW-11698, 11699	1/8/2002	Gr. Beta	7.68 ± 1.33	8.49 ± 1.43	8.09 ± 0.98
U-275, 276	1/10/2002	Gr. Alpha	1.40 ± 1.00	1.10 ± 1.20	1.25 ± 0.78
LW-356, 357	1/16/2002	Gr. Beta	3.47 ± 0.65	2.94 ± 0.61	3.21 ± 0.45
LW-377, 378	1/16/2002	Gr. Beta	2.75 ± 0.68	2.84 ± 0.61	2.79 ± 0.46
SW-525, 526	1/30/2002	Gr. Alpha	0.56 ± 0.35	0.24 ± 0.35	0.40 ± 0.25
SW-525, 526	1/30/2002	Gr. Beta	2.29 ± 0.41	2.58 ± 0.39	2.43 ± 0.28
DW-504, 505	1/31/2002	Gr. Alpha	2.30 ± 1.70	3.90 ± 1.40	3.10 ± 1.10
MI-649, 650	2/5/2002	K-40	1319.40 ± 176.70	1210.80 ± 118.20	1265.10 ± 106.29
DW-697, 698	2/6/2002	Gr. Beta	5.10 ± 1.20	4.70 ± 1.20	4.90 ± 0.85
DW-927, 928	2/8/2002	Sr-90	0.69 ± 0.29	0.71 ± 0.29	0.70 ± 0.21
W-973, 974	2/18/2002	Fe-55	7.29 ± 0.97	6.86 ± 0.94	7.08 ± 0.68
W-1673, 1674	2/25/2002	H-3	2640.00 ± 155.00	2908.00 ± 161.00	2774.00 ± 111.74
SWT-1395, 1396	2/26/2002	Gr. Beta	2.96 ± 0.59	2.29 ± 0.53	2.63 ± 0.40
MI-1268, 1269	2/27/2002	K-40	1460.50 ± 162.50	1573.00 ± 168.00	1516.75 ± 116.87
MI-1268, 1269	2/27/2002	Sr-90	0.77 ± 0.36	0.95 ± 0.40	0.86 ± 0.27
MI-1332, 1333	3/5/2002	K-40	1503.00 ± 164.00	1305.00 ± 168.00	1404.00 ± 117.39
MI-1332, 1333	3/5/2002	Sr-90	1.35 ± 0.38	1.07 ± 0.40	1.21 ± 0.28
MI-1458, 1459	3/6/2002	K-40	1411.70 ± 166.70	1390.00 ± 172.30	1400.85 ± 119.87
DW-10100, 10101	3/9/2002	Gr. Alpha	4.10 ± 1.70	1.80 ± 1.60	2.95 ± 1.17
DW-10111, 10112	3/9/2002	Gr. Alpha	7.10 ± 2.00	8.30 ± 2.30	7.70 ± 1.52
MI-1521, 1522	3/11/2002	K-40	1270.80 ± 103.30	1369.10 ± 121.60	1319.95 ± 79.78
MI-1521, 1522	3/11/2002	Sr-90	1.69 ± 0.46	2.46 ± 0.49	2.07 ± 0.34
MI-1541, 1542	3/11/2002	K-40	1562.20 ± 122.80	1529.30 ± 126.10	1545.75 ± 88.01
MI-1541, 1542	3/11/2002	Sr-90	0.85 ± 0.57	1.48 ± 0.43	1.16 ± 0 36
LW-1651, 1652	3/14/2002	Gr. Beta	2.90 ± 0.57	2.57 ± 0.56	2.74 ± 0.40
DW-10134, 10135	3/16/2002	Gr. Alpha	5.60 ± 1.90	5.40 ± 1.60	5 50 ± 1.24
WW-1694, 1695	3/18/2002	Gr. Beta	1.79 ± 0.59	1.53 ± 0.50	1.66 ± 0.39
SO-1715, 1716	3/19/2002	Cs-137	0.03 ± 0.01	0.02 ± 0.01	0.03 ± 0.01
SO-1715, 1716	3/19/2002	Gr. Beta	18.50 ± 1.70	19.10 ± 1.70	18.80 ± 1.20
DW-10302, 10303	3/20/2002	Gr. Alpha	2.30 ± 1.40	3.30 ± 1.60	2.80 ± 1.06
W-1758, 1759	3/25/2002	Gr. Alpha	2.50 ± 0.70	2.30 ± 0.60	2.40 ± 0.46
W-1758, 1759	3/25/2002	Gr. Beta	4.10 ± 1.20	2.50 ± 1.10	3.30 ± 0.81

