

STATE OF WISCONSIN  
1991  
POINT BEACH  
ENVIRONMENTAL RADIOACTIVITY SURVEY

NRC 30-83-647

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# STATE OF WISCONSIN

1991

## POINT BEACH ENVIRONMENTAL RADIOACTIVITY SURVEY

### INTRODUCTION

This report covering the calendar year 1991 is prepared under U.S. Nuclear Regulatory Commission Contract NRC 30-83-647 by the State of Wisconsin, Department of Health and Social Services, Radiation Protection Unit (WI DHSS). Results of environmental radioactivity monitoring are listed in tabular form. The data presented consists of duplicative sample analysis conducted by the state radiation protection laboratory or subcontractor and the licensee. A sample collection summary for 1991 is included in Table 10. The sample summary includes type and number of analyses performed, 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

Whenever possible a split sample is taken in order to obtain a valid comparison between WI DHSS and Point Beach results. Split sampling involves the thorough mixing of a sample into a homogeneous mixture that is then split between WI DHSS and Point Beach.

#### 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 sites 2 and 9. 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 2.5 cubic feet of air per minute depending on the type of pump used.

#### Surface Water

A split sample of liquid effluent is collected monthly at site 1 (Point Beach discharge 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 taken for WI DHSS at site 9 (Green Bay Pumping Station - Rostok, 15.6 miles NNE). A surface water sample from site 6 (Coast Guard Station, 4.8 miles SSE) is included as a background sample for Point Beach. The background surface samples are not split samples.

### Milk

A split sample of raw milk is collected monthly from sites 7 and 8.

### Sediment

A split sample for shoreline sediment is collected from sites 1, 3 & 6 on an annual basis.

### Fish

Split samples of both migratory and non-migratory fish are collected semi-annually from a Lake Michigan location near the Point Beach facility.

### Vegetation

Point Beach is not required to sample for food products. A split sample for vegetation is collected annually from sites 2, 4, 5 & 6 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 contracted 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

Place the quarterly composite on a GeLi detector and collect the gamma spectrum. Scan the gamma spectrum for any peaks which would include possible plant attributable radionuclides. Calculate the activity for selected radioisotopes 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 self-absorption.

#### Surface Water - Gamma Isotopic

Place a 3.5 liter sample on a GeLi detector and collect the gamma spectrum. Scan the gamma spectrum for any peaks which would include possible plant attributable radionuclides. Calculate the activity for selected radioisotopes correcting for counter efficiency and for decay.

#### Surface Water - Iodine 131 Chemical Extraction

Add a stable iodine carrier to a 2 liter surface water sample. Pass the sample through an anion exchange column and remove the iodine from the resin by batch/extraction using NaOCl. After reduction to elemental iodine by hydroxylamine hydrochloride, extract the iodine into carbon tetrachloride, reduce with bisulfite, and back extract into water. Precipitate the iodine as palladous iodide and determine the chemical yield gravimetrically. Count the sample in an external gas flow proportional counter and calculate the activity correcting for counter efficiency and for decay.

#### Fish - Gamma Isotopic

Place a 0.5 liter sample (edible portion) on a GeLi detector and collect the gamma spectrum. Scan the gamma spectrum for any peaks which would include possible plant attributable radionuclides. Calculate the activity for selected radioisotopes correcting for counter efficiency and for decay.

#### Vegetation - Alpha, Beta Gamma

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.

#### Vegetation - Gamma Isotopic

Chop the food product or vegetation sample and pack to the 500 ml mark of a 500 ml Marinelli beaker. Place the sample on a GeLi detector and collect the gamma spectrum. Scan the gamma spectrum for any peaks which would include possible plant attributable radionuclides. Calculate the activity for selected radioisotopes correcting for counter efficiency and for decay.

#### Milk - Gamma Isotopic

Procedure is the same as for Surface Water.

#### Milk - Iodine 131 Chemical Extraction

Procedure is the same as for Surface Water.

#### Shoreline Sediment - Alpha, Beta Gamma

Dry sample, grind, sieve and weigh 0.1 gram into a 2 inch stainless steel planchet. Beta and alpha count in an external gas flow proportional counter. Calculate alpha and beta activities correcting for self-absorption and counter efficiency.

#### Shoreline Sediment - Gamma Isotopic

Dry the sample, sieve and pack to the 500 ml mark of a 500 ml Marinelli beaker. Weigh the sample, place on a GeLi detector and collect the gamma spectrum. Scan the gamma spectrum for any peaks which would include possible parent attributable radionuclides. Calculate the activity for selected radioisotopes 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. 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 performance 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 1991 is included in Table 11.

### **SENSITIVITY AND ERROR - WISCONSIN DHSS**

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 10.

The WLDHSS definition for minimum detectable concentration follows closely the equation for the lower limits of detection as defined in 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.

Results for specific analyses will be reported as either a MDC value or 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

Except for naturally occurring radionuclides, all radionuclides detected at concentrations equal to or above their LLD are reported. Only the radionuclides specifically identified in the PBNP Radiological Effluent Technical Specifications are reported as less than the LLD.



Table 1. US NRC and Point Beach environmental monitoring TLD site description.

US NRC site	Direction	Distance (miles)	Point Beach site	Direction	Distance (miles)
1	S	8.1	1	SSE	0.5
2	SSW	7.0	2	SW	0.8
3	SSE	5.0	3	WNW	0.8
4	S	3.3	4	NW	1.3
5	SSW	3.3	5	NNW	1.7
6	SW	3.7	6	SSE	5.0
7	WSW	5.7	7	SW	3.3
8	SSW	1.8	8	WNW	5.9
9	S	1.8	9	NNW	3.3
10	SSE	1.9	12	E	0.1
11	SW	1.2	14	S	0.7
12	WSW	1.4	15	SW	1.2
13	W	1.4	16	WSW	1.4
14	WNW	0.8	17	SW	5.8
15	NNW	1.3	18	NW	3.4
16	NNW	1.7	20	SW	17
17	NW	2.0	22	NW	1.8
18	NW	3.4	23	SSW	4.3
19	WNW	4.0	24	SW	5.0
20	W	4.0	25	NW	5.0
21	WNW	5.6	26	W	5.0
22	NW	5.9	27	WSW	4.1
23	NNW	2.7			
24	NNW	3.4			
25	NNW	3.7			
26	NNW	4.3			
27	NNW	4.9			
28	N	5.3			
29	N	5.3			
30	N	4.7			
31	N	5.2			
32	N	6.2			
33	NNW	7.1			
34	NW	11.2			
35	NNW	7.6			
36	N	7.4			
37	N	7.2			
38	N	7.9			
39	N	11.8			
40	WSW	4.3			
41	N	23			
42	N	23			
43	N	23			

Table 2. US NRC and Point Beach collocated environmental monitoring TLD sites.

US NRC	Point Beach	Collocated
3	6	yes
5	7	yes
11	15	yes
12	16	yes
14	3	yes
15	4	yes
16	5	yes
18	18	yes



Figure 1. US NRC and Point Beach environmental TLD sites.



Figure 2. Environmental split sampling sites for the Point Beach facility.

Table 3. Environmental split sampling sites for the Point Beach facility.

Site	Sample	Collocated	Comments
1	SW, SS, FI	yes	0.1 miles E, Point Beach effluent channel
2	AP, AI, VE	yes	1.3 miles NW, north property line
3	SS	yes	1.7 miles NNW, Two Creeks Park
4	VE	yes	0.8 miles SW, south property line
5	VE	yes	0.8 miles WNW, west property line
6	VE, SS	yes	5.0 miles SSE, Coast Guard Station
6	SW	no	5.0 miles SSE, Coast Guard Station
7	MI	yes	3.7 miles W, Funk farm
8	MI	yes	2.3 miles NNW, Engelbrecht farm
9	AP, AI, SW	no	15.6 miles N, WI DHSS, Green Bay pumping station - Rostok
10	AP, AI	no	17 miles SW, Point Beach, Silver Lake College

AP air particulate; AI air iodine; SW surface water; SS shoreline sediment; MI milk;  
VE vegetation; FI fish

## SAMPLE COLLECTION SUMMARY

The following types and number of samples collected are listed in Table 4. An explanation for missing samples is listed in Table 5.

Table 4. Sample collection summary for 1991.

Sample Type	Collection and Frequency <sup>a</sup>	Number of Locations	Number of Samples Collected	Number of Samples Missed
air particulate	C/W	2	104	3
air iodine	C/W	2	104	3
surface water	G/M	2	24	0
vegetation	G/A	4	4	0
sediment	G/A	3	3	0
fish	G/SA	1	4	0
milk	G/M	2	24	0

a - Collection type: C/ = continuous; G/ = grab

Frequency: /W = weekly; /M = monthly; /Q = quarterly; /A = annually  
/BW = bi-weekly /SA = semi-annually

Table 5. Missing sample report for 1991.

Sample type	Date	Location	Comments
air particulate	09/11/91	2	Air sampler was inoperable for the indicated time period.
air iodine	09/11/91	2	Air sampler was inoperable for the indicated time period.
air particulate	06/14/91	9	Air sampler was off from 06/07/91 12:40 until 06/11/91 10:50.
air iodine	06/14/91	9	Air sampler was off from 06/07/91 12:40 until 06/11/91 10:50.
air particulate	01/03/92	9	Air sampler was inoperable for the indicated time period.
air iodine	01/03/92	9	Air sampler was inoperable for the indicated time period.

## RESULTS AND DISCUSSION

A sample collection summary for 1991 is included in Table 10. 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 12-29.

### Air Particulate

WI DHSS and Point Beach maintain separate air sampling stations. The indicator site for both WI DHSS and for Point Beach is located at site 2 (north property line, 1.3 miles NNW). The control site for WI DHSS is located at site 9 (Green Bay Pumping Station - Rostok, 15.6 miles NNE). The control site for Point Beach is located at site 10 (Silver Lake College, 17 miles WSW).

A summary of reported gross beta activities by WI DHSS and Point Beach from air particulate samples is included in Table 10. Results from the individual sample analyses are listed in Tables 12-15.

The quarterly or yearly averages for the gross beta activity on the air particulate filters are listed in Table 6. A comparison of WI DHSS and Point Beach data in Tables 12-15 was done using a procedure described in the NRC INSPECTION MANUAL, INSPECTION PROCEDURE 84750. In Tables 12-15, data that is underlined in the ratio column indicates that the WI DHSS and Point Beach data are not in agreement. Gross beta analysis is dependent on the radionuclide used for calibration and the documented standard procedure that is followed. The WI DHSS's documented procedure for gross beta analysis on air particulate samples was inspected and no explanation can be given for the differences noted in Tables 12-15. There were no significant differences between the respective WI DHSS and Point Beach indicator and control sites.

Table 6. Comparison of the quarterly and yearly averages for gross beta activity from air particulate filters for 1991.

	WI - Radiation Protection		Point Beach	
	units of pCi/M <sup>3</sup>			
	Site 2	Site 9	Site 2	Site 10
1st quarter	0.024 ± 0.006	0.023 ± 0.007	0.025 ± 0.008	0.028 ± 0.009
2nd quarter	0.016 ± 0.004	0.014 ± 0.004	0.014 ± 0.006	0.017 ± 0.006
3rd quarter	0.016 ± 0.006	0.013 ± 0.006	0.021 ± 0.007	0.020 ± 0.007
4th quarter	0.015 ± 0.005	0.013 ± 0.004	0.030 ± 0.008	0.029 ± 0.009
yearly	0.018 ± 0.004	0.016 ± 0.004	0.022 ± 0.006	0.024 ± 0.005

A summary of reported gamma isotopic activities for WI DHSS and Point Beach from the quarterly air particulate filter composites is included in Table 10. Results from the individual sample analyses are listed in Tables 16-17.

From WI DHSS gamma isotopic analysis, beryllium-7 ( $^7\text{Be}$ ) was detected in all composites from both the indicator and the control sites. Beryllium-7 ( $^7\text{Be}$ ) is a naturally occurring radioisotope that is constantly produced through nuclear reactions between cosmic rays and nuclei in the atmosphere. All other radionuclides were below their respective WI DHSS's MDC.

