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STATE OF WISCONSIN

1985

Point Beach

Environmental Radioactivity Survey

NRC 30-83-647

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Bureau of Environmental Health  
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# STATE OF WISCONSIN

1985

## POINT BEACH ENVIRONMENTAL RADIOACTIVITY SURVEY

### INTRODUCTION

This report is prepared under U.S. Nuclear Regulatory Commission Contract NRC 30-83-647 by the State of Wisconsin, Department of Health and Social Services, Section of Radiation Protection. This report covers the calendar year 1985. Results of environmental radioactivity monitoring are listed in tabular form. The data presented consists of duplicative sample analysis such as air and TLD data and split sample analysis conducted by the state radiation protection laboratory or subcontractor and the licensee. A brief description of sample collection techniques and analytical procedures conducted by the state laboratory is also given. A sample collection summary for 1985 is included in Table 3. The sample summary includes type and number of samples collected, Minimum Detectable Concentrations (MDC's) or Lower Limits of Detection (LLD's) as well as the range of reported activities for each type of sample analysis.

### SAMPLING TECHNIQUES

#### Direct Radiation - Thermoluminescent Dosimeters (TLD's)

Continuous monitoring of direct radiation is performed quarterly using thermoluminescent dosimeters. The dosimeters are placed at 43 locations in the area of the Kewaunee and the Point Beach nuclear power plants.

#### Air Samples

Continuous air samples are collected weekly from two stations. Air particulate samples are collected on 47 mm. glass fiber filters. Air iodine samples are collected using charcoal absorbers mounted in tandem with the air particulate filters. The nominal sampling rate is 1 - 2.5 cubic feet of air per minute.

#### Surface Water

A split sample consisting of 3.5 liters of liquid effluent is collected monthly at a point close to the discharge of the Point Beach effluent channel. This sample is a monthly composite of weekly grab samples and is collected while the plant is discharging liquid to the channel. A background surface water sample is also taken at the Green Bay Pumping Station - Rostok, 15.6 miles NNE. A surface water sample from the Coast Guard Station, 4.8 miles SSE, is included as a background sample for Point Beach.



### Milk

A raw milk sample is collected monthly from the Lehrmann farm and W. Funk farm. The milk sample is split between Wisconsin and the Point Beach nuclear power facility.

### Sediment

A split sample for shoreline sediment is collected from three locations on an annual basis.

### Fish

Split samples of both migratory and non-migratory fish are collected periodically from locations in Lake Michigan near the Point Beach - Kewaunee area.

### Food Products

A split sample for vegetation (grass) is collected from several locations in the Point Beach area.

## **ANALYTICAL PROCEDURES**

The procedures given are abstracted to present only the basic steps. The analysis of the samples has been subcontracted to the State Laboratory of Hygiene. A detailed description of the procedures used is available from the State Laboratory of Hygiene.

### Air Particulate Samples - Beta Gamma

Place the 47 mm. glass fiber filter on a 2-inch stainless steel planchet. Beta count in an external gas flow proportional counter. Calculate activity correcting for counter efficiency.

### Air Particulate Samples - Gamma

The monthly composite of air particulate filters is placed on a Ge(Li) detector and the gamma spectrum is collected. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

### Surface Water - Alpha, Beta Gamma

Filter a 500 ml. aliquot of sample. Evaporate filtrate in a 2-inch stainless steel planchet. Place filter paper in a 2-inch stainless steel planchet and dry at 103 degrees Celsius. Beta and alpha count the soluble and insoluble portions in an external gas flow proportional counter. Calculate activity correcting for counter efficiency and for self-absorption.

### Surface Water - Gamma Isotopic

A 3.5 liter sample is placed in a Marinelli beaker and analyzed on a GeLi detector. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

### Vegetation or Food Product - Alpha, Beta and Gamma Isotopic

Dry sample at 110 degrees Celsius, grind, weigh into stainless steel planchet. Beta and alpha count in an external gas flow proportional counter. Calculate activity correcting for self-absorption and counter efficiency.

The food product sample is finely chopped. The sample is packed to the 500 ml mark of a 500 ml Marinelli beaker, weighed and counted for 900 minutes on a Ge(Li) detector. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

### Soil or Sediment - Alpha, Beta and Gamma Isotopic

Dry sample at 110 degrees Celsius, grind, and weigh into a stainless steel planchet. Beta and alpha count in an external gas flow proportional counter. Calculate activity correcting for self-absorption and counter efficiency.

The dried sediment is added to a 500 ml Marinelli beaker, weighed and counted on a Ge(Li) detector. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

### Milk - Gamma Isotopic

Procedure same as for Surface Water.

### Milk - Iodine 131 Chemical Extraction

A stable iodine carrier is added to a 2 liter sample of raw milk. The sample is passed through an anion exchange column and the iodine is removed from the resin by batch/extraction using NaOCl. After reduction to elemental iodine by hydroxylamine hydrochloride, the iodine is extracted into carbon tetrachlorine reduced with bisulfite, and back extracted into water. The iodine is precipitated as palladous iodide with the chemical yield determined gravimetrically and counted in an external gas flow proportional counter correcting for counter efficiency and for decay.

### Fish - Gamma Isotopic

A sample is placed in a 500 ml. Marinelli beaker. Place the sample on a GeLi detector and collect the gamma spectrum. Scan the gamma spectrum for any peaks and print out regions of interest which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

### Direct Radiation

Thermoluminescent dosimeters are supplied by the U.S. Nuclear Regulatory Commission. The exposed TLD's are shipped to NRC Region I and are read by the Commission.

### QUALITY ASSURANCE

The analysis of the samples is performed under subcontract with the State Laboratory of Hygiene (SLH). SLH maintains its own quality assurance program which was also reviewed by the NRC in January, 1985.

Analytical procedures provide for routine replicate analyses to verify methods and instrument operation. Traceable sources are used to regularly calibrate the counters and daily performance checks are made between calibrations. In addition, quality control charts are maintained on the counters.

SLH participates in the EPA Cross Check program. The quality assurance program that the SLH participates in include analysis of blind samples, air filters, food, milk, gamma in water, alpha-beta in water, iodine in water, strontium in water and tritium in water. The EPA Cross Check code for SLH is "AF". A complete listing of the EPA Cross Check results for 1984 and 1985 is included in Table 4.

### SENSITIVITIES AND ERROR - WISCONSIN

Following the recommendations of the Health Physics Society, detection limits will be expressed as a minimum detectable concentration (MDC). The minimum detectable concentration or MDC is an "a priori" estimate of the capability for detecting an activity concentration by a given measurement system, procedure, and type of sample. The MDC should not be viewed as an absolute activity concentration that can or cannot be detected. Minimum detectable concentrations (MDC) are based on the analysis performed and for gamma isotopic analysis have been calculated for a zero decay time. Minimum detectable concentrations (MDC's) are listed in Table 3.

The Wisconsin definition for minimum detectable concentration follows closely the equation for the lower limits of detection as defined in the NRC contract NRC-30-83-647. Activities defined by the equation for MDC will be used in this report.

The MDC for each radioisotope has been calculated from the following equation:

$$\text{MDC} = \frac{4.66 s_b}{E * V * 2.22 * Y * S * \exp(-dt)}$$

Where:

MDC is the "a priori" lower limit of detection as defined above, as picocuries per unit mass or volume,

$s_b$  is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate, as counts per minute,

E is the counting efficiency, as counts per disintegration,

V is the sample size in units of mass or volume,

2.22 is the number of disintegrations per minute per picocurie,

Y is the fractional radiochemical yield, when applicable,

S is the self-absorption correction factor,

d is the radioactive decay constant for the particular radionuclide, and

t for environmental samples is the elapsed time between sample collection, or end of the sample collection period, and time of counting.

Guidelines adopted by the U.S. Environmental Protection Agency are used in the reporting of specific analyses. Results from specific analyses will be reported whether the results are negative, zero, or positive. Caution should be exercised in the interpretation of individual negative values. While a negative activity value does not have physical significance, it is significant when taken together with other observations which indicate that the true value of a distribution is near zero. This procedure will allow all of the data to be reported and will allow a statistical evaluation without an arbitrary cutoff of small or negative numbers. An estimation of bias in the nuclide analyses is then possible as well as a better evaluation of distributions and trends in the environmental data. It is important when reviewing the data in the following tables to compare the reported result to the actual minimum detectable concentration (MDC) for that analysis.

Results for specific analyses will be reported as an activity followed by an error term for that analysis. The error term is a plus or minus counting error term at the 2 sigma (95%) confidence interval and is printed as (+/-).

#### SENSITIVITY - POINT BEACH

The statement below is taken from a report submitted to the Point Beach nuclear facility by Teledyne Isotopes Midwest Laboratory and applies to the reported data from January - June, 1985.

"For all gamma isotopic analyses, the spectrum is computer scanned from 80 to 2048 KeV. Specifically included are Mn-54, Zn-65, Co-58, Co-60, Zr-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 but not listed here. Data listed as "<" are at the 4.66 sigma level, others are 2 sigma. Unless otherwise noted, the less than value ("<") is for Cs-137 and may be higher or lower for other radionuclides.

For reported data from July - December, 1985 the following statement would apply. According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported. Lower limits of detection (LLD's) are included in Table 3.



## CONCLUSIONS

A sample collection summary for 1985 is included in Table 3. The sample summary includes the type and number of samples collected as well as the range of reported activities for each type of sample analysis. Results from the individual sample analyses are listed in Tables 5-20.

### Air Particulate

Wisconsin and Point Beach maintain separate air sampling stations. The indicator site for both Wisconsin and for Point Beach is located at the residency at the north property line, 1.3 miles NNW. The control site for Wisconsin is located at the Green Bay Pumping Station - Rostok, 15.6 miles NNE. The control site for Point Beach is located at Silver Lake College, 17 miles WSW.

A summary of reported activities by Wisconsin and Point Beach from air particulate samples is included in Table 3. Results from the individual sample analyses are listed in Tables 5-8. For Wisconsin, an air particulate sample was not collected at the indicator site for the period of 05/10/85 - 05/15/85 due to air pump problems.

The yearly averages, from a log-normal distribution, for the gross beta analysis on the air particulate filters are given in Table 1.

Table 1. Comparison of the yearly averages for gross beta activity from air particulate filters for 1985.

