Point Beach-Kewaunee
Environmental Radioactivity Survey

2016

WISCONSIN DEPARTMENT
of HEALTH SERVICES

Division of Public Health
Bureau of Environmental and Occupational Health
Radiation Protection Section

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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 2016 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 2016, 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 2016 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 Kewaunee Station-Point Beach nuclear power facilities and other monitoring areas will continue to be evaluated.

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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 2016 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 2 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 3 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 Kewaunee Station and Figure 2 is a map showing the location of environmental sampling sites in relation to the Point Beach power plant.

Program Modifications

The program modification implemented for 2016: Kewanee Station's movement of spent fuel from the spent fuel pool to the Independent Spent Fuel Storage Installation (ISFSI) resulted in modification of thermoluninescent dosometer (TLD) locations around Kewaunee Power Station. Summarized in Table 1, Eight TLDs were renamed and relocated to the chain link fence surrounding the ISFSI.

Table 1 Renaming of TLDs for relocation along the ISFSI's fence

Old TLD #	New TLD #
PBK-T19	PBK-51
PBK-T21	PBK-52
PBK-T22	PBK-53
PBK-T23	PBK-54
PBK-T24	PBK-55
PBK-T25	PBK-56
PBK-T26	PBK-57
PBK-T27	PBK-58

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 for environmental samples, 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 are reported as either a "less than" (<) value or an actual activity value. The reporting of results in Table 5 under the heading "Range" and in Tables 6-16 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 $\pm$).

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.

Table 1 Sample collection summary and required analyses for 2016.

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	311	4	GA, GB, GI[w]
air iodine	C/W	4, 17, 18	156	2	GI
precipitation	C/BW	1, 4	12	0	GB[x,u], H[x]
TLD	G/Q	T1–T18, T20, T28-T31, T51–T58	124	1	ambient gamma
surface water	G/M	9, 12a, 17	35	1	GA[u,v], GB[u,v], GI, Sr[z], H[z], I[y]
surface water	G/SA	5, 29	4	0	GA[u,v], GB[u,v], GI, Sr, H
fish	G/Q	10a	16	0	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[y], 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

[u] = Soluble

[v] = Insoluble

[w] = A quarterly composite for each site

[x] = One monthly composite from 2 sites

[y] = The procedure is performed six (6) times per year for each sample site

[z] = The procedure is performed for each site on a quarterly composite (3-month composite)

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
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-T19	0.7 N	5.0 N	Junction of Sandy Bay Road and Lakeview Road (discontinued in January 2016, relocated renamed to T-51)
PBK-T20	1.4 SW	3.4 NNW	Junction of Cty BB and Ratajcsak Lane
PBK-T21	1.3 W	4.5 NNW	Junction of Nuclear Road and Woodside Road (discontinued in January 2016, relocated renamed to T-52)
PBK-T22	1.2 NW	5.3 N	Sandy Bay Road, 0.4 mile W of Hwy 42 (discontinued in January 2016, relocated renamed to T-53)

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

Sample site	Distance and direction (miles)		Location description
	Kewaunee	Point Beach	
PBK-T23	4.9 WSW	5.5 NW	Cty B, S of Tisch Mills (discontinued in January 2016, relocated renamed to T-54)
PBK-T24	3.8 NW	7.0 NNW	Jct of Norman Road and Cty G (discontinued in January 2016, relocated renamed to T-55)
PBK-T25	3.1 NNW	7.2 N	Woodside Road, 0.2 miles S of Old Settlers Road (discontinued in January 2016, relocated renamed to T-56)
PBK-T26	3.0 N	7.3 N	Old Settlers Road, 0.1 mile W of Cemetery Road (discontinued in January 2016, relocated renamed to T-57)
PBK-T27	17.4 NNE	21.6 NNE	Algoma, S on Hwy 42 (discontinued in January 2016, relocated renamed to T-58)
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 2016.

Sample type	Date	Site	Explanation
TLD	1st quarter	PBK-T11	No data, TLD lost in the field.
Air particulate	4-6-16	PBK-1	Original datasheet missing – volume unavailable
Air particulate	4-13-16	PBK-1	Original datasheet missing – volume unavailable
Air particulate	9-28-16	PBK-1	Original datasheet missing – volume unavailable
Air particulate	4-13-16	PBK-4	Original datasheet missing – volume unavailable
Air particulate	4-18-16	PBK-4	Original datasheet missing – volume unavailable
Air particulate	3-2-16	PBK-7	Original datasheet missing – volume unavailable
Air particulate	4-6-16	PBK-7	Original datasheet missing – volume unavailable
Air particulate	4-13-16	PBK-7	Original datasheet missing – volume unavailable
Air particulate	4-20-16	PBK-7	Original datasheet missing – volume unavailable
Air particulate	8-11-16	PBK-7	Original datasheet missing – volume unavailable
Air particulate	9-28-16	PBK-7	Data sheet unavailable
Air particulate	12-22-16	PBK-7	Data sheet unavailable
Air particulate	2-23-16	PBK-8	Original datasheet missing – volume unavailable
Air particulate	4-5-16	PBK-8	Original datasheet missing – volume unavailable
Air particulate	4-12-16	PBK-8	Original datasheet missing – volume unavailable
Air particulate	4-19-16	PBK-8	Original datasheet missing – volume unavailable
Air particulate	9-20-16	PBK-8	Original datasheet missing – volume unavailable
Air particulate	11-15-16	PBK-8	Original datasheet missing – volume unavailable

Table 3 (continued) Missing sample or deviation report for 2016.

Sample type	Date	Site	Explanation
Air particulate	11-29-16	PBK-8	Data sheet unavailable
Air iodine	4-8-16	PBK-17	Data sheet unavailable
Air particulate	4-8-16	PBK-17	Original datasheet missing – volume unavailable
Air particulate	3-31-16	PBK-17	Data sheet unavailable
Air iodine	3-31-16	PBK-17	Data sheet unavailable
Air particulate	4-15-16	PBK-17	Original datasheet missing – volume unavailable
Air particulate	2-29-16	PBK-18	Low air volume – power outage
Surface water	Dec 16	PBK-9	No sample, the sample site was not accessible

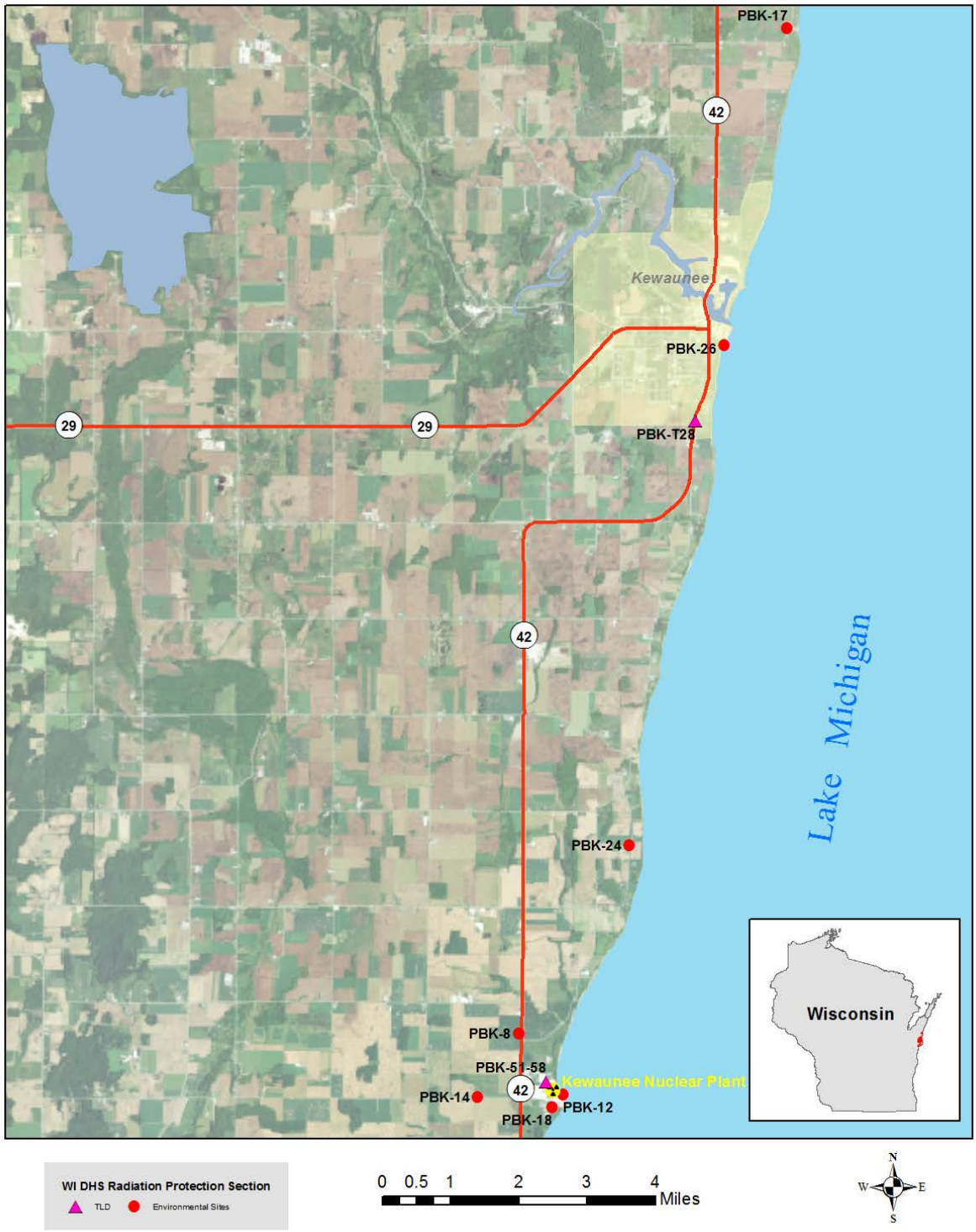

Figure 1 Point Beach-Kewaunee environmental monitoring sampling sites in relation to the Kewaunee plant.

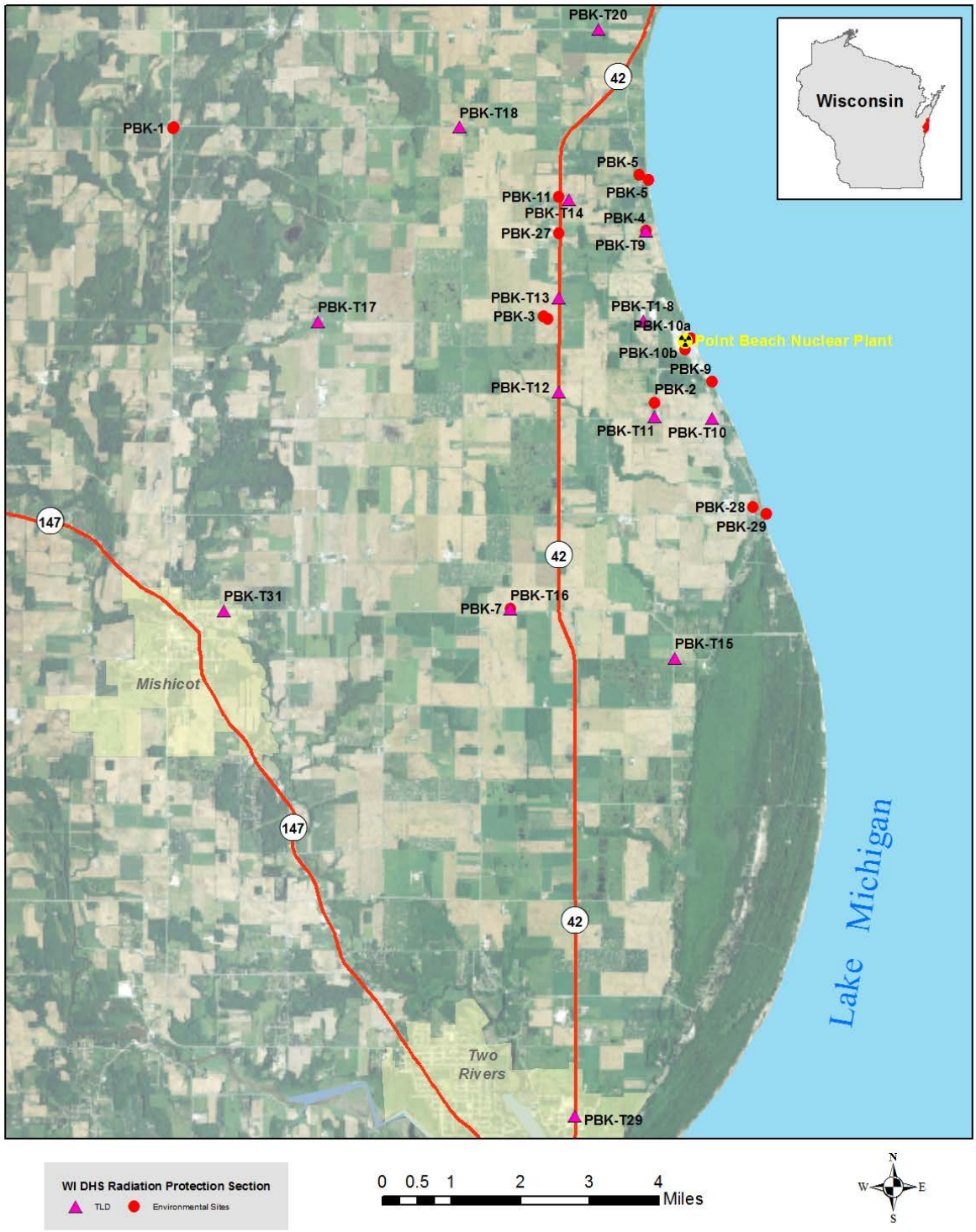

Figure 2 Point Beach-Kewaunee environmental monitoring sampling sites in relation to the Point Beach plant.