Point Beach did not report any activities above their respective LLD. Point Beach is not required to report naturally occurring radioisotopes and no comparison can be made for the beryllium-7 ( $^7\text{Be}$ ) reported by WI DHSS.

At the observed low level of activity the WI DHSS and Point Beach data are comparable in the gamma isotopic analysis of 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 samples are taken at the same sites as the air particulate samples.

A summary of reported air iodine activities for WI DHSS and Point Beach is included in Table 10. Results from the individual sample analyses are listed in Tables 12-15.

All reported WI DHSS and Point Beach air iodine measurements were below the NRC LLD of 0.07 pCi/M<sup>3</sup> for both the indicator (2) and the control (9 & 10) sites.

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

Tables 18-20 are the quarterly listings for the U.S. Nuclear Regulatory Commission's (US NRC) and Point Beach TLD programs for the Point Beach area. Table 7 is a comparison of quarterly and yearly exposure data at collocated sites. Table 8 is a comparison of exposure data at different distances from the Point Beach facility. All exposures for the US NRC are normalized to a 90-day quarter (standard quarter) and are reported in units of milliroentgens (mR). All exposures for Point Beach are normalized to a 7-day period and are reported in units of milliroentgens (mR). For the purposes of comparison in this report, the Point Beach exposure data (normalized to a 7-day period) is converted to the US NRC standard quarter (90-day) using the conversion factor 90/7.

A comparison of WI DHSS and Point Beach TLD data in Tables 7-8 was done using a procedure described in the NRC INSPECTION MANUAL, INSPECTION PROCEDURE 84750. Without access to either the USNRC or Point Beach quality control programs, no explanation can be given for the indicated differences in Tables 7-8.

Table 7. Comparison of USNRC and Point Beach collocated TLD data according to NRC INSPECTION MANUAL, Inspection Procedure 84750.

Qtr	site	US NRC			site	Point Beach			ratio Pt B/ USNRC	agree- ment
		Std	mR/ Qtr	1 sigma resol- ution		Qtr	mR/ Qtr	1 sigma		
1	3	12.8	0.5	25.6	6	11.2	0.5	0.88	yes	
	5	12.6	0.5	25.2	7	11.3	0.3	0.90	yes	
	11	16.9	0.7	24.1	15	26.8	0.4 a	1.59	no a	
	12	15.3	0.6	25.5	16	26.8	0.4 a	1.75	no a	
	14	17.1	0.7	24.4	3	13.8	0.8	0.81	yes	
	15	15.9	0.6	26.5	4	12.2	0.8	0.77	yes	
	16	15.9	0.6	26.5	5	12.0	0.4	0.75	yes	
	18	16.6	0.6	27.7	16	26.9	0.4 a	1.62	no a	
2	3	12.4	0.8	15.5	6	12.0	0.8	0.97	yes	
	5	9.7	0.8	12.1	7	12.0	1.2	1.24	yes	
	11	13.7	0.8	17.1	15	16.9	1.0	1.23	yes	
	12	14.2	0.9	15.8	16	15.6	0.8	1.10	yes	
	14	16.4	0.9	18.2	3	13.1	0.8	0.80	yes	
	15	15.1	0.9	16.8	4	13.3	0.9	0.88	yes	
	16	13.5	0.8	16.9	5	13.4	1.0	0.99	yes	
	18	18.6	1.0	18.6	18	17.0	0.8	0.91	yes	
3	3	13.5	0.7	19.3	6	9.8	1.0	0.73	yes	
	5	12.7	0.7	18.1	7	8.8	1.0	0.69	no	
	11	18.2	0.8	22.7	15	13.5	1.0	0.74	yes	
	12	16.5	0.8	20.6	16	16.5	1.0	1.00	yes	
	14	17.5	0.8	21.9	3	13.8	1.0	0.79	yes	
	15	16.6	0.8	20.8	4	14.0	1.0	0.84	yes	
	16	16.7	0.8	20.9	5	13.7	1.2	0.82	yes	
	18	18.5	0.8	23.1	18	14.7	1.2	0.79	yes	
4	3	14.0	0.7	20.0	6	12.1	0.1	0.86	yes	
	5	11.5	0.6	19.2	7	11.2	0.3	0.97	yes	
	11	17.6	0.8	22.0	15	16.9	0.4	0.96	yes	
	12	15.1	0.7	21.6	16	13.4	0.8	0.89	yes	
	14	17.1	0.8	21.4	3	15.2	0.5	0.89	yes	
	15	15.3	0.7	21.9	4	15.0	0.4	0.98	yes	
	16	15.6	0.7	22.3	5	14.3	0.5	0.92	yes	
	18	18.7	0.8	23.4	18	16.0	0.7	0.86	yes	

a - During the first quarter, a number of environmental TLDs were discovered to be wet or opaque upon return to the vendor for readout. The higher than normal results reports for these monitoring stations are suspected to be due interference in TLD readout caused by the moisture damage incurred by the TLD chips.

Table 8. Comparison of USNRC and Point Beach TLD data at different distances from the Point Beach plant according to NRC INSPECTION MANUAL, Inspection Procedure 84750.

Qtr	distance (miles)	US NRC			Qtr	Point Beach			ratio Pt B/ USNRC	agree- ment
		Std	mR/ Qtr	1 sigma resol- ution		Qtr	mR/ Qtr	1 sigma		
1	0-2	15.7	1.0	15.7		16.6	6.8		1.06	yes
	2-5	15.5	1.3	11.9		13.6	5.1		0.88	yes
	>5	15.1	1.5	10.1		11.4	0.8		0.75	yes
2	0-2	14.1	1.4	10.1		13.3	2.0		0.94	yes
	2-5	15.5	2.9	5.3		14.1	2.5		0.91	yes
	>5	13.3	1.3	10.2		13.3	2.0		1.00	yes
3	0-2	16.7	1.5	11.1		13.3	1.9		0.80	yes
	2-5	16.9	1.8	9.4		11.9	2.4		0.70	yes
	>5	15.8	1.8	8.8		11.3	1.2		0.72	yes
4	0-2	15.9	1.4	11.4		13.8	2.0		0.87	yes
	2-5	16.3	2.3	7.1		13.7	1.8		0.84	yes
	>5	14.7	1.3	11.3		13.3	0.8		0.90	yes
1-4	0-2	62.3	4.8	13.0		57.4	11.3		0.92	yes
	2-5	64.2	7.9	8.1		53.4	10.0		0.83	yes
	>5	58.8	5.3	11.1		49.3	4.2		0.84	yes



At distances of 0-2 miles, 2-5 miles and >5 miles from the Point Beach facility, the US NRC composite TLD data are not significantly different. Likewise, at these same distances the Point Beach data are not significantly different. With no significant differences, influence by the Point Beach facility on air quality is not evident.

#### Surface Water

The indicator site for WI DHSS and Point Beach is located at site 1 (effluent channel) and is a split sample. This sample is a monthly composite of weekly grab samples. The control site is not a split sample. WI DHSS collects a monthly grab sample at site 9 (Green Bay Pumping Station - Rosiok, 15.6 miles NNE). A monthly grab sample is collected by Point Beach at site 6 (Coast Guard Station, 4.8 miles SSE).

A summary of reported activities by WI DHSS and Point Beach from the monthly surface water samples is included in Table 10. Results from the individual sample analyses are listed in Tables 21-24.

All reported activities by WI DHSS and Point Beach are at background levels for the samples taken at the control sites (6 and 9). All reported gamma isotopic activities were less than the respective WI DHSS MDC or the respective Point Beach LLD. Gross beta and tritium ( $^3\text{H}$ ) activities reported by WI DHSS and Point Beach are at background levels. The gross beta yearly average for WI DHSS of  $3.4 \pm 1.6$  pCi/liter and for Point Beach of  $2.5 \pm 0.7$  pCi/liter for the control sites are not significantly different from previous years.

For samples taken at the indicator site (1), all reported gamma isotopic activities were less than the respective WI DHSS MDC or the respective Point Beach LLD. The gross beta yearly average for WI DHSS of  $2.9 \pm 1.4$  pCi/liter and for Point Beach of  $2.4 \pm 0.5$  pCi/liter is not significantly different from previous years.

All activities reported by either WI DHSS 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 WI DHSS 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 WI DHSS and Point Beach for fish samples is included in Table 10. Results from the individual sample analyses are listed in Table 25.

The WI DHSS detected activities for cesium-137 ( $^{137}\text{Cs}$ ) and for naturally occurring potassium-40 ( $^{40}\text{K}$ ) were also reported in previous years. For Point Beach, cesium-137 ( $^{137}\text{Cs}$ ) was detected in all samples and all other reported gamma isotopic activities were less than their respective LLD. Naturally occurring radioisotopes such as potassium-40 ( $^{40}\text{K}$ ) are not required to be reported by



Point Beach At the low level of reported activities the WI DHSS and Point Beach data are comparable.

#### Shoreline Sediments

Split samples were taken for shoreline sediments at sites 1, 3 and 6.

A summary of reported activities by WI DHSS and Point Beach for shoreline sediment is included in Table 10. Results from the individual sample analyses are listed in Table 26.

From the WI DHSS gamma isotopic analysis, cesium-137 ( $^{137}\text{Cs}$ ) and naturally occurring potassium-40 ( $^{40}\text{K}$ ) and radioisotopes from uranium and thorium decay series were detected in all three samples.

Point Beach analysis detected cesium-137 ( $^{137}\text{Cs}$ ) in all three samples and is not required to report naturally occurring radioisotopes.

At the low level of reported activities the WI DHSS and Point Beach data are comparable.

#### Milk

Split samples were taken for milk. Milk is collected from site 7 (Funk farm, 3.8 miles WSW) and from site 8 (Enbelbrecht farm, 2.2 miles NW).

A summary of reported activities by WI DHSS and Point Beach for milk samples is included in Table 10. Results from the individual sample analyses are listed in Tables 27-28.

For WI DHSS only naturally occurring potassium-40 ( $^{40}\text{K}$ ) was detected in all of the samples. Except for one activity of  $0.5 \pm 0.1$ , all activities for iodine-131 ( $^{131}\text{I}$ ) were all less than the WI DHSS MDC of 0.5 pCi/liter.

Point Beach did not detect any radioisotopes above their lower limits of detection in its gamma isotopic analysis. Reported results for iodine-131 ( $^{131}\text{I}$ ) were all less than 0.5 pCi/liter. Naturally occurring radioisotopes such as potassium-40 ( $^{40}\text{K}$ ) are not required to be reported by Point Beach.

Influence by the Point Beach nuclear facility in the milk pathway is not evident after reviewing the WI DHSS and Point Beach data.

#### Vegetation

Point Beach is not required to sample for food products. Split samples of vegetation were taken at sites 2, 4, 5 and 6.

A summary of reported activities by WI DHSS and Point Beach for vegetation samples is included in Table 10. Results from the individual sample analyses are listed in Table 29.

From the WI DHSS gamma isotopic analysis, naturally occurring potassium-40 ( $^{40}\text{K}$ ) and beryllium-7 ( $^7\text{Be}$ ) were detected. Activities for iodine-131 ( $^{131}\text{I}$ ) were below the WI DHSS MDC of 60 pCi/kg.

Point Beach is not required to report naturally occurring radioisotopes and no comparison is possible for the reported WI DHSS activities for beryllium-7 ( $^7\text{Be}$ ) and potassium-40 ( $^{40}\text{K}$ ). Point Beach did not detect any radioisotopes above their respective LLD. Activities for iodine-131 ( $^{131}\text{I}$ ) were below the Point Beach LLD of 60 pCi/kg.

Influence by the Point Beach nuclear facility in the food pathway is not evident after reviewing the data for WI DHSS and Point Beach.

#### Dose to an Average Individual

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 9, were calculated for the average exposed individual for WI DHSS samples with activities greater than MDC.

