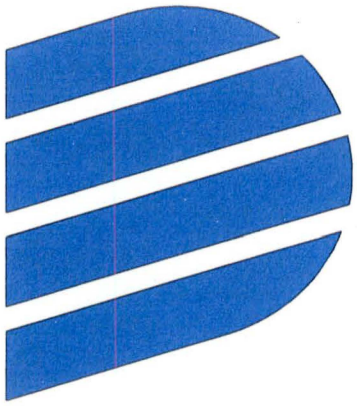

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2017 Annual Radiological Environmental Operating Report

Kewaunee Power Station

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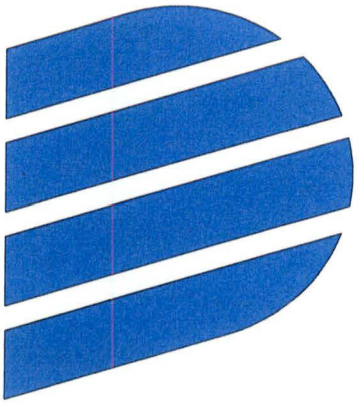

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2017 Annual Radiological Environmental Operating Report

Kewaunee Power Station

Part I

Summary and Interpretation

Dominion Energy Kewaunee, Inc.

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ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

TO

DOMINION NUCLEAR

RADIOLOGICAL MONITORING PROGRAM FOR
THE KEWAUNEE POWER STATION
KEWAUNEE, WISCONSIN

PART I - SUMMARY AND INTERPRETATION

January 1 to December 31, 2017

Prepared and submitted by:

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PREFACE

The staff of ATI Environmental, Inc., Midwest Laboratory were responsible for the acquisition of data presented in this report. Assistance in sample collection was provided by Kewaunee Power Station personnel. The report was prepared by staff members of ATI Environmental, Inc., Midwest Laboratory.

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Appendix A

1.0 INTRODUCTION

The Kewaunee Power Station is a 598 megawatt pressurized water reactor located on the Wisconsin shore of Lake Michigan in Kewaunee County. The Plant became critical on March 7, 1974. Initial power generation was achieved on April 8, 1974, and the Plant was declared commercial on June 16, 1974.

On February 25, 2013, Dominion Energy Kewaunee submitted a certification of intent to cease power operations to the Nuclear Regulatory Committee. Power Operation of the Kewaunee Power Station ceased on May 7, 2013. The fuel was permanently removed from the reactor and placed in the spent fuel pool for storage on May 14, 2013. On June 15, 2017, the transfer of all spent fuel from the KPS Spent Fuel Pool (SFP) to the Independent Spent Fuel Storage Installation (ISFSI) was completed. All remaining irradiated materials were removed from the SFP in October of 2017.

This report summarizes the environmental operation data collected during the period January - December 2017.

Dominion Energy Kewaunee, operator and owner of the Kewaunee Power Station, assumes responsibility for the environmental program at the Plant. Any questions should be directed to Mr. Daniel J. Shannon, Manager Radiological Protection and Chemistry, at (920) 304-1129.

2.0 SUMMARY

Results of sample analyses during the period January - December 2017 are summarized in Table 4.5. Radionuclide concentrations measured at indicator locations are compared with levels measured at control locations and in preoperational studies. In no instance were REMP threshold reporting levels exceeded.

3.0 RADIOLOGICAL SURVEILLANCE PROGRAM

Following is a description of the Radiological Surveillance Program and its execution.

3.1 METHODOLOGY

The sampling locations are shown in Figure 4-1. Table 4.1 describes the locations, lists for each direction and distance from the reactor, and defines which are indicators and control locations.

The sampling program monitors the air, terrestrial, and aquatic environments. The types of samples collected at each location and the frequency of collections are presented in Table 4.2, using sample codes defined in Table 4.3. The collections and analyses that comprise the program are described below. Finally, the execution of the program in the current reporting year is discussed.

3.1.1 The Air Program

Ambient Gamma Radiation – TLDs

Ambient gamma radiation is monitored at the six air sampling locations (K-1f, K-2, K-8, K-31, K-41 and K-43), at three milk sampling locations (K-3, K-5, and K-39), and from five additional sites (K-15, located 9.25 miles northwest of the plant; K-17, located 4.0 miles west of the plant; K-25, located 1.9 miles southwest of the plant; K-27, located 1.53 miles northwest of the plant and K-30, located 0.8 miles north of the plant) by thermoluminescent dosimetry (TLD). Two TLD cards, each having four main readout areas containing $CaSO_4$:Dy phosphor, are placed at each location (eight TLDs at each location). One card is exchanged quarterly, the other card is exchanged annually and read only on an emergency basis.

Dosimeters have also been placed at eight additional locations (K-1l through K-1s), to monitor an Independent Spent Fuel Storage Installation (ISFSI). They are replaced and measured quarterly.

Airborne Particulates

Airborne particulates are collected on 47 mm diameter, 1μm porosity glass fiber filters, at a volumetric rate of approx. one cubic foot per minute. The filters are collected weekly from six locations (K-1f, K-2, K-8, K-31, K-41 and K-43), and dispatched by mail to ATI Environmental, Inc. for radiometric analysis. The particulate filters are counted for gross beta activity, a minimum of three days after the date of collection, to allow for the decay of naturally-occurring short-lived radionuclides.

Quarterly composites from each sampling location are analyzed for gamma-emitting isotopes on a high-purity germanium (HPGe) detector.

Airborne Iodine

Charcoal traps are located at locations K-1f, K-2, K-8, K-31, K-41 and K-43. The traps are changed weekly and analyzed for iodine-131 immediately after arrival at the laboratory.

Precipitation

Monthly composites of precipitation samples are collected at K-11 and analyzed for tritium.

3.1.2 The Terrestrial Program

Milk

Milk samples are collected from two herds grazing within three miles of the reactor site (K-34 and K-38); from four herds that graze between 3-7 miles of the reactor site (K-3, K-5, K-35, and K-39); and one from a dairy in Green Bay (K-42), 28.1 miles from the reactor site.

The samples are collected twice per month during the grazing period (May through October) and monthly for the rest of the year. The samples are analyzed for iodine-131, strontium-89 and strontium-90, calcium, stable potassium and gamma-emitting isotopes.

Well Water

Well water is collected quarterly from the four off-site well locations K-10, K-11, K-13 and K-38 and from two on-site wells located at K-1g and K-1h.

Gamma spectroscopic analysis, tritium and gross beta on the total residue are performed for each water sample. The concentration of potassium-40 is calculated from total potassium. Samples of water from the two on-site wells (K-1g and K-1h) are analyzed for gross alpha. Water samples from K-1g are also tested for strontium-89 and strontium-90.

Monitoring wells and results associated with the Ground Water Protection Program (GWPP) are reported in the KPS Annual Radioactive Effluent Release Report (ARERR). The groundwater monitoring well locations associated with the GWPP are included in Figure 4-2 along with the onsite well water sampling locations associated with the REMP.

Domestic Meat

Domestic meat is collected annually (if available) during the third quarter, from three locations in the vicinity of the plant (K-24, K-29, and K-32). The flesh is separated from the bone and analyzed for gross alpha, gross beta and gamma emitting isotopes.

Eggs

Eggs are collected quarterly from locations K-24 and K-32. Samples are analyzed for gross beta, strontium-89, strontium-90 and gamma-emitting isotopes.

Vegetables and Grain

Annually, during the third quarter, five varieties of vegetables are collected from location K-26. Samples may also be obtained from other local sources to supplement the program (eg., K-3, and K-24). In addition, two varieties of grain or leafy vegetables are collected annually from farmland owned by Dominion Energy Kewaunee (K-23a and K-23b) and rented to a private individual for growing crops. The samples are analyzed for gross beta, strontium-89, strontium-90 and gamma emitting isotopes.

Cattle Feed

Cattle feed (e.g., hay and silage) is collected during the first quarter from dairy farm locations (K-3, K-5, K-34, K-35, K-38 and K-39). The samples are analyzed for gross beta, strontium-89, strontium-90 and gamma emitting isotopes.

Grass

Grass is collected during the second, third and fourth quarters from two on-site locations (K-1b and K-1f) and from the dairy farm locations (K-3, K-5, K-34, K-35, K-38 and K-39). The samples are analyzed for gross beta, strontium-89, strontium-90 and gamma emitting isotopes.

Soil

Soil samples are collected twice a year on-site at K-1f and from the dairy farm locations (K-3, K-5, K-34, K-35, K-38 and K-39). The samples are analyzed for gross alpha, gross beta, strontium-89, strontium-90 and gamma emitting isotopes.

3.1.3 The Aquatic Program

Surface Water

Surface water samples are taken monthly from three locations on Lake Michigan: 1) at the point where the service water is discharged into Lake Michigan (K-1d); 2) Two Creeks Park (K-14) located 2.6 miles south of the reactor site; and 3) at the main pumping station located approximately equidistant from Kewaunee and Green Bay, which pumps water from the Rostok water intake (K-9) located 11.5 miles NNE of the reactor site. Both raw and tap water are collected at K-9. One-gallon water samples are taken monthly from three creeks that pass through the site (K-1a, K-1b, and K- 1e). Samples from North and Middle Creeks (K-1a, K-1b) are collected near the mouth of each creek. Samples from the South Creek (K-1e) are collected about ten feet downstream from the point where the outflow from the two drain pipes meets. Additionally, the drainage pond (K-1k), located approximately 0.6 miles southwest of the plant, is included in the sampling program. Water samples at K-14 are collected and analyzed in duplicate.

The water is analyzed for gamma emitting isotopes, gross beta activity in total residue, dissolved and suspended solids, and potassium-40. The concentration of potassium-40 is calculated from the total potassium concentration. In addition, quarterly composites of monthly grab samples are analyzed for tritium, strontium-89 and strontium-90.

Fish

Fish samples are collected during the second, third and fourth quarters near location K-1d. The flesh is separated from the bones, gamma scanned and analyzed for gross beta activity. Bone samples are analyzed for gross beta, strontium-89 and strontium-90. Lafond's Fish Market (K-36) may be used for backup fish samples, if needed.

Aquatic Slime

Periphyton algae (slime) or aquatic vegetation is collected during the second and third quarters from three Lake Michigan locations (K-1d, K-9 and K-14), from three creek locations (K-1a, K-1b and K-1e) and from the drainage pond (K-1k), if available. The samples are analyzed for gross beta activity. If the quantity is sufficient, analyses for gamma-emitting isotopes and strontium-89 and strontium-90 activities are performed.

Bottom Sediment

Bottom sediments are collected in May and November from five locations (K-1c, K-1d, K-1j, K-9 and K-14). The samples are analyzed for gross beta, strontium-89, strontium-90 and gamma emitting isotopes.

3.1.4 Program Execution

Program execution is summarized in Table 4.4. The program was executed for the year 2017 as described in the preceding sections, with the following exceptions:

Air Particulates / Air Iodine

A partial air particulate / air iodine sample (149 m3) was collected at location K-31, for the sample period ending 4/11/17. A power failure with the sample pump resulted in a reduced runtime of 82.5 hours. (CR 1139)

A partial air particulate / air iodine sample (122 m3) was collected at location K-8, for the sample period ending 6/27/17. A power failure with the sample pump resulted in a reduced runtime of 67.5 hours. (CR 1285)

Fish

No fish sample was available for collection for the fourth quarter of 2017. Attempts were unsuccessful through both commercial and sport fishing. (CR 1571)

3.1.5 Program Modifications

None.

3.2 RESULTS AND DISCUSSION

Results for the reporting period January to December, 2017 are presented in summary form in Table 4.5. For each type of analysis, of each sampled medium, the table shows the annual mean and range for all indicator and control locations. The location with the highest annual mean and the results for this location are also given.

The discussion of the results has been divided into three broad categories: the air, terrestrial, and aquatic environments. Within each category, samples will be discussed in the order listed in Table 4.4. Any discussion of previous environmental data for the Kewaunee Power Station refers to data collected by Environmental Inc., Midwest Laboratory.

Results of all measurements made in 2017 are not included in this section, although references to these results will be made in the discussion. A complete tabulation of results is provided in Part II of the 2017 annual report on the Radiological Monitoring Program for the Kewaunee Power Station.

3.2.1 Atmospheric Nuclear Detonations and Nuclear Accidents

There were no atmospheric nuclear tests or accidents reported in 2017. The Chernobyl and Fukushima Daiichi nuclear accidents occurred on April 26, 1986 and March 11, 2011, respectively. The last reported atmospheric nuclear test was conducted by the People's Republic of China on October 16, 1980. Contributions from these events have resulted in the presence of long-lived radioisotopes of cesium and strontium still detectable in the environment.

3.2.2 The Air Environment

Ambient Gamma Radiation – TLDs

The MAGNASTOR ISFSI campaign to transfer the remainder of spent fuel to dry cask storage started in January 2017 and concluded in June 2017. Due to the travel path to the ISFSI pad and the increased dose rates at the ISFSI pad, the results shown on some of the protected area TLD's (K1l, K1m, K1o, K1p, K1q, K1r and K1s) near the ISFSI pad may be higher than seen in the past.

The Protected Area was reduced to the area adjacent to the ISFSI pad in December 2017. As part of this construction project the south ISFSI fence was relocated to the south approximately 20 feet. Prior to the old fence being removed the TLD's (K1l and K1s) on the south fence were moved to the approximate location of the new fence and subsequently attached to the new fence once it was installed. The movement of the two south TLD's occurred on April 11th, 2017. Both of these TLD's along with K1n and K1 were removed from use on January 1st, 2018 as part of revision 21 to the REMM.