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result
MI-1926, 1927	3/26/2002	K-40	1414.00 ± 115.00	1316.00 ± 128 00	1365.00 ± 86.04
MI-1926, 1927	3/26/2002	Sr-90	2.30 ± 0.70	2.40 ± 0.70	2.35 ± 0.49
SWU-2010, 2011	3/26/2002	Gr. Beta	2.90 ± 0.60	2.20 ± 0.50	2.55 ± 0 39
DW-10376, 10377	3/27/2002	Gr. Beta	10.50 ± 1.30	10.10 ± 1.50	10.30 ± 0.99
AP-2479, 2480	3/28/2002	Be-7	0.064 ± 0.023	0.068 ± 0.014	0.066 ± 0.013
DW-10395, 10396	3/29/2002	Gr. Alpha	10.20 ± 2.10	14.60 ± 2.40	12.40 ± 1.59
LW-2181, 2182	3/31/2002	Gr. Beta	2.98 ± 0.68	1.99 ± 0.70	2.48 ± 0.49
LW-2181, 2182	3/31/2002	H-3	2694.43 ± 156.53	2688.84 ± 156.40	2691.64 ± 110.64
CW-2437, 2438	3/31/2002	Gr. Beta	1.09 ± 0.61	1.14 ± 0.58	1.11 ± 0.42
CW-2437, 2438	3/31/2002	H-3	6456.70 ± 229.20	6292.80 ± 226.52	6374.75 ± 161.12
MI-1947, 1948	4/1/2002	K-40	1421.40 ± 130.90	1256.80 ± 104.20	1339.10 ± 83.65
AP-2458, 2459	4/1/2002	Be-7	0.077 ± 0.011	0.081 ± 0.010	0.079 ± 0.008
DW-10409, 10410	4/1/2002	Gr. Alpha	39.30 ± 4.00	35.30 ± 3 60	37.30 ± 2.69
MI-2052, 2053	4/3/2002	K-40	1283.70 ± 103.20	1434.80 ± 147.90	1359.25 ± 90.17
MI-2052, 2053	4/3/2002	Sr-90	0.81 ± 0.36	0.75 ± 0.35	0.78 ± 0.25
AP-2711, 2712	4/3/2002	Be-7	0.071 ± 0.01	0.07 ± 0.01	0.07 ± 0.01
W-938, 939	4/9/2002	Ni-63	1.73 ± 0.10	1.82 ± 0.10	1.78 ± 0.07
SS-2202, 2203	4/9/2002	Gr. Beta	5.83 ± 1.16	5.52 ± 1.19	5.67 ± 0.83
SS-2202, 2203	4/9/2002	K-40	5.75 ± 0.48	6.11 ± 0.51	5.93 ± 0.35
F-2307, 2308	4/10/2002	K-40	2.75 ± 0.27	2.49 ± 0.32	2.62 ± 0.21
DW-10476, 10477	4/12/2002	Gr. Alpha	5.10 ± 1.30	3.90 ± 1.60	4.50 ± 1.03
W-2244, 2245	4/15/2002	Gr. Beta	1.70 ± 1.10	1.60 ± 1.00	1.65 ± 0.74
DW-10509, 10510	4/17/2002	Gr. Alpha	6.00 ± 2 00	7.30 ± 1.80	6.65 ± 1.35
SW-2690, 2691	4/24/2002	Gr. Beta	2.25 ± 0 68	2.15 ± 0.59	2.20 ± 0.45
SO-2903, 2904	4/24/2002	Be-7	1.22 ± 0.57	0.78 ± 0.43	1.00 ± 0.36
SO-2903, 2904	4/24/2002	Cs-137	0.13 ± 0.05	0.09 ± 0.05	0.11 ± 0.04
SO-2903, 2904	4/24/2002	K-40	21.06 ± 1.48	19.91 ± 1.16	20.48 ± 0.94
DW-10562, 10563	4/24/2002	Gr. Alpha	2.17 ± 1.13	3 25 ± 1.54	2.71 ± 0.96
DW-10578, 10579	4/29/2002	Gr. Alpha	8.20 ± 2.20	7.40 ± 2.00	7.80 ± 1.49
SO-2861, 2862	4/30/2002	Cs-137	236.40 ± 46.00	200.70 ± 52.60	218.55 ± 34.94
SO-2861, 2862	4/30/2002	K-40	10191.00 ± 784.60	11025.00 ± 941.30	10608.00 ± 612.71
SL-2819, 2820	5/1/2002	Be-7	805.70 ± 301.50	860.73 ± 164.80	833.22 ± 171.80
SL-2819, 2820	5/1/2002	Gr. Beta	5566.00 ± 124.00	5359.00 ± 122.00	5462.50 ± 86.98
SL-2819, 2820	5/1/2002	K-40	5524.00 ± 632.90	5277.50 ± 431.40	5400.75 ± 382.97
SL-2840, 2841	5/1/2002	Be-7	1010.00 ± 352.10	872.95 ± 181.70	941.48 ± 198.11
SL-2840, 2841	5/1/2002	Gr. Beta	4399.00 ± 221.80	4593.00 ± 276.00	4496.00 ± 177.04
SL-2840, 2841	5/1/2002	K-40	2422.80 ± 352.10	2254.10 ± 371.40	2338.45 ± 255.89
MI-2971, 2972	5/5/2002	K-40	1338.90 ± 83.44	1345.80 ± 100.90	1342.35 ± 65.47
MI-2971, 2972	5/5/2002	Sr-90	0.83 ± 0.47	1.65 ± 0.46	1.24 ± 0.33
DW-10603, 10604	5/6/2002	Gr. Alpha	6.30 ± 1.70	5.50 ± 1.60	5.90 ± 1.17
SS-3037, 3038	5/9/2002	K-40	11585 00 ± 749.00	11612.00 ± 787.00	11598.50 ± 543 22
MI-3124, 3125	5/13/2002	K-40	1329.50 ± 103.80	1373.00 ± 107.40	1351.25 ± 74.68
MI-3208, 3209	5/14/2002	K-40	1494.60 ± 158.40	1462.60 ± 182.50	1478.60 ± 120.83
LW-3250, 3251	5/15/2002	Gr. Beta	3.14 ± 0.55	3.28 ± 0.63	3.21 ± 0.42