The dose to an average individual from the ingestion of fish are most likely due to background levels of radiation attributable to fallout from previous atmospheric nuclear tests and not to the operation of the Point Beach facility. The dose to an average individual from the ingestion of fish are due specifically to the detected cesium-137 ( $^{137}\text{Cs}$ ) activities.

The U.S. Environmental Protection Agency (EPA) in document 40 CFR Part 190 restricts the annual exposure of the population from all parts of the nuclear fuel cycle, including nuclear power plants. Doses resulting from gaseous and liquid effluent releases from the Point Beach nuclear facility meet the 25 mR/year criteria of 40 CFR Part 190.

Table 9. Calculated doses to an average exposed individual for WI DHSS samples with activities greater than MDC.

Sample type	Description	population	Average Exposed Individual (mrem/year)		
			whole body	bone	thyroid
fish	average of four	infant	---	---	---
		child	0.01	0.04	---
		teenager	0.02	0.04	---
		adult	0.03	0.04	---

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Table 10. Sample summary for 1991 from the environmental split sample monitoring program conducted by WI DHSS and Point Beach.

Sample type (units)	WI DHSS data				Point Beach data			
	MDC	Number of * Samples	Analysis	Range	NRL LLD	Number of * Samples	Analysis	Range
air particulate (pCi/M <sup>3</sup> )	0.003	104/104	gross beta	0.003 - 0.040	0.01	104/104	gross beta	0.007 - 0.046
		8	gamma isotopic			8	gamma isotopic	
	0.015	8/8	Be-7	0.030 - 0.047			Be-7	b
	0.003	8/0	Zr-95	<0.003			Zr-95	b
	0.002	8/0	Ru-103	<0.002			Ru-103	b
	0.008	8/0	Ru-106	<0.008			Ru-106	b
	0.3	8/0	I-131	<0.3			I-131	b
	0.002	8/0	Cs-134	<0.002	0.01	8/0	Cs-134	<0.01
	0.002	8/0	Cs-137	<0.002	0.01	8/0	Cs-137	<0.01
	0.004	8/0	Ce-141	<0.004			Ce-141	b
	0.004	8/0	Ce-144	<0.004			Ce-144	b
air iodine (pCi/M <sup>3</sup> )	0.06	104/0	I-131	<0.06	0.07	104/0	I-131	<0.03
direct exposure (mR/Std Qtr)	1.0 <sup>a</sup>	171/171	exposure	9.7 - 20.9	1.0 <sup>a</sup>	87/87	exposure	8.8 - 27.3
surface water (pCi/liter)	1.6	24/24	gross beta (sol)	2.0 - 7.0	1.0	23/23	gross beta	0.9 - 4.0
	1.6	24/3	gross beta (ins)	<1.6 - 3.2				
	300	24/3	H-3	<300 - 530	500	8/7	H-3	<182 - 320
	0.5	24/0	I-131	<0.5	0.5	23/0	I-131	<0.5
		24	gamma isotopic			23	gamma isotopic	
	10	24/0	Mn-54	<10	10	23/0	Mn-54	<10
	25	24/0	Fe-59	<25	30	23/0	Fe-59	<30
	15	24/0	Co-58	<15	10	23/0	Co-58	<10
	15	24/0	Co-60	<15	10	23/0	Co-60	<10
	30	24/0	Zn-65	<30	30	23/0	Zn-65	<30
	15	24/0	Zr-95	<15	15	23/0	Zr-95	<15
	13	24/0	Cs-134	<13	10	23/0	Cs-134	<10
	12	24/0	Cs-137	<12	10	23/0	Cs-137	<10
	15	24/0	Ba-140	<15	15	23/0	Ba-140	<15
fish (pCi/kg wet)		4	gamma isotopic			6	gamma isotopic	
	600	4/4	K-40	1000 - 2600			K-40	b
	50	4/0		<26	130	6/0	Mn-54	<130
	145	4/0		<72	260	6/0	Fe-59	<260
	65	4/0	Co-58	<22	130	6/0	Co-58	<130
	70	4/0	Co-60	<31	130	6/0	Co-60	<130
	130	4/0	Zn-65	<52	260	6/0	Zn-65	<260
	50	4/0	Cs-134	<30	130	6/0	Cs-134	<130
	60	4/0	Cs-137	29 - 80	150	6/6	Cs-137	40 - 110

Table 10. Sample summary for 1991 from the environmental split sample monitoring program conducted by WI DHSS and Point Beach.

Sample type (units)	WI DHSS data				Point Beach data			
	MDC	Number of Samples	Analysis	Range	NRL LLD	Number of Samples	Analysis	Range
shoreline sediments (pCi/kg dry)	6000	3/3	gross beta	9000 - 13000		3/3	gross beta	8000 - 9100
		3	gamma isotopic				gamma isotopic	
	700	3/3	K-40	7700 - 11400			K-40	b
	90	3/0	Co-58	<34			Co-58	b
	90	3/0	Co-60	<40			Co-60	b
	80	3/0	Cs-134	<29	150		Cs-134	b
	80	3/3	Cs-137	33 - 39	180	3/3	Cs-137	40 - 73
milk (pCi/liter)	130	3/3	Ra-226	133 - 201			Ra-226	b
	0.5	24/1	I-131	<0.5 - 0.5	0.5	24/0	I-131	<0
		24	gamma isotopic			24	gamma isotopic	
	150	24/24	K-40	1200 - 1600			K-40	
	12	24/0	Cs-134	<12	15	24/0	Cs-134	<
	12	24/0	Cs-137	<12	18	24/0	Cs-137	<
	15	24/0	Ba-140	<15	15	24/0	Ba-140	<5
fish (pCi/kg wet)	3000	4/4	gross beta	3600 - 8100		4/4	gross beta	2800 - 4600
		4	gamma isotopic			4	gamma isotopic	
	800	4/3	Be-7	<400 - 2300			Be-7	b
	1500	4/4	K-40	2300 - 5900			K-40	b
	90	4/0	Co-58	<38			Co-58	b
	100	4/0	Co-60	<55			Co-60	b
	200	4/0	Zr-95	<89			Zr-95	b
	60	4/0	I-131	<42	60	4/0	I-131	<60
	60	4/0	Cs-134	<48	60	4/0	Cs-134	<60
	80	4/0	Cs-137	<51	80	4/0	Cs-137	<80

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

b - Analysis is not required.

c - mR/TLD.



Table 11. U.S. Environmental Protection Agency's crosscheck program, comparison of EPA and State Laboratory of Hygiene (SLH) results for 1991.

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *		Deviation Known
			EPA result +/- sigma	SLH result +/- sigma	
Water	01/11/91	Sr-89	5.0 ± 2.9	5.0 ± 0.0	0.0
		Sr-90	5.0 ± 2.9	5.0 ± 0.0	0.0
Water	01/25/91	alpha	5.0 ± 2.9	7.3 ± 0.6	0.8
		beta	5.0 ± 2.9	6.7 ± 0.6	0.6
Water	02/08/91	Co-60	40.0 ± 2.9	40.3 ± 1.2	0.1
		Zn-65	149.0 ± 8.7	142.7 ± 3.1	0.7
		Ru-106	186.0 ± 11.0	182.7 ± 28.4	-0.3
		Cs-134	8.0 ± 2.9	6.0 ± 0.0	-0.7
		Cs-137	8.0 ± 2.9	7.7 ± 0.6	-0.1
		Ba-133	75.0 ± 4.6	70.0 ± 3.6	-1.1
Water	02/15/91	I-131	75.0 ± 4.6	72.3 ± 1.0	-0.7
Water	02/22/91	H-3	4418.0 ± 255	4606 ± 26	0.7
Water	03/03/91	Ra-226	31.8 ± 2.8	30.3 ± 0.7	-0.5
		Ra-228	21.1 ± 3.1	20.6 ± 0.5	-0.2
Water	03/15/91	U (nat)	7.6 ± 1.2	5.9 ± 0.0	-1.0
Filter	03/29/91	alpha	25.0 ± 3.5	34.3 ± 0.6	2.7
		beta	124.0 ± 3.5	136 ± 4	3.5
		Sr-90	40.0 ± 2.9	36.3 ± 1.2	-1.3
		Cs-137	40.0 ± 2.9	41.3 ± 1.2	1.5
Water	04/16/91	alpha	54.0 ± 8.1	55.3 ± 1.5	0.2
		beta	115.0 ± 9.8	110.0 ± 1.7	-0.5
		Ra-226	8.0 ± 0.7	6.7 ± 0.2	-1.5
		Ra-228	15.2 ± 2.2	15.1 ± 0.3	-0.1
		U (nat)	29.8 ± 1.7	29.4 ± 3.7	-0.2
		Sr-89	28.0 ± 2.9	27.0 ± 1.0	-0.4
		Sr-90	26.0 ± 2.9	24.0 ± 1.0	-0.7
		Cs-134	24.0 ± 2.9	20.0 ± 2	-1.4
		Cs-137	25.0 ± 2.9	22.7 ± 1.6	-0.8
Milk	04/26/91	Sr-89	32.0 ± 2.9	no data provided	
		Sr-90	32.0 ± 2.9	31.0 ± 1.7	-0.4
		I-131	60.0 ± 3.5	60.7 ± 4.2	0.2
		Cs-137	49.0 ± 2.9	51.7 ± 2.5	0.9
		K	1650.0 ± 4	1825 ± 5	3.7
Water	05/10/91	Sr-89	39.0 ± 2.9	35.7 ± 0.6	-1.2
		Sr-90	24.0 ± 2.9	26.7 ± 0.6	0.9
Water	05/17/91	alpha	24.0 ± 3.5	26.0 ± 0.1	0.6
		beta	46.0 ± 2.9	47.0 ± 2.0	0.4
Water	06/07/91	Co-60	10.0 ± 2.9	7.7 ± 0.6	-0.8
		Zn-65	108.0 ± 6.4	111.3 ± 10.2	0.5
		Ru-106	149.0 ± 8.7	142.0 ± 14.0	-0.8
		Cs-134	15.0 ± 2.9	13.0 ± 1.0	-0.7
		Cs-137	14.0 ± 2.9	13.7 ± 1.2	-0.1
		Ba-133	62.0 ± 3.5	54.0 ± 1.0	-2.3

Table 11. U.S. Environmental Protection Agency's crosscheck program, comparison of EPA and State Laboratory of Hygiene (SLH) results for 1991.