Ambient gamma radiation was monitored by TLDs at fourteen locations, eight indicators (K-1f, K-5, K-17, K-25, K-27, K-30, K-39 and K-43) and six controls (K-2, K-3, K-8, K-15, K-31 and K-41). TLDs at the indicator locations measured a mean dose equivalent of 16.1 mR/91 days, in close agreement with the control locations 15.4 mR/91 days. The readings are similar to the averages obtained from 2002 (and prior to) through 2016.

These results support the conclusion that no plant effect on ambient gamma radiation was indicated . These values are lower than the United States average value of 19.5 mR/91 days due to natural background radiation (National Council on Radiation Protection and Measurements, 1975). The highest annual mean was 17.6 mR/91 days, measured at indicator location K-25.

Year	Average (Indicators)	Average (Controls)
	Dose rate (mR/91 days)	
2003	14.1	13.7
2004	14.8	14.0
2005	15.7	14.3
2006	16.4	15.0
2007	16.2	15.2
2008	15.6	14.2
2009	15.2	13.9
2010	15.2	14.3
2011	15.0	14.5
2012	16.1	15.3
2013	16.2	15.5
2014	15.0	14.8
2015	16.2	16.1
2016	16.5	15.9
2017	16.1	15.4

Ambient gamma radiation as measured by thermoluminescent dosimetry.
Average quarterly dose rates.

Using ANSI/HPS N13.37-2014 as guidance, a determination of facility related dose was performed using quarterly TLD data from control and indicator locations from 2007 through 2016. A baseline background dose (B_Q) was computed for each TLD location. Then a Quarterly Minimum Differential Dose (MDD_Q) was calculated as 3 times the 90th percentile of the standard deviations of the historical quarterly results. The result of this calculation was 6.9 mrem. Transit and storage doses weren't considered since the TLD's currently are, and have historically been, collected in the field and delivered to the laboratory for immediate processing.

2017 results at all locations both indicator and control were lower than the sum of the Baseline Background Dose (B_Q) and the Quarterly Minimum Differential Dose (MDD_Q), which according to ANSI/HPS-N13.37-2014 indicates no detection (ND) and which supports the conclusion that there is no plant effect.

Monitoring Location	Quarterly Baseline B_Q(mrem)	Normalized Quarterly Monitoring Data M_Q (mrem per standard quarter)				Quarterly Facility Dose $F_Q = M_Q - [B_Q+MDD_Q]$(mrem)			
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
K-1f	13.2	15.6	14.9	14.4	15.4	ND	ND	ND	ND
K-5	17.0	16.0	17.2	14.5	16.6	ND	ND	ND	ND
K-17	15.2	15.1	14.1	13.1	13.1	ND	ND	ND	ND
K-25	17.3	17.8	18.9	16.3	17.5	ND	ND	ND	ND
K-27	16.1	17.7	17.2	16.2	14.7	ND	ND	ND	ND
K-30	15.5	18.0	15.3	16.0	14.3	ND	ND	ND	ND
K-39	15.7	18.4	17.2	16.6	16.1	ND	ND	ND	ND
K-43	15.9	15.1	14.1	13.1	13.1	ND	ND	ND	ND
K-2	15.8	16.8	17.2	15.8	17.4	ND	ND	ND	ND
K-3	17.0	18.3	17.0	17.4	16.8	ND	ND	ND	ND
K-8	15.0	18.3	17.2	16.2	16.6	ND	ND	ND	ND
K-15	14.1	15.5	14.9	14.5	14.1	ND	ND	ND	ND
K-31	12.5	13.5	13.3	11.7	12.3	ND	ND	ND	ND
K-41	15.3	14.2	14.3	12.7	13.4	ND	ND	ND	ND

Table assumes 1 roentgen = 1 rem (per NRC -Health Physics Positions Based on 10 CFR Part 20, October 2015)

Airborne Particulates

The annual gross beta concentration in air particulates averaged 0.021 pCi/m^3 at the both the indicator location and control locations, similar to the means observed from 2002 (and prior to) through 2016. There is no indication of a plant effect, the average readings were evenly distributed between indicator and control locations. New sampler pumps were installed in the third quarter of 2010. The slight increases in beta activity may be due to a change in the calculated volume. Results are tabulated below.

Year	Average (Indicators)	Average (Controls)
	Concentration (pCi/m^3)	
2002	0.023	0.023
2003	0.022	0.022
2004	0.019	0.020
2005	0.023	0.023
2006	0.021	0.021
2007	0.022	0.021
2008	0.022	0.022
2009	0.023	0.023
2010	0.023	0.022
2011	0.029	0.029
2012	0.029	0.030
2013	0.024	0.025
2014	0.019	0.019
2015	0.022	0.022
2016	0.021	0.020
2017	0.021	0.021

Average annual gross beta concentrations in airborne particulates.

Variation in the gross beta activity throughout the year is not unusual. Typically, higher beta averages occur during the months of January and December, and the first and fourth quarters, as noted in data from 2002 through 2016.

Gamma spectroscopic analysis of quarterly composites of air particulate filters yielded similar results for indicator and control locations. Beryllium-7, produced continuously in the upper atmosphere by cosmic radiation, was detected in all samples, with an average activity of 0.077 pCi/m^3 at the indicator locations and an average of 0.074 pCi/m^3 at the control locations. All other gamma-emitting isotopes were below their respective MDC levels.

Airborne Iodine

Levels of airborne iodine-131 were below a Minimum Detectable Concentration(MDC) of 0.030 pCi/m^3 at all locations. There was no indication of a plant effect on the local air environment.

Precipitation

Precipitation was monitored for tritium at indicator location, K-11. The concentration was below an MDC of 187 pCi/L in all samples.

3.2.3 The Terrestrial Environment

Milk

126 milk samples were tested for the presence of iodine-131, all measured below an MDC of 0.5 pCi/L.

Strontium-89 concentrations measured below an MDC of 1.3 pCi/L in all samples. Measurable levels of strontium-90 above an MDC of 1.0 pCi/L were detected in nine of eighty-four samples tested. The mean values were 1.2 pCi/L at the indicator and 1.1 at the control locations and are similar to averages seen from 1990 through 2016.

For gamma emitting isotopes, concentrations measured below the required limits of 15 pCi/L for barium-lanthanum-140 and 10 pCi/L for cesium-134 and cesium-137. Potassium-40 results were comparable at the indicator and control locations (1367 and 1405 pCi/L, respectively), and are consistent with levels observed from 1990 through 2016.

Detection of strontium, iodine and potassium activity is consistent with findings of the National Center for Radiological Health (1968). Most radio-contaminants in cattle feed do not find their way into milk, exceptions are radioisotopes of potassium, cesium, strontium, barium, and iodine. Due to chemical similarities between strontium and calcium, and cesium and potassium, organisms tend to deposit strontium-89 and strontium-90 in bone and cesium-137 in the soft tissue and flesh. Consequently, ratios of strontium-90 activity to the weight of calcium in milk and cesium-137 activity to the weight of potassium in milk were monitored in order to detect potential environmental accumulation of these radionuclides. Measured concentrations of calcium are in agreement with previously determined values and averaged 0.95 g/L at the indicator location and 0.96 g/L at the control locations. The average measured concentrations of stable potassium were 1.67 g/L at the indicator location and 1.71 at the control locations.

There was no indication of any effect due to the operation of the Kewaunee Power Station.

Well Water

Two of eight samples tested positive for gross alpha above an MDC of 2.6 at an average of 3.8 pCi/L. Gross beta activity above an MDC of 2.3 pCi/L, was measured in six of the twenty indicator samples tested at an average of 3.6 pCi/L. It is not unusual to see high potassium-40 levels in an agricultural setting. Potassium-40 is present wherever stable potassium is found. Therefore positive results can be attributed to agricultural runoff. The gross alpha activities are most likely contributions from naturally-occurring daughters of radium and thorium when detected in the well water.

No strontium-89 or strontium-90 were detected for the on-site well (K-1g). The concentrations measured below MDC values of 0.6 and 0.5 pCi/L, respectively.

Samples were tested for tritium and gamma emitting isotopes. All tritium concentrations measured below a detection level of 179 pCi/L. Gamma-emitting isotopes measured below respective MDC levels.

Domestic Meat

In domestic meat samples, gross alpha measured below an MDC of 0.034 pCi/g wet for both samples tested, while the gross beta concentrations measured 2.01 pCi/g wet and 1.31 pCi/g wet for indicator and control samples respectively. Gamma-spectroscopic analyses showed that most beta activity was due to naturally occurring potassium-40 (2.00 pCi/g wet for the indicator and 1.76 pCi/g wet for the control). All other gamma-emitting isotopes measured below MDC levels.

Eggs

In samples of eggs tested, the gross beta concentrations averaged 1.55 pCi/g wet at the indicator location and 1.59 pCi/g wet for the control location, similar to observed concentrations of naturally-occurring potassium-40 (1.19 and 1.25 pCi/g wet respectively). Other gamma-emitting isotopes were below their respective MDC levels.

Levels of strontium-89 measured less than an MDC of 0.019 pCi/g wet in all samples. Strontium-90 measured less than an MDC of 0.009 pCi/g wet in all samples tested.

Vegetables and Grain

In vegetables and grain samples an average gross beta concentration of 5.51 pCi/g wet was measured at the three indicator locations and an average of 3.39 pCi/g wet was measured for the six control samples from location K-26, due primarily to potassium-40 activity which was measured at an average of 2.47 pCi/g wet and Be-7 which was detected in the two samples collected at indicator location K-23 at an average of 1.53 pCi/g wet. No strontium-89 was detected above an MDC of 0.024 pCi/g wet. No strontium-90 was detected above an MDC of 0.013 pCi /g wet.

These results compare with results from past years and do not indicate a plant effect.

Cattle Feed

For cattlefeed, average gross beta concentrations were 11.39 and 8.59 pCi/g wet at the indicator and control locations respectively which agreed well with the measured potassium-40 levels of 8.72 and 7.23 pCi/g wet, at the indicator and control locations respectively. No strontium-89 activity was detected above an MDC of 0.048 pCi/g wet. No strontium-90 activity was measured above an MDC of 0.030 pCi/g wet.

No plant effect is indicated.

Grass

In grass, mean gross beta measured 9.52 and 15.45 pCi/g wet at indicator and control locations, respectively, In all cases the activity was predominantly due to naturally occurring potassium-40 and beryllium-7. Strontium-89 tested below MDC values of 0.270 pCi/g wet for all samples and strontium-90 was measured below an MDC of 0.213 pCi/g in all samples.

With the exception of the naturally-occurring beryllium and potassium, gamma-emitting isotopes were below MDC levels.

Soil

Gross alpha concentrations in soil averaged 10.04 pCi/g dry in all ten indicator location samples and 11.37 pCi/g dry at the two control locations. Mean gross beta levels measured at indicator and control locations averaged 27.37 and 26.25 pCi/g dry, respectively, primarily due to potassium-40 activity. Strontium-89 was below an MDC level of 0.240 pCi/g dry in all samples. Strontium-90 was detected in only one sample which was an indicator sample at a value of 0.062 pCi/g dry.

Cesium-137 was detected in all fourteen soil samples at an average of 0.08 pCi/g dry at the indicator and 0.10pCi/g dry at the control locations. Trace levels of Cs-137 in the environment can be attributed to nuclear testing and accidents. Potassium-40 was detected in all samples and averaged 18.71 and 16.32 pCi/g dry for indicator and control locations, respectively. All other gamma-emitting isotopes were below respective MDC levels. The levels of detected activities are similar to those observed from 1990 through 2016. The data suggests no evidence of a plant effect.

3.2.4 The Aquatic Environment

Surface Water

Gross beta activity in surface water measured higher at the indicator locations (4.2 pCi/L) than at the control locations (1.4 pCi/L). A similar pattern of activity has been observed since 1978. In 2017, the highest activities measured were sampled from location K-1a. The average activity was 10.0 pCi/L, with a range of 3.2 to 29.1 pCi/L, due primarily to potassium-40 activity. The potassium-40 concentrations averaged 9.3 pCi/L and ranged from 4.5 to 27.2 pCi/L.

Year	Average (Indicators)	Average (Controls)
	Gross Beta (pCi/L)	
2002	5.7	2.2
2003	7.3	2.4
2004	6.2	2.3
2005	5.2	1.7
2006	5.5	1.8
2007	5.7	1.8
2008	4.7	1.5
2009	4.7	1.5
2010	4.7	1.4
2011	5.0	1.5
2012	6.1	1.4
2013	5.7	1.5
2014	4.4	1.9
2015	4.2	1.4
2016	5.2	1.6
2017	4.2	1.4

Average annual gross beta concentrations in surface water.

These differences in activity are due in part to the indicator location (K-1k), a pond formed by drainage of surrounding fields to the southwest. The control sample is Lake Michigan water, which varies very little in gross beta concentration during the year, while indicator samples include the two creek locations (K-1a and K-1e) which are much higher in gross beta concentration and exhibit large month-to-month variations. The K-1a creek draws its water from the surrounding fields which are heavily fertilized; and the K-1e creek draws its water mainly from the Sewage Treatment Plant. In general, gross beta concentrations were high when potassium-40 levels were high and low when potassium-40 levels were low, indicating that fluctuations in beta concentration were due to variations in potassium-40 concentrations and were not due to plant operations. The fact that similar fluctuations at these locations were observed in pre-operational studies conducted prior to 1974 supports this assessment.

