

STATE OF WISCONSIN

1983 - 1984

Prairie Island Environmental Radioactivity Survey



Wisconsin Department of Health and Social Services  
Division of Health  
Bureau of Environmental Health  
Section of Radiation Protection  
P.O. Box 309  
Madison, Wisconsin 53701

8602190088 841231  
PDR ADOCK 05000282  
R PDR

FEB 7 1986

IED5  
1/1

## Table of Contents

Section I	Page Number
Introduction	1
Program Modification	1
Sampling Techniques	1
Analytical Procedures	2
Quality Assurance	5
Sensitivities and Error	5
Table 1 - Minimum Detectable Concentration (MDC)	7
Sampling Locations - description	8
Sampling Locations - map	9
Sample Collection Summary	10
Results and Discussion	11
References	15

Section II	1983 & 1984 Data
Table 1. Minimum Detectable Concentration (MDC)	7
Table 2. Prairie Island Environmental Monitoring sampling sites.	8
Table 3. Sample collection summary for 1983 and 1984.	10
Table 4. Missing sample report for 1983 and 1984.	10
Table 5. Yearly averages from a log-normal distribution for gross beta activity in the air particulate samples for 1983 and 1984.	11
Table 6. Radioisotopes detected in the air filter composites for 1983 and 1984.	11
Table 7. Radioisotopes detected in vegetation samples for 1983 and 1984.	13
Table 8. Radioisotopes detected in soil samples for 1983 and 1984.	13
Table 9. Radioisotopes detected in milk samples for 1983 and 1984.	14
Table 10. Average yearly activity for strontium-90 in milk samples.	14
Table 11. Air particulate gross beta and air iodine (I-131) results for January-December, 1983. PRI 1 & 2	16
Table 12. Air particulate gross beta and air iodine (I-131) results for January-December, 1983. PRI 3 & 4	17
Table 13. Air particulate gross beta and air iodine (I-131) results for January-December, 1984. PRI 1 & 2	18
Table 14. Air particulate gross beta and air iodine (I-131) results for January-December, 1984. PRI 3 & 4	19

Table 15.	Gamma isotopic results for January-December, 1983 from the monthly composite of air particulate samples. PRI 1 & 2	20
Table 16.	Gamma isotopic results for January-December, 1983 from the monthly composite of air particulate samples. PRI 3 & 4	21
Table 17.	Gamma isotopic results for January-December, 1984 from the monthly composite of air particulate samples. PRI 1 & 2	22
Table 18.	Gamma isotopic results for January-December, 1984 from the monthly composite of air particulate samples. PRI 3 & 4	23
Table 19.	U.S. Nuclear Regulatory Commission TLD network for 1983.	24
Table 20.	U.S. Nuclear Regulatory Commission TLD network for 1984.	25
Table 21.	Precipitation analysis for 1983.	26
Table 22.	Precipitation analysis for 1984.	27
Table 23.	Analysis of surface water samples for 1983 and 1984.	28
Table 24.	Analysis of fish samples for 1983 and 1984.	29
Table 25.	Analysis of vegetation samples for 1983. PRI 1-7	30
Table 26.	Analysis of vegetation samples for 1983. PRI 8,9	31
Table 27.	Analysis of vegetation samples for 1984. PRI 1-7	32
Table 28.	Analysis of vegetation samples for 1984. PRI 8,9	33
Table 29.	Analysis of soil samples for 1983. PRI 1-7	34
Table 30.	Analysis of soil samples for 1983. PRI 8,9	35
Table 31.	Analysis of soil samples for 1984. PRI 1-7	36
Table 32.	Analysis of soil samples for 1984. PRI 8,9	37
Table 33.	Analysis of well water samples for 1983 and 1984.	38
Table 34.	Analysis of milk samples for 1983.	39
Table 35.	Analysis of milk samples for 1984.	40

## INTRODUCTION

This environmental monitoring report is for the Prairie Island nuclear generating plant. The report is for the calendar years January, 1983 - December, 1984. Results of environmental radioactivity monitoring are listed in tabular form following the references.

Samples of surface air, precipitation, surface water, sediment, fish, soil, vegetation and milk were collected from selected locations at planned sampling intervals. A description of the sampling sites and sampling intervals is included in the following report.

## PROGRAM MODIFICATION

There were no program modification for 1983 or 1984.

## SAMPLING TECHNIQUES

### Air Samples

Continuous air samples are collected bi-weekly from four sampling stations. Air particulate samples are collected on 47 mm. glass fiber filters. Air iodine samples are collected on impregnated charcoal cartridges. The nominal sampling rate is 1 - 2.5 cubic feet of air per minute.

### Precipitation

Individual samples of precipitation are collected semi-monthly in which rainfall over 0.10 inch occurs. The samples are collected at the same stations as the air samples. A five gallon polyethylene container with a 0.16 square meter collection head is used to obtain the precipitation samples.

### Surface Water - Mississippi River

River water is collected as a grab sample from three locations. The surface water samples are collected semi-annually.

### Fish

Fish are collected periodically from locations in the Mississippi River near the Prairie Island nuclear power plant.

### Sediment

Split samples for sediment are collected annually by the Prairie Island facility. Sediment samples are collected 500 feet above and 500 feet below the intake canal.



## Soil

Soil samples are collected semi-annually at eight locations. Random three inch plugs of soil are collected and combined at each sampling station.

## Vegetation

Samples of vegetation are collected semi-annually at the same eight stations where soil samples are collected.

## Milk

A one gallon sample of milk is collected each month as a grab sample from farms in the Prairie Island area. One sample is collected from one of two farms (Johnson or Place) within a 5 mile radius and a second sample is collected from a farm (Kinneman) outside of the ten mile radius from the plant.

## 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

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

### 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

A 3.5 liter sample is placed in a Marinelli beaker and analyzed on a GeLi detector. Scan the gamma spectrum for any peaks and print out

regions of interest, which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

#### Fish - Gamma Isotopic

An edible portion is placed in a 500 ml Marinelli beaker. Place the sample on a GeLi detector and count for 100 minutes. Scan the gamma spectrum for any peaks and print out regions of interest, which would include possible plant attributable radionuclides. Calculate the activity for isotopes in the regions of interest, regardless if they are above or below the minimum detectable concentration, correcting for counter efficiency and for decay.

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

#### Milk - Gamma Isotopic

Procedure same as for Surface Water.

#### Milk - Iodine 131 Chemical Extraction

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

#### Milk - Strontium 90

Strontium and yttrium carriers are added to milk which has been aged two to four weeks. A one liter sample is passed successively through cation and anion exchange columns. The yttrium is eluted from the anion resin with hydrochloric acid, precipitated as yttrium oxalate, filtered and weighed to determine chemical yield. Beta count in an

external gas flow proportional counter correcting for counter efficiency and for decay.

#### Surface Water - Strontium 89 & Strontium 90

Strontium and yttrium carriers are added to the surface water samples. The procedure follows through a series of chemical separations whereby all interfering substances are removed. Calcium is removed by precipitating strontium and barium by nitrate precipitation thereby leaving the calcium in solution. Radium is removed by coprecipitation with barium as a chromate. The ingrowing yttrium is separated from the parent strontium through the use of hydroxide scavenging. Then the purified strontium is converted to a carbonate and beta counted in an external gas flow proportional counter. After two weeks ingrowth yttrium-90 is separated from the strontium carbonate via a series of hydroxide precipitations and finally converted to an oxalate and beta counted in an external gas flow proportional counter. The strontium-90 activity is calculated from the yttrium-90 count and the strontium-89 activity is calculated using the previous calculation for strontium-90 as well as total strontium activity from the strontium carbonate counting.

#### Precipitation - Beta Gamma

Evaporate a 500 ml. aliquot in a weighed 2 inch stainless steel planchet. Beta count in an external gas flow proportional counter. Calculate activity correcting for counter efficiency and self-absorption.

#### Well Water - Alpha, Beta Gamma

Evaporate an aliquot containing not more than 100 mg. of dried solids in a two inch stainless steel planchet. Beta and alpha count in an external gas flow proportional counter. Calculate activity correcting for self-absorption and counter efficiency.

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

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.

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

## 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.

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 and has performed satisfactorily over the report period. The quality assurance program that the SLH participates in include analysis of blind samples, air filters, food, milk, gamma in water, alpha-beta in water, iodine in water, strontium in water and tritium in water. EPA Cross Check results can be reviewed at the State Laboratory of Hygiene or at the Section of Radiation Protection.

## 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 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 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 MDC for each radioisotope has been calculated from the following equation and is listed in Table 1:

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

Where:

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

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

E is the counting efficiency, as counts per disintegration,

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



2.22 is the number of disintegrations per minute per picocurie,

Y is the fractional radiochemical yield, when applicable,

S is the self-absorption correction factor,

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

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

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

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

Table 1 - Minimum Detectable Concentration (MDC)

Wisconsin Division of Health  
Section of Radiation Protection

	Air Particulate Composite (pCi/M <sup>3</sup> )	Air Particulate (pCi/M <sup>3</sup> )	Air Iodine (pCi/M <sup>3</sup> )	Milk (pCi/liter)
Gross beta		0.003		
Be-7	0.080			
K-40				180
Sr-90				1.5
Zr-95	0.010			
Ru-103	0.006			
Ru-106	0.030			
I-131			0.046	0.5
Cs-134	0.006			13
Cs-137	0.006			15
Ba,La-140				15
Ce-141	0.015			
Ce-144	0.030			
	Surface Water (pCi/liter)	Fish (pCi/kg) (wet)	Soil Sediment (pCi/kg) (dry)	Vegetation (pCi/kg) (wet)
Gross beta	1.5		5200	2300
Gross alpha	2.5		7300	3200
H-3	700			
Sr-89	5			
Sr-90	1.5			
Be-7				1100
K-40		1100	1100	2100
Mn-54	10	50		
Fe-59	22	180		
Zn-65	20	135		
Co-58	15	90	100	140
Co-60	13	65	130	150
Zr-95	20			250
I-131	15			180
Cs-134	14	55	110	120
Cs-137	14	60	100	130
Tl-208			300	
Bi-214			200	
Pb-214			180	
Ra-226			1900	
Ac-228			320	

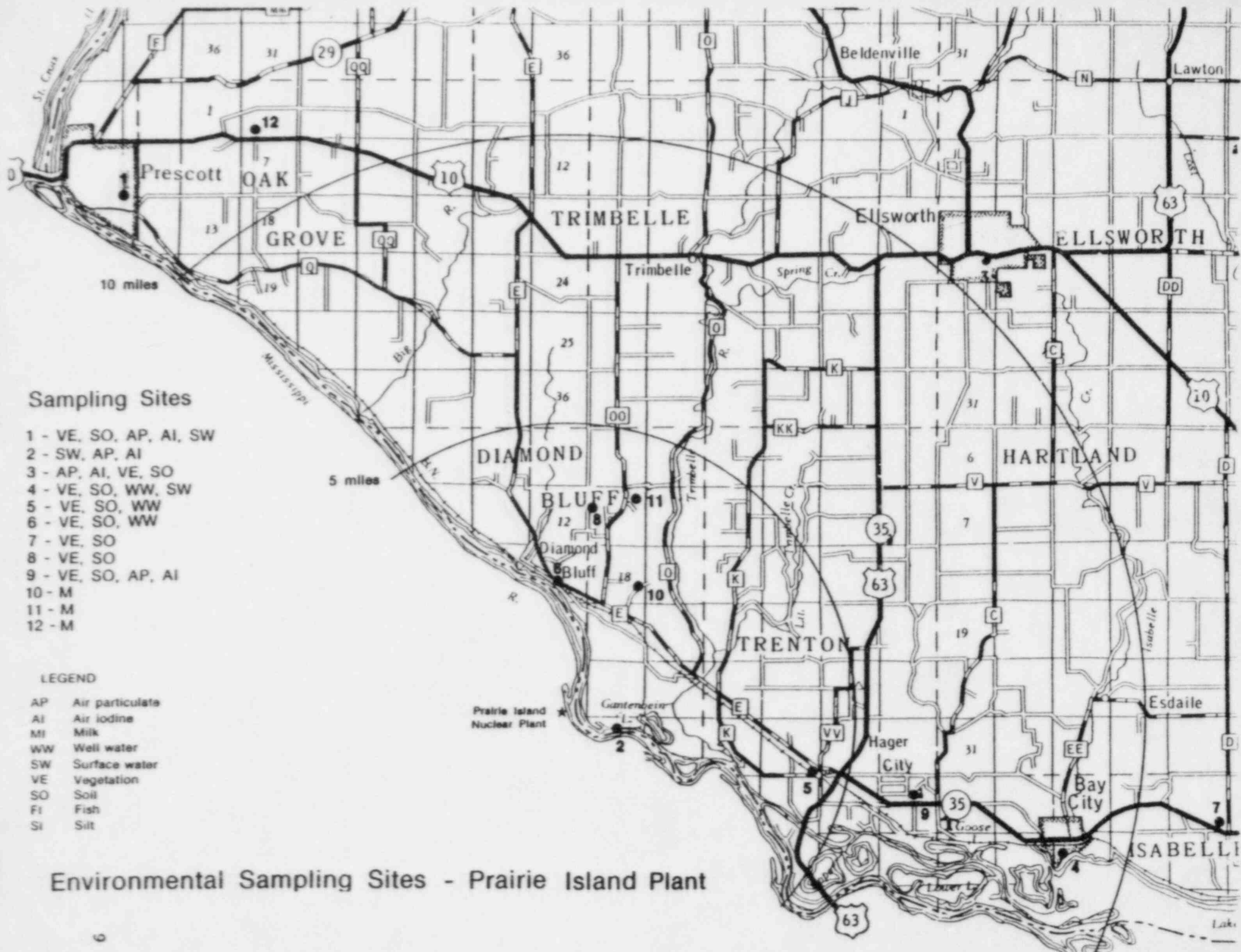
Well water and precipitation have the same MDC's as surface water for gross beta, gross alpha and tritium.

# PRAIRIE ISLAND ENVIRONMENTAL MONITORING SAMPLING SITES

The sampling sites are indicated in Table 2. The table lists for each site a description of each site and its direction and distance from the monitored power plant. A map showing the actual location for each sampling site is presented on the following page and includes the types of samples that are collected.

Table 2. Prairie Island Environmental Monitoring sampling sites.