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result
CF-3292, 3293	5/20/2002	K-40	1.33 ± 0.99	1.14 ± 0.91	1.23 ± 0.67
MI-3376, 3377	5/26/2002	K-40	1333.30 ± 159.40	1090.70 ± 143 40	1212.00 ± 107.21
MI-3418, 3419	5/28/2002	K-40	1423.70 ± 121.30	1443.30 ± 164.30	1433.50 ± 102.11
SWT-3461, 3462	5/28/2002	Gr. Beta	2 65 ± 0.54	3.28 ± 0.60	2.97 ± 0.40
SO-3503, 3504	5/29/2002	Cs-137	0.17 ± 0.04	0.18 ± 0.05	0.18 ± 0.03
SO-3503, 3504	5/29/2002	Gr. Beta	27.72 ± 2.26	25.45 ± 2.03	26.58 ± 1.52
SO-3503, 3504	5/29/2002	K-40	20.24 ± 1.19	20.54 ± 1.24	20 39 ± 0.86
SL-3545, 3546	6/3/2002	Gr. Beta	4436.00 ± 90 00	4281.00 ± 89.00	4358.50 ± 63.29
SL-3545, 3546	6/3/2002	K-40	4684.20 ± 734.40	5242.50 ± 884.50	4963.35 ± 574.82
DW-10754, 10755	6/6/2002	Sr-90	0.50 ± 0.30	0.60 ± 0.30	0.55 ± 0.21
SW-3777, 3778	6/11/2002	Gr. Alpha	4.42 ± 1.50	2.97 ± 1.40	3.70 ± 1.02
SW-3777, 3778	6/11/2002	Gr. Beta	7.57 ± 1.22	6.83 ± 1.16	7.20 ± 0.84
MI-3798, 3799	6/11/2002	K-40	1433.40 ± 124.20	1401.20 ± 96.96	1417.30 ± 78.78
LW-3924, 3925	6/13/2002	Gr. Beta	3.05 ± 0.59	3.38 ± 0.72	3.21 ± 0.46
MI-3966, 3967	6/18/2002	K-40	1245.20 ± 109.20	1340.20 ± 121.90	1292.70 ± 81.83
MI-3966, 3967	6/18/2002	Sr-90	2.38 ± 0.51	2.63 ± 0.52	2.51 ± 0.36
MI-3987, 3988	6/19/2002	Sr-90	0.98 ± 0.35	0.97 ± 0.35	0.98 ± 0.25
MI-4095, 4096	6/25/2002	K-40	1256.10 ± 138.20	1199.00 ± 128.30	1227.55 ± 94.29
SWU-4221, 4222	6/25/2002	Gr. Beta	6.89 ± 1.97	5.38 ± 1.93	6.13 ± 1.38
LW-4179, 4180	6/27/2002	Gr. Beta	2.37 ± 0.58	2.00 ± 0.62	2.19 ± 0.42
G-4329, 4330	7/1/2002	Be-7	1394.80 ± 538.40	1098.10 ± 437.40	1246.45 ± 346.84
G-4329, 4330	7/1/2002	Gr. Beta	8.10 ± 0.27	8.00 ± 0.25	8.05 ± 0.18
G-4329, 4330	7/1/2002	K-40	7758.20 ± 1100.00	8399.80 ± 929.30	8079.00 ± 720.00
SL-4337, 4338	7/1/2002	Be-7	1480.90 ± 223.80	1726.40 ± 552.60	1603.65 ± 298.10
SL-4337, 4338	7/1/2002	Cs-137	32.30 ± 14.70	50.97 ± 27.10	41.64 ± 15.42
SL-4337, 4338	7/1/2002	Gr. Beta	5262.40 ± 522.10	5432.40 ± 540.00	5347.40 ± 375.56
SL-4337, 4338	7/1/2002	K-40	2249.00 ± 381.90	2989.90 ± 509.60	2619.45 ± 318.41
AP-4864, 4865	7/1/2002	Be-7	0.085 ± 0.009	0.085 ± 0.006	0.085 ± 0.006
MI-4359, 4360	7/2/2002	K-40	1390.10 ± 168.30	1567.40 ± 194.30	1478.75 ± 128.53
AP-4569, 4570	7/2/2002	Be-7	0.068 ± 0.016	0.086 ± 0.018	0.077 ± 0.012
AP-4843, 4844	7/2/2002	Be-7	0.077 ± 0.016	0.090 ± 0.020	0.084 ± 0.013
AP-4789, 4790	7/3/2002	Be-7	0.080 ± 0.013	0.078 ± 0.015	0.079 ± 0.010
SWU-4810, 4811	7/3/2002	Gr. Beta	2.40 ± 0.84	2.47 ± 0.88	2.43 ± 0.61
MI-4548, 4549	7/9/2002	K-40	1511.80 ± 127.00	1446.80 ± 101.80	1479.30 ± 81.38
DW-4737, 4738	7/12/2002	I-131	0.52 ± 0.20	0.49 ± 0.29	0.51 ± 0.18
MI-4632, 4633	7/15/2002	K-40	1198.40 ± 114.10	1371.30 ± 146.90	1284.85 ± 93.00
MI-5054, 5055	7/30/2002	K-40	1428.80 ± 105.60	1344.30 ± 106.40	1386 55 ± 74.95
G-5075, 5076	7/30/2002	Gr. Beta	7.11 ± 0.07	6.99 ± 0.07	7.05 ± 0.05
SWU-5124, 5125	7/30/2002	Gr. Beta	1.75 ± 0.84	1.90 ± 0.78	1.82 ± 0.57
G-5151, 5152	7/31/2002	Be-7	1.82 ± 0.30	2.05 ± 0.32	1.93 ± 0.22
G-5151, 5152	7/31/2002	K-40	5.13 ± 0.66	5.72 ± 0.70	5.42 ± 0.48
MI-5103, 5104	8/2/2002	K-40	1415.90 ± 70.57	1423.80 ± 129.20	1419.85 ± 73.61
LW-5434, 5435	8/5/2002	Gr. Beta	2.77 ± 0 35	2.26 ± 0.35	2.52 ± 0 25
MI-5215, 5216	8/7/2002	K-40	1361.10 ± 111.90	1358.30 ± 115.80	1359.70 ± 80.52