Tritium was detected above an MDC of 184 pCi/L in two fourth quarter composite samples from locations K-14a and K-14b at values of 365 and 457 pC/L respectively. Analysis of the constituent monthly samples resulted in values of 217 and 206 pCi/L for the November samples at location K-14a and K-14b respectively and 744 and 872 pCi/L for the December samples at locations K-14a and K-14b respectively. These elevated tritium results are believed to have resulted from the discharge of the Refueling Water Storage Tank (RWST) during the fall of 2017. No tritium was detected in any of the other thirty-four samples tested (quarterly composites of monthly samples). (CR 1684)

All analyses for strontium-89 measured below an MDC of 1.3 pCi/L. All analyses for Strontium-90 measured below an MDC of 0.8 pCi/L.

With the exception of naturally occurring potassium-40, gamma-emitting isotopes measured below their respective MDC levels in all samples.

Fish

In fish, gross beta concentrations averaged 3.61 pCi/g wet in flesh and 1.83 pCi/g wet in bone fractions. In flesh, the gross beta concentration was primarily due to potassium-40 activity which averaged 2.87 pCi/g wet for the two samples.

Excluding potassium-40, gamma-emitting isotopes measured below their respective MDC levels in both samples.

Strontium-89 concentrations in the bone were below an MDC of 0.41 pCi/g wet. Strontium-90 was detected in both samples at an average of 0.19 pCi/g wet.

Aquatic Slime

In periphyton algae(slime) and aquatic vegetation samples, mean gross beta concentrations for indicator and control locations measured 3.96 and 6.06 pCi/g wet, respectively, due primarily to combined potassium-40 and beryllium-7 average activity of 3.37 and 5.09 pCi/g wet for the indicator and control locations, respectively.

Other gamma-emitting isotopes, with the exception of naturally-occurring beryllium-7 and potassium-40 discussed above, were below their respective MDC levels.

No strontium-89 was measured above the detection level of 0.074 pCi/g wet. No strontium-90 was measured above an MDC of 0.038 pCi/g wet.

These measurements are consistent with measurements obtained in past years and do not indicate a plant effect.

Bottom Sediments

In bottom sediment samples, the mean gross beta concentrations measured an average 7.32 pCi/g dry at the indicator locations versus an average of 22.43 pCi/g dry at the control location.

Cesium-134 measured below the MDC level of 0.016 pCi/g dry for all samples tested. Cesium-137 measured below an MDC of 0.031 pCi/g dry in all samples. Other gamma-emitting isotopes, with the exception of naturally-occurring potassium-40, were below their respective MDC levels.

Strontium-89 was measured below an MDC of 0.116 pCi/g dry for all samples. Strontium-90 was measured below an MDC of 0.044 pCi/g dry for all locations.

No plant effect is indicated.

3.3 LAND USE CENSUS

The Land Use Census satisfies the requirements of the KPS Radiological Environmental Monitoring Manual. Section 2.2.2 states:

"A land use census shall be conducted and shall identify within a distance of 8 km (5 mi.) the location, in each of the 10 meteorological sectors, of the nearest milk animal, the nearest residence and the nearest garden of greater than $50m^2$ ($500 ft^2$) producing broad leaf vegetation." (Figure 4-1)

The 2017 Land Use Census was completed to identify the presence of the nearest milk animals, gardens and farm crops surrounding the Kewaunee Power Station. The Land Use Census was completed on September 7, 2017. The census is conducted annually during the growing season per Health Physics Procedure RP-KW-001-014.

In summary, the nearest residence and the nearest milk animal did not change from the 2016 census in any sectors. Two sectors, J & K (See figure 4.1) did not have any identified gardens during the 2017 census but did have them in the previous year. The closest garden in sector L changed from 1 mile to 2.04 miles from the site.

3.4 LABORATORY PROCEDURES

Analytical Procedures used by Environmental, Inc. are on file and are available for inspection. Procedures are based on those prescribed by the Health and Safety Laboratory of the U.S. Dep't of Energy, Edition 28, 1997, U.S. Environmental Protection Agency for Measurement of Radioactivity in Drinking Water, 1980, and the U.S. Environmental Protection Agency, EERF, Radiochemical Procedures Manual, 1984.

Environmental, Inc., Midwest Laboratory has a comprehensive quality control/quality assurance program designed to assure the reliability of data obtained. Details of the QA Program are presented elsewhere (Environmental, Inc., Midwest Laboratory, 2017). The QA Program includes participation in Interlaboratory Comparison (crosscheck) Programs. Results obtained are presented in Appendix A.

4.0 FIGURES AND TABLES

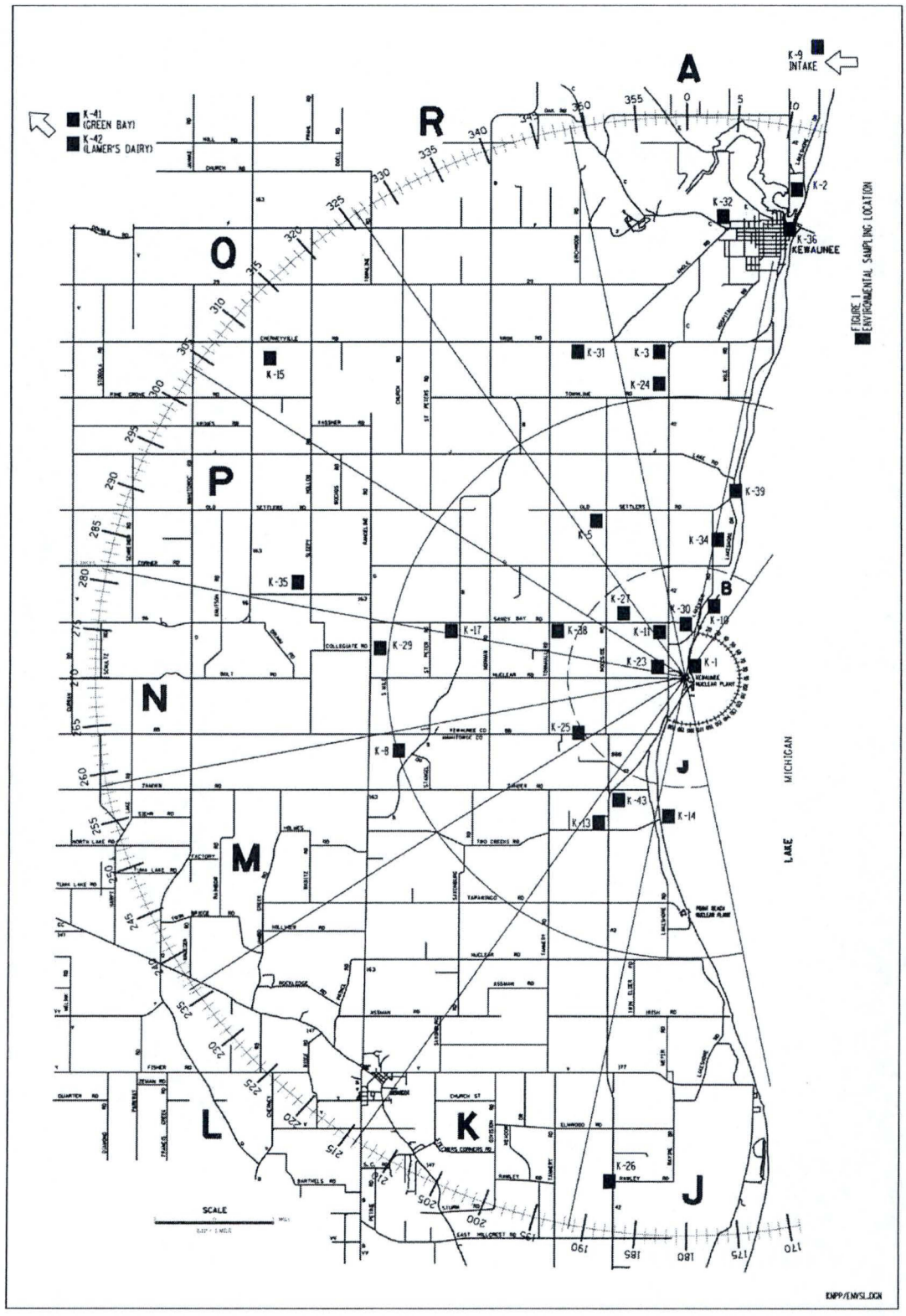

Figure 4-1. Sampling locations, Kewaunee Power Station.

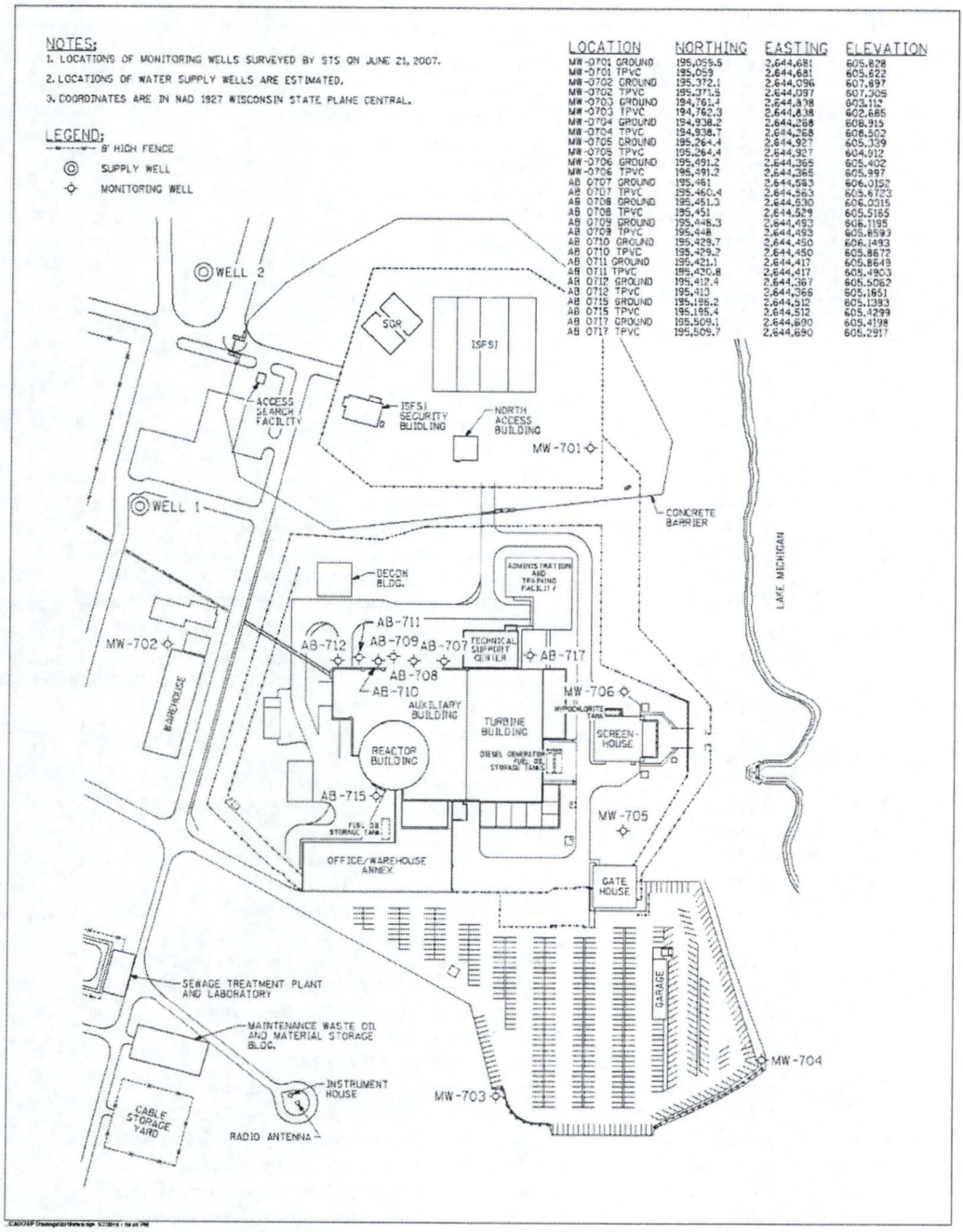

Figure 4-2. Groundwater Monitoring Wells, Kewaunee Power Station.

Table 4.1. Sampling locations, Kewaunee Power Station.