Sample Type	Date Collected	Analysis	Concentration in pCi/sample <sup>a</sup>		Deviation Known
			EPA result +/- sigma	SLH result +/- sigma	
Water	06/21/91	H-3	12480 ± 722	13112 ± 231	0.9
Water	07/12/91	Ra-226	15.9 ± 2.4	15.0 ± 0.2	-0.7
		Ra-228	16.7 ± 2.4	15.8 ± 0.6	-0.4
Water	07/19/91	U (nat)	14.2 ± 1.7	13.8 ± 0.8	-0.2
Water	08/09/91	I-131	20.0 ± 3.5	19.7 ± 1.5	-0.1
Filter	08/30/91	alpha	25.0 ± 3.5	30.7 ± 0.6	1.6
		beta	92.0 ± 5.8	82.3 ± 1.5	-1.7
		Sr-90	30.0 ± 2.9	26.3 ± 1.5	-1.3
		Cs-137	30.0 ± 2.9	38.3 ± 1.5	2.9
Water	09/13/91	Sr-89	49.0 ± 2.9	48.3 ± 0.6	-0.2
		Sr-90	25.0 ± 2.9	23.3 ± 0.6	-0.6
Water	09/20/91	alpha	10.0 ± 2.9	12.7 ± 0.6	0.9
		beta	20.0 ± 2.9	21.3 ± 1.5	0.5
Milk	09/27/91	Sr-89	25.0 ± 2.9	no data provided	
		Sr-90	25.0 ± 2.9	25.0 ± 1.0	0.0
		I-131	108.0 ± 6.4	106.3 ± 5.0	-0.3
		Cs-137	30.0 ± 2.9	30.0 ± 1.7	0.0
		K	1740.0 ± 50.3	1740 ± 126	-0.7
Water	10/04/91	Co-60	29.0 ± 2.9	26.7 ± 0.6	-0.8
		Zn-65	73.0 ± 4.0	65.7 ± 2.3	-1.8
		Ru-106	199.0 ± 11.6	199.3 ± 3.4	0.0
		Cs-134	10.0 ± 2.9	9.0 ± 0.1	-0.4
		Cs-137	10.0 ± 2.9	10.0 ± 1.0	0.0
		Ba-133	98.0 ± 5.8	87.7 ± 3.1	-1.0
Water	10/18/91	H-3	2454.0 ± 203.0	2701 ± 107	1.2
Water	10/22/91	alpha	82.0 ± 12.1	89.0 ± 5.2	0.6
		Ra-226	22.0 ± 1.9	20.6 ± 0.2	-0.7
		Ra-228	22.2 ± 3.2	22.1 ± 0.6	0.0
		U (nat)	13.5 ± 1.7	13.5 ± 2.4	0.0
		beta	65.0 ± 5.8	58.0 ± 1.0	-1.2
		Sr-89	10.0 ± 2.9	9.3 ± 0.6	-0.2
		Sr-90	10.0 ± 2.9	9.3 ± 0.6	-0.2
		Co-60	20.0 ± 2.9	20.0 ± 0.1	0.0
		Cs-134	10.0 ± 2.9	8.7 ± 0.6	-0.5
		Cs-137	11.0 ± 2.9	11.0 ± 0.6	0.1
Water	11/08/91	Ra-226	6.5 ± 0.6	6.1 ± 0.2	-0.8
		Ra-228	8.1 ± 1.2	8.1 ± 0.3	0.3
Water	11/15/91	U (nat)	24.9 ± 1.7	28.8 ± 0.6	2.2

a - pCi/sample refers to the following:

Sample	Units
water	pCi/liter
milk	pCi/liter except for K mg/liter
filter	pCi/filter

Table 12. Air particulate gross beta and air iodine (I-131) results for site 2 from January - June, 1991.

WISCONSIN DIVISION OF HEALTH  
RADIATION PROTECTIONPoint Beach  
1991Measurements in units of pCi/M<sup>3</sup>

## WI - Radiation Protection data

## Point Beach data

site 2, north property line  
1.3 miles NNWsite 2, north property line, (E-04)  
1.3 miles NNW

Agreement \*

collection date	volume L	air particulate	air iodine	collection date	volume m <sup>3</sup>	air particulate	air iodine	WI DHSS resolution	ratio Pt B/WI DHSS
01/04/91	664	0.030 +- 0.002	<0.06	01/07/91	208	0.031 +- 0.005	<0.03	15.0	1.03
01/09/91	470	0.026 +- 0.002	<0.06	01/14/91	336	0.032 +- 0.003	<0.03	13.0	1.23
01/18/91	826	0.036 +- 0.002	<0.06	01/21/91	251	0.040 +- 0.004	<0.03	18.0	1.11
01/24/91	566	0.025 +- 0.002	<0.06	01/28/91	293	0.027 +- 0.004	<0.03	12.5	1.08
02/01/91	758	0.029 +- 0.002	<0.06	02/04/91	294	0.027 +- 0.004	<0.03	14.5	0.93
02/08/91	637	0.032 +- 0.002	<0.06	02/11/91	290	0.025 +- 0.003	<0.03	16.0	0.78
02/13/91	457	0.018 +- 0.002	<0.06	02/18/91	302	0.017 +- 0.003	<0.03	9.0	0.94
02/22/91	837	0.019 +- 0.002	<0.06	02/25/91	286	0.024 +- 0.003	<0.03	9.5	1.26
02/28/91	548	0.021 +- 0.002	<0.06	03/04/91	294	0.026 +- 0.003	<0.03	10.5	1.24
03/06/91	554	0.025 +- 0.002	<0.06	03/11/91	291	0.027 +- 0.004	<0.03	12.5	1.08
03/15/91	817	0.020 +- 0.002	<0.06	03/18/91	296	0.012 +- 0.003	<0.03	10.0	1.60
03/21/91	540	0.021 +- 0.002	<0.06	03/25/91	290	0.014 +- 0.003	<0.03	10.5	0.67
03/29/91	722	0.015 +- 0.002	<0.06	04/02/91	338	0.017 +- 0.003	<0.03	7.5	1.13
1st Qtr mean +- s.d.		0.024 +- 0.006	<0.06	1st Qtr mean +- s.d.		0.024 +- 0.008	<0.03	4.1	0.98
04/03/91	450	0.020 +- 0.002	<0.06	04/10/91	313	0.017 +- 0.002	<0.03	10.0	0.85
04/11/91	720	0.021 +- 0.002	<0.06	04/16/91	258	0.014 +- 0.003	<0.03	10.5	0.67
04/18/91	609	0.016 +- 0.002	<0.06	04/22/91	250	0.011 +- 0.003	<0.03	8.0	0.69
04/26/91	713	0.016 +- 0.002	<0.06	04/29/91	284	0.016 +- 0.003	<0.03	8.0	1.00
05/02/91	537	0.015 +- 0.002	<0.06	05/06/91	292	0.007 +- 0.002	<0.03	7.5	<u>0.47</u>
05/08/91	521	0.007 +- 0.002	<0.06	05/13/91	292	0.010 +- 0.003	<0.03	3.5	1.43
05/17/91	787	0.018 +- 0.002	<0.06	05/20/91	294	0.013 +- 0.003	<0.03	9.0	0.72
05/24/91	594	0.016 +- 0.002	<0.06	05/28/91	317	0.010 +- 0.003	<0.03	8.0	0.63
05/31/91	599	0.012 +- 0.002	<0.06	06/03/91	234	0.008 +- 0.004	<0.03	6.0	0.67
06/05/91		0.013 +- 0.002	<0.06	06/10/91	254	0.012 +- 0.002	<0.03	6.5	0.92
06/14/91		0.014 +- 0.001	<0.06	06/17/91	255	0.024 +- 0.004	<0.03	14.0	<u>1.71</u>
06/20/91	498	0.018 +- 0.002	<0.06	06/24/91	285	0.018 +- 0.003	<0.03	9.0	1.00
06/28/91	674	0.019 +- 0.002	<0.06	07/01/91	286	0.027 +- 0.004	<0.03	9.5	1.42
2nd Qtr mean +- s.d.		0.016 +- 0.004	<0.06	2nd Qtr mean +- s.d.		0.014 +- 0.006	<0.03	4.4	0.91

a - Comparison of WI DHSS and Point Beach data using the NRC INSPECTION MANUAL, Inspection Procedure 84750. Data that is underlined in the ratio column indicates that the WI DHSS and Point Beach results are not in agreement.



Table 13. Air particulate gross beta and air iodine (I-131) results for site 2 from July - December, 1991.

WISCONSIN DIVISION OF HEALTH  
RADIATION PROTECTIONPoint Beach  
1991Measurements in units of pCi/M<sup>3</sup>

WI - Radiation Protection data

Point Beach data

site 2, north property line  
1.3 miles NNWsite 2, north property line, (E-04)  
1.3 miles NNW

Agreement \*

collection date	volume m <sup>3</sup>	air particulate	air iodine	collection date	volume m <sup>3</sup>	air particulate	air iodine	WI DHSS resolution	ratio Pt B/ WI DHSS	
07/03/91	415	0.017	0.002	<0.06	07/08/91	289	0.020 +- 0.003	<0.03	8.5	1.18
07/12/91	756	0.015	0.002	<0.06	07/15/91	287	0.020 +- 0.004	<0.03	7.5	1.33
07/19/91	586	0.019	0.002	<0.06	07/22/91	288	0.036 +- 0.004	<0.03	9.5	<u>1.89</u>
07/26/91	594	0.019	0.002	<0.06	07/30/91	330	0.011 +- 0.002	<0.03	9.5	0.58
08/02/91	586	0.014	0.002	<0.06	08/05/91	251	0.021 +- 0.004	<0.03	7.0	1.50
08/07/91	412	0.012	0.002	<0.06	08/12/91	297	0.018 +- 0.003	<0.03	6.0	1.50
08/16/91	750	0.020	0.002	<0.06	08/19/91	288	0.028 +- 0.004	<0.03	10.0	1.40
08/23/91	604	0.017	0.002	<0.06	08/26/91	286	0.018 +- 0.002	<0.03	8.5	1.06
08/29/91	491	0.024	0.002	<0.06	09/03/91	334	0.029 +- 0.003	<0.03	12.0	1.21
09/06/91	691	0.013	0.002	<0.06	09/09/91	240	0.027 +- 0.004	<0.03	6.5	<u>2.08</u>
09/11/91 <sup>b</sup>					09/16/91	300	0.017 +- 0.003	<0.03		
09/19/91	688	0.010	0.001	<0.06	09/23/91	306	0.011 +- 0.002	<0.03	10.0	1.10
09/27/91	741	0.007	0.001	<0.06	09/30/91	295	0.018 +- 0.002	<0.03	7.0	<u>2.57</u>
3rd Qtr mean +- s.d.		0.016 +- 0.006	<0.06	3rd Qtr mean +- s.d.		0.021 +- 0.007	<0.03	2.6	1.35	
10/03/91	540	0.013 +- 0.002	<0.06	10/07/91	289	0.021 +- 0.003	<0.03	6.5	1.52	
10/09/91	530	0.009 +- 0.002	<0.06	10/14/91	285	0.023 +- 0.003	<0.03	4.5	<u>2.56</u>	
10/17/91	723	0.010 +- 0.001	<0.06	10/21/91	293	0.024 +- 0.003	<0.03	10.0	<u>2.40</u>	
10/25/91	723	0.019 +- 0.002	<0.06	10/28/91	241	0.020 +- 0.003	<0.03	9.5	1.05	
10/30/91	464	0.008 +- 0.002	<0.06	11/04/91	296	0.020 +- 0.003	<0.03	4.0	<u>2.50</u>	
11/06/91	646	0.016 +- 0.002	<0.06	11/11/91	239	0.023 +- 0.003	<0.03	8.0	1.44	
11/14/91	737	0.016 +- 0.002	<0.06	11/18/91	295	0.037 +- 0.004	<0.03	8.0	<u>2.31</u>	
11/20/91	539	0.019 +- 0.002	<0.06	11/25/91	293	0.030 +- 0.004	<0.03	9.5	1.58	
11/27/91	639	0.008 +- 0.002	<0.06	12/03/91	339	0.031 +- 0.004	<0.03	4.0	<u>3.88</u>	
12/04/91	652	0.015 +- 0.002	<0.06	12/09/91	246	0.034 +- 0.004	<0.03	7.5	<u>2.27</u>	
12/13/91	829	0.016 +- 0.002	<0.06	12/16/91	292	0.041 +- 0.004	<0.03	8.0	<u>2.56</u>	
12/19/91	562	0.023 +- 0.002	<0.06	12/23/91	294	0.040 +- 0.004	<0.03	11.5	<u>1.76</u>	
12/27/91	742	0.019 +- 0.002	<0.06	12/30/91	293	0.041 +- 0.004	<0.03	9.5	<u>2.16</u>	
01/03/92	633	0.024 +- 0.002	<0.06							
4th Qtr mean +- s.d.		0.015 +- 0.005	<0.06	4th Qtr mean +- s.d.		0.030 +- 0.008	<0.03	3.0	1.93	

a - Comparison of WI DHSS and Point Beach data using the NRC INSPECTION MANUAL, Inspection Procedure 84750. Data that is underlined in the ratio column indicates that the WI DHSS and Point Beach results are not in agreement.

b - Air sampler was inoperable for the indicated time period.

Table 14. Air particulate gross beta and air iodine (I-131) results for sites 9 and 10 from January - June, 1991.