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

Lab Code	Date	Analysis	Concentration (pCi/L)[a] First Result	Second Result	Averaged Result
MI-5355, 5356	8/13/2002	K-40	1405 00 ± 165 80	1549.30 ± 114.40	1477.15 ± 100.72
F-5413, 5414	8/15/2002	Gr. Beta	2.37 ± 0.10	2.55 ± 0.10	2.46 ± 0.07
F-5413, 5414	8/15/2002	K-40	1.47 ± 0.32	1.73 ± 0.43	1.60 ± 0.27
MI-5603, 5604	8/26/2002	I-131	0.64 ± 0.34	0.52 ± 0.36	0.58 ± 0.25
MI-5603, 5604	8/26/2002	K-40	1353.60 ± 83.13	1261.40 ± 117.80	1307.50 ± 72.09
MI-5578, 5579	8/27/2002	K-40	1301.50 ± 161.70	1381.60 ± 111.20	1341.55 ± 98.12
VE-5682, 5683	8/28/2002	Be-7	0.29 ± 0.10	0.25 ± 0.11	0.27 ± 0.08
VE-5682, 5683	8/28/2002	Gr. Beta	3.79 ± 0.08	3.80 ± 0.08	3.79 ± 0.06
VE-5682, 5683	8/28/2002	K-40	3.06 ± 0.29	3.31 ± 0.42	3.18 ± 0.25
WW-6188, 6189	8/31/2002	Gr. Beta	2.70 ± 0.57	2.30 ± 0.57	2.50 ± 0.41
SL-5724, 5725	9/3/2002	Be-7	0.92 ± 0.19	1.04 ± 0.23	0.98 ± 0.15
SL-5724, 5725	9/3/2002	Cs-137	0.05 ± 0.02	0.05 ± 0.02	0.05 ± 0.01
SL-5724, 5725	9/3/2002	K-40	2.09 ± 0.31	2.28 ± 0.48	2.19 ± 0.29
MI-5877, 5878	9/9/2002	K-40	1340.70 ± 165.00	1168.50 ± 172.50	1254.60 ± 119.35
MI-6157, 6158	9/19/2002	K-40	1372.10 ± 115.10	1136.50 ± 222.70	1254.30 ± 125.34
MI-6258, 6259	9/24/2002	K-40	1328.60 ± 201.00	1312.60 ± 118.60	1320.60 ± 116.69
LW-6278, 6279	9/30/2002	Gr. Beta	2.15 ± 0.51	1.70 ± 0.50	1.93 ± 0.36
MI-6385, 6386	10/1/2002	K-40	1297.10 ± 168.90	1310.10 ± 128.30	1303.60 ± 106.05
BS-6453, 6454	10/1/2002	Cs-137	0.43 ± 0.03	0.44 ± 0.03	0.44 ± 0.02
BS-6453, 6454	10/1/2002	K-40	16.50 ± 0.51	16.80 ± 0.61	16.65 ± 0.40
SO-6478, 6479	10/1/2002	Cs-137	0.074 ± 0.016	0.070 ± 0.016	0.072 ± 0.011
SO-6478, 6479	10/1/2002	Gr. Alpha	8.01 ± 4.36	7.55 ± 4.57	7.78 ± 3.16
SO-6478, 6479	10/1/2002	Gr. Beta	30.41 ± 4.07	33.04 ± 4.28	31.73 ± 2.95
SO-6478, 6479	10/1/2002	K-40	19.82 ± 0.53	20.39 ± 0.58	20.10 ± 0.39
SO-6478, 6479	10/1/2002	Sr-90	0.087 ± 0.017	0.094 ± 0.020	0.091 ± 0.013
AP-6641, 6642	10/1/2002	Be-7	0.070 ± 0.016	0.080 ± 0.015	0 075 ± 0.011
MI-6544, 6545	10/2/2002	K-40	1331.60 ± 125.20	1326.50 ± 171.60	1329.05 ± 106.21
AP-6857, 6858	10/3/2002	Be-7	0.062 ± 0.015	0.071 ± 0.015	0.066 ± 0.010
AP-6857, 6858	10/3/2002	Be-7	0.062 ± 0.015	0 071 ± 0 015	0 066 ± 0.010
AP-6857, 6858	10/3/2002	Be-7	0.062 ± 0.015	0.071 ± 0.015	0.066 ± 0.010
BS-6620, 6621	10/7/2002	Co-60	0.090 ± 0.020	0.11 ± 0.02	0.10 ± 0.01
BS-6620, 6621	10/7/2002	Cs-137	0.62 ± 0.04	0.63 ± 0.03	0.62 ± 0.02
BS-6620, 6621	10/7/2002	K-40	11.38 ± 0.48	10.78 ± 0.52	11.08 ± 0.35
MI-6651, 6652	10/8/2002	K-40	1565.50 ± 141.00	1640.60 ± 189.20	1603.05 ± 117.98
G-6760, 6761	10/9/2002	Be-7	2.17 ± 0.49	2.31 ± 0.34	2.24 ± 0.30
G-6760, 6761	10/9/2002	K-40	6.24 ± 1.00	6.61 ± 0.60	6.42 ± 0.58
SWU-7054, 7055	10/10/2002	Gr. Beta	3.09 ± 0.57	2 06 ± 0.52	2.57 ± 0.39
U-7126, 7127	10/11/2002	Gr. Beta	2.61 ± 1.24	2.61 ± 1.08	2.61 ± 0.82
XW-7768, 7769	10/14/2002	Cs-137	2.25 ± 0.25	2.09 ± 0.18	2.17 ± 0.15
XW-7768, 7769	10/14/2002	H-3	2.63 ± 0.10	2.64 ± 0.10	2.64 ± 0.07
F-7148, 7149	10/15/2002	K-40	2.57 ± 0.28	2.98 ± 0.44	2.77 ± 0 26
BS-7337, 7338	10/23/2002	Co-60	0.083 ± 0.025	0.073 ± 0.031	0.078 ± 0.020
BS-7337, 7338	10/23/2002	Cs-137	0.082 ± 0.019	0.11 ± 0.04	0.10 ± 0.02
BS-7337, 7338	10/23/2002	Gr. Beta	12.54 ± 2.34	12.99 ± 2.22	12.77 ± 1.61
SO-7407, 7408	10/29/2002	Cs-137	0.14 ± 0.03	0.15 ± 0.03	0.15 ± 0.02
SO-7407, 7408	10/29/2002	Gr. Beta	16.73 ± 2.21	16.62 ± 2.27	16.67 ± 1.58
SO-7407, 7408	10/29/2002	K-40	12 05 ± 0 61	12.27 ± 0.81	12.16 ± 0.51