Code	Type [a]	Distance (miles)[b] and Sector	Location
K-1	I		Onsite
K-1a	I	0.62 N	North Creek
K-1b	I	0.12 N	Middle Creek
K-1c	I	0.10 N	500' north of condenser discharge
K-1d	I	0.10 E	Condenser discharge
K-1e	I	0.12 S	South Creek
K-1f	I	0.12 S	Meteorological Tower
K-1g	I	0.06 W	South Well
K-1h	I	0.12 NW	North Well
K-1j	I	0.10 S	500' south of condenser discharge
K-1k	I	0.60 SW	Drainage Pond, south of plant
K-1l	I	0.13 N	ISFSI Southeast
K-1m	I	0.15 N	ISFSI East
K-1n	I	0.16 N	ISFSI Northeast
K-1o	I	0.16 N	ISFSI North
K-1p	I	0.17 N	ISFSI Northwest
K-1q	I	0.16 N	ISFSI West
K-1r	I	0.13 N	ISFSI West
K-1s	I	0.12 N	ISFSI Southwest
K-2	C	8.91 NNE	WPS Operations Building in Kewaunee
K-3	C	5.9 N	Lyle and John Siegmund Farm, N2815 Hy 42, Kewaunee
K-5	I	3.2 NNW	Ben Paplham Farm, E4160 Old Settlers Rd, Kewaunee
K-8	C	4.85 WSW	St. Isadore the Farmer Church, 18424 Tisch Mills Rd, Tisch Mills
K-9	C	11.5 NNE	Green Bay Municipal Pumping Station, six miles east of Green Bay (sample source is Lake Michigan from Rostok Intake two miles north of Kewaunee.
K-10	I	1.35 NNE	Turner Farm, Kewaunee site
K-11	I	0.96 NW	Louise Ihlenfeldt Farm, N879 Hy 42, Kewaunee
K-13	C	3.0 SSW	Rand's General Store, Two Creeks
K-14	I	2.6 S	Two Creeks Park, 2.6 miles south of site
K-15	C	9.25 NW	Gas Substation, 1.5 miles north of Stangelville
K-17	I	4.0 W	Klimesh's' Farm, N885 Tk B, Kewaunee
K-23a	I	0.5 W	0.5 miles west of plant, Kewaunee site
K-23b	I	0.6 N	0.6 miles north of plant, Kewaunee site
K-24	I	5.4 N	Fictum Farm, N2653 Hy 42, Kewaunee
K-25	I	1.9 SW	Wotachek Farm, 3968 E. Cty Tk BB, Two Rivers
K-26	C	10.8 SSW	Wilfert Farms Vegetable Stand (8.0 miles south of "BB")
K-27	I	1.53 NW	Schleis Farm, E4298 Sandy Bay Rd, Kewaunee
K-29	I	5.34 W	Kunesh Farm, E3873 Cty Tk G, Kewaunee
K-30	I	0.8 N	End of site boundary
K-31	C	6.35 NNW	E. Krok Substation, Krok Road
K-32	C	7.8 N	Piggly Wiggly, 931 Marquette Dr., Kewaunee
K-34	I	2.7 N	Leon and Vicki Struck, N1549 Lakeshore Dr., Kewaunee
K-35	C	6.71 mi. WNW	Duane Ducat, N1215 Sleepy Hollow Rd., Kewaunee
K-36	I	8.0 mi NNE	Lafond's Fish market, 216 Milwaukee, Kewaunee
K-38	I	2.45 mi. WNW	Dave Sinkula Farm, N890 Town Hall Road, Kewaunee
K-39	I	3.46 mi. N	Francis Wojta, N1859 Lakeshore Dr., Kewaunee
K-41	C	22 NW	Point Beach-EOF, 3060 Voyager Dr. , Green Bay
K-42	C	28.1 NW	Lamers Dairy Products obtained from Green Bay Markets
K-43	I	2.71 SSW	Gary Maigatter Property, 17333 Hwy 42, Two Rivers
K-44	I	2.63 SW	Gerald Schleis Property, 4728 Schleis Rd., Two Rivers

[a] I = indicator; C = control
[b] Distances are measured from reactor stack.

Table 4.2. Type and frequency of collection.

Location	Weekly	Monthly	Quarterly	Semiannually	Annually
K-1a		SW		SL [f]	
K-1b		SW	GR [a]	SL [f]	
K-1c				BS [b]	
K-1d		SW	FI [a]	SL [f] BS [b]	
K-1e		SW		SL [f]	
K-1f	AP [g], AI		GR [a] TLD	SO	
K-1g, K-1h			WW		
K-1j				BS [b]	
K-1k		SW		SL [f]	
K-1l through K-1s			TLD		
K-2	AP [g], AI		TLD		
K-3, K-5		MI [c]	GR [a] TLD	SO	CF [d]
K-8	AP [g], AI		TLD		
K-9		SW [i]		SL [f] BS [b]	
K-10, K-13			WW		
K-11		PR	WW		
K-14		SW [h]		SL [f] BS [b]	
K-15, K-17			TLD		
K-23a, b					GRN / GLV [e]
K-24			EG		DM
K-25			TLD		
K-26					VE / GLV [e]
K-27			TLD		
K-29					DM
K-30			TLD		
K-31	AP [g], AI		TLD		
K-32			EG		DM
K-34, K-35		MI [c]	GR [a]	SO	CF [d]
K-36			FI [a,j]		
K-38		MI [c]	GR [a] WW	SO	CF [d]
K-39		MI [c]	GR [a] TLD	SO	CF [d]
K-41	AP [g], AI		TLD		
K-42		MI [c]			
K-43	AP [g], AI		TLD		

[a] Three times a year, second, third and fourth quarters.
[b] Collected in May and November.
[c] Monthly from November through April; semimonthly May through October.
[d] First quarter (January, February or March) only.
[e] Alternate, if milk is not available.
[f] Second and third quarters.
[g] The frequency may be increased dependent on the dust loading.
[h] Two samples are collected, North (K-14a) and South (K-14b) of Two Creeks Road.
[i] Two samples, raw and tap water.
[j] Alternate for K-1d fish sample, if needed.

Table 4.3. Sample Codes:

Code	Description	Code	Description
AI	Airborne Iodine	GR	Grass
AP	Airborne particulates	MI	Milk
BS	Bottom sediments	PR	Precipitation
CF	Cattlefeed	SL	Slime
DM	Domestic Meat	SO	Soil
EG	Eggs	SW	Surface water
FI	Fish	TLD	Thermoluminescent Dosimeter
GLV	Green Leafy Vegetables	VE	Vegetables
GRN	Grain	WW	Well water

Table 4.4. Sampling Summary, January – December, 2017.

Sample Type	Collection Type and Frequency [a]	Number of Locations	Number of Samples Collected	Number of Samples Missed
Air Environment				
TLD's	C/Q	22	88	0
Airborne particulates	C/W	6	312	0
Airborne Iodine	C/W	6	312	0
Precipitation	C/M	1	12	0
Terrestrial Environment				
Milk (May-Oct)	G/SM	7	84	0
(Nov-Apr)	G/M	7	42	0
Well water	G/Q	6	24	0
Domestic meat	G/A	2	2	0
Eggs	G/Q	2	8	0
Vegetables - 5 varieties	G/A	1	6	0
Grain - clover	G/A	2	3	0
Cattle feed	G/A	6	12	0
Grass	G/TA	8	24	0
Soil	G/SA	7	14	0
Aquatic Environment				
Surface water	G/M	7	108	0
Fish	G/TA	1	2	1
Slime	G/SA	7	14	0
Bottom sediments	G/SA	5	10	0

[a] Type of collection is coded as follows: C = continuous; G = grab.
Frequency is coded as follows: W = weekly; BW = bi-weekly; SM = semimonthly; M = monthly; Q = quarterly; SA = semiannually; TA = three times per year; A = annually.

Table 4.5 Environmental Radiation Monitoring Program Summary.

Name of Facility: Kewaunee Nuclear Power Plant
Location of Facility: Kewaunee County, Wisconsin (County, State)
Docket No.: 50-305
Reporting Period: January-December, 2017

Sample Type (Units)	Type and Number of Analyses[a]		MDC[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean Location[d]	Location with Highest Annual Mean Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
TLDs (Quarterly) (mR/91days)	Gamma	56	3.0	16.1 (32/32) (13.1-18.9)	K-25, Wotachek Farm 1.9 SW	17.6 (4/4) (16.3-18.9)	15.4 (24/24) (11.7-18.3)	0
TLDs, Quarterly (Protected Area) (mR/91days)	Gamma	32	3.0	110.8 (32/32) (19.1-389.9)	K-1n, ISFSI NE 0.16 N	266.4 (4/4) (49.1-389.9)	none	0
Airborne Particulates (pCi/m^3)	GB	312	0.010	0.021 (104/104) (0.008-0.042)	K-08, St. Isadore The Farmer Church 4.85 WSW	0.021 (52/52) (0.010-0.039)	0.021 (208/208) (0.007-0.045)	0
	GS	24						
	Be-7		0.020	0.077 (8/8) (0.059-0.101)	K-43, Maigatter 2.71 SSW	0.082 (4/4) (0.067-0.101)	0.074 (16/16) (0.063-0.093)	0
	Nb-95		0.003	< MDC	-	-	< MDC	0
	Zr-Nb-95		0.002	< MDC	-	-	< MDC	0
	Ru-103		0.002	< MDC	-	-	< MDC	0
	Ru-106		0.014	< MDC	-	-	< MDC	0
	Cs-134		0.001	< MDC	-	-	< MDC	0
	Cs-137		0.001	< MDC	-	-	< MDC	0
	Ce-141		0.004	< MDC	-	-	< MDC	0
	Ce-144		0.008	< MDC	-	-	< MDC	0
Airborne Iodine (pCi/m^3)	I-131	317	0.03	< MDC	-	-	< MDC	0
Precipitation (pCi/L)	H-3	12	187	< MDC	-	-	none	0
Milk (pCi/L)	I-131	126	0.5	< MDC	-	-	< MDC	0
	Sr-89	84	1.3	< MDC	-	-	< MDC	0
	Sr-90	84	0.8	1.2 (4/48) (1.1-1.5)	K-5, Paplham Farm 3.2 NNW	1.3 (2/12) (1.1-1.5)	1.1 (5/36) (1.0-1.2)	0
	GS	126						
	K-40		50	1367 (72/72) (1242-1586)	K-35, Ducat 6.71 mi. WNW	1432 (18/18) (1218-1637)	1405 (54/54) (1218-1637)	0
	Cs-134		7.0	< MDC	-	-	< MDC	0
	Cs-137		7.2	< MDC	-	-	< MDC	0
	Ba-La-140		7.5	< MDC	-	-	< MDC	0
(g/L)	K-stable	84	1.00	1.67 (48/48) (1.54-1.93)	K-35, Ducat 6.71 mi. WNW	1.75 (12/12) (1.57-1.91)	1.71 (36/36) (1.57-1.91)	0
(g/L)	Ca	84	0.40	0.95 (48/48) (0.83-1.08)	K-39, Wojta Farm, 3.46 mi. N	0.98 (12/12) (0.81-1.10)	0.96 (36/36) (0.81-1.18)	0

Table 4.5 Environmental Radiation Monitoring Program Summary.

Name of Facility: Kewaunee Nuclear Power Plant
Location of Facility: Kewaunee County, Wisconsin (County, State)
Docket No. 50-305
Reporting Period January-December, 2017

Sample Type (Units)	Type and Number of Analyses[a]	MDC[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean: Location[d]	Location with Highest Annual Mean: Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
Well Water (pCi/L)	GA 8	2.6	3.8(2/8) (3.6-4.0)	K-1g, South Well 0.06 mi S	4.0(1/1)	None	0
	GB 24	2.3	3.6(6/20) (2.5-6.5)	K-38, Sinkula Farm 2.45 mi,WNW	6.5(1/1)	< MDC	0
	H-3 24	179	< MDC	-	-	< MDC	0
	K-40 24	0.3	2.09(16/20) (0.46-8.86)	K-38, Sinkula Farm 2.45 mi,WNW	2.98(4/4) (0.46-8.86)	1.03(4/4) (0.99-1.06)	0
	Sr-89 4	0.6	< MDC	-	-	None	0
	Sr-90 4	0.5	< MDC	-	-	None	0
	GS 24				-		
	Mn-54	3.4	< MDC	-	-	< MDC	0
	Fe-59	7.4	< MDC	-	-	< MDC	0
	Co-58	4.2	< MDC	-	-	< MDC	0
	Co-60	4.0	< MDC	-	-	< MDC	0
	Zn-65	8.6	< MDC	-	-	< MDC	0
	Zr-Nb-95	4.6	< MDC	-	-	< MDC	0
	Cs-134	4.2	< MDC	-	-	< MDC	0
	Cs-137	4.9	< MDC	-	-	< MDC	0
	Ba-La-140	13.4	< MDC	-	-	< MDC	0
Domestic Meat (pCi/gwet)	GA 2	0.034	< MDC	-	-	< MDC	0
	GB 2	0.10	2.01 (1/1)	K-24, Fictum Farm 5.45 mi. N	2.01 (1/1)	1.31 (1/1)	0
	GS 2				-	-	
	Be-7	0.18	< MDC	-	-	< MDC	0
	K-40	0.50	2.00 (1/1)	K-24, Fictum Farm 5.45 mi. N	2.00 (1/1)	1.76 (1/1)	0
	Nb-95	0.028	< MDC	-	-	< MDC	0
	Zr-95	0.020	< MDC	-	-	< MDC	0
	Ru-103	0.023	< MDC	-	-	< MDC	0
	Ru-106	0.099	< MDC	-	-	< MDC	0
	Cs-134	0.014	< MDC	-	-	< MDC	0
	Cs-137	0.017	< MDC	-	-	< MDC	0
	Ce-141	0.036	< MDC	-	-	< MDC	0
	Ce-144	0.117	< MDC	-	-	< MDC	0
Eggs (pCi/gwet)	GB 8	0.008	1.55 (4/4) (1.46-1.63)	K-32, Piggly Wiggly 7.8 mi. N	1.59 (4/4) (1.40-1.97)	1.59 (4/4) (1.40-1.97)	0
	Sr-89 8	0.019	< MDC	-	-	< MDC	0
	Sr-90 8	0.009	< MDC	-	-	< MDC	0
	GS 8						
	Be-7	0.069	< MDC	-	-	< MDC	0
	K-40	0.50	1.19 (4/4) (1.05-1.30)	K-32, Piggly Wiggly 7.8 mi. N	1.25 (4/4) (1.16-1.37)	1.25 (4/4) (1.16-1.37)	0
	Nb-95	0.010	< MDC	-	-	< MDC	0
	Zr-95	0.016	< MDC	-	-	< MDC	0
	Ru-103	0.008	< MDC	-	-	< MDC	0
	Ru-106	0.064	< MDC	-	-	< MDC	0
	Cs-134	0.006	< MDC	-	-	< MDC	0
	Cs-137	0.006	< MDC	-	-	< MDC	0
	Ce-141	0.017	< MDC	-	-	< MDC	0
	Ce-144	0.054	< MDC	-	-	< MDC	0

Table 4.5 Environmental Radiation Monitoring Program Summary.

