State of Wisconsin

2012

Prairie Island

Environmental Radioactivity Survey

Wisconsin Department of Health Services
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State of Wisconsin, Department of Health Services

2012

Prairie Island Environmental Monitoring Survey

Executive Summary

Wisconsin Public Health Statutes 254.41 mandates the State of Wisconsin, Department of Health Services to conduct environmental radiation monitoring around the nuclear power facilities that impact Wisconsin. This environmental monitoring report is for the Prairie Island nuclear generating plant for the calendar year January – December 2012 and provides a description and results of this environmental monitoring program.

The Wisconsin Department of Health Services' environmental monitoring program consists of the collection of various types of samples from the air, water and terrestrial exposure pathways, sample analysis and interpretation of the data. The sampling program included samples of air, precipitation, ambient gamma radiation, surface water, fish, milk, well water, soil and vegetation that are collected from selected locations at planned sampling intervals.

Program Summary

For 2012, all sample results from the Prairie Island environmental monitoring area were less than state and federal standards or guidelines.

The Wisconsin Department of Health Services' environmental monitoring programs provide an ongoing baseline of radioactivity measurements to access any Wisconsin health concerns from the operation of nuclear power generating facilities in or near Wisconsin or other radiological incidents that may occur within Wisconsin or worldwide. These monitoring programs show the following:

- Environmental radioactivity levels have been trending downward in the time period since the 1950's-1960's atmospheric nuclear testing and such radiological incidents as the Chernobyl nuclear reactor incident.
- There were no incidents during 2012, such as the 2011 Japan Fukushima Daiichi incident, that required additional environmental monitoring.
- There is no radioactive problem in types of food consumed in Wisconsin or a health problem for Wisconsin citizens.

The ongoing environmental monitoring programs will continue to provide assurances to the citizens of Wisconsin that the environment surrounding the Prairie Island nuclear power facility and other monitoring areas will continue to be evaluated.

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Introduction

Wisconsin Public Health Statutes 254.41 mandates the Wisconsin (WI) Department of Health Services (DHS) to conduct environmental radiation monitoring around the nuclear power facilities that impact Wisconsin. This environmental monitoring report is for the Prairie Island nuclear generating plant for the calendar year January - December 2012 and provides a description and results of this environmental monitoring program.

WI DHS Prairie Island Environmental Monitoring Sampling Program

The WI DHS environmental monitoring program consists of the collection of various types of samples from the air, water and terrestrial exposure pathways. The sampling program included samples of air, precipitation, ambient gamma radiation as measured by thermoluminescent dosimeters (TLD), surface water, fish, soil, milk, well water and vegetation that are collected from selected locations at planned sampling intervals.

Table 1 is a listing of sampling sites and includes a description, direction and distance from the monitored power plant. Table 2 provides a listing of types of samples collected, sites where samples are collected, the number of samples collected, number of samples that were missed or had a non-routine sample analysis and a listing of the required analyses. Table 3 provides an explanation of missing samples or non-routine sample analyses. Figure 1 is a map showing the location of each environmental sampling site.

Program Modifications

There were no program modifications for 2012.

Laboratory Services and Quality Assurance

The analysis of the samples is performed under contract with the Wisconsin State Laboratory of Hygiene (WSLH). WSLH maintains a 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.

WSLH participates in the Environmental Resource Associates' Proficiency Testing program and has performed satisfactorily over the report period. Proficiency testing results are available from the Wisconsin State Laboratory of Hygiene.

Detection Limits

Detection limits, required by WI DHS, will be expressed as a lower limit of detection (LLD). The required WI DHS LLD as indicated in Table 4 under the heading "LLD" is an "a priori" estimate of the capability for detecting an activity concentration by a given measurement system, procedure, and type of sample. Counting statistics of the appropriate instrument background are used to compute the LLD

for each specific analysis. Using 4.66 times the standard deviation (s_b) of the instrument background, the LLD for each specific analysis is defined at the 95% Confidence Level.

The LLD for each radioisotope listed in Table 4 has been calculated from the following equation:

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

Where:

LLD	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 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.

Typical values for E, V, Y and dt have been used to calculate the LLD.

Reporting of Sample Analysis Results

Results for specific analyses will be reported as either a “less than” (<) value or an actual activity value. The reporting of results in Table 4 under the heading “Range” and in Tables 5-14 are “a posteriori” calculations based on the actual analysis performed using the actual sample values for E, V, Y and dt. Typically the reported “less than” (<) results are lower than the required WI DHS LLD indicating that the required WI DHS LLD has been met.

An actual activity value will be accompanied by an uncertainty term for that analysis. The uncertainty term is a plus or minus counting uncertainty term at the 2 sigma (95%) confidence interval and is printed as (+- or $\pm$). Examples and explanations of data reporting are:

Example	Nuclide	Activity reported
1	^{137}Cs	< 10 pCi/liter
2	^{137}Cs	15 $\pm$ 3 pCi/liter

In example 1 we can be 95% confident that the sample activity, if any, is less than the LLD of 10 pCi/liter. In example 2 we can be 95% confident that the actual sample activity is greater than the LLD for that analysis and is between 12 and 18 pCi/liter.