SITE	DISTANCE & DIRECTION (MILES)	LOCATION
PRI-1	11.6 NW	Prescott
PRI-2	1.5 ESE	Lock & Dam #3
PRI-3	11.3 NE	Ellsworth
PRI-4	9.0 ESE	Bay City
PRI-5	4.5 ESE	Hager City
PRI-6	2.2 N	Diamond Bluff
PRI-7	11.7 E	Junction of Hwy 35 & County D
PRI-8	3.6 N	Station 2 - farm
PRI-9	6.2 ESE	Substation Hwy 35
PRI-10	2.6 NE	R. Johnson farm
PRI-11	4.0 NNE	T. Place farm
PRI-12	11.1 NNW	R. Kinneman farm





# SAMPLE COLLECTION SUMMARY

The following types and number of samples collected are listed in Table 3. An explanation for missing samples is listed in Table 4.

Table 3. Sample collection summary for 1983 and 1984.

Sampling Period January - December, 1983				
Sample Type	Collection and Frequency*	Number of Locations	Number of Samples Collected	Number of Samples Missed
air particulate	C/BW	4	104	0
precipitation	C/BW	4	46	3
surface water	G/SA	3	6	0
sediment	G/A	2	0	2
fish	G/SA	1	4	0
vegetation	G/SA	8	16	0
soil	G/SA	8	16	0
well water	G/SA	3	6	0
milk	G/M	3	24	0

Sampling period January - December, 1984				
Sample Type	Collection and Frequency*	Number of Locations	Number of Samples Collected	Number of Samples Missed
air particulate	C/BW	4	104	2
precipitation	C/BW	4	48	0
surface water	G/SA	3	6	0
sediment	G/A	2	0	2
fish	G/SA	1	4	0
vegetation	G/SA	8	16	0
soil	G/SA	8	16	0
well water	G/SA	3	6	0
milk	G/M	3	24	0

\*Collection type: C/ = continuous; G/ = grab

Frequency: /W = weekly; /M = monthly; /Q = quarterly

/A = annually /BW = bi-weekly /SA = semi-annually

Table 4. Missing sample report for 1983 and 1984.

Sample type	Date	Location	Explanation
Sediment	01/83 - 12/83	500' above 500' below	Split samples were not sent to the State for analysis.
Precipitation	01/01/83-01/26/83	PRI-1, PRI-2 PRI-3	Samples were not collected.
Air particulate	02/15/84-03/14/84	PRI-4	Air pump was inoperative.
Sediment	01/84 - 12/84	500' above 500' below	Split samples were not sent to the State for analysis.

## RESULTS AND DISCUSSION

### Air Particulate

The yearly gross beta activity from a log-normal distribution for the air particulate samples is included in Table 5 for the following sample sites; PRI-1 (11.6 miles NW), PRI-2 (1.5 miles ESE), PRI-3 (11.3 miles NE) and PRI-4 (9.0 miles ESE).

Table 5. Yearly averages from a log-normal distribution for gross beta activity in the air particulate samples for 1983 and 1984.

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

Year	PRI-1	PRI-2	PRI-3	PRI-4
1983	0.025±0.002	0.022±0.002	0.017±0.002	0.018±0.002
1984	0.018±0.002	0.016±0.002	0.014±0.002	0.015±0.002

From the monthly gross beta averages it may be noted that there are no significant differences between the PRI-2 station and the PRI-1, PRI-3 and PRI-4 stations. With no significant differences between an indicator station (PRI-2) and control stations (PRI-1, PRI-3 and PRI-4), an increase in gross beta activity attributable to the Prairie Island plant operation is not evident.

The gamma isotopic analysis of the monthly air particulate filter composites detected only small amounts of the radioisotopes listed in Table 6. All other isotopes were below their respective minimum detectable concentration.

Beryllium-7 is constantly produced through nuclear reactions between cosmic rays and nuclei in the atmosphere and is commonly detected in air composites from other areas of the state. Influence by the Prairie Island nuclear facility on air quality is not evident when comparing the data from the indicator and the control sites.

Table 6. Radioisotopes detected in the air filter composites for 1983 and 1984.

Year	Isotope	number of composites detected	range (pCi/M <sup>3</sup> )
1983	Be-7	21	0.08 - 0.12
1984	Be-7	25	0.08 - 0.39

### Air Iodine

Air iodine measurements for 1983 and 1984 were all below the MDC of 0.046 pCi/M<sup>3</sup> for all sites.

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

Direct radiation data for 1983 and 1984 from the Nuclear Regulatory Commission monitoring network has been included as general information. For the sixteen (16) stations located in Wisconsin the average cumulative yearly exposure would be in the range (63.7±1.5) - (77.6±1.7) milliroentgens for 1983 and (62.3±1.5) - (99.7±2) milliroentgens for 1984. The exposure ranges for 1983 and 1984 are at background levels and are comparable to other areas within Wisconsin.

### Precipitation

The gross beta activity in precipitation was within the normal range of activity when compared to previous years data.

### Surface Water

The surface water samples showed no unusual activities. For the gamma isotopic analysis all isotopes were below their respective minimum detectable concentration. All detected activities are at background levels and are comparable to data from previous years. The surface water samples uniformly show activities well below the standards for uncontrolled areas specified in ICRP Report No. 2 or 10 CFR 20. The samples also showed activities well below the limits specified by the U.S. Environmental Protection Agency's National Primary Drinking Water Regulations for gross beta, tritium, and strontium-90.

### Fish

The fish samples showed no unusual activities. The gamma isotopic analysis detected only naturally occurring potassium-40 with all other radioisotopes below their respective minimum detectable concentration.

### Vegetation

Analysis of the vegetation samples showed no unusual activities. The gamma isotopic analysis detected only small amounts of naturally occurring potassium-40 and beryllium-7 listed in Table 7. All other radioisotopes were below their respective minimum detectable concentration. Influence by the Prairie Island facility is not evident.

Table 7. Radioisotopes detected in vegetation samples for 1983 and 1984.

Year	Isotope	number of samples detected	range (pCi/kg wet)
1983	Be-7	8	1300 - 4400
1983	K-40	16	2300 - 7000
1984	Be-7	14	1100 - 7800
1984	K-40	16	4900 - 9000

### Soil

Analysis of the soil samples showed no unusual activities. The gamma isotopic analysis detected only small amounts of the radionuclides listed in Table 8. Potassium-40 and those from the thorium and uranium decay series are naturally occurring radioisotopes. The reported activities of cesium-137, at the levels mentioned, were also detected in previous years and are probably attributable to fallout from previous atmospheric nuclear tests. Gross beta and gross alpha activities were all comparable to reported results from previous years.

Table 8. Radioisotopes detected in soil samples for 1983 and 1984.

Year	Isotope	number of samples detected	range (pCi/kg dry)
1983	K-40	16	10400 - 19300
1983	Cs-137	16	280 - 1630
1983	* a	16	250 - 2200
1984	K-40	16	10700 - 16700
1984	Cs-137	16	260 - 1440
1984	* a	16	330 - 2700

\* a - Naturally occurring radioisotopes from the thorium-232 and uranium-238 decay series.



### Well Water

The well water samples showed no unusual gross alpha and gross beta activities and all activities for tritium (H-3) were less than its minimum detectable concentration. The measured activities are all below the U.S. Environmental Protection Agency's Drinking Water Standards for gross alpha, gross beta and tritium.

### Milk

The gamma isotopic analysis of the milk samples detected the radioisotopes listed in Table 9 with all other radioisotopes below their respective minimum detectable concentration. All remaining activities for iodine-131 were below the minimum detectable concentration of 0.5 pCi/liter. Potassium-40 is a naturally occurring radioisotope. The strontium-90 activities, at the levels mentioned, were also detected in previous years and are probably attributable to fallout from previous atmospheric nuclear tests. The yearly average activities for 1982 - 1984 for strontium-90 are listed in Table 10.

Plant effect is not evident when comparing the data from the Kinneman farm (11.1 miles NNW) with the Place farm (4.0 miles NNE) and the Johnson farm (2.6 miles NE).

Table 9. Radioisotopes detected in milk samples for 1983 and 1984.

Year	Isotope	number of samples detected	range (pCi/liter)
1983	K-40	24	1040 - 1720
1983	Sr-90	24	2.3 - 7.8
1983	I-131	3	0.5 - 0.8
1984	K-40	24	1220 - 1690
1984	Sr-90	24	1.9 - 5.2
1984	I-131	1	0.7

Table 10. Average yearly activity for strontium-90 in milk samples.

Year	Place	Kinneman	Johnson
1982	4.5±1.4	5.0±1.5	4.4±1.5
1983	4.6±1.2	4.4±1.2	4.1±1.2
1984	3.5±1.0	3.4±1.0	3.2±1.0

## References

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

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

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

Interim Primary Drinking Water Regulations, EPA - 570/9-76-003.

U.S. Nuclear Regulatory Commission, NRC TLD Direct Radiation Monitoring Network - Progress Report January - March 1983, NUREG-0837, Vol. 3, No 1.

U.S. Nuclear Regulatory Commission, NRC TLD Direct Radiation Monitoring Network - Progress Report April - June 1983, NUREG-0837, Vol. 3, No 2.

U.S. Nuclear Regulatory Commission, NRC TLD Direct Radiation Monitoring Network - Progress Report July - September 1983, NUREG-0837, Vol. 3, No 3.

U.S. Nuclear Regulatory Commission, NRC TLD Direct Radiation Monitoring Network - Progress Report October - December 1983, NUREG-0837, Vol. 3, No 4.

U.S. Nuclear Regulatory Commission, NRC TLD Direct Radiation Monitoring Network - Progress Report January - March 1984, NUREG-0837, Vol. 4, No 1.

U.S. Nuclear Regulatory Commission, NRC TLD Direct Radiation Monitoring Network - Progress Report April - June 1984, NUREG-0837, Vol. 4, No 2.

U.S. Nuclear Regulatory Commission, NRC TLD Direct Radiation Monitoring Network - Progress Report July - September 1984, NUREG-0837, Vol. 4, No 3.

U.S. Nuclear Regulatory Commission, NRC TLD Direct Radiation Monitoring Network - Progress Report October - December 1984, NUREG-0837, Vol. 4, No 4.

Table 11. Air particulate gross beta and air iodine (I-131) results  
for January - December, 1983. PRI 1 & 2

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island

1983

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

Prescott  
PRI-1

Lock & Dam #3  
PRI-2

Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
01/17/83	0.021+/-0.001	0.001+/-0.03	01/17/83	0.020+/-0.001	-0.006+/-0.016
01/31/83	0.017+/-0.001	0.019+/-0.03	01/31/83	0.016+/-0.001	-0.001+/-0.02
02/09/83	0.018+/-0.002	0.006+/-0.03	02/09/83	0.016+/-0.001	0.000+/-0.02
02/23/83	0.019+/-0.001	0.015+/-0.03	02/23/83	0.020+/-0.001	0.009+/-0.019
03/09/83	0.016+/-0.001	-0.004+/-0.03	03/09/83	0.011+/-0.001	0.001+/-0.02
03/23/83	0.016+/-0.001	0.005+/-0.03	03/23/83	0.015+/-0.001	0.000+/-0.02
04/06/83	0.017+/-0.001	0.005+/-0.03	04/06/83	0.017+/-0.001	0.008+/-0.02
04/20/83	0.039+/-0.002	0.005+/-0.019	04/20/83	0.026+/-0.001	0.004+/-0.017
05/04/83	0.038+/-0.002	0.003+/-0.03	05/04/83	0.024+/-0.001	0.018+/-0.017
05/18/83	0.108+/-0.003	0.008+/-0.03	05/18/83	0.044+/-0.002	-0.003+/-0.02
06/01/83	0.036+/-0.002	-0.003+/-0.03	06/01/83	0.026+/-0.001	0.001+/-0.02
06/14/83	0.016+/-0.001	0.012+/-0.03	06/14/83	0.015+/-0.001	0.003+/-0.03
06/29/83	0.020+/-0.001	0.006+/-0.03	06/29/83	0.017+/-0.001	0.008+/-0.02
07/13/83	0.044+/-0.002	0.012+/-0.03	07/13/83	0.038+/-0.002	0.012+/-0.02
07/27/83	0.041+/-0.002	0.002+/-0.03	07/27/83	0.033+/-0.002	0.001+/-0.02
08/10/83	0.117+/-0.003	0.016+/-0.018	08/10/83	0.073+/-0.007	0.05+/-0.15
08/24/83	0.033+/-0.002	0.012+/-0.02	08/24/83	0.030+/-0.001	0.011+/-0.012
09/07/83	0.040+/-0.003	0.007+/-0.03	09/07/83	0.034+/-0.002	0.000+/-0.013
09/28/83	0.017+/-0.001	0.000+/-0.03	09/28/83	0.015+/-0.001	0.002+/-0.013
10/12/83	0.051+/-0.002	-0.006+/-0.013	10/12/83	0.030+/-0.001	0.009+/-0.012
10/26/83	0.019+/-0.001	-0.010+/-0.03	10/26/83	0.020+/-0.001	-0.014+/-0.03
11/09/83	0.020+/-0.001	0.000+/-0.03	11/09/83	0.018+/-0.001	0.006+/-0.011
11/23/83	0.011+/-0.001	0.006+/-0.04	11/23/83	0.011+/-0.001	0.000+/-0.013
12/07/83	0.029+/-0.003	0.013+/-0.04	12/07/83	0.024+/-0.001	0.000+/-0.02
12/21/83	0.035+/-0.002	0.002+/-0.03	12/21/83	0.033+/-0.001	0.000+/-0.03
01/05/84	0.025+/-0.001	0.009+/-0.03	01/05/84	0.025+/-0.001	0.000+/-0.03

Table 12. Air particulate gross beta and air iodine (I-131) results for January - December, 1983. PRI 3 & 4