WISCONSIN DIVISION OF HEALTH  
RADIATION PROTECTIONPoint Beach  
1991Measurements in units of pCi/M<sup>3</sup>

## WI - Radiation Protection data

## Point Beach data

Green Bay pumping station - Rostok  
Site 9, 15.6 miles NNESilver Lake College (E-20)  
site 10, 17 miles WSW

Agreement \*

collection date	volume m <sup>3</sup>	air particulate	air iodine	collection date	volume m <sup>3</sup>	air particulate	air iodine	WI DHSS resolution	ratio Pt B/ WI DHSS
01/04/91	685	0.027 +- 0.002	<0.06	01/07/91	229	0.035 +- 0.004	<0.03	13.5	1.30
01/11/91	681	0.026 +- 0.002	<0.06	01/14/91	359	0.040 +- 0.004	<0.03	13.0	1.54
01/18/91	675	0.040 +- 0.002	<0.06	01/21/91	266	0.043 +- 0.004	<0.03	20.0	1.08
01/25/91	699	0.023 +- 0.002	<0.06	01/28/91	320	0.035 +- 0.004	<0.03	11.5	1.52
02/04/91	967	0.028 +- 0.002	<0.06	02/04/91	314	0.035 +- 0.004	<0.03	14.0	1.25
02/08/91	383	0.049 +- 0.003	<0.06	02/11/91	301	0.032 +- 0.004	<0.03	9.7	1.10
02/15/91	684	0.017 +- 0.002	<0.06	02/13/91	304	0.021 +- 0.003	<0.03	8.5	1.24
02/22/91	662	0.019 +- 0.002	<0.06	02/25/91	299	0.028 +- 0.003	<0.03	9.5	1.07
03/01/91	689	0.021 +- 0.002	<0.06	03/04/91	364	0.025 +- 0.003	<0.03	10.5	1.19
03/08/91	667	0.024 +- 0.002	<0.06	03/11/91	298	0.027 +- 0.004	<0.03	12.0	1.13
03/15/91	668	0.018 +- 0.002	<0.06	03/18/91	306	0.013 +- 0.003	<0.03	9.0	0.72
03/22/91	662	0.018 +- 0.002	<0.06	03/25/91	300	0.014 +- 0.003	<0.03	9.0	0.78
03/29/91	664	0.014 +- 0.002	<0.06	04/02/91	347	0.016 +- 0.003	<0.03	7.0	1.14
1st Qtr mean +- s.d.		0.023 +- 0.007	<0.06	1st Qtr mean +- s.d.		0.028 +- 0.010	<0.03	3.1	1.20
04/05/91	653	0.021 +- 0.002	<0.06	04/09/91	288	0.014 +- 0.002	<0.03	10.5	0.67
04/12/91	664	0.017 +- 0.002	<0.06	04/16/91	286	0.016 +- 0.003	<0.03	8.5	0.94
04/19/91	654	0.014 +- 0.002	<0.06	04/22/91	251	0.014 +- 0.003	<0.03	7.0	1.00
04/26/91	651	0.016 +- 0.002	<0.06	04/29/91	302	0.018 +- 0.003	<0.03	8.0	1.15
05/03/91	656	0.011 +- 0.002	<0.06	05/06/91	302	0.008 +- 0.002	<0.03	5.5	0.73
05/10/91	661	0.008 +- 0.001	<0.06	05/13/91	299	0.017 +- 0.003	<0.03	8.0	<u>2.13</u>
05/17/91	629	0.018 +- 0.002	<0.06	05/20/91	302	0.019 +- 0.003	<0.03	9.0	1.06
05/24/91	643	0.014 +- 0.002	<0.06	05/28/91	345	0.012 +- 0.003	<0.03	7.0	0.86
05/31/91	629	0.009 +- 0.001	<0.06	06/03/91	264	0.014 +- 0.004	<0.03	9.0	1.56
06/07/91	652	0.009 +- 0.001	<0.06	06/10/91	289	0.011 +- 0.002	<0.03	9.0	1.12
06/14/91 <sup>a</sup>	361	0.013 +- 0.003	<0.06	06/17/91	292	0.025 +- 0.003	<0.03	4.3	1.92
06/21/91	622	0.017 +- 0.002	<0.06	06/24/91	289	0.030 +- 0.004	<0.03	8.5	<u>1.76</u>
06/28/91	647	0.017 +- 0.002	<0.06	07/01/91	289	0.028 +- 0.004	<0.03	8.5	1.65
2nd Qtr mean +- s.d.		0.014 +- 0.004	<0.06	2nd Qtr mean +- s.d.		0.017 +- 0.007	<0.03	3.7	1.23

a - Comparison of WI DHSS and Point Beach data using the NRC INSPECTION MANUAL, Inspection Procedure 84750. Data that is underlined in the ratio column indicates that the WI DHSS and Point Beach results are not in agreement.

b - Pump was off from 06/07/91 12:40 until 06/11/91 10:50.

Table 15. Air particulate gross beta and air iodine (I-131) results for sites 9 and 10 from July - December, 1991.

WISCONSIN DIVISION OF HEALTH RADIATION PROTECTION				Point Beach 1991					
Measurements in units of pCi/M <sup>3</sup>									
WI - Radiation Protection data				Point Beach data					
Green Bay pumping station - Rostok Site 9, 15.6 miles NNE				Silver Lake College (E-20) site 10, 17 miles WSW				Agreement *	
collection date	volume m <sup>3</sup>	air particulate	air iodine	collection date	volume m <sup>3</sup>	air particulate	air iodine	WI DHSS resol- ution	ratio Pt B/ WI DHSS
07/05/91	619	0.014 +- 0.002	<0.06	07/08/91	289	0.020 +- 0.003	<0.03	7.0	1.43
07/12/91	618	0.015 +- 0.002	<0.06	07/15/91	292	0.020 +- 0.004	<0.03	7.5	1.33
07/19/91	622	0.019 +- 0.002	<0.06	07/22/91	298	0.032 +- 0.004	<0.03	9.5	1.68
07/26/91	638	0.003 +- 0.001	<0.06	07/30/91	333	0.012 +- 0.002	<0.03	3.0	4.00
08/02/91	627	0.013 +- 0.002	<0.06	08/05/91	248	0.022 +- 0.004	<0.03	6.5	1.69
08/09/91	637	0.004 +- 0.001	<0.06	08/12/91	296	0.017 +- 0.003	<0.03	4.0	<u>4.25</u>
08/16/91	626	0.020 +- 0.002	<0.06	08/19/91	291	0.027 +- 0.004	<0.03	10.0	1.35
08/23/91	619	0.015 +- 0.002	<0.06	08/26/91	293	0.019 +- 0.002	<0.03	7.5	1.27
08/30/91	616	0.021 +- 0.002	<0.06	09/03/91	340	0.028 +- 0.003	<0.03	10.5	1.35
09/06/91	632	0.010 +- 0.002	<0.06	09/09/91	265	0.029 +- 0.004	<0.03	5.0	<u>2.90</u>
09/13/91	629	0.015 +- 0.002	<0.06	09/16/91	346	0.016 +- 0.003	<0.03	7.5	1.07
09/20/91	623	0.009 +- 0.001	<0.06	09/23/91	346	0.012 +- 0.002	<0.03	9.0	1.33
09/27/91	652	0.006 +- 0.001	<0.06	09/30/91	337	0.012 +- 0.002	<0.03	6.0	2.00
3rd Qtr mean +- s.d.				3rd Qtr mean +- s.d.				2.2	1.62
		0.013 +- 0.006	<0.06			0.020 +- 0.007	<0.03		
10/04/91	638	0.010 +- 0.002	<0.06	10/07/91	344	0.015 +- 0.003	<0.03	5.0	1.50
10/11/91	658	0.010 +- 0.002	<0.06	10/14/91	343	0.020 +- 0.003	<0.03	5.0	2.00
10/18/91	661	0.011 +- 0.002	<0.06	10/21/91	341	0.026 +- 0.003	<0.03	5.5	<u>2.36</u>
10/25/91	647	0.016 +- 0.002	<0.06	10/28/91	342	0.020 +- 0.002	<0.03	8.0	1.25
11/01/91	672	0.010 +- 0.002	<0.06	11/04/91	346	0.020 +- 0.003	<0.03	5.0	2.00
11/08/91	671	0.012 +- 0.002	<0.06	11/11/91	338	0.026 +- 0.003	<0.03	6.0	<u>2.17</u>
11/15/91	667	0.018 +- 0.002	<0.06	11/18/91	343	0.034 +- 0.003	<0.03	9.0	<u>1.89</u>
11/22/91	639	0.014 +- 0.002	<0.06	11/25/91	345	0.024 +- 0.003	<0.03	7.0	1.71
12/02/91	961	0.011 +- 0.001	<0.06	12/03/91	383	0.032 +- 0.003	<0.03	11.0	<u>2.91</u>
12/06/91	387	0.007 +- 0.002	<0.06	12/09/91	266	0.036 +- 0.004	<0.03	3.5	5.14
12/13/91	660	0.020 +- 0.002	<0.06	12/16/91	324	0.040 +- 0.004	<0.03	10.0	<u>2.00</u>
12/23/91	978	0.021 +- 0.001	<0.06	12/23/91	324	0.042 +- 0.004	<0.03	21.0	<u>2.00</u>
12/27/91	362	0.012 +- 0.003	<0.06	12/30/91	322	0.046 +- 0.004	<0.03	4.0	<u>3.83</u>
13/92 <sup>b</sup>									
4th Qtr mean +- s.d.				4th Qtr mean +- s.d.				3.2	2.22
		0.013 +- 0.004	<0.06			0.029 +- 0.009	<0.03		

a - Comparison of WI DHSS and Point Beach data using the WRC INSPECTION MANUAL, Inspection Procedure 84750. Data that is underlined in the ratio column indicates that the WI DHSS and Point Beach results are not in agreement.

b - Pump was off from 12/27/91 until 01/03/92.

Table 16. Gamma isotopic results for site 2 from January - December, 1991 from the quarterly composites of air particulate samples.

WISCONSIN DIVISION OF HEALTH  
RADIATION PROTECTION

Point Beach  
1991

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

WI - Radiation Protection data

site 2, north property line  
1.3 miles NNW

Isotope	1st quarter	2nd quarter	3rd quarter	4th quarter
Be-7	0.047 +- 0.007	0.041 +- 0.006	0.046 +- 0.008	0.031 +- 0.006
Zr-95	< 0.002	< 0.002	< 0.002	< 0.001
Ru-103	< 0.001	< 0.001	< 0.001	< 0.001
Ru-106	< 0.003	< 0.005	< 0.005	< 0.005
I-131	< 0.005	< 0.005	< 0.002	< 0.001
Cs-134	< 0.001	< 0.001	< 0.001	< 0.001
Cs-137	< 0.001	< 0.001	< 0.001	< 0.001
Ce-141	< 0.002	< 0.002	< 0.001	< 0.001
Ce-144	< 0.003	< 0.003	< 0.003	< 0.003

Isotopes other than those reported were not detected.

Point Beach data

site 2, north property line, (E-04)  
1.3 miles NNW

Isotope	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Cs-134	< 0.010	< 0.010	< 0.010	< 0.010
Cs-137	< 0.010	< 0.010	< 0.010	< 0.010

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.

Table 17. Gamma isotopic results for sites 9 and 10 from January - December, from the quarterly composite of air particulate samples.

WISCONSIN DIVISION OF HEALTH  
RADIATION PROTECTION

Point Beach  
1991

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

WI - Radiation Protection data

Green Bay pumping station - Rostok  
site 9, 15.6 miles NNE

Isotope	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Be-7	0.042 +- 0.007	0.034 +- 0.006	0.037 +- 0.007	0.030 +- 0.006
Zr-95	< 0.002	< 0.002	< 0.002	< 0.001
Ru-103	< 0.001	< 0.001	< 0.001	< 0.001
Ru-106	< 0.005	< 0.005	< 0.005	< 0.005
I-131	< 0.005	< 0.005	< 0.002	< 0.002
Cs-134	< 0.001	< 0.001	< 0.001	< 0.001
Cs-137	< 0.001	< 0.001	< 0.001	< 0.001
Ce-141	< 0.002	< 0.002	< 0.00*	< 0.001
Ce-144	< 0.003	< 0.003	< 0.003	< 0.003

Isotopes other than those reported were not detected.