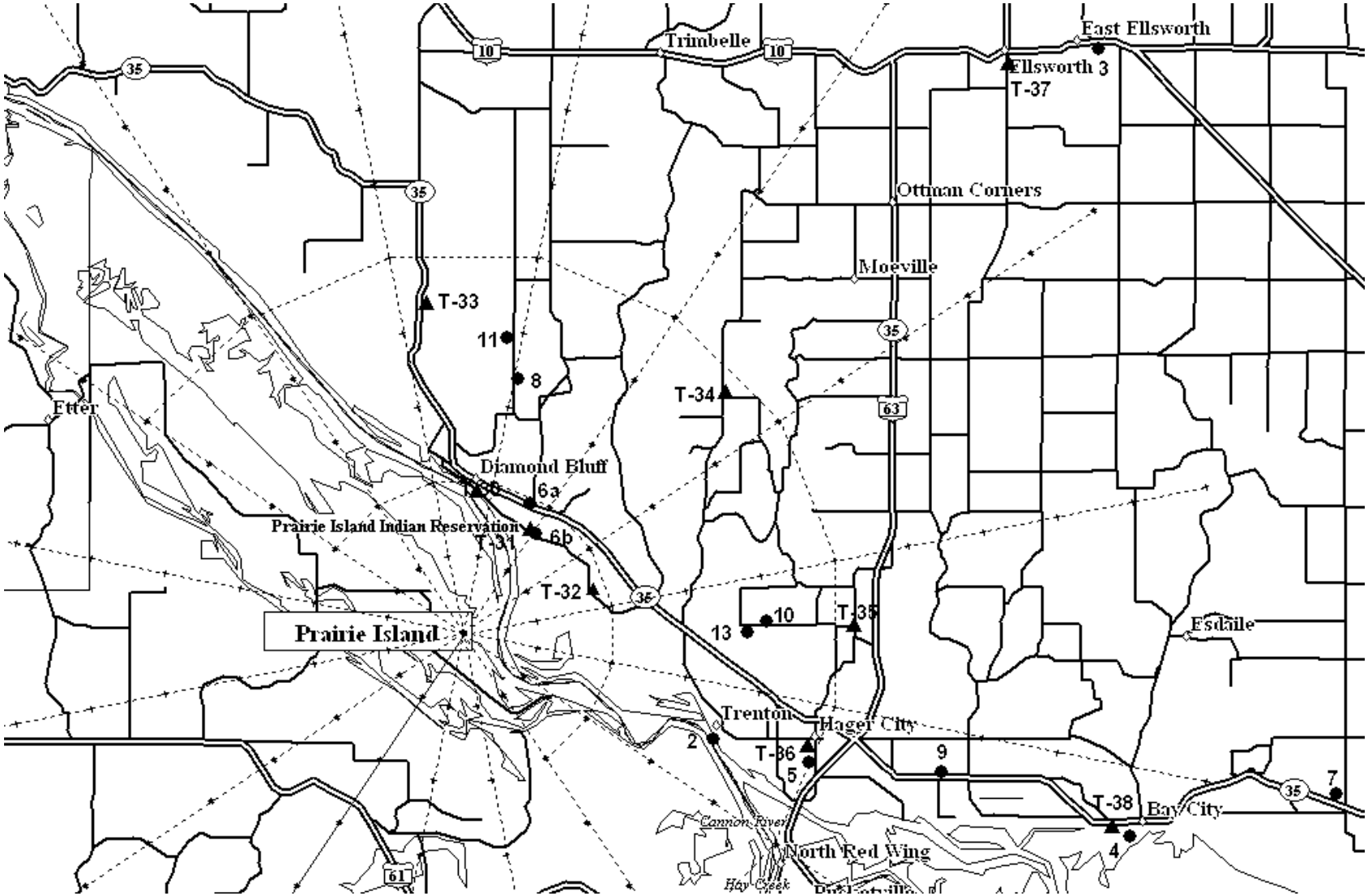

Figure 1. Location of WI DHS environmental monitoring sites for the Prairie Island monitoring program.

Table 1. WI DHS Prairie Island environmental monitoring sampling sites.

Sample site	Distance and direction (miles)	Location description
PRI-1a	11.6 NW	Prescott; air site
PRI-1b	11.6 NW	Prescott; harbor area
PRI-2	3.6 ESE	Trenton
PRI-3	10.9 NE	Ellsworth (discontinued 07/01/96)
PRI-4a	8.7 ESE	Bay City park
PRI-4b	8.7 ESE	Bay City, Hwy 35
PRI-5	4.8 ESE	Hager City
PRI-6a	1.9 NNE	Diamond Bluff; Pierce County highway shed
PRI-6b	1.8 NNE	Diamond Bluff cemetery
PRI-7	11.9 E	Junction of Hwy 35 & Cty D (discontinued 07/01/96)
PRI-8	3.4 N	Station 2 – farm
PRI-9	6.6 ESE	Bay City substation on Hwy 35
PRI-10	2.6 NE	Welch farm
PRI-11	4.0 NNE	D. Dosdall farm (discontinued in March, 1995)
PRI-12	11.1 NNW	S. Rohl farm (discontinued in October, 1999)
PRI-13	3.8 E	Christiansen farm
PRI-14	13.8 N	A. Huppert farm (discontinued in February 2004)
PRI-15	13.9 N	R. Peterson farm
PRI-T30	1.9 N	Diamond Bluff
PRI-T31	1.7 NNE	Diamond Bluff
PRI-T32	1.8 ENE	290th Avenue
PRI-T33	4.4 N	Hwy 35, Thomas Killian residence
PRI-T34	4.7 NE	Cty K and 840th Street
PRI-T35	5.2 E	Cty VV and 790th Street
PRI-T36	4.8 ESE	Hager City
PRI-T37	10.3 NE	Ellsworth
PRI-T38	8.9 ESE	Bay City, Hwy 35
PRI-T39	11.6 NW	Prescott

Table 2. Sample collection summary and required analyses for 2012.

Sample Type	Collection and Frequency	Site locations	Number of Samples Collected	Number of Sample Deviations	Required Analyses
Air particulate	C/BW	1a, 6a, 9	60	5	GA, GB, GI
Air iodine	C/BW	1a, 6a, 9	60	4	GI
Precipitation	C/BW	1a, 9	9	1	GB, H
TLD	C/Q	T30 – T39	40	0	direct exposure
Surface water	G/SA	1b, 2, 4a	6	0	GA, GB, GI, Sr, H
Fish	G/SA	upstream, downstream	4	0	GI
Vegetation	G/SA	1a, 4b, 5, 6a, 8, 9	12	0	GA, GB, GI
Soil	G/SA	1a, 4b, 5, 6a, 8, 9	12	0	GA, GB, GI
Well water	G/SA	4a, 5, 6b	6	0	GA, GB, H
Milk	G/M	10, 13, 15	24	0	GI, I, Sr

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

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

Required analyses: GA = gross alpha; GB = gross beta; GI = gamma isotopic; Sr = strontium; I = iodine; H = tritium

Table 3. WI DHS missing sample report or non-routine analyses for 2012.

Sample type	Date	Site	Explanation
air particulate	04/18/12 – 08/08/12	PRI-1	There was no sample collection from 04/18/12 - 08/08/12. The air site was not accessible.
Air particulate – quarterly gamma analysis.	2nd quarter	PRI-1 & PRI-9	Unable to reach LLD for I-131, Ba-140 and La-140. There was no sample collection from 04/18/12 - 08/08/12. Only one sample was analyzed.
air particulate	10/06/12	PRI-1	The sample was reported missing by WSLH when the gross beta analysis was to be performed. See Occurrence 1094 report.
air particulate	02/24/12	PRI-9	The air site was off for 11 days and 13 hours at the end of the collection period.
air particulate	04/18/12 – 08/08/12	PRI-9	There was no sample collection from 04/18/12 - 08/14/12. The air site was not accessible.
air iodine	04/18/12 – 08/08/12	PRI-1	There was no sample collection from 04/18/12 - 08/08/12. The air site was not accessible.
air iodine	10/06/12	PRI-1	The sample was reported missing by WSLH when the gross beta analysis was to be performed. See Occurrence 1094 report.
air iodine	02/24/12	PRI-9	The air site was off for 11 days and 13 hours at the end of the collection period.
air iodine	04/18/12 – 08/08/12	PRI-9	There was no sample collection from 04/18/12 - 08/14/12. The air site was not accessible.
precipitation	04/18/12 – 08/08/12	PRI-1a & PRI-9	There was no sample collection from 04/18/12 - 08/14/12. The sites were not accessible.

Results And Discussion for the Prairie Island Environmental Monitoring program

Air Particulate

A summary of reported activities by WI DHS for air particulate samples is included in Table 4. Results from the individual sample analyses are listed in Tables 5-6.

From the individual activities or quarterly averages for gross beta activities it may be noted that there are no significant differences between sites at different distances from the Prairie Island facility. With no significant difference with distance from the Prairie Island site, an increase in gross beta activity attributable to the Prairie Island plant operation is not evident.

