S T A T E O F W I S C O N S I N

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Point Beach Environmental Radioactivity Survey

NRC 30-83-647

Wisconsin Department of Health and Social Services
Division of Health
Bureau of Environmental Health
Section of Radiation Protection
P.O. Box 309
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STATE OF WISCONSIN

1983

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 1983. 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.

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 one cubic foot of air per minute.

Liquid Effluent

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.

A background surface water sample for Point Beach is not taken at the Green Bay Pumping Station-Rostok. A surface water sample from the Nature Conservatory 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 a split sample for both Wisconsin and the Point Beach nuclear power facility.

Sediment

Sediment is collected from three locations on an annual basis.

Fish

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

Food Products

Vegetation in the form of 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. Determine the gamma spectrum using 2046 channels of the Canberra Model 85 multichannel analyzer. Calculate activity 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 in an external gas flow proportional counter. Calculate activity correcting for counter efficiency.

Surface Water - Gamma Isotopic

A 3.5 liter sample is placed in a Marinelli beaker and analyzed on a GeLi detector. The sample is counted for 100 minutes using 2048 channels at 1.0 Kev per channel. Calculate activity 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. Calculate activity correcting for counter efficiency and for decay.

Milk - Gamma Isotopic

Procedure same as for Surface Water.

Milk - Iodine 131 Chemical Extraction

A stabile 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 a Widebeta I 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 count for 100 minutes. Determine the gamma spectrum using 2048 channels set at 1.0 Kev per channel. Calculate the activity 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 their own quality assurance program which was also reviewed by the NRC in

October, 1983. Refer to Report No. 999-0003/83-07 for a review of the NRC report.

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 progam 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 is included in Table 1 following the conclusion section.

SENSITIVITIES AND ERROR - WISCONSIN DATA

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 a priori estimate of the capabliity 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 concentrations 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.

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:

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

Where:

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

sb 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 DATA

The statement below is taken from a report submitted to the Point Beach nuclear facility by Teledyne Isotopes Midwest Laboratory.

"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.

CONCLUSIONS

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 both Wisconsin and for Point Beach is located at the Francar residence, 5.6 miles WNW. Since a sample for radioiodine is not collected at the Francar residence for Wisconsin, data from the control site located at the Green Bay Pumping - Rostok, 15.6 miles NNE has been included in the Wisconsin data.

The quarterly average for the gross beta analysis on the air particulate filters is given in the table below.

	WI - Section of Radiation Protection		Point Beach	
	units of pCi/M3			
Quarter	Indicator	Control	Indicator	Control
1st	0.011+/-0.002	0.007+/-0.002	0.013+/-0.01	0.018+/-0.01
2nd	0.015+/-0.002	0.006+/-0.002	0.014+/-0.01	0.014+/-0.01
3rd	0.052+/-0.004	0.008+/-0.002	0.022+/-0.01	0.011+/-0.01
4th	0.024+/-0.002	0.009+/-0.002	0.027+/-0.01	0.026+/-0.01

At the low level of activity that was detected, there is good agreement in the gross beta activity for the air particulate samples between Wisconsin and the Point Beach data. The difference in the 3rd quarter for the Wisconsin indicator station is due to higher activities for Wisconsin in three or four samples with no corresponding higher activities in the Point Beach samples. The gross beta activity for the air particulate filters for both Wisconsin and the Point Beach data showed little difference from the reported 1982 levels.

The Wisconsin gamma isotopic analysis of the monthly air particulate composites detected only beryllium-7 in eight of the composites at the indicator station. At the control station, Francar residence, only beryllium-7 was detected in four of the composites and at the control station, Green Bay Pumping Station-Rostok, only beryllium-7 was detected in four of the composites. All other radioisotopes were below their respective MDC.

The Point Beach quarterly analysis on the air particulate filter composites detected no isotopes above the less than value as stated for cesium-137. Beryllium-7 is not commonly analyzed for as stated in the section: Sensitivity - Point Beach Data.

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 pCi/M3 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 Nature Conservatory, 3.3 miles N.

The Wisconsin sample analysis detected only background levels of radiation at the control site (Green Bay Pumping Station - Rostok). Gamma isotopic analysis detected no isotopes above their respective MDC. Iodine-131, from the chemical procedure, was detected for the months of July and September with activities of 2.9+/-0.4 pCi/l and 1.1+/-0.3 pCi/l respectively.

The gamma isotopic analysis of the effluent channel by Wisconsin detected no isotopes above their respective MDC. Trace activities of tritium (H-3) were detected in May with a reported activity of 810+/-300 pCi/l.

The Point Beach gamma isotopic analysis detected no isotopes above their respective lower limits of detection for either the samples from the effluent channel or the samples from the Nature Conservatory.

Comparison of the background sample is not possible as Wisconsin and Point Beach sample at different locations and different dates. All Point Beach reported activities for iodine-131 were <10 pCi/l. The trace activity for tritium (H-3) detected by Wisconsin can be compared if we use a quarterly average, the quarterly activity for tritium would be <500 pCi/l for the Wisconsin data and would compare with the reported Point Bech quarterly average of <500 pCi/l.

The Wisconsin gross beta yearly average was 4.0+/-1.3 pCi/l at the indicator site and 3.6+/-1.2 pCi/l at the control site. The Point Beach gross beta yearly average was 2.8+/-0.6 pCi/l at the indicator site and 3.5+/-0.6 pCi/l at the control site. 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

Of the five reported fish samples only two of the samples are split samples.

Of the five samples analyzed Wisconsin detected cesium-137 in three of the samples and potassium-40 in all five samples. Other isotopes reported are below their respective MDC. The activities detected were at or slightly above their respective MDC.

For Point Beach no isotopes were detected above their respective lower limits of detection. Point Beach reported their results as <500 pCi/kg based on cesium-137 detection limits. Naturally occurring isotopes such as potassium-40 are not reported by Point Beach. Comparison with the Wisconsin data is not possible at the lower limits of detection reported by Point Beach and the fact that Point Beach does not report naturally occuring radioisotopes.

Bottom Sediments

Split samples were taken for bottom sediments at three locations.

Wisconsin analysis detected cesium-137 above its MDC in all three samples. Naturally occurring potassium-40 and radium daughters were also detected in all three samples. The activities detected for cesium-137 were slightly above its MDC and are less than those required for the NRC contract.

For Point Beach no isotopes were detected above their respective lower limits of detection. Point Beach reports activities as <1000 pCi/kg and does not report naturally occurring radioisotopes.

At the lower level of detection reported by Point Beach and the fact that Point Beach does not report naturally occurring radioisotopes, no comparison can be made with the Wisconsin data. Trace activities for cesium-137 are commonly detected in soil and bottom sediment samples collected by Wisconsin in other areas of the state.

Milk

A split sample is taken for milk. Milk is collected from two farms in the Point Beach area.

Wisconsin detected only naturally occurring potassium-40 above MDC in its gamma isotopic analysis. Activities for iodine-131 by chemical separation were above its MDC for the months of July and September at the Funk farm and for the month of January at the Lehrmann farm. The activities detected were 0.4+/-0.2 pCi/l and 1.10+/-0.14 pCi/l in samples from the Funk farm and 1.3+/-0.2 pCi/l from the Lehrmann farm.

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.

The activities for iodine-131 detected by Wisconsin were small and well below accepted standards.

Vegetation - Food Products

A split sample for food products was not taken. Point Beach does not sample food products. Data from vegetation samples is included for the same three sampling sites but different sampling dates.

Only naturally occurring potassium-40 above its MDC was detected in the gamma isotopic analysis of the Wisconsin samples.

Point Beach does not report naturally occurring radioisotopes and no isotopes were reported above their lower limits of detection.

Iodine-131 was not detected in any of the Wisconsin or the Point Beach samples. Comparison of gross beta results and gamma isotopic results illustrates the problem of reporting results on a wet basis versus a dry basis.