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

			Concentration (pCi/L)[a]		
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result
MI-7428, 7429	10/29/2002	K-40	1542.60 ± 213.00	1355.80 ± 185.70	1449.20 ± 141.29
pw-7621, 7622	10/30/2002	Gr. Beta	2.22 ± 0.92	2.08 ± 0.83	2.15 ± 0.62
TD-7653, 7654	10/31/2002	H-3	11122.00 ± 387.00	11259.00 ± 390.00	11190.50 ± 274.71
SW-7569, 7570	11/5/2002	Gr. Beta	15.90 ± 1.25	16.24 ± 1.27	16.07 ± 0.89
SW-7569, 7570	11/5/2002	K-40	14.79 ± 1.48	14.79 ± 1.48	14.79 ± 1.05
SO-8010, 8011	11/7/2002	Cs-137	0.11 ± 0.02	0.11 ± 0.03	0.11 ± 0.02
SO-8010, 8011	11/7/2002	K-40	6.91 ± 0.54	7.21 ± 0.54	7.06 ± 0.38
VE-7747, 7748	11/11/2002	Gr. Beta	3 59 ± 0.05	3.25 ± 0.05	3.42 ± 0.03
VE-7747, 7748	11/11/2002	K-40	3.17 ± 0.36	3.26 ± 0.46	3.22 ± 0.29
MI-7789, 7790	11/13/2002	K-40	1319.30 ± 167.60	1301.20 ± 140.70	1310 25 ± 109.41
DW-8082, 8083	11/29/2002	I-131	0.83 ± 0.24	0.98 ± 0.22	0.90 ± 0.16
SW-8054, 8055	12/2/2002	Gr. Beta	2.60 ± 0.46	2.21 ± 0.39	2.41 ± 0.30
SW-8054, 8055	12/2/2002	K-40	1.44 ± 0.14	1.43 ± 0.14	1.44 ± 0.10
MI-8105, 8106	12/4/2002	K-40	1300.60 ± 111.30	1315.40 ± 108.90	1308.00 ± 77.86
TD-8298, 8299	12/5/2002	H-3	355.00 ± 94.00	469.00 ± 99.00	412.00 ± 68.26
MI-8396, 8397	12/17/2002	K-40	1409.20 ± 117.30	1449.60 ± 108.60	1429.40 ± 79.93
SWT-8654, 8655	12/30/2002	Gr. Beta	1.63 ± 0.50	1.40 ± 0.47	1.51 ± 0.34
AP-8783, 8784	12/31/2002	Be-7	0.044 ± 0.009	0.042 ± 0.008	0.043 ± 0.006