WI - Section of Radiation Protection		Point Beach	
units of pCi/M <sup>3</sup>			
Indicator	Control	Indicator	Control
0.012 ± 0.001	0.010 ± 0.001	0.02 ± 0.01	0.02 ± 0.01

A summary of reported gamma isotopic activities for Wisconsin and Point Beach from the monthly or quarterly air particulate filter composites is included in Table 3. Results from the individual sample analyses are listed in Tables 9-10. The only radioisotope detected in the Wisconsin gamma isotopic analysis above its respective MDC was beryllium-7 (Be-7). Beryllium-7 (Be-7) is a naturally occurring radioisotope that is constantly produced through nuclear reactions between cosmic rays and nuclei in the atmosphere. Beryllium-7 (Be-7) was detected in composites from both the indicator and the control sites. Point Beach does not report naturally occurring radioisotopes and no comparison can be made for the beryllium-7 (Be-7) reported by Wisconsin.



At the observed lower levels of activity the Wisconsin and Point Beach data compared favorably in the gross beta and gamma isotopic analysis on the air particulate samples. Influence by the Point Beach nuclear facility on air quality is not evident when comparing the data from the indicator and control sites.

### Air Iodine

Air iodine measurements for both Wisconsin and Point Beach were all below the required NRC LLD of  $0.07 \text{ pCi/M}^3$  for the indicator and control sites.

### Surface Water

Surface water from the effluent channel is a split sample. This sample is a monthly composite of weekly grab samples. Surface water from a control site is not a split sample. Wisconsin collects a monthly grab sample at the Green Bay Pumping Station - Rostok, 15.6 miles NNE. A monthly grab sample is collected by Point Beach at the Coast Guard Station, 4.8 miles SSE.

A summary of reported activities by Wisconsin and Point Beach from the monthly surface water samples is included in Table 3. Results from the individual sample analyses are listed in Tables 11-14. For Wisconsin, the July, 1985 sample from the control site was not collected.

All reported activities by Wisconsin and Point Beach are at background levels for the samples taken at the indicator and control sites. All reported gamma isotopic activities by Wisconsin and Point Beach were less than the respective Wisconsin minimum detectable concentration (MDC) or the Point Beach lower limit of detection (LLD). The reported Wisconsin third quarter, 1986 activities for tritium (H-3) of  $4 \pm 300$ ,  $770 \pm 310$  and  $80 \pm 300$  pCi/liter are comparable to the Point Beach third quarter, 1986 reported activity of  $<500$  pCi/liter. Wisconsin reported two activities for iodine-131 (I-131) of  $1.7 \pm 0.3$  and  $0.6 \pm 0.2$  pCi/liter. All Point Beach reported activities for iodine-131 (I-131) were  $<0.5$  pCi/liter. Gross beta activities reported by Wisconsin and Point Beach were all at background levels for samples collected at the indicator and the control sites. The gross beta yearly average for Wisconsin of  $3.9 \pm 1.5$  and  $3.5 \pm 1.4$  pCi/liter and for Point Beach of  $2.8 \pm 0.6$  and  $3.1 \pm 0.6$  pCi/liter for the indicator and control sites respectively are not significantly different from reported yearly average gross beta activities from previous years.

All activities reported by either Wisconsin or Point Beach are below the standards for uncontrolled areas specified in ICRP Report No. 2 or 10 CFR 20. Plant influence is not evident after comparing Wisconsin and Point Beach data for the indicator and control sites.

## Fish

Split samples were taken for fish. The samples were obtained from the Point Beach pumphouse.

A summary of reported activities by Wisconsin and Point Beach for fish samples is included in Table 3. Results from the individual sample analyses are listed in Tables 15-16.

For Wisconsin, the detected levels of activity for cesium-137 (Cs-137) and for naturally occurring potassium-40 (K-40) were also reported in previous years. For Point Beach only cesium-137 (Cs-137) was detected above its respective lower limit of detection (LLD). Naturally occurring isotopes such as potassium-40 (K-40) are not reported by Point Beach.

At the low level of reported activities the Wisconsin and Point Beach data compare favorably.

## Shoreline Sediments

Split samples were taken for shoreline sediments at three locations.

A summary of reported activities by Wisconsin and Point Beach for shoreline sediment is included in Table 3. Results from the individual sample analyses are listed in Table 17.

From the Wisconsin gamma isotopic analysis, potassium-40 (K-40) was detected in all three samples and only trace activities for cobalt-60 (Co-60) and cesium-137 (Cs-137) from the discharge site E-12. The small detected activities for cobalt-60 (Co-60) and cesium-137 (Cs-137) were below the respective NRC and Point Beach LLD's. Point Beach analysis did not detect or report any radioisotopes above their respective LLD and does not report naturally occurring radioisotopes such as potassium-40 (K-40).

## Milk

A split sample is taken for milk. Milk is collected from the Funk farm, 3.8 miles WSW and from the Lehrmann farm, 2.7 miles NNW.

A summary of reported activities by Wisconsin and Point Beach for milk samples is included in Table 3. Results from the individual sample analyses are listed in Tables 18-19. For Wisconsin, the March, 1985 milk sample from the Lehrmann farm was not collected due to an empty milk tank at the farm.

For Wisconsin, naturally occurring potassium-40 (K-40) was detected in all of the samples. All activities for iodine-131 (I-131) were less than the Wisconsin MDC of 0.4 pCi/liter. The detected activity for cesium-134 (Cs-134) of 18 pCi/liter is only slightly above the Wisconsin MDC of 12 pCi/liter and was not reported by Point Beach.

Point Beach did not detect any isotopes above their lower limits of detection in its gamma isotopic analysis. All reported results for iodine-131 were less than 0.5 pCi/l. Naturally occurring potassium-40 (K-40) is not reported by Point Beach.

Influence by the Point Beach nuclear facility is not evident after reviewing the data for Wisconsin and Point Beach.

#### Vegetation - Food Products

Point Beach does not sample for food products. A split sample for vegetation was taken at four sites.

A summary of reported activities by Wisconsin and Point Beach for vegetation samples is included in Table 3. Results from the individual sample analyses are listed in Table 20.

Only naturally occurring potassium-40 (K-40) above its MDC was detected in the gamma isotopic analysis of the Wisconsin samples. Potassium-40 was detected in all three samples in the range of 3000-6000 pCi/kg (wet). Point Beach does not report naturally occurring radioisotopes and no isotopes were reported above their lower limits of detection. Iodine-131 (I-131) was not detected in any of the Wisconsin or the Point Beach samples.

Influence by the Point Beach nuclear facility is not evident after reviewing the data for Wisconsin and Point Beach.

#### Dose to Individuals from Gaseous and Liquid Effluents

Dose calculations for gaseous and liquid effluent releases were performed according to the mathematical models illustrated in USNRC Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I". The doses, listed in Table 2, were calculated for the maximum exposed individual for Wisconsin samples with activities greater than MDC and background levels.

Doses resulting from gaseous and liquid effluent releases are in compliance with 10 CFR Part 50, Appendix I.

Table 2. Calculated doses to a maximum exposed individual for Wisconsin samples with activities greater than MDC and background levels.

Sample type	Description	population	Maximum Exposed Individual (mrem/year)		
			whole body	bone	thyroid
fish	all 10 samples	infant	---	---	---
		child	0.026-0.054	0.18-0.38	---
		teenager	0.066-0.14	0.14-0.30	---
		adult	0.12-0.25	0.13-0.28	---
shoreline sediment	10/15/85 E-12	infant	---		
		child	0.0014+0.0003		
		teenager	0.0069+0.0015		
		adult	0.0012+0.0004		

#### References

Radiation Protection Standards, Federal Radiation Council, Report No. 2, September 1961.

U.S. Environmental Protection Agency, Upgrading Environmental Radiation Data, Health Physics Society Committee Report HPSR-1 (1980), EPA 520/1-80-012, August 1980.

U.S. Nuclear Regulatory Commission, Title 10, Part 20.

Table 3. Sample summary for 1985 from the environmental split sample monitoring program conducted by Wisconsin and Point Beach.

Sample type (units)	Wisconsin data				Point Beach data					
	MDC	Number of <sup>a</sup> Samples	Analysis	range	LLD	Number of <sup>a</sup> Samples	Analysis	range		
air particulate (pCi/M <sup>3</sup> )	0.003	101/99	gross beta	0.000 - 0.031	0.01	104/102	gross beta	<0.01 - 0.06		
		24	gamma isotopic				24	gamma isotopic		
	0.050	24/22	Be-7	0.045 - 0.11			Be-7	analysis not required		
	0.011	24/0	Zr-95	-0.003 - 0.004			Zr-95	analysis not required		
	0.005	24/0	Ru-103	-0.001 - 0.002			Ru-103	analysis not required		
	0.030	24/0	Ru-106	-0.004 - 0.010			Ru-106	analysis not required		
	0.005	24/0	Cs-134	-0.001 - 0.001			0.01	8/0	Cs-134	<0.01
	0.005	24/0	Cs-137	-0.001 - 0.001			0.01	8/0	Cs-137	<0.01
0.008	24/0	Ce-141	-0.002 - 0.003	Ce-141	analysis not required					
0.025	24/0	Ce-144	-0.002 - 0.006	Ce-144	analysis not required					
air iodine (pCi/M <sup>3</sup> )	0.046	101/0	I-131	-0.015 - 0.006	0.03	104/0	I-131	<0.03		
surface water (pCi/liter)	1.6	23/23	gross beta	2.7 - 6.5	1.0	24/24	gross beta	1.6 - 8.1		
	750	23/1	H-3	-250 - 770			500	8/0	H-3	<500
	0.4	23/1	I-131	-0.6 - 1.7			0.5	24/0	I-131	<0.5
		23	gamma isotopic				24	gamma isotopic		
	9	23/0	Mn-54	-5 - 3			10	24/0	Mn-54	<10
	20	23/0	Fe-59	-4 - 4			30	24/0	Fe-59	<30
	13	23/0	Co-58	-1 - 4			10	24/0	Co-58	<10
	11	23/0	Co-60	-3 - 2			10	24/0	Co-60	<10
	22	23/0	Zn-65	-5 - 11			30	24/0	Zn-65	<30
	13	23/0	Cs-134	-1 - 9			10	24/0	Cs-134	<10
	12	23/0	Cs-137	-2 - 5			10	24/0	Cs-137	<10
	15	23/0	Zr-95	-4 - 8			15	24/0	Zr-95	<15
	15	23/0	Ba-140	-7 - 5			15	24/0	Ba-140	<15
	fish (pCi/kg wet)		10	gamma isotopic				11	11	gamma isotopic
785		10/10	K-40	2200 - 3700	11	K-40	analysis not required			
66		10/0	Mn-54	-4 - 11	130	11/0	Mn-54			<130
145		10/0	Fe-59	-11 - 80	260	11/0	Fe-59			<260
54		10/0	Co-58	-7 - 30	130	11/0	Co-58			<130
70		10/0	Co-60	-30 - 20	130	11/0	Co-60			<130
133		10/0	Zn-65	-19 - 70	260	11/0	Zn-65			<260
51		10/0	Cs-134	-10 - 17	130	11/0	Cs-134			<130
74		10/10	Cs-137	80 - 170	150	11/3	Cs-137			<150 - 160



