

**State of Wisconsin**

**2015**

**Point Beach - Kewaunee**

**Environmental Radioactivity Survey**



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# State of Wisconsin, Department of Health Services

2015

## Point Beach – Kewaunee Environmental Monitoring Survey

### Executive Summary

Wisconsin Stat. § 254.41 mandates the Wisconsin Department of Health Services (DHS) to conduct environmental radiation monitoring around the nuclear power facilities that affect Wisconsin. This environmental monitoring report is for the Point Beach and Kewaunee nuclear generating plants for the calendar year January - December 2015 and provides a description and results of this environmental monitoring program.

The DHS 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, shoreline sediment, soil, milk, well water, and vegetation that are collected from selected locations at planned sampling intervals.

#### Program Summary

For 2015, all sample results from the Point Beach – Kewaunee environmental monitoring area were less than state and federal standards or guidelines.

The DHS environmental monitoring programs provide an ongoing baseline of radioactivity measurements to assess 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 1950s-1960s atmospheric nuclear testing and such radiological incidents as the Chernobyl nuclear reactor incident of 1986.
- There were no incidents during 2015 that required additional environmental monitoring.
- There is no radioactive problem with sampled types of food consumed in Wisconsin and no health problem related to radioactivity for Wisconsin citizens.

DHS's ongoing environmental monitoring programs will continue to provide assurances to the citizens of Wisconsin that the environment surrounding the Point Beach – Kewaunee nuclear power facilities and other monitoring areas will continue to be evaluated.

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## **State of Wisconsin Department of Health Services**

**2015**

### **Point Beach - Kewaunee Environmental Radioactivity Survey**

#### **Introduction**

Wisconsin Stat. § 254.41 mandates the Wisconsin 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 Point Beach and Kewaunee nuclear generating plants for the calendar year January - December 2015 and provides a description and results of this environmental monitoring program.

#### **DHS Point Beach - Kewaunee Environmental Monitoring Sampling Program**

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, shoreline sediment, soil, milk, well water, and vegetation that are collected from selected locations at planned sampling intervals.

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

#### **Program Modifications**

The only program modification implemented for 2015: Milk collection was suspended by DHS during the last quarter (Oct-Dec) of 2015 due to Wisconsin State Laboratory Hygiene staffing and analysis issues.

#### **Laboratory Services and Quality Assurance**

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 daily to regularly calibrate instrumentation and conduct performance checks. Instrumentation quality control charts are maintained and available upon written request.

WSLH participates in the Environmental Resource Associates' Proficiency Testing program and has performed satisfactorily over the report period. In addition, WSLH participates in the Multi Analytical Performance Evaluation Program (MAPER) for environmental matrix analysis. Proficiency testing results are available from the Wisconsin State Laboratory of Hygiene.

In late 2014, the State Laboratory of Hygiene experienced some staffing issues that impacted their capacity. Starting in 2015, monthly surface water and milk samples were sent to ATI Environmental Inc. for analysis.

ATI Environmental Inc. Midwest Laboratory participated in the National Environmental Laboratory Accreditation Conference Standards (2003) for a variety of radiological analyses during the reporting period.

### Detection Limits

Detection limits, required by DHS, are expressed as a lower limit of detection (LLD). The required 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.
- t is the elapsed time, *for environmental samples*, 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 are 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 5-15 is an "a posteriori" calculation 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 Wisconsin DHS LLD indicating that the required 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 ±). Examples and explanations of data reporting are:

Example	Nuclide	Activity reported
1	<sup>137</sup> Cs	< 10 pCi/liter
2	<sup>137</sup> Cs	15 ± 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.

Table 1 Sample collection summary and required analyses for 2015.

Sample Type	Collection and Frequency	Site Locations	Number of Samples Collected	Number of Sample Deviations	Required Analyses
air particulate	C/W	1, 4, 7, 8, 17, 18	313	5	GA, GB, GI
air iodine	C/W	4, 17, 18	156	3	GI
precipitation	C/BW	1, 4	12	0	GB, H
TLD	G/Q	T1 – T31	124	0	ambient gamma
surface water	G/M	9, 12a, 17	35	1	GA, GB, GI, Sr, H, I
surface water	G/SA	5, 29	4	0	GA, GB, GI, Sr, H
fish	G/Q	10a	5	1	GI
shoreline sediment	G/A	5, 10a, 12a, 12b, 12c, 26, 29	7	0	GA, GB, GI
vegetation	G/SA	1, 2, 3, 4, 5, 7, 8, 14, 17	18	0	GA, GB, GI
soil	G/SA	1, 2, 3, 4, 5, 7, 8, 14, 17	18	0	GA, GB, GI
well water	G/SA	3, 10b, 11, 12d (2 sites)	10	0	GA, GB, H
milk	G/M	24, 27, 28	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 2 Wisconsin DHS Point Beach - Kewaunee environmental monitoring sampling sites.

Sample site	Distance and direction (miles)		Location description
	Kewaunee	Point Beach	
PBK-1	5.7 WSW	5.7 WNW	Francar residence
PBK-2	4.9 S	0.7 SSW	Southwest corner property line - Point Beach
PBK-3	4.3 SSW	1.5 W	Two Creeks Town Hall
PBK-4	3.1 S	1.2 NNW	Residence north property line - Point Beach
PBK-5	2.6 S	1.7 NNW	Two Creeks Park; NW corner of property
PBK-7	7.3 SSW	3.3 SSW	WPSC substation, Cty V
PBK-8	0.8 WNW	4.9 N	P Ihlenfeldt farm
PBK-9	4.7 S	0.5 SSE	Point Beach, meteorological tower
PBK-10a	4.2 S	0.1 E	Point Beach, effluent channel
PBK-10b	4.2 S	0.1 E	Point Beach, entrance
PBK-11	3.1 SSW	2.0 NW	Two Creeks International Harvester
PBK-12a	0.1 E	4.2 N	Kewaunee, effluent channel
PBK-12b	0.1 E	4.2 N	Kewaunee, effluent channel, 500 feet N
PBK-12c	0.1 E	4.2 N	Kewaunee, effluent channel, 500 feet S
PBK-12d	0.1 W	4.2 N	Kewaunee, well sites
PBK-14	0.8 W	4.3 N	Nuclear Road – field east of parking lot



Table 2 (continued) Wisconsin DHS Point Beach – Kewaunee environmental monitoring sampling sites.

Sample site	Distance and direction (miles)		Location description
	Kewaunee	Point Beach	
PBK-17	11.4 NNE	15.6 N	Green Bay Pumping Station - Rostok
PBK-18	0.1 S	4.1 N	Kewaunee, meteorological tower
PBK-24	2.6 N	6.9 N	L. Struck farm
PBK-26	8.3 NNE	12.6 N	Kewaunee
PBK-27	3.5 SSW	1.7 NW	R. Barta farm
PBK-28	6.0 S	1.8 SSE	Strutz Farms Inc
PBK-29	6.1 SSE	2.1 SSE	Irish Road – at Lake Michigan
PBK-(T1-T8)	4.0 S	0.6 NW	Point Beach ISFSI on outside of perimeter fence
PBK-T9	3.2 S	1.2 NNW	Point Beach north property line, Lakeshore Road
PBK-T10	5.1 S	0.8 SSE	Nuclear Road, 0.6 mile E of Lakeshore Road
PBK-T11	5.1 S	0.9 SSW	Nuclear Road, 0.1 mile E of Lakeshore Road
PBK-T12	5.0 SSW	1.4 WSW	Highway 42, 0.6 mile N of Nuclear Road
PBK-T13	4.0 SSW	1.4 WNW	Highway 42, 0.3 mile N of Tapawingo Road
PBK-T14	3.1 SSW	1.9 NW	Two Creeks Road, 0.1 mile E of Highway 42
PBK-T15	7.6 S	3.3 S	Junction of Lakeshore Road and Ravine Drive
PBK-T16	7.3 SSW	3.3 SW	Cty V, 0.5 mile W of Hwy 42
PBK-T17	5.6 SW	3.8 W	Junction of Saxonbury Road and Tapawingo Road
PBK-T18	3.2 SW	3.3 NW	Zander Road, 0.1 mile W on Tannery Road
PBK-T20	1.4 SW	3.4 NNW	Junction of Cty BB and Ratajcsak Lane
PBK-T28	7.2 NNE	11.4 N	Kewaunee, South on Hwy 42
PBK-T29	12.4 S	8.1 SSW	Two Rivers, Junction of Hwy 42 and 34th Avenue
PBK-T30	16.0 SSW	11.9 SSW	Manitowoc, Hwy 42, Two Rivers Chamber of Commerce
PBK-T31	8.6 SW	5.6 WSW	Mishicot, Cty V, in front of house #653
PBK-T51-T58	0.1 NNW	4.4 N	KPS ISFSI on the inside of the perimeter fence

Table 3 Missing sample or sample deviation report for 2015.

Sample type	Date	Site	Explanation
Air particulate	01/05/15	18	Data sample was lost, and not reported
Air particulate	04/08/15	04	Data sample was lost, and not reported
Air particulate		07	No sample taken
Air particulate	11/01/15	1	Data sample was lost, and not reported
Air particulate	12/07/15	1	Data sample was lost, and not reported
Air iodine	01/05/15	18	Data sample was lost, and not reported

Table 3 (continued). Missing sample or deviation report for 2015.

<b>Sample type</b>	<b>Date</b>	<b>Site</b>	<b>Explanation</b>
Air iodine	04/08/15	04	Data sample was lost, and not reported
Air iodine	12/30/15	17	Data sample was lost, and not reported
Surface Water	01/15/15	9	Sr-89 and Sr-90 not reported
Surface Water	02/11/15	9	Sample not collected due to safety – ice build-up along shoreline
Surface Water	4/16/15	9	Sr-89 and Sr-90 not reported
Surface Water	01/06/15	12a	Sr-89 and Sr-90 not reported
Surface Water	04/01/15	12a	Sr-89 and Sr-90 not reported
Surface Water	01/15/15	17	Sr-89 and Sr-90 not reported
Surface Water	05/04/15	17	Sr-89, Sr-90, and tritium not reported
Fish	05/09/15	2 <sup>nd</sup> Quarter	Sample was too small
Fish		3 <sup>rd</sup> Quarter	No sample taken
Milk	05/13/15	28	Sr-90 not reported
Milk	06/10/15	28	Sr-90 not reported
Milk	08/12/15	28	Tritium not reported
Milk	Oct 2015	28	Milk sampling suspended due to WSLH staffing
Milk	Nov 2015	28	Milk sampling suspended due to WSLH staffing
Milk	Dec 2015	28	Milk sampling suspended due to WSLH staffing
Milk	01/14/15	27	Lower limit of detection not met
Milk	05/13/15	27	Tritium and Sr-90 not reported
Milk	06/10/15	27	Sr-90 not reported
Milk	08/12/15	27	Gamma spectrometry not reported
Milk	Oct 2015	27	Milk sampling suspended due to WSLH staffing
Milk	Nov 2015	27	Milk sampling suspended due to WSLH staffing
Milk	Dec 2015	27	Milk sampling suspended due to WSLH staffing
Milk	01/14/15	24	Tritium lower limit of detection not met
Milk	06/10/15	24	Sr-90 not reported
Milk	08/12/15	24	Gamma spectrometry not reported
Milk	Oct 2015	24	Milk sampling suspended due to WSLH staffing
Milk	Nov 2015	24	Milk sampling suspended due to WSLH staffing
Milk	Dec 2015	24	Milk sampling suspended due to WSLH staffing

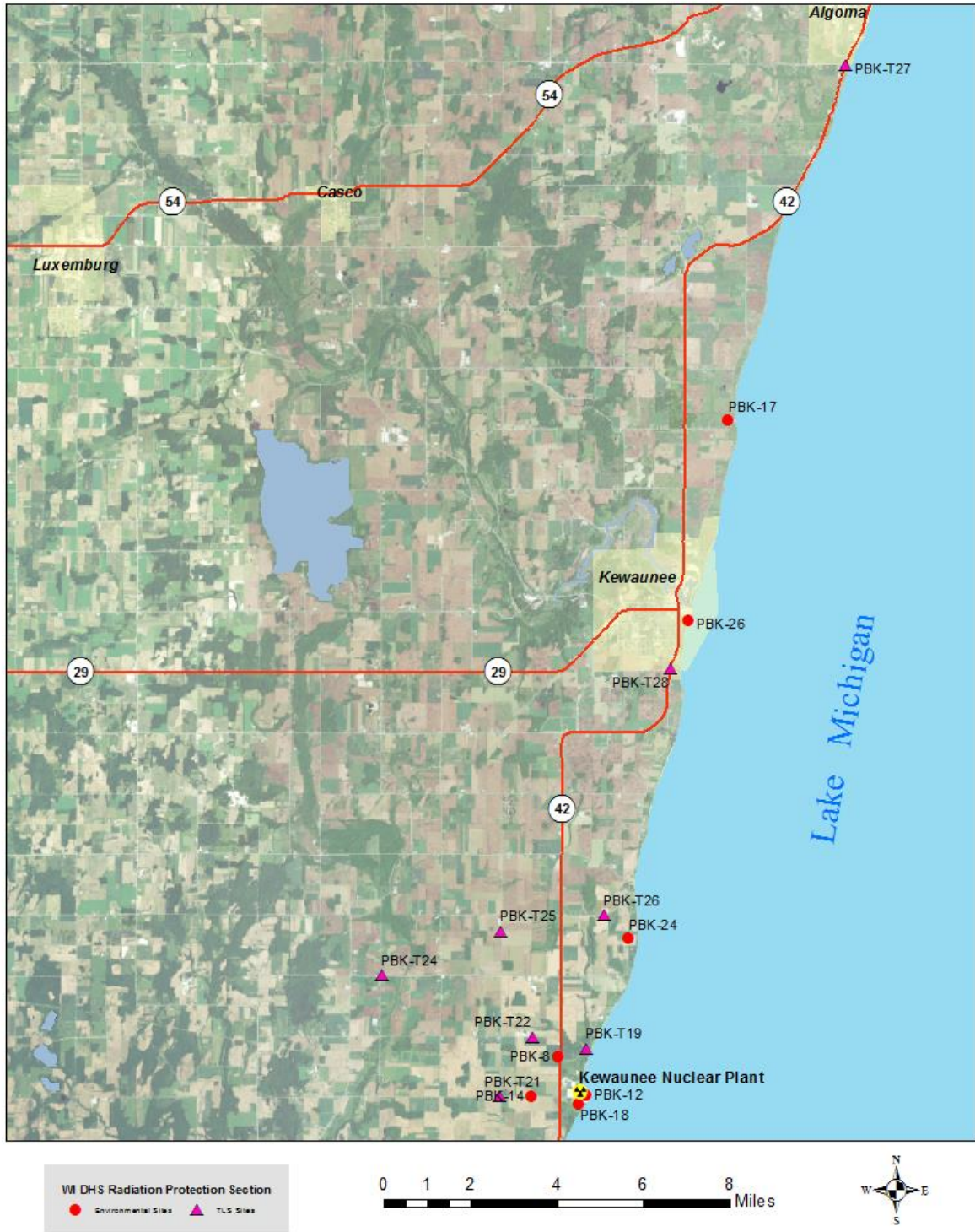


Figure 1 Point Beach - Kewaunee environmental monitoring sampling sites in relation to the Kewaunee plant.