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island

1983

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

Ellsworth  
PRI-3

Bay City  
PRI-4

Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
01/17/83	0.017+/-0.001	0.003+/-0.015	01/12/83	0.020+/-0.001	0.005+/-0.02
01/31/83	0.012+/-0.001	-0.007+/-0.02	01/26/83	0.014+/-0.001	0.007+/-0.015
02/09/83	0.011+/-0.001	-0.011+/-0.02	02/09/83	0.017+/-0.001	-0.004+/-0.019
02/23/83	0.011+/-0.001	0.008+/-0.02	02/23/83	0.018+/-0.001	0.004+/-0.02
03/09/83	0.003+/-0.001	-0.005+/-0.02	03/09/83	0.013+/-0.001	0.009+/-0.02
03/23/83	0.005+/-0.001	0.000+/-0.02	03/23/83	0.014+/-0.001	-0.004+/-0.02
04/06/83	0.015+/-0.001	0.003+/-0.018	04/06/83	0.017+/-0.001	0.007+/-0.019
04/20/83	0.023+/-0.001	-0.001+/-0.014	04/20/83	0.048+/-0.002	0.001+/-0.015
05/04/83	0.025+/-0.001	-0.008+/-0.02	05/04/83	0.035+/-0.001	0.013+/-0.018
05/18/83	0.080+/-0.002	0.013+/-0.02	05/18/83	0.066+/-0.002	0.007+/-0.016
06/01/83	0.019+/-0.001	0.002+/-0.019	06/01/83	0.029+/-0.001	0.000+/-0.02
06/14/83	0.014+/-0.001	0.013+/-0.02	06/14/83	0.013+/-0.001	0.008+/-0.03
06/29/83	0.017+/-0.001	0.010+/-0.02	06/29/83	0.014+/-0.001	0.009+/-0.02
07/13/83	0.041+/-0.002	-0.010+/-0.03	07/13/83	0.032+/-0.001	0.010+/-0.02
07/27/83	0.040+/-0.002	0.008+/-0.02	07/27/83	0.021+/-0.001	0.012+/-0.02
08/10/83	0.110+/-0.003	0.001+/-0.02	08/10/83	0.066+/-0.002	0.004+/-0.012
08/24/83	0.031+/-0.001	0.020+/-0.019	08/24/83	0.016+/-0.001	0.003+/-0.010
09/07/83	0.032+/-0.001	0.010+/-0.012	09/07/83	0.035+/-0.001	0.000+/-0.013
09/28/83	0.015+/-0.001	0.000+/-0.02	09/28/83	0.013+/-0.001	0.000+/-0.015
10/12/83	0.042+/-0.002	-0.005+/-0.012	10/12/83	0.036+/-0.001	0.001+/-0.011
10/26/83	0.015+/-0.001	-0.013+/-0.03	10/26/83	0.015+/-0.001	0.015+/-0.02
11/09/83	0.016+/-0.001	0.007+/-0.02	11/09/83	0.014+/-0.001	0.006+/-0.011
11/23/83	0.010+/-0.001	0.000+/-0.03	11/23/83	0.010+/-0.001	0.002+/-0.02
12/07/83	0.016+/-0.001	0.009+/-0.02	12/07/83	0.018+/-0.001	0.004+/-0.016
12/21/83	0.029+/-0.001	0.001+/-0.02	12/21/83	0.036+/-0.002	0.000+/-0.04
01/05/84	0.025+/-0.001	0.002+/-0.014	01/05/84	0.037+/-0.002	0.006+/-0.04



Table 13. Air particulate gross beta and air iodine (I-131) results  
for January - December, 1984. PRI 1 & 2

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island

1984

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

Prescott  
PRI-1

Lock & Dam #3  
PRI-2

Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
01/18/84	0.022+/-0.001	0.007+/-0.04	01/18/84	0.020+/-0.001	0.005+/-0.019
02/01/84	0.026+/-0.002	0.03+/-0.03	02/01/84	0.022+/-0.001	0.000+/-0.016
02/15/84	0.021+/-0.001	0.016+/-0.03	02/15/84	0.018+/-0.001	0.008+/-0.019
02/29/84	0.019+/-0.001	0.005+/-0.03	02/29/84	0.017+/-0.001	0.005+/-0.013
03/14/84	0.013+/-0.001	0.016+/-0.04	03/14/84	0.015+/-0.001	0.001+/-0.014
03/23/84	0.025+/-0.002	-0.007+/-0.015	03/28/84	0.019+/-0.001	-0.003+/-0.011
04/11/84	0.012+/-0.001	0.015+/-0.03	04/11/84	0.012+/-0.001	0.007+/-0.019
04/25/84	0.011+/-0.001	0.02+/-0.03	04/25/84	0.013+/-0.001	0.007+/-0.02
05/08/84	0.013+/-0.001	0.003+/-0.03	05/08/84	0.011+/-0.001	0.003+/-0.017
05/23/84	0.010+/-0.001	0.006+/-0.02	05/23/84	0.007+/-0.001	-0.001+/-0.016
06/06/84	0.013+/-0.001	-0.008+/-0.03	06/06/84	0.013+/-0.001	-0.004+/-0.017
06/21/84	0.011+/-0.001	-0.011+/-0.03	06/21/84	0.011+/-0.001	0.000+/-0.02
06/28/84	0.015+/-0.002	-0.002+/-0.04	06/28/84	0.012+/-0.001	-0.009+/-0.03
07/11/84	0.014+/-0.002	-0.017+/-0.04	07/11/84	0.010+/-0.001	-0.003+/-0.018
07/25/84	0.018+/-0.001	0.011+/-0.02	07/25/84	0.016+/-0.001	-0.003+/-0.017
08/09/84	0.020+/-0.001	0.001+/-0.017	08/09/84	0.021+/-0.001	-0.007+/-0.02
08/22/84	0.018+/-0.002	0.001+/-0.03	08/22/84	0.019+/-0.001	-0.002+/-0.02
09/05/84	0.018+/-0.002	-0.02+/-0.03	09/05/84	0.015+/-0.001	-0.009+/-0.017
09/19/84	0.016+/-0.001	-0.002+/-0.02	09/19/84	0.016+/-0.001	0.000+/-0.015
10/04/84	0.018+/-0.001	0.015+/-0.03	10/04/84	0.018+/-0.001	0.001+/-0.012
10/17/84	0.025+/-0.002	-0.001+/-0.03	10/17/84	0.022+/-0.001	-0.002+/-0.010
10/30/84	0.017+/-0.002	0.006+/-0.018	10/30/84	0.014+/-0.001	0.003+/-0.016
11/14/84	0.021+/-0.002	-0.010+/-0.03	11/14/84	0.018+/-0.001	0.005+/-0.02
11/28/84	0.022+/-0.002	-0.005+/-0.019	11/28/84	0.015+/-0.001	0.010+/-0.016
12/12/84	0.029+/-0.002	-0.009+/-0.03	12/12/84	0.022+/-0.001	-0.001+/-0.015
12/26/84	0.023+/-0.002	-0.003+/-0.04	12/26/84	0.019+/-0.001	-0.001+/-0.014

Table 14. Air particulate gross beta and air iodine (I-131) results  
for January - December, 1984. PRI 3 & 4

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island

1984

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

Ellsworth  
PRI-3

Bay City  
PRI-4

Collection date	Air Particulate	Air Iodine	Collection date	Air Particulate	Air Iodine
01/18/84	0.018+/-0.001	0.014+/-0.02	01/18/84	0.017+/-0.001	0.000+/-0.013
02/01/84	0.018+/-0.001	0.005+/-0.018	02/01/84	0.014+/-0.001	0.03+/-0.03
02/15/84	0.016+/-0.001	0.006+/-0.018	02/15/84 * a		
02/29/84	0.014+/-0.001	0.003+/-0.018	02/29/84 * a		
03/14/84	0.013+/-0.001	0.000+/-0.02	03/14/84	0.018+/-0.001	0.013+/-0.04
03/28/84	0.014+/-0.001	-0.003+/-0.011	03/28/84	0.016+/-0.001	0.002+/-0.016
04/11/84	0.011+/-0.001	0.008+/-0.018	04/11/84	0.011+/-0.001	-0.010+/-0.015
04/25/84	0.010+/-0.001	-0.002+/-0.019	04/25/84	0.009+/-0.001	0.002+/-0.018
05/08/84	0.010+/-0.001	0.001+/-0.03	05/08/84	0.008+/-0.001	0.005+/-0.015
05/23/84	0.008+/-0.001	0.007+/-0.015	05/23/84	0.007+/-0.001	-0.002+/-0.014
06/06/84	0.011+/-0.001	0.004+/-0.016	06/06/84	0.012+/-0.001	0.013+/-0.017
06/21/84	0.009+/-0.001	0.003+/-0.019	06/21/84	0.009+/-0.001	0.002+/-0.018
06/28/84	0.013+/-0.001	0.008+/-0.02	06/28/84	0.012+/-0.001	-0.009+/-0.013
07/11/84	0.010+/-0.001	-0.001+/-0.017	07/11/84	0.010+/-0.001	0.001+/-0.010
07/25/84	0.014+/-0.001	0.000+/-0.016	07/25/84	0.013+/-0.001	0.000+/-0.010
08/09/84	0.016+/-0.002	0.014+/-0.05	08/09/84	0.016+/-0.001	-0.011+/-0.018
08/22/84	0.015+/-0.001	-0.001+/-0.013	08/22/84	0.014+/-0.001	-0.013+/-0.02
09/05/84	0.014+/-0.002	-0.006+/-0.03	09/05/84	0.015+/-0.001	-0.013+/-0.015
09/19/84	0.014+/-0.002	-0.07+/-0.2	09/19/84	0.014+/-0.001	0.004+/-0.015
10/04/84	0.016+/-0.001	0.001+/-0.019	10/04/84	0.015+/-0.001	-0.004+/-0.010
10/17/84	0.015+/-0.001	0.003+/-0.016	10/17/84	0.016+/-0.001	0.005+/-0.016
10/30/84	0.014+/-0.001	-0.010+/-0.016	10/30/84	0.015+/-0.001	0.005+/-0.010
11/14/84	0.017+/-0.001	0.000+/-0.014	11/14/84	0.015+/-0.001	-0.006+/-0.02
11/28/84	0.018+/-0.001	0.008+/-0.017	11/28/84	0.017+/-0.001	-0.001+/-0.015
12/12/84	0.020+/-0.001	-0.002+/-0.016	12/12/84	0.020+/-0.001	-0.002+/-0.015
12/26/84	0.017+/-0.001	-0.009+/-0.02	12/26/84	0.017+/-0.001	-0.001+/-0.014

\* a - The air sampler was inoperative during this collection period.

Table 15. Gamma isotopic results for January - December, 1983  
from the monthly composite of air particulate samples.  
PRI 1 & 2

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island

1983

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

WI - Section of Radiation Protection data

Prescott

PRI-1	January	February	March	April	May	June
Be-7	0.050+/-0.016	0.05+/-0.03	0.08+/-0.03	0.11+/-0.03	0.11+/-0.03	0.05+/-0.02
Zr,Nb-95	0.000+/-0.001	0.002+/-0.002	0.001+/-0.002	0.002+/-0.004	0.000+/-0.006	0.002+/-0.004
Ru-106	0.020+/-0.006	0.020+/-0.011	0.030+/-0.009	0.003+/-0.018	0.004+/-0.017	-0.007+/-0.012
Cs-134	NA	NA	NA	NA	-0.001+/-0.002	0.000+/-0.001
Cs-137	0.000+/-0.001	0.001+/-0.002	0.002+/-0.002	0.001+/-0.002	0.002+/-0.002	0.000+/-0.002
Ce-144	0.006+/-0.006	0.009+/-0.011	0.003+/-0.009	0.000+/-0.011	-0.003+/-0.012	0.000+/-0.007
	July	August	September	October	November	December
Be-7	0.11+/-0.03	0.10+/-0.02	0.07+/-0.03	0.09+/-0.03	0.09+/-0.03	0.07+/-0.03
Zr,Nb-95	0.004+/-0.005	0.005+/-0.002	0.003+/-0.006	0.000+/-0.006	0.004+/-0.004	0.000+/-0.006
Ru-106	0.005+/-0.02	0.000+/-0.013	0.005+/-0.02	0.000+/-0.018	0.000+/-0.019	0.020+/-0.016
Cs-134	0.000+/-0.002	0.000+/-0.001	0.003+/-0.002	0.003+/-0.002	0.001+/-0.002	0.000+/-0.003
Cs-137	0.002+/-0.002	0.000+/-0.001	0.000+/-0.002	-0.001+/-0.002	0.000+/-0.002	-0.002+/-0.003
Ce-144	0.005+/-0.011	-0.001+/-0.006	0.005+/-0.012	0.008+/-0.011	-0.001+/-0.013	-0.002+/-0.011

Lock & Dam #3

PRI-2	January	February	March	April	May	June
Be-7	0.037+/-0.012	0.03+/-0.02	0.068+/-0.019	0.11+/-0.03	0.10+/-0.03	0.12+/-0.02
Zr,Nb-95	0.000+/-0.001	0.000+/-0.002	0.000+/-0.002	0.000+/-0.004	0.001+/-0.005	0.000+/-0.003
Ru-106	0.014+/-0.004	0.013+/-0.008	0.026+/-0.007	0.008+/-0.014	-0.003+/-0.014	-0.002+/-0.010
Cs-134	NA	NA	NA	NA	0.000+/-0.002	0.000+/-0.001
Cs-137	0.000+/-0.001	0.001+/-0.002	0.002+/-0.002	0.001+/-0.002	0.001+/-0.002	0.000+/-0.001
Ce-144	0.001+/-0.004	0.005+/-0.008	0.003+/-0.007	0.002+/-0.008	0.002+/-0.009	0.001+/-0.006
	July	August	September	October	November	December
Be-7	0.11+/-0.02	0.07+/-0.03	0.052+/-0.016	0.07+/-0.02	0.071+/-0.018	0.029+/-0.018
Zr,Nb-95	0.003+/-0.002	0.001+/-0.005	0.002+/-0.002	0.000+/-0.004	0.001+/-0.002	0.000+/-0.004
Ru-106	0.007+/-0.005	0.018+/-0.014	0.000+/-0.007	0.014+/-0.015	0.001+/-0.008	0.000+/-0.017
Cs-134	0.000+/-0.001	0.000+/-0.002	0.000+/-0.001	0.000+/-0.002	0.000+/-0.001	0.000+/-0.002
Cs-137	0.001+/-0.001	-0.001+/-0.002	0.000+/-0.002	0.001+/-0.002	0.000+/-0.001	-0.001+/-0.002
Ce-144	0.005+/-0.005	0.005+/-0.008	0.002+/-0.004	0.004+/-0.010	0.000+/-0.005	-0.001+/-0.009