Table 1. U.S. environmental Protection Agency's cross check 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	01-04-82	Sr-89	21+/-1.1	21+/-5	-0.1
		Sr-90	11+/-0.8	12+/-1.5	-1.2
Water	01-22-82	Alpha	19+/-3	24+/-6	-1.4
		Beta	28+/-2	32+/-5	-1.5
Water	01-29-82	I-131	8.4+/-1.0	8.4+/-1.4	0.0
Water	02-05-82	Cr-51	<146	0	---
		Co-60	23+/-8	20+/-5	1.0
		Zn-65	<25	15+/-5	---
		Ru-106	<101	20+ -5	---
		Cs-134	20+/-9	22+/-5	-0.8
		Cs-137	21+/-9	23+/-5	-0.8
Water	02-12-82	H-3	1960+/-200	1820+/-342	0.7
Water	03-19-82	Alpha	18+/-3	19+/-5.	-0.3
		Beta	16+/-2	19+/-5	-0.9
Filter	03-26-82	Alpha	33+/-2	27+/-7	1.6
		Beta	53+/-2	55+/-5	-0.8
		Sr-90	17+/-0.9	16+/-1.5	1.2
		Cs-137	23+/-7	23+/-5	-0.1
Water	04-02-82	I-131	53+/-10	62+/-6.2	-2.5
Water	04-09-82	H-3	3117+/-200	2860+/-360	1.2
Water	04-19-82	Alpha	66+/-5	85+/-21	-1.6
		Beta	121+/-5	106+/-5	4.8
		Sr-89	23+/-1.5	24+/-5	-0.5
		Sr-90	13+/-1.0	12+/-1.5	0.8
		Co-60	<11	0	
		Cs-134	16+/-3	15+/-5	0.5
		Cs-137	19+/-3	16+/-5	0.9
Milk	04-23-82	Sr-90	18+/-2	16+/-1.5	2.7
		I-131	32+/-3	30+/-5	0.7
		Cs-137	29+/-5	28+/-5	0.5
		Ba-140	<11	0	
		K	1373+/-60	1500+/-75	-2.9

Table 1 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	05-07-82	Sr-89	23+/-2	22+/-5	0.2
		Sr-90	13+/-1.5	13+/-1.5	-0.4
Water	05-21-82	Alpha	26.7+/-3	27.5+/-7	-0.2
		Beta	26+/-2	29+/-5	-0.9
Water	06-04-82	Cs-134	36+/-9	35+/-5	0.2
		Cs-137	29+/-9	25+/-5	1.3
		Cr-51	<135	23+/-5	
		Co-60	32+/-10	29+/-5	0.9
		Zn-65	<28	26+/-5	
		Ru-106	<105	0.0	
Water	06-11-82	H-3	1593+/-230	1830+/-340	-1.2
Water	06-25-82	I-131	5.1+/-1.0	4.4+/-0.7	1.8
Food	07-02-82	Sr-89	No data provided		
		Sr-90	No data provided		
		I-131	93+/-10	94+/-9.2	-0.3
		Cs-137	22+/-8	20+/-5	0.8
		Ba-140	<11	0.0	
		K-40	2207+/-90	2400+/-120	-2.8
Water	07-16-82	Alpha	17+/-3	16+/-5	0.3
		Beta	12+/-1.7	23+/-5	-3.7
Milk	07-23-82	I-131	6.5+/-0.8	5.4+/-0.8	2.4
Water	08-06-82	I-131	91+/-10	87+/-8.7	0.7
Water	08-13-82	H-3	3023+/-240	2890+/-360	0.6
Water	09-03-82	Sr-89	25.0+/-1.2	24.5+/-5	0.2
		Sr-90	13.1+/-0.9	14.5+/-1.5	-1.6
Water	09-10-82	Ra-226	No data provided		
		Ra-228	9.3+/-2	11.0+/-1.7	-1.8
Water	09-17-82	Alpha	25+/-3	29+/-7.3	-1.0
		Beta	31+/-3	40+/-5	-3.1
Filter	09-24-82	Alpha	30+/-2	32+/-8	-0.4
		Beta	54+/-2	67+/-5	-4.6
		Sr-90	16+/-1.0	20+/-1.5	-4.2
		Cs-137	22+/-5	27+/-5	-1.6

Table 1 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	10-01-82	Cr-51	<169	51+/-5	
		Co-60	21+/-10	20+/-5	0.5
		Zn-65	22+/-13	24+/-5	-0.8
		Ru-106	<99	30+/-5	
		Cs-134	17+/-7	19+/-5	-0.8
		Cs-137	24+/-8	20+/-5	1.3
Water	10-08-82	H-3	2243+/-290	2560+/-350	-1.6
Water	10-15-82	Alpha	43+/-4	55+/-14	-1.5
		Beta	74+/-4	81+/-5	-2.3
		Sr-89	<2	0.0	
		Sr-90	15.5+/-1.8	17.2+/-1.5	-2.0
		Ra-226	8.5+/-2	12.5+/-1.9	-3.7
		Ra-228	6.6+/-2	3.6+/-0.5	10.3
		Cs-134	<10	2+/-5	
		Cs-137	21+/-7	20+/-5	0.3
		Co-60	<8	0.0	
		U	No data provided	16+/-6	
Milk	10-22-82	Sr-89	No data provided	0.0	
		Sr-90	17.0+/-1.8	18.6+/-1.5	-1.9
		I-131	43+/-10	42+/-6	0.2
		Cs-137	31+/-8	34+/-5	-1.0
		Ba-140	<18	0.0	
		K	1347+/-80	1560+/-80	-4.7
Food	11-05-82	Sr-89	No data provided	0.0	
		Sr-90	No data provided	27.8+/-1.5	
		I-131	52+/-10	25+/-6	7.7
		Cs-137	28+/-8	27+/-5	0.2
		Ba-140	<20	0.0	
		K	2353+/-100	2790+/-140	-5.3
Water	11-19-82	Alpha	19+/-3	19+/-5	-0.1
		Beta	16+/-2	24+/-5	-2.8
Filter	11-26-82	Alpha	34+/-3	27+/-6.8	1.7
		Beta	61+/-8	59+/-5.0	0.6
		Sr-90	17+/-1.3	16+/-1.5	1.2
		Cs-137	25+/-10	27+/-5.0	-0.2
Water	12-03-82	I-131	44+/-10	37+/-6	2.1
Water	12-10-82	H-3	2047+/-220	1990+/-345	0.3

Table 1 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	12-17-82	Ra-226	8.5+/-1.5	11.0+/-1.7	-2.5
		Ra-228	1.0+/-0.8	0.0	
Water	01-07-83	Sr-89	27.7+/-1.5	29.2+/-5	-0.5
		Sr-90	16.3+/-1.5	17.2+/-1.5	-1.1
Water	01-21-83	Alpha	26+/-2	29+/-7.25	-0.7
		Beta	37+/-2	31+/-5	2.0
Water	02-04-83	Cr-51	<144	45+/-5	
		Co-60	26+/-10	22+/-5	1.4
		Zn-65	27+/-8	21+/-5	0.6
		Ru-106	<112	48+/-5	
		Cs-134	17+/-8	20+/-5	-1.0
		Cs-137	19+/-8	19+/-5	-0.1
Water	02-11-83	H-3	2673+/-300	2560+/-353	0.1
Milk	02-25-83	Sr-89	No data provided	37.4+/-5	
		Sr-90	20.3+/-1.5	17.8+/-1.5	2.9
		I-131	57+/-15	54.5+/-6	0.8
		Cs-137	25+/-10	25.6+/-5	-0.1
		Ba-140	<9	0.0	
		K	1310+/-200	1512+/-76	-4.6
Food	03-04-83	Sr-89	No data provided	34.6+/-5	
		Sr-90	No data provided	27.8+/-1.5	
		I-131	42+/-15	36.9+/-6	1.4
		Cs-137	32+/-15	31.3+/-5	0.4
		Ba-140	<12	0.0	
		K	2217+/-250	2592+/-130	-5.0
Water	03-11-83	Ra-226	13.7+/-1.5	12.7+/-1.9	0.9
		Ra-228	<1	0.0	
Water	03-18-83	Alpha	26+/-3	31+/-7.8	-1.0
		Beta	25+/-2	28+/-5	-1.2
Filter	03-25-83	Alpha	36+/-3	26+/-6.5	2.8
		Beta	68+/-5	68+/-5	0.0
		Sr-90	20+/-2	20+/-1.5	0.0
		Cs-137	27+/-8	27+/-5	0.1
Water	04-08-83	H-3	3287+/-330	3330+/-362	-0.2
Water	04-01-83	I-131	25.7+/-5	26.8+/-6	-0.3

Table 1 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	05-06-83	Sr-89	53+/-2	57.1+/-5	-1.5
		Sr-90	37.0+/-1.5	37.7+/-1.9	-0.6
Water	05-09-83	Alpha	51+/-5	64+/-16	-1.4
		Beta	150+/-15	149+/-7.5	0.3
		Sr-89	21+/-1.3	24+/-5	-1.2
		Sr-90	13+/-1.0	13+/-1.5	0.0
		Ra-226	6.8+/-1.5	8.5+/-1.3	-2.3
		Ra-228	6.2+/-1.5	4.7+/-0.7	3.6
		Co-60	29+/-10	30+/-5	-0.2
		Cs-134	29+/-8	33+/-5	-1.3
		Cs-137	32+/-9	27+/-5	1.8
		U	No data provided	25+/-6	
Water	05-20-83	Alpha	10+/-3	11+/-5	-0.3
		Beta	57+/-5	57+/-5	0.1
Water	06-03-83	Cr-51	<168	60+/-5	
		Co-60	16+/-8	13+/-5	1.0
		Zn-65	38+/-17	36+/-5	1.0
		Ru-106	<120	40+/-5	
		Cs-134	48+/-12	47+/-5	0.2
		Cs-137	29+/-10	26+/-5	1.2
Water	06-10-83	H-3	1490+/-310	1529+/-337	-0.2
Milk	06-10-83	Sr-89	No data provided	25+/-5	
		Sr-90	16+/-2	16+/-1.5	0.0
		I-131	30+/-10	30+/-6	0.0
		Cs-137	42+/-10	47+/-5	-1.7
		K	1500+/-150	1486+/-74	0.4
Water	06-17-83	Ra-226	5.3+/-1.5	4.8+/-0.7	1.3
		Ra-228	<1.0	0.0	
Water	07-15-83	Alpha	6+/-3	7+/-5.0	-0.2
		Beta	25+/-2	22+/-5.0	0.9
Water	08-05-83	I-131	26+/-15	14+/-6	3.4
Water	08-12-83	H-3	1970+/-450	1836+/-342	0.7
Filter	08-26-83	Alpha	16+/-1.8	13+/-5	0.9
		Beta	36+/-1.8	36+/-5	0.0
		Sr-90	9+/-2	10+/-1.5	-0.8
		Cs-137	21+/-6	15+/-5	2.1