Results and Discussion for the Wisconsin DHS Point Beach-Kewaunee Environmental Monitoring program

Air Particulate

Table 5 provides a summary of reported activities by DHS for air particulate samples. Tables 6–7 provide results from the individual sample analyses.

From the gross beta activities listed in Table 6, 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 Kewaunee Station or the Point Beach nuclear plant operation.

The gamma isotopic analysis of the quarterly air particulate filter composites detected only small amounts of the radioisotopes listed in Table 7. All other radioisotopes were below their respective LLD. 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 and was detected in air composites from other areas of the state.

Air Iodine

Table 5 provides a summary of reported activities by DHS for air iodine samples. Table 6 provides results from the individual sample analyses.

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

Ambient Gamma Radiation—Thermoluminescent Dosimeters (TLD)

Table 5 provides a summary of reported activities by DHS for ambient gamma radiation. Table 8 provides results from the individual sample analyses.

Analysis of samples taken at varying distances from either the Kewaunee Station 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 (PBK-T1 – PBK-T8), the average quarterly exposure from the remaining 23 sites was 14.6 $\pm$ 1.4 milliroentgens. The average quarterly exposure for 2016 was at background levels and was comparable to other areas in Wisconsin. Influence by the Kewaunee Station or the Point Beach nuclear generating facilities on air quality is not evident from ambient gamma radiation analysis.

Precipitation

Table 5 provides a summary of reported activities by DHS for precipitation. Table 9 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 Station or Point Beach nuclear generating facilities on air quality is not evident from precipitation sample analysis.

Fish

Table 5 provides a summary of reported activities by DHS for fish samples. Table 10 provides results from the individual sample analyses. The fish samples showed no unusual activities.

Shoreline Sediment

Table 5 provides a summary of reported activities by DHS for shoreline sediment samples. Table 11 provides results from the individual sample analyses.

Analysis of the shoreline samples showed no unusual activities. All samples indicated naturally occurring potassium-40 (^{40}K). Previous years' reported activities also detected cesium-137 (^{137}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}U) and thorium-232 (^{232}Th) decay series, but they have not been quantified or reported. Sample analysis indicates that neither the Kewaunee Station nor the Point Beach nuclear generating facilities influenced shoreline sediment activity levels.

Surface Water

Table 5 provides a summary of reported activities by DHS for surface water samples. Table 12 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 and chemically extracted iodine.

From the gamma isotopic analysis, all radioisotopes were below their respective LLD. All reported activities for gross beta, gross alpha, and tritium (^{3}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 Station or Point Beach nuclear generating facilities is not evident from surface water sample analysis.

Well Water

Table 5 provides a summary of reported activities by DHS for well water samples. Table 13 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}H) were less than its LLD. The measured activities were all below state and federal standards. Influence by the Kewaunee Station or Point Beach nuclear generating facilities is not evident from well water sample analysis.

Milk

Table 5 provides a summary of reported activities by DHS for milk samples. Table 14 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 and chemically extracted iodine.

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

Vegetation

Table 5 provides a summary of reported activities by DHS for vegetation samples. Table 15 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}K) and beryllium-7 (^{7}Be) listed in Table 5. Influence by the Kewaunee or Point Beach nuclear generating facilities is not evident from vegetation sample analysis.

Soil

Table 5 provides a summary of reported activities by DHS for soil samples. Table 16 provides results from the individual sample analyses.

Analysis of the soil samples showed no unusual activities. Naturally occurring potassium-40 (^{40}K) was detected in all samples. The reported activities for cesium-137 (^{137}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}U) and thorium-232 (^{232}Th) decay series are commonly detected but have not been quantified or reported.

Point Beach Independent Spent Fuel Storage Installation

Table 8 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. In 2016 average standard quarterly ambient gamma exposure for sites T9 –T31 was 14.8 ± 1.4 milliroentgens and for sites T1–T8 varied from 17.0–63.5 milliroentgens per standard quarter depending on the distance from the storage casks.

Kewaunee Station Independent Spent Fuel Storage Installation

Table 8 provides a summary of reported activities by DHS for ambient gamma radiation monitored in the vicinity of the Kewaunee Station Independent Spent Fuel Storage Installation (ISFSI).

Thermoluminescent dosimeter (TLD) measurements did not detect ambient gamma exposure above background at sites T51–T58, located on the Kewaunee Station ISFSI perimeter fence. TLD measurements did not detect an increase in ambient gamma exposure levels at sites T9, T18, and T20 (1.4–3.1 miles from the Point Beach ISFSI). In 2016, average standard quarterly ambient gamma exposure for sites T9–T31 was 14.8 ± 1.4 milliroentgens, and for sites T51–T58 varied from 11.4–19.1 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 [a]	Analysis	Range
Air particulate (pCi/m^3)	**0.005**	**312 / 308**	**gross beta**	**0.003 - 0.179**
			gamma isotopic	
	0.020	24 / 24	Be-7	0.032 - 0.114
	0.002	24 / 0	Mn-54	< 0.0004
	0.002	24 / 0	Co-58	< 0.0004
	0.005	24 / 0	Fe-59	< 0.0068
	0.002	24 / 0	Co-60	< 0.0006
	0.005	24 / 0	Zn-65	< 0.0008
	0.002	24 / 0	Nb-95	< 0.0037
	0.005	24 / 0	Zr-95	< 0.0053
	0.002	24 / 0	Ru-103	< 0.0035
	0.015	24 / 0	Ru-106	< 0.0042
	0.020	24 / 0	I-131	< 0.0016
	0.002	24 / 0	Cs-134	< 0.0005
	0.002	24 / 0	Cs-137	< 0.0005
	0.030	24 / 0	Ba-140	< 0.0032
	0.020	24 / 0	La-140	< 0.0012
	0.002	24 / 0	Ce-141	< 0.0008
	0.005	24 / 0	Ce-144	< 0.0024
Air iodine (pCi/m^3)	**0.07**	**156 / 2**	**I-131**	**< 0.195**
Surface water	**3.0**	**39 / 0**	**gross alpha (sol)**	**< 1.0 – 2.1**
(pCi/liter)	**3.0**	**39 / 1**	**gross beta (sol)**	**< 2.2 – 3.3**
	3.0	39 / 0	gross alpha (insol)	< 1.3 – 0.8
	3.0	39 / 0	gross beta (insol)	< 1.9 – 1.6
	0.5	15 / 2	I-131	< 0.5
	300	16 / 0	H-3	< 150 - 204
	2.0	16 / 0	Sr-89	< 1.4
	1.0	16 / 0	Sr-90	< 0.7
			gamma isotopic	
	15	39 / 0	Mn-54	< 3.4 – 2.3
	15	39 / 0	Co-58	< 9.0
	30	39 / 0	Fe-59	< 18.9 – 2.9
	15	39 / 0	Co-60	< 9.5 – 1.2
	30	39 / 0	Zn-65	< 20.1
	15	39 / 0	Nb-95	< 10.4
	30	39 / 0	Zr-95	< 16.0
	15	39 / 0	I-131	< 13.2
	15	39 / 0	Cs-134	< 9.8
	15	39 / 0	Cs-137	< 10.4
	60	39 / 0	Ba-140	< 37.7
	15	39 / 0	La-140	< 16.3

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

Sample type (units)	LLD	Number of samples [a]	Analysis	Range
Fish			**gamma isotopic**	
(pCi/kg wet)	**800**	**16 / 16**	**K-40**	**1810 – 3570**
	50	16 / 0	Mn-54	< 11
	60	16 / 0	Co-58	< 13
	130	16 / 0	Fe-59	< 60
	70	16 / 0	Co-60	< 13
	130	16 / 0	Zn-65	< 32
	50	16 / 1	Nb-95	< 69
	100	16 / 0	Zr-95	< 22
	50	16 / 0	Cs-134	< 11
	60	16 / 0	Cs-137	< 10 - 27
Shoreline sediment	**15000**	**7 / 0**	**gross alpha**	**< 4450 - 10700**
(pCi/kg dry)	**6000**	**7 / 1**	**gross beta**	**< 2060 - 18900**
			gamma isotopic	
	80	7 / 0	Cs-134	< 13.3
	80	7 / 0	Cs-137	< 16 - 31
	90	7 / 0	Co-58	< 15
	90	7 / 0	Co-60	< 17
	600	7 / 0	Fe-59	< 46
	60	7 / 0	Mn-54	< 13
	100	7 / 0	Nb-95	< 26
	800	7 / 7	K-40	< 3320 - 7210
	300	7 / 0	Zn-65	< 32
	200	7 / 0	Zr-95	< 29
Vegetation	**5000**	**18 / 0**	**gross alpha**	**< 1700 - 1620**
(pCi/kg wet)	**4000**	**18 / 15**	**gross beta**	**1990 - 7160**
			gamma isotopic	
	600	18 / 17	Be-7	531 - 5560
	2000	18 / 18	K-40	3350 - 6660
	90	18 / 0	Mn-54	< 34
	100	18 / 0	Co-58	< 29
	200	18 / 0	Fe-59	< 66
	100	18 / 0	Co-60	< 43
	250	18 / 0	Zn-65	< 75
	100	18 / 0	Nb-95	< 40
	200	18 / 0	Zr-95	< 63
	80	18 / 0	I-131	< 73
	80	18 / 0	Cs-134	< 33
	90	18 / 0	Cs-137	< 42
	350	18 / 0	Ba-140	< 177
	100	18 / 0	La-140	< 60

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

Sample type (units)	LLD	Number of samples [a]	Analysis	Range
Soil	**13000**	**18 / 0**	**gross alpha**	**5440 - 12200**
(pCi/kg dry)	**6000**	**18 / 18**	**gross beta**	**10700 - 23500**
			gamma isotopic	
	80	18 / 0	Cs-134	< 28
	80	18 / 10	Cs-137	< 30 - 283
	90	18 / 1	Co-58	< 159
	90	18 / 0	Co-60	< 30
	600	18 / 0	Fe-59	< 2970
	60	18 / 0	Mn-54	< 29
	100	18 / 1	Nb-95	< 6520
	800	18 / 18	K-40	3540 - 22600
	300	18 / 0	Zn-65	< 73
	250	18 / 1	Zr-95	< 423
Milk	**0.5**	**18 / 1**	**I-131**	**< 0.6**
(pCi/liter)	**1.5**	**36 / 2**	**Sr-90**	**< 0.9 - 1.2**
			gamma isotopic	
	500	36 / 24	K-40	1235 -1557
	15	36 / 0	Mn-54	<4
	15	36 / 0	Co-58	<8
	40	36 / 0	Fe-59	<9
	15	36 / 0	Co-60	<4
	40	36 / 0	Zn-65	<9
	15	36 / 0	Nb-95	<4
	40	36 / 0	Zr-95	<8
	15	36 / 0	I-131	<7
	15	36 / 0	Cs-134	<6
	15	36 / 0	Cs-137	<5
	60	36 / 0	Ba-140	<20
	15	36 / 0	La-140	<5
Well water	**5.0**	**10 / 1**	**gross alpha**	**< 1.6 – 5.5**
(pCi/liter)	**3.0**	**10 / 2**	**gross beta**	**< 2.8 – 4.3**
	300	10 / 0	H-3	< 211
Precipitation	**1.5**	**12 / 0**	**gross beta**	**< 0.2 – 0.42**
(nCi/m^2)	**300**	**12 / 0**	**H-3**	**< 30**
Ambient radiation	**1.0** [c]	**123 / 123**	**exposure**	**10.6 – 63.5**
(mR/Std Qtr)				