The gamma isotopic analysis of the quarterly air particulate filter composites detected only small amounts of the radioisotopes listed in Table 4. Beryllium-7 (^{7}Be), detected in all composites, is a naturally occurring radioisotope that is constantly produced through nuclear reactions between cosmic rays and nuclei in the atmosphere. It is detected in air composites from other areas of the state on a routine basis. Influence by the Prairie Island nuclear generating facility on air quality is not evident from air particulate analysis.

Air Iodine

A summary of reported activities by WI DHS for air iodine samples is included in Table 4. Results from the individual sample analyses are listed in Table 5.

All air iodine measurements were below the LLD of 0.07 pCi/$m^{3.}$ Influence by the Prairie Island nuclear generating facility on air quality is not evident from air iodine analysis.

Ambient Gamma Radiation - Thermoluminecent Dosimeters (TLD)

A summary of reported activities by WI DHS for ambient gamma radiation is included in Table 4. Results from the individual sample analyses are listed in Table 7.

Direct radiation (TLD) data for 2012 from the WI DHS network was comparable for all sites. Significant differences in exposure were not noticed at different distances from the Prairie Island nuclear facility. The average quarterly exposure from the ten sites located within Wisconsin was 15.8 $\pm$ 1.9 milliroentgens. The average quarterly exposure for 2012 is at background levels and is comparable to other areas within Wisconsin. Influence by the Prairie Island nuclear facility is not evident from air ambient gamma radiation analysis.

Precipitation

A summary of reported activities by WI DHS for precipitation is included in Table 4. Results from the individual sample analyses are listed in Table 8.

The gross beta activity in precipitation was all within the normal range of activity when compared to previous year's data. Influence by the Prairie Island nuclear facility is not evident from precipitation analysis.

Surface Water

A summary of reported activities by WI DHS for surface water samples is included in Table 4. Results from the individual sample analyses are listed in Table 9.

From the gamma isotopic analysis all radioisotopes were below their respective LLD. All reported activities for gross beta; gross alpha and tritium (^{3}H) are at background levels and are comparable to data from previous years. The surface water samples uniformly show activities well below state or federal standards. Influence by the Prairie Island nuclear facility is not evident from surface water sample analysis.

Fish

A summary of reported activities by WI DHS for fish samples is included in Table 4. Results from the individual sample analyses are listed in Table 10.

The fish samples showed no unusual activities. Naturally occurring potassium-40 (^{40}K) was detected in all samples. All other radioisotopes were below their respective LLD. Influence by the Prairie Island nuclear facility is not evident from fish sample analysis.

Well Water

A summary of reported activities by WI DHS for well water samples is included in Table 4. Results from the individual sample analyses are listed in Table 11.

The well water samples showed no unusual gross alpha and gross beta activities and all activities for tritium (^{3}H) were less than its LLD. The measured activities are all below state and federal standards. Influence by the Prairie Island nuclear facility is not evident from well water sample analysis.

Milk

A summary of reported activities by WI DHS for milk samples is included in Table 4. Results from the individual sample analyses are listed in Table 12.

Analysis of the milk samples showed no unusual activities. Naturally occurring potassium-40 (^{40}K) was detected in all samples. The detected activities for strontium-90 (^{90}Sr) are attributable to residual fallout from previous atmospheric nuclear weapons testing and were also detected in previous years at similar activity levels. Influence by the Prairie Island nuclear facility is not evident from milk sample analysis.

Vegetation

A summary of reported activities by WI DHS for vegetation samples is included in Table 4. Results from the individual sample analyses are listed in Tables 13.

Analysis of the vegetation samples showed no unusual activities. The gamma isotopic analysis detected only small amounts of the naturally occurring radioisotopes beryllium-7 (^{7}Be) and potassium-40 (^{40}K) listed in Table 4. All other radioisotopes were below their respective LLD. Influence by the Prairie Island nuclear facility is not evident from vegetation sample analysis.

Soil

A summary of reported activities by WI DHS for soil samples is included in Table 4. Results from the individual sample analyses are listed in Table 14.

Analysis of the soil samples showed no unusual activities. The gamma isotopic analysis detected only small amounts of the radionuclides listed in Table 4. Potassium-40 (^{40}K) is a naturally occurring radioisotope. The reported activities for cesium-137 (^{137}Cs) were also detected in previous years and are largely attributable to fallout from previous atmospheric nuclear weapons testing. Naturally occurring radioisotopes such as radium-226 (^{226}Ra), bismuth-214 (^{214}Bi), lead-214 (^{214}Pb), actinium-228 (^{228}Ac), bismuth-212 (^{212}Bi) and lead-212 (^{212}Pb) from the naturally occurring uranium-238 (^{238}U) and thorium-232 (^{232}Th) decay series are commonly detected but have not been quantified or reported. Influence by the Prairie Island nuclear facility is not evident from soil sample analysis.

Dose to an Average Individual

Federal regulations 10 CFR 20, 10 CFR 50 Appendix I and 40 CFR 190 restrict the annual exposure of the population from all parts of the nuclear fuel cycle, including nuclear power plants. Doses resulting from gaseous and liquid effluent releases from the Prairie Island nuclear generating facility are less than the limits as stated in these Federal regulations.

The WI DHS limit for permissible levels of radiation exposure from external sources in unrestricted areas is defined in the Wis. Adm. Code section DHS 157.23. Doses resulting from gaseous and liquid effluent releases from the Prairie Island nuclear generating facility are less than the limits as stated in Wis. Adm. Code section DHS 157.23.

References

State of Wisconsin, Wisconsin Administrative Code, DHS 157.23

U.S. Environmental Protection Agency, Environmental Radiation Requirements for Normal Operations of Activities in the Uranium Fuel Cycle, EPA 520/4-76-016, 40 CFR Part 190, November 1976.

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

U.S. Nuclear Regulatory Commission, Title 10, Part 50, Appendix I.

Table 4. Sample activity summary for the Prairie Island environmental monitoring program for 2012.