Figure 2 Point Beach - Kewaunee environmental monitoring sampling sites in relation to the Point Beach plant.

## **Results and Discussion for the Wisconsin DHS Point Beach – Kewaunee Environmental Monitoring program**

### **Air Particulate**

Table 4 provides a summary of reported activities by DHS for air particulate samples. Tables 5–6 provide results from the individual sample analyses.

From the gross beta activities listed in Table 5, it may be noted that there were no significant differences due to distance away from either the Kewaunee or the Point Beach facility. Although the gross beta activity was above the LLD, it was similar to previous years; and the increase in gross beta activity could not be attributed to the Kewaunee or the Point Beach operation.

The gamma isotopic analysis of the quarterly air particulate filter composites detected only small amounts of the radioisotopes listed in Table 4. All other radioisotopes were below their respective LLD. Beryllium-7 ( $^7\text{Be}$ ), detected in all composites, is a naturally occurring radioisotope that is constantly produced through nuclear reactions between cosmic rays and nuclei in the atmosphere and was detected in air composites from other areas of the state.

### **Air Iodine**

Table 4 provides a summary of reported activities by DHS for air iodine samples. Table 5 provides results from the individual sample analyses.

Most air iodine measurements were below the LLD of  $0.07 \text{ pCi/m}^3$ . Sample analysis indicated that neither the Kewaunee nor the Point Beach nuclear generating facilities influenced air iodine levels during the reporting period.

### **Ambient Gamma Radiation – Thermoluminescent dosimeters (TLD)**

Table 4 provides a summary of reported activities by DHS for ambient gamma radiation. Table 7 provides results from the individual sample analyses.

Analysis of samples taken at varying distances from either the Kewaunee or Point Beach nuclear facilities did not yield significant differences in exposure for sites PBK-T9 through PBK-T31. Excluding the sites around the perimeter of the Point Beach ISFSI (T1 – T8), the average quarterly exposure from the remaining 23 sites was  $14.1 \pm 2.1$  milliroentgens. The average quarterly exposure for 2015 was at background levels and was comparable to other areas in Wisconsin. Influence by the Kewaunee or the Point Beach nuclear generating facilities on air quality is not evident from ambient gamma radiation analysis.

### **Precipitation**

Table 4 provides a summary of reported activities by DHS for precipitation. Table 8 provides results from the individual sample analyses.

The gross beta activity in precipitation was within the normal range of activity when compared to previous years' data. Influence by the Kewaunee or Point Beach nuclear generating facilities on air quality is not evident from precipitation sample analysis.

### **Fish**

Table 4 provides a summary of reported activities by DHS for fish samples. Table 9 provides results from the individual sample analyses. The fish samples showed no unusual activities.

## **Shoreline Sediment**

Table 4 provides a summary of reported activities by DHS for shoreline sediment samples. Table 10 provides results from the individual sample analyses.

Analysis of the shoreline samples showed no unusual activities. All samples indicated naturally occurring potassium-40 ( $^{40}\text{K}$ ). Previous years' reported activities also detected cesium-137 ( $^{137}\text{Cs}$ ), which was probably attributable to residual fallout from previous atmospheric nuclear weapons testing. Samples commonly detect naturally occurring radioisotopes from the uranium-238 ( $^{238}\text{U}$ ) and thorium-232 ( $^{232}\text{Th}$ ) decay series, but they have not been quantified or reported. Sample analysis indicates that neither the Kewaunee nor the Point Beach nuclear generating facilities influenced shoreline sediment activity levels.

## **Surface Water**

Table 4 provides a summary of reported activities by DHS for surface water samples. Table 11 provides results from individual sample analyses. During this reporting period, samples were sent to ATI Environmental Inc. Midwest Laboratory as a result of Wisconsin State Lab of Hygiene's inability to analyze strontium.

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

## **Well Water**

Table 4 provides a summary of reported activities by DHS for well water samples. Table 12 results from the individual sample analyses.

The well water samples showed no unusual gross alpha and gross beta activities and all activities for tritium ( $^3\text{H}$ ) were less than its LLD. The measured activities were all below state and federal standards. Influence by the Kewaunee or Point Beach nuclear generating facilities is not evident from well water sample analysis.

## **Milk**

Table 4 provides a summary of reported activities by DHS for milk samples. Table 13 results from the individual sample analyses. During this reporting period, samples were sent to ATI Environmental Inc. Midwest Laboratory as a result of Wisconsin State Lab of Hygiene's inability to analyze strontium.

The analysis of milk samples detected no unusual activities. Naturally occurring potassium-40 ( $^{40}\text{K}$ ) was detected in all samples. The detected activities for strontium-90 ( $^{90}\text{Sr}$ ), attributable to residual fallout from previous atmospheric nuclear weapons testing, were also detected in previous years at similar activity levels. Influence by the Kewaunee or Point Beach nuclear generating facilities is not evident from milk sample analysis.

## **Vegetation**

Table 4 provides a summary of reported activities by DHS for vegetation samples. Table 14 provides results from the individual sample analyses.

Analysis of the vegetation samples showed no unusual activities. The gamma isotopic analysis detected only small amounts of naturally occurring potassium-40 ( $^{40}\text{K}$ ) and beryllium-7 ( $^7\text{Be}$ ) listed in

Table 4. Influence by the Kewaunee or Point Beach nuclear generating facilities is not evident from vegetation sample analysis.

### **Soil**

Table 4 provides a summary of reported activities by DHS for soil samples. Table 15 provides results from the individual sample analyses.

Analysis of the soil samples showed no unusual activities. Naturally occurring potassium-40 ( $^{40}\text{K}$ ) was detected in all samples. The reported activities for cesium-137 ( $^{137}\text{Cs}$ ) were also detected in previous years and are probably attributable to residual fallout from previous atmospheric nuclear weapons testing. Naturally occurring radioisotopes from the uranium-238 ( $^{238}\text{U}$ ) and thorium-232 ( $^{232}\text{Th}$ ) decay series are commonly detected but have not been quantified or reported.

### **Point Beach Independent Spent Fuel Storage Installation**

Table 7 provides a summary of reported activities by DHS for ambient gamma radiation monitored in the vicinity of the Point Beach Independent Spent Fuel Storage Installation (ISFSI).

Thermoluminescent dosimeter (TLD) measurements detected ambient gamma exposure levels greater than background at all sites (T1-T8) located on the Point Beach ISFSI perimeter fence closest to the ventilated storage casks. TLD measurements did not detect an increase in ambient gamma exposure levels at sites T9 - T14 (0.8 – 1.9 miles from the Point Beach ISFSI) or at sites T15 – T31 (greater than 2 miles from the Point Beach ISFSI). These readings are consistent with previous years' data. The average standard quarterly ambient gamma exposure for 2015 for sites T9 – T31 was  $14.1 \pm 2.1$  milliroentgens and for sites T1 – T8 varied from 17.3 – 57.4 milliroentgens per standard quarter depending on the distance from the storage casks.

### **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 Point Beach or Kewaunee nuclear generating facilities are less than the limits as stated in these federal regulations.

The DHS limit for permissible levels of radiation exposure from external sources in unrestricted areas is defined in the Wis. Admin. Code § DHS 157.23. Doses resulting from gaseous and liquid effluent releases from the Point Beach or Kewaunee nuclear generating facilities are less than the limits as stated in Wis. Admin. Code § DHS 157.23.

### **References**

Wisconsin Admin. Code § DHS 157.23

State of Wisconsin, "FINAL ENVIRONMENTAL IMPACT STATEMENT, Point Beach Nuclear Power Plant Projects Proposed by Wisconsin Electric Power Company, Temporary Storage of Spent Nuclear Fuel in Dry Casks, PSC Docket 6630-CE-197, Unit 2 Steam Generator Replacement, PSC Docket 6630-CE-209, AUGUST 1994."

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.

## Sample Activity Summary

Table 4 Sample activity summary for the Wisconsin DHS Point Beach - Kewaunee environmental monitoring.

Sample type (units)	LLD	Number of samples <sup>a</sup>	Analysis	Range
Air particulate (pCi/m <sup>3</sup> )	0.005	309 / 306	gross beta gamma isotopic	0.001 - 0.124
	0.020	24 / 24	Be-7	< 0.067
	0.002	24 / 0	Mn-54	< 0.0004
	0.002	24 / 0	Co-58	< 0.0004
	0.005	24 / 0	Fe-59	< 0.0008
	0.002	24 / 0	Co-60	< 0.0001 - 0.0005
	0.005	24 / 0	Zn-65	< 0.0009
	0.002	24 / 0	Nb-95	< 0.0001 - 0.0014
	0.005	24 / 0	Zr-95	< 0.0006
	0.002	24 / 0	Ru-103	< 0.0004
	0.015	24 / 0	Ru-106	< 0.0034
	0.020	24 / 0	I-131	< 0.0067
	0.002	24 / 0	Cs-134	< 0.0004
	0.002	24 / 0	Cs-137	< 0.0010
	0.030	24 / 0	Ba-140	< 0.0030
	0.020	24 / 0	La-140	< 0.0012
	0.002	24 / 0	Ce-141	< 0.0007
0.005	24 / 0	Ce-144	< 0.0018	
Air iodine (pCi/m <sup>3</sup> )	0.07	154 / 2	I-131	0.005 – 0.232
Surface water (pCi/liter)	3.0	39 / 0	gross alpha (sol)	< 0.5 - 2.2
	3.0	39 / 1	gross beta (sol)	< 0.9 - 3.2
	3.0	39 / 0	gross alpha (insol)	< 0.7 - 1.2
	3.0	39 / 0	gross beta (insol)	< 1.1 - 1.3
	0.5	19 / 4	I-131	< 0.7
	300	18 / 0	H-3	< 211
	2.0	18 / 0	Sr-89	< 1
	1.0	18 / 0	Sr-90	< 0.2
			gamma isotopic	
	15	36 / 0	Mn-54	< 8.6
	15	36 / 0	Co-58	< 7.1
	30	36 / 0	Fe-59	< 14.8
	15	36 / 0	Co-60	< 8.2
	30	36 / 0	Zn-65	< 16.4
	15	36 / 0	Nb-95	< 7.7
	30	36 / 0	Zr-95	< 12.8
	15	36 / 0	I-131	< 8.6
15	36 / 0	Cs-134	< 6.4	
15	36 / 0	Cs-137	< 6.9	
60	36 / 0	Ba-140	< 30.1	
15	36 / 0	La-140	< 11.6	



Table 4 (continued). Sample activity summary for the Wisconsin DHS Point Beach - Kewaunee environmental monitoring program.

Sample type (units)	LLD	Number of samples <sup>a</sup>	Analysis	Range
Fish (pCi/kg wet)	800	4 / 4	gamma isotopic K-40	1520 – 2820
	50	4 / 0	Mn-54	< 11
	60	4 / 0	Co-58	< 10
	130	4 / 0	Fe-59	< 31
	70	4 / 0	Co-60	< 14
	130	4 / 0	Zn-65	< 26
	50	4 / 0	Nb-95	< 15
	100	4 / 0	Zr-95	< 19
	50	4 / 0	Cs-134	< 7
	60	4 / 0	Cs-137	< 12 - 17
	Shoreline sediment (pCi/kg dry)	8000	7 / 0	gross alpha
6000		7 / 1	gross beta	2800 - 6840
			gamma isotopic	
800		7 / 7	K-40	3200 – 6020
60		7 / 0	Mn-54	< 15
90		7 / 0	Co-58	< 29
600		7 / 0	Fe-59	< 116
90		7 / 0	Co-60	< 17
300		7 / 0	Zn-65	< 44
100		7 / 0	Nb-95	< 62
200		7 / 0	Zr-95	< 49
80		7 / 0	Cs-134	< 12
80		7 / 0	Cs-137	< 13 – 22
Vegetation (pCi/kg wet)		5000	18 / 0	gross alpha
	4000	18 / 11	gross beta	1740 - 7740
			gamma isotopic	
	600	18 / 16	Be-7	261 - 4980
	2000	18 / 18	K-40	3890 - 7390
	90	18 / 0	Mn-54	< 32
	100	18 / 0	Co-58	< 32
	200	18 / 0	Fe-59	< 80
	100	18 / 0	Co-60	< 41
	250	18 / 0	Zn-65	< 85
	100	18 / 0	Nb-95	< 39
	200	18 / 0	Zr-95	< 62
	80	18 / 0	I-131	< 76
	80	18 / 0	Cs-134	< 34
	90	18 / 0	Cs-137	< 43
	350	18 / 0	Ba-140	< 181
100	18 / 0	La-140	< 79	

Table 4 (continued). Sample activity summary for the Wisconsin DHS Point Beach - Kewaunee environmental monitoring program.