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

Table 16. Gamma isotopic results for January - December, 1983  
from the monthly composite of air particulate samples.  
PRI 3 & 4

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island

1983

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

WI - Section of Radiation Protection data

Ellsworth

PRI-3	January	February	March	April	May	June
Be-7	0.031+/-0.011	0.014+/-0.019	0.010+/-0.017	0.10+/-0.02	0.12+/-0.03	0.083+/-0.017
Zr,Nb-95	0.000+/-0.001	0.000+/-0.002	0.000+/-0.002	0.002+/-0.004	0.000+/-0.004	0.000+/-0.003
Ru-106	0.012+/-0.004	0.005+/-0.008	0.006+/-0.006	0.001+/-0.013	0.000+/-0.014	0.004+/-0.009
Cs-134	NA	NA	NA	NA	0.001+/-0.001	0.000+/-0.001
Cs-137	0.000+/-0.001	-0.002+/-0.002	0.001+/-0.001	0.001+/-0.001	0.002+/-0.001	-0.001+/-0.001
Ce-144	0.001+/-0.004	0.007+/-0.000	0.006+/-0.007	0.000+/-0.008	-0.001+/-0.009	0.000+/-0.006
	July	August	September	October	November	December
Be-7	0.09+/-0.02	0.053+/-0.019	0.045+/-0.018	0.084+/-0.016	0.05+/-0.02	0.041+/-0.013
Zr,Nb-95	0.003+/-0.004	0.002+/-0.002	0.001+/-0.003	0.003+/-0.002	0.001+/-0.004	0.000+/-0.003
Ru-106	0.000+/-0.015	0.004+/-0.007	0.000+/-0.016	0.001+/-0.008	0.000+/-0.014	0.003+/-0.009
Cs-134	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.002	0.003+/-0.001
Cs-137	0.002+/-0.002	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.002	-0.001+/-0.001
Ce-144	0.001+/-0.009	0.001+/-0.005	0.002+/-0.007	-0.001+/-0.004	0.001+/-0.009	0.000+/-0.005

Bay City

PRI-4	January	February	March	April	May	June
Be-7	0.050+/-0.016	0.043+/-0.017	0.060+/-0.017	0.08+/-0.02	0.09+/-0.02	0.089+/-0.017
Zr,Nb-95	0.000+/-0.001	0.000+/-0.002	0.000+/-0.001	0.002+/-0.003	0.001+/-0.004	0.001+/-0.002
Ru-106	0.018+/-0.006	0.019+/-0.007	0.024+/-0.006	-0.008+/-0.013	-0.008+/-0.013	0.003+/-0.008
Cs-134	NA	NA	NA	NA	-0.001+/-0.001	0.000+/-0.001
Cs-137	0.000+/-0.001	0.001+/-0.001	0.000+/-0.001	0.000+/-0.002	0.000+/-0.002	0.000+/-0.001
Ce-144	-0.001+/-0.006	0.006+/-0.007	0.003+/-0.006	0.000+/-0.008	0.000+/-0.008	0.001+/-0.006
	July	August	September	October	November	December
Be-7	0.088+/-0.017	0.043+/-0.017	0.048+/-0.018	0.082+/-0.018	0.07+/-0.02	0.04+/-0.02
Zr,Nb-95	0.000+/-0.003	0.001+/-0.002	0.000+/-0.003	0.003+/-0.004	0.002+/-0.004	0.002+/-0.005
Ru-106	0.004+/-0.007	0.009+/-0.007	0.011+/-0.009	0.000+/-0.012	0.007+/-0.011	0.003+/-0.015
Cs-134	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.001+/-0.001	0.000+/-0.002
Cs-137	0.001+/-0.001	0.001+/-0.001	0.000+/-0.001	-0.001+/-0.002	0.000+/-0.001	-0.001+/-0.002
Ce-144	0.000+/-0.004	-0.001+/-0.004	-0.001+/-0.007	-0.001+/-0.008	0.000+/-0.005	-0.001+/-0.009

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



Table 17. Gamma isotopic results for January - December, 1984  
from the monthly composite of air particulate samples.  
PRI 1 & 2

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island  
1984

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

WI - Section of Radiation Protection data

Prescott

PRI-1	January	February	March	April	May	June
Be-7	0.054+/-0.015	0.09+/-0.03	0.08+/-0.03	0.10+/-0.04	0.13+/-0.02	0.06+/-0.02
Zr-95	0.004+/-0.004	0.002+/-0.006	0.000+/-0.006	-0.006+/-0.007	0.001+/-0.003	0.000+/-0.003
Ru-103	NA	NA	0.000+/-0.003	0.001+/-0.004	0.001+/-0.002	0.000+/-0.003
Ru-106	0.000+/-0.007	0.000+/-0.02	-0.003+/-0.02	0.001+/-0.03	0.004+/-0.010	-0.004+/-0.012
Cs-134	0.000+/-0.001	0.001+/-0.002	-0.002+/-0.002	-0.001+/-0.002	0.000+/-0.001	0.000+/-0.001
Cs-137	-0.001+/-0.001	0.002+/-0.002	0.000+/-0.002	0.000+/-0.003	0.000+/-0.001	-0.001+/-0.001
Ce-141	NA	NA	0.001+/-0.004	0.002+/-0.005	0.000+/-0.002	-0.001+/-0.002
Ce-144	0.002+/-0.005	0.003+/-0.013	0.010+/-0.012	0.008+/-0.013	0.002+/-0.005	-0.003+/-0.005
	July	August	September	October	November	December
Be-7	0.13+/-0.04	0.14+/-0.04	0.10+/-0.04	0.07+/-0.05	0.08+/-0.05	0.10+/-0.04
Zr-95	0.000+/-0.007	0.008+/-0.008	0.001+/-0.009	-0.006+/-0.010	0.006+/-0.011	0.000+/-0.010
Ru-103	0.000+/-0.003	-0.002+/-0.004	0.001+/-0.004	0.000+/-0.005	0.000+/-0.005	0.000+/-0.005
Ru-106	-0.003+/-0.02	-0.009+/-0.02	-0.004+/-0.03	0.019+/-0.04	-0.003+/-0.04	-0.013+/-0.03
Cs-134	0.001+/-0.002	0.000+/-0.002	-0.001+/-0.003	0.000+/-0.004	0.000+/-0.004	0.000+/-0.003
Cs-137	0.000+/-0.002	-0.001+/-0.003	-0.001+/-0.004	0.002+/-0.004	0.003+/-0.005	-0.001+/-0.004
Ce-141	0.000+/-0.005	-0.002+/-0.005	0.001+/-0.006	0.003+/-0.007	0.005+/-0.008	-0.001+/-0.007
Ce-144	0.013+/-0.013	0.003+/-0.013	0.004+/-0.017	-0.009+/-0.02	-0.001+/-0.02	0.006+/-0.019

Lock & Dam #3

PRI-2	January	February	March	April	May	June
Be-7	0.051+/-0.016	0.055+/-0.015	0.077+/-0.017	0.11+/-0.02	0.096+/-0.014	0.07+/-0.03
Zr-95	0.000+/-0.003	0.001+/-0.003	0.000+/-0.003	0.000+/-0.003	0.000+/-0.002	0.000+/-0.005
Ru-103	NA	NA	-0.001+/-0.001	0.000+/-0.002	0.000+/-0.001	0.001+/-0.003
Ru-106	0.008+/-0.007	0.004+/-0.009	0.004+/-0.010	-0.002+/-0.009	-0.001+/-0.006	0.000+/-0.02
Cs-134	0.000+/-0.001	-0.001+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	-0.001+/-0.002
Cs-137	0.001+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001	0.002+/-0.002
Ce-141	NA	NA	0.001+/-0.002	0.000+/-0.002	0.001+/-0.001	0.001+/-0.004
Ce-144	0.001+/-0.006	0.000+/-0.005	0.000+/-0.004	0.002+/-0.004	0.001+/-0.003	0.002+/-0.011
	July	August	September	October	November	December
Be-7	0.13+/-0.02	0.110+/-0.017	0.09+/-0.03	0.064+/-0.018	0.072+/-0.016	0.069+/-0.016
Zr-95	-0.001+/-0.004	0.000+/-0.003	-0.002+/-0.005	0.003+/-0.004	0.000+/-0.003	0.000+/-0.003
Ru-103	0.001+/-0.002	0.000+/-0.001	-0.001+/-0.003	0.000+/-0.002	0.000+/-0.001	-0.001+/-0.001
Ru-106	0.004+/-0.012	0.001+/-0.008	-0.001+/-0.019	0.001+/-0.011	-0.004+/-0.009	0.009+/-0.010
Cs-134	0.001+/-0.001	0.000+/-0.001	-0.001+/-0.002	0.000+/-0.001	0.000+/-0.001	0.000+/-0.001
Cs-137	0.000+/-0.001	0.000+/-0.001	0.000+/-0.002	0.000+/-0.001	0.001+/-0.001	0.000+/-0.001
Ce-141	0.002+/-0.003	0.001+/-0.002	0.000+/-0.004	0.000+/-0.002	0.000+/-0.002	0.001+/-0.002
Ce-144	0.002+/-0.007	-0.001+/-0.005	-0.002+/-0.011	0.001+/-0.007	0.004+/-0.006	0.004+/-0.006

NA - Isotope was not specifically analyzed for.

Isotopes other than those reported were not detected.



Table 18. Gamma isotopic results for January - December, 1984  
from the monthly composite of air particulate samples.  
PRI 3 & 4

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island  
1984

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

WI - Section of Radiation Protection data

Ellsworth

PRI-3	January	February	March	April	May	June
Be-7	0.040+/-0.016	0.05+/-0.02	0.09+/-0.02	0.09+/-0.02	0.098+/-0.014	0.069+/-0.019
Zr-95	0.000+/-0.002	-0.002+/-0.004	-0.001+/-0.004	-0.001+/-0.004	0.001+/-0.002	-0.002+/-0.003
Ru-103	NA	NA	0.000+/-0.002	-0.002+/-0.002	0.000+/-0.001	0.000+/-0.002
Ru-106	0.001+/-0.009	-0.002+/-0.014	0.010+/-0.015	-0.006+/-0.014	-0.001+/-0.006	0.003+/-0.012
Cs-134	0.001+/-0.001	0.000+/-0.001	0.000+/-0.001	0.001+/-0.002	0.000+/-0.001	0.000+/-0.001
Cs-137	0.000+/-0.001	0.000+/-0.002	0.000+/-0.002	0.001+/-0.002	0.000+/-0.001	-0.002+/-0.001
Ce-141	NA	NA	0.000+/-0.003	0.002+/-0.003	0.000+/-0.001	0.000+/-0.002
Ce-144	0.000+/-0.006	-0.002+/-0.009	0.003+/-0.008	0.005+/-0.008	-0.001+/-0.003	0.003+/-0.006

	July	August	September	October	November	December
Be-7	0.13+/-0.03	0.39+/-0.10	0.17+/-0.05	0.05+/-0.03	0.07+/-0.03	0.07+/-0.03
Zr-95	-0.002+/-0.006	0.000+/-0.019	0.002+/-0.010	0.000+/-0.006	-0.002+/-0.005	0.003+/-0.006
Ru-103	0.000+/-0.003	-0.003+/-0.011	-0.003+/-0.005	0.000+/-0.003	0.000+/-0.003	0.001+/-0.003
Ru-106	0.011+/-0.02	0.010+/-0.06	-0.002+/-0.04	-0.007+/-0.02	-0.006+/-0.018	-0.005+/-0.018
Cs-134	0.000+/-0.002	-0.001+/-0.005	0.001+/-0.004	-0.001+/-0.002	0.003+/-0.002	0.000+/-0.002
Cs-137	0.000+/-0.002	-0.001+/-0.006	-0.002+/-0.004	0.000+/-0.002	0.001+/-0.002	0.000+/-0.002
Ce-141	0.001+/-0.005	0.004+/-0.016	0.004+/-0.007	-0.001+/-0.004	0.004+/-0.004	0.002+/-0.004
Ce-144	0.004+/-0.012	0.016+/-0.03	0.010+/-0.02	0.000+/-0.012	0.009+/-0.011	-0.001+/-0.010

Bay City

PRI-4	January	February	March	April	May	June
Be-7	0.038+/-0.012	* a	0.07+/-0.02	0.084+/-0.017	0.093+/-0.017	0.05+/-0.02
Zr-95	0.002+/-0.002	* a	-0.002+/-0.004	0.001+/-0.003	0.000+/-0.003	-0.001+/-0.005
Ru-103	NA	* a	0.000+/-0.003	0.000+/-0.001	0.000+/-0.001	0.000+/-0.003
Ru-106	0.005+/-0.006	* a	0.008+/-0.017	0.002+/-0.009	-0.003+/-0.009	-0.004+/-0.017
Cs-134	0.001+/-0.001	* a	0.000+/-0.002	0.000+/-0.001	0.000+/-0.001	-0.001+/-0.002
Cs-137	0.000+/-0.001	* a	0.000+/-0.002	0.000+/-0.001	0.000+/-0.001	0.000+/-0.002
Ce-141	NA	* a	0.001+/-0.003	0.001+/-0.002	0.001+/-0.002	0.000+/-0.003
Ce-144	-0.001+/-0.005	* a	0.000+/-0.009	0.004+/-0.004	0.004+/-0.005	-0.001+/-0.009

	July	August	September	October	November	December
Be-7	0.12+/-0.02	0.089+/-0.015	0.08+/-0.02	0.056+/-0.017	0.038+/-0.014	0.04+/-0.02
Zr-95	0.000+/-0.004	0.000+/-0.002	-0.001+/-0.005	-0.001+/-0.003	-0.001+/-0.003	0.001+/-0.005
Ru-103	0.000+/-0.002	0.000+/-0.001	0.001+/-0.003	0.000+/-0.002	0.000+/-0.001	0.000+/-0.003
Ru-106	-0.005+/-0.010	0.001+/-0.007	0.010+/-0.019	-0.001+/-0.010	0.002+/-0.010	0.001+/-0.016
Cs-134	0.000+/-0.001	0.000+/-0.001	0.000+/-0.002	0.000+/-0.001	0.000+/-0.001	0.000+/-0.002
Cs-137	-0.001+/-0.001	0.000+/-0.001	0.000+/-0.002	0.000+/-0.001	0.000+/-0.001	-0.001+/-0.002
Ce-141	0.000+/-0.003	0.000+/-0.002	0.000+/-0.003	0.001+/-0.002	0.002+/-0.002	0.001+/-0.004
Ce-144	0.002+/-0.007	0.001+/-0.004	0.009+/-0.010	0.001+/-0.006	0.005+/-0.006	-0.002+/-0.010

\* a - Air sampler was inoperative.