Sample type (units)	LLD	Number of samples [a]	Analysis	Range
Air particulate (pCi/m^3)	0.005	60 / 60	gross beta	0.011 - 0.043
			gamma isotopic	
	0.020	12 / 12	Be-7	0.045 - 0.107
	0.002	12 / 0	Mn-54	< 0.0006
	0.002	12 / 0	Co-58	< 0.0006
	0.005	12 / 0	Fe-59	< 0.0018
	0.002	12 / 0	Co-60	< 0.0008
	0.005	12 / 0	Zn-65	< 0.0011
	0.002	12 / 0	Nb-95	< 0.0013
	0.005	12 / 0	Zr-95	< 0.0011
	0.002	12 / 0	Ru-103	< 0.0010
	0.015	12 / 0	Ru-106	< 0.0043
	0.020	12 / 0	I-131	< 0.0022
	0.002	12 / 0	Cs-134	< 0.0006
	0.002	12 / 0	Cs-137	< 0.0008
	0.030	12 / 0	Ba-140	< 0.0040
	0.020	12 / 0	La-140	< 0.0017
	0.002	12 / 0	Ce-141	< 0.0014
	0.005	12 / 0	Ce-144	< 0.0032
Air iodine (pCi/m^3)	0.07	60 / 0	I-131	< 0.022
Surface water (pCi/liter)	3.0	6 / 6	gross beta (sol)	1.2 – 3.4
	3.0	6 / 0	gross beta (insol)	< 1.4
	3.0	6 / 4	gross alpha (sol)	< 1.9 – 4.5
	3.0	6 / 0	gross alpha (insol)	< 1.4
	300	6 / 0	H-3	< 201
	2.0	6 / 2	Sr-89	< 2.2 – 0.9
	1.0	6 / 0	Sr-90	< 0.9
			gamma isotopic	
	15	6 / 0	Mn-54	< 10
	15	6 / 0	Co-58	< 11
	30	6 / 0	Fe-59	< 22
	15	6 / 0	Co-60	< 12
	30	6 / 0	Zn-65	< 24
	15	6 / 0	Nb-95	< 14
	30	6 / 0	Zr-95	< 18
	15	6 / 0	I-131	< 14
	15	6 / 0	Cs-134	< 10
	15	6 / 0	Cs-137	< 12
	60	6 / 0	Ba-140	< 39
	15	6 / 0	La-140	< 15

Table 4. Sample activity summary for the Prairie Island environmental monitoring program for 2012, continued.

Sample type (units)	LLD	Number of samples [a]	Analysis	Range
Fish			gamma isotopic	
(pCi/kg wet)	800	4 / 4	K-40	2670 – 3030
	50	4 / 0	Mn-54	< 12
	60	4 / 0	Co-58	< 10
	130	4 / 0	Fe-59	< 30
	60	4 / 0	Co-60	< 15
	130	4 / 0	Zn-65	< 23
	50	4 / 0	Nb-95	< 15
	100	4 / 0	Zr-95	< 21
	50	4 / 0	Cs-134	< 11
	60	4 / 0	Cs-137	< 14
Precipitation	1.5 [b]	9 / 7	gross beta	< 0.04 -0.56
(nCi/m^2)	300 [b]	9 / 0	H-3	< 14.9
Well water	3.0	6 / 2	gross beta	< 2.8 – 4.4
(pCi/liter)	3.0	6 / 0	gross alpha	< 2.8
	300	6 / 0	H-3	< 200
Vegetation	5000	12 / 0	gross alpha	< 6840
(pCi/kg wet)	4000	12 / 12	gross beta	4980 - 16200
			gamma isotopic	
	600	12 / 11	Be-7	< 460 – 6770
	2000	12 / 12	K-40	4340 - 10200
	90	12 / 0	Mn-54	< 48
	100	12 / 0	Co-58	< 43
	200	12 / 0	Fe-59	< 75
	100	12 / 0	Co-60	< 55
	250	12 / 0	Zn-65	< 114
	100	12 / 0	Nb-95	< 44
	200	12 / 0	Zr-95	< 69
	80	12 / 0	I-131	< 48
	80	12 / 0	Cs-134	< 51
	90	12 / 0	Cs-137	< 51
	350	12 / 0	Ba-140	< 163
	100	12 / 0	La-140	< 62

Table 4. Sample activity summary for the Prairie Island environmental monitoring program for 2012 continued.

Sample type (units)	LLD	Number of samples [a]	Analysis	Range
Soil	6000	12 / 12	gross beta	8000 – 23700
(pCi/kg dry)	15000	12 / 5	gross alpha	< 8900 - 15900
			gamma isotopic	
	800	12 / 12	K-40	9840 – 14700
	60	12 / 0	Mn-54	< 29
	90	12 / 0	Co-58	< 22
	600	12 / 0	Fe-59	< 57
	90	12 / 0	Co-60	< 30
	300	12 / 0	Zn-65	< 59
	100	12 / 0	Nb-95	< 28
	250	12 / 0	Zr-95	< 47
	80	12 / 0	Cs-134	< 24
	80	12 / 12	Cs-137	104 - 323
Milk	1.0	24 / 22	Sr-90	< 0.6 - 1.5
(pCi/liter)	1.5	13 / 0	I-131	< 0.6
			gamma isotopic	
	500	24 / 24	K-40	1140 - 1570
	15	24 / 0	Mn-54	< 15
	15	24 / 0	Co-58	< 13
	40	24 / 0	Fe-59	< 30
	15	24 / 0	Co-60	< 15
	40	24 / 0	Zn-65	< 32
	15	24 / 0	Nb-95	< 12
	40	24 / 0	Zr-95	< 20
	15	24 / 0	I-131	< 14
	15	24 / 0	Cs-134	< 14
	15	24 / 0	Cs-137	< 16
	60	24 / 0	Ba-140	< 48
	15	24 / 0	La-140	< 15
Direct exposure	1.0 [c]	40 / 40	direct exposure	11.5 – 20.1
(mR/Std Qtr)				

a - Number of analyses / number of analyses detected above the WI DHS LLD.
b – LLD (minimum detectable concentration) activities expressed in units of pCi/liter.
c – 1.0 mR/ TLD

Table 5. WI DHS air particulate gross beta and air iodine (I-131) analysis results from the Prairie Island environmental monitoring program.