Sample type (units)	LLD	Number of samples <sup>a</sup>	Analysis	Range
Soil (pCi/kg dry)	8000	18 / 10	gross alpha	1200 - 13200
	6000	18 / 17	gross beta	< 1360 - 21600
			gamma isotopic	
	80	18 / 1	Cs-134	< 25 - 127
	80	18 / 14	Cs-137	< 42 - 277
	90	18 / 0	Co-58	< 45
	90	18 / 0	Co-60	< 31
	600	18 / 0	Fe-59	< 184
	60	18 / 0	Mn-54	< 31
	100	18 / 0	Nb-95	< 98
	800	18 / 18	K-40	13000 - 22700
	300	18 / 0	Zn-65	< 76
	250	18 / 0	Zr-95	< 89
	Milk (pCi/liter)	0.5	13 / 5	I-131
1.0		22 / 1	Sr-90	<0.4 - 1.29
			gamma isotopic	
500		24 / 24	K-40	1060-1560
15		24 / 0	Mn-54	<11
15		24 / 0	Co-58	<11
40		24 / 0	Fe-59	<23
15		24 / 1	Co-60	<15
40		24 / 0	Zn-65	<24
15		24 / 0	Nb-95	<10
40		24 / 0	Zr-95	<19
15		24 / 0	I-131	<14
15		24 / 0	Cs-134	<12
15		24 / 0	Cs-137	<13
60	24 / 0	Ba-140	<44	
15	24 / 0	La-140	<14	
Well water (pCi/liter)	5.0	10 / 0	gross alpha	< 2.7 – 3.7
	3.0	10 / 4	gross beta	< 3.5
	300	10 / 0	H-3	< 210
Precipitation (nCi/m <sup>2</sup> )	1.5	12 / 0	gross beta	0.04– 0.63
	300	12 / 0	H-3	< 30
ambient radiation (mR/Std Qtr)	1.0 <sup>c</sup>	124 / 124	exposure	8.9 – 57.4

a - Number of analyses / number of analyses detected above the WI DHS LLD.  
b - LLD activities expressed in units of pCi/liter.  
c - mR/TLD  
d - Samples not analyzed due to laboratory error and delays, see result and discussion section.

Table 5 Wisconsin DHS air particulate gross beta and air iodine (I-131) analysis results from the Point Beach – Kewaunee environmental monitoring program.



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

Site: **PBK-1**

Collection date	Volume m <sup>3</sup>	Air Particulate	Collection date	Volume m <sup>3</sup>	Air Particulate
01/07/15	622	0.029 ± 0.002	07/08/15	521	0.016 ± 0.002
01/14/15	549	0.024 ± 0.003	07/15/15	514	0.011 ± 0.002
01/21/15	552	0.028 ± 0.003	07/22/15	525	0.012 ± 0.002
01/28/15	552	0.018 ± 0.002	07/29/15	*c	0.020 ± 0.002
02/04/15	542	0.017 ± 0.002	08/05/15	528	0.012 ± 0.002
02/11/15	549	0.032 ± 0.003	08/12/15	532	0.014 ± 0.002
02/18/15	528	0.027 ± 0.003	08/19/15	528	0.028 ± 0.003
02/25/15	545	0.048 ± 0.003	08/26/15	542	0.012 ± 0.002
03/04/15	539	0.026 ± 0.003	09/02/15	521	0.030 ± 0.003
03/11/15	542	0.020 ± 0.002	09/09/15	525	0.029 ± 0.003
03/18/15	535	0.016 ± 0.002	09/16/15	528	0.020 ± 0.002
03/25/15	542	0.015 ± 0.002	09/23/15	532	0.020 ± 0.002
04/01/15	542	0.012 ± 0.002	09/30/15	525	0.025 ± 0.003
1st Qtr			3rd Qtr		
mean +- s.d.		0.224 ± 0.010	mean +- s.d.		0.019 ± 0.007
04/08/15	539	0.016 ± 0.002	10/14/15	556	0.019 ± 0.002
04/15/15	528	0.016 ± 0.002	10/21/15	549	0.019 ± 0.002
04/22/15	532	0.011 ± 0.002	10/28/15	552	0.015 ± 0.002
04/29/15	535	0.011 ± 0.002	*d	*d	*d ± *d
05/06/15	532	0.013 ± 0.002	11/04/15	552	0.020 ± 0.002
05/13/15	518	0.011 ± 0.002	11/11/15	563	0.024 ± 0.002
05/20/15	521	0.011 ± 0.002	11/18/15	552	0.026 ± 0.003
05/27/15	514	0.017 ± 0.002	11/24/15	480	0.015 ± 0.002
06/03/15	518	0.011 ± 0.002	12/02/15	636	0.021 ± 0.002
06/10/15	511	0.014 ± 0.002	*d	*d	*d ± *d
06/17/15	504	0.009 ± 0.002	12/16/15	546	0.021 ± 0.002
06/24/15	507	0.011 ± 0.002	12/22/15	476	0.023 ± 0.003
07/01/15	518	0.014 ± 0.002	12/30/15	636	0.021 ± 0.002
2nd Qtr			4th Qtr		
mean +- s.d.		0.014 ± 0.002	mean +- s.d.		0.020 ± 0.003

\*a – Laboratory error

\*b – Error in recording data in the field

\*c = The original data sheet was not returned

\*d = Data sheet unavailable



Table 5 (continued). Wisconsin DHS air particulate gross beta and air iodine (I-131) analysis results from the Point Beach – Kewaunee environmental monitoring program.

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

**Site: PBK-4**

Collection date	Volume m <sup>3</sup>	Air particulate	Air iodine	Collection date	Volume m <sup>3</sup>	Air particulate	Air iodine
01/05/15	534	0.022 ± 0.003	< 0.034	07/08/15	726	0.010 ± 0.002	< 0.010
01/14/15	591	0.022 ± 0.002	< 0.010	07/13/15	395	0.012 ± 0.003	< 0.013
01/19/15	370	0.031 ± 0.004	< 0.016	07/20/15	568	0.010 ± 0.002	< 0.025
01/26/15	510	0.017 ± 0.002	< 0.012	07/27/15	583	0.016 ± 0.002	< 0.007
02/03/15	557	0.015 ± 0.002	< 0.012	08/03/15	575	0.016 ± 0.002	< 0.015
02/11/15	584	0.028 ± 0.003	< 0.013	08/12/15	743	0.011 ± 0.002	< 0.009
02/16/15	336	0.023 ± 0.004	< 0.027	08/17/15	415	0.028 ± 0.003	< 0.016
02/24/15	541	0.041 ± 0.003	< 0.011	08/24/15	571	0.015 ± 0.002	< 0.008
03/02/15	423	0.024 ± 0.003	< 0.017	08/31/15	562	0.012 ± 0.002	< 0.020
03/11/15	393	0.004 ± 0.003	< 0.007	09/09/15	740	0.026 ± 0.002	< 0.015
03/16/15	393	0.014 ± 0.002	< 0.232	09/14/15	396	0.014 ± 0.003	< 0.027
03/23/15	534	0.015 ± 0.002	< 0.014	09/22/15	637	0.019 ± 0.002	< 0.013
03/30/15	523	0.013 ± 0.002	< 0.011	09/28/15	479	0.025 ± 0.003	< 0.027
1st Qtr				3rd Qtr			
mean +- s.d.		0.021 ± 0.009	< 0.032	mean +- s.d.		0.016 ± 0.006	< 0.016
04/08/15	692	*d ± *d	< *a	10/05/15	523	0.011 ± 0.002	< 0.027
04/13/15	384	0.015 ± 0.015	< 0.019	10/12/15	541	0.017 ± 0.002	< 0.018
04/20/15	554	0.010 ± 0.010	< 0.012	10/20/15	596	0.014 ± 0.002	< 0.016
04/27/15	528	0.010 ± 0.010	< 0.013	10/28/15	590	0.018 ± 0.002	< 0.059
05/04/15	554	0.009 ± 0.009	< 0.010	11/02/15	371	0.011 ± 0.003	< 0.018
05/13/15	707	0.008 ± 0.008	< 0.006	11/10/15	595	0.022 ± 0.002	< 0.029
05/18/15	385	0.013 ± 0.013	< 0.016	11/16/15	433	0.022 ± 0.003	< 0.021
05/27/15	700	0.011 ± 0.011	< 0.010	11/24/15	565	0.020 ± 0.002	< 0.026
06/01/15	390	0.008 ± 0.008	< 0.021	11/30/15	432	0.018 ± 0.003	< 0.013
06/10/15	711	0.012 ± 0.012	< 0.012	12/08/15	570	0.033 ± 0.003	< 0.082
06/15/15	397	0.009 ± 0.009	< 0.027	12/15/15	506	0.027 ± 0.003	< 0.021
06/23/15	645	0.008 ± 0.008	< 0.013	12/22/15	484	0.020 ± 0.003	< 0.033
06/29/15	477	0.012 ± 0.012	< 0.012	12/28/15	416	0.021 ± 0.003	< 0.024
2nd Qtr				4th Qtr			
mean +- s.d.		0.002 ± 0.015	< 0.014	mean +- s.d.		0.020 ± 0.006	< 0.030

\*a – Laboratory error

\*b – Error in recording data in the field

\*c = The original data sheet was not returned

\*d = Data sheet unavailable



Table 5 (continued). Wisconsin DHS air particulate gross beta and air iodine (I-131) analysis results from the Point Beach – Kewaunee environmental monitoring program,.

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

**Site: PBK-7**

Collection date	Volume m <sup>3</sup>	Air particulate	Collection date	Volume m <sup>3</sup>	Air particulate
01/07/15	655	0.027 ± 0.002	07/08/15	*c	0.014 ± 0.002
01/14/15	580	0.022 ± 0.002	07/15/15	507	0.124 ± 0.002
01/21/15	558	0.018 ± 0.002	07/22/15	510	0.013 ± 0.002
01/28/15	556	0.016 ± 0.002	07/29/15	507	0.019 ± 0.003
02/04/15	565	0.017 ± 0.002	08/05/15	502	0.011 ± 0.002
02/11/15	580	0.028 ± 0.003	08/12/15	522	0.014 ± 0.002
02/18/15	558	0.026 ± 0.003	08/19/15	488	0.029 ± 0.003
02/25/15	568	0.044 ± 0.003	08/26/15	519	0.015 ± 0.002
03/04/15	580	0.022 ± 0.002	09/02/15	510	0.027 ± 0.003
03/11/15	534	0.016 ± 0.002	09/02/15	510	0.030 ± 0.003
03/18/15	548	0.017 ± 0.002	09/16/15	510	0.019 ± 0.002
03/25/15	541	0.018 ± 0.002	09/23/15	510	0.020 ± 0.002
			09/30/15	502	0.023 ± 0.003
<b>1st Qtr</b>			<b>3rd Qtr</b>		
mean +- s.d.		0.022 ± 0.008	mean +- s.d.		0.027 ± 0.030
04/01/15	546	0.016 ± 0.002	10/07/15	507	0.012 ± 0.002
04/08/15	553	0.016 ± 0.002	10/14/15	517	0.017 ± 0.002
04/15/15	546	0.013 ± 0.002	10/21/15	512	0.018 ± 0.002
04/22/15	522	0.009 ± 0.002	10/28/15	512	0.018 ± 0.002
04/29/15	534	0.011 ± 0.002	11/04/15	522	0.018 ± 0.002
05/06/15	534	0.011 ± 0.002	11/11/15	519	0.025 ± 0.003
05/13/15	534	0.010 ± 0.002	11/18/15	515	0.028 ± 0.003
05/20/15	529	0.012 ± 0.002	11/24/15	461	0.018 ± 0.003
05/27/15	527	0.016 ± 0.002	12/02/15	587	0.022 ± 0.002
*a	*a	*a *a	12/09/15	517	0.046 ± 0.003
06/10/15	519	0.012 ± 0.002	12/16/15	515	0.023 ± 0.003
06/17/15	507	0.007 ± 0.002	12/22/15	449	0.022 ± 0.003
06/24/15	512	0.011 ± 0.002	12/30/15	595	0.020 ± 0.002
			10/07/15	507	0.012 ± 0.002
<b>2nd Qtr</b>			<b>4th Qtr</b>		
mean +- s.d.		0.012 ± 0.003	mean +- s.d.		0.022 ± 0.008

\*a – Laboratory error

\*b – Error in recording data in the field

\*c = The original data sheet was not returned

\*d = Data sheet unavailable

Table 5 (continued). Wisconsin DHS air particulate gross beta and air iodine (I-131) analysis results from the Point Beach – Kewaunee environmental monitoring program.