NA - Isotope was not specifically analyzed for.

Isotopes other than those reported were not detected.

Table 19. U.S. Nuclear Regulatory Commission TLD network for 1983.

## Prairie Island

1983

Measurements in units of milliroentgens (mR)			field time (days)			
Exposure period: 1st quarter			12/22/82 - 04/12/83	(90)	3rd quarter	06/28/83 - 10/14/83 (99)
2nd quarter			03/24/83 - 07/15/83	(94)	4th quarter	09/28/83 - 01/19/84 (95)
Site	Location					
		1st quarter	2nd quarter	3rd quarter	4th quarter	
	Azimuth/Distance (Degrees) (Miles)	Exposure Rate mR/Std. Qtr. +/- Std. Dev	Exposure Rate mR/Std. Qtr. +/- Std. Dev	Exposure Rate mR/Std. Qtr. +/- Std. Dev	Exposure Rate mR/Std. Qtr. +/- Rdm; Tot.	
1	312	17.3	18.5+/-0.9	18.8+/-0.8	14.0+/-0.6	23.4+/-0.9
2	310	15.2	16.8+/-0.8	20.2+/-0.9	15.3+/-0.7	23.4+/-0.9
3	310	15.2	17.7+/-0.8	20.1+/-0.9	14.9+/-0.6	22.9+/-0.9
4	308	5.5	Missing dos.	19.0+/-0.8	14.8+/-0.6	22.1+/-0.9
5	297	4.1	14.7+/-0.8	16.9+/-0.8	12.8+/-0.6	21.4+/-0.9
6	287	1.3	16.2+/-0.8	18.3+/-0.8	13.6+/-0.6	22.2+/-0.9
7	313	0.8	15.7+/-0.8	16.1+/-0.8	11.5+/-0.6	19.2+/-0.8
8	244	0.5	16.5+/-0.8	17.2+/-0.8	12.4+/-0.6	21.5+/-0.9
9	194	0.6	18.2+/-0.9	15.4+/-0.7	14.6+/-0.6	20.8+/-0.9
10	155	0.5	17.3+/-0.8	17.2+/-0.8	14.4+/-0.6	20.7+/-0.9
11	129	1.6	15.2+/-0.8	15.5+/-0.7	Missing dos.	19.6+/-0.8
12	153	1.4	16.0+/-0.8	16.6+/-0.8	11.0+/-0.5	20.0+/-0.9
13	217	0.6	15.6+/-0.8	16.8+/-0.8	12.8+/-0.6	20.0+/-0.8
14	178	0.8	16.7+/-0.8	17.8+/-0.8	13.8+/-0.6	21.8+/-0.9
15	272	1.9	15.8+/-0.8	15.8+/-0.8	Missing dos.	21.0+/-0.9
16	262	4.6	16.6+/-0.8	18.5+/-0.8	Missing dos.	Missing dos.
17	250	4.3	17.3+/-0.8	17.7+/-0.8	15.3+/-0.7	22.7+/-0.9
18	225	4.1	15.6+/-0.8	17.9+/-0.8	14.2+/-0.6	21.2+/-0.9
19	233	6.7	14.5+/-0.8	17.1+/-0.8	12.8+/-0.6	20.8+/-0.9
20	200	4.9	17.5+/-0.8	13.4+/-0.7	Missing dos.	17.6+/-0.6
21	187	4.7	17.9+/-0.8	Missing dos.	14.5+/-0.6	20.8+/-0.9
22	160	4.4	16.6+/-0.8	17.1+/-0.8	14.8+/-0.6	21.5+/-0.9
23	140	4.7	15.8+/-0.8	17.8+/-0.8	13.9+/-0.6	21.7+/-0.9
24	131	6.6	16.7+/-0.8	17.7+/-0.8	13.6+/-0.6	20.8+/-0.9
25	117	4.9	13.6+/-0.8	17.2+/-0.8	12.8+/-0.6	21.6+/-0.9
26	88	1.9	16.1+/-0.8	17.4+/-0.8	13.4+/-0.6	20.8+/-0.9
27	69	1.8	16.4+/-0.8	17.6+/-0.8	12.7+/-0.6	21.7+/-0.9
28	47	1.6	15.6+/-0.8	17.9+/-0.8	13.3+/-0.6	22.4+/-0.9
29	19	1.5	16.6+/-0.8	15.0+/-0.7	11.9+/-0.6	20.2+/-0.9
30	356	1.9	15.5+/-0.8	19.2+/-0.8	12.8+/-0.6	21.9+/-0.9
31	346	2.4	16.1+/-0.8	17.5+/-0.8	13.7+/-0.6	20.9+/-0.9
32	340	3.8	18.1+/-0.9	Missing dos.	Missing dos.	21.3+/-0.9
33	8	4.6	17.4+/-0.8	18.9+/-0.8	15.5+/-0.7	21.4+/-0.9
34	17	4.7	20.3+/-0.9	19.3+/-0.8	15.4+/-0.7	22.6+/-0.9
35	45	10.5	17.2+/-0.8	16.6+/-0.8	13.9+/-0.6	21.5+/-0.9
36	48	4.7	16.1+/-0.8	17.6+/-0.8	15.1+/-0.6	21.1+/-0.9
37	61	4.2	16.5+/-0.8	17.8+/-0.8	16.3+/-0.7	21.0+/-0.9
38	86	4.9	17.0+/-0.8	18.3+/-0.8	15.0+/-0.6	21.8+/-0.9
39	107	9.1	13.3+/-0.8	17.9+/-0.8	12.8+/-0.6	21.6+/-0.9
40	111	3.7	16.2+/-0.8	17.4+/-0.8	13.3+/-0.6	20.2+/-0.9

The following sites are located in Wisconsin: 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39 & 40.

NRC TLD DIRECT RADIATION MONITORING NETWORK, U.S. Nuclear Regulatory Commission, NUREG-0837, Washington, Vol. 3, No. 1, 2, 3 & 4, 1983.

Table 20. U.S. Nuclear Regulatory Commission TLD network for 1984.

## Prairie Island

1984

Measurements in units of milliroentgens (mR)			field time (days)			
Exposure period: 1st quarter			12/12/83 - 04/12/84	(88)	3rd quarter	06/14/84 - 10/12/84 (92)
2nd quarter			03/21/84 - 07/12/84	(92)	4th quarter	09/14/84 - 01/07/85 (93)
			1st quarter	2nd quarter	3rd quarter	4th quarter
Site	Location		Exposure Rate	Exposure Rate	Exposure Rate	Exposure Rate
	Azimuth/Distance	(Degrees) (Miles)	mR/Std. Qtr. +/- Std. Dev	mR/Std. Qtr. +/- Std. Dev	mR/Std. Qtr. +/- Std. Dev	mR/Std. Qtr. +/- Rdm; Tot.
1	312	17.3	13.8+/-0.8	18.5+/-0.8	18.6+/-0.8	18.0+/-0.7
2	310	15.2	13.9+/-0.8	18.3+/-0.8	18.9+/-0.8	18.2+/-0.7
3	310	15.2	13.2+/-0.8	18.6+/-0.8	19.1+/-0.8	18.7+/-0.7
4	308	5.5	14.7+/-0.8	18.2+/-0.8	18.0+/-0.8	17.7+/-0.7
5	297	4.1	12.4+/-0.8	16.8+/-0.7	16.4+/-0.7	16.1+/-0.6
6	287	1.3	13.2+/-0.8	17.4+/-0.7	17.6+/-0.8	17.4+/-0.7
7	313	0.8	12.3+/-0.8	14.9+/-0.7	15.5+/-0.7	15.0+/-0.6
8	244	0.5	13.4+/-0.8	Missing dos.	17.4+/-0.8	16.2+/-0.6
9	194	0.6	14.1+/-0.8	16.8+/-0.7	16.1+/-0.7	16.0+/-0.6
10	155	0.5	13.9+/-0.8	18.0+/-0.8	16.7+/-0.7	17.4+/-0.7
11	129	1.6	12.6+/-0.8	15.5+/-0.7	16.3+/-0.7	15.0+/-0.6
12	153	1.4	13.6+/-0.8	17.3+/-0.7	16.4+/-0.7	16.7+/-0.6
13	217	0.6	13.7+/-0.8	17.5+/-0.7	16.2+/-0.7	17.0+/-0.6
14	178	0.8	13.4+/-0.8	17.0+/-0.7	15.8+/-0.7	16.4+/-0.6
15	272	1.9	12.5+/-0.8	15.6+/-0.7	17.0+/-0.8	15.7+/-0.6
16	262	4.6	12.7+/-0.8	19.6+/-0.8	19.4+/-0.8	18.3+/-0.7
17	250	4.3	14.1+/-0.8	17.3+/-0.7	18.7+/-0.8	16.1+/-0.6
18	225	4.1	13.1+/-0.8	Missing dos.	16.9+/-0.7	Missing dos.
19	233	6.7	12.5+/-0.8	17.3+/-0.7	15.5+/-0.7	15.7+/-0.6
20	200	4.9	14.7+/-0.8	19.4+/-0.8	20.6+/-0.8	18.8+/-0.7
21	187	4.7	14.1+/-0.8	18.8+/-0.8	18.0+/-0.8	18.3+/-0.7
22	160	4.4	14.0+/-0.8	19.0+/-0.8	16.8+/-0.7	18.1+/-0.7
23	140	4.7	15.4+/-0.8	19.2+/-0.8	17.7+/-0.8	18.5+/-0.7
24	131	6.6	13.8+/-0.8	17.5+/-0.7	16.5+/-0.7	17.6+/-0.7
25	117	4.9	13.4+/-0.8	17.3+/-0.7	15.9+/-0.7	16.3+/-0.6
26	88	1.9	15.0+/-0.8	17.5+/-0.7	17.4+/-0.8	16.3+/-0.6
27	69	1.8	12.8+/-0.8	18.7+/-0.8	16.1+/-0.7	18.0+/-0.7
28	47	1.6	14.5+/-0.8	18.2+/-0.8	17.1+/-0.8	16.8+/-0.6
29	19	1.5	13.0+/-0.8	17.9+/-0.8	15.3+/-0.7	16.1+/-0.6
30	356	1.9	13.8+/-0.8	17.4+/-0.7	15.6+/-0.7	16.4+/-0.6
31	346	2.4	12.7+/-0.8	18.0+/-0.8	16.1+/-0.7	17.6+/-0.7
32	340	3.8	42.1+/-1.5	19.6+/-0.8	18.5+/-0.8	19.5+/-0.7
33	8	4.6	15.1+/-0.8	19.8+/-0.8	19.4+/-0.8	18.8+/-0.7
34	17	4.7	12.0+/-0.8	18.8+/-0.8	19.2+/-0.8	18.9+/-0.7
35	45	10.5	13.6+/-0.8	17.5+/-0.7	17.2+/-0.8	16.6+/-0.6
36	48	4.7	15.2+/-0.8	20.1+/-0.8	18.9+/-0.8	19.4+/-0.7
37	61	4.2	15.1+/-0.8	19.8+/-0.8	19.1+/-0.8	19.6+/-0.7
38	86	4.9	14.5+/-0.8	19.1+/-0.8	18.7+/-0.8	18.2+/-0.7
39	107	9.1	14.4+/-0.8	17.5+/-0.7	16.5+/-0.7	16.5+/-0.6
40	111	3.7	13.5+/-0.8	16.9+/-0.7	16.6+/-0.7	16.5+/-0.6

The following sites are located in Wisconsin: 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39 & 40.

NRC TLD DIRECT RADIATION MONITORING NETWORK, U.S. Nuclear Regulatory Commission, NUREG-0837, Washington, Vol. 4, No. 1, 2, 3 & 4, 1984.

Table 21. Precipitation analysis for 1983.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

## Prairie Island

1983

Measurements in units of nCi/M<sup>2</sup>

WI - Section of Radiation Protection data

Sample period 1983	Precipitation (inches)	PRI-1 Gross beta	PRI-1 tritium	PRI-2 Gross beta	PRI-2 tritium
01/26 - 02/23	1.43	0.19+/-0.05	-11+/-11	0.17+/-0.05	-5+/-10
02/23 - 03/23	2.04	0.20+/-0.06	-7+/-15	0.21+/-0.06	-16+/-15
03/23 - 04/20	3.45	0.11+/-0.08	19+/-25	0.17+/-0.09	8+/-25
04/20 - 05/18	2.80	0.22+/-0.06	-8+/-20	0.21+/-0.06	10+/-21
05/18 - 06/29	2.49	0.26+/-0.08	26+/-27	0.27+/-0.08	4+/-27
06/29 - 08/02	4.81	0.37+/-0.15	-1.0+/-53	0.27+/-0.13	-33+/-53
08/02 - 08/24	4.34	0.44+/-0.09	4+/-44	0.46+/-0.09	-26+/-44
08/24 - 09/28	5.83	0.30+/-0.15	-34+/-58	0.43+/-0.15	-40+/-58
09/28 - 10/26	2.33	0.14+/-0.06	12+/-23	0.11+/-0.06	-15+/-23
10/26 - 11/23	3.51	0.28+/-0.10	-17+/-36	0.21+/-0.09	20+/-37
11/23 - 12/21	2.17	0.25+/-0.07	11+/-20	0.26+/-0.09	53+/-20

Sample period 1983	Precipitation (inches)	PRI-3 Gross beta	PRI-3 tritium	PRI-4 Gross beta	PRI-4 tritium
01/01 - 01/12		* a	* a	0.07+/-0.02	-1.9+/-4
01/12 - 01/26		* a	* a	0.008+/-0.002	-0.3+/-0.4
01/26 - 02/23	1.43	0.33+/-0.06	-12+/-10	0.12+/-0.04	-10+/-10
02/23 - 03/23	2.04	0.20+/-0.06	-9+/-15	0.33+/-0.07	1.3+/-14
03/23 - 04/20	3.45	0.22+/-0.10	36+/-25	0.21+/-0.10	-5+/-25
04/20 - 05/18	2.80	0.23+/-0.06	-12+/-20	0.31+/-0.09	0.9+/-21
05/18 - 06/29	2.49	0.49+/-0.10	11+/-27	0.21+/-0.08	19+/-27
06/29 - 08/02	4.81	0.22+/-0.13	-77+/-53	0.40+/-0.16	-82+/-53
08/02 - 08/24	4.34	0.18+/-0.08	-5+/-44	0.25+/-0.08	-28+/-44
08/24 - 09/28	5.83	0.25+/-0.13	-6+/-59	0.19+/-0.13	-15+/-59
09/28 - 10/26	2.33	0.21+/-0.07	17+/-23	0.11+/-0.06	8+/-23
10/26 - 11/23	3.51	0.32+/-0.11	-6+/-36	0.17+/-0.09	-21+/-36
11/23 - 12/21	2.17	0.13+/-0.06	11+/-20	0.12+/-0.06	13+/-20

\* a - A precipitation sample was not collected for the indicated time period.