Measurements in units of pCi/m^3

PRI-1; Prescott				**PRI-6; Diamond Bluff**			
Collection date	Volume m^3	Air particulate	Air iodine	Collection date	Volume m^3	Air particulate	Air iodine
01/11/12	904	0.024 +- 0.002	< 0.008	01/11/12	958	0.023 +- 0.002	< 0.004
01/24/12	873	0.026 +- 0.002	< 0.006	01/24/12	929	0.027 +- 0.002	< 0.009
02/10/12	1,108	0.024 +- 0.002	< 0.022	02/10/12	1,170	0.023 +- 0.002	< 0.006
02/24/12	898	0.026 +- 0.002	< 0.009	02/24/12	949	0.023 +- 0.002	< 0.006
03/08/12	851	0.023 +- 0.002	< 0.011	03/08/12	912	0.023 +- 0.002	< 0.011
03/22/12	888	0.021 +- 0.002	< 0.007	03/22/12	922	0.021 +- 0.002	< 0.008
04/03/12	760	0.012 +- 0.002	< 0.008				
1st Qtr				1st Qtr			
mean +- s.d.		0.022 +- 0.005	< 0.010	mean +- s.d.		0.023 +- 0.002	< 0.007
04/18/12	949	0.015 +- 0.002	< 0.005	04/18/12	985	0.016 +- 0.002	< 0.006
*a				05/02/12	918	0.019 +- 0.002	< 0.009
				05/16/12	895	0.014 +- 0.002	< 0.010
				06/03/12	1103	0.017 +- 0.001	< 0.005
				06/16/12	787	0.019 +- 0.002	< 0.011
				06/30/12	828	0.017 +- 0.002	< 0.005
2nd Qtr				2nd Qtr			
mean +- s.d.		0.015 +- 0.002	< 0.005	mean +- s.d.		0.017 +- 0.002	< 0.008
				07/14/12	839	0.024 +- 0.002	< 0.011
				07/30/12	595	0.024 +- 0.002	< 0.005
				08/12/12	446	0.016 +- 0.002	< 0.008
08/24/12	943	0.019 +- 0.002	< 0.005	08/24/12	741	0.020 +- 0.002	< 0.008
09/08/12	840	0.030 +- 0.002	< 0.008	09/08/12	888	0.028 +- 0.002	< 0.010
09/22/12	840	0.017 +- 0.002	< 0.008	09/22/12	883	0.017 +- 0.002	< 0.010
3rd Qtr				3rd Qtr			
mean +- s.d.		0.022 +- 0.007	< 0.007	mean +- s.d.		0.022 +- 0.005	< 0.008
10/06/12 *b				10/06/12	883	0.022 +- 0.002	< 0.009
10/21/12	956	0.020 +- 0.002	< 0.011	10/21/12	965	0.018 +- 0.002	< 0.007
11/04/12	908	0.024 +- 0.002	< 0.007	11/04/12	916	0.021 +- 0.002	< 0.009
11/14/12	659	0.031 +- 0.002	< 0.010	11/14/12	664	0.026 +- 0.002	< 0.013
11/29/12	979	0.042 +- 0.002	< 0.013	11/29/12	998	0.041 +- 0.002	< 0.009
12/12/12	847	0.040 +- 0.002	< 0.006	12/12/12	857	0.043 +- 0.002	< 0.008
12/26/12	946	0.037 +- 0.002	< 0.008	12/26/12	960	0.035 +- 0.002	< 0.013
4th Qtr				4th Qtr			
mean +- s.d.		0.032 +- 0.009	< 0.010	mean +- s.d.		0.029 +- 0.010	< 0.010

a - There was no sample collection from 04/18/12 - 08/08/12. The air site was not accessible.

b - The sample was reported missing by WSLH when the gross beta analysis was to be performed. See Occurrence 1094 report.

Table 5. WI DHS air particulate gross beta and air iodine (I-131) analysis results from the Prairie Island environmental monitoring program, continued.

Measurements in units of pCi/m^3

PRI-9; Bay City substation

Collection date	Volume m^3	Air particulate	Air iodine
01/11/12	1,228	0.024 +- 0.002	< 0.004
02/10/12	2,691	0.025 +- 0.001	< 0.010
02/24/12 *a	277	0.018 +- 0.004	< 0.021
03/08/12	1,148	0.022 +- 0.002	< 0.011
03/22/12	1,179	0.021 +- 0.001	< 0.007
04/03/12	1,007	0.011 +- 0.001	< 0.007
1st Qtr mean +- s.d.		0.020 +- 0.005	< 0.011
04/18/12 *b	1264	0.015 +- 0.001	< 0.004
2nd Qtr mean +- s.d.		0.015 +- 0.001	< 0.004
08/24/12	779	0.017 +- 0.002	< 0.006
09/08/12	1095	0.027 +- 0.002	< 0.007
09/22/12	1103	0.017 +- 0.001	< 0.009
3rd Qtr mean +- s.d.		0.020 +- 0.006	< 0.007
10/06/12	1351	0.016 +- 0.001	< 0.006
10/21/12	989	0.022 +- 0.002	< 0.007
11/04/12	1165	0.020 +- 0.001	< 0.005
11/14/12	846	0.027 +- 0.002	< 0.006
11/30/12	1335	0.037 +- 0.002	< 0.007
12/12/12	1007	0.041 +- 0.002	< 0.006
12/26/12	1200	0.034 +- 0.002	< 0.009
4th Qtr mean +- s.d.		0.028 +- 0.009	< 0.006

a - The air site was off for 11 days and 13 hours at the end of the collection period.

b - There was no sample collection from 04/18/12 - 08/14/12. The air site was not accessible.

Table 6. WI DHS gamma isotopic analysis results from the quarterly composites of air particulate filters collected from the Prairie Island environmental monitoring program.

Measurements in units of pCi/m^3

Site: PRI-1	1st quarter	2nd quarter * a	3rd quarter	4th quarter
Be-7	0.060 +- 0.009	0.099 +- 0.010	0.099 +- 0.008	0.045 +- 0.008
Mn-54	< 0.0006	< 0.0003	< 0.0003	< 0.0004
Co-58	< 0.0004	< 0.0006	< 0.0004	< 0.0004
Fe-59	< 0.0003	< 0.0018	< 0.0007	< 0.0006
Co-60	< 0.0006	< 0.0003	< 0.0004	< 0.0005
Zn-65	< 0.001	< 0.0007	< 0.0006	< 0.0008
Nb-95	< 0.0005	< 0.0013	< 0.0004	< 0.0005
Zr-95	< 0.0005	< 0.0011	< 0.0006	< 0.0008
Ru-103	< 0.0005	< 0.0010	< 0.0003	< 0.0004
Ru-106	< 0.0026	< 0.0027	< 0.0027	< 0.0031
I-131	< 0.0014	< 0.3620	< 0.0016	< 0.0017
Cs-134	< 0.0005	< 0.0003	< 0.0004	< 0.0003
Cs-137	< 0.0005	< 0.0003	< 0.0004	< 0.0003
Ba-140	< 0.0025	< 0.0897	< 0.0030	< 0.0029
La-140	< 0.0015	< 0.0409	< 0.0014	< 0.0017
Ce-141	< 0.0007	< 0.0014	< 0.0006	< 0.0006
Ce-144	< 0.0018	< 0.0011	< 0.0016	< 0.0017
Site: PRI-6				
Be-7	0.061 +- 0.009	0.107 +- 0.010	0.092 +- 0.008	0.052 +- 0.006
Mn-54	< 0.0004	< 0.0006	< 0.0003	< 0.0004
Co-58	< 0.0006	< 0.0005	< 0.0003	< 0.0004
Fe-59	< 0.0010	< 0.0012	< 0.0007	< 0.0009
Co-60	< 0.0006	< 0.0008	< 0.0005	< 0.0006
Zn-65	< 0.0011	< 0.0009	< 0.0007	< 0.0008
Nb-95	< 0.0008	< 0.0006	< 0.0004	< 0.0005
Zr-95	< 0.0010	< 0.0009	< 0.0006	< 0.0007
Ru-103	< 0.0004	< 0.0007	< 0.0004	< 0.0004
Ru-106	< 0.0040	< 0.0043	< 0.0030	< 0.0034
I-131	< 0.0013	< 0.0013	< 0.0019	< 0.0022
Cs-134	< 0.0004	< 0.0006	< 0.0004	< 0.0004
Cs-137	< 0.0005	< 0.0008	< 0.0005	< 0.0005
Ba-140	< 0.0028	< 0.0032	< 0.0032	< 0.0031
La-140	< 0.0014	< 0.0015	< 0.0014	< 0.0015
Ce-141	< 0.0006	< 0.0010	< 0.0008	< 0.0008
Ce-144	< 0.0016	< 0.0032	< 0.0021	< 0.0024
Site: PRI-9				
Be-7	0.068 +- 0.008	0.089 +- 0.005	0.105 +- 0.009	0.048 +- 0.008
Mn-54	< 0.0004	< 0.0001	< 0.0005	< 0.0002
Co-58	< 0.0004	< 0.0002	< 0.0005	< 0.0004
Fe-59	< 0.0008	< 0.0006	< 0.0011	< 0.0008
Co-60	< 0.0007	< 0.0001	< 0.0006	< 0.0005
Zn-65	< 0.0009	< 0.0002	< 0.0010	< 0.0006
Nb-95	< 0.0006	< 0.0005	< 0.0005	< 0.0004
Zr-95	< 0.0008	< 0.0004	< 0.0006	< 0.0007
Ru-103	< 0.0006	< 0.0004	< 0.0004	< 0.0005
Ru-106	< 0.0040	< 0.0009	< 0.0031	< 0.0022
I-131	< 0.0020	< 0.1830	< 0.0020	< 0.0016
Cs-134	< 0.0005	< 0.0001	< 0.0005	< 0.0004
Cs-137	< 0.0005	< 0.0001	< 0.0004	< 0.0003
Ba-140	< 0.0040	< 0.0401	< 0.0036	< 0.0029
La-140	< 0.0014	< 0.0159	< 0.0015	< 0.0016
Ce-141	< 0.0009	< 0.0007	< 0.0007	< 0.0006
Ce-144	< 0.0026	< 0.0005	< 0.0019	< 0.0017