Name of Facility: Kewaunee Nuclear Power Plant — Docket No. 50-305
Location of Facility: Kewaunee County, Wisconsin (County, State) — Reporting Period January-December, 2017

Sample Type (Units)	Type and Number of Analyses [a]	MDC [b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean: Location [d]	Location with Highest Annual Mean: Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
Vegetables and Grains (pCi/gwet)	GB 9	0.010	5.51 (3/3) (3.48-7.72)	K-23, Kewaunee Site, 0.5 mi. W	6.52 (2/3) (5.32-7.72)	3.39 (6/6) (2.61-3.94)	0
	Sr-89 9	0.024	< MDC	-	-	< MDC	0
	Sr-90 9	0.013	< MDC	-	-	< MDC	0
	GS 9						
	Be-7	0.077	1.53 (2/3) (1.05-2.03)	K-23, Kewaunee Site, 0.5 mi. W	1.53(2/2) (1.05-2.03)	< MDC	0
	K-40	0.50	3.96 (3/3) (1.79-5.11)	K-23, Kewaunee Site, 0.5 mi. W	5.05 (2/2) (4.99-5.11)	2.47(6/6) (2.07-3.12)	0
	Nb-95	0.017	< MDC			< MDC	0
	Zr-95	0.025	< MDC			< MDC	0
	Ru-103	0.019	< MDC			< MDC	0
	Ru-106	0.191	< MDC			< MDC	0
	Cs-134	0.018	< MDC			< MDC	0
	Cs-137	0.020	< MDC			< MDC	0
	Ce-141	0.035	< MDC			< MDC	0
	Ce-144	0.151	< MDC			< MDC	0
Cattlefeed (pCi/gwet)	GB 12	0.10	11.39 (8/8) (5.52-18.33)	K-5, Paplham Farm 3.2 mi. NNW	15.01 (2/2) (11.68-18.33)	8.59 (4/4) (4.60-11.07)	0
	Sr-89 12	0.048	< MDC	-	-	< MDC	0
	Sr-90 12	0.030	< MDC	-	-	< MDC	0
	GS 12			-	-	-	
	Be-7	0.14	0.89 (5/8) (0.25-1.60)	K-34,Struck 2.7 N	1.56 (2/2) (1.52-1.60)	0.42 (3/4) (0.27-0.61)	0
	K-40	0.10	8.72 (8/8) (4.14-12.90)	K-5, Paplham Farm 3.2 mi. NNW	10.75 (2/2) (8.60-12.90)	7.23 (4/4) (3.97-9.27)	0
	Nb-95	0.018	< MDC	-	-	< MDC	0
	Zr-95	0.033	< MDC	-	-	< MDC	0
	Ru-103	0.019	< MDC	-	-	< MDC	0
	Ru-106	0.165	< MDC	-	-	< MDC	0
	Cs-134	0.018	< MDC	-	-	< MDC	0
	Cs-137	0.020	< MDC	-	-	< MDC	0
	Ce-141	0.030	< MDC	-	-	< MDC	0
	Ce-144	0.117	< MDC	-	-	< MDC	0

Table 4.5 Environmental Radiation Monitoring Program Summary.

Name of Facility: Kewaunee Nuclear Power Plant
Location of Facility: Kewaunee County, Wisconsin (County, State)
Docket No. 50-305
Reporting Period January-December, 2017

Sample Type (Units)	Type and Number of Analyses[a]	MDC[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean		Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
				Location[d]	Mean (F)[c] Range[c]		
Grass (pCi/gwet)	GB 24	0.10	9.52 (18/18) (5.69-27.36)	K-35, D. Ducat 6.71mi. WNW	20.83 (3/3) (7.74-31.96)	15.45 (6/6) (7.74-31.96)	0
	Sr-89 24	0.270	< MDC	-	-	< MDC	0
	Sr-90 24	0.213	< MDC	-	-	< MDC	0
	GS 24						
	Be-7	0.14	3.26 (18/18) (0.50-7.50)	K-38, Sinkula Farm 2.4 mi WNW	4.20 (3/3) (3.10-6.36)	2.48 (6/6) (0.54-6.52)	0
	K-40	0.50	7.11 (18/18) (3.92-12.46)	K-35, D. Ducat 6.71 mi.W NW	18.20 (3/3) (7.51-28.03)	14.59 (6/6) 7.00-28.03)	0
	Nb-95	0.038	< MDC	-	-	< MDC	0
	Zr-95	0.055	< MDC	-	-	< MDC	0
	Ru-103	0.035	< MDC		-	< MDC	0
	Ru-106	0.272	< MDC	-	-	< MDC	0
	Cs-134	0.033	< MDC	-	-	< MDC	0
	Cs-137	0.038	< MDC	-	-	< MDC	0
	Ce-141	0.049	< MDC	-	-	< MDC	0
	Ce-144	0.243	< MDC	-	-	< MDC	0
Soil (pCi/gdry)	GA 14	4.6	10.04(10/10) (6.68-20.68)	K-3, Sigmund Farm 5.9 mi N	14.97 (2/2) (6.89-23.04)	11.37(4/4) (5.63-23.04)	0
	GB 14	2.0	27.37(10/10) (21.66-33.83)	K-5, Paplham Farm 3.2 mi. NNW	30.38(2/2) (26.92-33.83)	26.25(4/4) (20.68-34.10)	0
	Sr-89 14	0.240		-	-	< MDC	0
	Sr-90 14	0.061	0.062(1/10)	K-38, Sinkula Farm - 2.45 mi. WNW	0.062(1/2)	< MDC	0
	GS 14			-			
	Be-7	0.20	< MDC	K-35, D. Ducat 6.71mi. WNW	0.88(1/2)	0.88(1/4)	0
	K-40	1.4	18.71(10/10) (15.90-20.05)	K-5, Paplham Farm 3.2 mi. NNW	19.49 (2/2) (19.39-19.58)	16.32(4/4) (12.84-18.12)	0
	Nb-95	0.042	< MDC	-	-	< MDC	0
	Zr-95	0.045	< MDC	-	-	< MDC	0
	Ru-103	0.025	< MDC	-	-	< MDC	0
	Ru-106	0.161	< MDC	-	-	< MDC	0
	Cs-134	0.022	< MDC	-	-	< MDC	0
	Cs-137	0.031	0.08(10/10) (0.05-0.14)	K-3, Siegmund Farm 5.9 N	0.12 (2/2) (0.12-0.12)	0.10(4/4) (0.06-0.12)	0
	Ce-141	0.084	< MDC	-	-	< MDC	0
	Ce-144	0.107	< MDC	-	-	< MDC	0

Table 4.5 Environmental Radiation Monitoring Program Summary.

Name of Facility: Kewaunee Nuclear Power Plant — Docket No. 50-305
Location of Facility: Kewaunee County, Wisconsin (County, State) — Reporting Period January-December, 2017

Sample Type (Units)	Type and Number of Analyses[a]	MDC[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean Location[d]	Location with Highest Annual Mean Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
Surface Water	GB (TR) 108	1.2	4.2 (84/84) (3.2-29.1)	K-1a, North Creek 0.62 N	10.0 (12/12) (3.2-29.1)	1.4 (24/24) (0.7-3.6)	0
(pCi/L)	GS 108						
	Mn-54	6.3	< MDC	-	-	< MDC	0
	Fe-59	11.5	< MDC	-	-	< MDC	0
	Co-58	6.0	< MDC	-	-	< MDC	0
	Co-60	6.2	< MDC	-	-	< MDC	0
	Zn-65	17.0	< MDC	-	-	< MDC	0
	Zr-Nb-95	6.6	< MDC	-	-	< MDC	0
	Cs-134	6.8	< MDC	-	-	< MDC	0
	Cs-137	6.3	< MDC	-	-	< MDC	0
	Ba-La-140	11.5	< MDC	-	-	< MDC	0
	H-3 36	184	411 (2/36) (365-457)	K-14b, Two Creeks Park 2.6 mi. S	457(1/4)	< MDC	0
	Sr-89 36	1.3	< MDC	-	-	< MDC	0
	Sr-90 36	0.8	< MDC	-	-	< MDC	0
	K-40 108	0.87	3.4 (84/84) (0.3-27.2)	K-1a, North Creek 0.62 N	9.3 (12/12) (4.5-27.2)	1.2 (24/24) (1.1-1.4)	0
Fish (Flesh) (pCi/gwet)	GB 2	0.5	3.61 (2/2) (3.43-3.78)	K-1d, Cond. Discharge 0.10 mi. E	3.61 (2/2) (3.43-3.78)	None	0
	GS 2						
	K-40	0.5	2.87 (2/2) (2.81-2.93)	K-1d, Cond. Discharge 0.10 mi. E	2.87 (2/2) (2.81-2.93)	None	0
	Mn-54	0.033	< MDC	-	-	None	0
	Fe-59	0.126	< MDC	-	-	None	0
	Co-58	0.036	< MDC	-	-	None	0
	Co-60	0.015	< MDC	-	-	None	0
	Cs-134	0.029	< MDC	-	-	None	0
	Cs-137	0.024	< MDC	-	-	None	0
Fish (Bones) (pCi/gwet)	GB 2	0.5	1.83 (2/2) (0.60-3.05)	K-1d, Cond. Discharge 0.10 mi. E	1.83 (2/2) (0.60-3.05)	None	0
	Sr-89 2	0.41	< MDC	-	-	None	0
	Sr-90 2	0.11	0.19 (2/2) (0.18-0.20)	K-1d, Cond. Discharge 0.10 mi. E	0.19 (2/2) (0.18-0.20)	None	0 0

Table 4.5 Environmental Radiation Monitoring Program Summary.

Name of Facility: Kewaunee Nuclear Power Plant — Docket No. 50-305
Location of Facility: Kewaunee County, Wisconsin (County, State) — Reporting Period January-December, 2017

Sample Type (Units)	Type and Number of Analyses[a]	MDC[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean Location[d]	Location with Highest Annual Mean Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
Periphyton (Algae)	GB 14	0.10	3.96 (12/12) (0.87-6.24)	K-1b, Middle Creek 0.12 N	6.33 (2/2) (5.97-6.69)	6.06 (2/2) (5.11-7.01)	0
(pCi/gwet)	Sr-89 14	0.074	< MDC	-	-	< MDC	0
	Sr-90 14	0.038	< MDC	-	-	< MDC	0
	GS 14						
	Be-7	0.16	0.59 (10/12) (0.16-1.13)	K-9, Rostok Intake 11.5 NNE	0.90 (2/2) (0.58-1.22)	0.90 (2/2) (0.58-1.22)	0
	K-40	0.5	3.37 (12/12) (0.82-5.47)	K-1b, Middle Creek 0.12 N	5.25 (2/2) (5.02-5.47)	5.09 (2/2) (4.92-5.25)	0
	Mn-54	0.017	< MDC	-	-	< MDC	0
	Co-58	0.017	< MDC	-	-	< MDC	0
	Co-60	0.017	< MDC	-	-	< MDC	0
	Nb-95	0.019	< MDC	-	-	< MDC	0
	Zr-95	0.022	< MDC	-	-	< MDC	0
	Ru-103	0.020	< MDC	-	-	< MDC	0
	Ru-106	0.138	< MDC	-	-	< MDC	0
	Cs-134	0.021	< MDC	-	-	< MDC	0
	Cs-137	0.020	< MDC			< MDC	0
	Ce-141	0.029	< MDC	-	-	< MDC	0
	Ce-144	0.127	< MDC	-	-	< MDC	0
	Sb-125	0.104	< MDC	-	-	< MDC	0
Bottom Sediments	GB 10	1.0	7.32 (8/8) (5.37-9.67)	K-9, Rostok Intake 11.5 NNE	22.43 (2/2) (20.21-24.65)	22.43 (2/2) (20.21-24.65)	0
(pCi/gdry)	Sr-89 10	0.116	< MDC	-	-	< MDC	0
	Sr-90 10	0.044	< MDC	-	-	< MDC	0
	GS 10						
	K-40	0.5	4.95 (8/8) (3.72-7.25)	K-9, Rostok Intake 11.5 NNE	13.20 (2/2) (11.35-15.05)	13.20 (2/2) (11.35-15.05)	0
	Co-58	0.027	< MDC	-	-	< MDC	0
	Co-60	0.022	< MDC	-	-	< MDC	0
	Cs-134	0.016	< MDC	-	-	< MDC	0
	Cs-137	0.031	< MDC	-	-	< MDC	0

[a] GA = gross alpha, GB = gross beta, GS = gamma spectroscopy, TR = total residue.
[b] MDC = Minimum Detectable Concentration based on a 4.66 sigma counting error for background sample.
[c] Mean and range are based on detectable measurements only (i.e., >MDC) Fraction of detectable measurements at specified locations is indicated in parentheses (F).
[d] Locations are specified by station code (Table 4.1) and distance (miles) and direction relative to reactor site.
[e] Non-routine results are those which exceed ten times the control station value. If no control station value is available, the result is considered non-routine if it exceeds ten times the preoperational value for the location.