Table 3. (continued)

Sample type (units)	Wisconsin data				Point Beach data			
	MDC	Number of <sup>*a</sup> Samples	Analysis	range	LLD	Number of <sup>*a</sup> Samples	Analysis	range
shoreline sediments (pCi/kg dry)	740	3/3	gross beta	6000 - 11000	---	3/3	gross beta	7800 - 8300
		3	gamma isotopic			3	gamma isotopic	
	70	3/0	Co-58	16 - 40			Co-58	analysis not required
	70	3/1	Co-60	30 - 130			Co-60	analysis not required
	60	3/0	Cs-134	-1 - 30			Cs-134	analysis not required
	80	3/1	Cs-137	28 - 90	150	3/0	Cs-137	<150
	800	3/3	K-40	6300 - 7500			K-40	analysis not required
	1900	3/0	Ra-226	400 - 900			Ra-226	analysis not required
	180	3/0	Pb-214	110 - 150			Pb-214	analysis not required
	200	3/0	Bi-214	120 - 160			Bi-214	analysis not required
	300	3/0	Tl-208	100 - 160			Tl-208	analysis not required
320	3/0	Ac-228	120 - 170			Ac-228	analysis not required	
milk (pCi/liter)	0.4	23/0	I-131	-0.8 - 0.4	0.5	24/0	I-131	<0.5
		23	gamma isotopic			24	gamma isotopic	
	120	23/23	K-40	1210 - 1540			K-40	analysis not required
	12	23/1	Cs-134	-1 - 18	5	24/0	Cs-134	<5
	12	23/0	Cs-137	-3 - 10	5	24/0	Cs-137	<5
15	23/0	Ba-140	-9 - 7	5	24/0	Ba-140	<5	
vegetation (pCi/kg wet)	740	4/4	gross beta	3000 - 6000	---	4/4	gross beta	3400 - 4700
		4	gamma isotopic			4	gamma isotopic	
	1100	4/4	Be-7	2400 - 8100			Be-7	analysis not required
	600	4/4	K-40	1600 - 4700			K-40	analysis not required
	50	4/0	Co-58	-11 - 1			Co-58	analysis not required
	55	4/0	Co-60	-6 - 8			Co-60	analysis not required
	80	4/0	Zr-95	-11 - 19			Zr-95	analysis not required
	60	4/0	I-131	-3 - 14	60	4/0	I-131	<60
	50	4/0	Cs-134	-4 - 1	60	4/0	Cs-134	<60
	60	4/0	Cs-137	-9 - (-3)	80	4/0	Cs-137	<80

\* a - Number of samples / number of analyses detected above MDC or LLD.



Table 4. U.S. Environmental Protection Agency's crosscheck program, comparison of EPA and State Laboratory of Hygiene (SLH) results.

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a		
			SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	01-06-84	Sr-89	39+/-1.5	36+/-5	0.9
		Sr-90	21+/-1.1	24+/-1.5	-3.1
Water	01-20-84	Alpha	11+/-2	10+/-5.0	0.2
		Beta	8+/-1.8	12+/-5.0	-1.5
Food	01-27-84	Sr-89	No data provided	34+/-5.0	
		Sr-90	No data provided	20+/-5.0	
		I-131	22+/-5	20+/-6.0	0.6
		Cs-137	21+/-5	20+/-5.0	0.5
		K	2958+/-180	2720+/-136	3.0
Water	02-03-84	Cr-51	<60	40+/-5	
		Co-60	11+/-3	10+/-5	0.2
		Zn-65	54+/-8	50+/-5	1.4
		Ru-106	<50	61+/-5	
		Cs-134	29+/-5	31+/-5	-0.7
		Cs-137	15+/-4	16+/-5	-0.2
Water	02-10-84	H-3	2767+/-390	2383+/-351	1.9
Milk	03-02-84	I-131	6+/-1.0	6+/-0.9	0.0
Water	03-09-84	Ra-226	4.8+/-0.6	4.1+/-0.6	1.9
		Ra-228	2.2+/-0.3	2.0+/-0.3	1.2
Water	03-18-84	Alpha	5+/-2	5+/-5.0	0.2
		Beta	18+/-2	20+/-5.0	-0.6
Filter	03-23-84	Alpha	20+/-2	15+/-5	1.6
		Beta	49+/-4	51+/-5	-0.6
		Sr-90	20+/-1.5	21+/-1.5	-0.8
		Cs-137	12+/-5	10+/-5	0.6
Water	04-06-84	I-131	4+/-1.0	6+/-0.9	-4.3
Water	04-13-84	H-3	3330+/-400	3508+/-364	-0.8
Water	05-04-84	Sr-89	21+/-1.0	25+/-5	-1.4
		Sr-90	5+/-0.7	5+/-1.5	0.0
Water	05-18-84	Alpha	4+/-1.3	3+/-5.0	0.3
		Beta	8+/-1.5	6+/-5.0	0.6

Table 4 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a		
			SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	06-08-84	H-3	3007+/-400	3081+/-389	-0.2
Water	06-01-84	Cr-51	63+/-30	66+/-5	-1.2
		Co-60	32+/-3	31+/-5	0.5
		Zn-65	68+/-7	63+/-5	1.7
		Ru-106	<35	29+/-5	
		Cs-134	44+/-4	47+/-5	-1.0
		Cs-137	37+/-3	37+/-5	0.0
Water	06-15-84	Ra-226	4.5	3.5+/-0.53	3.4
		Ra-228	1.8	2.0+/-0.30	-1.0
Milk	06-22-84	Sr-89	No data provided	25+/-5	
		Sr-90	17+/-1.5	17+/-1.5	0.4
		I-131	44+/-8	43+/-6	0.2
		Cs-137	39+/-9	35+/-5	1.3
		K	1710+/-210	1496+/-75	4.9
Water	07-20-84	Alpha	6+/-1.5	6+/-5	-0.1
		Beta	9+/-1.7	13+/-5	-1.4
Water	08-03-84	I-131	33+/-5	34+/-6	-0.2
Water	08-07-84	H-3	2970+/-360	2817+/-356	0.7
Filter	08-24-84	Alpha	19+/-1.7	17+/-5	0.6
		Beta	47+/-2	51+/-5	-1.5
		Sr-90	17+/-1.0	18+/-1.5	-1.2
		Cs-137	18+/-5	15+/-5	1.2
Water	09-07-84	Sr-89	31+/-1.6	34+/-5	-0.9
		Sr-90	20+/-1.1	19+/-1.5	1.2
Water	09-14-84	Ra-226	5.1+/-0.7	4.9+/-0.74	0.4
		Ra-228	2.1+/-0.4	2.3+/-0.35	-1.2
Water	10-05-84	Cr-51	48+/-16	40+/-5	2.9
		Co-60	19+/-3	20+/-5	-0.2
		Zn-65	158+/-9	147+/-7.4	2.5
		Ru-106	47+/-16	47+/-5	0.0
		Cs-134	29+/-3	31+/-5	-0.8
		Cs-137	23+/-3	24+/-5	-0.2
Water	10-12-84	H-3	2783+/-320	2810+/-356	-0.1

Table 4 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a		
			SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	10-22-84	Alpha	13+/-2	14+/-5.0	-0.2
		Beta	69+/-5	64+/-5.0	1.7
		Ra-226	3.0+/-0.5	3.0+/-0.45	0.0
		Ra-228	3.1+/-0.3	2.1+/-0.32	5.2
		Sr-89	12+/-4	11+/-5.0	0.2
		Sr-90	13+/-1.5	12+/-1.5	1.5
		Co-60	15+/-5	14+/-5.0	0.5
		Cs-134	<10	2+/-5.0	
		Cs-137	15+/-5	14+/-5.0	0.2
Milk	10-26-84	Sr-89	No data provided	22+/-5	
		Sr-90	No data provided	16+/-1.5	
		I-131	41+/-9	42+/-6	-0.2
		Cs-137	30+/-7	32+/-5	-0.6
		K	1567+/-150	1517+/-76	1.1
Water	11-16-84	Alpha	8+/-4	7+/-5	0.2
		Beta	22+/-2	20+/-5.0	0.8
Filter	11-23-84	Alpha	18+/-5	15+/-5	1.2
		Beta	53+/-5	52+/-5	0.2
		Sr-90	20+/-1.5	21+/-1.5	-1.2
		Cs-137	11+/-4	10+/-5	0.3
Water	12-07-84	I-131	41+/-8	36+/-6	1.4
Water	12-14-84	H-3	2977+/-320	3182+/-360	-1.0
Water	01-04-85	Sr-89	<1	3+/-5	
		Sr-90	31+/-2	30+/-1.5	0.8
Water	01-18-85	Alpha	4+/-2	5+/-5	-0.3
		Beta	20+/-2	15+/-5	1.6
Food	01-25-85	Sr-89	No data provided	34.0+/-5.0	
		Sr-90	No data provided	26.0+/-1.5	
		I-131	33+/-6	35+/-6	-0.4
		Cs-137	30+/-6	29+/-5	0.2
		K	1290+/-90	1382+/-120	0.9
Water	02-08-85	Cr-51	53+/-18	43+/-5	1.8
		Co-60	18+/-5	20+/-5	-0.7
		Zn-65	59+/-5	55+/-5	1.4
		Ru-106	31+/-5	25+/-5	2.0
		Cs-134	35+/-5	35+/-5	0.0
		Cs-137	25+/-5	25+/-5	0.1