Table 1 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	09-02-83	Sr-89	11+/-2	15+/-5	-1.4
		Sr-90	10+/-2	10+/-1.5	-0.4
Water	09-09-83	Ra-226	3.0+/-1.5	3.1+/-0.47	-0.4
		Ra-228	4.4+/-0.8	2.0+/-0.30	13.9
Water	09-16-83	Alpha	5+/-1.5	5+/-5.0	-0.2
		Beta	6+/-1.4	9+/-5.0	-1.0
Water	10-07-83	Cr-51	<80	51+/-5	
		Co-60	20+/-5	19+/-5	0.3
		Zn-65	45+/-10	40+/-5	1.8
		Ru-106	<54	52+/-5	
		Cs-134	15+/-5	15+/-5	0.0
		Cs-137	26+/-5	22+/-5	1.4
Water	10-14-83	H-3	1310+/-420	1210+/-329	0.5
Milk	10-28-83	Sr-89	No data provided	15+/-5	
		Sr-90	15+/-1.5	14+/-1.5	1.2
		I-131	54+/-10	40+/-6	4.0
		Cs-137	36+/-6	33+/-5	1.2
		K	1677+/-200	1550+/-78	2.8
Water	11-18-83	Alpha	13+/-2	14+/-5.0	-0.3
		Beta	7+/-2	16+/-5.0	-3.0
Water	11-14-83	Alpha	19+/-3	22+/-5.5	-0.9
		Ra-226	5.8+/-1.0	5.1+/-0.8	1.6
		Ra-228	4.2+/-0.5	2.8+/-0.4	6.1
		U	No data provided	11+/-6	
		Beta	60+/-3	63+/-5	-0.9
		Sr-89	16+/-1.0	17+/-5	-0.2
		Sr-90	7+/-0.5	8+/-1.5	-1.2
		Co-60	13+/-4	11+/-5	0.8
		Cs-134	19+/-4	15+/-5	1.5
		Cs-137	16+/-5	15+/-5	0.5
Filter	11-25-83	Alpha	24+/-1.8	19+/-5	1.8
		Beta	45+/-2	50+/-5	-0.8
		Sr-90	13+/-0.9	15+/-1.5	-1.9
		Cs-137	23+/-4	20+/-5	0.9
Water	12-09-83	H-3	2280+/-400	2389+/-351	-0.5
Water	12-16-83	I-131	21+/-7	20+/-6	0.4

Table 1 (continued)

Sample Type	Date Collected	Analysis	Concentration in pCi/sample *a SLH result +/- 1 sigma	EPA result +/- 1 sigma	Deviation Known
Water	12-16-83	Ra-226	8.6+/-0.6	7.4+/-1.1	1.8
		Ra-228	4.4+/-0.4	3.9+/-0.56	1.5
Water	01-20-84	Alpha	11+/-2	10+/-5.0	0.2
		Beta	5+/-1.8	12+/-5.0	-1.5
Water	02-10-84	H-3	2767+/-390	2383+/-351	1.9

Table 2. Minimium Detectable Concentration (MDC)

Wisconsin Division of Health
Section of Radiation Protection

	Air Particulate Composite	Air Particulate	Air Iodine	Milk	Surface Water	Fish	Soil Sediment	Vegetation
	pCi/M3	pCi/M3	pCi/M3	pCi/l	pCi/l	pCi/kg (wet)	pCi/kg (dry)	pCi/kg (wet)
Gross Beta		0.0026			1.6		740	740
Gross Alpha					1.8		900	900
Cs-134	0.005			13	14	51	60	50
Cs-137	0.005			13	14	74	80	55
Be-7	0.050							500
Ce-144	0.025							
Rh-106	0.030							
Zr-95	0.011				15			140
I-131			0.046	0.3	0.4			110
Mn-54					9	66		
Zn-65					26	135		
Fe-59					24	145		
Co-58					15	54	70	55
Co-60					13	70	90	70
Cr-51					100			
K-40				66		785	1000	680
Ba,La-140				15	14			
H-3					750			
Sr-89					1.7			
Sr-90				1.2	1.7			

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.

Wisconsin Department of Health and Social Services, Division of Health, Section of Radiation Protection. NRC 05-80-275 1982 Annual report, Point Beach Environmental Radioactivity Survey.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

AIR PARTICULATE - GROSS BETA
AIR IODINE (I-131)

Measurementsin units of pCi/M3

POINT BEACH

1983

North Property Line
1.3 miles NNW

WI - Section of Radiation Protection data			Point Beach data		
Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
01-06-83	0.005+/-0.001	0.018+/-0.11	01-10-83	0.01+/-0.01	*b
01-13-83	0.020+/-0.002	-0.002+/-0.03	01-17-83	0.01+/-0.01	
01-21-83	0.011+/-0.001	0.004+/-0.04	01-24-83	0.01+/-0.01	
01-26-83	0.013+/-0.002	0.02+/-0.04	01-31-83	0.03+/-0.01	
02-04-83	0.016+/-0.001	0.002+/-0.02	02-07-83	0.01+/-0.01	
02-11-83	0.003+/-0.002	-0.002+/-0.04	02-14-83	0.02+/-0.01	
02-17-83	0.016+/-0.002	0.000+/-0.04	02-21-83	0.01+/-0.01	
*02-23-83	0.011+/-0.001	0.010+/-0.04	03-01-83	0.01+/-0.01	
03-03-83	0.006+/-0.002	-0.006+/-0.05	03-07-83	0.01+/-0.01	
03-11-83	0.015+/-0.001	-0.001+/-0.03	03-14-83	0.01+/-0.01	
03-18-83	0.010+/-0.001	0.03+/-0.04	03-22-83	0.01+/-0.01	
03-25-83	0.007+/-0.002	0.005+/-0.04	03-30-83	0.01+/-0.01	
03-30-83	0.015+/-0.002	0.002+/-0.04	04-07-83	0.01+/-0.01	
04-08-83	0.011+/-0.001	-0.012+/-0.03	04-11-83	0.01+/-0.01	
04-14-83	0.002+/-0.002	-0.007+/-0.06	04-19-83	0.01+/-0.01	
04-21-83	0.012+/-0.001	-0.022+/-0.04	04-25-83	0.02+/-0.01	
04-28-83	0.031+/-0.003	-0.005+/-0.04	05-02-83	0.03+/-0.01	
05-05-83	0.010+/-0.001	0.03+/-0.03	05-09-83	0.01+/-0.01	
05-12-83	0.012+/-0.001	0.03+/-0.03	05-16-83	0.01+/-0.01	
05-20-83	0.014+/-0.001	-0.014+/-0.04	05-23-83	0.01+/-0.01	
05-25-83	0.010+/-0.003	-0.005+/-0.04	05-30-83	0.01+/-0.01	
06-02-83	0.041+/-0.002	-0.003+/-0.03	06-07-83	0.01+/-0.01	
06-09-83	0.017+/-0.003	0.002+/-0.04	06-13-83	0.02+/-0.03	
06-16-83	0.015+/-0.002	0.000+/-0.04	06-20-83	0.01+/-0.01	
06-23-83	0.004+/-0.002	-0.001+/-0.04	06-27-83	0.02+/-0.01	
06-29-83	0.011+/-0.002	-0.017+/-0.05			

*b - Iodine-131 is sampled weekly. Activity is <0. 03 pCi/M3 unless specified otherwise.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

AIR PARTICULATE - GROSS BETA
AIR IODINE (I-131)