Point Beach data

Silver Lake College  
site 10, 17 miles WSW, (E-20)

Isotope	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Cs-134	< 0.010	< 0.010	< 0.010	< 0.010
Cs-137	< 0.010	< 0.010	< 0.010	< 0.010

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.

Table 18. Point Beach environmental TLD network for 1991. Exposure rate expressed as mR/Std Qtr.

Site	Location Azimuth/Distance (Direct.) (Miles)	1st Quarter Exposure Rate mR/Std Qtr. +/- mR	2nd Quarter Exposure Rate mR/Std Qtr. +/- mR	3rd Quarter Exposure Rate mR/Std Qtr. +/- mR	4th Quarter Exposure Rate mR/Std Qtr. +/- mR
1	SSE 0.5	10.8 +/- 0.8	10.8 +/- 1.0	11.3 +/- 1.0	12.1 +/- 0.8
2	SW 0.8	12.7 +/- 0.4	12.6 +/- 0.8	12.9 +/- 1.0	b
3	WNW 0.8	13.8 +/- 0.8	13.1 +/- 0.8	13.8 +/- 1.0	15.2 +/- 0.5
4	NW 1.3	12.2 +/- 0.8	13.3 +/- 0.9	14.0 +/- 1.0	15.0 +/- 0.4
5	NNW 1.9	12.0 +/- 0.4	13.4 +/- 1.0	13.7 +/- 1.2	14.3 +/- 0.5
6	SSE 5.0	11.2 +/- 0.5	12.0 +/- 0.9	9.8 +/- 1.0	12.1 +/- 0.1
7	SW 3.3	11.3 +/- 0.3	12.0 +/- 1.2	8.8 +/- 1.0	11.2 +/- 0.3
8	WNW 5.9	10.0 +/- 0.4	10.7 +/- 0.8	10.5 +/- 1.2	12.1 +/- 0.5
9	NNW 3.3	13.4 +/- 0.9	12.2 +/- 1.2	13.9 +/- 1.0	15.2 +/- 0.4
12	E 0.1	11.2 +/- 0.4	9.8 +/- 0.9	8.8 +/- 1.0	9.4 +/- 0.5
14	S 0.7	17.5 +/- 0.4 c	13.7 +/- 0.9	13.3 +/- 1.0	14.4 +/- 0.5
15	SW 1.2	26.8 +/- 0.4 c	16.9 +/- 1.0	13.5 +/- 1.0	16.9 +/- 0.4
16	WSW 1.4	26.8 +/- 0.4 c	15.6 +/- 0.8	16.5 +/- 1.0	13.4 +/- 0.8
17	SW 5.8	12.0 +/- 0.7	13.5 +/- 0.8	9.6 +/- 1.2	13.1 +/- 0.4
18	NW 3.4	26.9 +/- 0.4 c	17.0 +/- 0.8	14.7 +/- 1.2	16.0 +/- 0.7
20	SW 17	11.7 +/- 0.4	12.9 +/- 0.8	12.4 +/- 1.0	13.9 +/- 0.1
22	NW 1.8	12.9 +/- 0.7	14.0 +/- 0.8	13.1 +/- 1.0	13.8 +/- 0.9
23	SSW 4.3	11.7 +/- 0.3	18.3 +/- 1.2	15.5 +/- 1.2	16.1 +/- 0.5
24	SW 5.0	12.2 +/- 0.7	16.0 +/- 0.8	12.4 +/- 1.2	14.0 +/- 0.5
25	NW 5.0	11.8 +/- 0.4	16.3 +/- 0.8	12.6 +/- 1.2	14.2 +/- 0.5
26	W 5.0	10.5 +/- 0.4	11.6 +/- 0.8	9.6 +/- 1.0	11.8 +/- 0.3
27	WSW 4.1	11.7 +/- 0.4	14.0 +/- 0.8	10.5 +/- 1.0	13.1 +/- 0.5

a - Exposure rate data was calculated by using the conversion factor of (13.0) x (Table 19 data). The conversion factor was used to convert the Point Beach data expressed in Table 19 as mR/7 days to mR/Std Qtr which is the United States Nuclear Regulatory Commission report format.

b - TLD lost in the field

c - During the first quarter, a number of environmental TLDs were discovered to be wet or opaque upon return to the vendor for readout. The higher than normal results reported for these monitoring stations are suspected to be due to interference in TLD readout caused by the moisture damage incurred by the TLD chips.

Table 19. Point Beach environmental TLD network for 1991. Exposure rate expressed as mR/7 days.

Site	Location Azimuth/Distance (Direct.) (Miles)	1st Quarter Exposure Rate mR/7 days +/- mR	2nd Quarter Exposure Rate mR/7 days +/- mR	3rd Quarter Exposure Rate mR/7 days +/- mR	4th Quarter Exposure Rate mR/7 days +/- mR
1	SSE 0.5	0.83 +/- 0.06	0.83 +/- 0.08	0.87 +/- 0.08	0.93 +/- 0.06
2	SW 0.8	0.98 +/- 0.03	0.97 +/- 0.06	0.99 +/- 0.08	a
3	WNW 0.8	1.06 +/- 0.06	1.01 +/- 0.06	1.06 +/- 0.08	1.17 +/- 0.04
4	NW 1.3	0.94 +/- 0.06	1.02 +/- 0.07	1.08 +/- 0.08	1.15 +/- 0.03
5	NNW 1.9	0.92 +/- 0.03	1.03 +/- 0.08	1.05 +/- 0.09	1.10 +/- 0.04
6	SSE 5.0	0.86 +/- 0.04	0.92 +/- 0.06	0.75 +/- 0.08	0.93 +/- 0.01
7	SW 3.3	0.87 +/- 0.02	0.92 +/- 0.09	0.68 +/- 0.08	0.86 +/- 0.02
8	WNW 5.9	0.77 +/- 0.03	0.82 +/- 0.05	0.81 +/- 0.09	0.93 +/- 0.04
9	NNW 3.3	1.03 +/- 0.07	0.94 +/- 0.09	1.07 +/- 0.08	1.17 +/- 0.03
12	E 0.1	0.95 +/- 0.03	0.75 +/- 0.07	0.68 +/- 0.08	0.72 +/- 0.04
14	S 0.7	2.10 +/- 0.03 b	1.05 +/- 0.07	1.02 +/- 0.08	1.11 +/- 0.04
15	SW 1.2	2.06 +/- 0.03 b	1.30 +/- 0.08	1.04 +/- 0.08	1.30 +/- 0.03
16	WSW 1.4	2.06 +/- 0.03 b	1.20 +/- 0.06	1.27 +/- 0.08	1.03 +/- 0.06
17	SW 5.8	0.92 +/- 0.05	1.04 +/- 0.06	0.74 +/- 0.09	1.01 +/- 0.03
18	NW 3.4	2.07 +/- 0.03 b	1.31 +/- 0.06	1.13 +/- 0.09	1.23 +/- 0.05
20	SW 17	0.90 +/- 0.03	0.99 +/- 0.06	0.95 +/- 0.08	1.07 +/- 0.01
22	NW 1.8	0.99 +/- 0.05	1.08 +/- 0.06	1.01 +/- 0.08	1.06 +/- 0.07
23	SSW 4.3	0.90 +/- 0.02	1.41 +/- 0.09	1.19 +/- 0.09	1.24 +/- 0.04
24	SW 5.0	0.94 +/- 0.05	1.23 +/- 0.06	0.95 +/- 0.09	1.08 +/- 0.04
25	NW 5.0	0.91 +/- 0.03	1.25 +/- 0.06	0.97 +/- 0.09	1.09 +/- 0.04
26	W 5.0	0.81 +/- 0.03	0.89 +/- 0.06	0.74 +/- 0.08	0.91 +/- 0.02
27	WSW 4.1	0.90 +/- 0.03	1.08 +/- 0.06	0.81 +/- 0.08	1.01 +/- 0.04

a - TLD lost in field.

b - During the first quarter, a number of environmental TLDs were discovered to be wet or opaque upon return to the vendor for readout. The higher than normal results reported for these monitoring stations are suspected to be due to interference in TLD readout caused by the moisture damage incurred by the TLD chips.



Table 20. U.S. Nuclear Regulatory Commission TLD network for Point Beach for 1991.

Measurements in units of milliroentgens (mR)			field time (days)			
Exposure period :			1st quarter	12/11/90 - 04/18/91 (92)	3rd quarter	06/11/91 - 11/21/91 (98)
			2nd quarter	03/20/91 - 08/13/91 (P6)	4th quarter	09/17/91 - 01/16/92 (90)
Site	Location		1st Quarter Exposure Rate mR/Std Qtr. +/- Rdm	2nd Quarter Exposure Rate mR/Std Qtr. +/- Rdm	3rd Quarter Exposure Rate mR/Std Qtr. +/- Rdm	4th Quarter Exposure Rate mR/Std Qtr. +/- Rdm
	Azimuth/Distance (Degrees) (Miles)					
1	189	8.1	12.3 +- 3.6	11.9 +- 4.7	13.2 +- 4.2	13.2 +- 4.1
2	195	7.0	18.2 +- 4.2	13.4 +- 4.8	18.0 +- 4.7	15.8 +- 4.4
3	163	4.9	12.8 +- 3.6	12.4 +- 4.7	13.5 +- 4.2	14.6 +- 4.2
4	183	3.3	16.2 +- 4.0	16.9 +- 5.2	18.3 +- 4.7	16.7 +- 4.5
5	210	3.2	12.6 +- 3.6	9.7 +- 4.5	12.7 +- 4.1	11.5 +- 4.0
6	223	3.7	16.4 +- 4.0	16.1 +- 5.1	18.8 +- 4.8	16.8 +- 4.5
7	242	5.7	15.0 +- 3.9	13.8 +- 4.9	13.8 +- 4.3	15.3 +- 4.4
8	202	1.8	16.7 +- 4.0	15.6 +- 5.1	18.4 +- 4.8	17.8 +- 4.6
9	180	1.8	14.7 +- 3.8	14.1 +- 4.9	16.0 +- 4.5	16.5 +- 4.5
10	158	1.9	14.2 +- 3.8	11.6 +- 4.7	13.6 +- 4.2	13.1 +- 4.1
11	235	1.2	16.9 +- 4.1	13.7 +- 4.1	18.2 +- 4.7	17.6 +- 4.6
12	258	1.4	15.3 +- 3.9	14.2 +- 4.9	16.5 +- 4.5	15.1 +- 4.3
13	273	1.4	14.9 +- 3.8	14.9 +- 5.0	16.6 +- 4.8	16.3 +- 4.5
14	290	0.9	17.1 +- 4.1	16.4 +- 5.2	17.5 +- 4.7	17.1 +- 4.5
15	333	0.8	15.9 +- 3.9	15.1 +- 5.0	16.6 +- 4.6	15.3 +- 4.3
16	342	1.9	15.9 +- 4.0	13.5 +- 4.9	16.7 +- 4.6	15.6 +- 4.4
17	317	2.0	14.9 +- 3.8	12.1 +- 4.7	14.8 +- 4.4	14.1 +- 4.2
18	310	3.4	16.6 +- 4.0	18.6 +- 5.4	18.5 +- 4.8	18.7 +- 4.7
19	293	4.0	14.3 +- 3.8	11.2 +- 4.6	15.3 +- 4.4	15.1 +- 4.3
20	273	4.0	15.8 +- 3.9	13.3 +- 4.8	16.4 +- 4.5	13.4 +- 4.1
21	300	5.6	14.7 +- 3.8	13.2 +- 4.8	15.3 +- 4.4	15.1 +- 4.3
22	316	5.9	16.0 +- 4.0	14.1 +- 4.9	17.1 +- 4.6	14.4 +- 4.3
23	345	2.7	16.5 +- 4.0	16.7 +- 5.2	17.8 +- 4.7	17.0 +- 4.5
24	342	3.4	14.9 +- 3.8	14.2 +- 4.9	15.8 +- 4.5	15.1 +- 4.3
25	337	3.7	15.9 +- 3.9	15.8 +- 5.1	18.2 +- 4.7	16.9 +- 4.5
26	340	4.3	15.9 +- 3.9	16.7 +- 5.2	17.0 +- 4.7	17.0 +- 4.5
27	343	4.9	16.0 +- 4.0	16.3 +- 5.2	17.6 +- 4.7	17.8 +- 4.6
28	349	5.3	17.8 +- 4.2	14.4 +- 5.0	18.5 +- 4.8	16.3 +- 4.5
29	356	5.3	16.2 +- 4.0	11.7 +- 4.7	17.3 +- 4.6	14.7 +- 4.3
30	356	4.7	16.6 +- 4.0	17.5 +- 5.3	17.8 +- 4.7	17.4 +- 4.6
31	1	5.2	16.1 +- 4.0	14.3 +- 4.9	a	15.0 +- 4.3
32	357	6.2	16.1 +- 4.0	14.0 +- 4.9	17.4 +- 4.6	15.5 +- 4.4
33	331	7.1	13.8 +- 3.7	13.0 +- 4.8	14.7 +- 4.3	13.9 +- 4.2
34	318	11.2	16.3 +- 4.0	15.9 +- 5.1	17.2 +- 4.6	16.7 +- 4.5
35	341	7.6	14.4 +- 3.8	11.0 +- 4.6	15.2 +- 4.4	12.9 +- 4.1
36	349	7.4	15.8 +- 3.9	14.6 +- 5.0	18.8 +- 4.8	16.5 +- 4.5
37	2	7.2	14.4 +- 3.8	13.7 +- 4.9	15.5 +- 4.4	14.6 +- 4.3
38	6	7.9	15.4 +- 3.9	14.5 +- 5.0	16.9 +- 4.6	16.7 +- 4.5
39	8	11.8	13.3 +- 3.7	11.7 +- 4.7	13.8 +- 4.3	13.8 +- 4.2
40	247	4.3	16.9 +- 4.1	20.9 +- 5.7	17.9 +- 4.7	20.9 +- 5.0
41	8	23	14.4 +- 3.8	11.7 +- 4.7	14.2 +- 4.3	12.5 +- 4.1
42	8	23	13.8 +- 3.7	12.6 +- 4.8	14.3 +- 4.3	13.7 +- 4.2
43	8	23	12.8 +- 3.6	12.4 +- 4.7	13.4 +- 4.2	13.3 +- 4.1