Table 4 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a		
			SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	02-15-85	H-3	3927+/-330	3796+/-366	0.6
Milk	03-01-85	I-131	9+/-1.0	9+/-0.9	0.6
Water	03-15-85	Ra-226	4.3+/-0.8	5.0+/-0.75	-1.6
		Ra-228	7.8+/-1.4	9.0+/-1.35	-1.6
Water	03-22-85	Alpha	6+/-3	6+/-5	0.0
		Beta	15+/-2	15+/-5	-0.1
Filter	03-29-85	Alpha	12.7+/-4	10.0+/-5.0	0.9
		Beta	33+/-4	36.0+/-5.0	-1.0
		Sr-90	15+/-2	15.0+/-1.5	0.0
		Cs-137	9.3+/-4	6.0+/-5.0	1.1
Water	04-05-85	I-131	8.0+/-1.0	7.5+/-0.8	1.1
Water	04-12-85	H-3	3480+/-350	3559+/-364	-0.4
Water	04-19-85	Alpha	34.7+/-3	32.0+/-5.0	0.9
		Beta	75.3+/-5	72.0+/-5.0	1.2
		Ra-226	6.9+/-0.6	4.1+/-0.6	8.2
		Ra-228	12.0+/-0.9	6.2+/-0.9	11.1
		U	No data provided	7.0+/-6.0	
		Sr-89	13.3+/-5	10.0+/-5.0	1.2
		Sr-90	12.7+/-1.5	15.0+/-1.5	-2.3
		Co-60	14+/-4	15.0+/-5.0	-0.3
		Cs-134	12+/-4	15.0+/-5.0	-1.0
		Cs-137	10.7+/-4	12.0+/-5.0	-0.5
Water	05-10-85	Sr-90	15.3+/-1.2	15.0+/-1.5	0.4
		Sr-89	39.0+/-1.5	39.0+/-5.0	0.0
Water	05-24-85	Alpha	11.7+/-2	12.0+/-5.0	-0.1
		Beta	13.7+/-1.8	11.0+/-5.0	0.9
Water	06-07-85	Cr-51	52+/-8	44.0+/-5.0	2.9
		Co-60	13+/-2	14.0+/-5.0	-0.2
		Zn-65	50+/-6	47.0+/-5.0	1.2
		Ru-106	57+/-19	62.0+/-5.0	-1.6
		Cs-134	36+/-3	35.0+/-5.0	0.2
		Cs-137	19+/-3	20.0+/-5.0	-0.2
Water	06-14-85	H-3	2200+/-320	2416+/-351	-1.1

Table 4 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a		
			SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	06-21-85	Ra-226	3.2+/-0.5	3.1+/-0.4	0.3
		Ra-228	5.2+/-0.6	4.2+/-0.6	2.7
Milk	06-28-85	Sr-89	No data provided	11.0+/-5.0	
		Sr-90	14+/-2	11.0+/-1.5	3.9
		I-131	12+/-5	11.0+/-6.0	0.3
		Cs-137	11+/-5	11.0+/-5.0	-0.1
		K	1660+/-120	1525+/-76	3.1
Water	07-19-85	Alpha	10.7+/-1.5	11.0+/-5.0	0.6
		Beta	10.0+/-1.5	8.0+/-5.0	0.7
Food	07-26-85	Sr-89	No data provided	33.0+/-5.0	
		Sr-90	No data provided	26.0+/-1.5	
		I-131	32+/-8	35.0+/-6.0	-0.9
		Cs-137	28+/-8	29.0+/-5.0	-0.2
		K	1560+/-100	1514+/-76	1.0
Water	08-09-85	I-131	29+/-10	33.0+/-6.0	-1.3
Water	08-14-85	H-3	4453+/-360	4480+/-448	-0.1
Water	08-23-85	U	5+/-5	4.0+/-6.0	0.3
Filter	08-30-85	Alpha	15.3+/-1.5	13.0+/-5.0	0.8
		Beta	41.0+/-1.5	44.0+/-5.0	-1.0
		Sr-90	19.0+/-1.5	18.0+/-1.5	1.2
		Cs-137	7.7+/-4	8.0+/-5.0	-0.1
Water	09-06-85	Sr-89	23+/-2	20.0+/-5.0	1.2
		Sr-90	6.0+/-1.5	7.0+/-1.5	-1.2
Water	09-13-85	Ra-226	8.7+/-1.3	8.9+/-1.3	-0.3
		Ra-228	3.4+/-0.8	4.6+/-0.7	-2.9
Water	09-20-85	Alpha	7.3+/-1.7	8.0+/-5.0	-0.2
		Beta	10.0+/-1.7	8.0+/-5.0	0.7
Water	10-04-85	Cr-51	<44.	21.0+/-5.0	
		Co-60	19+/-5	20.0+/-5.0	-0.3
		Zn-65	21+/-5	19.0+/-5.0	0.8
		Ru-106	<40	20.0+/-5.0	
		Cs-134	16+/-5	20.0+/-5.0	-1.3
		Cs-137	19+/-5	20.0+/-5.0	-0.2
Water	10-11-85	H-3	1823+/-320	1974+/-345	-0.8

Table 4 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a		
			SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Milk	10-25-85	Sr-89	No data provided	48.0+/-5.0	
		Sr-90	30.7+/-1.8	26.0+/-1.5	5.4
		I-131	41+/-5	42.0+/-6.0	-0.2
		Cs-137	56+/-5	56.0+/-5.0	0.1
		K	1630+/-180	1540.+/-77.0	2.0
Water	12-06-85	I-131	46+/-5	45.0+/-6.0	0.2

\* a - pCi/sample refers to the following:

<u>Sample</u>	<u>Units</u>
water	pCi/liter
milk	pCi/liter except for K mg/liter
food	pCi/kg except for K mg/kg
filter	pCi/filter



Table 5. Air particulate gross beta and air iodine (I-131) results for January - June, 1985. Indicator site.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach

1985

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Measurements in units of pCi/M<sup>3</sup>

WI - Section of Radiation Protection data

Point Beach data

North Property Line  
1.3 miles NNW

North Property Line  
1.3 miles NNW

Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
01-08-85	0.016+/-0.002	0.002+/-0.04	01-07-85	0.01+/-0.01	<0.03
01-18-85	0.010+/-0.001	-0.009+/-0.02	01-14-85	0.01+/-0.01	<0.03
01-24-85	0.012+/-0.002	0.002+/-0.02	01-21-85	0.01+/-0.01	<0.03
01-31-85	0.014+/-0.001	0.018+/-0.03	01-28-85	0.01+/-0.01	<0.03
02-07-85	0.021+/-0.002	-0.006+/-0.03	02-04-85	0.02+/-0.01	<0.03
02-15-85	0.013+/-0.001	0.008+/-0.03	02-12-85	0.01+/-0.01	<0.03
02-21-85	0.018+/-0.002	-0.010+/-0.03	02-18-85	0.01+/-0.01	<0.03
02-26-85	0.015+/-0.002	-0.006+/-0.02	02-25-85	0.02+/-0.01	<0.03
03-07-85	0.013+/-0.001	0.015+/-0.03	03-05-85	<0.01	<0.03
03-15-85	0.012+/-0.001	-0.013+/-0.03	03-11-85	0.01+/-0.01	<0.03
03-21-85	0.013+/-0.002	0.008+/-0.04	03-18-85	0.01+/-0.01	<0.03
03-26-85	0.014+/-0.002	0.012+/-0.04	03-25-85	0.01+/-0.01	<0.03
04-04-85	0.010+/-0.001	-0.004+/-0.012	04-01-85	0.01+/-0.01	<0.03
04-11-85	0.002+/-0.001	0.005+/-0.03	04-08-85	0.01+/-0.01	<0.03
04-18-85	0.010+/-0.001	-0.002+/-0.02	04-15-85	0.02+/-0.01	<0.03
04-24-85	0.017+/-0.002	0.012+/-0.03	04-22-85	0.02+/-0.01	<0.03
05-02-85	0.008+/-0.001	-0.009+/-0.03	04-29-85	0.01+/-0.01	<0.03
05-10-85	0.003+/-0.001	0.000+/-0.03	05-06-85	0.02+/-0.01	<0.03
05-15-85	* a	* a	05-13-85	0.02+/-0.01	<0.03
05-22-85	0.000+/-0.001	-0.004+/-0.02	05-20-85	0.01+/-0.01	<0.03
05-29-85	0.010+/-0.001	-0.008+/-0.03	05-27-85	0.01+/-0.01	<0.03
06-07-85	0.008+/-0.001	0.004+/-0.02	06-03-85	0.01+/-0.01	<0.03
06-13-85	0.010+/-0.001	-0.008+/-0.03	06-10-85	0.02+/-0.01	<0.03
06-21-85	0.012+/-0.001	0.011+/-0.03	06-17-85	0.01+/-0.01	<0.03
06-26-85	0.013+/-0.002	-0.012+/-0.03	06-24-85	0.01+/-0.01	<0.03
07-03-85	0.009+/-0.001	-0.003+/-0.03	07-01-85	0.02+/-0.01	<0.03

\* a - Pump was not operating. Samples were not collected.

Table 6. Air particulate gross beta and air iodine (I-131) results for July - December, 1985. Indicator site.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach

1985

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Measurements in units of pCi/M<sup>3</sup>

WI - Section of Radiation Protection data

Point Beach data

North Property Line  
1.3 miles NNW

North Property Line  
1.3 miles NNW

Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
07-10-85	0.012+/-0.001	0.010+/-0.02	07-08-85	0.02+/-0.01	<0.03
07-24-85	0.012+/-0.001	-0.004+/-0.014	07-15-85	0.03+/-0.01	<0.03
07-31-85	0.011+/-0.001	-0.003+/-0.04	07-22-85	0.02+/-0.01	<0.03
08-07-85	0.013+/-0.001	-0.002+/-0.02	07-29-85	0.02+/-0.01	<0.03
08-16-85	0.013+/-0.001	0.001+/-0.014	08-05-85	0.02+/-0.01	<0.03
08-21-85	0.007+/-0.001	0.001+/-0.02	08-12-85	0.02+/-0.01	<0.03
08-28-85	0.011+/-0.001	0.002+/-0.014	08-19-85	0.02+/-0.01	<0.03
09-05-85	0.012+/-0.001	-0.003+/-0.013	08-26-85	0.02+/-0.01	<0.03
09-12-85	0.011+/-0.001	-0.004+/-0.02	09-03-85	0.02+/-0.01	<0.03
09-19-85	0.014+/-0.001	-0.004+/-0.018	09-09-85	0.02+/-0.01	<0.03
09-26-85	0.008+/-0.001	-0.006+/-0.03	09-16-85	0.02+/-0.01	<0.03
10-04-85	0.015+/-0.001	-0.007+/-0.03	09-23-85	0.03+/-0.01	<0.03
10-11-85	0.012+/-0.001	-0.004+/-0.04	09-30-85	0.02+/-0.01	<0.03
10-17-85	0.010+/-0.001	-0.011+/-0.04	10-07-85	0.02+/-0.01	<0.03
10-24-85	0.015+/-0.001	0.001+/-0.018	10-15-85	0.02+/-0.01	<0.03
10-30-85	0.009+/-0.001	0.006+/-0.03	10-21-85	0.02+/-0.01	<0.03
11-07-85	0.006+/-0.001	-0.004+/-0.03	10-28-85	0.02+/-0.01	<0.03
11-15-85	0.010+/-0.001	-0.001+/-0.03	11-04-85	0.01+/-0.01	<0.03
11-20-85	0.016+/-0.002	-0.007+/-0.03	11-11-85	0.01+/-0.01	<0.03
11-27-85	0.023+/-0.002	0.014+/-0.05	11-18-85	0.02+/-0.01	<0.03
12-05-85	0.019+/-0.001	-0.006+/-0.016	11-25-85	0.03+/-0.01	<0.03
12-12-85	0.031+/-0.002	-0.015+/-0.02	12-03-85	0.03+/-0.01	<0.03
12-18-85	0.026+/-0.002	-0.006+/-0.03	12-09-85	0.06+/-0.01	<0.03
12-26-85	0.017+/-0.001	-0.005+/-0.03	12-16-85	0.04+/-0.01	<0.03
01-02-86	0.012+/-0.001	0.001+/-0.03	12-23-85	0.03+/-0.01	<0.03
			12-30-85	0.02+/-0.01	<0.03