Table 22. Precipitation analysis for 1984.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island

1984

Measurements in units of nCi/M<sup>2</sup>

WI - Section of Radiation Protection data

Sample period 1984	Precipitation (inches)	PRI-1 Gross beta	PRI-1 tritium	PRI-2 Gross beta	PRI-2 tritium
12/21 - 01/18	0.35	0.044+/-0.011	2+/-3	0.045+/-0.011	11+/-3
01/18 - 02/29	1.64	0.18+/-0.05	14+/-17	0.25+/-0.06	4+/-17
02/29 - 03/28	1.95	0.19+/-0.06	-0.8+/-16	0.15+/-0.05	-2+/-16
03/28 - 04/25	1.41	0.11+/-0.04	3+/-12	0.15+/-0.04	-7+/-12
04/25 - 05/23	6.09	0.48+/-0.17	-34+/-51	0.43+/-0.17	35+/-51
05/23 - 06/28	3.96	0.31+/-0.12	6+/-35	0.39+/-0.12	11+/-35
06/28 - 07/25	2.95	0.28+/-0.08	56+/-26	0.16+/-0.08	13+/-26
07/25 - 09/05	3.57	0.20+/-0.09	-4+/-28	0.24+/-0.09	-4+/-28
09/05 - 10/08	3.49	0.19+/-0.09	-8+/-25	0.17+/-0.09	-15+/-25
10/08 - 11/01	3.79	0.13+/-0.09	-18+/-28	0.17+/-0.09	-0.6+/-28
11/01 - 11/28	1.21	0.49+/-0.06	-6+/-8	0.32+/-0.05	9+/-8
11/28 - 12/26	2.02	0.31+/-0.06	-15+/-14	1.6+/-0.1	-2+/-14

Sample period 1984	Precipitation (inches)	PRI-3 Gross beta	PRI-3 tritium	PRI-4 Gross beta	PRI-4 tritium
12/21 - 01/18	0.35	0.027+/-0.010	-0.7+/-3	0.036+/-0.012	-1.0+/-3
01/18 - 02/29	1.64	0.23+/-0.06	6+/-17	0.51+/-0.08	14+/-17
02/29 - 03/28	1.95	0.14+/-0.05	0.3+/-16	1.2+/-0.11	17+/-16
03/28 - 04/25	1.41	0.14+/-0.04	-3+/-12	0.13+/-0.04	-0.6+/-12
04/25 - 05/23	6.09	0.43+/-0.17	2+/-51	0.36+/-0.16	1.4+/-51
05/23 - 06/28	3.96	0.24+/-0.11	13+/-35	0.32+/-0.12	12+/-35
06/28 - 07/25	2.95	0.13+/-0.08	-9+/-26	0.13+/-0.08	4+/-26
07/25 - 09/05	3.57	0.33+/-0.15	13+/-28	0.27+/-0.10	-2+/-28
09/05 - 10/08	3.49	0.17+/-0.09	-11+/-25	0.26+/-0.09	-8+/-25
10/08 - 11/01	3.79	0.46+/-0.12	-4+/-28	0.37+/-0.11	-3+/-28
11/01 - 11/28	1.21	0.06+/-0.03	4+/-8	0.52+/-0.06	-2+/-8
11/28 - 12/26	2.02	0.10+/-0.05	-7+/-14	1.8+/-0.2	-7+/-14



Table 23. Analysis of surface water samples for 1983 and 1984.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTIONPrairie Island  
1983 and 1984

Measurements in units of pCi/liter

WI - Section of Radiation Protection data

Collection Date	05/16/83	05/16/83	05/16/83	10/05/83	10/04/83	10/04/83
Location	PRI-1	PRI-2	PRI-4	PRI-1	PRI-2	PRI-4
Gross Alpha-sol.	0.1+/-0.5	3.0+/-1.5	1.0+/-1.0	0.3+/-0.6	1.3+/-1.1	1.3+/-1.1
Gross Alpha-insol	0.3+/-0.6	1.2+/-0.8	0.3+/-0.6	0.3+/-0.6	0.1+/-0.6	0.3+/-0.6
Gross Beta-sol.	2.0+/-1.1	6.5+/-1.5	6.6+/-1.5	2.2+/-1.1	4.5+/-1.3	3.5+/-1.2
Gross Beta-insol.	1.6+/-1.1	1.9+/-1.1	1.0+/-1.0	-0.8+/-0.9	1.5+/-1.1	1.9+/-1.1
H-3	-260+/-290	-200+/-290	-120+/-290	260+/-410	390+/-410	50+/-400
Sr-89	0.05+/-0.5	-0.3+/-0.4	-0.2+/-0.5	-0.9+/-0.6	-0.6+/-0.6	0.3+/-0.7
Sr-90	0.6+/-0.5	1.0+/-0.4	0.7+/-0.5	1.1+/-0.6	0.7+/-0.7	-0.3+/-0.7
Gamma Isotopic						
Mn-54	0+/-5	2+/-5	1+/-4	-3+/-6	2+/-5	1+/-5
Fe-59	10+/-10	5+/-11	1+/-8	-1+/-11	9+/-10	-4+/-11
Co-58	0+/-6	-3+/-6	-1+/-4	1+/-5	0+/-5	1+/-5
Co-60	5+/-6	3+/-6	0+/-4	0+/-5	0+/-6	0+/-7
Zn-65	-4+/-12	2+/-10	-1+/-8	-4+/-10	-6+/-13	-2+/-11
Zr-95	14+/-13	-2+/-13	0+/-9	-2+/-12	9+/-12	0+/-10
I-131	3+/-10	0+/-13	-6+/-10	-1+/-8	2+/-9	-2+/-10
Cs-134	-3+/-6	1+/-6	-1+/-4	0+/-4	1+/-6	-2+/-5
Cs-137	4+/-7	-3+/-8	-1+/-5	2+/-6	-1+/-6	5+/-5
Ba,La-140	7+/-7	9+/-8	13+/-6	2+/-8	0+/-8	2+/-9
Collection Date	05/09/84	05/08/84	05/08/84	10/23/84	10/22/84	10/23/84
Location	PRI-1	PRI-2	PRI-4	PRI-1	PRI-2	PRI-4
Gross Alpha-sol.	0.8+/-0.8	4+/-2	1.1+/-1.2	-0.2+/-0.7	1.3+/-1.3	0.9+/-1.1
Gross Alpha-insol	0.2+/-0.5	0.9+/-0.7	0.6+/-0.6	-0.1+/-0.6	0.6+/-0.8	0.8+/-0.7
Gross Beta-sol.	1.3+/-1.1	7.0+/-1.6	5.4+/-1.4	2.8+/-1.1	5.9+/-1.4	5.5+/-1.4
Gross Beta-insol.	0.9+/-1.0	4.8+/-1.3	0.4+/-1.0	-0.1+/-0.9	1.9+/-1.1	0.5+/-1.0
H-3	30+/-340	-140+/-340	120+/-340	6+/-280	190+/-290	160+/-290
Sr-89	0.05+/-0.5	-1.1+/-0.7	0.8+/-0.5	-0.8+/-0.4	-1.8+/-0.6	-0.3+/-0.5
Sr-90	0.4+/-0.5	1.8+/-0.7	0.3+/-0.5	0.7+/-0.4	1.2+/-0.5	0.8+/-0.4
Gamma Isotopic						
Mn-54	-4+/-4	4+/-5	0+/-5	-3+/-3	-5+/-3	0+/-1
Fe-59	-3+/-8	1+/-10	3+/-9	-4+/-6	4+/-6	1+/-3
Co-58	3+/-5	3+/-6	-1+/-5	0+/-3	0+/-3	1+/-1
Co-60	4+/-6	4+/-6	3+/-6	-1+/-3	-1+/-3	-1+/-2
Zn-65	9+/-12	1+/-11	5+/-11	-4+/-6	5+/-7	2+/-3
Zr-95	0+/-11	3+/-12	0+/-11	0+/-7	-2+/-7	0+/-3
I-131	7+/-7	4+/-14	1+/-8	-3+/-4	0+/-5	1+/-2
Cs-134	3+/-5	2+/-5	2+/-5	1+/-3	2+/-3	2+/-1
Cs-137	-3+/-5	0+/-6	5+/-6	2+/-4	1+/-4	0+/-2
Ba,La-140	0+/-6	-1+/-9	-1+/-6	-1+/-3	0+/-4	-3+/-2

Isotopes other than those reported were not detected.

Table 24. Analysis of fish samples for 1983 and 1984.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island

1983 and 1984

-----  
Measurements in units of pCi/kg (wet)

WI - Section of Radiation Protection data

Collection Date	06/20/83	06/20/83	09/22/83	09/27/83
Type	white bass	white bass	white bass	white bass
Location	downstream	upstream	upstream	downstream
Gamma Isotopic				
K-40	2700+/-600	2500+/-500	2700+/-700	2500+/-700
Mn-54	-1+/-30	0+/-20	-14+/-40	-14+/-40
Co-58	1+/-30	30+/-20	0+/-70	0+/-60
Co-60	-5+/-30	10+/-30	5+/-40	0+/-40
Cs-134	9+/-20	4+/-20	-1+/-30	-1+/-30
Cs-137	2+/-30	2+/-30	-8+/-40	4+/-40

Collection Date	06/04/84	05/24/84	09/21/84	09/21/84
Type	white bass	white bass	white bass	white bass
Location	upstream	downstream	upstream	downstream
Gamma Isotopic				
K-40	3500+/-500	2400+/-400	4300+/-700	3500+/-600
Mn-54	-9+/-16	2+/-17	16+/-20	14+/-20
Co-58	-6+/-20	-13+/-19	-10+/-30	-10+/-30
Co-60	10+/-20	20+/-20	30+/-30	20+/-30
Cs-134	-2+/-18	-2+/-17	19+/-20	40+/-20
Cs-137	15+/-20	7+/-19	30+/-30	20+/-30

Isotopes other than those reported were not detected.

Table 25. Analysis of vegetation samples for 1983.

PRI 1 - PRI 7

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

## Prairie Island

1983

-----  
Measurements in units of pCi/kilogram

Collection Date	05/16/83	05/17/83	05/16/83	05/17/83	05/17/83	05/16/83
Type	vegetation	vegetation	vegetation	vegetation	vegetation	vegetation
Location	PRI-1	PRI-3	PRI-4	PRI-5	PRI-6	PRI-7
Analysis						
Gross beta (dry)	3400+/-4000	27000+/-4000	69000+/-5000	29000+/-4000	30000+/-4000	34000+/-4000
Gross alpha (dry)	-1300+/-1900	-1300+/-1900	4000+/-3000	-400+/-1900	400+/-2000	1300+/-2000
Gamma Isotopic (wet)						
Be-7	200+/-400	200+/-400	500+/-400	200+/-400	800+/-400	1000+/-400
K-40	2600+/-800	3200+/-700	2300+/-700	3400+/-800	2600+/-800	2600+/-700
Co-58	30+/-40	20+/-40	4+/-40	19+/-40	20+/-40	17+/-40
Co-60	2+/-50	20+/-40	20+/-40	3+/-50	2+/-50	5+/-50
Zr-95	60+/-80	-8+/-90	20+/-80	50+/-70	18+/-100	20+/-80
I-131	-9+/-60	20+/-50	-7+/-70	0+/-70	14+/-70	60+/-70
Cs-134	8+/-40	-14+/-40	9+/-40	20+/-40	30+/-40	4+/-30
Cs-137	4+/-50	-20+/-50	-7+/-40	14+/-50	19+/-50	30+/-40

Collection Date	10/05/83	10/05/83	10/04/83	10/04/83	10/04/83	10/04/83
Type	vegetation	vegetation	vegetation	vegetation	vegetation	vegetation
Location	PRI-1	PRI-3	PRI-4	PRI-5	PRI-6	PRI-7
Analysis						
Gross beta (dry)	17000+/-3000	23000+/-3000	40000+/-4000	30000+/-4000	22000+/-3000	29000+/-4000
Gross alpha (dry)	3000+/-3000	1100+/-3000	4000+/-3000	1100+/-3000	1700+/-3000	3000+/-3000
Gamma Isotopic (wet)						
Be-7	3700+/-800	1300+/-700	1400+/-400	700+/-700	4400+/-1000	1000+/-600
K-40	4100+/-1200	5100+/-1700	5500+/-1000	7000+/-2000	6000+/-2000	6800+/-1700
Co-58	-2+/-60	-50+/-70	1+/-40	-30+/-70	70+/-70	30+/-50
Co-60	30+/-60	10+/-80	20+/-60	10+/-90	-20+/-100	10+/-70
Zr-95	30+/-90	60+/-130	40+/-80	80+/-160	-16+/-160	140+/-120
I-131	8+/-70	-20+/-90	40+/-60	-30+/-100	-80+/-110	70+/-90
Cs-134	-30+/-50	20+/-60	-9+/-40	-40+/-60	-20+/-70	30+/-40
Cs-137	30+/-60	40+/-60	30+/-50	-10+/-70	60+/-90	-90+/-60

Isotopes other than those reported were not detected.

Table 26. Analysis of vegetation samples for 1983.