Table 4.6 Land Use Census

The following table lists an inventory of residence, gardens ≥ 500 ft^2 and milk animals found nearest to the plant in each of the 10 meteorological sectors within a five mile radius of the Kewaunee Power Station. (Figure 4-1)

Sector	Township No.	Residence	Garden	Milk Animals	Distance From Plant (miles)	Location ID
A	24	X			1.12	
A	12		X		3.71	
A	1			X	4.62	
B	24	X			1.01	K-10
B	18		X		2.12	
B	18			X	2.70	K-34
R	26	X			0.96	K-11
R	23		X	X	2.16	
Q	23	X			1.27	
Q	23		X	X	1.53	K-27
P	26	X			1.35	
P	27		X	X	2.45	K-38
N	35	X			0.94	
N	26		X		1.03	
N	28			X	2.37	
M	35	X			1.38	
M	3		X		2.47	
M	4			X	2.89	
L	35	X			1.00	
L	2		X		2.04	
L	4			X	3.26	
K	36	X	(Note 2)		0.91	
K	15			X	3.40	
J	11	X	(Note 3)	(Note 3)	2.72	

Note 1. Bold Type denotes change from previous census.
Note 2. There were no gardens located in Sector K within five miles of the Kewaunee Power Station.
Note 3. There were no milk animals or gardens located in Sector J within five miles of the Kewaunee Power Station.

No changes to the nearest residence or nearest milk animal locations were identified. The nearest garden in Sector L changed from 1 mile to 2.04 miles from the site.

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APPENDIX A

INTERLABORATORY COMPARISON PROGRAM RESULTS
AND INTRALABORATORY COMPARISON PROGRAM RESULTS

NOTE: Appendix A is updated four times a year. The complete appendix is included in March, June, September and December monthly progress reports only.

January, 2017 through December, 2017

Appendix A

Interlaboratory/ Intralaboratory Comparison Program Results

Environmental, Inc., Midwest Laboratory has participated in interlaboratory comparison (crosscheck) programs since the formulation of it's quality control program in December 1971. These programs are operated by agencies which supply environmental type samples containing concentrations of radionuclides known to the issuing agency but not to participant laboratories. The purpose of such a program is to provide an independent check on a laboratory's analytical procedures and to alert it of any possible problems.

Participant laboratories measure the concentration of specified radionuclides and report them to the issuing agency. Several months later, the agency reports the known values to the participant laboratories and specifies control limits. Results consistently higher or lower than the known values or outside the control limits indicate a need to check the instruments or procedures used.

Results in Table A-1 were obtained through participation in the RAD PT Study Proficiency Testing Program administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada.

Table A-2 lists results for thermoluminescent dosimeters (TLDs), via irradiation and evaluation by the University of Wisconsin-Madison Radiation Calibration Laboratory at the University of Wisconsin Medical Radiation Research Center.

Table A-3 lists results of the analyses on in-house "spiked" samples for the past twelve months. All samples are prepared using NIST traceable sources. Data for previous years available upon request.

Table A-4 lists results of the analyses on in-house "blank" samples for the past twelve months. Data for previous years available upon request.

Table A-5 lists analytical results from the in-house "duplicate" program for the past twelve months. Acceptance is based on the difference of the results being less than the sum of the errors. Complete analytical data for duplicate analyses is available upon request.

The results in Table A-6 were obtained through participation in the Mixed Analyte Performance Evaluation Program.

Results in Table A-7 were obtained through participation in the MRAD PT Study Proficiency Testing Program administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the Environmental Measurement Laboratory Quality Assessment Program (EML).

Attachment A lists the laboratory precision at the 1 sigma level for various analyses. The acceptance criteria in Table A-3 is set at ± 2 sigma.

Out-of-limit results are explained directly below the result.

Attachment A

ACCEPTANCE CRITERIA FOR "SPIKED" SAMPLES

Analysis	Ratio of lab result to known value.
Gamma Emitters	0.8 to 1.2
Strontium-89	0.8 to 1.2
Strontium-90	0.8 to 1.2
Potassium-40	0.8 to 1.2
Gross alpha	0.5 to 1.5
Gross beta	0.8 to 1.2
Tritium	0.8 to 1.2
Radium-226,-228	0.7 to 1.3
Plutonium	0.8 to 1.2
Iodine-131, Iodine-129	0.8 to 1.2
Uranium-238, Nickel-63 Technetium-99	0.7 to 1.3
Iron-55	0.8 to 1.2
Other Analyses	0.8 to 1.2

TABLE A-1. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)[a].
RAD study

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result	ERA Result	Control Limits	Acceptance
ERW-95	1/9/2017	Sr-89	51.9 ± 4.6	55.5	44.3 - 63.2	Pass
ERW-95	1/9/2017	Sr-90	43.6 ± 2.4	43.1	31.8 - 49.5	Pass
ERW-97	1/9/2017	Ba-133	78.2 ± 4.1	85.6	72.0 - 94.2	Pass
ERW-97	1/9/2017	Cs-134	53.9 ± 3.8	52.6	42.4 - 57.9	Pass
ERW-97	1/9/2017	Cs-137	122 ± 6	112	101 - 126	Pass
ERW-97	1/9/2017	Co-60	117 ± 4	113	102 - 126	Pass
ERW-97	1/9/2017	Zn-65	208 ± 13	189	170 - 222	Pass
ERW-99	1/9/2017	Gr. Alpha	48.9 ± 2.4	52.3	27.3 - 65.5	Pass
ERW-99	1/9/2017	Gr. Beta	37.1 ± 1.3	41.6	27.7 - 49.0	Pass
ERW-101	1/9/2017	I-131	22.3 ± 0.6	24.3	20.2 - 28.8	Pass
ERW-103	1/9/2017	Ra-226	11.3 ± 0.4	12.7	9.5 - 14.7	Pass
ERW-103	1/9/2017	Ra-228	6.10 ± 0.90	6.20	3.8 - 8.1	Pass
ERW-103	1/9/2017	Uranium	11.8 ± 0.8	12.6	9.9 - 14.4	Pass
ERW-106	1/9/2017	H-3	12,600 ± 300	12,500	10,900 - 13,800	Pass
ERW-3344	7/10/2017	Sr-89	29.0 ± 10.0	26.4	18.4 - 32.9	Pass
ERW-3344	7/10/2017	Sr-90	33.8 ± 3.3	36.0	26.4 - 41.5	Pass
ERW-3346	7/10/2017	Ba-133	66.4 ± 4.1	66.3	55.2 - 72.9	Pass
ERW-3346	7/10/2017	Cs-134	27.0 ± 4.3	24.4	18.7 - 27.2	Pass
ERW-3346	7/10/2017	Cs-137	57.4 ± 4.5	51.6	46.4 - 59.6	Pass
ERW-3346	7/10/2017	Co-60	92.6 ± 4.4	88.6	79.7 - 99.8	Pass
ERW-3346	7/10/2017	Zn-65	32.4 ± 6.0	32.7	27.3 - 41.6	Pass
ERW-3348	7/10/2017	Gr. Alpha	23.7 ± 1.9	25.7	13.0 - 34.1	Pass
ERW-3348	7/10/2017	Gr. Beta	54.6 ± 1.6	63.0	43.5 - 69.6	Pass
ERW-3350	7/10/2017	I-131	25.4 ± 1.3	25.5	21.2 - 30.1	Pass
ERW-3352	7/10/2017	Ra-226	1.38 ± 0.15	1.29	1.07 - 1.95	Pass
ERW-3352	7/10/2017	Ra-228	6.70 ± 0.93	5.66	3.45 - 7.47	Pass
ERW-3352	7/10/2017	Uranium	58.4 ± 0.9	66.7	54.3 - 73.9	Pass
ERW-3354	7/10/2017	H-3	5,254 ± 224	5,060	4,340 - 5,570	Pass

[a] Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the crosscheck program for proficiency testing in drinking water conducted by Environmental Resources Associates (ERA).

TABLE A-2. Thermoluminescent Dosimetry, (TLD, $CaSO_4$: Dy Cards). [a]

			mrem		
Lab Code	Irradiation Date	Description	Delivered Dose	Reported [b] Dose	Performance [c] Quotient (P)	
Environmental, Inc.		Group 1				
2017-1	10/16/2017	Spike 1	59.0	49.3	-0.16	
2017-1	10/16/2017	Spike 2	59.0	53.2	-0.10	
2017-1	10/16/2017	Spike 3	59.0	52.7	-0.11	
2017-1	10/16/2017	Spike 4	59.0	53.4	-0.09	
2017-1	10/16/2017	Spike 5	59.0	51.8	-0.12	
2017-1	10/16/2017	Spike 6	59.0	54.0	-0.08	
2017-1	10/16/2017	Spike 7	59.0	52.0	-0.12	
2017-1	10/16/2017	Spike 8	59.0	52.6	-0.11	
2017-1	10/16/2017	Spike 9	59.0	54.6	-0.07	
2017-1	10/16/2017	Spike 10	59.0	50.4	-0.15	
2017-1	10/16/2017	Spike 11	59.0	53.9	-0.09	
2017-1	10/16/2017	Spike 12	59.0	55.7	-0.06	
2017-1	10/16/2017	Spike 13	59.0	50.2	-0.15	
2017-1	10/16/2017	Spike 14	59.0	52.4	-0.11	
2017-1	10/16/2017	Spike 15	59.0	54.3	-0.08	
2017-1	10/16/2017	Spike 16	59.0	53.2	-0.10	
2017-1	10/16/2017	Spike 17	59.0	50.1	-0.15	
2017-1	10/16/2017	Spike 18	59.0	52.3	-0.11	
2017-1	10/16/2017	Spike 19	59.0	50.3	-0.15	
2017-1	10/16/2017	Spike 20	59.0	50.7	-0.14	
2017-1	10/16/2017	Spike 21	59.0	53.1	-0.10	
2017-1	10/16/2017	Spike 22	59.0	51.5	-0.13	
2017-1	10/16/2017	Spike 23	59.0	54.4	-0.08	
2017-1	10/16/2017	Spike 24	59.0	53.3	-0.10	
2017-1	10/16/2017	Spike 25	59.0	53.7	-0.09	
2017-1	10/16/2017	Spike 26	59.0	51.6	-0.13	
2017-1	10/16/2017	Spike 27	59.0	51.5	-0.13	
2017-1	10/16/2017	Spike 28	59.0	51.6	-0.13	
2017-1	10/16/2017	Spike 29	59.0	49.9	-0.15	
2017-1	10/16/2017	Spike 30	59.0	55.3	-0.06	
Mean (Spike 1-30)				52.4	-0.11	Pass[d]
Standard Deviation (Spike 1-30)				1.7	0.03	Pass[d]

a TLD's were irradiated by the University of Wisconsin-Madison Radiation Calibration Laboratory following ANSI N13.37 protocol from a known air kerma rate. TLD's were read and the results were submitted by Environmental Inc. to the University of Wisconsin-Madison Radiation Calibration Laboratory for comparison to the delivered dose.

b Reported dose was converted from exposure (R) to Air Kerma (cGy) using a conversion of 0.876. Conversion from air kerma to ambient dose equivalent for Cs-137 at the reference dose point $H^*(10)K_a = 1.20$. mrem/cGy = 1000.

c Performance Quotient (P) is calculated as ((reported dose - conventially true value) ÷ conventially true value) where the conventially true value is the delivered dose.

d Acceptance is achieved when neither the absolute value of mean of the P values, nor the standard deviation of the P values exceed 0.15.