Table 7. Air particulate gross beta and air iodine (I-131) results for January - June, 1985. Control site.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach

1985

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Measurements in units of pCi/M<sup>3</sup>

WI - Section of Radiation Protection data

Green Bay Pumping Station - Rostok  
15.6 miles NNE

Point Beach data

Silver Lake College  
17 miles WSW

Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
01-04-85	0.003+/-0.001	0.002+/-0.02	01-07-85	0.03+/-0.01	<0.03
01-11-85	0.013+/-0.003	0.008+/-0.06	01-14-85	0.04+/-0.01	<0.03
01-18-85	0.013+/-0.001	-0.006+/-0.02	01-21-85	0.02+/-0.01	<0.03
02-01-85	0.010+/-0.001	0.012+/-0.02	01-28-85	0.02+/-0.02	<0.03
02-08-85	0.019+/-0.002	-0.003+/-0.02	02-04-85	0.01+/-0.01	<0.03
02-15-85	0.013+/-0.001	0.001+/-0.02	02-12-85	0.02+/-0.01	<0.03
02-22-85	0.015+/-0.001	0.001+/-0.02	02-18-85	0.03+/-0.01	<0.03
03-01-85	0.011+/-0.001	-0.015+/-0.03	02-25-85	<0.01	<0.03
03-08-85	0.011+/-0.001	-0.001+/-0.02	03-05-85	0.02+/-0.01	<0.03
03-15-85	0.012+/-0.001	-0.003+/-0.02	03-11-85	0.02+/-0.01	<0.03
03-22-85	0.009+/-0.001	0.005+/-0.02	03-18-85	0.01+/-0.01	<0.03
03-30-85	0.010+/-0.001	-0.004+/-0.02	03-25-85	0.02+/-0.01	<0.03
04-05-85	0.007+/-0.001	0.002+/-0.03	04-01-85	0.01+/-0.01	<0.03
04-12-85	0.013+/-0.001	0.000+/-0.02	04-08-85	0.01+/-0.01	<0.03
04-19-85	0.013+/-0.001	0.001+/-0.02	04-15-85	0.02+/-0.01	<0.03
04-27-85	0.011+/-0.001	-0.005+/-0.02	04-22-85	0.01+/-0.01	<0.03
05-03-85	0.009+/-0.001	-0.003+/-0.02	04-29-85	0.01+/-0.01	<0.03
05-10-85	0.010+/-0.001	0.007+/-0.02	05-06-85	0.02+/-0.01	<0.03
05-17-85	0.007+/-0.001	-0.002+/-0.02	05-13-85	0.01+/-0.01	<0.03
05-24-85	0.004+/-0.001	-0.014+/-0.03	05-20-85	0.01+/-0.01	<0.03
05-31-85	0.009+/-0.001	-0.009+/-0.02	05-27-85	0.01+/-0.01	<0.03
06-07-85	0.005+/-0.001	0.000+/-0.015	06-03-85	0.01+/-0.01	<0.03
06-14-85	0.008+/-0.001	0.000+/-0.015	06-10-85	0.01+/-0.01	<0.03
06-21-85	0.009+/-0.001	0.000+/-0.02	06-17-85	0.01+/-0.01	<0.03
06-28-85	0.011+/-0.001	0.002+/-0.02	06-24-85	0.02+/-0.01	<0.03
			07-01-85	0.02+/-0.01	<0.03

Table 8. Air particulate gross beta and air iodine (I-131) results for July - December, 1985. Control site.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach

1985

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Measurements in units of pCi/M<sup>3</sup>

WI - Section of Radiation Protection data

Green Bay Pumping Station - Rostok  
15.6 miles NNE

Point Beach data

Silver Lake College  
17 miles WSW

Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
07-12-85	0.008+/-0.001	0.008+/-0.017	07-08-85	0.02+/-0.01	<0.03
07-19-85	0.011+/-0.001	-0.002+/-0.02	07-15-85	0.03+/-0.01	<0.03
07-26-85	0.009+/-0.001	0.001+/-0.016	07-22-85	0.02+/-0.01	<0.03
08-02-85	0.008+/-0.001	0.019+/-0.03	07-29-85	0.02+/-0.01	<0.03
08-09-85	0.011+/-0.001	0.005+/-0.015	08-05-85	0.02+/-0.01	<0.03
08-16-85	0.010+/-0.001	-0.010+/-0.014	08-12-85	0.02+/-0.01	<0.03
08-23-85	0.008+/-0.001	-0.001+/-0.014	08-19-85	0.03+/-0.01	<0.03
08-30-85	0.012+/-0.001	-0.004+/-0.018	08-26-85	0.02+/-0.01	<0.03
09-06-85	0.007+/-0.001	-0.003+/-0.018	09-03-85	0.02+/-0.01	<0.03
09-13-85	0.009+/-0.001	-0.003+/-0.018	09-09-85	0.02+/-0.01	<0.03
09-20-85	0.013+/-0.001	0.006+/-0.016	09-16-85	0.02+/-0.01	<0.03
09-27-85	0.007+/-0.001	-0.003+/-0.03	09-23-85	0.02+/-0.01	<0.03
10-04-85	0.011+/-0.001	-0.006+/-0.015	09-30-85	0.02+/-0.01	<0.03
10-12-85	0.009+/-0.001	0.004+/-0.03	10-07-85	0.02+/-0.01	<0.03
10-18-85	0.010+/-0.001	-0.003+/-0.019	10-15-85	0.01+/-0.01	<0.03
10-25-85	0.008+/-0.001	0.009+/-0.03	10-21-85	0.02+/-0.01	<0.03
11-02-85	0.007+/-0.001	0.014+/-0.03	10-28-85	0.02+/-0.01	<0.03
11-08-85	0.003+/-0.001	0.005+/-0.03	11-04-85	0.01+/-0.01	<0.03
11-15-85	0.009+/-0.001	0.001+/-0.03	11-11-85	0.01+/-0.01	<0.03
11-22-85	0.023+/-0.002	0.014+/-0.04	11-18-85	0.03+/-0.01	<0.03
11-29-85	0.021+/-0.002	-0.003+/-0.02	11-25-85	0.05+/-0.01	<0.03
12-06-85	0.017+/-0.002	-0.007+/-0.04	12-03-85	0.02+/-0.01	<0.03
12-13-85	0.028+/-0.002	-0.010+/-0.03	12-09-85	0.02+/-0.01	<0.03
12-20-85	0.013+/-0.001	-0.014+/-0.04	12-16-85	0.02+/-0.01	<0.03
12-28-85	0.013+/-0.001	-0.006+/-0.03	12-23-85	0.01+/-0.01	<0.03
01-03-86	0.012+/-0.002	-0.009+/-0.03	12-30-85	<0.01	<0.03

Table 9. Gamma isotopic results for January - December, 1985 from the monthly composite of air particulate samples. Indicator site.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach  
1985

Measurements in units of pCi/M<sup>3</sup>

WI - Section of Radiation Protection data

North Property Line  
1.3 miles NNW

	January	February	March	April	May	June
Be-7	0.045+/-0.014	0.07+/-0.02	0.11+/-0.03	0.08+/-0.02	0.06+/-0.02	0.09+/-0.03
Zr,Nb-95	-0.001+/-0.003	0.001+/-0.004	0.004+/-0.006	0.000+/-0.004	-0.001+/-0.005	-0.003+/-0.005
Ru-103	0.000+/-0.001	-0.001+/-0.002	0.001+/-0.003	0.000+/-0.002	0.000+/-0.002	0.000+/-0.003
Ru-106	-0.003+/-0.008	-0.002+/-0.012	0.010+/-0.02	-0.001+/-0.011	-0.001+/-0.015	0.008+/-0.019
Cs-134	0.000+/-0.001	0.000+/-0.001	-0.001+/-0.002	0.000+/-0.001	0.000+/-0.002	0.000+/-0.002
Cs-137	0.000+/-0.001	0.000+/-0.001	0.000+/-0.003	0.000+/-0.001	0.000+/-0.002	0.000+/-0.002
Ce-141	0.000+/-0.002	-0.002+/-0.002	0.003+/-0.004	0.000+/-0.002	0.001+/-0.003	0.000+/-0.004
Ce-144	0.006+/-0.006	0.001+/-0.007	0.005+/-0.012	0.002+/-0.007	0.000+/-0.009	-0.001+/-0.010

  

	July	August	September	October	November	December
Be-7	0.075+/-0.017	0.10+/-0.02	0.070+/-0.018	0.056+/-0.014	0.056+/-0.016	0.065+/-0.015
Zr,Nb-95	0.001+/-0.003	0.002+/-0.004	0.001+/-0.004	0.001+/-0.003	0.000+/-0.003	0.001+/-0.003
Ru-103	0.000+/-0.002	0.000+/-0.002	-0.001+/-0.002	0.001+/-0.001	0.000+/-0.001	0.000+/-0.001
Ru-106	0.002+/-0.010	0.000+/-0.010	0.002+/-0.010	0.000+/-0.008	0.003+/-0.010	0.001+/-0.008
Cs-134	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001
Cs-137	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.001+/-0.001
Ce-141	0.000+/-0.002	0.000+/-0.003	0.000+/-0.002	0.000+/-0.002	0.001+/-0.002	0.000+/-0.002
Ce-144	0.005+/-0.006	0.002+/-0.006	0.002+/-0.006	0.001+/-0.004	-0.002+/-0.005	-0.001+/-0.004

Isotopes other than those reported were not detected.

Point Beach data

North Property Line  
1.3 miles NNW

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Gamma isotopic	<0.01 *a	<0.01 *a		
Cs-134			<0.01 *b	<0.01 *b
Cs-137			<0.01 *b	<0.01 *b

\*a - Unless otherwise noted the less than value ('<') is for Cs-137 and may be higher or lower for other radionuclides.

\*b - According to Point Beach Radiological Effluent Technical Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.

The gamma isotopic analysis is performed on a quarterly composite.