PRI 8 - PRI 9

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

## Prairie Island

1983

-----  
Measurements in units of pCi/kilogram

Collection Date	05/17/83	05/16/83
Type	vegetation	vegetation
Location	PRI-8	PRI-9
Analysis		
Gross beta (dry)	21000+/-3000	23000+/-3000
Gross alpha (dry)	900+/-2000	2000+/-2000
Gamma Isotopic (wet)		
Be-7	1600+/-400	2400+/-600
K-40	2300+/-700	3200+/-900
Co-58	15+/-40	10+/-50
Co-60	20+/-40	-20+/-50
Zr-95	17+/-80	70+/-110
I-131	40+/-80	80+/-100
Cs-134	20+/-30	6+/-40
Cs-137	18+/-40	14+/-50

Collection Date	10/04/83	10/04/83
Type	vegetation	vegetation
Location	PRI-8	PRI-9
Analysis		
Gross beta (dry)	29000+/-4000	20000+/-3000
Gross alpha (dry)	1100+/-3000	0+/-3000
Gamma Isotopic (wet)		
Be-7	2600+/-900	4000+/-1000
K-40	6000+/-2000	5000+/-2000
Co-58	90+/-60	19+/-80
Co-60	-20+/-100	8+/-110
Zr-95	3+/-150	-200+/-180
I-131	-50+/-120	-40+/-130
Cs-134	40+/-60	-16+/-60
Cs-137	-40+/-80	10+/-80

Isotopes other than those reported were not detected.



Table 27. Analysis of vegetation samples for 1984.

PRI 1 - PRI 7

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

## Prairie Island

1984

-----  
Measurements in units of pCi/kilogram (wet)

WI - Section of Radiation Protection data

Collection Date	05/09/84	05/09/84	05/08/84	05/09/84	05/09/84	05/08/84
Type	vegetation	vegetation	vegetation	vegetation	vegetation	vegetation
Location	PRI-1	PRI-3	PRI-4	PRI-5	PRI-6	PRI-7
Analysis						
Gross beta	8000+/-4000	7000+/-3000	7000+/-4000	8000+/-4000	8000+/-3000	7000+/-4000
Gross alpha	700+/-900	300+/-900	-100+/-600	100+/-800	0+/-1000	600+/-700
Gamma Isotopic						
Be-7	1100+/-700	1700+/-700	1600+/-700	1300+/-900	500+/-400	2600+/-900
K-40	7700+/-1600	6400+/-1500	6100+/-1500	6000+/-1900	5200+/-1000	5500+/-1600
Co-58	12+/-60	20+/-70	9+/-70	20+/-90	0+/-40	6+/-70
Co-60	20+/-70	50+/-70	50+/-70	80+/-100	40+/-40	30+/-80
Zr-95	20+/-140	130+/-150	80+/-150	70+/-200	-20+/-80	100+/-170
I-131	90+/-110	60+/-120	110+/-130	12+/-150	-80+/-60	100+/-150
Cs-134	50+/-60	-6+/-60	60+/-60	20+/-80	12+/-40	20+/-70
Cs-137	16+/-70	30+/-70	50+/-70	4+/-90	20+/-40	19+/-80

Collection Date	10/23/84	10/23/84	10/23/84	10/23/84	10/23/84	10/23/84
Type	vegetation	vegetation	vegetation	vegetation	vegetation	vegetation
Location	PRI-1	PRI-3	PRI-4	PRI-5	PRI-6	PRI-7
Analysis						
Gross beta	8000+/-2000	8000+/-1900	8500+/-1300	10100+/-1900	20000+/-4000	8000+/-2000
Gross alpha	1300+/-2000	900+/-2000	700+/-1200	-900+/-1500	1500+/-5000	-300+/-2000
Gamma Isotopic						
Be-7	6200+/-300	5600+/-700	2700+/-600	5200+/-1000	4500+/-1000	7600+/-900
K-40	4900+/-1400	5900+/-1200	6100+/-1200	6000+/-1900	6000+/-2000	5400+/-1200
Co-58	-3+/-60	-11+/-50	4+/-40	80+/-90	80+/-100	-15+/-15
Co-60	50+/-70	40+/-60	40+/-60	60+/-100	-30+/-90	50+/-60
Zr-95	-15+/-130	12+/-110	50+/-100	70+/-180	100+/-200	-6+/-110
I-131	-40+/-70	-40+/-60	-11+/-50	140+/-100	130+/-110	40+/-70
Cs-134	40+/-60	-40+/-40	30+/-40	160+/-90	80+/-90	-19+/-50
Cs-137	6+/-70	5+/-50	-14+/-40	80+/-90	100+/-110	60+/-60

Isotopes other than those reported were not detected.



Table 28. Analysis of vegetation samples for 1984.

PRI 8 - PRI 9

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

## Prairie Island

1984

-----  
Measurements in units of pCi/kilogram (wet)

WI - Section of Radiation Protection data

Collection Date	05/09/84	05/08/84
Type	vegetation	vegetation
Location	PRI-8	PRI-9
Analysis		
Gross beta	8000+/-4000	7000+/-3000
Gross alpha	100+/-800	400+/-1000
Gamma Isotopic		
Be-7	1600+/-900	900+/-600
K-40	8000+/-1900	5400+/-1200
Co-58	15+/-90	-3+/-50
Co-60	70+/-90	60+/-60
Zr-95	80+/-200	10+/-115
I-131	10+/-160	-150+/-90
Cs-134	40+/-80	50+/-50
Cs-137	40+/-90	0+/-50

Collection Date	10/23/84	10/23/84
Type	vegetation	vegetation
Location	PRI-8	PRI-9
Analysis		
Gross beta	10000+/-2000	10000+/-2000
Gross alpha	-200+/-1800	-300+/-2000
Gamma Isotopic		
Be-7	7800+/-1400	6600+/-900
K-40	9000+/-3000	5100+/-1400
Co-58	130+/-120	-19+/-60
Co-60	70+/-140	50+/-80
Zr-95	140+/-250	-40+/-130
I-131	180+/-140	-80+/-70
Cs-134	60+/-100	-15+/-60
Cs-137	110+/-130	20+/-70

Isotopes other than those reported were not detected.

Table 29. Analysis of soil samples for 1983.

PRI 1 - PRI 7

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island

1983

W1 - Section of Radiation Protection data

Measurements in units of pCi/kilogram (dry)

Collection Date	05/16/83	05/17/83	05/16/83	05/17/83	05/17/83	05/16/83
Type	soil	soil	soil	soil	soil	soil
Location	PRI-1	PRI-3	PRI-4	PRI-5	PRI-6	PRI-7
Analysis						
Gross beta (dry)	23000+/-3000	26000+/-4000	24000+/-3000	19000+/-3000	23000+/-3000	27000+/-4000
Gross alpha (dry)	5000+/-3000	7000+/-3000	1000+/-4000	5000+/-3000	8000+/-3000	1000+/-4000
Gamma Isotopic						
Co-58	13+/-40	18+/-60	4+/-50	-20+/-40	-18+/-50	2+/-60
Co-60	30+/-60	5+/-80	20+/-80	-8+/-70	20+/-70	-20+/-90
Cs-134	30+/-40	30+/-60	60+/-50	15+/-40	20+/-50	20+/-70
Cs-137	700+/-70	760+/-100	360+/-80	440+/-70	360+/-70	1070+/-100
K-40	11700+/-1200	17900+/-1600	16800+/-1600	13900+/-1300	16100+/-1400	19300+/-1700
Ra-226 * a	700+/-800	2200+/-1100	1600+/-1000	1200+/-700	1800+/-900	1800+/-1100
Pb-214 * a	360+/-100	740+/-130	630+/-120	290+/-90	540+/-110	710+/-140
Bi-214 * a	430+/-110	700+/-150	590+/-140	380+/-100	680+/-130	760+/-150
Tl-208 * a	450+/-150	800+/-200	630+/-190	290+/-90	700+/-160	910+/-190
Ac-228 * a	450+/-190	800+/-300	800+/-200	440+/-160	800+/-200	1000+/-300

Collection Date	10/05/83	10/05/83	10/04/83	10/04/83	10/04/83	10/04/83
Type	soil	soil	soil	soil	soil	soil
Location	PRI-1	PRI-3	PRI-4	PRI-5	PRI-6	PRI-7
Analysis						
Gross beta (dry)	22000+/-3000	27000+/-3000	31000+/-4000	23000+/-3000	31000+/-4000	20000+/-3000
Gross alpha (dry)	6000+/-4000	11000+/-4000	8000+/-4000	5000+/-4000	11000+/-4000	10000+/-4000
Gamma Isotopic						
Co-58	-8+/-30	-20+/-40	40+/-40	-5+/-30	4+/-30	-6+/-30
Co-60	-5+/-50	-7+/-50	6+/-50	9+/-40	-7+/-40	9+/-50
Cs-134	30+/-30	20+/-40	40+/-60	14+/-30	4+/-30	16+/-40
Cs-137	750+/-60	740+/-80	280+/-50	640+/-50	450+/-50	750+/-60
K-40	13800+/-900	16900+/-1000	14600+/-1300	11700+/-800	11900+/-1000	13800+/-900
Ra-226 * a	1300+/-700	1500+/-800	900+/-600	800+/-600	800+/-500	900+/-700
Pb-214 * a	580+/-80	810+/-90	640+/-90	420+/-70	330+/-60	500+/-90
Bi-214 * a	540+/-80	770+/-100	610+/-110	430+/-70	300+/-70	510+/-80
Tl-208 * a	560+/-110	550+/-130	700+/-120	480+/-90	580+/-100	570+/-110
Ac-228 * a	580+/-140	860+/-150	690+/-180	460+/-120	440+/-130	550+/-140

\*a - Naturally occurring radioisotopes Ac-228 and Tl-208 are from the Thorium-232 decay series.

Ra-226, Pb-214, and Bi-214 are from the Uranium-238 decay series.

Isotopes other than those reported were not detected.

Table 30. Analysis of soil samples for 1983.

PRI 8 - PRI 9

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island

1983

-----  
WI - Section of Radiation Protection data

Measurements in units of pCi/kilogram (dry)

Collection Date	05/17/83	05/16/83
Type	soil	soil
Location	PRI-8	PRI-9
Analysis		
Gross beta (dry)	26000+/-4000	21000+/-3000
Gross alpha (dry)	11000+/-4000	8000+/-3000
Gamma Isotopic		
Co-58	-15+/-30	-11+/-50
Co-60	20+/-50	40+/-70
Cs-134	20+/-40	-8+/-50
Cs-137	550+/-50	1630+/-110
K-40	17900+/-900	14100+/-1300
Ra-226 * a	2200+/-600	1000+/-900
Pb-214 * a	810+/-80	390+/-100
Bi-214 * a	790+/-80	430+/-100
Tl-208 * a	1010+/-120	430+/-150
Ac-228 * a	1110+/-150	530+/-190

Collection Date	10/04/83	10/04/83
Type	soil	soil
Location	PRI-8	PRI-9
Analysis		
Gross beta (dry)	29000+/-4000	20000+/-3000
Gross alpha (dry)	13000+/-5000	5000+/-3000
Gamma Isotopic		
Co-58	60+/-40	9+/-30
Co-60	-15+/-50	-10+/-40
Cs-134	20+/-50	10+/-60
Cs-137	340+/-50	1190+/-80
K-40	13300+/-1200	10400+/-1000
Ra-226 * a	1800+/-600	400+/-500
Pb-214 * a	550+/-80	250+/-60
Bi-214 * a	570+/-100	280+/-70
Tl-208 * a	650+/-130	390+/-100
Ac-228 * a	450+/-160	330+/-120

\*a - Naturally occurring radioisotopes Ac-228 and Tl-208 are from the Thorium-232 decay series.

Ra-226, Pb-214, and Bi-214 are from the Uranium-238 decay series.

Isotopes other than those reported were not detected.

Table 31. Analysis of soil samples for 1984.

PRI 1 - PRI 7

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

## Prairie Island

1984

WI - Section of Radiation Protection data

Measurements in units of pCi/kilogram (dry)

Collection Date	05/09/84	05/08/84	05/08/84	05/09/84	05/09/84	05/08/84
Type	soil	soil	soil	soil	soil	soil
Location	PRI-1	PRI-3	PRI-4	PRI-5	PRI-6	PRI-7
Analysis						
Gross beta (dry)	25000+/-4000	29000+/-4000	28000+/-4000	16000+/-3000	23000+/-3000	32000+/-4000
Gross alpha (dry)	1000+/-4000	9000+/-4000	9000+/-4000	3000+/-3000	7000+/-4000	9000+/-4000
Gamma Isotopic						
Co-58	-1+/-50	40+/-30	-2+/-60	9+/-20	-1+/-40	19+/-40
Co-60	30+/-60	15+/-50	20+/-70	0+/-30	40+/-60	30+/-40
Cs-134	-6+/-60	70+/-50	70+/-60	30+/-30	30+/-50	60+/-40
Cs-137	890+/-80	750+/-60	350+/-70	370+/-40	290+/-60	910+/-70
K-40	12000+/-1100	16700+/-900	15800+/-1300	10900+/-700	12600+/-1100	16100+/-1000
Ra-226 * a	1800+/-1000	1800+/-700	2700+/-1200	1000+/-500	2400+/-1000	1900+/-800
Pb-214 * a	530+/-120	640+/-90	800+/-140	340+/-60	560+/-100	810+/-100
Bi-214 * a	470+/-120	720+/-90	770+/-140	300+/-60	540+/-100	810+/-100
Tl-208 * a	500+/-160	820+/-120	920+/-190	490+/-90	780+/-150	900+/-130
Ac-228 * a	430+/-190	660+/-140	700+/-200	470+/-100	680+/-180	1000+/-150

Collection Date	10/23/84	10/23/84	10/23/84	10/23/84	10/23/84	10/23/84
Type	soil	soil	soil	soil	soil	soil
Location	PRI-1	PRI-3	PRI-4	PRI-5	PRI-6	PRI-7
Analysis						
Gross beta (dry)	19000+/-4000	24000+/-5000	31000+/-5000	18000+/-4000	18000+/-4000	29000+/-5000
Gross alpha (dry)	6000+/-6000	7000+/-6000	8000+/-6000	9000+/-6000	9000+/-6000	13000+/-7000
Gamma Isotopic						
Co-58	-2+/-50	-3+/-60	-5+/-40	3+/-30	18+/-40	-5+/-40
Co-60	40+/-60	15+/-70	15+/-50	2+/-30	-5+/-60	30+/-50
Cs-134	20+/-50	5+/-60	60+/-40	40+/-30	70+/-40	40+/-40
Cs-137	720+/-70	670+/-80	260+/-50	460+/-40	290+/-50	580+/-60
K-40	10700+/-1100	14600+/-1200	15900+/-1000	11000+/-700	11700+/-1000	15400+/-900
Ra-226 * a	600+/-1000	1200+/-1000	2700+/-800	1400+/-500	1600+/-800	2500+/-800
Pb-214 * a	460+/-100	530+/-110	580+/-80	350+/-60	480+/-80	660+/-80
Bi-214 * a	370+/-110	650+/-120	750+/-90	340+/-60	440+/-100	590+/-90
Tl-208 * a	490+/-140	700+/-160	740+/-120	600+/-80	360+/-120	790+/-120
Ac-228 * a	620+/-190	600+/-200	820+/-160	490+/-100	520+/-170	570+/-160

\*a - Naturally occurring radioisotopes Ac-228 and Tl-208 are from the Thorium-232 decay series.