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^3

Site: PBK-1

Collection date	Volume m^3	Air Particulate	Collection date	Volume m^3	Air Particulate
01/06/16	566	0.030 ± 0.003	07/06/16	503.8	0.017 ± 0.002
01/14/16	619	0.023 ± 0.002	07/13/16	521.2	0.017 ± 0.002
01/20/16	482	0.025 ± 0.003	07/20/16	496.8	0.016 ± 0.002
01/27/16	566	0.024 ± 0.002	07/27/16	510.7	0.019 ± 0.002
02/04/16	636	0.016 ± 0.002	08/03/16	521.2	0.014 ± 0.002
02/10/16	483	0.021 ± 0.003	08/11/16	590.7	0.020 ± 0.002
02/17/16	546	0.016 ± 0.002	08/17/16	441.3	0.021 ± 0.002
02/24/16	549	0.015 ± 0.002	08/24/16	510.7	0.018 ± 0.002
03/02/16	549	0.018 ± 0.002	08/31/16	510.0	0.018 ± 0.002
03/10/16	622	0.017 ± 0.002	09/07/16	517.0	0.018 ± 0.002
03/16/16	448	0.014 ± 0.002	09/14/16	524.0	0.014 ± 0.002
03/23/16	514	0.012 ± 0.002	09/21/16	517.0	0.021 ± 0.002
03/30/16	528	0.014 ± 0.002	09/28/16	*c	0.016 ± 0.002
1st Qtr			**3rd Qtr**		
mean +- s.d.		0.019 ± 0.005	mean +- s.d.		0.018 ± 0.002
04/06/16	*c	0.017 ± 0.002	10/05/16	524	0.017 ± 0.002
04/13/16	*c	0.014 ± 0.002	10/12/16	535	0.021 ± 0.002
04/20/16	*c	0.017 ± 0.002	10/19/16	531	0.019 ± 0.002
04/27/16	521	0.013 ± 0.002	10/26/16	538	0.014 ± 0.002
05/04/16	511	0.011 ± 0.002	11/02/16	535	0.015 ± 0.002
05/11/16	532	0.008 ± 0.002	11/09/16	549	0.028 ± 0.002
05/18/16	514	0.011 ± 0.002	11/16/16	535	0.022 ± 0.002
05/25/16	525	0.020 ± 0.002	11/22/16	461	0.031 ± 0.002
06/01/16	525	0.013 ± 0.002	11/30/16	619	0.029 ± 0.002
06/08/16	511	0.009 ± 0.002	12/07/16	542	0.017 ± 0.002
06/15/16	511	0.013 ± 0.002	12/15/16	647	0.018 ± 0.001
06/22/16	507	0.016 ± 0.002	12/20/16	359	0.028 ± 0.002
06/29/16	518	0.011 ± 0.002	12/28/16	623	0.022 ± 0.002
2nd Qtr			**4th Qtr**		
mean +- s.d.		0.021 ± 0.010	mean +- s.d.		0.022 ± 0.006

*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^3

Site: PBK-4

Collection date	Volume m^3	Air particulate	Air iodine	Collection date	Volume m^3	Air particulate	Air iodine
01/05/16	537	0.024 ± 0.003	< 0.034	07/05/16	589	0.010 ± 0.002	< 0.019
01/13/16	530	0.021 ± 0.002	< 0.037	07/13/16	597	0.018 ± 0.002	< 0.028
01/19/16	372	0.028 ± 0.003	< 0.024	07/18/16	373	0.013 ± 0.002	< 0.053
01/27/16	306	0.035 ± 0.004	< 0.024	07/25/16	522	0.019 ± 0.002	< 0.023
02/01/16	664	0.011 ± 0.003	< 0.016	08/02/16	594	0.011 ± 0.001	< 0.015
02/10/16	422	0.024 ± 0.003	< 0.031	08/10/16	589	0.016 ± 0.002	< 0.028
02/16/16	424	0.015 ± 0.003	< 0.024	08/15/16	368	0.022 ± 0.002	< 0.042
02/23/16	519	0.014 ± 0.002	< 0.030	08/23/16	579	0.018 ± 0.002	< 0.025
02/29/16	432	0.018 ± 0.002	< 0.042	08/30/16	499	0.018 ± 0.002	< 0.021
03/09/16	671	0.015 ± 0.002	< 0.010	09/07/16	551	0.018 ± 0.002	< 0.028
03/14/16	375	0.017 ± 0.002	< 0.027	09/14/16	477	0.013 ± 0.002	< 0.030
03/21/16	512	0.007 ± 0.002	< 0.012	09/20/16	407	0.021 ± 0.002	< 0.034
03/28/16	514	0.013 ± 0.002	< 0.017	09/26/16	409	0.016 ± 0.002	< 0.028
1st Qtr				**3rd Qtr**			
mean +- s.d.		0.019 ± 0.008	< 0.042	mean +- s.d.		0.016 ± 0.004	< 0.053
04/04/16	512	0.012 ± 0.002	< 0.020	10/03/16	479	0.015 ± 0.002	< 0.013
04/13/16	*c	0.013 ± 0.001	< 0.024	10/12/16	606	0.021 ± 0.002	< 0.015
04/18/16	*c	0.016 ± 0.002	< 0.018	10/17/16	347	0.020 ± 0.002	< 0.022
04/26/16	576	0.010 ± 0.002	< 0.005	10/24/16	464	0.012 ± 0.002	< 0.015
05/04/16	589	0.010 ± 0.002	< 0.025	10/31/16	469	0.013 ± 0.002	< 0.023
05/11/16	519	0.007 ± 0.002	< 0.018	11/09/16	601	0.026 ± 0.002	< 0.044
05/16/16	368	0.008 ± 0.002	< 0.033	11/14/16	327	0.017 ± 0.002	< 0.059
05/23/16	530	0.014 ± 0.002	< 0.016	11/21/16	464	0.039 ± 0.002	< 0.015
05/31/16	594	0.016 ± 0.002	< 0.013	11/29/16	529	0.024 ± 0.002	< 0.012
06/08/16	594	0.010 ± 0.002	< 0.014	12/05/16	389	0.019 ± 0.002	< 0.022
06/13/16	370	0.014 ± 0.002	< 0.020	12/14/16	569	0.018 ± 0.002	< 0.195
06/20/16	527	0.014 ± 0.002	< 0.021	12/21/16	429	0.021 ± 0.002	< 0.012
06/27/16	522	0.012 ± 0.002	< 0.031	12/28/16	464	0.021 ± 0.002	< 0.035
2nd Qtr				**4th Qtr**			
mean +- s.d.		0.012 ± 0.003	< 0.033	mean +- s.d.		0.021 ± 0.007	< 0.195

*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^3

Site: PBK-7

Collection date	Volume m^3	Air particulate	Collection date	Volume m^3	Air particulate
01/06/16	527	0.030 ± 0.003	07/06/16	454	0.018 ± 0.002
01/14/16	607	0.023 ± 0.002	07/13/16	464	0.018 ± 0.002
01/20/16	607	0.007 ± 0.001	07/21/16	498	0.016 ± 0.002
01/27/16	524	0.024 ± 0.003	07/27/16	379	0.017 ± 0.002
02/04/16	592	0.016 ± 0.002	08/03/16	444	0.015 ± 0.002
02/10/16	461	0.022 ± 0.003	08/11/16	*c	0.024 ± 0.002
02/17/16	507	0.016 ± 0.002	08/17/16	383	0.023 ± 0.002
02/24/16	517	0.014 ± 0.002	08/24/16	439	0.020 ± 0.002
03/02/16	*c	0.179 ± 0.002	08/31/16	447	0.020 ± 0.002
03/10/16	580	0.017 ± 0.002	09/08/16	552	0.017 ± 0.002
03/16/16	422	0.013 ± 0.002	09/14/16	425	0.015 ± 0.002
03/23/16	502	0.010 ± 0.002	09/21/16	468	0.022 ± 0.002
03/30/16	498	0.014 ± 0.002	*d	*d	*d *d *d
1st Qtr			**3rd Qtr**		
mean +- s.d.		0.030 ± 0.045	mean +- s.d.		0.018 ± 0.003
04/06/17	*c	0.013 ± 0.002	10/05/16	484	0.017 ± 0.002
04/13/16	*c	0.015 ± 0.002	10/12/16	484	0.022 ± 0.002
04/20/16	*c	0.016 ± 0.002	10/19/16	486	0.018 ± 0.002
04/27/16	483	0.014 ± 0.002	10/26/16	486	0.013 ± 0.002
05/04/16	478	0.009 ± 0.002	11/02/16	486	0.016 ± 0.002
05/11/16	498	0.008 ± 0.002	11/09/16	497	0.029 ± 0.002
05/18/16	456	0.010 ± 0.002	11/16/16	470	0.025 ± 0.002
05/25/16	471	0.019 ± 0.002	11/30/16	547	0.031 ± 0.002
06/01/16	478	0.014 ± 0.002	12/07/16	486	0.018 ± 0.002
06/09/16	517	0.010 ± 0.002	12/15/16	579	0.020 ± 0.002
06/15/16	398	0.014 ± 0.002	*d	*d	*d *d *d
06/22/16	449	0.017 ± 0.002	12/28/16	563	0.022 ± 0.002
06/29/16	454	0.013 ± 0.002			
2nd Qtr			**4th Qtr**		
mean +- s.d.		0.013 ± 0.003	mean +- s.d.		0.021 ± 0.006

*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^3

Site: PBK-8

Collection date	Volume m^3	Air particulate	Collection date	Volume m^3	Air particulate
01/05/16	482	0.040 ± 0.003	07/05/16	479	0.015 ± 0.002
01/12/16	533	0.023 ± 0.003	07/12/16	435	0.024 ± 0.002
02/23/16	*c	0.017 ± 0.002	07/19/16	447	0.019 ± 0.002
01/26/16	601	0.026 ± 0.003	07/26/16	428	0.022 ± 0.002
02/02/16	530	0.019 ± 0.002	08/02/16	403	0.016 ± 0.002
02/09/16	523	0.020 ± 0.002	08/09/16	403	0.021 ± 0.002
02/16/16	561	0.017 ± 0.002	08/16/16	400	0.029 ± 0.002
02/23/16	*c	0.017 ± 0.002	08/23/16	396	0.021 ± 0.002
03/01/16	533	0.020 ± 0.002	08/30/16	387	0.023 ± 0.002
03/08/16	558	0.017 ± 0.002	09/06/16	438	0.020 ± 0.002
03/15/16	514	0.017 ± 0.002	09/13/16	432	0.019 ± 0.002
03/22/16	488	0.013 ± 0.002	09/20/16	*c	0.022 ± 0.002
03/29/16	482	0.018 ± 0.002	09/27/16	462	0.017 ± 0.002
1st Qtr			**3rd Qtr**		
mean +- s.d.		0.020 ± 0.007	mean +- s.d.		0.021 ± 0.004
04/05/16	*c	0.017 ± 0.002	10/04/16	398	0.018 ± 0.002
04/12/16	*c	0.167 ± 0.002	10/11/16	408	0.024 ± 0.002
04/19/16	*c	0.020 ± 0.002	10/18/16	435	0.029 ± 0.002
04/26/16	517	0.032 ± 0.002	10/25/16	523	0.014 ± 0.002
05/03/16	504	0.011 ± 0.002	11/01/16	445	0.016 ± 0.002
05/10/16	517	0.009 ± 0.002	11/08/16	537	0.033 ± 0.002
05/17/16	530	0.010 ± 0.002	11/15/16	*c	0.018 ± 0.002
05/24/16	546	0.018 ± 0.002	11/22/16	520	0.040 ± 0.002
05/31/16	517	0.018 ± 0.002	*d	*d	*d *d *d
06/07/16	514	0.010 ± 0.002	12/06/16	506	0.026 ± 0.002
06/14/16	498	0.014 ± 0.002	12/13/16	496	0.020 ± 0.002
06/21/16	482	0.016 ± 0.002	12/20/16	551	0.028 ± 0.002
06/28/16	488	0.013 ± 0.002	12/27/16	469	0.030 ± 0.002
2nd Qtr			**4th Qtr**		
mean +- s.d.		0.027 ± 0.042	mean +- s.d.		0.025 ± 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^3