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

**Site: PBK-8**

Collection date	Volume m <sup>3</sup>	Air particulate	Collection date	Volume m <sup>3</sup>	Air particulate
01/06/15	587	0.030 ± 0.003	07/07/15	507	0.014 ± 0.002
01/13/15	596	0.026 ± 0.002	07/14/15	482	0.010 ± 0.002
01/20/15	580	0.031 ± 0.003	07/21/15	498	0.012 ± 0.002
01/27/15	568	0.020 ± 0.002	07/28/15	523	0.021 ± 0.003
02/03/15	587	0.020 ± 0.002	08/04/15	523	0.017 ± 0.002
02/10/15	596	0.031 ± 0.003	08/11/15	504	0.014 ± 0.002
02/17/15	596	0.027 ± 0.002	08/11/15	517	0.029 ± 0.003
02/24/15	301	0.096 ± 0.006	08/25/15	473	0.018 ± 0.003
03/03/15	637	0.027 ± 0.002	09/01/15	558	0.021 ± 0.002
03/10/15	603	0.020 ± 0.002	09/08/15	501	0.037 ± 0.003
03/17/15	590	0.018 ± 0.002	09/15/15	533	0.019 ± 0.002
03/24/15	612	0.020 ± 0.002	09/22/15	495	0.023 ± 0.003
03/31/15	552	0.017 ± 0.002	09/29/15	457	0.031 ± 0.003
1st Qtr			3rd Qtr		
mean +- s.d.		0.029 ± 0.021	mean +- s.d.		0.019 ± 0.008
04/07/15	200	0.023 ± 0.005	10/06/15	*c	0.011 ± 0.002
04/14/15	390	0.019 ± 0.003	10/13/15	*c	0.021 ± 0.002
04/21/15	593	0.011 ± 0.002	10/20/15	561	0.015 ± 0.002
04/28/15	577	0.011 ± 0.002	10/27/15	507	0.023 ± 0.003
05/05/15	596	0.012 ± 0.002	11/03/15	495	0.020 ± 0.003
05/12/15	593	0.010 ± 0.002	11/10/15	523	0.027 ± 0.003
05/19/15	571	0.011 ± 0.002	11/17/15	514	0.032 ± 0.003
05/26/15	596	0.014 ± 0.002	11/24/15	463	0.027 ± 0.003
06/02/15	584	0.011 ± 0.002	12/01/15	546	0.025 ± 0.003
06/09/15	568	0.013 ± 0.002	12/08/15	523	0.047 ± 0.003
06/16/15	542	0.009 ± 0.002	12/15/15	438	0.043 ± 0.004
06/23/15	523	0.010 ± 0.002	12/22/15	482	0.025 ± 0.003
06/30/15	511	0.013 ± 0.002	12/29/15	438	0.031 ± 0.003
2nd Qtr			4th Qtr		
mean +- s.d.		0.013 ± 0.004	mean +- s.d.		0.026 ± 0.027

\*a – Laboratory error

\*b – Error in recording data in the field

\*c = The original data sheet was not returned

\*d = Data sheet unavailable

Table 5 (continued). Wisconsin DHS air particulate gross beta and air iodine (I-131) analysis results from the Point Beach – Kewaunee environmental monitoring program.



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

**Site: PBK-17**

Collection date	Volume m <sup>3</sup>	Air particulate	Air iodine	Collection date	Volume m <sup>3</sup>	Air particulate	Air iodine
01/09/15	582	0.026 ± 0.002	< 0.010	07/02/15	529	0.012 ± 0.002	< 0.025
01/16/15	562	0.031 ± 0.003	< 0.016	07/10/15	89	0.087 ± 0.014	< 0.014
01/23/15	560	0.021 ± 0.002	< 0.012	07/16/15	262	0.014 ± 0.004	< 0.025
1/30/15	561	0.016 ± 0.002	< 0.024	07/23/15	505	0.014 ± 0.002	< 0.025
02/06/15	571	0.023 ± 0.002	< 0.018	07/30/15	507	0.020 ± 0.003	< 0.025
02/13/15	562	0.029 ± 0.003	< 0.023	08/07/15	587	0.009 ± 0.002	< 0.027
02/19/15	498	0.029 ± 0.003	< 0.013	08/14/15	512	0.019 ± 0.002	< 0.046
02/27/15	640	0.043 ± 0.003	< 0.016	08/21/15	516	0.002 ± 0.002	< 0.029
03/06/15	570	0.022 ± 0.002	< 0.011	08/28/15	521	0.014 ± 0.002	< 0.027
03/13/15	549	0.017 ± 0.002	< 0.013	09/03/15	456	0.032 ± 0.003	< 0.030
03/19/15	470	0.015 ± 0.002	< 0.015	09/11/15	577	0.022 ± 0.002	< 0.023
03/27/15	634	0.018 ± 0.002	< 0.016	09/17/15	450	0.022 ± 0.003	< 0.038
				09/25/15	596	0.018 ± 0.002	< 0.044
<b>1st Qtr</b>				<b>3rd Qtr</b>			
mean +- s.d.		0.024 ± 0.008	< 0.016	mean +- s.d.		0.022 ± 0.021	< 0.027
04/02/15	476	0.014 ± 0.002	< 0.016	10/01/15	433	0.023 ± 0.003	< 0.033
04/10/15	628	0.015 ± 0.002	< 0.012	10/09/15	601	0.011 ± 0.002	< 0.026
04/17/15	547	0.013 ± 0.002	< 0.016	10/15/15	462	0.017 ± 0.003	< 0.027
04/24/15	550	0.007 ± 0.002	< 0.013	10/22/15	726	0.016 ± 0.002	< 0.024
05/01/15	547	0.011 ± 0.002	< 0.010	10/30/15	404	0.015 ± 0.003	< 0.043
05/08/15	537	0.017 ± 0.002	< 0.014	11/06/15	536	0.024 ± 0.003	< 0.033
05/15/15	545	0.009 ± 0.002	< 0.011	11/19/15	1001	0.023 ± 0.002	< 0.008
05/22/15	537	0.010 ± 0.002	< 0.013	11/25/15	462	0.017 ± 0.003	< 0.018
05/29/15	538	0.016 ± 0.002	< 0.019	12/03/15	624	0.023 ± 0.002	< 0.034
06/05/15	532	0.010 ± 0.002	< 0.009	12/11/15	612	0.046 ± 0.003	< 0.041
06/12/15	534	0.012 ± 0.002	< 0.029	12/17/15	460	0.011 ± 0.002	< 0.033
06/18/15	528	0.006 ± 0.002	< 0.016	12/23/15	468	0.023 ± 0.003	< 0.029
06/25/15	455	0.012 ± 0.002	< 0.014	12/30/15	555	0.001 ± 0.002	< *d
<b>2nd Qtr</b>				<b>4th Qtr</b>			
mean +- s.d.		0.013 ± 0.004	< 0.018	mean +- s.d.		0.015 ± 0.003	< 0.018

\*a – Laboratory error

\*b – Error in recording data in the field

\*c = The original data sheet was not returned

\*d = Data sheet unavailable

Table 5 (continued). Wisconsin DHS air particulate gross beta and air iodine (I-131) analysis results from the Point Beach – Kewaunee environmental monitoring program.



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

**Site: PBK-18**

Collection date	Volume m <sup>3</sup>	Air particulate			Air iodine	Collection date	Volume m <sup>3</sup>	Air particulate			Air iodine
01/05/15	677	*d	±	*d	< *d	07/08/15	814	0.118	±	0.002	< 0.010
01/14/15	877	0.021	±	0.002	< 0.007	07/13/15	475	0.014	±	0.003	< 0.015
01/19/15	479	0.029	±	0.003	< 0.020	07/20/15	602	0.010	±	0.002	< 0.022
01/26/15	683	0.017	±	0.002	< 0.009	07/27/15	671	0.016	±	0.002	< 0.010
02/03/15	766	0.016	±	0.002	< 0.007	08/03/15	617	0.014	±	0.002	< 0.010
02/11/15	771	0.029	±	0.002	< 0.013	08/12/15	796	0.010	±	0.002	< 0.019
02/16/15	485	0.023	±	0.003	< 0.018	08/17/15	439	0.032	±	0.003	< 0.024
02/24/15	778	0.039	±	0.002	< 0.006	08/24/15	628	0.010	±	0.002	< 0.011
03/02/15	580	0.024	±	0.002	< 0.014	08/31/15	623	0.012	±	0.002	< 0.018
03/11/15	861	0.016	±	0.002	< 0.005	09/09/15	794	0.028	±	0.002	< 0.014
03/16/15	472	0.014	±	0.002	< 0.012	09/14/15	440	0.014	±	0.003	< 0.025
03/23/15	664	0.017	±	0.002	< 0.015	09/22/15	725	0.019	±	0.002	< 0.016
03/30/15	670	0.012	±	0.002	< 0.012	09/28/15	539	0.022	±	0.002	< 0.019
<b>1st Qtr</b>					<b>3rd Qtr</b>						
mean +- s.d.		0.021	±	0.008	< 0.011	mean +- s.d.		0.017	±	0.007	< 0.017
04/08/15	852	0.015	±	0.002	< 0.009	10/05/15	641	0.011	±	0.002	< 0.013
04/13/15	464	0.016	±	0.003	< 0.015	10/12/15	634	0.019	±	0.002	< 0.014
04/20/15	658	0.009	±	0.002	< 0.015	10/20/15	734	0.012	±	0.002	< 0.040
04/27/15	660	0.007	±	0.002	< 0.009	10/28/15	731	0.018	±	0.002	< 0.015
05/04/15	649	0.010	±	0.002	< 0.013	11/02/15	464	0.012	±	0.002	< 0.022
05/13/15	833	0.009	±	0.001	< 0.006	11/10/15	735	0.024	±	0.002	< 0.019
05/18/15	454	0.013	±	0.002	< 0.013	11/16/15	551	0.024	±	0.003	< 0.020
05/27/15	831	0.012	±	0.002	< 0.010	11/24/15	741	0.019	±	0.002	< 0.008
06/01/15	458	0.009	±	0.002	< 0.020	11/30/15	561	0.019	±	0.002	< 0.022
06/10/15	817	0.013	±	0.002	< 0.016	12/08/15	742	0.035	±	0.002	< 0.017
06/15/15	455	0.009	±	0.002	< 0.023	12/15/15	653	0.026	±	0.002	< 0.026
06/23/15	734	0.008	±	0.002	< 0.012	12/22/15	649	0.021	±	0.002	< 0.016
06/29/15	528	0.012	±	0.002	< 0.011	12/28/15	555	0.018	±	0.002	< 0.035
<b>2nd Qtr</b>					<b>4th Qtr</b>						
mean +- s.d.		0.019	±	0.029	< 0.013	mean +- s.d.		0.018	±	0.007	< 0.009

\*a – Laboratory error

\*b – Error in recording data in the field

\*c = The original data sheet was not returned

\*d = Data sheet unavailable



Table 6 Wisconsin DHS gamma isotopic analysis results from the quarterly composites of air particulate filters collected from the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/m <sup>3</sup>				
Site: PBK-1	1st quarter	2nd quarter	3 <sup>rd</sup> quarter	4th quarter
Be-7	0.067 ± 0.0045	0.055 ± 0.0035	0.0551 ± 0.0052	0.0481 ± 0.0044
Mn-54	< 0.0002	< 0.0001	< 0.0003	< 0.0003
Co-58	< 0.0002	< 0.0001	< 0.0003	< 0.0003
Fe-59	< 0.0004	< 0.0002	< 0.0006	< 0.0006
Co-60	< 0.0002	< 0.0001	< 0.0003	< 0.0003
Zn-65	< 0.0003	< 0.0002	< 0.0006	< 0.0005
Nb-95	< 0.0003	< 0.0014	< 0.0003	< 0.0003
Zr-95	< 0.0004	< 0.0002	< 0.0005	< 0.0004
Ru-103	< 0.0002	< 0.0001	< 0.0003	< 0.0003
Ru-106	< 0.0015	< 0.0007	< 0.0020	< 0.0021
I-131	< 0.0019	< 0.0018	< 0.0008	< 0.0018
Cs-134	< 0.0002	< 0.0001	< 0.0003	< 0.0003
Cs-137	< 0.0002	< 0.0002	< 0.0003	< 0.0002
Ba-140	< 0.0026	< 0.0018	< 0.0016	< 0.0029
La-140	< 0.0009	< 0.0006	< 0.0010	< 0.0012
Ce-141	< 0.0005	< 0.0002	< 0.0004	< 0.0004
Ce-144	< 0.0011	< 0.0004	< 0.0014	< 0.0009
<b>Site: PBK-4</b>				
Be-7	0.056 ± 0.0045	0.054 ± 0.0035	0.0551 ± 0.0052	0.051 ± 0.0055
Mn-54	< 0.0002	< 0.0001	< 0.0003	< 0.0004
Co-58	< 0.0002	< 0.0001	< 0.0003	< 0.0003
Fe-59	< 0.0005	< 0.0003	< 0.0006	< 0.0007
Co-60	< 0.0002	< 0.0002	< 0.0003	< 0.0005
Zn-65	< 0.0004	< 0.0002	< 0.0006	< 0.0009
Nb-95	< 0.0003	< 0.0002	< 0.0003	< 0.0005
Zr-95	< 0.0004	< 0.0002	< 0.0005	< 0.0006
Ru-103	< 0.0003	< 0.0002	< 0.0003	< 0.0004
Ru-106	< 0.0018	< 0.0010	< 0.0020	< 0.0034
I-131	< 0.0020	< 0.0018	< 0.0008	< 0.0015
Cs-134	< 0.0002	< 0.0001	< 0.0003	< 0.0004
Cs-137	< 0.0002	< 0.0001	< 0.0003	< 0.0004
Ba-140	< 0.0026	< 0.0023	< 0.0016	< 0.0028
La-140	< 0.0012	< 0.0008	< 0.0010	< 0.0011
Ce-141	< 0.0004	< 0.0003	< 0.0004	< 0.0007
Ce-144	< 0.0009	< 0.0007	< 0.0014	< 0.0017
<b>Site: PBK-7</b>				
Be-7	0.058 ± 0.0039	0.058 ± 0.0025	0.0637 ± 0.0055	0.0481 ± 0.0052
Mn-54	< 0.0001	< 0.0000	< 0.0003	< 0.0004
Co-58	< 0.0001	< 0.0000	< 0.0003	< 0.0004
Fe-59	< 0.0003	< 0.0001	< 0.0007	< 0.0008
Co-60	< 0.0001	0.0001 ± 0.0000	< 0.0005	< 0.0005
Zn-65	< 0.0003	< 0.0000	< 0.0006	< 0.0005
Nb-95	< 0.0002	0.0001 ± 0.0000	< 0.0004	< 0.0004
Zr-95	< 0.0003	< 0.0001	< 0.0005	< 0.0006
Ru-103	< 0.0002	< 0.0001	< 0.0004	< 0.0004
Ru-106	< 0.0010	< 0.0002	< 0.0028	< 0.0030
I-131	< 0.0020	< 0.0067	< 0.0010	< 0.0012
Cs-134	< 0.0001	< 0.0000	< 0.0004	< 0.0004
Cs-137	< 0.0001	< 0.0000	< 0.0005	< 0.0003
Ba-140	< 0.0024	< 0.0026	< 0.0023	< 0.0024
La-140	< 0.0009	< 0.0010	< 0.0009	< 0.0011
Ce-141	< 0.0003	< 0.0001	< 0.0005	< 0.0004
Ce-144	< 0.0006	< 0.0001	< 0.0018	< 0.0013