Table 10. Gamma isotopic results for January - December, 1985 from the monthly composite of air particulate samples. Control site.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach  
1985

Measurements in units of pCi/M<sup>3</sup>

WI - Section of Radiation Protection data

Green Bay Pumping Station - Rostok  
15.6 miles NNE

	January	February	March	April	May	June
Be-7	0.045+/-0.014	0.06+/-0.02	0.07+/-0.02	0.071+/-0.014	0.055+/-0.015	0.104+/-0.019
Zr,Nb-95	0.000+/-0.003	0.001+/-0.005	0.000+/-0.004	0.000+/-0.002	0.000+/-0.003	-0.001+/-0.004
Ru-103	0.000+/-0.001	0.002+/-0.002	-0.001+/-0.002	0.000+/-0.001	0.000+/-0.001	-0.001+/-0.002
Ru-106	0.001+/-0.008	0.011+/-0.018	-0.002+/-0.012	0.001+/-0.007	0.006+/-0.010	0.000+/-0.013
Cs-134	0.000+/-0.001	0.000+/-0.002	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001
Cs-137	0.000+/-0.001	0.000+/-0.002	-0.001+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001
Ce-141	0.000+/-0.002	0.003+/-0.003	0.000+/-0.003	0.001+/-0.002	0.000+/-0.002	0.000+/-0.003
Ce-144	0.002+/-0.005	0.005+/-0.010	-0.002+/-0.007	0.000+/-0.005	0.000+/-0.005	0.000+/-0.007
	July	August	September	October	November	December
Be-7	0.074+/-0.014	0.078+/-0.018	0.055+/-0.018	0.050+/-0.013	0.062+/-0.018	0.052+/-0.014
Zr,Nb-95	0.000+/-0.002	0.002+/-0.003	-0.001+/-0.003	0.000+/-0.002	0.001+/-0.004	0.000+/-0.003
Ru-103	0.000+/-0.001	0.000+/-0.002	-0.001+/-0.002	0.000+/-0.001	0.000+/-0.002	0.000+/-0.001
Ru-106	0.001+/-0.008	0.002+/-0.010	-0.004+/-0.009	0.003+/-0.008	-0.001+/-0.013	0.002+/-0.008
Cs-134	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	-0.001+/-0.001	0.000+/-0.001
Cs-137	0.000+/-0.001	-0.001+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001
Ce-141	0.001+/-0.002	0.000+/-0.002	0.000+/-0.002	0.000+/-0.001	0.001+/-0.002	0.000+/-0.002
Ce-144	0.000+/-0.005	-0.002+/-0.006	0.000+/-0.005	0.002+/-0.004	-0.002+/-0.006	-0.003+/-0.004

Isotopes other than those reported were not detected.

Point Beach data

Silver Lake College  
17 miles WSW

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Gamma Isotopic	<0.01 *a	<0.01 *a		
Cs-134			<0.01 *b	<0.01 *b
Cs-137			<0.01 *b	<0.01 *b

\*a - Unless otherwise noted the less than value ("<") is for Cs-137 and may be higher or lower for other radionuclides.

\*b - According to Point Beach Radiological Effluent Technical Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.

The gamma isotopic analysis is performed on a quarterly composite.



Table 11. Analysis of surface water samples from January - June, 1985. Indicator site.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach  
1985

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Measurements in units of pCi/liter

WI - Section of Radiation Protection data

Effluent channel  
0.1 mile E

Collection Date	January	February	March	April	May	June
Gross Alpha-sol.	0.4+/-0.8	-0.3+/-0.7	0.1+/-0.8	0.0+/-0.9	-0.2+/-1.0	0.7+/-0.9
Gross Alpha-insol	0.0+/-0.4	0.0+/-0.6	0.6+/-0.7	0.2+/-0.5	0.2+/-0.6	0.8+/-0.7
Gross Beta-sol.	3.7+/-1.2	3.6+/-1.2	3.1+/-1.2	4.2+/-1.3	3.9+/-1.3	3.8+/-1.2
Gross Beta-insol.	0.6+/-1.0	0.1+/-0.9	1.8+/-1.1	0.5+/-1.0	-2.6+/-0.7	1.6+/-1.1
H-3	420+/-290	170+/-290	100+/-310	190+/-290	-9+/-290	150+/-300
Sr-89	1.3+/-0.6	0.4+/-0.4	0.02+/-0.5	0.13+/-0.4	-0.5+/-0.5	-0.4+/-0.8
Sr-90	-0.7+/-0.6	0.0+/-0.4	0.8+/-0.5	0.6+/-0.3	1.1+/-0.5	0.8+/-0.7
I-131	1.7+/-0.3	0.61+/-0.18	-0.6+/-0.12	-0.28+/-0.10	0.3+/-0.2	-0.15+/-0.10
Gamma Isotopic						
Mn-54	-2+/-4	-3+/-4	2+/-3	-2+/-4	0+/-5	3+/-5
Fe-59	0+/-8	0+/-8	-1+/-5	-1+/-8	3+/-8	-1+/-8
Co-58	1+/-4	0+/-4	0+/-3	2+/-4	0+/-5	1+/-4
Co-60	-1+/-5	1+/-5	2+/-3	-1+/-5	-1+/-5	2+/-6
Zn-65	1+/-10	2+/-10	2+/-6	4+/-10	3+/-11	8+/-11
Cs-134	2+/-5	-1+/-4	1+/-3	5+/-5	3+/-5	-1+/-6
Cs-137	-2+/-5	0+/-5	-1+/-3	-1+/-5	5+/-5	0+/-5
Zr-95	-1+/-11	-1+/-11	5+/-7	-3+/-10	3+/-11	-4+/-13
Ba,La-140	-4+/-7	-3+/-8	-2+/-5	-3+/-7	-2+/-6	-3+/-7

Isotopes other than those reported were not detected.

Point Beach Data

Effluent channel  
0.1 mile E

Collection Date	01-02-85	02-04-85	03-06-85	04-02-85	05-06-85	06-03-85
Gross Alpha * a						
Gross Beta	2.6+/-0.6	1.6+/-0.6	2.7+/-0.6	2.5+/-0.6	2.5+/-0.4	2.7+/-0.4
H-3 * b			<500			<500
Sr-89 * b			<5			<5
Sr-90 * b			1.0+/-0.3			<1
I-131	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Gamma isotopic * c	<10	<10	<10	<10	<10	<10

\* a - Analysis was not performed.

\* b - Analyses are performed on a quarterly composite.

\* c - Unless noted the less than value '<' is for Cs-137 and may be higher or lower for other radionuclides.

Table 12. Analysis of surface water samples from July - December, 1985. Indicator site.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach  
1985

Measurements in units of pCi/liter

WI - Section of Radiation Protection data

Effluent channel  
0.1 mile E

Collection Date	July	August	September	October	November	December
Gross Alpha-sol.	2.0+/-1.3	-0.1+/-0.8	1.2+/-1.0	-0.5+/-0.7	1.2+/-1.0	0.6+/-1.0
Gross Alpha-insol	0.0+/-0.6	0.4+/-0.6	-0.1+/-0.5	0.4+/-0.6	0.4+/-0.7	0.3+/-0.6
Gross Beta-sol.	5.0+/-1.4	3.1+/-1.2	3.1+/-1.2	2.5+/-1.1	4.5+/-1.3	2.7+/-1.1
Gross Beta-insol.	0.9+/-1.0	1.5+/-1.0	0.8+/-1.0	1.1+/-1.0	1.2+/-1.0	-0.4+/-0.9
H-3	4+/-300	770+/-310	80+/-300	300+/-320	250+/-310	-230+/-320
Sr-89	-0.3+/-0.6	0.4+/-0.4	-1.2+/-0.4	0.5+/-0.5	-0.018+/-0.6	-1.0+/-0.3
Sr-90	1.3+/-0.6	0.0+/-0.3	0.5+/-0.4	0.5+/-0.5	0.07+/-0.5	1.0+/-0.3
I-131	-0.01+/-0.09	0.19+/-0.12	-0.14+/-0.12	0.19+/-0.09	-0.03+/-0.11	0.03+/-0.08
Gamma Isotopic						
Mn-54	-1+/-3	-1+/-2	-5+/-7	0+/-4	-1+/-4	0+/-4
Fe-59	4+/-6	2+/-4	-3+/-14	-1+/-9	-1+/-8	-1+/-12
Co-58	3+/-3	1+/-2	0+/-7	1+/-4	3+/-5	3+/-5
Co-60	2+/-4	1+/-3	-1+/-7	-1+/-5	-3+/-5	0+/-5
Zn-65	0+/-7	0+/-4	2+/-15	-3+/-9	1+/-10	5+/-11
Cs-134	2+/-4	-1+/-2	4+/-7	8+/-5	2+/-5	9+/-7
Cs-137	4+/-4	-1+/-2	-1+/-8	-1+/-6	1+/-6	2+/-6
Zr-95	4+/-8	-2+/-5	8+/-17	-4+/-10	-4+/-12	6+/-11
Ba,La-140	-1+/-5	-5+/-4	5+/-10	-7+/-6	-2+/-6	-1+/-7

Isotopes other than those reported were not detected.

Point Beach Data

Effluent channel  
0.1 mile E

Collection Date	07-03-85	08-05-85	09-03-85	11-02-85	11-04-85	12-03-85
Gross Alpha * a						
Gross Beta	2.1+/-0.6	2.3+/-0.6	8.1+/-0.8	2.2+/-0.6	2.5+/-0.6	2.3+/-0.4
H-3 * b			<500			<500
Sr-89 * b			<5			<5
Sr-90 * b			<1			<1
I-131	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Gamma Isotopic						
Mn-54	<10	<10	<10	<10	<10	<10
Fe-59	<30	<20	<30	<30	<30	<30
Co-58	<10	<10	<10	<10	<10	<10
Co-60	<10	<10	<10	<10	<10	<10
Zn-65	<30	<30	<30	<30	<30	<30
Cs-134	<10	<10	<10	<10	<10	<10
Cs-137	<10	<10	<10	<10	<10	<10
Zr-95	<15	<15	<15	<15	<15	<15
Ba,La-140	<15	<15	<15	<15	<15	<15

\* a - Analysis was not performed.

\* b - Analyses are performed on a quarterly composite.

\* d - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.