Site: PBK-17

Collection date	Volume m^3	Air particulate	Air iodine	Collection date	Volume m^3	Air particulate	Air iodine
01/08/16	688	0.029 ± 0.002	< 0.024	07/08/16	502	0.018 ± 0.002	< 0.056
01/14/16	477	0.021 ± 0.003	< 0.025	07/14/16	435	0.015 ± 0.002	< 0.024
01/22/16	634	0.023 ± 0.002	< 0.013	07/21/16	577	0.014 ± 0.002	< 0.004
01/29/16	556	0.020 ± 0.002	< 0.027	07/29/16	503	0.016 ± 0.002	< 0.029
02/04/16	491	0.016 ± 0.002	< 0.014	08/05/16	503	0.016 ± 0.002	< 0.022
02/15/16	844	0.016 ± 0.002	< 0.011	08/12/16	502	0.020 ± 0.002	< 0.042
02/19/16	313	0.017 ± 0.003	< 0.031	08/19/16	501	0.021 ± 0.002	< 0.035
02/26/16	539	0.013 ± 0.002	< 0.026	08/26/16	505	0.014 ± 0.002	< 0.055
03/04/16	550	0.014 ± 0.002	< 0.041	09/02/16	493	0.016 ± 0.002	< 0.044
03/11/16	536	0.017 ± 0.002	< 0.017	09/09/16	493	0.019 ± 0.002	< 0.030
03/18/16	538	0.010 ± 0.002	< 0.020	09/16/16	492	0.014 ± 0.002	< 0.032
03/24/16	466	0.012 ± 0.002	< 0.037	09/23/16	495	0.023 ± 0.002	< 0.032
*d	*d	*d *d *d		09/30/16	501	0.0144 ± 0.002	< 0.048
1st Qtr				**3rd Qtr**			
mean +- s.d.		0.017 ± 0.005	< 0.041	mean +- s.d.		0.017 ± 0.003	< 0.056
04/01/16	617	0.014 ± 0.002	< 0.024	10/07/16	495	0.021 ± 0.002	< 0.032
04/08/16	*c	0.015 ± 0.002	< 0.025	10/14/16	506	0.015 ± 0.002	< 0.038
04/15/16	*c	0.012 ± 0.002	< 0.013	10/21/16	502	0.017 ± 0.002	< 0.014
04/22/16	530	0.014 ± 0.002	< 0.027	10/28/16	510	0.010 ± 0.001	< 0.025
04/29/16	532	0.012 ± 0.002	< 0.014	11/04/16	504	0.017 ± 0.002	< 0.043
05/06/16	530	0.007 ± 0.002	< 0.011	11/11/16	511	0.030 ± 0.002	< 0.029
05/13/16	399	0.010 ± 0.002	< 0.031	11/17/16	435	0.031 ± 0.002	< 0.036
05/19/16	461	0.007 ± 0.002	< 0.026	11/23/16	443	0.024 ± 0.002	< 0.031
05/27/16	583	0.003 ± 0.001	< 0.041	12/02/16	658	0.028 ± 0.002	< 0.010
06/03/16	513	0.010 ± 0.002	< 0.017	12/09/16	523	0.015 ± 0.002	< 0.026
06/10/16	516	0.010 ± 0.002	< 0.020	12/16/16	528	0.021 ± 0.002	< 0.019
06/17/16	509	0.014 ± 0.002	< 0.037	12/21/16	373	0.027 ± 0.002	< 0.054
06/24/16	502	0.014 ± 0.002	< 0.024	12/29/16	659	0.022 ± 0.002	< 0.042
2nd Qtr				**4th Qtr**			
mean +- s.d.		0.011 ± 0.003	< 0.043	mean +- s.d.		0.021 ± 0.006	< 0.054

*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/m3

Site: PBK-18

Collection date	Volume m^3	Air particulate	Air iodine	Collection date	Volume m^3	Air particulate	Air iodine
01/05/16	741	0.024 ± 0.002	< 0.023	07/05/16	691	0.010 ± 0.001	< 0.015
01/13/16	746	0.019 ± 0.002	< 0.021	07/13/16	685	0.017 ± 0.002	< 0.013
01/19/16	569	0.025 ± 0.002	< 0.011	07/18/16	436	0.013 ± 0.002	< 0.046
01/27/16	744	0.021 ± 0.002	< 0.021	07/25/16	691	0.016 ± 0.002	< 0.028
02/01/16	472	0.018 ± 0.003	< 0.025	08/02/16	684	0.012 ± 0.001	< 0.015
02/10/16	845	0.015 ± 0.002	< 0.018	08/10/16	678	0.016 ± 0.001	< 0.013
02/16/16	568	0.014 ± 0.002	< 0.018	08/15/16	427	0.021 ± 0.002	< 0.032
02/23/16	666	0.013 ± 0.002	< 0.029	08/23/16	682	0.017 ± 0.001	< 0.021
02/29/16	57	0.014 ± 0.012	< 0.047	08/30/16	608	0.017 ± 0.001	< 0.022
03/09/16	852	0.015 ± 0.001	< 0.007	09/07/16	663	0.015 ± 0.001	< 0.016
03/14/16	463	0.013 ± 0.002	< 0.023	09/14/16	584	0.014 ± 0.001	< 0.026
03/21/16	650	0.008 ± 0.001	< 0.015	09/20/16	501	0.021 ± 0.002	< 0.029
03/28/16	650	0.014 ± 0.002	< 0.021	09/26/16	503	0.016 ± 0.002	< 0.033
1st Qtr				**3rd Qtr**			
mean +- s.d.		0.016 ± 0.005	< 0.047	mean +- s.d.		0.016 ± 0.003	< 0.046
04/04/16	648	0.012 ± 0.001	< 0.014	10/03/16	594	0.012 ± 0.001	< 0.031
04/13/16	844	0.013 ± 0.001	< 0.009	10/12/16	764	0.021 ± 0.001	< 0.012
04/18/16	474	0.016 ± 0.002	< 0.183	10/17/16	436	0.019 ± 0.002	< 0.023
04/26/16	717	0.011 ± 0.001	< 0.014	10/24/16	592	0.012 ± 0.001	< 0.019
05/04/16	736	0.009 ± 0.001	< 0.020	10/31/16	601	0.012 ± 0.001	< 0.020
05/11/16	642	0.008 ± 0.001	< 0.015	11/09/16	772	0.027 ± 0.001	< 0.034
05/16/16	455	0.009 ± 0.002	< 0.016	11/14/16	432	0.013 ± 0.002	< 0.047
05/23/16	641	0.015 ± 0.002	< 0.004	11/21/16	605	0.040 ± 0.002	< 0.013
05/31/16	710	0.015 ± 0.001	< 0.010	11/29/16	702	0.025 ± 0.002	< 0.011
06/08/16	713	0.007 ± 0.001	< 0.009	12/05/16	521	0.020 ± 0.002	< 0.015
06/13/16	441	0.014 ± 0.002	< 0.015	12/14/16	787	0.020 ± 0.001	< 0.010
06/20/16	608	0.012 ± 0.002	< 0.021	12/21/16	603	0.025 ± 0.002	< 0.015
06/27/16	603	0.012 ± 0.002	< 0.036	12/28/16	618	0.021 ± 0.002	< 0.031
2nd Qtr				**4th Qtr**			
mean +- s.d.		0.012 ± 0.003	< 0.183	mean +- s.d.		0.020 ± 0.008	< 0.047

*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^3

Site: PBK-1	1st quarter	2nd quarter	3rd quarter	4th quarter
Be-7	0.101 +- 0.008	0.073 +- 0.007	0.073 +- 0.007	0.043 +- 0.005
Mn-54	< 0.0003	< 0.0003	< 0.0003	< 0.0002
Co-58	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Fe-59	< 0.0008	< 0.0006	< 0.0006	< 0.0006
Co-60	< 0.0006	< 0.0004	< 0.0004	< 0.0003
Zn-65	< 0.0008	< 0.0008	< 0.0008	< 0.0006
Nb-95	< 0.0004	< 0.0004	< 0.0004	< 0.0002
Zr-95	< 0.0006	< 0.0006	< 0.0006	< 0.0006
Ru-103	< 0.0004	< 0.0003	< 0.0003	< 0.0004
Ru-106	< 0.0031	< 0.0033	< 0.0033	< 0.0026
I-131	< 0.0009	< 0.0010	< 0.0010	< 0.0009
Cs-134	< 0.0004	< 0.0004	< 0.0004	< 0.0003
Cs-137	< 0.0005	< 0.0003	< 0.0003	< 0.0003
Ba-140	< 0.0025	< 0.0023	< 0.0023	< 0.0019
La-140	< 0.0008	< 0.0010	< 0.0010	< 0.0009
Ce-141	< 0.0006	< 0.0005	< 0.0005	< 0.0004
Ce-144	< 0.0021	< 0.0016	< 0.0016	< 0.0012
Site: PBK-4				
Be-7	0.0926 +- 0.0079	0.0772 +- 0.0068	0.0772 +- 0.0068	0.0317 +- 0.0040
Mn-54	< 0.0004	< 0.0003	< 0.0003	< 0.0004
Co-58	< 0.0004	< 0.0003	< 0.0003	< 0.0003
Fe-59	< 0.0006	< 0.0068	< 0.0007	< 0.0005
Co-60	< 0.0004	< 0.0003	< 0.0003	< 0.0003
Zn-65	< 0.0007	< 0.0008	< 0.0008	< 0.0007
Nb-95	< 0.0004	< 0.0037	< 0.0004	< 0.0004
Zr-95	< 0.0006	< 0.0005	< 0.0005	< 0.0008
Ru-103	< 0.0003	< 0.0003	< 0.0003	< 0.0004
Ru-106	< 0.0032	< 0.0029	< 0.0029	< 0.0029
I-131	< 0.0010	< 0.0013	< 0.0013	< 0.0010
Cs-134	< 0.0004	< 0.0004	< 0.0004	< 0.0003
Cs-137	< 0.0004	< 0.0003	< 0.0003	< 0.0004
Ba-140	< 0.0018	< 0.0024	< 0.0024	< 0.0028
La-140	< 0.0004	< 0.0010	< 0.0010	< 0.0008
Ce-141	< 0.0006	< 0.0006	< 0.0006	< 0.0005
Ce-144	< 0.0018	< 0.0016	< 0.0016	< 0.0013
Site: PBK-7				
Be-7	0.1000 +- 0.0086	0.0744 +- 0.0065	0.0744 +- 0.0065	0.0526 +- 0.0053
Mn-54	< 0.0004	< 0.0004	< 0.0004	< 0.0003
Co-58	< 0.0004	< 0.0004	< 0.0004	< 0.0004
Fe-59	< 0.0008	< 0.0010	< 0.0010	< 0.0008
Co-60	< 0.0005	< 0.0006	< 0.0006	< 0.0003
Zn-65	< 0.0008	< 0.0008	< 0.0008	< 0.0006
Nb-95	< 0.0004	< 0.0005	< 0.0005	< 0.0004
Zr-95	< 0.0006	< 0.0007	< 0.0007	< 0.0006
Ru-103	< 0.0003	< 0.0005	< 0.0005	< 0.0004
Ru-106	< 0.0042	< 0.0040	< 0.0040	< 0.0032
I-131	< 0.0010	< 0.0015	< 0.0015	< 0.0012
Cs-134	< 0.0005	< 0.0004	< 0.0004	< 0.0003
Cs-137	< 0.0004	< 0.0005	< 0.0005	< 0.0004
Ba-140	< 0.0022	< 0.0027	< 0.0027	< 0.0029
La-140	< 0.0005	< 0.0012	< 0.0012	< 0.0008
Ce-141	< 0.0006	< 0.0008	< 0.0008	< 0.0005
Ce-144	< 0.0021	< 0.0024	< 0.0024	< 0.0016

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^3

Site: PBK-8	1st quarter	2nd quarter	3rd quarter	4th quarter
Be-7	0.1140 +- 0.0093	0.0901 +- 0.0072	0.0901 +- 0.0072	0.0621 +- 0.0060
Mn-54	< 0.0004	< 0.0003	< 0.0003	< 0.0003
Co-58	< 0.0004	< 0.0003	< 0.0003	< 0.0003
Fe-59	< 0.0007	< 0.0008	< 0.0008	< 0.0008
Co-60	< 0.0004	< 0.0004	< 0.0004	< 0.0003
Zn-65	< 0.0006	< 0.0007	< 0.0007	< 0.0007
Nb-95	< 0.0005	< 0.0004	< 0.0004	< 0.0005
Zr-95	< 0.0007	< 0.0006	< 0.0006	< 0.0006
Ru-103	< 0.0004	< 0.0004	< 0.0004	< 0.0004
Ru-106	< 0.0034	< 0.0031	< 0.0031	< 0.0030
I-131	< 0.0010	< 0.0016	< 0.0016	< 0.0014
Cs-134	< 0.0004	< 0.0004	< 0.0004	< 0.0003
Cs-137	< 0.0003	< 0.0004	< 0.0004	< 0.0003
Ba-140	< 0.0024	< 0.0032	< 0.0032	< 0.0027
La-140	< 0.0009	< 0.0010	< 0.0010	< 0.0010
Ce-141	< 0.0006	< 0.0006	< 0.0006	< 0.0006
Ce-144	< 0.0020	< 0.0017	< 0.0017	< 0.0017
Site: PBK-17				
Be-7	0.0808 +- 0.0069	0.0678 +- 0.0060	0.0687 +- 0.0057	0.0555 +- 0.0054
Mn-54	< 0.0004	< 0.0004	< 0.0004	< 0.0003
Co-58	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Fe-59	< 0.0008	< 0.0007	< 0…664	< 0.0007
Co-60	< 0.0005	< 0.0003	< 0.0003	< 0.0003
Zn-65	< 0.0008	< 0.0007	< 0.0007	< 0.0006
Nb-95	< 0.0004	< 0.0004	< 0.0004	< 0.0004
Zr-95	< 0.0005	< 0.0006	< 0.0006	< 0.0006
Ru-103	< 0.0004	< 0.0035	< 0.0003	< 0.0003
Ru-106	< 0.0032	< 0.0026	< 0.0026	< 0.0030
I-131	< 0.0013	< 0.0008	< 0.0008	< 0.0011
Cs-134	< 0.0004	< 0.0004	< 0.0004	< 0.0003
Cs-137	< 0.0005	< 0.0003	< 0.0003	< 0.0003
Ba-140	< 0.0026	< 0.0023	< 0.0023	< 0.0023
La-140	< 0.0011	< 0.0007	< 0.0007	< 0.0009
Ce-141	< 0.0007	< 0.0005	< 0.0005	< 0.0005
Ce-144	< 0.0021	< 0.0016	< 0.0016	< 0.0015
Site: PBK-18				
Be-7	0.0880 +- 0.0069	0.0725 +- 0.0062	0.0725 +- 0.0062	0.0468 +- 0.0046
Mn-54	< 0.0002	< 0.0003	< 0.0003	< 0.0003
Co-58	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Fe-59	< 0.0006	< 0.0007	< 0.0007	< 0.0004
Co-60	< 0.0004	< 0.0003	< 0.0003	< 0.0003
Zn-65	< 0.0006	< 0.0006	< 0.0006	< 0.0005
Nb-95	< 0.0003	< 0.0004	< 0.0004	< 0.0003
Zr-95	< 0.0053	< 0.0005	< 0.0005	< 0.0005
Ru-103	< 0.0004	< 0.0003	< 0.0003	< 0.0003
Ru-106	< 0.0027	< 0.0003	< 0.0026	< 0.0011
I-131	< 0.0010	< 0.0011	< 0.0011	< 0.0008
Cs-134	< 0.0003	< 0.0003	< 0.0003	< 0.0002
Cs-137	< 0.0004	< 0.0002	< 0.0002	< 0.0003
Ba-140	< 0.0022	< 0.0023	< 0.0023	< 0.0018
La-140	< 0.0008	< 0.0009	< 0.0009	< 0.0005
Ce-141	< 0.0005	< 0.0005	< 0.0005	< 0.0003
Ce-144	< 0.0017	< 0.0015	< 0.0015	< 0.0010