Measurementsin units of pCi/M3

POINT BEACH

1983

North Property Line
1.3 miles NNW

WI - Section of Radiation Protection data			Point Beach data		
Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
07-07-83	0.051+/-0.004	0.007+/-0.04	07-05-83	0.02+/-0.01	*b
07-14-83	0.183+/-0.005	0.010+/-0.03	07-11-83	0.02+/-0.01	
07-22-83	0.005+/-0.002	0.014+/-0.04	07-18-83	0.03+/-0.01	
07-28-83	0.016+/-0.002	-0.013+/-0.04	07-25-83	0.01+/-0.01	
08-04-83	0.131+/-0.004	0.020+/-0.02	08-01-83	0.02+/-0.01	
08-12-83	0.010+/-0.001	0.000+/-0.03	08-08-83	0.02+/-0.01	
08-19-83	0.005+/-0.002	0.02+/-0.03	08-15-83	0.02+/-0.01	
08-25-83	0.018+/-0.003	0.02+/-0.02	08-22-83	0.03+/-0.01	
08-31-83	0.029+/-0.002	0.009+/-0.02	08-29-83	0.02+/-0.01	
09-08-83	0.038+/-0.004	0.019+/-0.03	09-06-83	0.04+/-0.01	
09-15-83	0.177+/-0.005	0.000+/-0.03	09-12-83	0.02+/-0.01	
09-22-83	0.008+/-0.001	0.000+/-0.04	09-19-83	0.02+/-0.01	
09-28-83	0.005+/-0.003	0.008+/-0.04	09-26-83	0.02+/-0.01	
10-07-83	0.029+/-0.003	-0.005+/-0.02	10-03-83	0.05+/-0.01	
10-18-83	0.006+/-0.002	0.03+/-0.03	10-11-83	0.01+/-0.01	
10-25-83	0.022+/-0.002	-0.02+/-0.03	10-17-83	0.02+/-0.01	
11-03-83	0.085+/-0.003	0.000+/-0.02	10-24-83	0.02+/-0.01	
11-10-83	0.031+/-0.002	-0.003+/-0.03	11-01-83	0.02+/-0.01	
11-18-83	0.011+/-0.001	0.000+/-0.03	11-07-83	0.03+/-0.01	
11-23-83	0.016+/-0.002	0.000+/-0.03	11-14-83	0.03+/-0.01	
11-30-83	0.005+/-0.001	0.019+/-0.03	11-21-83	0.02+/-0.01	
12-09-83	0.028+/-0.002	0.006+/-0.03	11-28-83	0.02+/-0.01	
12-15-83	0.013+/-0.002	0.000+/-0.04	12-05-83	0.02+/-0.01	
12-22-83	0.014+/-0.001	0.000+/-0.02	12-12-83	0.05+/-0.01	
12-28-83	0.027+/-0.002	0.000+/-0.03	12-19-83	0.02+/-0.01	
			12-27-83	0.04+/-0.01	
			01-03-84 *c	<0.006	

*b - Iodine-131 is sampled weekly. Activity is <0.03 pCi/M3 unless specified otherwise.
*c - Filter light; very little air particulate matter on the filter.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

AIR PARTICULATE - GROSS BETA
AIR IODINE (I-131)

Measurementsin units of pCi/M3

POINT BEACH

1983

Francar residence
5.6 miles WNW

WI - Section of Radiation Protection data			Point Beach data		
Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
01-03-83	0.008+/-0.002	*a	01-10-83	0.02+/-0.01	*b
01-10-83	0.007+/-0.002		01-17-83	0.02+/-0.01	
01-17-83	0.004+/-0.002		01-24-83	0.01+/-0.01	
01-24-83	0.004+/-0.002		01-31-83	0.03+/-0.01	
01-31-83	0.010+/-0.002		02-07-83	0.02+/-0.01	
02-07-83	0.007+/-0.002		02-14-83	0.01+/-0.01	
02-14-83	0.006+/-0.002		02-21-83	0.02+/-0.01	
02-21-83	0.006+/-0.002		03-01-83	0.01+/-0.01	
03-01-83	0.006+/-0.002		03-07-83	0.02+/-0.01	
03-07-83	0.008+/-0.002		03-14-83	0.01+/-0.01	
03-14-83	0.006+/-0.002		03-22-83	0.01+/-0.01	
03-22-83	0.007+/-0.002		03-30-83	0.03+/-0.01	
03-30-83	0.006+/-0.002		04-07-83	0.02+/-0.01	
04-07-83	0.006+/-0.002		04-11-83	0.01+/-0.01	
04-11-83	0.001+/-0.002		04-19-83	0.02+/-0.01	
04-19-83	0.007+/-0.002		04-25-83	0.01+/-0.01	
04-25-83	0.008+/-0.002		05-02-83	0.02+/-0.01	
05-02-83	0.007+/-0.002		05-09-83	0.01+/-0.01	
05-09-83	0.009+/-0.002		05-16-83	0.01+/-0.01	
05-16-83	0.007+/-0.002		05-23-83	0.02+/-0.01	
05-23-83	0.005+/-0.002		05-30-83	0.01+/-0.01	
05-31-83	0.003+/-0.001		06-07-83	0.01+/-0.01	
06-07-83	0.004+/-0.002		06-13-83	0.02+/-0.01	
06-13-83	0.006+/-0.002		06-20-83	0.01+/-0.01	
06-20-83	0.012+/-0.002		06-27-83	0.01+/-0.01	
06-27-83	0.009+/-0.002				

*a - Air iodine sample is not collected.
*b - Iodine-131 is sampled weekly. Activity is <0.03 pCi/M3 unless otherwise specified.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

AIR PARTICULATE - GROSS BETA
AIR IODINE (I-131)

Measurementsin units of pCi/M3

POINT BEACH

1983

Francar residence
5.6 miles WNW

WI - Section of Radiation Protection data			Point Beach data		
Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
07-05-83	0.004+/-0.001	*a	07-05-83	0.01+/-0.01	*b
07-11-83	0.019+/-0.003		07-11-83	0.01+/-0.01	
07-18-83	0.007+/-0.002		07-18-83	0.01+/-0.01	
07-25-83	0.004+/-0.002		07-25-83	0.01+/-0.01	
08-01-83	0.010+/-0.002		08-01-83	0.01+/-0.01	
08-08-83	0.009+/-0.002		08-08-83	0.01+/-0.01	
08-15-83	0.004+/-0.002		08-15-83	0.01+/-0.01	
08-22-83	0.008+/-0.002		08-22-83	0.01+/-0.01	
08-29-83	0.007+/-0.002		08-29-83	0.01+/-0.01	
09-06-83	0.014+/-0.002		09-06-83	0.02+/-0.01	
09-12-83	0.009+/-0.002		09-12-83	0.01+/-0.01	
09-19-83	0.005+/-0.002		09-19-83	0.01+/-0.01	
09-26-83	0.007+/-0.002		09-26-83	0.01+/-0.01	
10-03-83	0.017+/-0.002		10-03-83	0.02+/-0.01	
10-12-83	0.007+/-0.002		10-12-83 *c	<0.003	
10-17-83	0.005+/-0.002		10-17-83	0.02+/-0.01	
10-24-83	0.007+/-0.002		10-24-83	0.02+/-0.01	
11-01-83	0.007+/-0.002		11-01-83	0.02+/-0.01	
11-07-83	0.007+/-0.002		11-07-83	0.03+/-0.01	
11-14-83	0.006+/-0.002		11-14-83	0.02+/-0.01	
11-21-83	0.010+/-0.002		11-21-83	0.02+/-0.01	
11-28-83	0.006+/-0.002		11-28-83	0.01+/-0.01	
12-05-83	0.009+/-0.002		12-05-83	0.03+/-0.01	
12-12-83	0.013+/-0.002		12-12-83	0.04+/-0.01	
12-19-83	0.006+/-0.002		12-19-83	0.02+/-0.01	
12-27-83	0.014+/-0.002		12-27-83	0.03+/-0.01	
			01-03-84	0.03+/-0.01	

*a - Air iodine sample is not collected.
*b - Iodine-131 is sampled weekly. Activity is <0.03 pCi/M3 unless otherwise specified.
*c - Filter light; very little air particulate matter on the filter.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

AIR PARTICULATE - GROSS BETA
AIR IODINE (I-131)