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

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

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

			Concentration[b]			
Lab Code	Type	Date	Analysis	Laboratory result	Known Activity	Control Limits[c]
STW-939	water	12/01/01	Am-241	1.25 ± 0.0	1.19 ± 0.0	0.83 - 1.6
STW-939	water	12/01/01	Co-57	138.9 ± 0.5	143 ± 14.3	100.1 - 185.9
STW-939	water	12/01/01	Co-60	139.1 ± 0.5	141 ± 14.1	98.7 - 183.3
STW-939	water	12/01/01	Cs-134	25.16 ± 0.2	28.5 ± 0.3	19.95 - 37.1
STW-939	water	12/01/01	Cs-137	279.96 ± 0.9	286 ± 28.6	200.2 - 371.8
STW-939[d]	water	12/01/01	Fe-55	19.68 ± 23.2	9.2 ± 0.9	6.44 - 12.0
STW-939	water	12/01/01	Mn-54	253 64 ± 0.9	246 ± 0.2	172.2 - 319.8
STW-939	water	12/01/01	Ni-63	65 88 ± 1.9	88.3 ± 8.8	61.81 - 114.8
STW-939[e]	water	12/01/01	Pu-238	0.060 ± 0.01	0.0 ± 0.0	-
STW-939	water	12/01/01	Pu-239/40	2.79 ± 0.0	2.99 ± 0.3	2.09 - 3.9
STW-939	water	12/01/01	Sr-90	4.88 ± 0.3	4.8 ± 0.5	3.36 - 6.2
STW-939	water	12/01/01	U-233/4	0.89 ± 0.0	0.98 ± 0.1	0.69 - 1.3
STW-939	water	12/01/01	U-238	6.75 ± 0.0	7.8 ± 0.8	5.46 - 10.1
STW-939	water	12/01/01	Zn-65	70.6 ± 1.1	67.3 ± 6.7	47.11 - 87.5
STSO-955	soil	10/16/02	Am-241	40.54 ± 2.7	43.5 ± 4.4	30.45 - 56.6
STSO-955	soil	10/16/02	Co-57	210.58 ± 2.0	246 ± 24.6	172.2 - 319.8
STSO-955	soil	10/16/02	Co-60	84.38 ± 0.9	87.5 ± 8.8	61.25 - 113.8
STSO-955	soil	10/16/02	Cs-134	692.6 ± 2.1	862 ± 86.0	603.4 - 1120.6
STSO-955	soil	10/16/02	Cs-137	96.98 ± 1.7	111 ± 11.1	77.7 - 144.3
STSO-955	soil	10/16/02	Fe-55	1714.6 ± 299.6	1870 ± 187.0	1309 - 2431.0
STSO-955	soil	10/16/02	Mn-54	509.74 ± 3.4	546 ± 54.6	382.2 - 709.8
STSO-955	soil	10/16/02	Ni-63	890.6 ± 22.4	1180 ± 118.0	826 - 1534.0
STSO-955	soil	10/16/02	Pu-238	34.04 ± 6.0	33.3 ± 3.3	23.31 - 43.3
STSO-955	soil	10/16/02	Pu-239/40	68.7 ± 3.7	72.9 ± 7.3	51.03 - 94.8
STSO-955[e]	soil	10/16/02	Sr-90	1.5 ± 3.0	0.0 ± 0.0	-
STSO-955	soil	10/16/02	U-233/4	166.33 ± 3.8	229 ± 22.9	160.3 - 297.7
STSO-955	soil	10/16/02	U-238	169.76 ± 3.8	220 ± 22.0	154 - 286.0
STSO-955	soil	10/16/02	Zn-65	783.59 ± 6.4	809 ± 80.9	566.3 - 1051.7

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

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

[c] MAPEP results are presented as the known values and expected laboratory precision (1 sigma, 1 determination) and control limits as defined by the MAPEP.

[d] Known activity below the laboratory LLD. The sample was recounted for 2000 minutes; result : 11.52 ± 5.55 Bq /L

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

TABLE A-7. Environmental Measurements Laboratory Quality Assessment Program (EML)