Radioisotopes other than those reported were not detected.

Table 6 (continued). Wisconsin DHS gamma isotopic analysis results from the quarterly composites of air particulate filters collected from the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/m <sup>3</sup>					
Site: <b>PBK-8</b>	1st quarter	2nd quarter		3 <sup>rd</sup> quarter	4th quarter
Be-7	0.059 ± 0.0043	0.063	0.0040	0.0662 ± 0.0048	0.0578 ± 0.0039
Mn-54	< 0.0002		0.0001	< 0.0002	< 0.0001
Co-58	< 0.0002		0.0001	< 0.0002	< 0.0001
Fe-59	< 0.0004		0.0003	< 0.0004	< 0.0003
Co-60	< 0.0002		0.0001	< 0.0003	< 0.0001
Zn-65	< 0.0004		0.0002	< 0.0004	< 0.0003
Nb-95	< 0.0003		0.0002	< 0.0002	< 0.0002
Zr-95	< 0.0003		0.0002	< 0.0004	< 0.0002
Ru-103	< 0.0003		0.0002	< 0.0002	< 0.0001
Ru-106	< 0.0015		0.0008	< 0.0024	< 0.0011
I-131	< 0.0020		0.0036	< 0.0005	< 0.0007
Cs-134	< 0.0002		0.0001	< 0.0003	< 0.0001
Cs-137	< 0.0002		0.0010	< 0.0003	< 0.0001
Ba-140	< 0.0029		0.0030	< 0.0011	< 0.0011
La-140	< 0.0010		0.0012	< 0.0005	< 0.0004
Ce-141	< 0.0005		0.0003	< 0.0003	< 0.0002
Ce-144	< 0.0011		0.0005	< 0.0012	< 0.0005
<b>Site: PBK-17</b>					
Be-7	0.055 ± 0.0038	0.060	0.0035	0.0613 ± 0.0058	0.0418 ± 0.0046
Mn-54	< 0.0001		0.0001	< 0.0003	< 0.0002
Co-58	< 0.0001		0.0001	< 0.0004	< 0.0003
Fe-59	< 0.0003		0.0002	< 0.0005	< 0.0006
Co-60	< 0.0002		0.0001	< 0.0004	< 0.0003
Zn-65	< 0.0003		0.0001	< 0.0007	< 0.0006
Nb-95	< 0.0002		0.0001	< 0.0004	< 0.0004
Zr-95	< 0.0002		0.0001	< 0.0006	< 0.0006
Ru-103	< 0.0002		0.0001	< 0.0003	< 0.0003
Ru-106	< 0.0011		0.0005	< 0.0026	< 0.0027
I-131	< 0.0018		0.0018	< 0.0010	< 0.0010
Cs-134	< 0.0001		0.0001	< 0.0004	< 0.0003
Cs-137	< 0.0001		0.0002	< 0.0003	< 0.0003
Ba-140	< 0.0022		0.0017	< 0.0022	< 0.0022
La-140	< 0.0008		0.0006	< 0.0007	< 0.0007
Ce-141	< 0.0003		0.0002	< 0.0005	< 0.0004
Ce-144	< 0.0006		0.0003	< 0.0016	< 0.0010
<b>Site: PBK-18</b>					
Be-7	0.061 ± 0.0042	0.048 ± 0.0032		0.0493 ± 0.0047	0.0501 ± 0.0047
Mn-54	< 0.0001	< 0.0001		< 0.0003	< 0.0003
Co-58	< 0.0002	< 0.0001		< 0.0003	< 0.0003
Fe-59	< 0.0004	< 0.0003		< 0.0005	< 0.0007
Co-60	< 0.0002	< 0.0001		< 0.0003	< 0.0004
Zn-65	< 0.0003	< 0.0002		< 0.0005	< 0.0006
Nb-95	< 0.0002	< 0.0002		< 0.0003	< 0.0003
Zr-95	< 0.0003	< 0.0002		< 0.0004	< 0.0006
Ru-103	< 0.0002	< 0.0001		< 0.0003	< 0.0003
Ru-106	< 0.0013	< 0.0008		< 0.0022	< 0.0024
I-131	< 0.0021	< 0.0018		< 0.0009	< 0.0015
Cs-134	< 0.0002	< 0.0001		< 0.0003	< 0.0003
Cs-137	< 0.0002	< 0.0001		< 0.0003	< 0.0004
Ba-140	< 0.0026	< 0.0020		< 0.0016	< 0.0025
La-140	< 0.0010	< 0.0008		< 0.0006	< 0.0008
Ce-141	< 0.0004	< 0.0002		< 0.0004	< 0.0005
Ce-144	< 0.0010	< 0.0004		< 0.0013	< 0.0018

Radioisotopes other than those reported were not detected.

Table 7 Wisconsin DHS TLD network for the Point Beach – Kewaunee environmental monitoring program.



	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Date Placed:	01/13/15	04/02/15	07/07/15	10/06/15
Date Removed:	04/02/15	07/07/15	10/06/15	01/05/16
Days in the Field:	79	96	91	91

Individual quarterly date is reported as: mR / Standard Quarter + 2 sigma counting error.

**TLD sites located at the Point Beach ISFSI.**

1	23.1 +- 1.7	26.1 +- 2.0	23.3 +- 1.8	28.4 +- 2.3
2	49.0 +- 3.5	53.4 +- 1.8	44.1 +- 1.8	57.4 +- 3.8
3	23.9 +- 1.1	23.4 +- 1.7	23.4 +- 1.7	24.0 +- 1.5
4	17.3 +- 1.1	17.8 +- 0.6	17.5 +- 1.2	21.1 +- 1.1
5	19.6 +- 0.6	17.4 +- 1.0	20.2 +- 0.5	18.2 +- 0.8
6	35.7 +- 1.0	33.7 +- 1.8	46.4 +- 1.3	35.9 +- 2.4
7	45.7 +- 1.8	52.7 +- 2.5	53.4 +- 2.0	54.3 +- 3.1
8	25.3 +- 1.1	24.5 +- 1.2	24.8 +- 1.2	26.4 +- 1.8
Quarterly average +- s.d.	30.0 +- 12.0	31.1 +- 14.5	31.6 +- 13.9	33.2 +- 14.9

**TLD sites, excluding sites 1-8, that are located 0 – 2 miles from either the Point Beach or the Kewaunee facility.**

9	15.6 +- 0.9	14.1 +- 0.8	17.0 +- 1.1	13.6 +- 0.7
10	12.5 +- 0.6	16.0 +- 1.1	13.4 +- 0.6	15.0 +- 0.7
11	11.0 +- 0.6	15.3 +- 0.8	12.3 +- 0.6	14.8 +- 0.9
12	15.7 +- 0.7	15.8 +- 0.6	17.4 +- 1.0	14.7 +- 1.1
13	12.0 +- 0.8	15.8 +- 0.7	13.6 +- 1.0	14.8 +- 0.7
14	15.8 +- 0.6	18.5 +- 1.1	15.6 +- 0.6	16.8 +- 1.4
19	14.0 +- 0.8	16.3 +- 1.2	15.5 +- 0.9	15.4 +- 1.2
20	13.1 +- 0.7	14.4 +- 1.0	14.5 +- 0.8	15.9 +- 1.1
21	11.9 +- 0.7	14.6 +- 0.9	13.7 +- 0.9	17.3 +- 1.1
22	16.1 +- 1.0	20.4 +- 0.8	18.1 +- 0.7	21.2 +- 0.9
Quarterly average +- s.d.	13.8 +- 1.9	16.1 +- 2.0	15.1 +- 1.9	16.0 +- 2.1

**TLD sites that are located 2 – 5 miles from either the Point Beach or the Kewaunee facility.**

15	14.1 +- 0.9	17.9 +- 1.1	15.0 +- 1.0	16.1 +- 0.9
16	10.5 +- 0.8	12.0 +- 1.1	11.1 +- 0.8	10.8 +- 0.8
17	13.9 +- 0.8	14.1 +- 0.7	15.8 +- 1.1	14.4 +- 0.7
18	13.5 +- 0.7	21.1 +- 1.1	14.9 +- 0.5	18.9 +- 0.9
23	14.1 +- 1.0	16.5 +- 1.5	16.0 +- 0.7	17.9 +- 2.0
24	9.0 +- 0.7	12.1 +- 0.5	9.6 +- 0.7	12.7 +- 0.8
25	12.3 +- 0.7	18.6 +- 0.9	13.6 +- 0.7	19.6 +- 1.2
26	13.3 +- 0.5	12.6 +- 1.0	14.8 +- 0.6	13.6 +- 1.0
Quarterly average +- s.d.	12.6 +- 1.9	15.6 +- 3.4	13.9 +- 2.3	15.5 +- 3.1

**TLD sites that are located greater than 5 miles from either the Point Beach or the Kewaunee facility.**

27	8.9 +- 0.5	13.3 +- 0.8	9.4 +- 0.6	14.9 +- 1.0
28	12.1 +- 0.7	13.5 +- 0.9	13.1 +- 0.8	15.3 +- 1.1
29	11.4 +- 0.6	11.1 +- 0.6	14.2 +- 0.8	12.6 +- 0.7
30	12.1 +- 0.8	15.3 +- 1.3	14.1 +- 1.0	16.4 +- 1.0
31	11.4 +- 1.0	11.7 +- 0.8	11.9 +- 1.1	12.8 +- 1.5
Quarterly average +- s.d.	11.2 +- 1.3	13.0 +- 1.7	12.5 +- 2.0	14.4 +- 1.6

ND - No data; the TLD was lost in the field.

Table 8 Wisconsin DHS analysis results for precipitation samples collected for the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of nCi/m2

monthly composite sample

Collection	Inches	Gross beta	Tritium
01/07/15	0.43	0.05 +- 0.01	< 2.3
02/04/15	0.40	0.06 +- 0.01	< 2.1
03/04/15	0.55	0.06 +- 0.01	< 2.9
04/08/15	2.78	0.15 +- 0.06	< 14.8
05/06/15	0.93	0.11 +- 0.02	< 4.9
06/02/15	5.69	0.08 +- 0.09	< 29.9
07/01/15	0.98	0.04 +- 0.02	< 5.2
08/13/15	3.87	0.14 +- 0.07	< 20.2
09/09/15	3.51	0.09 +- 0.06	< 18.3
10/07/15	2.27	0.10 +- 0.04	< 12.1
11/04/15	4.12	< 0.11	< 21.9
12/09/15	4.83	0.63 +- 0.13	< 25.5



Table 9 Wisconsin DHS analysis results for fish samples collected for the Point Beach – Kewaunee environmental monitoring program.

Measurements in units of pCi/kilogram (wet)

Collection date:	01/06/15	02/25/15	05/09/15	06/14/15
Type	White Fish	Burbot	Rainbow Trout	combined *a
gamma isotopic				
K-40	2820 +- 508	1960 +- 345	*b	1520 +- 267
Mn-54	< 11	< 7	*b	< 7
Co-58	< 10	< 9	*b	< 10
Fe-59	< 31	< 26	*b	< 23
Co-60	< 14	< 6	*b	< 8
Zn-65	< 26	< 20	*b	< 15
Nb-95	< 15	< 14	*b	< 14
Zr-95	< 16	< 19	*b	< 17
Cs-134	< 7	< 7	*b	< 6
Cs-137	< 12	< 5	*b	< 11

Collection date: 11/19/15

Type Trout /White fish

gamma isotopic

K-40	2340 +- 407
Mn-54	< 8
Co-58	< 9
Fe-59	< 22
Co-60	< 10
Zn-65	< 17
Nb-95	< 14
Zr-95	< 19
Cs-134	< 7
Cs-137	17 +- 5

Radioisotopes other than those reported were not detected.