Measurements in units of pCi/M3

POINT BEACH

1983

Green Bay Pumping Station
15.6 miles NNE

WI - Section of Radiation Protection data

Collection date	Air Particulate	Air Iodine
01-10-83	0.015+/-0.002	0.02+/-0.04
01-14-83	0.010+/-0.003	-0.007+/-0.05
01-21-83	0.006+/-0.002	-0.015+/-0.04
01-28-83	0.025+/-0.004	0.016+/-0.06
02-04-83	0.011+/-0.002	-0.009+/-0.04
02-11-83	0.011+/-0.002	0.017+/-0.05
02-28-83	0.122+/-0.017	0.018+/-0.14
03-18-83	0.004+/-0.001	0.014+/-0.02
03-25-83	0.015+/-0.002	0.010+/-0.03
04-04-83	0.011+/-0.002	0.003+/-0.04
04-08-83	0.006+/-0.003	0.013+/-0.06
05-06-83	0.008+/-0.001	0.007+/-0.03
05-13-83	0.014+/-0.002	0.009+/-0.04
06-03-83	0.006+/-0.001	0.011+/-0.04
06-10-83	0.021+/-0.007	-0.010+/-0.12
06-17-83	0.005+/-0.001	-0.001+/-0.02
06-24-83	0.010+/-0.002	-0.007+/-0.04
07-01-83	0.007+/-0.003	0.010+/-0.03
07-08-83	0.006+/-0.002	0.009+/-0.04
07-15-83	0.013+/-0.002	-0.014+/-0.04
07-22-83	0.010+/-0.003	-0.004+/-0.04
07-29-83	0.007+/-0.002	0.00+/-0.04
08-01-83	0.078+/-0.008	0.019+/-0.06
08-08-83	0.013+/-0.002	0.006+/-0.04
08-12-83	0.008+/-0.003	0.04+/-0.03
08-19-83	0.012+/-0.002	0.004+/-0.04
08-26-83	0.005+/-0.002	0.02+/-0.03
09-02-83	0.007+/-0.002	0.00+/-0.03
09-09-83	0.016+/-0.002	0.00+/-0.03
09-16-83	0.005+/-0.002	0.00+/-0.03
10-07-83	0.009+/-0.001	0.013+/-0.05
10-14-83	0.009+/-0.003	-0.007+/-0.03
10-21-83	0.006+/-0.002	0.00+/-0.02
10-28-83	0.008+/-0.002	0.011+/-0.04
11-04-83	0.008+/-0.002	0.00+/-0.04
11-11-83	0.009+/-0.002	0.00+/-0.03
11-18-83	0.011+/-0.002	0.00+/-0.03
11-28-83	0.009+/-0.002	0.011+/-0.03
12-02-83 *a	0.007+/-0.006	0.018+/-0.09
12-12-83 *b	0.002+/-0.001	0.014+/-0.03
12-19-83	0.013+/-0.002	0.00+/-0.04
12-30-83	0.021+/-0.002	0.00+/-0.04

*a - Power was off for an unknown period of time.
*b - Little particulate matter on filter, possible air leak.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

AIR PARITCULATE -GAMMA ISOTOPIC COMPOSITE

Measurements in units of pCi/M3

POINT BEACH

1983

North Property Line
1.3 miles NNW

WI - Section of Radiation Protection data

	January	February	March	April	May	June
Ce-144	0.007+/-0.007	0.009+/-0.008	0.001+/-0.007	0.001+/-0.010	0.005+/-0.010	-0.004+/-0.009
Be-7	0.03+/-0.02	0.03+/-0.02	0.05+/-0.02	0.05+/-0.02	0.08+/-0.02	0.07+/-0.02
Zr,Nb-95	0.000+/-0.001	0.001+/-0.002	0.000+/-0.002	0.003+/-0.005	-0.001+/-0.005	0.001+/-0.004
Ru-106	0.013+/-0.007	0.012+/-0.008	0.017+/-0.007	0.011+/-0.014	-0.003+/-0.016	0.004+/-0.016
Cs-137	0.000+/-0.001	0.001+/-0.002	0.000+/-0.002	0.001+/-0.002	-0.001+/-0.002	0.000+/-0.002
Cs-134	NA	NA	NA	NA	0.000+/-0.002	0.000+/-0.002

Point Beach data

	January	February	March	April	May	June
Ce-144			<0.01 *a			<0.01 *a
Be-7			<0.01			<0.01
Zr,Nb-95			<0.01			<0.01
Ru-106			<0.01			<0.01
Cs-137			<0.01			<0.01
Cs-134			<0.01			<0.01

Isotopes other than those reported were not detected.
NA - Isotope was not analyzed for.
*a - Unless otherwise noted, the less than value ("<") is for Cs-137 and may be higher or lower for other radionuclides The gamma isotopic analysis is performed on a quarterly composite.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

AIR PARITCULATE -GAMMA ISOTOPIC COMPOSITE

Measurements in units of pCi/M3

POINT BEACH

1983

North Property Line
1.3 miles NNW

WI - Section of Radiation Protection data

	July	August	September	October	November	December
Ce-144	0.000+/-0.009	0.001+/-0.010	-0.001+/-0.013	0.006+/-0.013	0.000+/-0.004	-0.001+/-0.009
Be-7	0.11+/-0.03	0.05+/-0.02	0.016+/-0.03	0.05+/-0.03	0.03+/-0.02	0.06+/-0.02
Zr,Nb-95	0.002+/-0.004	0.003+/-0.005	0.006+/-0.005	0.001+/-0.006	0.001+/-0.002	0.002+/-0.004
Ru-106	0.009+/-0.013	0.020+/-0.014	0.008+/-0.020	0.000+/-0.020	0.005+/-0.006	0.002+/-0.014
Cs-137	0.000+/-0.002	0.000+/-0.002	-0.001+/-0.002	0.000+/-0.002	0.000+/-0.001	0.001+/-0.002
Cs-134	0.000+/-0.002	0.001+/-0.002	0.002+/-0.002	0.001+/-0.002	0.001+/-0.001	0.000+/-0.001

Point Beach data

	July	August	September	October	November	December
Ce-144			<0.01 *a			<0.01 *a
Be-7			<0.01			<0.01
Zr,Nb-95			<0.01			<0.01
Ru-106			<0.01			<0.01
Cs-137			<0.01			<0.01
Cs-134			<0.01			<0.01

Isotopes other than those reported were not detected.
NA - isotope was not analyzed for.
*a - Unless otherwise noted, the less than value ("<") is for Cs-137 and may be higher or lower for other radionuclides
The gamma isotopic analysis is performed on a quarterly composite.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

AIR PARITCULATE -GAMMA ISOTOPIC COMPOSITE

Measurements in units of pCi/M3

POINT BEACH

1983

Francar residence
5.6 miles WNW

WI - Section of Radiation Protection data

	January	February	March	April	May	June
Ce-144	-0.006+/-0.012	0.012+/-0.017	0.004+/-0.010	0.002+/-0.015	-0.003+/-0.015	-0.002+/-0.012
Be-7	0.03+/-0.03	0.011+/-0.04	0.02+/-0.03	0.05+/-0.03	0.05+/-0.03	0.017+/-0.032
Zr,Nb-95	0.000+/-0.002	0.002+/-0.004	0.000+/-0.002	-0.002+/-0.007	0.003+/-0.007	-0.004+/-0.007
Ru-106	0.009+/-0.012	0.005+/-0.016	0.006+/-0.009	-0.001+/-0.024	0.007+/-0.022	-0.004+/-0.018
Cs-137	0.000+/-0.002	0.002+/-0.002	0.000+/-0.002	0.003+/-0.003	0.001+/-0.003	0.001+/-0.002
Cs-134	NA	NA	NA	NA	0.000+/-0.002	0.002+/-0.002

Point Beach data

	January	February	March	April	May	June
Ce-144			<0.01 *a			<0.01 *a
Be-7			<0.01			<0.01
Zr,Nb-95			<0.01			<0.01
Ru-106			<0.01			<0.01
Cs-137			<0.01			<0.01
Cs-134			<0.01			<0.01

Isotopes other than those reported were not detected.
NA - Isotope was not analyzed for.
*a - Unless otherwise noted, the less than value ("<") is for Cs-137and may be higher or lower for other radionuclides. The gamma isotopic analysis is performed on a quarterly coeposite.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

AIR PARITCULATE -GAMMA ISOTOPIC COMPOSITE

Measurements in units of pCi/M3

POINT BEACH

1983

Francar residence
5.6 miles WNW

WI - Section of Radiation Protection data

	July	August	September	October	November	December
Ce-144	0.000+/-0.008	0.004+/-0.006	0.004+/-0.009	-0.001+/-0.008	-0.001+/-0.010	-0.001+/-0.007
Be-7	0.05+/-0.02	0.029+/-0.016	0.012+/-0.012	0.03+/-0.02	0.02+/-0.02	0.05+/-0.02
Zr,Nb-95	0.007+/-0.003	0.003+/-0.003	0.004+/-0.004	0.003+/-0.004	0.003+/-0.005	0.000+/-0.004
Ru-106	-0.002+/-0.016	0.000+/-0.013	0.000+/-0.017	0.024+/-0.010	0.000+/-0.016	0.011+/-0.011
Cs-137	0.000+/-0.002	0.000+/-0.001	0.000+/-0.002	0.001+/-0.002	0.001+/-0.002	-0.001+/-0.002
Cs-134	0.000+/-0.002	0.002+/-0.001	0.003+/-0.002	0.001+/-0.002	0.001+/-0.002	0.000+/-0.002

Point Beach data

	July	August	September	October	November	December
Ce-144			<0.01 +a			<0.01 +a
Be-7			<0.01			<0.01
Zr,Nb-95			<0.01			<0.01
Ru-106			<0.01			<0.01
Cs-137			<0.01			<0.01
Cs-134			<0.01			<0.01