Lab Code	Type	Date	Concentration[a] Analysis	Laboratory results	EML Result[b]	Control Limits[c]
STW-945	Water	03/01/02	Am-241	1.68 ± 0.14	1.47	0.79 - 1.41
STW-945	Water	03/01/02	Co-60	349.20 ± 2.60	347.33	0.80 - 1.20
STW-945	Water	03/01/02	Cs-134	3.40 ± 0.60	3.36	0.80 - 1.30
STW-945	Water	03/01/02	Cs-137	57.20 ± 1.70	56.07	0.80 - 1.22
STW-945	Water	03/01/02	Pu-238	0.45 ± 0.11	0.49	0 74 - 1.20
STW-945	Water	03/01/02	Pu-239/40	4.47 ± 0.28	4.22	0.79 - 1.20
STW-945	Water	03/01/02	Sr-90	7.40 ± 1.30	7.58	0.69 - 1.34
STW-945	Water	03/01/02	Uranium	3.27 ± 0.43	2.84	0.75 - 1.33
STW-946	Water	03/01/02	Gr. Alpha	265.40 ± 7.70	375.00	0.58 - 1.29
STW-946	Water	03/01/02	Gr. Beta	930.60 ± 12.00	1030.00	0.61 - 1.43
STW-946	Water	03/01/02	H-3	226 30 ± 32.70	283.70	0.78 - 2.45
STSO-947	Soil	03/01/02	Ac-228	55.00 ± 5.50	51.17	0.80 - 1.38
STSO-947	Soil	03/01/02	Am-241	8.30 ± 3.30	10.93	0.65 - 2.28
STSO-947	Soil	03/01/02	Bi-212	49.20 ± 12.40	53.43	0.50 - 1.34
STSO-947	Soil	03/01/02	Bi-214	46.60 ± 3.10	53 93	0.78 - 1.42
STSO-947	Soil	03/01/02	Cs-137	1401.60 ± 9.10	1326.67	0 80 - 1.25
STSO-947	Soil	03/01/02	K-40	613.10 ± 28.10	621.67	0.80 - 1.32
STSO-947	Soil	03/01/02	Pb-212	51.60 ± 2.60	51.10	0.78 - 1.32
STSO-947	Soil	03/01/02	Pb-214	52.00 ± 3.60	54.37	0.76 - 1.46
STSO-947	Soil	03/01/02	Pu-239/40	14.70 ± 3.50	19.10	0.71 - 1.30
STSO-947	Soil	03/01/02	Sr-90	52.10 ± 6.30	53.76	0.67 - 2.90
STSO-947	Soil	03/01/02	Th-234	122.40 ± 6.30	89.30	0.63 - 2.35
STSO-947	Soil	03/01/02	Uranium	143.40 ± 9.40	194.77	0.71 - 1.32
STVE-948	Vegetation	03/01/02	Am-241	3.10 ± 2.20	2.23	0 73 - 2.02
STVE-948	Vegetation	03/01/02	Cm-244	0.90 ± 0.80	1.32	0.61 - 1.59
STVE-948	Vegetation	03/01/02	Co-60	13.50 ± 2.10	11.23	0.80 - 1.44
STVE-948	Vegetation	03/01/02	Cs-137	350.40 ± 6.30	313.67	0.80 - 1.31
STVE-948	Vegetation	03/01/02	K-40	940.80 ± 45.60	864.33	0.79 - 1.39
STVE-948[d]	Vegetation	03/01/02	Pu-239/40	16.90 ± 0.70	3.54	0.69 - 1.31
STVE-948	Vegetation	03/01/02	Sr-90	543 40 ± 24.90	586.28	0.55 - 1.21
STAP-949	Air Filter	03/01/02	Am-241	0.09 ± 0.05	0.09	0.70 - 2.34
STAP-949	Air Filter	03/01/02	Co-60	30.10 ± 0.30	30.52	0.80 - 1.26
STAP-949	Air Filter	03/01/02	Cs-137	29.90 ± 0.30	28 23	0.80 - 1.32
STAP-949	Air Filter	03/01/02	Mn-54	40.40 ± 0.40	38 53	0.80 - 1.35
STAP-949	Air Filter	03/01/02	Pu-238	0.05 ± 0.02	0 06	0.67 - 1.33
STAP-949	Air Filter	03/01/02	Pu-239/40	0.15 ± 0.02	0.19	0.73 - 1.26
STAP-949	Air Filter	03/01/02	Sr-90	3.40 ± 0.40	4 83	0.53 - 1.84
STAP-949	Air Filter	03/01/02	Uranium	0.80 ± 0.20	0.61	0.79 - 2.10
STAP-950	Air Filter	03/01/02	Gr. Alpha	0.43 ± 0.04	0.53	0.73 - 1.43
STAP-950	Air Filter	03/01/02	Gr. Beta	1.34 ± 0.05	1.30	0.76 - 1.36
STW-959	Water	09/01/02	Am-241	3.00 ± 0.10	3 04	0.79 - 1.41
STW-959	Water	09/01/02	Co-60	258.40 ± 2.30	268.67	0.80 - 1.20
STW-959	Water	09/01/02	Cs-134	50.80 ± 3.30	60.20	0.80 - 1 30
STW-959	Water	09/01/02	Cs-137	80.10 ± 0.30	81.43	0.80 - 1.22
STW-959	Water	09/01/02	Cs-137	80.10 ± 0.30	81.43	0.80 - 1.22
STW-959	Water	09/01/02	Am-241	3.00 ± 0.10	3.04	0 79 - 1.41

TABLE A-7. Environmental Measurements Laboratory Quality Assessment Program (EML)[a].