\*a - One sample from three separate samples of 2 Burbot and 1 Lake Trout

\*b - Not enough fish for a sample



Table 10 Wisconsin DHS analysis results for shoreline sediment samples collected for the Point Beach – Kewaunee environmental monitoring program.

Measurements in units of pCi/kilogram (dry)

Collection date:	07/14/15	07/15/15	07/07/15	
Site:	PBK-5	PBK-10a	PBK-29	
gross alpha	< 4260	< 2980	< 3810	
gross beta	2800 +- 915	3220 +- 904	3320 +- 1040	
K-40	3840 +- 649	3200 +- 572	4940 +- 837	
Mn-54	< 10	< 14	< 14	
Co-58	< 17	< 22	< 29	
Fe-59	< 68	< 91	< 116	
Co-60	< 10	< 16	< 17	
Zn-65	< 22	< 32	< 44	
Nb-95	< 42	< 57	< 62	
Zr-95	< 31	< 44	< 49	
Cs-134	< 9	< 12	< 11	
Cs-137	< 13	< 15	22 +- 6	

Collection date:	07/15/15	07/15/15	07/15/15	07/14/15
Site:	PBK-12a	PBK-12b	PBK-12c	PBK-26
gross alpha	< 3910	< 4250	< 4300	< 2900
gross beta	5890 +- 1090	4540 +- 1050	6840 +- 1050	2820 +- 923
K-40	6020 +- 993	4880 +- 830	5570 +- 929	5340 +- 884
Mn-54	< 13	< 15	< 15	< 11
Co-58	< 20	< 24	< 26	< 16
Fe-59	< 71	< 87	< 87	< 65
Co-60	< 13	< 16	< 16	< 13
Zn-65	< 29	< 39	< 37	< 28
Nb-95	< 47	< 62	< 61	< 47
Zr-95	< 33	< 47	< 44	< 33
Cs-134	< 11	< 10	< 12	< 9
Cs-137	< 16	< 15	< 15	< 15

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

Radioisotopes other than those reported were not detected.

Table 11 Wisconsin DHS analysis results for surface water samples collected for the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/liter

**PBK-9; Point Beach meteorological tower**

Collection date:	01/15/15	February	03/11/15	04/16/15	05/14/15	06/11/15
gross alpha-sol	0.8 +- 0.7	*d	1.1 +- 0.8	3.2 +- 1.3	1.2 +- 0.9	< 0.9
gross beta-sol	2.0 +- 0.9	*d	1.5 +- 0.8	2.9 +- 0.9	2.1 +- 0.9	< 1.3
gross alpha-insol	< 0.6	*d	< 0.5	< 0.7	< 0.5	< 0.6
gross beta-insol	< 1.1	*d	< 1.1	< 1.1	< 1.1	< 1.0
I-131	< 0.2			< 0.11	< 0.53 <sup>b</sup>	
H-3 <sup>a</sup>	< 211			< 209		
Sr-89 <sup>a</sup>	*c			*c		
Sr-90 <sup>a</sup>	*c			*c		
gamma isotopic						
Mn-54	< 2	*d	< 10	< 2	< 8	< 7
Co-58	< 2	*d	< 7	< 2	< 8	< 7
Fe-59	< 4	*d	< 20	< 5	< 17	< 17
Co-60	< 2	*d	< 13	< 2	< 7	< 11
Zn-65	< 4	*d	< 21	< 5	< 12	< 15
Nb-95	< 2	*d	< 11	< 3	< 8	< 7
Zr-95	< 3	*d	< 21	< 4	< 13	< 12
I-131	< 2	*d	< 13	< 3	< 11	< 14
Cs-134	< 2	*d	< 12	< 3	< 7	< 9
Cs-137	< 2	*d	< 13	< 2	< 7	< 11
Ba-140	< 7	*d	< 40	< 10	< 27	< 34
La-140	< 2	*d	< 15	< 4	< 11	< 13
Collection date:	07/09/15	08/13/15	09/16/15	10/14/15	11/05/15	12/10/15
gross alpha-sol	< 0.6	< 0.6	< 0.7	0.9 +- 0.6	< 0.6	< 0.5
gross beta-sol	< 1.0	1.3 +- 0.8	1.8 +- 0.8	1.6 +- 0.8	1.8 +- 0.8	1.7 +- 0.7
gross alpha-insol	< 0.6	< 0.6	< 0.6	< 0.7	< 0.6	< 0.5
gross beta-insol	< 1.0	< 1.0	< 1.3	< 1.0	< 1.1	< 1.0
I-131		< 0.1				< 0.08
H-3 <sup>a</sup>	< 207			< 209		< 207
Sr-89 <sup>a</sup>	< 3.0			< 2.08		< 3.0
Sr-90 <sup>a</sup>	< 0.5			< 0.24		< 0.5
gamma isotopic						
Mn-54	< 7	*c	< 9	< 8	< 6	< 8
Co-58	< 7	*c	< 8	< 9	< 6	< 9
Fe-59	< 13	*c	< 15	< 16	< 12	< 16
Co-60	< 7	*c	< 9	< 13	< 8	< 9
Zn-65	< 14	*c	< 24	< 15	< 15	< 17
Nb-95	< 8	*c	< 11	< 8	< 6	< 9
Zr-95	< 11	*c	< 15	< 19	< 10	< 13
I-131	< 12	*c	< 12	< 15	< 8	< 13
Cs-134	< 7	*c	< 8	< 8	< 7	< 8
Cs-137	< 7	*c	< 11	< 12	< 7	< 9
Ba-140	< 36	*c	< 38	< 42	< 27	< 31
La-140	< 13	*c	< 14	< 13	< 12	< 15

\*a - Analysis is performed on a quarterly composite.

\*b - did not meet lower limit of detection

\*c - analysis not performed

\*d - due to safety concern sample was not taken

Radioisotopes other than those reported were not detected.

Table 11 (continued). Wisconsin DHS analysis results for surface water samples collected for the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/liter

**PBK-12a (K-001D); Kewaunee effluent channel**

Collection date:	01/06/15	02/03/15	03/02/15	04/01/15	05/05/15	06/01/15
gross alpha-sol	< 1.3	< 0.8	< 0.8	< 1.0	2.2 +- 1.1	1.2 +- 0.8
gross beta-sol	< 1.3	2.7 +- 0.9	1.5 +- 0.9	< 1.1	2.9 +- 0.9	1.8 +- 0.9
gross alpha-insol	< 0.9	< 0.7	< 0.7	< 0.6	< 0.6	< 0.7
gross beta-insol	< 1.3	< 1.1	< 1.1	< 1.3	< 1.2	< 1.1
I-131	< 0.5	< 0.2		< 0.29	< 0.55	
H-3 *a	< 211			< 209		
Sr-89 *a	*c			*c		
Sr-90 *a	*c			*c		
gamma isotopic						
Mn-54	< 8	< 1	< 7	< 5	< 6	< 7
Co-58	< 7	< 1	< 8	< 5	< 7	< 6
Fe-59	< 18	< 1	< 17	< 14	< 12	< 16
Co-60	< 9	< 1	< 9	< 7	< 7	< 8
Zn-65	< 16	< 1	< 17	< 14	< 14	< 15
Nb-95	< 10	< 1	< 7	< 6	< 7	< 7
Zr-95	< 16	< 1	< 14	< 9	< 10	< 13
I-131	< 12	< 5	< 11	< 9	< 9	< 13
Cs-134	< 8	< 1	< 8	< 6	< 7	< 8
Cs-137	< 8	< 1	< 7	< 6	< 7	< 7
Ba-140	< 39	< 7	< 35	< 27	< 31	< 36
La-140	< 15	< 2	< 13	< 12	< 10	< 14

Collection date:	07/01/15	08/03/15	09/06/15	10/01/15	11/02/15	12/01/15
gross alpha-sol	< 0.6	< 0.6	< 0.7	< 0.6	< 0.6	< 0.6
gross beta-sol	< 1.2	1.6 +- 0.7	1.6 +- 0.8	1.2 +- 0.7	1.4 +- 0.7	< 1.2
gross alpha-insol	< 0.6	< 0.6	< 0.73	< 0.7	< 0.6	< 0.6
gross beta-insol	< 1.3	< 1.0	< 1.14	< 1.1	< 1.2	1.3 +- 0.8
I-131		< 0.3		< 0.24		0.22 +- 0.11
H-3 *a	< 207			< 201		< 207
Sr-89 *a	< 3.7			< 2.34		< 3.7
Sr-90 *a	< 0.5			< 0.23		< 0.5
gamma isotopic						
Mn-54	< 2	< 3	< 9	< 9	< 7	< 7
Co-58	< 2	< 3	< 7	< 8	< 6	< 7
Fe-59	< 4	< 6	< 16	< 13	< 14	< 14
Co-60	< 2	< 4	< 10	< 8	< 10	< 6
Zn-65	< 5	< 6	< 20	< 21	< 15	< 16
Nb-95	< 3	< 3	< 9	< 9	< 7	< 8
Zr-95	< 4	< 5	< 16	< 16	< 15	< 13
I-131	< 4	< 5	< 14	< 14	< 10	< 16
Cs-134	< 2	< 3	< 8	< 8	< 7	< 8
Cs-137	< 2	< 3	< 9	< 9	< 7	< 7
Ba-140	< 11	< 14	< 48	< 38	< 33	< 35
La-140	< 4	< 6	< 12	< 12	< 13	< 13

\*a - Analysis is performed on a quarterly composite.

\*b - did not meet lower limit of detection

\*c - analysis not performed

\*d - due to safety concern sample was not taken

Radioisotopes other than those reported were not detected.



Table 11 (continued). Wisconsin DHS analysis results for surface water samples collected for the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/liter

**PBK-17; Green Bay Water Utility - Rostok**

Collection date:	01/05/15	02/02/15	03/02/15	04/06/15	05/04/15	06/01/15
gross alpha-sol	< 0.5	< 1.0	< 1.1	2.4 +- 1.1	2.1 +- 1.0	< 1.0
gross beta-sol	1.2 +- 0.7	< 1.1	< 1.2	2.3 +- 0.9	3.2 +- 1.0	1.2 +- 0.8
gross alpha-insol	< 0.5	< 0.5	< 0.5	< 0.7	< 0.5	< 0.5
gross beta-insol	< 1.0	< 1.2	< 1.3	< 1.1	< 1.0	< 1.0
I-131	< 0.5	< 0.1		< 0.2	< 0.7 *b	
H-3 *a	< 211			*b		
Sr-89 *a	*b			*b		
Sr-90 *a	*b			*b		
gamma isotopic						
Mn-54	< 10	< 8	< 9	< 9	< 7	< 7
Co-58	< 8	< 8	< 8	< 7	< 6	< 6
Fe-59	< 17	< 16	< 22	< 15	< 16	< 16
Co-60	< 13	< 8	< 11	< 8	< 7	< 6
Zn-65	< 16	< 13	< 21	< 16	< 12	< 12
Nb-95	< 8	< 9	< 8	< 8	< 7	< 8
Zr-95	< 16	< 16	< 16	< 13	< 13	< 13
I-131	< 12	< 10	< 10	< 9	< 9	< 10
Cs-134	< 9	< 9	< 10	< 6	< 7	< 7
Cs-137	< 12	< 9	< 8	< 7	< 6	< 8
Ba-140	< 41	< 29	< 32	< 30	< 27	< 29
La-140	< 10	< 14	< 14	< 12	< 7	< 9

Collection date:	07/06/15	08/04/15	09/06/15	10/12/15	11/02/15	12/07/15
gross alpha-sol	< 0.4	< 0.7	< 0.6	< 0.5	0.8 +- 0.5	< 0.6
gross beta-sol	< 0.7	< 1.0	< 1.2	1.7 +- 0.7	< 1.3	1.1 +- 0.7
gross alpha-insol	< 0.5	< 0.6	< 0.6	< 0.5	< 0.6	< 0.6
gross beta-insol	1.3 +- 0.8	< 1.2	< 1.3	< 1.3	< 1.0	< 1.0
I-131		< 0.2		< 0.1		< 0.1
H-3 *a	< 207			< 209		
Sr-89 *a	< 3.0			< 2.3		
Sr-90 *a	< 0.4			< 0.3		
gamma isotopic						
Mn-54	< 7	< 7	< 8	< 8	< 7	< 9
Co-58	< 8	< 6	< 8	< 8	< 6	< 8
Fe-59	< 19	< 21	< 15	< 15	< 14	< 16
Co-60	< 10	< 9	< 9	< 6	< 7	< 14
Zn-65	< 15	< 18	< 20	< 13	< 17	< 21
Nb-95	< 9	< 8	< 10	< 8	< 6	< 10
Zr-95	< 15	< 13	< 14	< 12	< 10	< 17
I-131	< 9	< 9	< 10	< 15	< 8	< 13
Cs-134	< 9	< 8	< 7	< 8	< 6	< 10
Cs-137	< 6	< 7	< 10	< 8	< 6	< 13
Ba-140	< 23	< 30	< 33	< 38	< 29	< 40
La-140	< 13	< 13	< 10	< 11	< 12	< 7

\*a - Analysis is performed on a quarterly composite.

\*b - did not meet lower limit of detection

\*c - analysis not performed

\*d - due to safety concern sample was not taken

Radioisotopes other than those reported were not detected.