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:	1/12-13/16	4/6-7/16	7/12-13/16	10/13-14/16
Date Removed:	4/6-7/16	7/12-13/16	10/13-14/16	1/10-11/17
Average Days is the Field:	84-86	96-98	93-94	89-90
Location:	Individual quarterly data is reported as: mR / Standard Quarter +- 2 sigma counting error.			
TLD sites located at the Point Beach ISFSI				
1	22.7 +- 2.0	28.6 +- 1.9	29.4 +- 2.2	34.2 +- 2.1
2	48.5 +- 2.4	51.6 +- 2.1	58.2 +- 2.8	63.5 +- 3.4
3	22.4 +- 1.7	22.0 +- 0.8	37.0 +- 2.4	41.1 +- 2.5
4	17.0 +- 1.4	19.8 +- 0.8	22.0 +- 2.0	24.5 +- 1.3
5	21.0 +- 1.9	17.7 +- 0.9	23.3 +- 0.7	20.9 +- 1.2
6	44.4 +- 1.9	36.1 +- 2.4	53.5 +- 1.6	43.8 +- 2.9
7	52.1 +- 1.8	53.4 +- 2.9	58.9 +- 2.5	56.2 +- 4.0
8	24.3 +- 1.4	26.4 +- 1.6	28.0 +- 1.6	28.2 +- 1.8
Quarterly average +- s.d.	31.6 +- 14.2	32.0 +- 0.8	38.8 +- 0.7	39.1 +- 1.0
TLD sites, excluding sites 1- 8, that are located 0 - 2 miles from either the Point Beach or the Kewaunee facility.				
9	15.8 +- 1.1	14.7 +- 0.9	18.2 +- 1.5	14.0 +- 1.4
10	11.4 +- 0.6	16.7 +- 0.9	16.8 +- 1.0	16.8 +- 1.1
11	ND	15.5 +- 0.9	16.2 +- 1.0	15.8 +- 1.1
12	15.7 +- 1.2	16.0 +- 1.0	19.2 +- 1.0	15.9 +- 1.1
13	10.7 +- 1.0	16.0 +- 0.7	16.0 +- 1.2	15.2 +- 1.0
14	13.7 +- 0.8	17.8 +- 1.1	16.2 +- 0.7	17.4 +- 1.0
20	12.8 +- 0.9	14.5 +- 0.8	15.7 +- 1.1	16.8 +- 1.5
Quarterly average +- s.d.	13.4 +- 2.1	15.9 +- 1.1	16.9 +- 1.3	16.0 +- 0.2
TLD sites that are located 2 - 5 miles from either the Point Beach or the Kewaunee facility.				
15	13.0 +- 1.0	17.2 +- 0.9	17.0 +- 1.1	16.8 +- 1.5
16	10.6 +- 1.0	12.9 +- 0.9	12.4 +- 1.0	13.5 +- 1.0
17	14.1 +- 1.1	15.0 +- 1.1	16.3 +- 1.0	14.6 +- 1.1
18	12.5 +- 0.6	19.5 +- 0.7	17.4 +- 0.7	14.9 +- 0.8
Quarterly average +- s.d.	12.6 +- 1.5	16.2 +- 2.8	15.8 +- 2.3	15.0 +- 0.3
TLD sites that are located greater than 5 miles from either the Point Beach or the Kewaunee facility.				
28	11.5 +- 0.9	14.5 +- 0.7	13.9 +- 1.1	14.6 +- 1.0
29	13.1 +- 0.6	12.2 +- 0.5	15.2 +- 0.7	12.9 +- 0.9
30	12.9 +- 1.3	15.5 +- 0.9	15.9 +- 1.6	14.7 +- 0.8
31	10.9 +- 1.2	12.4 +- 0.7	12.9 +- 1.0	12.1 +- 1.1
Quarterly average +- s.d.	12.1 +- 1.1	13.7 +- 1.6	14.5 +- 1.3	13.6 +- 0.1
TLD sites that are located at the Kewaunee Power Station's (KPS) Independent Spent Fuel Installation (ISFSI).				
51	17.2 +- 1.0	17.4 +- 1.1	18.5 +- 1.0	19.1 +- 1.1
52	13.3 +- 1.0	15.2 +- 0.8	14.3 +- 1.2	17.2 +- 0.9
53	15.7 +- 0.9	16.8 +- 0.3	16.3 +- 1.1	15.5 +- 0.7
54	13.2 +- 0.7	13.6 +- 1.0	14.5 +- 0.8	15.3 +- 1.1
55	12.0 +- 1.6	12.9 +- 0.4	13.2 +- 1.1	14.4 +- 0.7
56	11.4 +- 0.6	13.4 +- 0.7	12.8 +- 0.8	14.8 +- 1.1
57	12.4 +- 0.7	11.5 +- 0.7	13.7 +- 0.6	12.7 +- 1.2
58	13.0 +- 1.0	18.8 +- 1.3	15.9 +- 0.9	15.7 +- 1.0
Quarterly average +- s.d.	13.5 +- 2.0	15.0 +- 2.5	14.9 +- 1.9	15.6 +- 0.2

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
01/05/16	4.43	0.42 +- 0.10	< 24.1
02/04/16	1.28	0.08 +- 0.02	< 6.9
03/10/16	0.57	0.04 +- 0.01	< 3.1
04/06/16	3.57	< 0.14	< 19.0
05/04/16	1.19	< 0.06	< 6.3
06/08/16	3.05	0.17 +- 0.06	< 16.0
07/12/16	5.23	< 0.17	< 27.9
08/12/16	5.31	< 0.20	< 28.2
09/08/16	5.60	< 0.20	< 29.6
10/05/16	3.67	< 0.20	< 19.5
11/09/16	1.47	0.05 +- 0.02	< 7.8
12/07/16	1.90	0.10 +- 0.04	< 10.0

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

Measurements in units of pCi/kg (wet)

WI DHFS (should this be DHS)
data

Collection	02/20/16			04/11/16			05/31/16			05/31/16			06/26/16			07/27/16		
Type	Lake Trout & Herring			Combined 4 fish			Catfish			Catfish			Samon			Rainbow Trout		
gamma isotopic																		
K-40	2770	+-	452	2980	+-	549	2940	+-	482	2940	+-	482	1810	+-	349	3570	+-	579
Mn-54		<	3		<	10		<	7		<	7		<	8		<	8
Co-58		<	5		<	12		<	9		<	9		<	12		<	10
Fe-59		<	14		<	33		<	26		<	15		<	28		<	30
Co-60		<	4		<	13		<	9		<	9		<	12		<	9
Zn-65		<	9		<	32		<	19		<	19		<	25		<	19
Nb-95		<	7		<	13		<	15		<	15		<	15		<	15
Zr-95		<	9		<	22		<	16		<	16		<	17		<	19
Cs-134		<	4		<	11		<	6		<	6		<	9		<	7
Cs-137	15	+-	2	27	+-	8	13	+-	3	13	+-	3		<	10	9	+-	3

Collection	08/14/16			06/15/16			06/15/16			06/26/16			08/02/16			08/14/16		
Type	Rainbow Trout			COHO Salmon			COHO Salmon			Salmon			Brown Trout			Rainbow Trout		
gamma isotopic																		
K-40	3510	+-	598	2770	+-	494	2770	+-	494	1810	+-	349	3360	+-	541	3510	+-	598
Mn-54		<	11		<	9.11		<	9		<	8		<	6		<	11
Co-58		<	13		<	12		<	12		<	12		<	9		<	13
Fe-59		<	32		<	28		<	28		<	28		<	25		<	32
Co-60		<	13		<	10		<	10		<	12		<	9		<	13
Zn-65		<	25		<	20		<	20		<	25		<	18		<	25
Nb-95		<	15		<	16		<	16		<	15		<	12		<	15
Zr-95		<	21		<	19		<	19		<	17		<	14		<	21
Cs-134		<	9		<	10		<	10		<	9		<	5		<	9
Cs-137	24	+-	6	11	+-	5	11.3	+-	5	9	+-	5	17.8	+-	3	24	+-	6

Collection	09/02/16			11/08/16			10/23/16			11/30/16		
Type	Brown Trout			Lake Trout			Brown Trout			Lake Trout		
gamma isotopic												
K-40	3540	+-	605	2340	+-	373	2290	+-	391	2550	+-	437
Mn-54		<	2		<	2		<	1		<	2
Co-58		<	8		<	4		<	4		<	1
Fe-59		<	60		<	21		<	21		<	20
Co-60	5	<	1		<	1		<	1		<	1
Zn-65		<	5		<	4		<	3		<	5
Nb-95		<	69		<	17		<	19		<	14
Zr-95		<	18		<	8		<	8		<	8
Cs-134		<	1		<	1		<	1		<	1
Cs-137	25	+-	2	16	+-	1	8	+-	1	7	+-	1

Radioisotopes other than those reported were not detected.

Table 20 Wisconsin DHS analysis results for shoreline sediment samples collected for the Point Beach-Kewaunee environmental monitoring program.

Measurements in units of pCi/kg dry)

Location	PBK-5			PBK-10a			PBK-29		
Collection date	06/16/16			06/15/16			06/14/16		
gross alpha		<	2290		<	3590		<	3750
gross beta	3970	+-	1070		<	1640		<	2060
Radioisotopes									
Cs-134		<	13.2		<	13.3		<	8.66
Cs-137		<	14.6	16.4	<	6.56		<	14.7
Co-58		<	13.5		<	15.1		<	14.3
Co-60		<	14		<	14		<	17
Fe-59		<	46		<	34		<	42
Mn-54		<	13		<	12		<	11
Nb-95		<	26		<	23		<	23
K-40	7210	+-	1280	4320	+-	796	5030	+-	858
Zn-65		<	32		<	32		<	29
Zr-95		<	29		<	26		<	27

Location	PBK-12a			PBK-12b			PBK-12c			PBK-26		
Collection date	06/15/16			06/15/16			06/15/16			06/15/16		
gross alpha		<	4450		<	4320	10700	<	3510		<	3300
gross beta	2490	+-	1030	2400	+-	1030	18900	+-	1420		+-	1570
Radioisotopes												
Cs-134		<	10.2		<	11.1		<	9.79		<	10.2
Cs-137	31	<	7.21		<	15.7		<	13.7	21.8	<	6.44
Co-58		<	14.9		<	14.2		<	12.1		<	15.3
Co-60		<	15.6		<	11.1		<	12.6		<	16.3
Fe-59		<	30.9		<	32.9		<	30.2		<	39.8
Mn-54		<	10		<	10		<	10		<	12
Nb-95		<	20		<	21		<	21		<	22
K-40	4910	+-	837	4380	+-	751	3320	+-	579	5810	+-	979
Zn-65		<	29		<	26		<	26		<	28
Zr-95		<	29		<	28		<	22		<	26