Isotopes other than those reported were not detected.
NA - Isotope was not analyzed for.
+a - Unless otherwise noted, the less than value ("<") is for Cs-137and may be higher or lower for other radionuclides. The gamma isotopic analysis is performed on a quarterly composite.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

AIR PARITCULATE -GAMMA ISOTOPIC COMPOSITE

Measurements in units of pCi/M3

POINT BEACH

1983

Green Bay Pumping Station - Rostok
15.6 miles NNE

WI - Section of Radiation Protection data

	January	February	March	April	May	June
Ce-144	-0.003+/-0.011	0.011+/-0.02	0.002+/-0.010	-0.012+/-0.03	0.002+/-0.014	-0.001+/-0.011
Be-7	0.04+/-0.03	0.05+/-0.06	0.02+/-0.03	0.15+/-0.08	0.08+/-0.04	0.04+/-0.03
Zr,Nb-95	0.000+/-0.002	0.002+/-0.006	0.000+/-0.002	0.002+/-0.017	0.004+/-0.007	0.001+/-0.005
Ru-106	0.013+/-0.010	0.03+/-0.02	0.006+/-0.009	-0.008+/-0.05	0.002+/-0.02	-0.001+/-0.018
Cs-137	0.000+/-0.002	0.006+/-0.006	0.001+/-0.002	0.002+/-0.006	-0.002+/-0.003	0.000+/-0.002
Cs-134	NA	NA	NA	NA	0.000+/-0.002	0.000+/-0.002

	July	August	September	October	November	December
Ce-144	0.003+/-0.008	0.003+/-0.009	0.013+/-0.02	-0.001+/-0.012	0.001+/-0.009	-0.001+/-0.017
Be-7	0.06+/-0.03	0.06+/-0.02	0.013+/-0.06	-0.002+/-0.02	0.04+/-0.02	0.016+/-0.04
Zr,Nb-95	0.002+/-0.005	0.000+/-0.007	0.000+/-0.011	0.000+/-0.005	0.004+/-0.004	0.003+/-0.008
Ru-106	-0.002+/-0.015	0.021+/-0.016	0.013+/-0.04	0.006+/-0.018	0.021+/-0.015	0.000+/-0.03
Cs-137	0.003+/-0.001	0.001+/-0.002	0.005+/-0.004	-0.001+/-0.003	0.000+/-0.002	0.001+/-0.003
Cs-134	0.003+/-0.001	0.001+/-0.001	0.000+/-0.004	0.000+/-0.002	0.001+/-0.002	0.000+/-0.003

Isotopes other than those reported were not detected.
NA - isotope was not analyzed for.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

SURFACE WATER

Measurements in units of pCi/liter

POINT BEACH
1983
Efflunet channel
0.1 mile E

WI - Section of Radiation Protection data

Collection date	January	February	March	April	May	June
Gross Alpha-sol.	0.4+/-0.7	1.3+/-0.9	0.6+/-0.8	0.6+/-0.8	0.5+/-0.7	0.7+/-0.6
Gross Alpha-insol	0.3+/-0.6	0.2+/-0.7	0.0+/-0.4	0.3+/-0.6	0.3+/-0.6	0.3+/-0.5
Gross Beta-sol.	3.0+/-1.2	4.6+/-1.3	4.6+/-1.3	5.3+/-1.4	3.0+/-1.2	3.9+/-1.3
Gross Beta-insol.	2.9+/-1.1	0.8+/-1.1	0.6+/-1.0	1.1+/-1.0	0.2+/-1.0	2.5+/-1.1
H-3	-12+/-290	-60+/-290	110+/-290	-60+/-290	810+/-300	-150+/-420
Sr-89	<0	<0	0.6+/-0.5	-0.6+/-0.4	-0.7+/-0.5	-0.3+/-0.4
Sr-90	1.1+/-0.4	1.5+/-0.6	0.2+/-0.5	0.6+/-0.5	1.3+/-0.6	0.6+/-0.4
Gamma Isotopic						
Mn-54	0+/-8	6+/-7	1+/-4	2+/-7	1+/-6	4+/-8
Fe-59	4+/-11	2+/-14	3+/-10	-1+/-14	3+/-16	2+/-17
Co-58	1+/-7	3+/-7	2+/-5	1+/-8	2+/-8	2+/-7
Co-60	-1+/-9	3+/-8	1+/-5	2+/-9	7+/-9	4+/-8
Zn-65	-3+/-13	-3+/-16	-26+/-12	9+/-13	2+/-15	0+/-14
I-131	-0.16+/-0.14	-0.06+/-0.16	0.05+/-0.15	0.08+/-0.19	-0.08+/-0.14	-0.4+/-0.6
Cs-134	3+/-8	-1+/-8	0+/-5	4+/-8	3+/-8	0+/-7
Cs-137	4+/-8	0+/-8	5+/-5	-3+/-9	-2+/-10	-2+/-10
Zr-95	8+/-14	6+/-14	2+/-9	10+/-16	7+/-19	19+/-19
Ba,La-140	1+/-9	9+/-5	1+/-7	5+/-9	3+/-9	-10+/-20

Isotopes other than those reported were not detected.

POINT BEACH data

Collection date	January	February	March	April	May	June
Gross Alpha	NA	NA	NA	NA	NA	NA
Gross Beta	2.8+/-0.6	2.1+/-0.5	3.6+/-0.7	3.7+/-0.7	2.4+/-0.5	3.5+/-0.7
H-3 *b			<500			<500
Sr-89 *b			<5			<5
Sr-90 *b			<1			<1
Gamma Isotopic *a	<10	<10	<10	<10	<10	<10

*a - 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 "<" are at the 4.66 sigma level, others are 2 sigma. Unless otherwise noted, the less than value ("<") is forCs-137 and may be higher or lower for other radionuclides.

*b - Analyses are performed on a quarterly composite.

NA - Analysis was not performed.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

SURFACE WATER

Measurements in units of pCi/liter

POINT BEACH
1983
Efflunet channel
0.1 mile E

WI - Section of Radiation Protection data

Collection date	July	August	September	October	Novemeber	December
Gross Alpha-sol.	0.7+/-0.9	0.3+/-0.8	0.2+/-0.8	0.4/-0.9	0.3+/-0.8	1.0+/-0.9
Gross Alpha-insol	0.1+/-0.5	0.3+/-0.5	-0.2+/-0.4	0.6+/-0.7	-0.1+/-0.5	0.8+/-0.7
Gross Beta-sol.	6.7+/-2.1	3.4+/-1.2	3.1+/-1.2	3.6+/-1.3	3.1+/-1.2	3.7+/-1.2
Gross Beta-insol.	0.5+/-1.2	-0.3+/-0.9	0.6+/-0.9	2.4+/-1.1	-0.3+/-0.9	0.5+/-0.9
H-3	-390+/-420	460+/-420	100+/-410	540+/-410	100+/-410	-190+/-360
Sr-89	-1.2+/-0.4	-0.7+/-0.5	-1.2+/-0.6	0.4+/-0.8	1.7+/-0.5	1.0+/-0.6
Sr-90	1.2+/-0.4	1.2+/-0.5	1.7+/-0.6	0.3+/-0.8	-0.1+/-0.5	0.2+/-0.6
Gamma Isotopic						
Mn-54	1+/-5	-1+/-4	1+/-3	2+/-5	1+/-4	0+/-6
Fe-59	-1+/-12	0+/-8	-1+/-6	1+/-10	4+/-10	-4+/-10
Co-58	-2+/-6	-2+/-4	1+/-3	5+/-5	-1+/-5	2+/-5
Co-60	4+/-7	0+/-5	0+/-4	4+/-5	3+/-6	1+/-7
Zn-65	1+/-10	0+/-9	0+/-6	2+/-10	13+/-8	-2+/-11
I-131	0.0+/-0.2	0.5+/-0.3	0.06+/-0.13	0.15+/-0.2	-0.01+/-0.16	0.2+/-0.3
Cs-134	1+/-6	0+/-4	2+/-3	0+/-6	0+/-6	0+/-6
Cs-137	0+/-7	1+/-5	1+/-3	-2+/-6	-1+/-6	-2+/-6
Zr-95	-4+/-13	6+/-9	1+/-6	2+/-13	0+/-12	1+/-12
Ba,La-140	2+/-6	0+/-5	6+/-3	2+/-3	5+/-4	-1+/-9

Isotopes other than those reported were not detected.

POINT BEACH data

Collection date	July	August	Septeaber	October	Novemeber	December
Gross Alpha	NA	NA	NA	NA	NA	NA
Gross Beta	2.8+/-0.6	3.0+/-0.6	1.7+/-0.5	2.9+/-0.6	2.5+/-0.5	2.4+/-0.6
H-3 *b			<500			<500
Sr-89 *b			<5			<5
Sr-90 *b			<1			<1
Gamma Isotopic *a	<10	<10	<10	<10	<10	<10

*a - For all gamma isotopic analyses, the spectrum is coeputer scanned from 60 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 "<" are at the 4.66 sigma level, others are 2 sigma. Unless otherwise noted, the less than value ("<") is forCs-137 and may be higher or lower for other radionuclides.