Table 13. Analysis of surface water samples from January - June, 1985. Control site.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach  
1985

Measurements in units of pCi/liter

WI - Section of Radiation Protection data

Green Bay Pumping Station - Rostok  
15.6 miles NNE

Collection Date	01-04-85	02-04-85	03-12-85	04-01-85	04-30-85	06-03-85
Gross Alpha-sol.	0.0+/-0.6	0.6+/-0.8	-0.3+/-0.7	0.7+/-0.9	0.3+/-0.8	-0.2+/-1.0
Gross Alpha-insol	0.1+/-0.5	-0.1+/-0.4	-0.4+/-0.5	0.1+/-0.6	-0.3+/-0.5	-0.2+/-0.5
Gross Beta-sol.	2.4+/-1.2	2.4+/-1.2	3.7+/-1.2	2.8+/-1.2	2.6+/-1.2	2.9+/-1.2
Gross Beta-insol.	-0.1+/-0.9	0.5+/-0.9	0.1+/-0.9	0.3+/-0.9	-0.1+/-0.9	-0.5+/-0.9
H-3	260+/-280	120+/-280	-140+/-290	-30+/-310	4+/-290	-250+/-290
Sr-89	-0.8+/-0.4	0.0+/-1.2	-0.06+/-0.5	0.5+/-0.4	-0.17+/-0.4	-1.4+/-1.3
Sr-90	1.1+/-0.4	0.0+/-1.0	0.3+/-0.5	0.0+/-0.4	0.8+/-0.4	2.1+/-1.3
I-131	-0.01+/-0.17	-0.2+/-0.2	0.31+/-0.14	-0.01+/-0.12	0.01+/-0.07	-0.19+/-0.09
Gamma Isotopic						
Mn-54	1+/-4	0+/-4	2+/-4	0+/-2	0+/-5	-1+/-4
Fe-59	-4+/-7	1+/-9	2+/-8	0+/-5	-1+/-8	-1+/-8
Co-58	2+/-5	0+/-4	4+/-4	0+/-2	0+/-4	-1+/-4
Co-60	0+/-5	0+/-5	0+/-5	-2+/-3	-1+/-5	-2+/-5
Zn-65	-5+/-8	-2+/-5	3+/-10	0+/-5	-3+/-9	1+/-9
Cs-134	2+/-5	3+/-5	2+/-5	0+/-3	3+/-5	0+/-5
Cs-137	1+/-5	1+/-5	2+/-5	1+/-3	0+/-5	2+/-5
Zr-95	-4+/-10	-1+/-11	-4+/-10	1+/-6	-3+/-10	2+/-11
Ba,La-140	-6+/-6	-4+/-8	-6+/-5	-3+/-4	-3+/-7	-3+/-7

Isotopes other than those reported were not detected.

Point Beach data

Coast Guard Station  
4.8 miles SSE

Collection Date	01-02-85	02-04-85	03-06-85	04-02-85	05-06-85	06-03-85
Gross Beta	5.4+/-0.9	2.3+/-0.6	3.1+/-0.6	4.8+/-0.7	2.8+/-0.6	3.2+/-0.4
H-3 * b			<500			<500
Sr-89 * b			<5			<5
Sr-90 * b			1.7+/-0.4			<1
I-131	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Gamma Isotopic * a	<10	<10	<10	<10	<10	<10

\* a - Unless otherwise noted the less than value '<' is for Cs-137 and may be higher or lower for other radionuclides.

\* b - Analyses are performed on a quarterly composite.

Table 14. Analysis of surface water samples from July - December, 1985. Control site.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach  
1985

Measurements in units of pCi/liter

WI - Section of Radiation Protection data

Green Bay Pumping Station - Rostok  
15.6 miles NNE

Collection Date	* a	08-06-85	09-03-85	10-01-85	11-07-85	12-04-85
Gross Alpha-sol.		0.6+/-0.9	1.2+/-1.1	0.5+/-1.0	0.9+/-1.0	0.3+/-0.8
Gross Alpha-insol		0.4+/-0.7	0.4+/-0.6	0.6+/-0.6	0.0+/-0.5	-0.3+/-0.6
Gross Beta-sol.		2.9+/-1.2	3.2+/-1.2	3.4+/-1.2	3.7+/-1.2	3.0+/-1.2
Gross Beta-insol.		0.3+/-0.9	3.3+/-1.2	1.0+/-1.0	0.5+/-0.9	2.7+/-1.2
H-3		40+/-300	50+/-300	210+/-300	410+/-310	-4+/-310
Sr-89		-1.5+/-2.0	0.4+/-0.4	-0.3+/-0.4	-0.9+/-0.4	-0.11+/-0.3
Sr-90		0.9+/-2.0	0.3+/-0.4	0.9+/-0.4	1.0+/-0.5	0.4+/-0.3
I-131		0.23+/-0.11	0.07+/-0.07	0.01+/-0.08	-0.03+/-0.06	-0.22+/-0.12
Gamma Isotopic						
Mn-54		0+/-4	-1+/-5	2+/-5	1+/-4	0+/-4
Fe-59		0+/-8	3+/-9	3+/-11	1+/-8	3+/-9
Co-58		0+/-5	3+/-5	1+/-5	3+/-5	-1+/-4
Co-60		0+/-5	-1+/-5	-1+/-5	2+/-6	-1+/-5
Zn-65		4+/-10	8+/-11	11+/-12	6+/-10	8+/-11
Cs-134		-1+/-5	-1+/-6	-1+/-6	4+/-6	5+/-6
Cs-137		-1+/-5	-1+/-5	-1+/-5	2+/-6	5+/-6
Zr-95		-4+/-10	4+/-11	3+/-12	-4+/-11	0+/-10
Ba,La-140		-4+/-6	-2+/-8	1+/-10	-3+/-7	-3+/-8

\* a - A sample was not collected for the time period.  
Isotopes other than those reported were not detected.

Point Beach data

Coast Guard Station  
4.8 miles SSE

Collection Date	07-03-85	08-05-85	09-03-85	10-02-85	11-04-85	12-03-85
Gross Beta	2.0+/-0.5	2.5+/-0.6	3.0+/-0.6	3.5+/-0.6	2.4+/-0.6	2.7+/-0.6
H-3 * b			<500			<500
Sr-89 * b			<5			<5
Sr-90 * b			1.1+/-0.5			<1
I-131	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Gamma Isotopic * c						
Mn-54	<10	<10	<10	<10	<10	<10
Fe-59	<30	<30	<30	<30	<30	<30
Co-58	<10	<10	<10	<10	<10	<10
Co-60	<10	<10	<10	<10	<10	<10
Zn-65	<30	<30	<30	<30	<30	<30
Cs-134	<10	<10	<10	<10	<10	<10
Cs-137	<10	<10	<10	<10	<10	<10
Zr-95	<15	<15	<15	<15	<15	<15
Ba,La-140	<15	<15	<15	<15	<15	<15

\* b - Analyses are performed on a quarterly composite.

\* c - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.

Table 15. Analysis of fish samples for 1985.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach  
1985

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Measurements in units of pCi/kg (wet)

WI - Section of Radiation Protection

Collection Date	04-03-85	04-03-85	04-03-85	06-25-85	06-25-85
Type	trout	trout	carp	brown trout	lake trout
Location	Point Beach	Point Beach	Point Beach	Point Beach	Point Beach
Gamma Isotopic					
K-40	2700+/-400	2700+/-700	3100+/-700	3700+/-500	3000+/-5000
Mn-54	-3+/-14	4+/-30	-1+/-20	11+/-16	2+/-13
Fe-59	40+/-40	-11+/-80	80+/-70	50+/-70	15+/-50
Co-58	6+/-19	-3+/-40	30+/-30	-7+/-20	-3+/-18
Co-60	0+/-20	-4+/-40	12+/-30	20+/-19	7+/-30
Zn-65	-5+/-50	70+/-70	50+/-80	5+/-40	30+/-40
Cs-134	17+/-13	-2+/-30	11+/-30	-1+/-16	-1+/-16
Cs-137	170+/-30	160+/-40	80+/-40	100+/-20	150+/-30

Isotopes other than those reported were not detected.

Point Beach data

Measurements in units of pCi/gr (dry)

Collection Date	04-03-85	04-03-85	04-03-85	04-03-85	04-03-85
Type	trout	trout	trout	trout	trout
Location	Point Beach	Point Beach	Point Beach	Point Beach	Point Beach
Gamma Isotopic * a	<1	<1	<1	<1	<1

\* a - Unless otherwise noted the less than value '<' is for Cs-137 and may be higher or lower for other radionuclides.

Table 16. Analysis of fish samples for 1985.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach  
1985

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Measurements in units of pCi/kg (wet)

WI - Section of Radiation Protection

Collection Date	12/18/85	12/18/85	09/18/85	09/18/85	12/18/85
Type	salmon	trout	trout	perch	trout
Location	Point Beach	Point Beach	Point Beach	Point Beach	Point Beach
Gamma Isotopic					
K-40	3000+/-500	2200+/-400	2900+/-500	3200+/-500	2300+/-400
Mn-54	4+/-20	-4+/-17	-3+/-16	-2+/-30	-1+/-13
Fe-59	70+/-60	-4+/-50	30+/-30	7+/-70	9+/-30
Co-58	6+/-30	5+/-16	6+/-15	-2+/-30	-4+/-19
Co-60	-3+/-30	-1+/-20	10+/-18	-30+/-40	11+/-20
Zn-65	-19+/-70	40+/-40	40+/-40	-6+/-70	8+/-40
Cs-134	-6+/-20	10+/-14	16+/-15	-10+/-30	1+/-13
Cs-137	120+/-40	90+/-20	120+/-30	170+/-40	110+/-30

Isotopes other than those reported were not detected.

Point Beach data

Measurements in units of pCi/gr (wet)

Collection Date	08-28-85	08-28-85	08-28-85	12-18-85	12-18-85	12-18-85
Type	trout	trout	trout	trout	trout	salmon
Location	Point Beach	Point Beach	Point Beach	Point Beach	Point Beach	Point Beach
Gamma Isotopic						
Mn-54	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13
Fe-59	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Co-58	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13
Co-60	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13
Zn-65	<0.26	<0.26	<0.26	<0.26	<0.26	<0.26
Cs-134	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13
Cs-137	<0.15	0.16+/-0.02	0.16+/-0.02	<0.15	<0.15	0.16+/-0.02

\* b - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.



Table 17. Analysis of shoreline sediments for 1985.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach  
1985

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Measurements in units of pCi/kg (dry)

WI - Section of Radiation Protection data

Collection Date	10-15-85	10-15-85	10-15-85
Type	Shoreline sed.	Shoreline sed.	Shoreline sed.
Location	E-05	E-06	E-12
	1.4 miles N	5.3 miles SSE	0.1 mile E
<b>Analysis</b>			
Gross beta (dry)	6000+/-4000	7000+/-4000	11000+/-4000
Gross alpha (dry)	-700+/-3000	3000+/-5000	3000+/-4000
<b>Gamma Isotopic</b>			
Co-58	16+/-17	20+/-17	40+/-20
Co-60	40+/-20	30+/-20	130+/-30
Cs-134	30+/-13	12+/-19	-1+/-20
Cs-137	28+/-16	60+/-20	90+/-20
K-40	6300+/-500	7500+/-500	6900+/-500
Ra-226 * a	400+/-300	500+/-400	900+/-400
Pb-214 * a	140+/-40	150+/-40	110+/-40
Bi-214 * a	150+/-40	160+/-40	120+/-50
Tl-208 * a	160+/-50	120+/-50	100+/-60
Ac-228 * a	120+/-60	170+/-60	160+/-80

\*a - Naturally occurring radioisotopes Ac-228 and Tl-208 are from the Thorium-232 decay series.  
Ra-226, Pb-214, and Bi-214 are from the Uranium-238 decay series.