* a – For PRI-1 and PRI-9 the WSLH was unable to reach the LLD for I-131, Ba-140 and La-140. See Table 3 for explanation.
Radioisotopes other than those reported were not detected.

Table 7. WI DHS TLD network for the Prairie Island environmental monitoring program.

Date Placed:	01/11/12	04/11/12	07/11/12	10/10/12
Date Removed:	04/11/12	07/11/12	10/10/12	01/09/13
Days in the Field:	91	91	91	91
	Individual quarterly date is reported as: mR / Standard Quarter + 2 sigma counting error.			
TLD sites that are located 0 – 2 miles from the Prairie island facility.				
T30	15.5 +- 0.6	14.3 +- 0.4	14.2 +- 0.6	16.8 +- 0.6
T31	15.0 +- 0.9	13.6 +- 0.5	13.6 +- 0.8	15.7 +- 0.7
T32	16.4 +- 0.9	14.5 +- 0.8	15.3 +- 1.0	16.5 +- 1.0
Quarterly average +- s.d.	15.6 +- 0.7	14.1 +- 0.5	14.4 +- 0.9	16.3 +- 0.6
TLD sites that are located 2– 5 miles from the Prairie island facility				
T33	14.7 +- 0.6	16.0 +- 0.4	17.4 +- 0.7	19.4 +- 0.6
T34	19.2 +- 0.5	17.7 +- 0.5	18.2 +- 0.8	20.1 +- 0.6
T35	17.7 +- 0.7	15.9 +- 0.8	17.1 +- 0.6	18.3 +- 1.3
T36	15.6 +- 0.5	16.8 +- 0.7	14.8 +- 0.5	18.5 +- 0.8
Quarterly average +- s.d.	16.8 +- 2.0	16.6 +- 0.8	16.9 +- 1.5	19.1 +- 0.8
TLD sites that are located greater than 5 miles from the Prairie island facility				
T37	16.9 +- 1.4	15.6 +- 0.5	15.6 +- 1.2	17.1 +- 0.5
T38	14.7 +- 0.5	11.5 +- 0.6	13.7 +- 0.4	12.4 +- 0.7
T39	15.0 +- 0.8	13.3 +- 0.6	13.9 +- 0.7	15.2 +- 0.7
Quarterly average +- s.d.	15.5 +- 1.2	13.5 +- 2.1	14.4 +- 1.0	14.9 +- 2.4

Table 8. WI DHS analysis results for precipitation samples collected for the Prairie Island environmental monitoring program.

Measurements in units of nCi/m2

monthly composite sample

Collection	**inches**	**Gross beta**	**Tritium**
01/24/12	1.18	0.27 +- 0.03	< 5.4
02/24/12	0.25	0.04 +- 0.01	< 1.1
03/22/12	2.34	0.16 +- 0.07	< 10.7
04/18/12	2.25	< 0.08	< 10.2
08/24/12	2.90	< 0.09	< 14.9
09/22/12	0.64	0.07 +- 0.01	< 3.3
10/21/12	0.33	0.21 +- 0.02	< 1.7
11/14/12	1.94	0.56 +- 0.06	< 9.9
12/26/12	1.17	0.25 +- 0.06	< 5.9

b - There was no sample collection from 04/18/12 - 08/14/12. The sites were not accessible.

Table 9. WI DHS analysis results for surface water samples collected for the Prairie Island environmental monitoring program.

Measurements in units of pCi/liter

Site:	PRI-1	PRI-2	PRI-4	PRI-1	PRI-2	PRI-4
Collection date:	06/13/12	06/13/2	06/13/12	09/25/12	09/25/12	09/25/12
gross alpha-sol	1.1 +- 0.8	4.5 +- 1.7	4.2 +- 2.0	< 1.5	< 1.9	1.8 +- 1.1
gross beta-sol	1.2 +- 0.6	3.2 +- 0.8	3.4 +- 0.9	1.8 +- 0.7	2.5 +- 0.7	1.8 +- 0.6
gross alpha-insol	< 1.1	< 1.4	< 1.1	< 0.5	< 0.7	< 0.8
gross beta-insol	< 1.1	< 1.4	< 1.3	< 0.7	< 0.8	< 0.8
H-3	< 180	< 180	< 180	< 201	< 200	< 200
Sr-89	< 0.5	0.9 +- 0.3	0.6 +- 0.3	< 0.9	< 1.2	< 2.2
Sr-90	< 0.4	< 0.4	< 0.4	< 0.5	< 0.5	< 0.9
gamma isotopic						
Mn-54	< 9	< 10	< 8	< 9	< 8	< 8
Co-58	< 8	< 10	< 6	< 11	< 7	< 8
Fe-59	< 14	< 4	< 15	< 17	< 22	< 17
Co-60	< 9	< 12	< 9	< 8	< 10	< 12
Zn-65	< 21	< 19	< 16	< 24	< 24	< 16
Nb-95	< 8	< 11	< 7	< 14	< 12	< 8
Zr-95	< 15	< 16	< 10	< 18	< 14	< 14
I-131	< 10	< 14	< 9	< 9	< 11	< 10
Cs-134	< 6	< 10	< 8	< 10	< 10	< 9
Cs-137	< 11	< 9	< 8	< 12	< 10	< 11
Ba-140	< 33	< 39	< 38	< 28	< 36	< 35
La-140	< 13	< 15	< 13	< 14	< 11	< 9

Radioisotopes other than those reported were not detected.

Table 10. WI DHS analysis results for fish samples collected for the Prairie Island environmental monitoring program.