*b - Analyses are performed on a quarterly composite.

NA - Analysis was not performed.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

SURFACE WATER

Measurements in units of pCi/liter

POINT BEACH
1983

WI - Section of Radiation Protection data Green Bay Pumping Station-Rostok 15.6 miles N

Collection Date	01-06-83	02-08-83	03-02-83	04-06-83	05-05-83	06-01-83
Gross Alpha-sol.	0.8+/-0.8	1.2+/-0.9	1.4+/-0.9	1.4+/-0.9	0.2+/-0.6	0.1+/-0.7
Gross Alpha-insol	0.5+/-0.6	0.1+/-0.5	0.6+/-0.6	1.2+/-0.7	0.6+/-0.6	0.3+/-0.5
Gross Beta-sol.	3.9+/-1.3	3.8+/-1.2	4.5+/-1.3	4.5+/-1.3	3.8+/-1.2	3.0+/-1.2
Gross Beta-insol.	0.6+/-1.0	0.7+/-1.0	0.6+/-1.0	1.3+/-1.1	0.7+/-1.0	0.2+/-0.9
H-3	210+/-290	60+/-290	40+/-290	250+/-290	-30+/-290	430+/-290
Sr-89	<0	<0	<0	0.2+/-0.5	0.2+/-0.5	0.1+/-0.5
Sr-90	0.9+/-0.5	2.3+/-0.6	0.6+/-0.7	0.4+/-0.5	0.6+/-0.5	0.9+/-0.5
Gamma Isotopic						
Mn-54	1+/-8	-1+/-4	-2+/-7	1+/-7	1+/-8	-1+/-4
Fe-59	3+/-13	3+/-7	-4+/-13	-9+/-15	2+/-15	4+/-9
Co-58	2+/-8	2+/-4	0+/-7	4+/-7	0+/-7	2+/-4
Co-60	1+/-8	2+/-4	5+/-7	4+/-7	2+/-7	3+/-4
Zn-65	-5+/-18	1+/-8	<15	-22=/-16	-3+/-16	-1+/-8
I-131	-0.18+/-0.13	-0.15+/-0.18	0.06+/-0.15	-0.09+/-0.15	-0.03+/-0.15	-0.07+/-0.16
Cs-134	3+/-8	2+/-4	-1+/-8	5+/-7	-3+/-8	-2+/-4
Cs-137	-2+/-9	2+/-5	6+/-8	-5+/-9	0+/-9	4+/-5
Zr-95	8+/-19	-2+/-9	-2+/-17	7+/-15	1+/-18	6+/-9
Ba,La-140	9+/-9	4+/-4	-3+/-11	5+/-7	-5+/-12	4+/-6

Isotopes other than those reported were not detected.

POINT BEACH data Nature Conservatory 3.3 miles N

Collection Date	01-03-83	02-07-83	03-01-83	04+07-83	05-02-83	06-07-83
Gross Alpha	NA	NA	NA	NA	NA	NA
Gross Beta	2.6+/-0.6	3.1+/-0.6	5.2+/-0.7	3.4+/-0.7	3.6+/-0.6	3.7+/-0.7
H-3 *b			<500			<500
Sr-89 *b			<5			<5
Sr-90 *b			<1			<1
Gamma Isotopic *a	<10	<10	<10	<10	<10	<10

*a - 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, 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.

*b - Analysis is performed on a quarterly composite.

NA - Analysis was not performed.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

SURFACE WATER

Measurements in units of pCi/liter

POINT BEACH
1983

WI - Section of Radiation Protection data Green Bay Pumping Station-Rostok 15.6 miles N

Collection Date	07-05-83	08-11-83	09-16-83	10-04-83	11-01-83	12-02-83
Gross Alpha-sol.	0.4+/-0.8	0.4+/-0.8	-0.2+/-0.7	0.2+/-0.7	1.0+/-0.9	0.3+/-0.6
Gross Alpha-insol	0.0+/-0.5	0.3+/-0.5	0.1+/-0.5	-0.2+/-0.5	-0.2+/-0.6	0.3+/-0.6
Gross Beta-sol.	3.4+/-1.3	6+/-2	3.5+/-1.2	1.9+/-1.1	2.9+/-1.2	1.8+/-1.1
Gross Beta-insol.	-0.7+/-1.0	0.4+/-1.1	0.2+/-0.9	0.5+/-1.0	2.0+/-1.1	-0.2+/-0.9
H-3	360+/-450	-270+/-420	5+/-410	-170+/-400	90+/-400	260+/-370
Sr-89	-0.9+/-0.5	-1.2+/-0.8	-0.9+/-0.7	1.0+/-0.7	1.1+/-0.6	0.5+/-0.6
Sr-90	1.1+/-0.5	1.0+/-0.9	1.2+/-0.7	-0.3+/-0.7	0.0+/-0.6	0.0+/-0.7
Gamma Isotopic						
Mn-54	-2+/-7	1+/-5	-1+/-5	-2+/-5	2+/-5	2+/-5
Fe-59	2+/-11	-2+/-11	7+/-7	1+/-9	1+/-12	-4+/-11
Co-58	0+/-5	0+/-6	4+/-3	0+/-5	0+/-4	2+/-5
Co-60	2+/-6	1+/-6	6+/-5	1+/-7	-2+/-6	-2+/-6
Zn-65	-3+/-13	-11+/-13	10+/-8	0+/-11	-2+/-9	-2+/-10
I-131	2.9+/-0.4	0.11+/-0.2	1.1+/-0.3	0.4+/-0.2	-0.4+/-0.2	-0.03+/-0.2
Cs-134	-1+/-6	0+/-6	4+/-5	-3+/-6	2+/-6	0+/-5
Cs-137	2+/-7	0+/-6	0+/-6	1+/-6	0+/-6	-2+/-6
Zr-95	0+/-13	-2+/-14	0+/-11	0+/-11	0+/-12	6+/-13
Ba,La-140	3+/-9	-5+/-7	5+/-6	0+/-9	-1+/-10	5+/-6

Isotopes other than those reported were not detected.

POINT BEACH data Nature Conservatory 3.3 miles N

Collection Date	07-05-83	08-01-83	09-12-83	10-04-83	11-14-83	12-05-83
Gross Alpha	NA	NA	NA	NA	NA	NA
Gross Beta	2.6+/-0.6	2.8+/-0.6	2.2+/-0.6	7.1+/-0.8	2.9+/-0.6	2.5+/-0.6
H-3 *b			<300			<300
Sr-89 *b			<5			<5
Sr-90 *b			<1			<1
Gamma Isotopic *a	<10	<10	<10	<10	<10	<10

*a - 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, 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.

*b - Analysis is performed on a quarterly composite.

NA - Analysis was not performed.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

FISH

Measurements in units of pCi/kg (wet)

POINT BEACH

1983

WI - Section of Radiation Protection data

Collection Date	03-09-83	03-09-83	07-13-83	07-13-83	07-13-83
Type	trout	bass	smelt	lake trout	perch
Gamma Isotopic					
Mn-54	20+/-20	2+/-20	-11+/-40	7+/-30	8+/-30
Fe-59	-7+/-80	-20+/-70	30+/-80	-34+/-80	-24+/-90
Co-58	-12+/-30	-2+/-30	6+/-30	15+/-40	-2+/-30
Co-60	5+/-30	15+/-30	1+/-40	-5+/-40	-3+/-50
Zn-65	10+/-60	-11+/-60	9+/-70	19+/-70	-18+/-80
Cs-134	8+/-20	1+/-20	-14+/-30	-2+/-30	-3+/-30
Cs-137	110+/-30	60+/-30	40+/-50	110+/-40	120+/-50
K-40	1740+/-470	2500+/-500	2510+/-710	1610+/-640	2540+/-670

Isotopes other than those reported were not detected.