TABLE A-2. Thermoluminescent Dosimetry, (TLD, $CaSO_4$: Dy Cards). [a]

Lab Code	Irradiation Date	Description	Delivered Dose (mrem)	Reported Dose [b] (mrem)	Performance Quotient (P) [c]	
Environmental, Inc.		Group 2				
2017-2	10/16/2017	Spike 31	186.0	164.7	-0.11	
2017-2	10/16/2017	Spike 32	186.0	172.0	-0.08	
2017-2	10/16/2017	Spike 33	186.0	167.3	-0.10	
2017-2	10/16/2017	Spike 34	186.0	160.6	-0.14	
2017-2	10/16/2017	Spike 35	186.0	171.7	-0.08	
2017-2	10/16/2017	Spike 36	186.0	177.0	-0.05	
2017-2	10/16/2017	Spike 37	186.0	176.7	-0.05	
2017-2	10/16/2017	Spike 38	186.0	165.5	-0.11	
2017-2	10/16/2017	Spike 39	186.0	174.6	-0.06	
2017-2	10/16/2017	Spike 40	186.0	172.7	-0.07	
2017-2	10/16/2017	Spike 41	186.0	167.8	-0.10	
2017-2	10/16/2017	Spike 42	186.0	161.0	-0.13	
2017-2	10/16/2017	Spike 43	186.0	166.3	-0.11	
2017-2	10/16/2017	Spike 44	186.0	172.4	-0.07	
2017-2	10/16/2017	Spike 45	186.0	173.0	-0.07	
2017-2	10/16/2017	Spike 46	186.0	169.5	-0.09	
2017-2	10/16/2017	Spike 47	186.0	169.0	-0.09	
2017-2	10/16/2017	Spike 48	186.0	166.9	-0.10	
2017-2	10/16/2017	Spike 49	186.0	165.9	-0.11	
2017-2	10/16/2017	Spike 50	186.0	166.7	-0.10	
2017-2	10/16/2017	Spike 51	186.0	161.1	-0.13	
2017-2	10/16/2017	Spike 52	186.0	173.4	-0.07	
2017-2	10/16/2017	Spike 53	186.0	173.1	-0.07	
2017-2	10/16/2017	Spike 54	186.0	160.0	-0.14	
2017-2	10/16/2017	Spike 55	186.0	166.1	-0.11	
2017-2	10/16/2017	Spike 56	186.0	164.5	-0.12	
2017-2	10/16/2017	Spike 57	186.0	163.8	-0.12	
2017-2	10/16/2017	Spike 58	186.0	159.9	-0.14	
2017-2	10/16/2017	Spike 59	186.0	165.6	-0.11	
2017-2	10/16/2017	Spike 60	186.0	165.0	-0.11	
Mean (Spike 31-60)				167.8	-0.10	Pass[d]
Standard Deviation (Spike 31-60)				5.0	0.03	Pass[d]

a TLD's were irradiated by the University of Wisconsin-Madison Radiation Calibration Laboratory following ANSI N13.37 protocol from a known air kerma rate. TLD's were read and the results were submitted by Environmental Inc. to the University of Wisconsin-Madison Radiation Calibration Laboratory for comparison to the delivered dose.

b Reported dose was converted from exposure (R) to Air Kerma (cGy) using a conversion of 0.876. Conversion from air kerma to ambient dose equivalent for Cs-137 at the reference dose point $H^*(10)K_a = 1.20$. mrem/cGy = 1000.

c Performance Quotient (P) is calculated as ((reported dose - conventially true value) ÷ conventially true value) where the conventially true value is the delivered dose.

d Acceptance is achieved when neither the absolute value of mean of the P values, nor the standard deviation of the P values exceed 0.15.

TABLE A-3. In-House "Spiked" Samples

Lab Code [b]	Date	Concentration [a] Analysis	Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance	Ratio Lab/Known
W-010417	4/29/2016	Cs-134	38.2 ± 8.1	36.2	29.0 - 43.4	Pass	1.06
W-010417	4/29/2016	Cs-137	78.0 ± 8.8	71.9	57.5 - 86.3	Pass	1.08
SPW-306	1/4/2017	Ra-226	18.1 ± 0.4	16.7	11.7 - 21.7	Pass	1.08
SPW-32	1/6/2017	H-3	17,849 ± 393	17,243	13,794 - 20,692	Pass	1.04
SPW-46	1/9/2017	Gr. Alpha	20.0 ± 0.4	20.1	10.0 - 30.1	Pass	1.00
SPW-46	1/9/2017	Gr. Beta	29.0 ± 0.3	28.9	23.1 - 34.6	Pass	1.00
SPW-92	1/11/2017	H-3	18,095 ± 397	17,243	13,794 - 20,692	Pass	1.05
SPW-142	1/12/2017	Sr-90	39.4 ± 2.3	36.6	29.2 - 43.9	Pass	1.08
SPW-155	1/19/2017	H-3	17,974 ± 400	17,243	13,794 - 20,692	Pass	1.04
SPW-186	1/23/2017	H-3	17,383 ± 366	17,243	13,794 - 20,692	Pass	1.01
SPW-232	1/19/2017	H-3	17,542 ± 368	17,243	13,794 - 20,692	Pass	1.02
SPW-304	1/26/2017	H-3	17,782 ± 400	17,243	13,794 - 20,692	Pass	1.03
SPW-333	1/30/2017	H-3	17,910 ± 406	17,243	13,794 - 20,692	Pass	1.04
SPW-353	2/2/2017	U-234	47.8 ± 2.3	41.7	29.2 - 54.2	Pass	1.15
SPW-353	2/2/2017	U-238	50.4 ± 2.4	41.7	29.2 - 54.2	Pass	1.21
W-020217	4/29/2016	Cs-134	33.7 ± 6.1	36.2	29.0 - 41.2	Pass	0.93
W-020217	4/29/2016	Cs-137	78.4 ± 7.3	71.9	57.5 - 86.3	Pass	1.09
SPW-412	2/6/2017	Sr-90	36.2 ± 2.4	36.6	29.2 - 43.9	Pass	0.99
SPW-465	2/8/2017	H-3	17,573 ± 396	17,243	13,794 - 20,692	Pass	1.02
SPW-561	2/15/2017	H-3	17,358 ± 395	17,243	13,794 - 20,692	Pass	1.01
SPW-605	2/16/2017	H-3	17,820 ± 401	17,243	13,794 - 20,692	Pass	1.03
SPW-657	2/17/2017	H-3	17,614 ± 376	17,243	13,794 - 20,692	Pass	1.02
SPW-714	2/23/2017	H-3	17,662 ± 400	17,243	13,794 - 20,692	Pass	1.02
SPW-737	2/28/2017	H-3	17,196 ± 395	17,243	13,794 - 20,692	Pass	1.00
SPAP-740	2/28/2017	Gr. Beta	38.9 ± 0.1	41.5	33.2 - 49.8	Pass	0.94
SPAP-742	2/24/2017	Cs-134	1.05 ± 0.60	0.98	0.8 - 6.0	Pass	1.07
SPAP-742	2/24/2017	Cs-137	90.4 ± 2.5	92.9	74.3 - 111	Pass	0.97
SPW-746	2/28/2017	Sr-90	42.8 ± 2.5	36.6	29.2 - 43.9	Pass	1.17
SPW-748	2/28/2017	C-14	4,270 ± 17	4,735	3,788 - 5,682	Pass	0.90
SPW-750	2/28/2017	Ni-63	463 ± 4	400	280 - 520	Pass	1.16
SPF-752	2/28/2017	Cs-134	1033 ± 38	1090	872 - 1308	Pass	0.95
SPF-752	2/28/2017	Cs-137	3071 ± 61	2820	2,256 - 3,384	Pass	1.09
SPW-781	3/1/2017	Ra-226	18.1 ± 0.4	16.7	11.7 - 21.7	Pass	1.08
SPW-783	3/1/2017	H-3	17,653 ± 400	17,243	13,794 - 20,692	Pass	1.02
W-030517	4/29/2016	Cs-134	38.0 ± 9.0	36.2	29.0 - 43.4	Pass	1.05
W-030517	4/29/2016	Cs-137	80.9 ± 9.2	71.9	57.5 - 86.3	Pass	1.13
SPW-1010	3/14/2017	H-3	17,312 ± 395	17,243	13,794 - 20,692	Pass	1.00
SPW-1026	3/16/2017	Gr. Alpha	22.4 ± 0.5	20.1	10.0 - 30.1	Pass	1.11
SPW-1026	3/16/2017	Gr. Beta	29.2 ± 0.3	28.9	23.1 - 34.6	Pass	1.01
SPW-1092	3/21/2017	H-3	17,252 ± 390	17,243	13,794 - 20,692	Pass	1.00
SPW-1151	3/24/2017	H-3	17,009 ± 388	17,243	13,794 - 20,692	Pass	0.99
SPW-1163	3/28/2017	Sr-90	39.0 ± 2.3	36.3	29.0 - 43.5	Pass	1.08
SPW-1178	3/29/2017	Ra-228	15.1 ± 1.9	16.0	11.2 - 20.8	Pass	0.94

TABLE A-3. In-House "Spiked" Samples

Lab Code [b]	Date	Concentration [a] Analysis	Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance	Ratio Lab/Known
SPW-1232	3/30/2017	H-3	17,150 ± 390	17,243	13,794 - 20,692	Pass	0.99
SPW-1246	3/31/2017	I-131(G)	33.0 ± 7.3	36.6	29.3 - 43.9	Pass	0.90
SPW-1246	3/31/2017	Cs-134	28.9 ± 4.6	26.6	21.3 - 31.9	Pass	1.09
SPW-1246	3/31/2017	Cs-137	80.6 ± 8.2	70.4	56.3 - 84.5	Pass	1.15
SPMI-1248	3/31/2017	I-131(G)	39.8 ± 7.0	36.6	29.3 - 43.9	Pass	1.09
SPMI-1248	3/31/2017	Cs-134	26.9 ± 5.9	26.6	21.3 - 31.9	Pass	1.01
SPMI-1248	3/31/2017	Cs-137	70.4 ± 6.9	70.4	56.3 - 84.5	Pass	1.00
SPMI-1248	3/31/2017	I-131	36.2 ± 0.6	36.6	29.3 - 43.9	Pass	0.99
SPW-1295	3/31/2017	Ra-226	17.9 ± 0.4	16.7	11.7 - 21.7	Pass	1.07
SPW-1304	4/4/2017	H-3	17,741 ± 398	17,243	13,794 - 20,692	Pass	1.03
SPW-1359	4/5/2017	I-131	44.3 ± 0.5	47.6	38.1 - 57.1	Pass	0.93
SPW-1378	4/7/2017	H-3	17,528 ± 395	17,243	13,794 - 20,692	Pass	1.02
SPW-1391	4/7/2017	Gr. Alpha	21.1 ± 0.4	20.1	10.0 - 30.1	Pass	1.05
SPW-1391	4/7/2017	Gr. Beta	27.8 ± 0.3	28.2	22.6 - 33.8	Pass	0.99
SPW-1480	4/12/2017	H-3	17,399 ± 392	17,243	13,794 - 20,692	Pass	1.01
W-041317	4/29/2016	Cs-134	34.6 ± 5.6	36.2	29.0 - 43.4	Pass	0.96
W-041317	4/29/2016	Cs-137	81.9 ± 8.0	71.9	57.5 - 86.3	Pass	1.14
SPW-1480	4/12/2017	H-3	17,399 ± 392	17,243	13,794 - 20,692	Pass	1.01
SPW-1575	4/18/2017	H-3	17,419 ± 393	17,243	13,794 - 20,692	Pass	1.01
SPW-1626	4/20/2017	Sr-90	37.2 ± 2.4	36.3	29.0 - 43.5	Pass	1.02
SPW-1658	4/21/2017	H-3	17,194 ± 391	17,243	13,794 - 20,692	Pass	1.00
SPW-1776	4/26/2017	H-3	16,609 ± 386	17,243	13,794 - 20,692	Pass	0.96
SPW-1806	4/27/2017	H-3	17,203 ± 390	17,243	13,794 - 20,692	Pass	1.00
SPW-1937	5/3/2017	H-3	16,690 ± 385	17,243	13,794 20,692	Pass	0.97
SPW-1971	5/5/2017	Sr-90	41.5 ± 2.2	36.3	29.0 - 43.5	Pass	1.14
SPW-2033	5/8/2017	H-3	16,780 ± 386	17,243	13,794 20,692	Pass	0.97
SPW-2420	5/9/2017	Ra-226	16.3 ± 0.5	16.7	11.7 - 21.7	Pass	0.98
W-051517	4/29/2016	Cs-134	36.3 ± 5.0	36.2	29.0 - 43.4	Pass	1.00
W-051517	4/29/2016	Cs-137	68.9 ± 6.6	71.9	57.5 - 86.3	Pass	0.96
SPW-2284	5/22/2017	H-3	16,935 ± 389	16,703	13,362 - 20,044	Pass	1.01
SPW-2354	5/23/2017	H-3	17,006 ± 390	16,700	13,360 - 20,040	Pass	1.02
SPW-2891	5/23/2017	Ra-226	17.5 ± 0.4	16.7	13.4 - 20.1	Pass	1.05
SPW-2418	5/23/2017	Ra-228	14.0 ± 1.8	16.0	11.2 - 20.8	Pass	0.87
SPW-2439	5/25/2017	Ra-228	13.0 ± 1.8	16.0	11.2 - 20.8	Pass	0.81
SPMI-2378	5/24/2017	Sr-89	83.7 ± 4.9	98.4	78.7 - 118.1	Pass	0.85
SPMI-2378	5/24/2017	Sr-90	39.5 ± 1.5	36.1	28.9 - 43.4	Pass	1.09
SPW-2468	5/26/2017	H-3	17,065 ± 391	16,692	13,354 - 20,030	Pass	1.02
SPW-2848	5/26/2017	I-131	56.4 ± 0.6	58.3	46.6 - 69.9	Pass	0.97
SPW-2502	6/1/2017	H-3	17,596 ± 396	16,677	13,342 - 20,012	Pass	1.06
SPW-2659	6/5/2017	H-3	17,027 ± 390	16,677	13,342 - 20,012	Pass	1.02
SPW-2790	6/9/2017	H-3	17,101 ± 392	17,101	13,681 - 20,521	Pass	1.00