Table 31 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	01/13/16	02/10/16	03/09/16	04/12/16	05/11/16	06/08/16
gross alpha-sol (DS)	1.1 +- 0.6	< 0.5	< 0.5	< 0.5	< 0.8	< 0.4
gross beta-sol (DS)	1.8 +- 0.6	1.6 +- 0.3	2.1 +- 0.3	1.6 +- 0.3	1.9 +- 0.7	0.9 +- 0.3
gross alpha-insol (SS)	< 0.7	< 0.6	0.3 +- 0.2	< 0.3	< 0.3	< 0.3
gross beta-insol (SS)	< 1.9	< 1.8	< 0.9	< 0.9	< 0.9	< 0.9
I-131		< 0.2				< 0.2
H-3 *a			< 146	164 +- 80.0		
Sr-89 *a			< 0.4	< 0.6		
Sr-90 *a			< 0.4	< 0.5		
Gamma isotopic						
Mn-54	< 3.0	< 3.4	< 2.2	< 1.8	< 2.6	< 3.2
Co-58	< 3.3	< 3.0	< 1.8	< 1.7	< 2.3	< 2.1
Fe-59	< 4.0	< 6.5	< 4.8	< 3.5	< 2.6	< 4.2
Co-60	< 2.8	< 2.7	< 2.0	< 2.3	< 2.0	< 1.9
Zn-65	< 4.4	< 7.0	< 4.3	< 2.5	< 4.2	< 2.2
Nb-95	< 2.8	< 3.4	< 2.8	< 2.5	< 2.5	< 1.8
Zr-95	< 4.7	< 4.4	< 3.7	< 3.9	< 4.1	< 2.2
I-131	< 4.3	< 4.2	< 2.5	< 3.6	< 4.1	< 3.6
Cs-134	< 3.8	< 4.1	< 3.2	< 2.5	< 3.0	< 2.5
Cs-137	< 3.0	< 4.0	< 2.2	< 2.9	< 2.6	< 2.4
Ba-140	< 8.9	< 15.8	< 13.5	< 10.6	< 5.9	< 10.6
La-140	< 1.4	< 2.7	< 2.7	< 1.5	< 2.3	< 1.8

Collection date	07/13/16	08/10/16	06/14/16	10/11/16	11/09/16	Dec
gross alpha-sol (DS)	0.9 +- 0.4	< 0.4	0.9 +- 0.4	< 0.5	0.8 +- 0.6	*b
gross beta-sol (DS)	1.6 +- 0.6	1.1 +- 0.3	2.2 +- 0.6	2.1 +- 0.6	3.3 +- 0.7	*b
gross alpha-insol (SS)	< 0.3	< 0.2	0.8 +- 0.3	< 0.3	< 0.5	*b
gross beta-insol (SS)	< 0.9	< 0.8	1.6 +- 0.6	< 0.9	< 0.9	*b
I-131		< 0.3		< 0.4		*b
H-3 *a	< 149			204 +- 86.0		*b
Sr-89 *a	< 1.0			< 1.4		*b
Sr-90 *a	< 0.5			< 0.6		*b
Gamma isotopic						
Mn-54	< 2.8	< 2.0	< 1.9	< 2.5	< 2.3	*b
Co-58	< 2.2	< 1.3	< 3.3	< 2.3	< 2.3	*b
Fe-59	< 4.2	< 4.5	< 4.4	< 5.5	< 3.5	*b
Co-60	< 1.8	< 1.2	< 2.7	< 2.8	< 1.4	*b
Zn-65	< 5.0	< 2.9	< 5.3	< 6.6	< 3.8	*b
Nb-95	< 2.5	< 2.2	< 3.9	< 2.6	< 3.8	*b
Zr-95	< 3.5	< 5.0	< 5.0	< 5.5	< 2.7	*b
I-131	< 4.2	< 4.3	< 5.2	< 5.3	< 3.8	*b
Cs-134	< 3.6	< 2.9	< 3.5	< 3.6	< 3.5	*b
Cs-137	< 1.8	< 2.3	< 2.4	< 3.2	< 2.1	*b
Ba-140	< 12.3	< 13.8	< 10.0	< 17.0	< 9.0	*b
La-140	< 3.0	< 3.3	< 4.6	< 2.1	< 2.0	*b

*a - The analysis is performed on a quarterly composite.

*b - Sample not collected due to safety concerns

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	01/04/16	02/01/16	03/01/16	04/04/16	05/02/16	06/01/16
gross alpha-sol (DS)	< 0.7	< 0.6	< 1.0	< 0.4	0.6 +- 0.4	0.8 +- 0.4
gross beta-sol (DS)	1.1 +- 0.6	< 1.6	1.6 +- 0.6	2.0 +- 0.6	2.1 +- 0.5	1.9 +- 0.6
gross alpha-insol (SS)	< 1.0	< 1.3	< 0.8	< 0.3	< 0.3	< 0.3
gross beta-insol (SS)	< 1.8	< 1.6	< 1.9	< 0.9	< 0.9	< 0.9
I-131		< 0.3		< 0.4		< 0.3
H-3 *a			< 147	173 +- 81.0		
Sr-89 *a			< 0.4	< 0.9		
Sr-90 *a			< 0.3	< 0.7		
Gamma isotopic						
Mn-54	< 2.7	< 2.2	< 1.9	2.3 +- 1.3	< 2.4	< 2.0
Co-58	< 2.6	< 1.8	< 1.6	< 1.7	< 2.4	< 1.8
Fe-59	< 3.9	< 2.5	< 2.3	< 4.6	< 2.7	< 3.0
Co-60	< 2.0	< 2.1	< 1.4	< 2.7	< 1.8	< 1.2
Zn-65	< 3.9	< 5.2	< 2.3	< 2.6	< 3.7	< 1.6
Nb-95	< 2.8	< 1.8	< 3.2	< 1.7	< 2.6	< 2.5
Zr-95	< 3.4	< 4.0	< 3.4	< 3.9	< 2.9	< 2.7
I-131	< 4.7	< 3.5	< 3.4	< 3.3	< 3.9	< 3.2
Cs-134	< 2.4	< 3.0	< 3.1	< 2.8	< 2.6	< 2.3
Cs-137	< 3.3	< 2.2	< 3.4	< 3.0	< 3.1	< 2.2
Ba-140	< 17.7	< 8.9	< 9.2	< 15.0	< 10.2	< 9.2
La-140	< 2.7	< 2.0	< 2.4	< 2.6	< 1.7	< 1.8

Collection date:	07/05/16	08/01/16	09/06/16	10/03/16	11/01/16	12/01/16
gross alpha-sol (DS)	< 0.5	0.6 +- 0.4	0.4 +- 0.3	< 0.4	< 0.6	< 0.4
gross beta-sol (DS)	2.0 +- 0.6	1.7 +- 0.6	1.5 +- 0.6	0.9 ± 0.3	< 0.9	0.8 ± 0.4
gross alpha-insol (SS)	0.2 +- 0.2	< 0.5	< 0.2	< 0.5	< 0.3	< 0.2
gross beta-insol (SS)	< 0.8	< 0.8	< 0.7	< 0.9	< 0.9	< 0.8
I-131		< 0.2		< 0.5		< 0.4
H-3 *a	< 149			< 144		
Sr-89 *a	< 1.2			< 1.1		
Sr-90 *a	< 0.5			< 0.6		
Gamma isotopic						
Mn-54	< 2.3	< 1.9	< 2.5	< 2.6	< 3.0	< 1.9
Co-58	< 1.3	< 2.5	< 2.2	< 2.8	< 3.4	< 1.4
Fe-59	< 4.6	< 3.7	< 5.4	< 2.6	< 3.4	< 3.0
Co-60	1.1 +- 1.3	1.2 +- 1.6	< 1.9	< 2.1	< 2.3	< 1.4
Zn-65	< 4.0	< 4.0	< 3.3	< 3.4	< 2.7	< 2.1
Nb-95	< 2.3	< 2.7	< 4.5	< 2.4	< 2.0	< 2.8
Zr-95	< 3.9	< 4.0	< 5.3	< 4.0	< 5.0	< 4.8
I-131	< 3.3	< 4.5	< 4.8	< 5.4	< 5.2	< 5.1
Cs-134	< 3.1	< 3.0	< 3.1	< 3.4	< 3.2	< 3.1
Cs-137	< 1.9	< 2.3	< 2.2	< 2.8	< 2.1	< 3.1
Ba-140	< 9.8	< 18	< 11.4	< 14.8	< 12.4	< 12
La-140	< 2.1	< 3.0	< 3.3	< 4.4	< 3.6	< 3.8

*a - The analysis is performed on a quarterly composite.

*b - Sample not collected due to safety concerns

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:	01/04/16	02/23/16	03/07/16	04/04/16	05/02/16	06/06/16
gross alpha-sol (DS)	< 0.8	< 0.4	< 0.4	0.6 +- 0.4	< 1.0	< 0.6
gross beta-sol (DS)	< 0.9	1.9 +- 0.3	0.8 +- 0.3	1.6 +- 0.8	1.6 +- 0.6	1.3 +- 0.6
gross alpha-insol (SS)	< 0.6	< 1.0	< 0.2	< 0.2	< 0.3	< 0.3
gross beta-insol (SS)	< 1.8	< 1.8	< 0.8	< 0.9	< 0.9	< 0.9
I-131	< 0.5	< 0.4		< 0.4		< 0.2
H-3 a			< 150	< 148		
Sr-89 a			< 0.4	< 0.8		
Sr-90 a			< 0.4	< 0.6		
Gamma isotopic						
Mn-54	< 2.6	< 2.4	< 2.9	< 2.3	< 2.8	< 2.4
Co-58	< 2.0	< 1.3	< 2.5	< 1.6	< 3.2	< 1.5
Fe-59	< 5.8	< 5.4	< 4.9	< 3.6	< 3.0	< 2.5
Co-60	< 2.1	< 2.9	< 1.6	< 1.6	< 1.7	< 1.6
Zn-65	< 4.0	< 3.1	< 4.3	< 2.6	< 5.0	< 2.6
Nb-95	< 3.2	< 3.4	< 3.0	< 2.7	< 1.8	< 1.9
Zr-95	< 3.6	< 3.9	< 5.8	< 3.2	< 4.4	< 3.9
I-131	< 5.2	< 2.3	< 3.6	< 2.4	< 2.5	< 2.6
Cs-134	< 1.3	< 3.1	< 3.0	< 2.7	< 2.8	< 2.2
Cs-137	< 3.4	< 2.2	< 2.4	< 3.4	< 3.0	< 2.7
Ba-140	< 2.5	< 10.7	< 11.7	< 9.7	< 11.4	< 6.6
La-140	< 5.9	< 0.9	< 1.3	< 0.9	< 2.5	< 2.0

Collection date:	07/11/16	08/01/16	09/06/16	10/03/16	11/07/16	12/05/16
gross alpha-sol (DS)	< 0.5	< 0.6	< 0.4	< 0.4	1.5 +- 0.6	< 0.4
gross beta-sol (DS)	1.7 +- 0.6	2.6 +- 0.6	< 0.7	0.9 ± 0.3	3.3 +- 0.7	0.7 ± 0.3
gross alpha-insol (SS)	< 0.3	< 0.4	< 0.5	< 0.4	< 0.3	< 0.2
gross beta-insol (SS)	< 0.9	< 0.9	< 0.8	< 1.0	1.0 +- 0.6	< 0.8
I-131						< 0.2
H-3 a	< 149			< 144		
Sr-89 a	< 1.1			< 0.9		
Sr-90 a	< 0.4			< 0.5		
Gamma isotopic						
Mn-54	< 2.6	< 2.1	< 3.3	< 2.3	< 2.2	< 3.0
Co-58	< 3.4	< 2.0	< 2.8	< 2.1	< 1.3	< 1.4
Fe-59	< 3.0	< 2.9	< 4.3	2.9 +- 3.2	< 3.5	< 3.0
Co-60	< 2.6	< 1.1	< 3.8	< 2.0	< 2.1	< 2.0
Zn-65	< 3.4	< 4.1	< 1.7	< 5.1	< 3.0	< 2.2
Nb-95	< 1.7	< 2.5	< 3.1	< 3.3	< 2.9	< 2.4
Zr-95	< 3.4	< 3.7	< 2.2	< 4.2	< 3.8	< 5.7
I-131	< 2.7	< 4.4	< 5.0	< 6.3	< 4.0	< 5.8
Cs-134	< 2.5	< 2.7	< 2.8	< 3.7	< 3.0	< 3.3
Cs-137	< 3.4	< 2.7	< 3.6	< 3.6	< 3.7	< 2.2
Ba-140	< 7.3	< 11.6	< 14.5	< 14.3	< 12.3	< 19.0
La-140	< 3.0	< 3.8	< 1.9	< 3.2	< 3.9	< 4.4

*a - The analysis is performed on a quarterly composite.

*b - Sample not collected due to safety concerns

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-5	PBK-29	PBK-5	PBK-29
Collection date:	06/16/16	06/16/16	09/28/16	09/28/16
gross alpha-sol (DS)	0.5 ± 0.3	0.2 ± 0.2	0.9 ± 0.6	2.1 ± 1.0
gross beta-sol (DS)	1.2 ± 0.3	1.0 ± 0.3	1.6 ± 0.9	< 2.2
gross alpha-insol	< 0.3	< 0.3	< 1.3	0.7 ± 0.5
gross beta-insol	< 0.9	< 0.9	< 2.4	< 1.1
H-3	< 148	< 148	< 208	< 208
Sr-89	< 0.5	< .54	< 0.5	< 0.5
Sr-90	< 0.5	< .48	< 0.3	< 0.3
Gamma isotopic				
Mn-54	< 3.0	< 1.7	< 9.2	< 8.2
Co-58	< 3.4	< 2.4	< 6.8	< 9.0
Fe-59	< 5.1	< 6.2	< 18.9	< 15.7
Co-60	< 3.2	< 1.9	< 9.5	< 8.4
Zn-65	< 5.5	< 6.5	< 20.1	< 12.3
Nb-95	< 3.5	< 3.9	< 8.8	< 10.4
Zr-95	< 4.8	< 4.2	< 16.0	< 15.6
I-131	< 7.9	< 4.6	< 13.2	< 12.7
Cs-134	< 4.2	< 3.7	< 9.8	< 9.6
Cs-137	< 3.3	< 1.9	< 10.4	< 8.9
Ba-140	< 22.4	< 13.4	< 32.6	< 37.7
La-140	< 3.9	< 3.4	< 12.7	< 16.3

*a - The analysis is performed on a quarterly composite.
*b - Sample not collected due to safety concerns

Radioisotopes other than those reported were not detected.