Table 11 (continued). Wisconsin DHS analysis results for surface water samples collected for the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/liter

	<b>PBK-5</b>	<b>PBK-29</b>	<b>PBK-5</b>	<b>PBK-29</b>
Collection date:	7/14/15	7/16/15	9/16/15	9/16/15
gross alpha-sol	1.3 +- 0.6	< 0.7	< 0.6	< 0.6
gross beta-sol	2.7 < 0.9	< 1.1	1.3 +- 0.7	1.8 +- 0.7
gross alpha-insol	1.2 < 0.8	< 0.7	< 0.8	< 0.7
gross beta-insol	1.2 < 0.7	< 1.3	< 1.1	< 1.0
H-3	< 204	< 204	< 207	< 207
Sr-89	< 3.0	< 3.1	< 1.2	< 1.0
Sr-90	< 0.6	< 0.6	< 0.5	< 0.4
gamma isotopic				
Mn-54	< 9	< 7	< 8	< 8
Co-58	< 8	< 7	< 9	< 9
Fe-59	< 17	< 14	< 18	< 16
Co-60	< 8	< 11	< 9	< 13
Zn-65	< 17	< 15	< 18	< 19
Nb-95	< 8	< 8	< 7	< 10
Zr-95	< 13	< 12	< 13	< 16
I-131	< 10	< 13	< 10	< 14
Cs-134	< 8	< 9	< 9	< 8
Cs-137	< 7	< 11	< 7	< 12
Ba-140	< 30	< 38	< 36	< 48
La-140	< 12	< 14	< 13	< 12

\*a - Analysis is performed on a quarterly composite.

\*b - did not meet lower limit of detection

\*c - analysis not performed

\*d - due to safety concern sample was not taken

Radioisotopes other than those reported were not detected.

Table 12 Wisconsin DHS analysis results for well water samples collected for the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/liter

	<b>PBK-3</b>	<b>PBK-10</b>	<b>PBK-11</b>	<b>PBK-12d N</b>	<b>PBK-12d S</b>
Collection date:	07/15/15	04/15/15	07/15/15	07/15/15	07/15/15
gross alpha	< 2.6	< 1.1	< 2.2	< 2.3	< 2.7
gross beta	< 3.5	< 1.8	< 3.4	< 2.7	< 2.5
H-3	< 204	< 209	< 204	< 204	< 204
Collection date:	09/16/15	10/07/15	09/16/15	09/16/15	09/16/15
gross alpha	< 2.2	3.74 +- 1.8	< 2.2	0.6 +- 1.4	1.7 +- 1.5
gross beta	< 3.1	2.42 +- 1.4	< 3.1	2.8 +- 1.9	1.1 +- 1.4
H-3	< 207	< 210	< 207	< 207	< 207

NS – A sample was unable to be collected.

Table 13 Wisconsin DHS analysis results for milk samples collected for the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/liter

**PBK-28 (E-21); Strutz farm**

Collection date:	01/14/15	02/11/15	03/11/15	04/08/15	05/13/15	06/10/15
I-131	< 0.46	< 0.3		< 0.4	< 0.5	
Sr-90	0.45 +- 0.23	< 0.4	< 0.3	< 0.26 *b	*c	*c
gamma isotopic						
K-40	1440 +- 258	1460 +- 291	1280 +- 263	1370 +- 260	1430 +- 258	1490 +- 270
Mn-54	< 7	< 9	< 8	< 6	< 5	< 6
Co-58	< 6	< 8	< 8	< 7	< 5	< 7
Fe-59	< 12	< 23	< 20	< 17	< 13	< 16
Co-60	< 8	< 11	< 12	< 10	< 7	< 10
Zn-65	< 12	< 23	< 19	< 16	< 12	< 16
Nb-95	< 7	< 9	< 9	< 8	< 7	< 7
Zr-95	< 12	< 16	< 15	< 12	< 11	< 13
I-131	< 8	< 14	< 10	< 12	< 8	< 10
Cs-134	< 7	< 9	< 10	< 8	< 7	< 6
Cs-137	< 6	< 9	< 8	< 8	< 7	< 6
Ba-140	< 21	< 41	< 35	< 32	< 24	< 31
La-140	< 7	< 13	< 10	< 14	< 7	< 14

Collection date:	07/08/15	08/12/15	09/09/15	October	November	December
I-131		< 0.2			*d	
Sr-90	< 0.6	< 0.5	< 0.5	*d	*d	*d
gamma isotopic						
K-40	1370 +- 269	*c	1370 +- 277	*d	*d	*d
Mn-54	< 9	*c	< 10	*d	*d	*d
Co-58	< 9	*c	< 11	*d	*d	*d
Fe-59	< 18	*c	< 16	*d	*d	*d
Co-60	< 9	*c	< 10	*d	*d	*d
Zn-65	< 17	*c	< 17	*d	*d	*d
Nb-95	< 10	*c	< 9	*d	*d	*d
Zr-95	< 18	*c	< 17	*d	*d	*d
I-131	< 13	*c	< 14	*d	*d	*d
Cs-134	< 9	*c	< 7	*d	*d	*d
Cs-137	< 10	*c	< 10	*d	*d	*d
Ba-140	< 42	*c	< 43	*d	*d	*d
La-140	< 13	*c	< 14	*d	*d	*d

Radioisotopes other than those reported were not detected.

\*a = Lower Limit of Detection not met

\*b = Did not meet matrix recovery

\*c = not reported

\*d = sampling suspended

Table 13 (continued). Wisconsin DHS analysis results for milk samples collected for the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/liter

**PBK-24; Struck farm**

Collection date:	01/14/15	02/11/15	03/11/15	04/08/15	05/13/15	06/10/15
I-131	< 0.53	< 0.3		< 0.4	< 0.9	
Sr-90	0.37 +- 0.2	< 0.65 *a	< 0.4	< 0.24 *b	< 1.29 *b	*c
gamma isotopic						
K-40	1320 +- 270	1560 +- 306	1160 +- 250	1130 +- 214	1380 +- 279	1310 +- 241
Mn-54	< 9	< 9	< 11	< 6	< 8	< 7
Co-58	< 9	< 9	< 9	< 5	< 8	< 6
Fe-59	< 19	< 20	< 15	< 15	< 18	< 12
Co-60	< 10	< 12	< 15	< 8	< 12	< 8
Zn-65	< 22	< 20	< 21	< 17	< 24	< 16
Nb-95	< 10	< 9	< 10	< 5	< 10	< 6
Zr-95	< 16	< 14	< 19	< 11	< 13	< 12
I-131	< 11	< 11	< 14	< 9	< 10	< 12
Cs-134	< 9	< 9	< 12	< 6	< 9	< 7
Cs-137	< 10	< 9	< 14	< 6	< 8	< 6
Ba-140	< 33	< 36	< 44	< 27	< 34	< 31
La-140	< 12	< 11	< 14	< 14	< 10	< 7

Collection date:	7/8/15	8/12/15	9/9/15			
I-131		< 0.17			*d	
Sr-90	< 0.53	0.5 +- 0.27	0.7 +- 0.4	*d	*d	*d
gamma isotopic						
K-40	1540 +- 297	*c	1060 +- 222	*d	*d	*d
Mn-54	< 10.7	*c	< 8.46	*d	*d	*d
Co-58	< 8.48	*c	< 9.15	*d	*d	*d
Fe-59	< 18.3	*c	< 18.9	*d	*d	*d
Co-60	< 10.9	*c	< 13	*d	*d	*d
Zn-65	< 21.6	*c	< 16.3	*d	*d	*d
Nb-95	< 8.89	*c	< 9.65	*d	*d	*d
Zr-95	< 17.5	*c	< 16.2	*d	*d	*d
I-131	< 13.7	*c	< 14.2	*d	*d	*d
Cs-134	< 8.24	*c	< 9.27	*d	*d	*d
Cs-137	< 9.69	*c	< 12	*d	*d	*d
Ba-140	< 36.3	*c	< 41	*d	*d	*d
La-140	< 10.2	*c	< 13.2	*d	*d	*d

Radioisotopes other than those reported were not detected.

\*a = Lower Limit of Detection not met

\*b = Did not meet matrix recovery

\*c = not reported

\*d = sampling suspended

Table 13 (continued). Wisconsin DHS analysis results for milk samples collected for the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/liter

**PBK-27 (E-40); R. Barta farm**

Collection date:	01/14/15	02/11/15	03/11/15	04/08/15	05/13/15	06/10/15
I-131	< 0.52 *a	< 0.4		< 0.4	*c	
Sr-90	< 0.4	< 0.7	< 0.3	0.42 +- 0.18 *b	*c	*c
gamma isotopic						
K-40	1270 +- 234	1350 +- 279	1420 +- 255	1340 +- 220	1400 +- 230	1400 +- 257
Mn-54	< 6	< 11	< 5	< 2	< 4	< 8
Co-58	< 6	< 11	< 4	< 2	< 4	< 7
Fe-59	< 13	< 19	< 13	< 5	< 8	< 16
Co-60	< 7	< 14	< 8	< 3	< 5	< 11
Zn-65	< 13	< 24	< 12	< 6	< 9	< 16
Nb-95	< 7	< 9	< 5	< 3	< 5	< 9
Zr-95	< 11	< 17	< 10	< 4	< 8	< 13
I-131	< 7	< 13	< 7	< 4	< 14	< 14
Cs-134	< 7	< 11	< 7	< 2	< 5	< 8
Cs-137	< 6	< 13	< 6	< 2	< 4	< 10
Ba-140	< 23	< 44	< 22	< 11	< 30	< 38
La-140	< 7	< 13	< 8	< 4	< 10	< 9

Collection date:	07/08/15	08/12/15	09/09/15	*d	*d	*d
I-131		< 0.2			*d	
Sr-90	< 0.6	< 0.5	< 0.5	*d	*d	*d
gamma isotopic						
K-40	1370 +- 269	*c	1370 +- 277	*d	*d	*d
Mn-54	< 9	*c	< 10	*d	*d	*d
Co-58	< 9	*c	< 11	*d	*d	*d
Fe-59	< 18	*c	< 16	*d	*d	*d
Co-60	< 9	*c	< 10	*d	*d	*d
Zn-65	< 17	*c	< 17	*d	*d	*d
Nb-95	< 10	*c	< 9	*d	*d	*d
Zr-95	< 18	*c	< 17	*d	*d	*d
I-131	< 13	*c	< 14	*d	*d	*d
Cs-134	< 9	*c	< 7	*d	*d	*d
Cs-137	< 10	*c	< 10	*d	*d	*d
Ba-140	< 42	*c	< 43	*d	*d	*d
La-140	< 13	*c	< 14	*d	*d	*d

Radioisotopes other than those reported were not detected.

\*a = Lower Limit of Detection not met

\*b = Did not meet matrix recovery

\*c = not reported

\*d = sampling suspended

Table 14 Wisconsin DHS analysis results for vegetation samples collected for the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/kilogram (wet)

Site:	PBK-1	PBK-2	PBK-3	PBK-4	PBK-5
Collection date:	07/16/15	07/15/15	07/15/15	07/14/15	07/14/15
gross alpha	< 1980	< 1610	< 1200	< 1350	< 1550
gross beta	5670 +- 630	5290 +- 506	3950 +- 422	5010 +- 531	4220 +- 459
gamma isotopic					
Be-7	1500 +- 204	1100 +- 199	900 +- 185	1040 +- 168	543 +- 145
K-40	6230 +- 1110	6140 +- 1130	3990 +- 859	3890 +- 733	7020 +- 1300
Mn-54	< 24	< 27	< 29	< 22	< 27
Co-58	< 23	< 32	< 30	< 21	< 29
Fe-59	< 52	< 66	< 80	< 47	< 57
Co-60	< 34	< 40	< 40	< 32	< 40
Zn-65	< 56	< 66	< 63	< 47	< 67
Nb-95	< 27	< 36	< 39	< 25	< 27
Zr-95	< 44	< 56	< 62	< 37	< 43
I-131	< 42	< 66	< 61	< 56	< 46
Cs-134	< 24	< 33	< 26	< 20	< 22
Cs-137	< 32	< 42	< 26	< 31	< 29
Ba-140	< 120	< 171	< 148	< 129	< 135
La-140	< 38	< 44	< 79	< 33	< 54

Site:	PBK-7	PBK-8	PBK-14	PBK-17
Collection date:	07/15/15	07/14/15	07/15/15	07/14/15
gross alpha	< 2420	< 1160	< 853	< 769
gross beta	3590 +- 627	5070 +- 444	1930 +- 257	2550 +- 269
gamma isotopic				
Be-7	1650 +- 183	1020 +- 93	261 +- 97	1190 +- 185
K-40	5880 +- 1010	6080 +- 989	3950 +- 796	4220 +- 794
Mn-54	< 18	< 10	< 23	< 24
Co-58	< 20	< 10	< 23	< 25
Fe-59	< 47	< 25	< 60	< 52
Co-60	< 21	< 14	< 28	< 27
Zn-65	< 45	< 23	< 62	< 52
Nb-95	< 24	< 13	< 24	< 30
Zr-95	< 37	< 20	< 32	< 40
I-131	< 65	< 32	< 38	< 60
Cs-134	< 19	< 11	< 20	< 25
Cs-137	< 19	< 13	< 20	< 25
Ba-140	< 125	< 74	< 114	< 138
La-140	< 40	< 20	< 47	< 40

Radioisotopes other than those reported were not detected.