Measurements in units of pCi/kilogram (wet)

Collection date:	05/14/12	05/16/12	09/17/12	09/20/12
Location:	downstream	upstream	downstream	upstream
Type:	white bass	white bass	white bass / walleye	white bass / walleye
gamma isotopic				
K-40	3030 +- 520	2670 +- 490	2810 +- 470	2890 +- 480
Mn-54	< 10	< 12	< 6	< 6
Co-58	< 9	< 10	< 9	< 9
Fe-59	< 24	< 30	< 24	< 25
Co-60	< 12	< 15	< 7	< 8
Zn-65	< 21	< 23	< 14	< 15
Nb-95	< 14	< 14	< 12	< 15
Zr-95	< 16	< 21	< 11	< 17
Cs-134	< 8	< 11	< 5	< 6
Cs-137	< 12	< 14	< 5	< 9

Radioisotopes other than those reported were not detected

Table 11. WI DHS analysis results for well water samples collected for the Prairie Island environmental monitoring program.

Measurements in units of pCi/liter

	PRI-4	**PRI-5**	**PRI-6**	**PRI-4**	**PRI-5**	**PRI-6**
Collection date:	06/13/12	06/13/12	06/13/12	09/25/12	09/25/12	09/25/12
gross alpha	< 2.0	< 2.7	< 2.8	< 2.7	< 2.2	< 2.5
gross beta	4.3 +- 1.4	4.4 +- 1.3	< 2.4	< 2.8	< 2.8	< 2.4
H-3	< 180	< 180	< 180	< 200	< 200	< 200

Table 12. WI DHS analysis results for milk samples collected for the Prairie Island environmental monitoring program.

Measurements in units of pCi/liter

Location	PRI-13	PRI-10	PRI-13	PRI-10	PRI-13	PRI-10
Collection date:	01/08/12	02/14/12	03/13/12	04/09/12	05/16/12	06/12/12
I-131		< 0.3	< 0.6		< 0.3	
Sr-90	0.7 +- 0.2	0.4 +- 0.2	0.9 +- 0.2	0.5 +- 0.2	0.9 +- 0.2	0.7 +- 0.2
gamma isotopic						
K-40	1290 +- 260	1410 +- 300	1170 +- 260	1420 +- 290	1230 +- 260	1450 +- 360
Mn-54	< 8	< 8	< 7	< 9	< 8	< 12
Co-58	< 9	< 10	< 7	< 6	< 6	< 8
Fe-59	< 17	< 16	< 18	< 16	< 18	< 21
Co-60	< 10	< 11	< 9	< 11	< 9	< 14
Zn-65	< 18	< 24	< 22	< 15	< 19	< 26
Nb-95	< 7	< 4	< 8	< 9	< 9	< 11
Zr-95	< 12	< 9	< 14	< 12	< 13	< 14
I-131	< 10	< 8	< 10	< 8	< 9	< 11
Cs-134	< 8	< 8	< 9	< 8	< 8	< 10
Cs-137	< 7	< 8	< 9	< 8	< 9	< 10
Ba-140	< 37	< 22	< 23	< 33	< 30	< 45
La-140	< 9	< 7	< 12	< 12	< 10	< 5

Location	PRI-13	PRI-10	PRI-13	PRI-10	PRI-13	PRI-10
Collection date:	07/11/12	08/14/12	09/11/12	10/16/12	11/13/12	12/11/12
I-131		< 0.3		< 0.3	< 0.1	< 0.3
Sr-90	1.1 +- 0.2	0.7 +- 0.2	0.6 +- 0.2	< 0.4	< 0.6	1.5 +- 0.3
gamma isotopic						
K-40	1390 +- 300	1540 +- 320	1570 +- 360	1320 +- 260	1220 +- 290	1150 +- 320
Mn-54	< 10	< 7	< 8	< 8	< 9	< 12
Co-58	< 8	< 6	< 13	< 7	< 9	< 12
Fe-59	< 21	< 17	< 30	< 15	< 12	< 23
Co-60	< 14	< 11	< 12	< 12	< 14	< 10
Zn-65	< 20	< 19	< 32	< 19	< 26	< 28
Nb-95	< 9	< 8	< 9	< 9	< 8	< 7
Zr-95	< 17	< 13	< 14	< 13	< 11	< 12
I-131	< 11	< 9	< 11	< 11	< 9	< 11
Cs-134	< 9	< 9	< 11	< 7	< 10	< 14
Cs-137	< 13	< 8	< 9	< 11	< 8	< 9
Ba-140	< 36	< 29	< 45	< 32	< 35	< 31
La-140	< 11	< 13	< 12	< 10	< 14	< 11

Radioisotopes other than those reported were not detected.

Table 12. WI DHS analysis results for milk samples collected for the Prairie Island environmental monitoring program cont.

Measurements in units of pCi/liter

Location: PRI-15

Collection date:	01/08/12	02/14/12	03/13/12	04/09/12	05/16/12	06/12/12
I-131		< 0.5	< 0.5		< 0.3	
Sr-90	0.5 +- 0.2	0.8 +- 0.2	0.6 +- 0.2	0.8 +- 0.2	0.9 +- 0.2	0.7 +- 0.2
gamma isotopic						
K-40	1470 +- 290	1340 +- 210	1300 +- 310	1360 +- 290	1260 +- 310	1310 +- 280
Mn-54	< 7	< 2	< 11	< 9	< 14	< 10
Co-58	< 7	< 2	< 10	< 9	< 9	< 8
Fe-59	< 14	< 4	< 25	< 15	< 18	< 20
Co-60	< 6	< 2	< 12	< 9	< 12	< 15
Zn-65	< 15	< 4	< 27	< 20	< 26	< 17
Nb-95	< 9	< 2	< 12	< 8	< 11	< 10
Zr-95	< 13	< 3	< 19	< 12	< 20	< 14
I-131	< 12	< 9	< 10	< 8	< 10	< 14
Cs-134	< 9	< 2	< 11	< 8	< 9	< 9
Cs-137	< 8	< 2	< 10	< 8	< 11	< 12
Ba-140	< 38	< 18	< 40	< 27	< 39	< 41
La-140	< 11	< 5	< 15	< 12	< 15	< 14

Collection date:	07/11/12	08/14/12	09/11/12	10/16/12	11/13/12	12/11/12
I-131		< 0.3		< 0.3		< 0.3
Sr-90	0.5 +- 0.2	0.7 +- 0.2	0.6 +- 0.2	0.6 +- 0.2	0.8 +- 0.3	1.0 +- 0.3
gamma isotopic						
K-40	1140 +- 310	1260 +- 310	1280 +- 320	1350 +- 280	1550 +- 370	1430 +- 290
Mn-54	< 11	< 8	< 10	< 6	< 15	< 9
Co-58	< 8	< 10	< 12	< 8	< 11	< 9
Fe-59	< 21	< 30	< 30	< 16	< 21	< 17
Co-60	< 14	< 11	< 15	< 8	< 15	< 15
Zn-65	< 25	< 27	< 20	< 14	< 26	< 22
Nb-95	< 12	< 10	< 8	< 7	< 11	< 10
Zr-95	< 18	< 17	< 18	< 10	< 18	< 18
I-131	< 10	< 13	< 11	< 8	< 10	< 11
Cs-134	< 12	< 12	< 11	< 7	< 9	< 8
Cs-137	< 13	< 10	< 11	< 6	< 12	< 16
Ba-140	< 48	< 37	< 48	< 26	< 44	< 41
La-140	< 12	< 4	< 4	< 13	< 14	< 11

Radioisotopes other than those reported were not detected.