a - The data was not available due to damaged or missing dosimeters.

NRC TLD DIRECT RADIATION MONITORING NETWORK, U.S. Nuclear Regulatory Commission, NUREG-0837, Washington, Vol 11, No. 1, 2, 3, &amp; 4, 1991.

Table 21. Analysis of surface water samples from site 1 for January - June, 1991.

WISCONSIN DIVISION OF HEALTH  
RADIATION PROTECTIONPoint Beach  
1991

Measurements in units of pCi/liter

WI - Radiation Protection data

site 1, effluent channel - 0.1 mile E

Collection date	January	February	March	April	May	June
gross alpha-sol	< 2.8	< 2.8	< 2.8	< 2.8	< 2.8	< 1.3
gross alpha-insol	< 2.8	< 2.8	< 2.8	< 2.8	< 2.8	< 0.9
gross beta-sol	3.2 ± 1.2	2.8 ± 1.2	2.4 ± 1.2	2.3 ± 1.2	2.5 ± 1.1	2.3 ± 1.1
gross beta-insol	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.5
H-3	< 300	320 ± 230	< 300	< 300	< 300	< 300
Sr-89	< 2.0	< 2.0	< 2.0	< 2.0	< 1.1	< 0.8
Sr-90	< 1.0	< 1.0	< 1.0	1.6 ± 0.4	0.7 ± 0.3	0.9 ± 0.4
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	< 25	< 25	< 25	< 25	< 25	< 25
Co-58	< 15	< 15	< 15	< 15	< 15	< 15
Co-60	< 15	< 15	< 15	< 15	< 15	< 15
Zn-65	< 30	< 30	< 30	< 30	< 30	< 30
Zr,Nb-95	< 15	< 15	< 15	< 15	< 15	< 15
Cs-134	< 13	< 13	< 13	< 13	< 13	< 13
Cs-137	< 12	< 12	< 12	< 12	< 12	< 12
Ba,La-140	< 15	< 15	< 15	< 15	< 15	< 15

Isotopes other than those reported were not detected.

Point Beach data

site 1, effluent channel - 0.1 mile E, (E-12)

Collection date	January	February	March	April	May	June
gross beta	2.6 ± 0.5	2.2 ± 0.5	2.9 ± 0.6	2.3 ± 0.5	2.6 ± 0.5	2.7 ± 0.5
H-3			251 ± 94			134 ± 92
Sr-89			< 5			< 5
Sr-90			0.6 ± 0.3			< 1.0
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	< 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
Zr,Nb-95	< 15	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10	< 10
Ba,La-140	< 15	< 15	< 15	< 15	< 15	< 15

According to Point Beach Radiological Effluent Technical Specifications, analysis is required for all the listed radionuclides except I-131. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.



Table 22. Analysis of surface water samples from site 1 for July - December, 1991.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTIONPoint Beach  
1991

Measurements in units of pCi/liter

WI - Section of Radiation Protection data

site 1, effluent channel - 0.1 mile E

Collection date	July	August	September	October	November	December
gross alpha-sol	< 1.4	< 1.4	< 1.2	< 1.3	< 1.3	< 1.5
gross alpha-insol	< 0.9	< 0.9	< 1.0	< 0.8	< 0.8	< 1.0
gross beta-sol	2.7 ± 1.2	2.4 ± 1.1	2.2 ± 1.1	2.3 ± 1.1	2.5 ± 1.1	2.4 ± 1.2
gross beta-insol	1.5 ± 1.0	< 1.5	< 1.5	< 1.4	< 1.4	3.2 ± 0.7
H-3	< 300	260 ± 220	< 300	< 300	< 300	530 ± 230
Sr-89	< 1.1	< 0.8	< 0.7	< 1.5	< 1.0	< 0.6
Sr-90	< 0.7	< 0.8	< 0.7	0.6 ± 0.4	0.7 ± 0.0	0.8 ± 0.3
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	< 25	< 25	< 25	< 25	< 25	< 25
Co-58	< 15	< 15	< 15	< 15	< 15	< 15
Co-60	< 15	< 15	< 15	< 15	< 15	< 15
Zn-65	< 30	< 30	< 30	< 30	< 30	< 30
Zr,Nb-95	< 15	< 15	< 15	< 15	< 15	< 15
Cs-134	< 13	< 13	< 13	< 13	< 13	< 13
Cs-137	< 12	< 12	< 12	< 12	< 12	< 12
Ba,Ln-140	< 15	< 15	< 15	< 15	< 15	< 15

Isotopes other than those reported were not detected.

Point Beach data

site 1, effluent channel - 0.1 mile E, (E-12)

Collection date	July	August	September	October	November	December
gross beta	2.0 ± 0.3	2.9 ± 0.6	1.8 ± 0.8	2.5 ± 0.4	2.1 ± 0.5	2.4 ± 0.6
H-3			282 ± 90			201 ± 103
Sr-89			< 5			< 5
Sr-90			< 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	< 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
Zr,Nb-95	< 15	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10	< 10
Ba,Ln-140	< 15	< 15	< 15	< 15	< 15	< 15

According to Point Beach Radiological Effluent Technical Specifications, analysis is required for all the listed radionuclides except I-131. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.

Table 23. Analysis of surface water samples from sites 6 and 9 for January - June, 1991.

WISCONSIN DIVISION OF HEALTH  
RADIATION PROTECTIONPoint Beach  
1991

Measurements in units of pCi/liter

WI - Radiation Protection data

site 7 (PBK-17) Green Bay pumping station, Racine - 15.6 miles NNE

Collection date	01/02/91	02/04/91	03/04/91	04/02/91	05/01/91	06/03/91
gross alpha-sol	< 2.8	< 2.8	< 2.8	< 2.8	< 2.8	< 2.8
gross alpha-insol	< 2.8	< 2.8	< 2.8	< 2.8	< 2.8	< 2.8
gross beta-sol	2.8 +/- 1.2	2.4 +/- 1.2	2.1 +/- 1.1	2.5 +/- 1.7	7.0 +/- 1.5	3.5 +/- 1.2
gross beta-insol	< 1.6	< 1.6	< 1.6	3.0 +/- 1.1	< 1.6	< 1.6
H-3	< 300	< 300	< 300	< 300	< 300	< 300
Sr-87	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Sr-90	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
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	< 33	< 25	< 25	< 25	< 25	< 25
Co-58	< 15	< 15	< 15	< 15	< 15	< 15
Co-60	< 15	< 15	< 15	< 15	< 15	< 15
Zn-65	< 30	< 30	< 30	< 30	< 30	< 30
Zr-Nb-95	< 15	< 15	< 15	< 15	< 15	< 15
Cs-134	< 13	< 13	< 13	< 13	< 13	< 13
Cs-137	< 12	< 12	< 12	< 12	< 12	< 12
Ba-La-140	< 15	< 15	< 15	< 15	< 15	< 15

Isotopes other than those reported were not detected.

Point Beach data

site 6 (E-06), Coast Guard Station - 4.8 miles SSE

Collection date	January *	February	March	April	May	June
gross beta		0.9 +/- 0.2	2.5 +/- 0.3	3.2 +/- 0.4	3.1 +/- 0.5	2.4 +/- 0.6
H-3			227 +/- 93			234 +/- 96
Sr-89			< 5			< 5
Sr-90			< 1			< 1
I-131		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Gamma isotopic						
Mn-54		< 10	< 10	< 10	< 10	< 10
Fe-59		< 30	< 30	< 30	< 30	< 30
Co-58		< 10	< 10	< 10	< 10	< 10
Co-60		< 10	< 10	< 10	< 10	< 10
Zn-65		< 30	< 30	< 30	< 30	< 30
Zr-95		< 15	< 15	< 15	< 15	< 15
Cs-134		< 10	< 10	< 10	< 10	< 10
Cs-137		< 10	< 10	< 10	< 10	< 10
La-140		< 15	< 15	< 15	< 15	< 15

\* - No sample was collected because of ice.

According to Point Beach Radiological Effluent Technical Specifications, analysis is required for all the listed radionuclides except I-131. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.

Table 24. Analysis of surface water samples from sites 6 and 9 for July - December, 1991.

WISCONSIN DIVISION OF HEALTH  
RADIATION PROTECTIONPoint Beach  
1991

Measurements in units of pCi/liter

WI - Radiation Protection data

site 9 (PBK-77), Green Bay pumping station, Rostok - 15.6 miles NNE

Collection date	07/01/91	08/05/91	09/04/91	10/07/91	11/04/91	12/02/91
gross alpha-sol	< 1.3	< 1.4	< 1.4	1.3 +- 1.0	< 1.3	< 1.3
gross alpha-insol	< 0.9	< 0.9	< 0.9	< 1.0	< 0.8	< 0.8
gross beta-sol	3.6 +- 1.2	2.6 +- 1.2	2.3 +- 1.1	2.5 +- 1.1	2.8 +- 1.2	2.6 +- 1.1
gross beta-insol	< 1.5	< 1.6	< 1.5	< 1.5	< 1.4	< 1.4
H-3	< 300	< 300	< 300	< 300	< 300	< 300
Sr-89	< 2.0	< 2.0	< 2.0	< 0.7	< 0.6	< 0.9
Sr-90	< 1.1	< 1.0	1.0 +- 0.3	< 0.6	< 0.7	0.6 +- 0.3
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	< 25	< 25	< 25	< 25	< 25	< 25
Co-58	< 15	< 15	< 15	< 15	< 15	< 15
Co-60	< 15	< 15	< 15	< 15	< 15	< 15
Zn-65	< 30	< 30	< 30	< 30	< 30	< 30
Zr,Nb-95	< 15	< 15	< 15	< 15	< 15	< 15
Cs-134	< 13	< 13	< 13	< 13	< 13	< 13
Cs-137	< 12	< 12	< 12	< 12	< 12	< 12
Ba,La-140	< 15	< 15	< 15	< 15	< 15	< 15

Isotopes other than those reported were not detected.