POINT BEACH data

Collection Date	03-09-83	03-09-83	08-31-83	08-31-83	08-31-83
Type	bass	trout	carp	carp	trout
Gamma Isotopic *a	<0.5	<0.5	<0.5	<0.5	<0.5

*a - For all gamma isotopic analyses, the spectrum is computer scanned from 80 to 2048 KeV. Specially 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.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

SOIL or SEDIMENT

Measurements in units of pCi/kg (dry)

POINT BEACH

1983

WI - Section of Radiation Protection data

Collection Date		10-04-83	10-04-83	10-04-83
Type		Shoreline silt	Shoreline silt	Shoreline silt
Location		Meteor. Tower 0.5 miles SSE	Discharge flume 0.1 miles E	Two Creeks Park 1.7 miles NNW
Analysis				
Gross beta (dry)		12000+/-3000	12000+/-3000	5000+/-3000
Gross alpha (dry)		8000+/-4000	3000+/-3000	600+/-3000
Gamma Isotopic				
Co-58		-6+/-50	20+/-80	-1+/-20
Co-60		20+/-20	14+/-40	15+/-20
Cs-134		-3+/-20	50+/-40	30+/-20
Cs-137		140+/-20	130+/-40	140+/-30
K-40		3700+/-400	4100+/-600	3200+/-400
Ra-226	*	320+/-390	750+/-740	1300+/-600
Pb-214	*	250+/-50	530+/-80	560+/-60
Bi-214	*	300+/-50	450+/-80	580+/-70
Tl-208	*	250+/-60	560+/-100	640+/-90
Ac-228	*	300+/-70	550+/-130	740+/-100

* Naturally occurring isotopes. The isotopes Ac-228 and Tl-208 are from the Thorium-232 decay series. The isotopes 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

Collection Date		10-04-83	10-04-83	10-04-83
Type		Shoreline silt	Shoreline silt	Shoreline silt
Location		Meteor. tower 0.5 miles SSE	Discharge flume 0.1 mile E	Two Creeks Park 1.7 miles NNW
Analysis				
Gross beta (dry)		4000+/-2000	3000+/-2000	7000+/-3000
Gamma Isotopic	*a	<1000	<1000	<1000

*a - 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.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

MILK

Measurements in units of pCi/liter

POINT BEACH

1983

Funk farm
3.8 miles W

WI - Section of Radiation Protection data

Collection date	I-131	Ba,La-140	Cs-134	Cs-137	K-40	Sr-90
01-26-83	-0.09+/-0.18	4.7	NA	-6.0	1350+/-80	1.5+/-0.6
02-23-83	-0.10+/-0.07	-0.8	NA	2.4	1420+/-90	1.8+/-0.7
03-30-83	0.13+/-0.17	4.6	NA	0.07	1290+/-80	5.3+/-0.8
04-28-83	-0.04+/-0.17	4.5	NA	-1.4	1290+/-80	6.3+/-1.3
05-25-83	-0.13+/-0.17	6.4	NA	0.5	1230+/-80	5.5+/-0.8
06-29-83	-0.13+/-0.16	8+/-5	NA	-2+/-10	1310+/-200	2.4+/-0.8
07-27-83	0.4+/-0.2	4+/-8	-2+/-10	2+/-12	1540+/-200	3.8+/-0.8
08-31-83	0.05+/-0.16					1.6+/-0.7
09-28-83	1.10+/-0.14	5+/-4	2+/-7	5+/-7	1370+/-170	1.9+/-0.8
10-25-83 *a						
11-30-83	0.05+/-0.17	4+/-4	7+/-5	-1+/-6	1470+/-180	1.4+/-0.7
12-28-83	0.27+/-0.17	-1+/-9	0+/-8	-2+/-8	1530+/-180	1.8+/-0.7

NA - Analysis was not performed.
*a - Milk sample was lost during shipment.
Isotopes other than those reported were not detected.

POINT BEACH data

Collection date	I-131	Ba,La-140 *c	Cs-134 *c	Cs-137	K-40	Sr-90
01-26-83	<0.5	<5	<5	<5	*b	2.4+/-0.8
02-23-83	<0.5	<5	<5	<5	*b	1.1+/-0.8
03-30-83	<0.5	<5	<5	<5	*b	2.3+/-0.4
04-28-83	<0.5	<5	<5	<5	*b	2.3+/-0.7
05-25-83	<0.5	<5	<5	<5	*b	1.7+/-0.7
06-29-83	<0.5	<5	<5	<5	*b	1.4+/-0.7
07-27-83	<0.5	<5	<5	<5	*b	1.9+/-0.5
08-31-83	<0.5	<5	<5	<5	*b	2.5+/-0.6
09-28-83	<0.5	<5	<5	<5	*b	2.2+/-0.6
10-25-83	<0.5	<5	<5	<5	*b	0.9+/-0.6
11-30-83	<0.5	<5	<5	<5	*b	1.6+/-0.6
12-28-83	<0.5	<5	<5	<5	*b	2.1+/-0.6

*b - Naturally occurring radioisotopes are not reported.
*c - Unless otherwise noted, the less than value ("<") is for Cs-137 and may be higher or lower for other radionuclides

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

MILK

Measurements in units of pCi/liter

POINT BEACH

1983

Lehrmann farm
2.7miles NNW

WI - Section of Radiation Protection data

Collection date	I-131	Ba,La-140	Cs-134	Cs-137	K-40	Sr-90
01-26-83	1.3+/-0.2	5.9	NA	-4.0	1280+/-80	3.5+/-0.8
02-23-83	0.04+/-0.09	2.3	NA	0.02	1370+/-80	2.6+/-0.6
03-30-83	0.06+/-0.17	-0.2	NA	-1.7	1410+/-80	6.2+/-0.9
04-28-83	0.36+/-0.18	4.5	NA	-1.4	1290+/-80	7.2+/-1.5
05-25-83	0.20+/-0.17	-0.7	NA	0.5	1320+/-80	4.4+/-1.1
06-29-83	-0.11+/-0.18	11+/-9	-1+/-8	6+/-10	1400+/-200	3.7+/-0.9
07-27-83	-0.10+/-0.20	2+/-10	2+/-8	4+/-10	1230+/-180	4.1+/-1.0
08-31-83	-0.06+/-0.15	-3+/-7	1+/-9	-1+/-11	1410+/-210	3.5+/-0.8
09-28-83	0.02+/-0.12	-1+/-8	0+/-7	13+/-7	1370+/-160	2.3+/-0.7
10-25-83	-0.51+/-0.19	1+/-7	-2+/-8	2+/-8	1420+/-190	1.6+/-0.7
11-30-83	-0.04+/-0.16	-1+/-6	1+/-7	1+/-8	1450+/-160	2.7+/-0.7
12-28-83	-0.09+/-0.17	4+/-5	0+/-6	0+/-7	1540+/-160	1.6+/-0.5

NA - Analysis was not performed.
Isotopes other than those reported were not detected.

POINT BEACH data

Collection date	I-131	Ba,La-140	*b	Cs-134	*b	Cs-137	K-40	Sr-90
01-26-83	<0.5		<5		<5	<5	*a	2.9+/-0.9
02-23-83	<0.5		<5		<5	<5	*a	1.8+/-0.8
03-30-83	<0.5		<5		<5	<5	*a	2.0+/-0.6
04-28-83	<0.5		<5		<5	<5	*a	2.1+/-0.7
05-25-83	<0.5		<5		<5	<5	*a	2.5+/-0.7
06-29-83	<0.5		<5		<5	<5	*a	1.8+/-0.8
07-27-83	<0.5		<5		<5	<5	*a	2.4+/-0.6
08-31-83	<0.5		<5		<5	<5	*a	2.0+/-0.6
09-28-83	<0.5		<5		<5	<5	*a	1.4+/-0.4
10-25-83	<0.5		<5		<5	<5	*a	1.5+/-0.8
11-30-83	<0.5		<5		<5	<5	*a	1.9+/-0.6
12-28-83	<0.5		<5		<5	<5	*a	1.8+/-0.5

*a - Activities for naturally occurring radioisotopes are not reported.
*b - Unless otherwise noted, the less than value ("<") is for Cs-137and may be higheror lower for other radionuclides.

WISCONSIN DIVISION OF HEALTH
SECTION OF RADIATION PROTECTION

FOOD PRODUCTS

Measurements in units of pCi/kg (wet)

POINT BEACH

1983

WI - Section of Radiation Protection data				POINT BEACH data		
Collection Date	06-09-83	06-08-83	06-08-83	07-05-83	07-05-83	07-05-83
Type	Vegetation	Vegetation	Vegetation	Vegetation	Vegetation	Vegetation
Location	Francar residence 5.3 miles WNW	North Property Line 1.0 mile NNW	Coast Guard Station 5.3 miles SSE	Francar residence 5.3 miles WNW	North Property Line 1.0 mile NNW	Coast Guard Station 5.3 miles SSE
Analysis						
Gross beta (dry)	40000+/-4000	33000+/-4000	17000+/-3000	15000+/-500	19200+/-800	11100+/-500
Gross alpha (dry)	400+/-2000	1300+/-2000	400+/-2000	NA	NA	NA
Gamma Isotopic				*a <250	<250	<250
I-131	5+/-40	6+/-70	40+/-70			
Be-7	60+/-230	320+/-290	310+/-350			
Zr-95	3+/-60	17+/-90	50+/-70			
Co-58	8+/-30	-2+/-30	-4+/-30			
Co-60	10+/-30	12+/-40	-13+/-40			
Cs-134	9+/-30	20+/-30	0+/-30			
Cs-137	1+/-30	8+/-30	70+/-40			
K-40	2200+/-500	2400+/-600	1400+/-600			

For the Wisconsin data, isotopes other than those reported were not detected.

NA - Analysis was not performed.

*a - For all gamma isotopic analyses, the spectrum is computer scanned from 80 to 2048 Kev. Specefically 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 lowerfor other radionuclides.