Table 42 Wisconsin DHS analysis results for well water samples collected for the Point Beach-Kewaunee environmental monitoring program.

Measurements in units of pCi/liter

	PBK-3	PBK-10	PBK-11	PBK-12d N	PBK-12d S
Collection date:	06/16/16	04/12/16	06/15/16	06/15/16	06/15/16
gross alpha	< 1.3	4.25 +- 1.6	< 1.6	2.6 +- 1.6	3.9 +- 1.5
gross beta	< 1.8	4.3 +- 0.7	< 1.9	2.4 +- 1.5	3.9 +- 1.3
H-3	< 207	< 211	< 207	< 207	< 207

	PBK-3	PBK-10	PBK-11	PBK-12d N	PBK-12d S
Collection date:	09/29/16	10/11/16	09/28/16	09/28/16	09/28/16
gross alpha	< 1.2	5.5 +- 1.7	< 1.5	2.5 +- 1.5	2.2 +- 1.5
gross beta	< 2.8	< 2.2	< 1.5	< 2.1	< 2.8
H-3	< 208	< 207	< 208	< 208	< 208

NS – A sample was unable to be collected.

Table 53 Wisconsin DHS analysis results for milk samples collected for the Point Beach-Kewaunee environmental monitoring program.

PBK-28 (E-21); Strutz farm

Collection date:	01/13/16	02/10/16	03/09/16	04/13/16	05/11/16	06/08/16
I-131		< 0.3		< 0		< 0.27
Sr-90	0.40 +- 0.3	< 0.6	< 0.7	0.48 +- 0.3	< 0.6	< 0.41
Gamma isotopic						
K-40		< 0.3		< 0.4		< 0.27
Mn-54	0.40 +- 0.3	< 0.6	< 0.7	0.48 +- 0.3	< 0.6	< 0.41
Co-58						
Fe-59	1427 +- 119	1245 +- 105	1385 +- 93	1293 +- 110	1275 +- 99	1419 +- 106
Co-60	< 3.0	< 2.1	< 2.9	< 3.9	< 1.7	< 1.9
Zn-65	< 2.5	< 1.7	< 3.3	< 1.9	< 1.4	< 3.1
Nb-95	< 7.9	< 7.5	< 6.8	< 4.7	< 5.6	< 8.7
Zr-95	< 3.4	< 3.4	< 2.8	< 2.7	< 1.3	< 1.1
I-131	< 5.8	< 3.2	< 7.8	< 4.1	< 4.2	< 6.4
Cs-134	< 4.0	< 3.6	< 2.5	< 1.6	< 2.3	< 2.8
Cs-137	< 5.4	< 6.2	< 4.9	< 5.4	< 3.8	< 5.0
Ba-140	< 2.8	< 3.3	< 2.6	< 3.1	< 6.7	< 2.3
La-140	< 3.4	< 3.6	< 2.6	< 3.6	< 3.4	< 3.3

Collection date:	07/13/16	08/10/16	09/14/16	10/12/16	11/09/16	12/14/16
I-131		< 0.4		< 0.4		< 0.3
Sr-90	+- 0.5	< 0.9	< 0.5	< 0.5	1.14 < 0.3	< 0.9
gamma isotopic						
K-40	1419 +- 105.6	1468 +- 124	1483 +- 125	1364 +- 105	1399 +- 99	1473 +- 120
Mn-54	< 2.6	< 2.2	< 2.3	< 3.7	< 2.3	< 1.8
Co-58	< 2.3	< 3.3	< 2.4	< 2.1	< 2.1	< 1.6
Fe-59	< 6.8	< 5.1	< 6.6	< 7.3	< 5.8	< 4.5
Co-60	< 2.4	< 1.6	< 3.0	< 2.6	< 2.5	< 3.5
Zn-65	< 5.3	< 5.4	< 4.1	< 4.9	< 8.6	< 6.0
Nb-95	< 3.5	< 3.4	< 3.6	< 2.9	< 3.0	< 2.0
Zr-95	< 3.0	< 5.1	< 5.8	< 3.4	< 6.1	< 3.6
I-131	< 5.4	< 2.7	< 4.0	< 3.4	< 7.0	< 3.6
Cs-134	< 3.7	< 3.6	< 3.3	< 3.1	< 3.5	< 4.1
Cs-137	< 3.5	< 3.8	< 3.6	< 4.3	< 2.4	< 4.0
Ba-140	< 15.6	< 9.8	< 12.5	< 8.8	< 20.3	< 8.8
La-140	< 1.3	< 2.3	< 1.6	< 2.2	< 4.6	< 2.8

Radioisotopes other than those reported were not detected.

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:	01/13/16	02/10/16	03/09/16	04/13/16	05/11/16	06/08/16
I-131		< 0.2		< 0.3		< 0.4
Sr-90	1.17 +- 0.4	0.7 < 0.3	< 0.5	< 0.6	< 0.5	< 0.5
gamma isotopic						
K-40	1235 +- 106.2	1460 +- 110	1412 +- 100	1352 +- 110	1369 +- 108	1405 +- 121
Mn-54	< 1.7	< 3.3	< 2.6	< 3.2	< 2.7	< 3.6
Co-58	< 2.1	< 2.7	< 2.0	< 2.8	< 3.5	< 3.0
Fe-59	< 7.6	< 5.4	< 5.6	< 6.8	< 9.1	< 7.8
Co-60	< 3.9	< 2.6	< 2.0	< 1.1	< 3.2	< 3.0
Zn-65	< 6.5	< 4.7	< 6.1	< 4.0	< 7.2	< 8.5
Nb-95	< 1.7	< 3.5	< 3.3	< 3.5	< 3.8	< 3.0
Zr-95	< 6.8	< 6.7	< 5.2	< 4.4	< 6.4	< 3.8
I-131	< 5.0	< 3.7	< 2.8	< 2.7	< 3.1	< 4.2
Cs-134	< 3.6	< 3.0	< 3.0	< 3.3	< 3.9	< 4.2
Cs-137	< 3.2	< 2.8	< 2.4	< 3.7	< 4.0	< 3.0
Ba-140	< 12.8	< 10.1	< 10.2	< 12.6	< 13.7	< 11.7
La-140	< 2.5	< 2.7	< 1.6	< 1.8	< 1.1	< 1.6

Collection date:	07/13/16	08/12/15	09/14/16	10/12/16	11/09/16	12/14/16
I-131		< 0.2		< 0.4		< 0.2
Sr-90	0.75 +- 0.32	0.5 +- 0.3	< 0.5	< 0.6	< 0.5	< 0.9
gamma isotopic						
K-40	1459 +- ± 117.3	1331 +- 115.7	1557 +- 122.1	1395 +- 110	1338 +- 114	1345 +- 105
Mn-54	< 2.9	< 3.0	< 3.6	< 3.6	< 3.5	< 3.1
Co-58	< 1.6	< 8.4	< 1.9	< 2.7	< 1.3	< 2.7
Fe-59	< 7.4	< 8.4	< 7.9	< 5.0	< 4.0	< 7.2
Co-60	< 2.5	< 3.1	< 2.6	< 2.9	< 2.6	< 2.8
Zn-65	< 4.1	< 5.7	< 4.8	< 4.4	< 7.0	< 7.8
Nb-95	< 3.9	< 2.4	< 2.3	< 3.5	< 3.0	< 3.8
Zr-95	< 4.5	< 3.4	< 5.9	< 7.7	< 6.3	< 3.3
I-131	< 3.3	< 3.4	< 3.7	< 4.4	< 7.3	< 4.1
Cs-134	< 3.7	< 4.0	< 3.8	< 4.0	< 3.6	< 3.9
Cs-137	< 2.4	< 3.7	< 3.3	< 3.2	< 2.7	< 3.7
Ba-140	< 12	< 9.4	< 17.1	< 9.7	< 19.5	< 15.5
La-140	< 2.4	< 2.3	< 1.3	< 1.2	< 4.4	< 1.6

Radioisotopes other than those reported were not detected.

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:	01/13/16	02/10/16	03/09/16	04/13/16	05/11/16	06/08/16
I-131		< 0.4		< 0.2		< 0.3
Sr-90	< 0.51	< 0.5	< 0.6	< 0.5	< 0.4	0.61 +- 0.3
gamma isotopic						
K-40	1406 +- 114.6	1455 +- 108	1452 +- 94	1358 +- 111	1410 +- 108	1452 +- 114
Mn-54	< 2.5	< 3.6	< 2.7	< 3.7	< 2.3	< 2.1
Co-58	< 2.9	< 2.7	< 2.3	< 2.5	< 2.1	< 2.6
Fe-59	< 5.1	< 5.8	< 4.3	< 6.6	< 5.5	< 8.5
Co-60	< 3.3	< 2.8	< 1.7	< 2.8	< 2.6	< 2.9
Zn-65	< 6.5	< 6.8	< 6.4	< 4.1	< 6.1	< 8.8
Nb-95	< 3.6	< 3.0	< 3.0	< 3.5	< 2.0	< 2.2
Zr-95	< 5.0	< 4.9	< 5.2	< 6.0	< 5.6	< 4.4
I-131	< 3.5	< 3.3	< 2.1	< 4.0	< 3.2	< 4.2
Cs-134	< 3.2	< 3.0	< 2.8	< 6.3	< 3.3	< 3.8
Cs-137	< 3.2	< 3.6	< 3.3	< 2.8	< 2.7	< 2.6
Ba-140	< 9.3	< 10.4	< 12.4	< 14.4	< 10.4	< 8.9
La-140	< 1.6	< 1.7	< 1.4	< 1.6	< 1.5	< 2.1

Collection date:	07/13/16	08/10/16	09/14/16	10/12/16	11/09/16	12/14/16
I-131		< 0.3		< 0.5		< 0.6
Sr-90	< 0.5	< 0.6	0.9 < 0.3	< 0.6	0.51 < 0.3	< 0.2
gamma isotopic						
K-40	1342 +- 105	1377 +- 124	1384 +- 113	1280 +- 106	1385 +- 114	1306 +- 98
Mn-54	< 2.8	< 3.0	< 2.6	< 2.9	< 3.8	< 3.4
Co-58	< 3.1	< 4.5	< 3.9	< 2.8	< 1.5	< 2.0
Fe-59	< 5.2	< 4.8	< 6.6	< 6.0	< 6.0	< 4.3
Co-60	< 3.9	< 1.4	< 2.6	< 2.6	< 2.8	< 3.4
Zn-65	< 6.3	< 4.7	< 6.9	< 4.0	< 5.7	< 6.0
Nb-95	< 3.4	< 2.5	< 3.4	< 3.0	< 3.5	< 3.2
Zr-95	< 5.7	< 2.1	< 6.7	< 5.1	< 3.6	< 5.5
I-131	< 4.6	< 3.9	< 3.7	< 3.2	< 5.2	< 3.4
Cs-134	< 2.8	< 3.8	< 3.4	< 3.4	< 3.7	< 2.8
Cs-137	< 3.0	< 3.1	< 2.9	< 3.9	< 5.0	< 3.4
Ba-140	< 10.5	< 9.5	< 8.2	< 12.9	< 20.0	< 15.5
La-140	< 2.7	< 2.3	< 2.1	< 3.2	< 3.7	< 2.7

Radioisotopes other than those reported were not detected.