\*a – required detection limit was not met due to laboratory error

Table 14 (continued). Wisconsin DHS analysis results for vegetation samples collected for the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/kilogram (wet)

Site:	PBK-1	PBK-2	PBK-3	PBK-4	PBK-5
Collection date:	09/16/15	09/16/15	09/16/15	09/16/15	09/16/15
gross alpha	< 1460	< 1460	< 973	< 1670	< 988
gross beta	6400 +- 520	2670 +- 393	1740 +- 254	3000 +- 433	5930 +- 323
gamma isotopic					
Be-7	4980 +- 391	4440 +- 353	1250 +- 154	3140 +- 292	3020 +- 340
K-40	6000 +- 1090	4980 +- 916	4730 +- 838	5580 +- 1010	7390 +- 1340
Mn-54	< 28	< 26	< 21	< 26	< 27
Co-58	< 24	< 26	< 19	< 26	< 31
Fe-59	< 69	< 66	< 46	< 65	< 71
Co-60	< 30	< 34	< 31	< 32	< 33
Zn-65	< 59	< 63	< 43	< 66	< 55
Nb-95	< 26	< 30	< 23	< 29	< 33
Zr-95	< 35	< 44	< 37	< 38	< 52
I-131	< 64	< 70	< 74	< 72	< 72
Cs-134	< 23	< 26	< 21	< 25	< 29
Cs-137	< 26	< 27	< 28	< 22	< 27
Ba-140	< 153	< 151	< 150	< 158	< 181
La-140	< 65	< 65	< 46	< 65	< 62
<b>Site:</b>	<b>PBK-7</b>	<b>PBK-8</b>	<b>PBK-14</b>	<b>PBK-17</b>	
Collection date:	09/16/15	09/16/15	09/16/15	09/17/15	
gross alpha	< 1600	< 801	< 734	< 864	
gross beta	5110 +- 472	7740 +- 389	4970 +- 309	5020 +- 311	
gamma isotopic					
Be-7	4090 +- 359	1110 +- 184	1260 +- 228	1250 +- 207	
K-40	7090 +- 1230	6650 +- 1210	4920 +- 990	6190 +- 1150	
Mn-54	< 23	< 29	< 30	< 32	
Co-58	< 23	< 23	< 31	< 29	
Fe-59	< 57	< 60	< 63	< 61	
Co-60	< 26	< 36	< 37	< 32	
Zn-65	< 50	< 56	< 84	< 69	
Nb-95	< 29	< 34	< 35	< 29	
Zr-95	< 44	< 56	< 54	< 54	
I-131	< 76	< 74	< 73	< 64	
Cs-134	< 23	< 28	< 27	< 28	
Cs-137	< 25	< 33	< 27	< 24	
Ba-140	< 155	< 165	< 161	< 130	
La-140	< 44	< 50	< 52	< 50	

Radioisotopes other than those reported were not detected.

\*a – required detection limit was not met due to laboratory error

Table 15 Wisconsin DHS analysis results for soil samples collected for the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/kilogram (dry)

Site:	PBK-1	PBK-2	PBK-3	PBK-4	PBK-5
Collection date:	07/16/15	07/15/15	07/15/15	07/14/15	07/14/15
gross alpha	8860 +- 3490	7710 +- 3210	6660 +- 3180	1200 +- 4170	11200 +- 3630
gross beta	14500 +- 1290	18100 +- 1360	18300 +- 1480	15400 +- 1330	17200 +- 1340
gamma isotopic					
Cs-134	< 20	< 19	< 19	< 19	< 19
Cs-137	99.1 +- 17	130 +- 17	121 +- 17	100 +- 15	147 +- 19
Co-58	< 41	< 36	< 45	< 35	< 39
Co-60	< 24	< 25	< 26	< 24	< 24
Fe-59	< 184	< 144	< 164	< 134	< 149
Mn-54	< 28	< 23	< 26	< 23	< 23
Nb-95	< 79	< 93	< 94	< 92	< 97
K-40	13000 +- 2110	21200 +- 3420	21400 +- 3350	17500 +- 2840	19000 +- 3060
Zn-65	< 69	< 65	< 66	< 61	< 55
Zr-95	< 88	< 81	< 86	< 76	< 75

Site:	PBK-7	PBK-8	PBK-14	PBK-17
Collection date:	07/15/15	07/14/15	07/14/15	07/14/15
gross alpha	7720 +- 3250	9160 +- 3720	10200 +- 3830	11700 +- 3700
gross beta	17200 +- 1340	18900 +- 1440	21100 +- 1530	15300 +- 1290
gamma isotopic				
Cs-134	< 20	< 18	< 17	< 15
Cs-137	170 +- 19	59.4 +- 13	120 +- 16	< 19
Co-58	< 40	< 35	< 37	< 33
Co-60	< 30	< 24	< 22	< 18
Fe-59	< 176	< 133	< 150	< 119
Mn-54	< 27	< 22	< 22	< 18
Nb-95	< 91	< 94	< 96	< 69
K-40	22700 +- 3550	19800 +- 3200	20000 +- 3220	14100 +- 2270
Zn-65	< 69	< 60	< 58	< 47
Zr-95	< 81	< 88	< 75	< 61

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

Radioisotopes other than those reported were not detected.



Table 15 (continued). Wisconsin DHS analysis results for soil samples collected for the Point Beach – Kewaunee environmental monitoring program.



Measurements in units of pCi/kilogram (dry)

Site:	PBK-1	PBK-2	PBK-3	PBK-4	PBK-5
Collection date:	09/16/15	09/16/15	09/18/15	09/16/15	09/16/15
gross alpha	2990 +- 2740	6850 +- 3110	9450 +- 3360	6410 +- 3270	9710 +- 3710
gross beta	< 1360	15700 +- 1410	19900 +- 1420	16100 +- 1440	20600 +- 1450
gamma isotopic					
Cs-134	< 20	< 18	< 24	< 22	< 23
Cs-137	277 +- 29	247 +- 27	134 +- 20	114 +- 18	146 +- 22
Co-58	< 23	< 23	< 35	< 27	< 34
Co-60	< 27	< 24	< 27	< 21	< 25
Fe-59	< 63	< 84	< 94	< 81	< 86
Mn-54	< 22	< 23	< 29	< 24	< 27
Nb-95	< 32	< 47	< 55	< 48	< 58
K-40	13900 +- 2290	13600 +- 2240	20400 +- 3330	15600 +- 2560	19200 +- 3140
Zn-65	< 47	< 61	< 69	< 57	< 67
Zr-95	< 47	< 56	< 64	< 57	< 62
<b>Site:</b>	<b>PBK-7</b>	<b>PBK-8</b>	<b>PBK-14</b>	<b>PBK-17</b>	
Collection date:	09/16/15	09/16/15	09/16/15	09/17/15	
gross alpha	7800 +- 3780	8890 +- 3680	13200 +- 3880	13100 +- 4170	
gross beta	21000 +- 1460	18900 +- 1470	21600 +- 1430	11200 +- 1230	
gamma isotopic					
Cs-134	< 25	< 21	127 < 25	< 19	
Cs-137	175 +- 24	68 +- 15	< 42	128 +- 19	
Co-58	< 33	< 22	< 27	< 19	
Co-60	< 31	< 29	< 27	< 27	
Fe-59	< 111	< 79	< 89	< 64	
Mn-54	< 31	< 27	< 30	< 20	
Nb-95	< 61	< 34	< 54	< 30	
K-40	21700 +- 3530	17300 +- 2830	17600 +- 2900	13500 +- 2220	
Zn-65	< 69	< 54	< 76	< 51	
Zr-95	< 68	< 50	< 63	< 43	

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

Radioisotopes other than those reported were not detected.

## Appendices

### Appendix A – Radionuclide Concentration Levels needing review by state radiological coordinator (SRC)

Should radioactivity concentrations exceed SRC review levels for a given radionuclide, the SRC will be consulted for review and assessment.

Medium	Radionuclide	SRC Review Level <sup>a</sup>
Airborne Particulates or Gas (pCi/m <sup>3</sup> )	Gross Beta	1
	I-131 (Charcoal)	0.1
	Cs-134	1
	Cs-137	1
Precipitation (pCi/l)	H-3	1,000
Water (pCi/l)	Gross Alpha	10
	Gross Beta	30
	H-3	10,000
	Mn-54	100
	Fe-59	40
	Co-58	100
	Co-60	30
	Zn-65	30
	Zr-Nb-95	40
	I-131	1
	Cs-134	10
	Cs-137	20
	Ba-La-140	100
	Sr-89	8
Sr-90	8 <sup>d</sup>	
Milk (pCi/l)	I-131	1
	Cs-134	20
	Cs-137	20
	Ba-La-140	100
	Sr-89	10
Grass (Vegetation), Cattle Feed, and Vegetables (pCi/kg wet)	Gross Beta	30,000
	I-131	100
	Cs-134	200
	Cs-137	200
	Sr-89	1,000
	Sr-90	1,000
Eggs (pCi/kg wet)	Gross Beta	30,000
	Cs-134	200
	Cs-137	200
	Sr-89	1,000

	Sr-90	1,000
Soil, Bottom Sediment (pCi/kg)	Gross Beta	5,000
	Cs-134	5,000
	Cs-137	5,000
	Sr-89	5,000
	Sr-90	5,000
Meat (pCi/kg)	Gross Beta (Flesh, Bones)	10,000
	Cs-134 (Flesh)	1,000
	Cs-137 (Flesh)	2,000
	Sr-89 (Bones)	2,000
	Sr-90 (Bones)	2,000
Fish (pCi/kg wet)	Gross Beta (Flesh, Bones)	10,000
	Mn-54	--
	Fe-59	--
	Co-58	--
	Co-60	--
	Cs-134 (Flesh)	1,000
	Cs-137 (Flesh)	2,000
	Sr-89 (Bones)	2,000
	Sr-90 (Bones)	2,000
	Zn-65 (Bones)	--
Thermoluminescent Dosimeter (mR/Std Qtr)	Direct Exposure	

- a. Radionuclides will be monitored by Wisconsin Dept. of Health Services, Radiation Protection Sections, Environmental Monitoring program and concentrations above the listed levels will be reported to the Wisconsin state radiological coordinator (SRC) for further review and assessment.
- b. For drinking water (well water) samples, this is a 40 CFR Part 141 value. If no drinking water pathway exists, a value of 30,000 pCi/l may be used. (NUREG-1301. Supplement No. 1, page 64, table 3.12-2)
- c. If no drinking water pathway exists, a value of 20 pCi/l may be used. (NUREG-1301. Supplement No. 1, page 64, table 3.12-2)
- d. Drinking Water values from Prescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA-600/4-80-032, August 1980.

## Appendix B – Sample Point Locations

The sample point locations.

Sample Point	Location Description
PBK-1	Francar residence
PBK-1	Francar residence
PBK-2	Southwest corner property line - Point Beach
PBK-3	Two Creeks Town Hall
PBK-3	Two Creeks Town Hall
PBK-4	Residence north property line - Point Beach
PBK-5	Two Creeks Park; NW corner of property
PBK-5	Two Creeks Park; NW corner of property
PBK-7	WPSC substation, Cty V
PBK-8	P Ihlenfeldt farm
PBK-9	Point Beach, meteorological tower
PBK-10a	Point Beach, effluent channel
PBK-10b	Point Beach, entrance
PBK-11	Two Creeks International Harvester
PBK-12a	Kewaunee, effluent channel
PBK-12b	Kewaunee, effluent channel, 500 feet N
PBK-12c	Kewaunee, effluent channel, 500 feet S
PBK-12d	Kewaunee, well sites
PBK-14	Nuclear Road – field east of parking lot
PBK-17	Green Bay Pumping Station - Rostok
PBK-17	Green Bay Pumping Station - Rostok
PBK-18	Kewaunee, meteorological tower
PBK-24	L. Struck farm
PBK-26	Kewaunee
PBK-29	Irish Road – at Lake Michigan
PBK-51-58	KPS ISFSI on the inside of the perimeter fence
PBK-T1-8	Point Beach ISFSI on outside of perimeter fence
PBK-T9	Point Beach north property line, Lakeshore Road
PBK-T10	Nuclear Road, 0.6 mile E of Lakeshore Road
PBK-T11	Nuclear Road, 0.1 mile E of Lakeshore Road
PBK-T12	Highway 42, 0.6 mile N of Nuclear Road
PBK-T13	Highway 42, 0.3 mile N of Tapawingo Road
PBK-T14	Two Creeks Road, 0.1 mile E of Highway 42
PBK-T15	Junction of Lakeshore Road and Ravine Drive
PBK-T16	Cty V, 0.5 mile W of Hwy 42
PBK-T17	Junction of Saxonbury Road and Tapawingo Road
Sample Point	Location Description

PBK-T18	Zander Road, 0.1 mile W on Tannery Road
PBK-T20	Junction of Cty BB and Ratajcsak Lane
PBK-T28	Kewaunee, South on Hwy 42
PBK-T29	Two Rivers, Junction of Hwy 42 and 34th Avenue
PBK-T30	Manitowoc, Hwy 42, Two Rivers Chamber of Commerce
PBK-T31	Mishicot, Cty V, in front of house #653
PBK-T51	KPS ISFSI on the inside of the perimeter fence
PBK-T52	KPS ISFSI on the inside of the perimeter fence
PBK-T53	KPS ISFSI on the inside of the perimeter fence
PBK-T54	KPS ISFSI on the inside of the perimeter fence
PBK-T55	KPS ISFSI on the inside of the perimeter fence
PBK-T56	KPS ISFSI on the inside of the perimeter fence
PBK-T57	KPS ISFSI on the inside of the perimeter fence
PBK-T58	KPS ISFSI on the inside of the perimeter fence

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