Point Beach data

site 6 (E-06), Coast Guard Station - 4.8 miles SSE

Collection date	July	August	September	October	November	December
gross beta	2.4 +- 0.7	2.0 +- 0.5	2.6 +- 0.8	3.3 +- 0.4	4.0 +- 0.8	3.8 +- 0.6
H-3			320 +- 92			< 182
Sr-89			< 5			< 5
Sr-90			< 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	< 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
Zr,Nb-95	< 15	< 15	< 15	< 15	< 15	< 15
Cs-134	< 10	< 10	< 10	< 10	< 10	< 10
Cs-137	< 10	< 10	< 10	< 10	< 10	< 10
Ba,La-140	< 15	< 15	< 15	< 15	< 15	< 15

According to Point Beach Radiological Effluent Technical Specifications, analysis is required for all the listed radionuclides except I-131. Radionuclides other than those reported were not detected. Naturally occurring radionuclides are commonly detected but are not reported.

Table 25. Analysis of fish samples for 1991.

WISCONSIN DIVISION OF HEALTH  
RADIATION PROTECTIONPoint Beach  
1991

Measurements in units of pCi/kg (wet)

WI - Radiation Protection data

Collection date	03/21/91	03/21/91	12/26/91	12/26/91
Type	trout	trout	brown trout	brown trout
Gamma isotopic				
K-40	1000 ± 300	2700 ± 700	2600 ± 500	1800 ± 400
Mn-54	< 1	< 21	< 21	< 26
Fe-59	< 33	< 65	< 72	< 62
Co-58	< 11	< 20	< 22	< 21
Co-60	< 15	< 28	< 30	< 31
Zn-65	< 21	< 43	< 49	< 52
Cs-134	< 30	< 30	< 26	< 23
Cs-137	29 ± 11	80 ± 20	60 ± 20	36 ± 16

Isotopes other than those reported were not detected.

Point Beach data

Collection date	03/21/91	03/21/91	03/21/91	12/26/91	12/26/91	12/26/91
Type	trout	trout	congo	trout	trout	trout
Gamma isotopic						
Mn-54	< 130	< 130	< 130	< 130	< 130	< 130
Fe-59	< 260	< 260	< 160	< 260	< 260	< 260
Co-58	< 130	< 130	< 130	< 130	< 130	< 130
Co-60	< 130	< 130	< 130	< 130	< 130	< 130
Zn-65	< 260	< 260	< 260	< 260	< 260	< 260
Cs-134	< 130	< 130	< 130	< 130	< 130	< 130
Cs-137	74 ± 15	73 ± 13	97 ± 41	110 ± 40	40 ± 17	85 ± 21

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 26. Analysis of shoreline sediments for 1991.

WISCONSIN DIVISION OF HEALTH RADIATION PROTECTION		Point Beach 1991	
Measurements in units of pCi/kg (dry)			
WI - Radiation Protection data			
Collection date	07/17/91	09/17/91	09/17/91
Type	shoreline sed.	shoreline sed.	shoreline sed.
Location	1.4 miles N site 3 (PBK-5)	5.3 miles SSE site 6 (PBK-6)	0.1 mile E site 1 (PBK-10)
Analysis			
gross beta (dry)	11000 +- 4000	13000 +- 4000	9000 +- 4000
gross alpha (dry)	< 6100	< 6100	< 6000
Gamma isotopes			
K-40	7700 +- 1000	11400 +- 1400	8100 +- 1000
Co-58	< 29	< 34	< 33
Co-60	< 33	< 40	< 33
Cs-134	< 27	< 29	< 28
Cs-137	37 +- 15	33 +- 17	39 +- 15
Ra-226	201 +- 17	133 +- 15	148 +- 15

Isotopes other than those reported were not detected.

Point Beach data

Collection date	09/17/91	09/17/91	09/17/91
Type	shoreline sed.	shoreline sed.	shoreline sed.
Location	1.4 miles N site 3 (E-05)	5.3 miles SSE site 6 (E-06)	0.1 mile E site 1 (E-12)
Analysis			
gross beta (dry)	8000 +- 1400	9100 +- 1400	8800 +- 1400
Gamma isotopes			
Cs-137	40 +- 22	73 +- 27	63 +- 30

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 27. Analysis of milk samples from site 7 for 1991.

WISCONSIN DIVISION OF HEALTH  
RADIATION PROTECTIONPoint Beach  
1991

Measurements in units of pCi/liter

WI - Radiation Protection data

site 7 (PBK-19), Funk farm - 3.8 miles WSW

Collection date	01/08/91	02/13/91	03/06/91	04/03/91	05/08/91	06/05/91
Radioisotopes						
Sr-90	1.5 ± 0.4	2.1 ± 0.6	2.4 ± 0.5	2.0 ± 0.5	1.8 ± 0.5	2.0 ± 0.5
I-131	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
K-40	1500 ± 200	1300 ± 400	1400 ± 400	1400 ± 400	1400 ± 300	1400 ± 400
Cs-134	< 12	< 12	< 12	< 12	< 12	< 12
Cs-137	< 12	< 12	< 12	< 12	< 12	< 12
Ba,La-140	< 15	< 15	< 15	< 15	< 15	< 15

  

Collection date	07/03/91	08/07/91	09/11/91	10/09/91	11/06/91	12/04/91
Radioisotopes						
Sr-90	1.5 ± 0.5	1.9 ± 0.6	3.1 ± 0.6	1.7 ± 0.6	1.0 ± 0.4	1.8 ± 0.5
I-131	0.3 ± 0.1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
K-40	1300 ± 400	1500 ± 300	1400 ± 200	1400 ± 300	1300 ± 200	1400 ± 200
Cs-134	< 12	< 12	< 12	< 12	< 12	< 12
Cs-137	< 12	< 12	< 12	< 12	< 12	< 12
Ba,La-140	< 15	< 15	< 15	< 15	< 15	< 15

Isotopes other than those reported were not detected.

Point Beach data

site 7 (E-11), Funk farm - 3.8 miles WSW

Collection date	01/09/91	02/13/91	03/06/91	04/03/91	05/08/91	06/05/91
Radioisotopes						
Sr-90	0.9 ± 0.3	1.7 ± 0.4	1.8 ± 0.4	1.9 ± 0.5	1.2 ± 0.3	0.8 ± 0.3
I-131	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cs-134	< 5	< 5	< 5	< 5	< 5	< 5
Cs-137	< 5	< 5	< 5	< 5	< 5	< 5
La-140	< 5	< 5	< 5	< 5	5	< 5

  

Collection date	07/03/91	08/07/91	09/11/91	10/09/91	11/06/91	12/04/91
Radioisotopes						
Sr-90	1.5 ± 0.4	0.9 ± 0.3	1.2 ± 0.4	3.0 ± 0.5	1.7 ± 0.4	2.1 ± 0.5
I-131	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cs-134	< 5	< 5	< 5	< 5	< 5	< 5
Cs-137	< 5	< 5	< 5	< 5	< 5	< 5
La-140	< 5	< 5	< 5	< 5	< 5	< 5

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 28. Analysis of milk samples from site B for 1991.

WISCONSIN DIVISION OF HEALTH  
RADIATION PROTECTIONPoint Beach  
1991

Measurements in units of pCi/liter

WI - Radiation Protection data

site B (PBK-24), Engelbrecht farm - 2.2 miles NW

Collection date	01/08/91	02/13/91	03/06/91	04/03/91	05/08/91	06/05/91
Radioisotopes						
Sr-90	2.0 ± 0.4	2.0 ± 0.6	2.3 ± 0.9	2.0 ± 0.6	1.7 ± 0.5	1.9 ± 0.5
I-131	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
K-40	1400 ± 200	1300 ± 400	400 ± 400	1400 ± 400	1200 ± 400	1500 ± 500
Cs-134	< 12	< 12	< 12	< 12	< 12	< 12
Cs-137	< 12	< 12	< 12	< 12	< 12	< 12
Pu,La-140	< 15	< 15	< 15	< 15	< 15	< 15

Collection date	07/03/91	08/07/91	09/11/91	10/09/91	11/05/91	12/04/91
Radioisotopes						
Sr-90	1.4 ± 0.5	2.0 ± 0.6	2.4 ± 0.6	1.7 ± 0.5	1.8 ± 0.7	1.3 ± 0.5
I-131	0.5 ± 0.1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
K-40	1300 ± 400	1500 ± 300	1500 ± 300	1600 ± 300	1400 ± 200	1300 ± 200
Cs-134	< 12	< 12	< 12	< 12	< 12	< 12
Cs-137	< 12	< 12	< 12	< 12	< 12	< 12
Pu,La-140	< 15	< 15	< 15	< 15	< 15	< 15

Isotopes other than those reported were not detected.

Point Beach data

site B (E-19), Engelbrecht farm - 2.2 miles NW

Collection date	01/09/91	02/13/91	03/06/91	04/03/91	05/08/91	06/05/91
Radioisotopes						
Sr-90	2.0 ± 0.5	1.2 ± 0.3	1.7 ± 0.4	1.7 ± 0.4	1.2 ± 0.4	1.7 ± 0.4
I-131	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cs-134	< 5	< 5	< 5	< 5	< 5	< 5
Cs-137	< 5	< 5	< 5	< 5	< 5	< 5
La-140	< 5	< 5	< 5	< 5	< 5	< 5

Collection date	07/03/91	08/07/91	09/11/91	10/09/91	11/06/91	12/04/91
Radioisotopes						
Sr-90	1.4 ± 0.4	1.6 ± 0.4	1.4 ± 0.4	1.2 ± 0.4	1.8 ± 0.5	1.1 ± 0.4
I-131	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Cs-134	< 5	< 5	< 5	< 5	< 5	< 5
Cs-137	< 5	< 5	< 5	< 5	< 5	< 5
La-140	< 5.2	< 5	< 5	< 5	< 5	< 5

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 29. Analysis of vegetation samples for 1991.

WISCONSIN DIVISION OF HEALTH  
RADIATION PROTECTIONPoint Beach  
1991

Measurements in units of pCi/kg (wet)

## WI - Radiation Protection data

Collection date	09/17/91	09/17/91	09/17/91	09/17/91
Type	vegetation	vegetation	vegetation	vegetation
Location	site 2 (PBK-4)	site 4 (PBK-2)	site 5 (E-03)	site 6 (PBK-6)
Analysis				
gross beta (wet)	8100 +- 1800	3600 +- 900	7100 +- 1200	6000 +- 2100
gross alpha (wet)	< 2200	< 1200	< 1300	< 2800
gamma isotopic				
Be-7	1400 +- 400	900 +- 300	400	2300 +- 400
K-40	5800 +- 1100	2300 +- 600	5900 +- 1100	3000 +- 600
Co-58	< 61	< 57	< 47	< 38
Co-60	< 72	< 57	< 60	< 55
Zr-95	< 120	< 94	< 117	< 89
I-131	< 58	< 44	< 47	< 42
Cs-134	< 73	< 56	< 50	< 48
Cs-137	< 51	< 46	< 48	< 43

Isotopes other than those reported were not detected.

## Point Beach data

Collection date	09/17/91	09/17/91	09/17/91	09/17/91
Type	vegetation	vegetation	vegetation	vegetation
Location	site 2 (E-04)	site 4 (E-02)	site 5 (E-03)	site 6 (E-06)
Analysis				
gross beta (wet)	4500 +- 200	3200 +- 100	4300 +- 200	2800 +- 200
gamma isotopic				
I-131	< 60	< 60	< 60	< 60
Cs-134	< 60	< 60	< 60	< 60
Cs-137	< 80	< 80	< 80	< 80

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.