			Concentration[b]			
Lab Code	Type	Date	Analysis	Laboratory results	EML Result[c]	Control Limits[d]
STW-959	Water	09/01/02	Am-241	3.00 ± 0.10	3.04	0.79 - 1.41
STW-959	Water	09/01/02	Co-60	258.40 ± 2.30	268 67	0.80 - 1.20
STW-959	Water	09/01/02	Cs-134	50 80 ± 3.30	60.20	0 80 - 1.30
STW-959	Water	09/01/02	Cs-137	80.10 ± 0.30	81.43	0.80 - 1.22
STW-959	Water	09/01/02	H-3	271.90 ± 20.90	227.30	0 78 - 2.45
STW-959	Water	09/01/02	Pu-238	4 40 ± 0.20	4.33	0.74 - 1.20
STW-959	Water	09/01/02	Pu-239/40	2.10 ± 0.10	2.07	0.79 - 1.20
STW-959	Water	09/01/02	Sr-90	9.70 ± 0.20	8 69	0.69 - 1.34
STW-959	Water	09/01/02	Uranium	5.60 ± 0.10	6 84	0.75 - 1.33
STW-960	Water	09/01/02	Gr. Alpha	204.90 ± 3.20	210 00	0.58 - 1.29
STW-960	Water	09/01/02	Gr. Beta	852.00 ± 26 50	900.00	0.61 - 1.43
STSO-961	Soil	09/01/02	Ac-228	47.60 ± 1.90	42.30	0.80 - 1.38
STSO-961	Soil	09/01/02	Am-241	7.80 ± 1.40	6.77	0.65 - 2.28
STSO-961	Soil	09/01/02	Bi-212	45.60 ± 1.70	45.93	0.50 - 1.34
STSO-961[e]	Soil	09/01/02	Bi-214	48.80 ± 4.90	33.63	0.78 - 1.42
STSO-961	Soil	09/01/02	Cs-137	819.60 ± 16 60	829.33	0.80 - 1.25
STSO-961	Soil	09/01/02	K-40	705 30 ± 31.40	637.67	0.80 - 1.32
STSO-961	Soil	09/01/02	Pb-212	48.60 ± 3.40	43.43	0.78 - 1.32
STSO-961	Soil	09/01/02	Pb-214	51.10 ± 5.10	35.20	0.76 - 1.46
STSO-961[f]	Soil	09/01/02	Pu-239/40	20.20 ± 0 80	12.90	0.71 - 1.30
STSO-961	Soil	09/01/02	Sr-90	38 50 ± 0.10	41.16	0.67 - 2.90
STSO-961	Soil	09/01/02	Uranium	58.90 ± 0.70	87.21	0.71 - 1.32
STVE-962	Vegetation	09/01/02	Am-241	2 10 ± 0.30	2.25	0.73 - 2.02
STVE-962	Vegetation	09/01/02	Cm-244	1.00 ± 0.30	1.25	0.61 - 1.59
STVE-962	Vegetation	09/01/02	Co-60	11.80 ± 1.50	9.66	0.80 - 1.44
STVE-962	Vegetation	09/01/02	Cs-137	340 30 ± 16.80	300.67	0.80 - 1.31
STVE-962	Vegetation	09/01/02	K-40	1646.00 ± 74.40	1480 00	0.79 - 1.39
STVE-962	Vegetation	09/01/02	Pu-239/40	3.00 ± 0.30	3.43	0.69 - 1.31
STVE-962	Vegetation	09/01/02	Sr-90	345.60 ± 97.80	476 26	0.55 - 1.21
STAP-963[g]	Air Filter	09/01/02	Am-241	0.20 ± 0.01	0.19	0 70 - 2.34
STAP-963	Air Filter	09/01/02	Co-60	24.90 ± 0.60	23 00	0 80 - 1.26
STAP-963	Air Filter	09/01/02	Cs-137	38.00 ± 1.30	32.50	0.80 - 1.32
STAP-963	Air Filter	09/01/02	Mn-54	60.80 ± 1.90	52.20	0.80 - 1.35
STAP-963[g]	Air Filter	09/01/02	Pu-238	0.11 ± 0.02	0.12	0.67 - 1.33
STAP-963[g]	Air Filter	09/01/02	Pu-239/40	0.21 ± 0.01	0.21	0.73 - 1.26
STAP-963	Air Filter	09/01/02	Sr-90	5 20 ± 0.20	5.56	0.53 - 1.84
STAP-963[g]	Air Filter	09/01/02	Uranium	0.41 ± 0.04	0.47	0.79 - 2.10
STAP-964	Air Filter	09/01/02	Gr. Alpha	0 40 ± 0.10	0 29	0.73 - 1.43
STAP-964	Air Filter	09/01/02	Gr. Beta	0.80 ± 0.10	0.87	0.76 - 1.36

[a] Results are reported in Bq/L with the following exceptions: Air Filters (Bq/Filter), Soil and Vegetation (Bq/kg)

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

[c] Control limits are reported by EML as the ratio of Reported Value / EML value.

[d] An error was found in the conversion from pCi/g to Bq/kg Corrected result : 2 84 ± 0 59 Bq/kg.

[e] Naturally-occurring radium daughters are present in the shield background, and a probable cause of the higher bias seen for isotopes of lead and bismuth

[f] Reporting error.The average result of the triplicate analyses was 14.1± 5.7 Bq/kg

[g] STAP-963, Calculations for the transuranics analyses (Am-241, Uranium, Pu-238, -239/40) were not converted to Bq/total filter. The data listed is the result of recalculation

APPENDIX B

DATA REPORTING CONVENTIONS

Data Reporting Conventions

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

2.0. Single Measurements

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

where: x = value of the measurement;

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

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

3.0. Duplicate analyses

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

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

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

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

4.0. Computation of Averages and Standard Deviations

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

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

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

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

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

4.5 In rounding off, the following rules are followed:

4.5.1. If the 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.

APPENDIX C

Sampling Program and Locations

POINT BEACH NUCLEAR PLANT

Sample Type	Locations No.	Locations Codes (and Type)[a]	Collection Type (and Frequency)[b]	Analysis (and Frequency)[b]
Airborne Filters	6	E-1-4, 8, 20	Weekly	GB, GS, on QC for each location
Airborne Iodine	6	E-1-4, 8, 20	Weekly	I-131
Ambient Radiation (TLD's)	22	E-1-9, 12, 14-18, 20, 22-32, 34-36, 38,39	Quarterly	Ambient Gamma
Lake Water	5	E-1, 5, 6, 33	Monthly	GB, BS, I-131 on MC H-3, Sr-89-90 on QC
Well Water	1	E-10	Quarterly	GB, GS, H-3, Sr-89-90, I-131
Vegetation	8	E-1-4, 6. 9, 20	3x / year as available	GB, GS
Shoreline Silt	5	E-1, 5, 6, 8, 9, 12	2x / year	GB, GS
Soil	8	E-1-4, 6, 8, 9, 20	2x / year	GB, GS
Milk	3	E-11, 19, 21	Monthly	GS, I-131, Sr-89-90
Algae	2	E-5, 12	3x / year as available	GB, GS
Fish	1	E-13	3x / year as available	GB, GS (in edible portions)
			SPECIAL COLLECTIONS AND ANALYSES	
Airborne Filters			4 per month 1 per quarter	Sr-89, Sr-90 Sr-89, Sr-90 (comp.)
Liquid			1 per month	GA, Sr-89, Sr-90
Subsoil Water			4 per quarter	GA, GB, H-3, GS
Miscellaneous Water Samples			4-5 per year	Sr-89, Sr-90

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

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