Table 64 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**
ollection date:	06/14/16	06/15/16	06/16/16	06/14/16	06/16/16
gross alpha	< 1520	< 995	< 1300	< 1050	< 867
gross beta	7160 +- 501	4550 +- 344	2770 +- 430	5580 +- 389	4530 +- 431
gamma isotopic					
Be-7	1070 +- 168	1020 +- 193	745 +- 181	1230 +- 228	1210 +- 144
K-40	6660 +- 1190	5560 +- 1050	4070 +- 820	6550 +- 1230	4870 +- 859
Mn-54	< 20	< 29	< 34	< 32	< 16
Co-58	< 22	< 29	< 26	< 27	< 16
Fe-59	< 47	< 64	< 66	< 63	< 40
Co-60	< 24	< 29	< 43	< 37	< 25
Zn-65	< 61	< 74	< 55	< 75	< 41
Nb-95	< 23	< 35	< 32	< 40	< 20
Zr-95	< 43	< 52	< 53	< 63	< 22
I-131	< 44	< 63	< 62	< 66	< 33
Cs-134	< 21	< 29	< 33	< 33	< 15
Cs-137	< 21	< 29	< 42	< 35	< 22
Ba-140	< 108	< 140	< 159	< 177	< 82
La-140	< 37	< 60	< 56	< 44	< 30

Site:	**PBK-7**	**PBK-8**	**PBK-14**	**PBK-17**
Collection date:	06/14/16	06/15/16	06/16/16	06/17/16
gross alpha	< 1270	739 +- 481	< 750	< 897
gross beta	3040 +- 535	4510 +- 357	4430 +- 296	4630 +- 306
gamma isotopic				
Be-7	1570 +- 203	758 +- 114	1150 +- 147	1260 +- 171
K-40	6130 +- 1090	5070 +- 886	3350 +- 623	4550 +- 826
Mn-54	< 18	< 15	< 20	< 17
Co-58	< 25	< 18	< 16	< 16
Fe-59	< 44	< 36	< 42	< 41
Co-60	< 25	< 22	< 27	< 18
Zn-65	< 45	< 39	< 44	< 42
Nb-95	< 23	< 21	< 17	< 24
Zr-95	< 38	< 29	< 29	< 30
I-131	< 41	< 47	< 49	< 40
Cs-134	< 18	< 15	< 17	< 17
Cs-137	< 24	< 22	< 21	< 15
Ba-140	< 106	< 105	< 112	< 103
La-140	< 35	< 34	< 32	< 26

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**
ollection date:	09/29/16	09/29/16	09/29/16	09/29/16	09/28/16
gross alpha	1620 +- 979	17.2 +- 1330	254 +- 136	< 1270	< 1070
gross beta	5210 +- 550	5810 +- 682	1990 +- 95	7100 +- 516	6210 +- 372
gamma isotopic					
Be-7	4850 +- 338	4900 +- 299	531 +- 92	2560 +- 201	1880 +- 156
K-40	4860 +- 816	4150 +- 676	6630 +- 1120	4840 +- 791	6560 +- 1040
Mn-54	< 14	< 8	< 16	< 12	< 10
Co-58	< 15	< 9	< 17	< 14	< 12
Fe-59	< 34	< 21	< 43	< 34	< 33
Co-60	< 13	< 11	< 17	< 14	< 12
Zn-65	< 31	< 17	< 34	< 30	< 27
Nb-95	< 20	< 12	< 18	< 17	< 15
Zr-95	< 26	< 17	< 30	< 25	< 19
I-131	< 73	< 56	< 72	< 73	< 72
Cs-134	< 15	< 8	< 14	< 13	< 11
Cs-137	< 14	< 11	< 16	< 12	< 12
Ba-140	< 134	< 87	< 153	< 126	< 120
La-140	< 37	< 23	< 53	< 35	< 34

Site:	**PBK-7**	**PBK-8**	**PBK-14**	**PBK-17**
Collection date:	09/28/16	09/28/16	09/28/16	09/29/16
gross alpha	< 1700	< 883	1460 +- 1080	< 909
gross beta	4920 +- 528	5090 +- 334	6740 +- 555	5450 +- 413
gamma isotopic				
Be-7	5560 +- 366	1820 +- 158	3000 +- 189	1870 +- 156
K-40	4370 +- 732	5070 +- 849	4800 +- 763	4820 +- 798
Mn-54	< 11	< 13	< 8	< 11
Co-58	< 13	< 14	< 11	< 10
Fe-59	< 30	< 33	< 25	< 27
Co-60	< 13	< 14	< 9	< 14
Zn-65	< 27	< 31	< 19	< 26
Nb-95	< 14	< 17	< 12	< 14
Zr-95	< 22	< 24	< 18	< 23
I-131	< 70	< 73	< 67	< 73
Cs-134	< 12	< 11	< 9	< 9
Cs-137	< 11	< 11	< 9	< 13
Ba-140	< 119	< 122	< 106	< 107
La-140	< 41	< 37	< 29	< 28

Radioisotopes other than those reported were not detected.

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

Table 75 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:	06/14/16	06/15/16	06/16/16	06/14/16	06/16/16
gross alpha	5900 +- 3100	12200 +- 4150	11400 +- 3730	6570 +- 2940	6170 +- 2970
gross beta	11300 +- 1390	17100 +- 1250	23500 +- 1400	11000 +- 1430	10700 +- 1620
gamma isotopic					
Cs-134	< 14	< 25	< 18	< 21	< 16
Cs-137	262 < 24	34.8 < 11	< 26	129 < 19	< 24
Co-58	< 18	< 27	< 25	< 24	< 21
Co-60	< 19	< 30	< 27	< 29	< 25
Fe-59	< 48	< 81	< 65	< 69	< 66
Mn-54	< 15	< 25	< 22	< 24	< 21
Nb-95	< 26	< 46	< 31	< 39	< 32
K-40	12600 +- 2070	18000 +- 3150	21800 +- 3570	18800 +- 3090	18300 +- 3010
Zn-65	< 41	< 66	< 47	< 58	< 53
Zr-95	< 35	< 59	< 41	< 44	< 45

Site:	PBK-7	PBK-8	PBK-14	PBK-17
Collection date:	06/14/16	06/15/16	06/16/16	06/15/16
gross alpha	7920 +- 3090	9520 +- 3440	7180 +- 3140	8270 +- 3660
gross beta	20700 +- 1550	19800 +- 1410	21000 +- 1330	14500 +- 1220
gamma isotopic				
Cs-134	< 28	< 20	< 19	< 23
Cs-137	137 +- 20	50 +- 13	166 +- 20	142 +- 19.7
Co-58	< 31	< 23	< 21	< 24.3
Co-60	< 26	< 26	< 26	< 24.3
Fe-59	< 89	< 71	< 66	< 70.7
Mn-54	< 29	< 22	< 22	< 22.4
Nb-95	< 47	< 31	< 31	< 41.8
K-40	22600 +- 3940	18100 +- 2970	18800 +- 3090	14100 +- 2490
Zn-65	< 73	< 56	< 51	< 60.1
Zr-95	< 60	< 45	< 42	< 49

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.

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:	09/30/16	09/30/16	09/29/16	09/29/16	09/28/16
gross alpha	6780 +- 3270	8570 +- 4150	7030 +- 3510	7170 +- 3350	5440 +- 3230
gross beta	10800 +- 1270	15900 +- 1360	18200 +- 1390	14400 +- 1250	15500 +- 1370
gamma isotopic					
Cs-134	< 16	< 17	< 20	< 22	< 8
Cs-137	72 +- 13	211 +- 21	120 +- 17	< 30	183 +- 11
Co-58	< 34	< 40	< 36	< 42	< 159
Co-60	< 19	< 17	< 24	< 24	< 6
Fe-59	< 112	< 129	< 147	< 145	< 2970
Mn-54	< 17	< 22	< 24	< 23	< 10
Nb-95	< 81	< 95	< 100	< 100	< 6520
K-40	12600 +- 2050	16000 +- 2590	22400 +- 3610	14700 +- 2400	15800 +- 72
Zn-65	< 50	< 52	< 60	< 65	< 39
Zr-95	< 67	< 73	< 90	< 84	< 423

Site:	**PBK-7**	**PBK-8**	**PBK-14**	**PBK-17**
Collection date:	09/28/16	09/28/16	09/30/16	09/29/16
gross alpha	8380 +- 3200	9620 +- 3880	12200 +- 41900	9190 +- 3290
gross beta	22000 +- 1490	17100 +- 1420	13000 +- 1420	13700 +- 1270
gamma isotopic				
Cs-134	< 18.4	< 19.4	< 19.1	< 13.9
Cs-137	283 +- 24.4	100 +- 16.1	62.6 +- 12.5	77.1 +- 11.2
Co-58	< 34	< 46	< 35.1	< 35
Co-60	< 22	< 25.9	< 18.4	< 18.8
Fe-59	< 142	< 151	< 115	< 137
Mn-54	< 20	< 25	< 22.5	< 20
Nb-95	< 96	< 100	< 95.2	< 95
K-40	21900 +- 3520	17000 +- 2760	6070 +- 1030	3540 +- 605
Zn-65	< 55	< 70	< 45.6	< 44
Zr-95	< 76.2	< 78.7	< 72.3	< 73.3

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.

Appendices

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

If radioactivity concentrations exceed SRC review levels for a given radionuclide, consult SRC or review and assessment.

Medium	Radionuclide	SRC Review Level [a]
Airborne Particulates or Gas (pCi/m^3)	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 [d]
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	44.31286	-87.64382
PBK-1	Francar residence	44.31273	-87.64391
PBK-2	Southwest corner property line - Point Beach	44.27170	-87.54323
PBK-3	Two Creeks Town Hall	44.28455	-87.56638
PBK-3	Two Creeks Town Hall	44.28419	-87.56558
PBK-4	Residence north property line - Point Beach	44.29741	-87.54500
PBK-5	Two Creeks Park; NW corner of property	44.30497	-87.54435
PBK-5	Two Creeks Park; NW corner of property	44.30584	-87.54646
PBK-7	WPSC substation, Cty V	44.24071	-87.57332
PBK-8	P Ihlenfeldt farm	44.35174	-87.54321
PBK-9	Point Beach, meteorological tower	44.27477	-87.53120
PBK-10a	Point Beach, effluent channel	44.28133	-87.53549
PBK-10b	Point Beach, entrance	44.27964	-87.53686
PBK-11	Two Creeks International Harvester	44.30250	-87.56315
PBK-12a	Kewaunee, effluent channel	44.34245	-87.53385
PBK-12b	Kewaunee, effluent channel, 500 feet N	44.34345	-87.53421
PBK-12c	Kewaunee, effluent channel, 500 feet S	44.34152	-87.53314
PBK-12d(1)	Kewaunee , south well	44.34273	-87.53818
PBK-12d(2)	Kewaunee , north well	44.34419	-87.53834
PBK-14	Nuclear Road – field east of parking lot	44.34209	-87.55209
PBK-17	Green Bay Pumping Station - Rostok	44.50379	-87.48515
PBK-17	Green Bay Pumping Station – Rostok	44.50370	-87.48645
PBK-18	Kewaunee, meteorological tower	44.34047	-87.53631
PBK-24	L. Struck Farm	44.37997	-87.51994
PBK-26	Kewaunee	44.45584	-87.49985
PBK-27	Barta Farm	44.29703	-87.56319
PBK-28	Strutz Farm	44.255999	-87.522693
PBK-29	Irish Road – at Lake Michigan	44.25499	-87.51986
PBK-T1-8	Point Beach ISFSI on outside of perimeter fence	44.28533	-87.54587
PBK-T9	Point Beach north property line, Lakeshore Road	44.29741	-87.54495
PBK-T10	Nuclear Road, 0.6 mile E of Lakeshore Road	44.26935	-87.53113
PBK-T11	Nuclear Road, 0.1 mile E of Lakeshore Road	44.26961	-87.54318
PBK-T12	Highway 42, 0.6 mile N of Nuclear Road	44.27331	-87.56329
PBK-T13	Highway 42, 0.3 mile N of Tapawingo Road	44.28735	-87.56325
PBK-T14	Two Creeks Road, 0.1 mile E of Highway 42	44.30216	-87.56109
PBK-T15	Junction of Lakeshore Road and Ravine Drive	44.23341	-87.53894
PBK-T16	Cty V, 0.5 mile W of Hwy 42	44.24072	-87.57332
PBK-T17	Junction of Saxonbury Road and Tapawingo Road	44.28387	-87.61360
Sample Point	Location Description		

PBK-T18	Zander Road, 0.1 mile W on Tannery Road	44.31300	-87.58396
PBK-T20	Junction of Cty BB and Ratajcsak Lane	44.32765	-87.55484
PBK-T28	Kewaunee, South on Hwy 42	44.44445	-87.50591
PBK-T29	Two Rivers, Junction of Hwy 42 and 34th Avenue	44.16469	-87.55987
PBK-T30	Manitowoc, Hwy 42, Two Rivers Chamber of Commerce	44.12039	-87.62514
PBK-T31	Mishicot, Cty V, in front of house #653	44.24052	-87.63330
PBK-51-58	KPS ISFSI on the inside of the perimeter fence	44.34421	-87.53651
PBK-T51	KPS ISFSI on the inside of the perimeter fence	44.34369	-87.53676
PBK-T52	KPS ISFSI on the inside of the perimeter fence	44.34389	-87.53570
PBK-T53	KPS ISFSI on the inside of the perimeter fence	44.34419	-87.53558
PBK-T54	KPS ISFSI on the inside of the perimeter fence	44.34450	-87.53592
PBK-T55	KPS ISFSI on the inside of the perimeter fence	44.34455	-87.53634
PBK-T56	KPS ISFSI on the inside of the perimeter fence	44.34442	-87.53704
PBK-T57	KPS ISFSI on the inside of the perimeter fence	44.34420	-87.53726
PBK-T58	KPS ISFSI on the inside of the perimeter fence	44.34377	-87.53726