Isotopes other than those reported were not detected.

Point Beach data

Measurements in units of pCi/gr (dry)

Collection Date	10-15-85	10-15-85	10-15-85
Type	Shoreline sed.	Shoreline sed.	Shoreline sed.
Location	E-05	E-06	E-12
	1.4 miles N	5.3 miles SSE	0.1 mile E
<b>Analysis</b>			
Gross beta (dry)	7.9+/-2.7	8.3+/-2.7	7.8+/-2.7
<b>Gamma Isotopic * b</b>			
Cs-137	<0.15	<0.15	<0.15

\* b - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.

Table 18. Analysis of milk samples for January - December, 1985.  
Funk farm.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach  
1985

Measurements in units of pCi/liter		Funk farm 3.8 miles WSW				
WI - Section of Radiation Protection data						
Collection date	01-31-85	02-26-85	03-26-85	04-24-85	05-29-85	06-26-85
Isotope:						
I-131	0.07+/-0.17	0.40+/-0.16	-0.6+/-0.11	-0.10+/-0.11	-0.6+/-0.12	0.16+/-0.11
Ba,La-140	1+/-6	4+/-6	-1+/-4	5+/-6	-2+/-6	0+/-7
Cs-134	-1+/-6	2+/-7	6+/-5	8+/-5	4+/-6	10+/-6
Cs-137	3+/-6	-1+/-6	0+/-7	-1+/-7	3+/-7	0+/-7
K-40	1430+/-170	1500+/-190	1370+/-180	1440+/-170	1460+/-180	1420+/-180
Sr-90	2.7+/-0.6	3.3+/-0.7	1.1+/-0.6	2.3+/-0.7	1.5+/-0.5	1.7+/-0.5
Collection date	07-31-85	08-28-85	09-26-85	10-30-85	11-20-85	12-26-85
Isotope:						
I-131	-0.03+/-0.08	-1+/-12	0.03+/-0.12	-0.12+/-0.08	0.31+/-0.09	-0.03+/-0.10
Ba,La-140	-4+/-7	-9+/-8	-1+/-8	-1+/-6	-2+/-6	2+/-8
Cs-134	10+/-6	3+/-7	-1+/-7	10+/-6	9+/-6	18+/-7
Cs-137	-1+/-7	4+/-6	-1+/-7	3+/-7	4+/-6	10+/-7
K-40	1450+/-180	1430+/-190	1380+/-180	1500+/-190	1350+/-170	1380+/-180
Sr-90	4.1+/-0.7	* b	1.5+/-0.6	2.5+/-0.9	1.3+/-0.5	2.3+/-0.9

\* b - Analysis was not performed since the sample was spoiled.

\* c - Results were obtained from a gamma isotopic analysis.

Isotopes other than those reported were not detected.

Point Beach data		Funk farm 3.8 miles WSW				
Collection date	01-31-85	02-26-85	03-26-85	04-24-85	05-29-85	06-26-85
Isotope:						
I-131	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ba,La-140	< 5 * a	< 5 * a	< 5 * a	< 5 * a	< 5 * a	< 5 * a
Cs-134	< 5 * a	< 5 * a	< 5 * a	< 5 * a	< 5 * a	< 5 * a
Cs-137	< 5 * a	< 5 * a	< 5 * a	< 5 * a	< 5 * a	< 5 * a
K-40	* b	* b	* b	* b	* b	* b
Sr-89	<5	<5	<5	<5	<5	<5
Sr-90	1.0+/-0.3	2.2+/-0.8	1.3+/-0.3	2.0+/-0.5	<1	<1
Collection date	07-31-85	08-28-85	09-26-85	10-30-85	11-20-85	12-18-85
Isotope: * c						
I-131	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ba,La-140	<5	<5	<5	<5	<5	<5
Cs-134	<5	<5	<5	<5	<5	<5
Cs-137	<5	<5	<5	<5	<5	<5
K-40	-----	-----	-----	-----	-----	-----
Sr-89	<5	<5	<5	<5	<5	<5
Sr-90	1.6+/-0.6	1.5+/-0.5	1.4+/-0.4	3.7+/-0.6	1.4+/-0.2	2.5+/-0.6

\* a - Unless otherwise noted, the less than value ('<') is for Cs-137 and may be higher or lower for other radionuclides.

\* b - Naturally occurring radionuclides are not reported.

\* c - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.

Table 19. Analysis of milk samples for January - December, 1985.  
Lehrmann farm.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach  
1985

Measurements in units of pCi/liter		Lehrmann farm 2.7 miles NNW				
WI - Section of Radiation Protection data						
Collection date	01-31-85	02-26-85	March * a	04-24-85	05-29-85	06-26-85
Isotope:						
I-131	-0.2+/-0.2	-0.07+/-0.14		0.27+/-0.13	-0.82+/-0.14	-0.14+/-0.10
Ba,La-140	4+/-6	-1+/-9		-5+/-6	-5+/-6	5+/-8
Cs-134	6+/-6	1+/-7		7+/-5	1+/-6	3+/-7
Cs-137	-1+/-7	1+/-9		6+/-6	-1+/-7	3+/-8
K-40	1540+/-180	1410+/-200		1320+/-170	1450+/-180	1510+/-200
Sr-90	2.5+/-1.0	2.1+/-0.5		1.6+/-1.0	2.8+/-0.6	3.7+/-0.9
Collection date	07-31-85	08-28-85	09-26-85	10-30-85	11-20-85	12-18-85
Isotope:						
I-131	0.10+/-0.08	0+/-12 * c	-0.24+/-0.11	0.02+/-0.09	0.04+/-0.09	-0.8+/-0.2
Ba,La-140	-3+/-7	-6+/-8	-3+/-7	-4+/-10	7+/-9	-4+/-8
Cs-134	1+/-7	-1+/-6	4+/-7	8+/-8	-1+/-8	-1+/-7
Cs-137	3+/-7	2+/-7	1+/-8	1+/-9	-3+/-9	9+/-6
K-40	1440+/-180	1500+/-190	1240+/-170	1500+/-200	1210+/-190	1420+/-180
Sr-90	4.6+/-0.7	* b	1.3+/-0.5	2.2+/-0.7	1.9+/-0.6	1.3+/-0.5

\* a - Milk sample was not collected due to empty milk tank.

\* b - Analysis was not performed since the sample was spoiled.

\* c - Results were obtained from a gamma isotopic analysis.

Isotopes other than those reported were not detected.

Point Beach data		Lehrmann farm 2.7 miles NNW				
Collection date	01-31-85	02-26-85	03-26-85	04-24-85	05-29-85	06-26-85
Isotope:						
I-131	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ba,La-140	<5 * a	<5 * a	<5 * a	<5 * a	<5 * a	<5 * a
Cs-134	<5 * a	<5 * a	<5 * a	<5 * a	<5 * a	<5 * a
Cs-137	<5 * a	<5 * a	<5 * a	<5 * a	<5 * a	<5 * a
K-40	* b	* b	* b	* b	* b	* b
Sr-89	<5	<5	<5	<5	<5	<5
Sr-90	1.9+/-0.4	1.9+/-0.3	3.1+/-0.9	2.5+/-0.6	2.0+/-0.5	1.7+/-0.5
Collection date	07-31-85	08-28-85	09-26-85	10-30-85	11-20-85	12-18-85
Isotope: * c						
I-131	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ba,La-140	<5	<5	<5	<5	<5	<5
Cs-134	<5	<5	<5	<5	<5	<5
Cs-137	<5	<5	<5	<5	<5	<5
K-40	* b	* b	* b	* b	* b	* b
Sr-89	<5	<5	<5	<5	<5	<5
Sr-90	2.3+/-0.7	2.3+/-0.5	2.1+/-0.5	3.7+/-0.6	1.9+/-0.2	2.6+/-0.6

\* a - Unless otherwise noted, the less than value ('<') is for Cs-137 and may be higher or lower for other radionuclides.

\* b - Naturally occurring radionuclides are not reported.

\* c - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.

Table 20. Analysis of vegetation samples for 1985.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Point Beach  
1985

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Measurements in units of pCi/kilogram (wet)

WI - Section of Radiation Protection data

Collection Date	10-15-85	10-15-85	10-15-85	10-15-85
Type	vegetation	vegetation	vegetation	vegetation
Location	E-02 0.7 miles SSW	E-03 0.8 miles WNW	E-04 1.0 miles NNW	E-06 5.3 miles SSE
<b>Analysis</b>				
Gross beta (wet)	6000+/-1000	5500+/-1100	5400+/-1200	3000+/-3000
Gross alpha (wet)	900+/-900	600+/-1000	1100+/-1200	-1300+/-2000
<b>Gamma Isotopic</b>				
Be-7	2400+/-130	2800+/-200	3900+/-200	8100+/-300
K-40	4700+/-300	3900+/-400	3300+/-400	1600+/-300
Cn-58	-6+/-10	1+/-17	-11+/-19	-9+/-15
Co-60	8+/-12	-2+/-20	-5+/-20	-6+/-17
Zr-95	5+/-20	19+/-40	-9+/-40	-11+/-40
I-131	-2+/-10	14+/-19	-3+/-20	0+/-20
Cs-134	0+/-9	1+/-16	1+/-17	-4+/-15
Cs-137	-7+/-10	-7+/-19	-3+/-20	-9+/-17

Isotopes other than those reported were not detected.

Point Beach data

Collection Date	10-15-85	10-15-85	10-15-85	10-15-85
Type	vegetation	vegetation	vegetation	vegetation
Location	E-02 0.7 miles SSW	E-03 0.8 miles WNW	E-04 1.0 miles NNW	E-06 5.3 miles SSE
<b>Analysis</b>				
Gross beta	4700+/-200	4100+/-200	3600+/-200	3400+/-200
<b>Gamma Isotopic * a</b>				
I-131	<60	<60	<60	<60
Cs-134	<60	<60	<60	<60
Cs-137	<80	<80	<80	<80

\* a - According to Point Beach Radiological Effluent Specifications, analysis is only required on the radionuclides listed. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.