Ra-226, Pb-214, and Bi-214 are from the Uranium-238 decay series.

Isotopes other than those reported were not detected.



Table 32. Analysis of soil samples for 1984.

PRI 8 - PRI 9

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island

1984

WI - Section of Radiation Protection data

Measurements in units of pCi/kilogram (dry)

Collection Date	05/09/84	05/08/84
Type	soil	soil
Location	PRI-8	PRI-9
Analysis		
Gross beta (dry)	30000+/-4000	21000+/-3000
Gross alpha (dry)	11000+/-5000	3000+/-4000
Gamma Isotopic		
Co-58	-1+/-60	14+/-30
Co-60	40+/-70	7+/-40
Cs-134	80+/-60	20+/-60
Cs-137	510+/-80	1440+/-80
K-40	15200+/-1300	14400+/-900
Ra-226 * a	2200+/-1200	1700+/-700
Pb-214 * a	890+/-130	430+/-90
Bi-214 * a	810+/-140	410+/-80
Tl-208 * a	900+/-190	550+/-120
Ac-228 * a	700+/-200	760+/-130

Collection Date	10/23/84	10/23/84
Type	soil	soil
Location	PRI-8	PRI-9
Analysis		
Gross beta (dry)	27000+/-5000	19000+/-4000
Gross alpha (dry)	15000+/-7000	6000+/-6000
Gamma Isotopic		
Co-58	1+/-60	6+/-30
Co-60	30+/-70	10+/-30
Cs-134	50+/-60	30+/-30
Cs-137	300+/-70	1010+/-60
K-40	14800+/-1300	11600+/-700
Ra-226 * a	2500+/-1100	1200+/-600
Pb-214 * a	820+/-110	330+/-60
Bi-214 * a	610+/-140	330+/-60
Tl-208 * a	790+/-170	450+/-90
Ac-228 * a	800+/-200	410+/-110

\*a - Naturally occurring radioisotopes Ac-228 and Tl-208 are from the Thorium-232 decay series.

Ra-226, Pb-214, and Bi-214 are from the Uranium-238 decay series.

Isotopes other than those reported were not detected.



Table 33. Analysis of well water samples for 1983 and 1984.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTION

Prairie Island

1983 & 1984

WI - Section of Radiation Protection data

Measurements in units of pCi/liter

Location	Collection date	Gross beta	Gross alpha	Tritium (H-3)
Bay City	05/16/83	1.5+/-1.1	1.5+/-1.2	240+/-290
PRI-4	10/04/83	2.1+/-1.2	0.3+/-1.1	500+/-400
Hager City	05/17/83	1.2+/-1.1	0.3+/-0.9	180+/-290
PRI-5	10/04/83	2.1+/-1.2	1.4+/-1.4	-300+/-400
Diamond Bluff	05/17/83	7.5+/-1.6	1.1+/-1.5	300+/-290
PRI-6	10/04/83	6.1+/-1.5	0.2+/-1.6	700+/-400

Location	Collection date	Gross beta	Gross alpha	Tritium (H-3)
Bay City	05/08/84	1.4+/-1.2	0.0+/-1.1	400+/-400
PRI-4	10/23/84	1.4+/-1.1	-0.4+/-1.1	400+/-300
Hager City	05/09/84	2.1+/-1.2	-0.8+/-1.3	-300+/-300
PRI-5	10/23/84	3.4+/-1.3	-0.6+/-1.6	130+/-300
Diamond Bluff	05/09/84	7.7+/-1.7	0.3+/-3	150+/-300
PRI-6	10/23/84	7.4+/-1.6	-0.3+/-2	-30+/-300

Table 34. Analysis of milk samples for 1983.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTIONPrairie Island  
1983-----  
Measurements in units of pCi/liter

WI - Section of Radiation Protection data			Johnson Place	PRI 10 PRI 11		
Collection date	01/17/83	02/14/83	03/15/83	04/18/83	05/17/83	06/21/83
Location	Place	Place	Place	Johnson	Place	Johnson
Isotope:						
Sr-90	3.6+/-0.9	3.9+/-0.7	5.9+/-1.0	6.2+/-1.2	4.9+/-1.3	3.0+/-0.8
I-131	0.11+/-0.14	0.06+/-0.12	0.20+/-0.16	0.02+/-0.13	-0.2+/-0.2	0.09+/-0.12
K-40	1370+/-80	1310+/-80	1410+/-80	1390+/-80	1400+/-80	1500+/-90
Cs-134	NA	NA	NA	NA	NA	NA
Cs-137	4+/-10	2+/-10	-7+/-10	-6+/-10	0.6+/-10	-2+/-10
La-140	1.5+/-10	-0.7+/-10	7+/-10	6+/-10	5+/-10	3+/-10

Collection date	07/19/83	08/15/83	09/19/83	10/17/83	11/14/83	12/20/83
Location	Place	Johnson	Place	Place	Johnson	Johnson
Isotope:						
Sr-90	5.6+/-1.0	5.6+/-0.9	4.6+/-1.0	3.4+/-1.0	3.1+/-0.8	2.4+/-0.7
I-131	0.35+/-0.16	0.09+/-0.12	0.77+/-0.12	-0.31+/-0.12	0.03+/-0.2	-0.10+/-0.3
K-40	1230+/-190	1360+/-190	1400+/-200	1350+/-180	1630+/-190	1370+/-170
Cs-134	2+/-9	0+/-8	3+/-9	2+/-7	2+/-7	0+/-6
Cs-137	-3+/-11	0+/-10	-2+/-10	6+/-7	-2+/-8	-2+/-8
La-140	0+/-9	6+/-6	11+/-7	-4+/-8	6+/-5	-1+/-9

Kinneman PRI 12

Collection date	01/17/83	02/14/83	03/15/83	04/18/83	05/17/83	06/21/83
Location	Kinneman	Kinneman	Kinneman	Kinneman	Kinneman	Kinneman
Isotope:						
Sr-90	3.7+/-0.9	4.9+/-0.9	5.7+/-0.8	3.7+/-1.2	7.8+/-1.0	2.8+/-0.8
I-131	-0.04+/-0.13	0.0+/-0.12	-0.13+/-0.14	0.00+/-0.11	-0.10+/-0.2	0.0+/-0.13
K-40	1450+/-80	1330+/-80	1390+/-80	1430+/-80	1320+/-80	1460+/-90
Cs-134	NA	NA	NA	NA	NA	NA
Cs-137	3+/-10	1.5+/-10	-9+/-10	-3+/-10	7+/-10	-1.1+/-10
La-140	-3+/-10	7+/-10	6+/-10	2+/-10	5+/-10	4+/-10

Collection date	07/19/83	08/15/83	09/19/83	10/17/83	11/14/83	12/20/83
Location	Kinneman	Kinneman	Kinneman	Kinneman	Kinneman	Kinneman
Isotope:						
Sr-90	6.9+/-1.0	3.3+/-0.8	3.1+/-1.2	3.7+/-0.8	2.3+/-0.9	2.4+/-0.7
I-131	0.53+/-0.16	0.37+/-0.13	0.49+/-0.12	0.33+/-0.15	-0.17+/-0.2	0.7+/-0.4
K-40	1270+/-190	1040+/-170	1720+/-190	1440+/-190	1370+/-170	1500+/-200
Cs-134	-3+/-9	7+/-8	0+/-6	-2+/-6	0+/-7	0+/-9
Cs-137	3+/-11	-1+/-10	-1+/-8	3+/-5	0+/-9	-2+/-10
La-140	1+/-8	-3+/-7	6+/-4	0+/-6	4+/-4	-5+/-12

NA - Isotope was not specifically analyzed for.

Isotopes other than those reported were not detected.

Table 35. Analysis of milk samples for 1984.

WISCONSIN DIVISION OF HEALTH  
SECTION OF RADIATION PROTECTIONPrairie Island  
1984-----  
Measurements in units of pCi/liter

WI - Section of Radiation Protection data		Johnson Place	PRI 10 PRI 11			
Collection date	01/17/84	02/20/84	03/19/84	04/16/84	05/21/84	06/18/84
Location	Johnson	Place	Johnson	Place	Johnson	Place
Isotope:						
Sr-90	2.7+/-0.7	2.0+/-0.8	2.6+/-0.6	3.0+/-0.9	3.1+/-0.7	5.2+/-1.1
I-131	0.38+/-0.15	-0.14+/-0.2	-0.14+/-0.10	-0.22+/-0.18	0.03+/-0.19	0.07+/-0.3
K-40	1300+/-170	1440+/-150	1310+/-180	1400+/-200	1220+/-180	1510+/-190
Cs-134	0+/-7	7+/-4	0+/-5	5+/-9	0+/-8	0+/-6
Cs-137	2+/-7	-2+/-6	11+/-6	1+/-10	3+/-7	7+/-7
La-140	5+/-4	4+/-3	4+/-5	-1+/-9	4+/-4	1+/-2

Collection date	07/16/84	08/20/84	09/17/84	10/15/84	11/19/84	12/17/84
Location	Johnson	Place	Johnson	Place	Place	Johnson
Isotope:						
Sr-90	4.6+/-0.6	4.5+/-0.8	2.4+/-0.7	3.7+/-0.8	2.7+/-0.8	3.6+/-1.2
I-131	-0.02+/-0.13	-0.11+/-0.13	-0.09+/-0.16	-0.05+/-0.18	-0.2+/-0.18	0.09+/-0.3
K-40	1480+/-180	1480+/-190	1400+/-170	1690+/-190	1330+/-180	1360+/-170
Cs-134	8+/-6	-1+/-5	7+/-6	0+/-6	2+/-6	1+/-5
Cs-137	0+/-7	7+/-6	2+/-7	9+/-7	5+/-6	3+/-6
La-140	0+/-5	3+/-5	3+/-5	-4+/-8	2+/-7	0+/-5

## Kinneman PRI 12

Collection date	01/17/84	02/20/84	03/19/84	04/16/84	05/21/84	06/18/84
Location	Kinneman	Kinneman	Kinneman	Kinneman	Kinneman	Kinneman
Isotope:						
Sr-90	2.7+/-0.7	3.5+/-0.9	2.8+/-0.8	3.8+/-1.2	1.9+/-0.6	5.2+/-1.3
I-131	0.71+/-0.15	0.09+/-0.2	-0.10+/-0.11	-0.10+/-0.14	-0.08+/-0.18	-0.12+/-0.12
K-40	1390+/-180	1450+/-160	1360+/-190	1400+/-200	1490+/-180	1580+/-190
Cs-134	7+/-5	2+/-6	8+/-8	-1+/-9	1+/-7	3+/-6
Cs-137	8+/-6	-2+/-8	0+/-9	8+/-8	0+/-7	5+/-8
La-140	3+/-4	1+/-7	12+/-6	7+/-5	5+/-4	5+/-4

Collection date	07/16/84	08/20/84	09/17/84	10/15/84	11/19/84	12/17/84
Location	Kinneman	Kinneman	Kinneman	Kinneman	Kinneman	Kinneman
Isotope:						
Sr-90	3.8+/-0.6	3.6+/-0.7	2.3+/-0.7	4.1+/-0.7	3.5+/-0.8	3.0+/-0.9
I-131	0.03+/-0.12	-0.05+/-0.13	0.04+/-0.18	-0.26+/-0.16	0.06+/-0.16	-0.2+/-0.3
K-40	1420+/-180	1360+/-170	1520+/-190	1490+/-180	1450+/-180	1450+/-190
Cs-134	-1+/-7	1+/-6	4+/-6	2+/-6	-1+/-6	4+/-8
Cs-137	8+/-7	4+/-6	3+/-6	-1+/-6	7+/-6	-1+/-9
La-140	3+/-5	2+/-5	2+/-5	1+/-5	1+/-6	10+/-6

Isotopes other than those reported were not detected.



State of Wisconsin \

DEPARTMENT OF HEALTH AND SOCIAL SERVICES

February 6, 1986

DHAB  
DIVISION OF HEALTH

MAIL ADDRESS:

1 WEST WILSON STREET

P.O. BOX 309

MADISON, WISCONSIN 53701

Phone: 608 - 273-5180

James Keppler  
US Nuclear Regulatory Commission  
Region III  
799 Roosevelt Road  
Glen Ellyn, IL 60137

PRIORITY ROUTING

First	Second
AS	AS
CS	CS
DS	DS
ES	ES
FS	FS
GS	GS
HS	HS
IS	IS
JS	JS
KS	KS
LS	LS
MS	MS
NS	NS
OS	OS
PS	PS
QS	QS
RS	RS
TS	TS
US	US
VS	VS
WS	WS
XS	XS
YS	YS
ZS	ZS

orig+1 ✓  
FILE *ms*

Enclosed is the State of Wisconsin, 1983-84, Prairie Island Environmental Radioactivity Survey prepared by the Section of Radiation Protection. This report is being provided for your information.

If you desire additional copies or have any questions, please do not hesitate to contact us.

Sincerely,

*Lawrence J. McDonnell*  
Lawrence J. McDonnell, Chief  
Section of Radiation Protection

dh  
Enclosure

IE25  
FEB 7 1986  
delete  
R111