Table 13. WI DHS analysis results for vegetation samples collected for the Prairie Island environmental monitoring program.

Measurements in units of pCi/kilogram (wet)

Site:	PRI-1	PRI-4	PRI-5	PRI-6	PRI-8	PRI-9
Collection date:	06/13/12	06/13/12	06/13/12	06/13/12	06/13/12	06/13/12
gross alpha	< 2900	< 4300	< 3500	< 4800	< 3200	< 3200
gross beta	7600 +- 1200	10800 +- 1700	9400 +- 1400	16200 +- 2100	5000 +- 1200	7300 +- 1300
gamma isotopic						
Be-7	910 +- 270	470 +- 170	630 +- 170	1220 +- 230	340 +- 180	< 460
K-40	5640 +- 1070	5300 +- 990	5890 +- 1040	7660 +- 1380	4560 +- 850	4340 +- 990
Mn-54	< 16	< 15	< 18	< 28	< 18	< 33
Co-58	< 19	< 16	< 15	< 23	< 15	< 26
Fe-59	< 44	< 38	< 33	< 47	< 36	< 57
Co-60	< 24	< 18	< 19	< 31	< 20	< 41
Zn-65	< 45	< 36	< 36	< 47	< 31	< 75
Nb-95	< 15	< 16	< 14	< 24	< 15	< 34
Zr-95	< 31	< 23	< 26	< 31	< 24	< 58
I-131	< 20	< 18	< 21	< 32	< 20	< 48
Cs-134	< 18	< 14	< 20	< 18	< 13	< 33
Cs-137	< 18	< 17	< 18	< 26	< 16	< 41
Ba-140	< 61	< 66	< 76	< 106	< 52	< 141
La-140	< 16	< 14	< 22	< 23	< 21	< 45
Collection date:	09/25/12	09/25/12	09/25/12	09/25/12	09/25/12	09/25/12
gross alpha	< 6800	< 4300	< 4200	< 3900	< 2900	< 4500
gross beta	6200 +- 1300	13300 +- 1200	9200 +- 1000	7700 +- 1000	6800 +- 800	8700 +- 1100
gamma isotopic						
Be-7	5890 +- 760	2640 +- 380	3260 +- 460	6770 +- 720	4220 +- 530	4550 +- 600
K-40	4710 +- 1170	10200 +- 1790	8000 +- 1490	7710 +- 1600	7030 +- 1400	6750 +- 1470
Mn-54	< 48	< 23	< 30	< 42	< 29	< 32
Co-58	< 43	< 22	< 35	< 33	< 26	< 37
Fe-59	< 74	< 51	< 69	< 75	< 71	< 68
Co-60	< 51	< 29	< 50	< 39	< 43	< 55
Zn-65	< 114	< 56	< 66	< 88	< 73	< 103
Nb-95	< 44	< 20	< 28	< 27	< 29	< 36
Zr-95	< 69	< 36	< 52	< 51	< 38	< 56
I-131	< 47	< 24	< 37	< 44	< 30	< 46
Cs-134	< 51	< 22	< 26	< 40	< 27	< 36
Cs-137	< 35	< 24	< 38	< 40	< 32	< 51
Ba-140	< 163	< 64	< 104	< 148	< 113	< 144
La-140	< 62	< 19	< 35	< 46	< 39	< 60

Radioisotopes other than those reported were not detected.

Table 14. WI DHS analysis results for soil samples collected for the Prairie Island environmental monitoring program.

Measurements in units of pCi/kilogram (dry)

Site:	PRI-1	PRI-4	PRI-5	PRI-6	PRI-8	PRI-9
Collection date:	06/13/12	06/13/12	06/13/12	06/13/12	06/13/12	06/13/12
gross alpha	11300 +- 7100	< 8900	< 8900	15900 +- 7700	12300 +- 7200	13800 +- 7400
gross beta	16400 +- 3400	15000 +- 3300	13900 +- 3300	23700 +- 3600	21900 +- 3500	17500 +- 3400
gamma isotopic						
K-40	10700 +- 1700	11700 +- 1900	11500 +- 1900	12600 +- 2100	14500 +- 2400	11400 +- 1900
Mn-54	< 16	< 15	< 19	< 21	< 29	< 16
Co-58	< 13	< 14	< 14	< 18	< 22	< 16
Fe-59	< 32	< 34	< 36	< 43	< 53	< 36
Co-60	< 17	< 13	< 19	< 20	< 28	< 22
Zn-65	< 35	< 35	< 37	< 47	< 59	< 40
Nb-95	< 17	< 15	< 17	< 19	< 28	< 18
Zr-95	< 24	< 22	< 30	< 30	< 42	< 28
Cs-134	< 13	< 12	< 17	< 16	< 24	< 16
Cs-137	323 +- 33	160 +- 22	106 +- 20	206 +- 29	104 +- 26	175 +- 26
Collection date:	09/25/12	09/25/12	09/25/12	09/25/12	09/25/12	09/25/12
gross alpha	< 7700	< 7400	< 7400	< 6300	11400 +- 5200	< 8100
gross beta	10200 +- 1600	11000 +- 1700	13000 +- 1800	12600 +- 1600	17500 +- 1800	8000 +- 1600
gamma isotopic						
K-40	11500 +- 1800	11600 +- 1900	9800 +- 1600	12100 +- 2000	14700 +- 2400	10200 +- 1700
Mn-54	< 11	< 15	< 22	< 24	< 26	< 21
Co-58	< 4	< 13	< 18	< 20	< 21	< 19
Fe-59	< 9	< 35	< 43	< 57	< 48	< 43
Co-60	< 5	< 21	< 15	< 21	< 30	< 23
Zn-65	< 10	< 35	< 43	< 52	< 56	< 46
Nb-95	< 5	< 18	< 20	< 25	< 25	< 22
Zr-95	< 8	< 26	< 32	< 47	< 46	< 32
Cs-134	< 4	< 16	< 17	< 21	< 21	< 14
Cs-137	196 +- 12	127 +- 21	118 +- 26	199 +- 37	117 +- 29	148 +- 30

Naturally occurring radioisotopes such as radium-226 (^{226}Ra), bismuth-214 (^{214}Bi), lead-214 (^{214}Pb), actinium-228 (^{228}Ac), bismuth-212 (^{212}Bi), lead-212 (^{212}Pb) from the naturally occurring uranium-238 (^{238}U) and thorium-232 (^{232}Th) decay series are commonly detected but have not been quantified or reported.

Radioisotopes other than those reported were not detected.