TABLE A-3. In-House "Spiked" Samples

Lab Code [b]	Date	Concentration [a]					
		Analysis	Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance	Ratio Lab/Known
SPW-2798	6/12/2017	H-3	16,683 ± 364	16,649	13,319 - 19,979	Pass	1.00
SPW-2943	6/19/2017	Sr-90	39.2 ± 2.3	36.1	28.9 - 43.3	Pass	1.09
SPW-3509	6/15/2017	Ra-226	17.6 ± 0.5	16.7	11.7 - 21.7	Pass	1.05
W-061317	4/29/2016	Cs-134	35.0 ± 6.2	36.2	29.0 - 43.4	Pass	0.97
W-061317	4/29/2016	Cs-137	77.4 ± 7.8	71.9	57.5 - 86.3	Pass	1.08
SPW-3041	6/23/2017	H-3	16,419 ± 378	16,620	13,296 - 19,944	Pass	0.99
SPW-3511	6/23/2017	Ra-226	15.5 ± 0.6	16.7	11.7 - 21.7	Pass	0.93
SPW-3103	6/28/2017	H-3	16,507 ± 380	16,507	13,206 - 19,808	Pass	1.00
SPW-3117	6/29/2017	Tc-99	112.7 ± 1.9	107.8	75.5 - 140.1	Pass	1.05
SPW-3513	6/29/2017	Ra-226	17.8 ± 0.5	16.7	11.7 - 21.7	Pass	1.06
SPW-3188	7/3/2017	Sr-90	38.1 ± 2.2	36.1	28.9 - 43.3	Pass	1.06
SPW-3283	7/11/2017	H-3	16,057 ± 347	16,649	13,319 - 19,979	Pass	0.96
SPW-4054	7/11/2017	Ra-226	17.7 ± 0.4	16.0	11.2 - 20.8	Pass	1.11
SPW-3467	7/14/2017	Gr. Alpha	22.3 ± 0.5	20.1	10.0 - 30.1	Pass	1.11
SPW-3467	7/14/2017	Gr. Beta	29.1 ± 0.3	28.2	22.6 - 33.8	Pass	1.03
SPW-3449	7/15/2017	H-3	17,196 ± 393	16,507	13,206 - 19,808	Pass	1.04
SPW-3548	7/19/2017	H-3	16,764 ± 386	16,507	13,206 - 19,808	Pass	1.02
SPW-3728	7/24/2017	H-3	16,117 ± 354	16,507	13,206 - 19,808	Pass	0.98
SPW-3794	7/28/2017	H-3	16,645 ± 384	16,507	13,206 - 19,808	Pass	1.01
W-072817	4/29/2016	Cs-134	38.6 ± 5.6	36.2	29.0 - 43.4	Pass	1.07
W-072817	4/29/2016	Cs-137	76.5 ± 7.6	71.9	57.5 - 86.3	Pass	1.06
SPW-3905	8/3/2017	Gr. Alpha	22.3 ± 0.5	20.1	10.0 - 30.1	Pass	1.11
SPW-3905	8/3/2017	Gr. Beta	27.6 ± 0.3	28.2	22.6 - 33.8	Pass	0.98
SPW-4030	8/9/2017	H-3	17,636 ± 403	16,507	13,206 - 19,808	Pass	1.07
SPW-4086	8/14/2017	H-3	17,472 ± 401	16,507	13,206 - 19,808	Pass	1.06
SPW-4207	8/17/2017	H-3	17,013 ± 393	16,507	13,206 - 19,808	Pass	1.03
W-083017	4/29/2016	Cs-134	34.7 ± 6.4	36.2	29.0 - 43.4	Pass	0.96
W-083017	4/29/2016	Cs-137	78.2 ± 6.7	71.9	57.5 - 86.3	Pass	1.09
SPW-4241	8/19/2017	H-3	17,222 ± 371	16,507	13,206 - 19,808	Pass	1.04
SPW-4458	9/1/2017	Ra-226	14.1 ± 1.8	16.7	11.7 - 21.7	Pass	0.84
SPW-4466	9/6/2017	Sr-89	22.8 ± 8.5	26.4	21.1 - 31.7	Pass	0.86
SPW-4466	9/6/2017	Sr-90	32.5 ± 2.1	33.8	27.0 - 40.6	Pass	0.96
SPW-4512	9/8/2017	Gr. Alpha	19.2 ± 0.4	20.1	10.1 - 30.2	Pass	0.96
SPW-4512	9/8/2017	Gr. Beta	27.8 ± 0.3	27.9	22.3 - 33.5	Pass	0.99
SPW-4586	9/9/2017	H-3	16,586 ± 362	16,507	13,206 - 19,808	Pass	1.00
SPW-4720	9/16/2017	H-3	16,439 ± 362	16,507	13,206 - 19,808	Pass	1.00
SPW-4834	9/22/2017	H-3	16,238 ± 378	16,507	13,206 - 19,808	Pass	0.98
SPW-4935	9/27/2017	H-3	16,595 ± 381	16,507	13,206 - 19,808	Pass	1.01
SPW-4937	9/27/2017	Ra-228	5.7 ± 0.9	5.8	4.1 - 7.5	Pass	0.98
W-092717	4/29/2016	Cs-134	36.0 ± 5.9	36.2	29.0 - 43.4	Pass	0.99
W-092717	4/29/2016	Cs-137	82.6 ± 8.5	71.9	57.5 - 86.3	Pass	1.15
SPW-5001	9/29/2017	H-3	16,446 ± 358	16,507	13,206 - 19,808	Pass	1.00

TABLE A-3. In-House "Spiked" Samples

Lab Code [b]	Date	Concentration [a] Analysis	Laboratory results 2s, n=1 [c]	Known Activity	Control Limits [d]	Acceptance	Ratio Lab/Known
SPW-5134	10/6/2017	H-3	16,128 ± 373	16,507	13,206 - 19,808	Pass	0.98
SPW-5274	10/12/2017	H-3	16,108 ± 374	16,507	13,206 - 19,808	Pass	0.98
W-101217S	10/12/2017	Fe-55	1,491 ± 77	1,482	1,186 - 1,778	Pass	1.01
SPW-5408	10/18/2017	Ni-63	203 ± 3	199	139.1 - 258.3	Pass	1.02
SPW-5430	10/19/2017	H-3	16,453 ± 380	16,507	13,206 - 19,808	Pass	1.00
W-102017	4/29/2016	Cs-134	31.3 ± 4.9	36.2	29.0 - 43.4	Pass	0.86
W-102017	4/29/2016	Cs-137	80.4 ± 6.9	71.9	57.5 - 86.3	Pass	1.12
SPW-5674	10/25/2017	H-3	16,313 ± 380	16,507	13,206 - 19,808	Pass	0.99
SPW-5719	10/27/2017	H-3	16,113 ± 350	16,507	13,206 - 19,808	Pass	0.98
SPW-5730	10/31/2017	H-3	16,776 ± 387	16,507	13,206 - 19,808	Pass	1.02
SPW-5944	10/27/2017	Ra-226	16.4 ± 0.5	16.7	11.7 - 21.7	Pass	0.98
SPW-5915	11/9/2017	H-3	16,930 ± 390	16,507	13,206 - 19,808	Pass	1.03
SPW-5989	11/11/2017	H-3	16,084 ± 352	16,507	13,206 - 19,808	Pass	0.97
W-111417	4/29/2016	Cs-134	38.1 ± 6.2	36.2	29.0 - 43.4	Pass	1.05
W-111417	4/29/2016	Cs-137	74.0 ± 7.5	71.9	57.5 - 86.3	Pass	1.03
SPW-6121	11/16/2017	H-3	16,276 ± 378	16,507	13,206 - 19,808	Pass	0.99
SPW-6132	11/20/2017	H-3	15,897 ± 374	16,507	13,206 - 19,808	Pass	0.96
SPW-6249	11/30/2017	Ra-226	12.2 ± 0.4	12.3	8.6 - 16.0	Pass	1.00
SPW-6226	12/1/2017	H-3	16,164 ± 378	16,507	13,206 - 19,808	Pass	0.98
SPW-6318	12/7/2017	H-3	15,779 ± 372	16,507	13,206 - 19,808	Pass	0.96
W-120817	4/29/2016	Cs-134	29.5 ± 5.6	36.2	29.0 - 43.4	Pass	0.81
W-120817	4/29/2016	Cs-137	78.8 ± 9.6	71.9	57.5 - 86.3	Pass	1.10
SPW-65	12/11/2017	Ra-226	12.5 ± 0.4	12.3	8.6 - 16.0	Pass	1.01
SPW-6437	12/13/2017	Gr. Alpha	19.6 ± 0.4	20.1	10.1 - 30.2	Pass	0.98
SPW-6437	12/13/2017	Gr. Beta	28.2 ± 0.3	27.9	22.3 - 33.5	Pass	1.01
SPW-6463	12/15/2017	H-3	15,560 ± 372	16,507	13,206 - 19,808	Pass	0.94

[a] Liquid sample results are reported in pCi/Liter, air filters (pCi/m3), charcoal (pCi/charcoal canister), and solid samples (pCi/kg).

[b] Laboratory codes : W (Water), MI (milk), AP (air filter), SO (soil), VE (vegetation), CH (charcoal canister), F (fish), U (urine).

[c] Results are based on single determinations.

[d] Control limits are listed in Attachment A of this report.

NOTE: For fish, gelatin is used for the spike matrix. For vegetation, cabbage is used for the spike matrix.

TABLE A-4. In-House "Blank" Samples

Lab Code	Sample Type	Date	Analysis[b]	Concentration [a]		
				Laboratory results (4.66σ)		Acceptance
				LLD	Activity[c]	Criteria (4.66 σ)
SPW-31	Water	1/6/2017	H-3	143	71 ± 75	200
SPW-45	Water	1/9/2017	Gr. Alpha	0.41	0.09 ± 0.30	2
SPW-45	Water	1/9/2017	Gr. Beta	0.74	-0.56 ± 0.50	4
SPW-91	Water	1/11/2017	H-3	151	-23 ± 71	200
SPW-141	Water	1/12/2017	Sr-89	0.55	0.29 ± 0.47	5
SPW-141	Water	1/12/2017	Sr-90	0.67	-0.02 ± 0.31	1
SPW-154	Water	1/19/2017	H-3	155	-17 ± 73	200
SPW-185	Water	1/23/2017	H-3	176	44 ± 94	200
SPW-231	Water	1/19/2017	H-3	179	26 ± 87	200
SPW-303	Water	1/26/2017	H-3	160	8 ± 77	200
SPW-305	Water	1/4/2017	Ra-226	0.02	0.02 ± 0.01	2
SPW-307	Water	1/27/2017	I-131	0.21	0.01 ± 0.11	1.00
SPW-332	Water	1/30/2017	H-3	169	-52 ± 86	200
SPW-352	Water	2/2/2017	U-234	0.14	0.00 ± 0.08	1
SPW-352	Water	2/2/2017	U-238	0.14	0.12 ± 0.15	1
SPW-411	Water	2/6/2017	Sr-89	0.49	0.30 ± 0.35	5
SPW-411	Water	2/6/2017	Sr-90	0.52	-0.22 ± 0.21	1
SPW-464	Water	2/8/2017	H-3	155	2 ± 74	200
SPW-560	Water	2/15/2017	H-3	156	38 ± 77	200
SPW-604	Water	2/16/2017	H-3	154	59 ± 77	200
SPW-656	Water	2/17/2017	H-3	187	28 ± 94	200
SPW-713	Water	2/23/2017	H-3	161	20 ± 81	200
SPW-736	Water	2/28/2017	H-3	161	-75 ± 76	200
SPAP-739	AP	2/28/2017	Gr. Beta	0.002	0.004 ± 0.001	0.01
SPAP-741	AP	2/24/2017	Cs-134	2.27	-0.95 ± 1.29	100
SPAP-741	AP	2/24/2017	Cs-137	2.65	0.17 ± 1.67	100
SPW-747	Water	2/28/2017	C-14	161	-28 ± 97	200
SPW-749	Water	2/28/2017	Ni-63	17	-3 ± 10	200
SPF-751	Fish	2/28/2017	Cs-134	0.008	0.002 ± 0.004	100
SPF-751	Fish	2/28/2017	Cs-137	0.008	0.000 ± 0.005	100
SPW-780	Water	3/1/2017	Ra-226	0.02	0.02 ± 0.01	2
SPW-782	Water	3/1/2017	H-3	154	35 ± 78	200
SPW-3506	Water	3/1/2017	Ra-226	0.03	0.02 ± 0.02	2
SPW-836	Water	3/3/2017	I-131	0.38	0.04 ± 0.18	1
SPW-1009	Water	3/14/2017	H-3	154	-31 ± 72	200
SPW-1025	Water	3/16/2017	Gr. Alpha	0.43	-0.16 ± 0.28	2
SPW-1025	Water	3/16/2017	Gr. Beta	0.75	-0.24 ± 0.52	4
SPW-1091	Water	3/21/2017	H-3	145	60 ± 73	200
SPW-1150	Water	3/24/2017	H-3	152	-31 ± 71	200
SPW-1162	Water	3/28/2017	Sr-89	0.61	-0.39 ± 0.45	5
SPW-1162	Water	3/28/2017	Sr-90	0.52	0.18 ± 0.27	1

[a] Liquid sample results are reported in pCi/Liter, air filters (pCi/m^3), charcoal (pCi/charcoal canister), and solid samples (pCi/g).

[b] I-131(G); iodine-131 as analyzed by gamma spectroscopy.

[c] Activity reported is a net activity result.

TABLE A-4. In-House "Blank" Samples

Lab Code	Sample Type	Date	Analysis[b]	Concentration [a]		
				Laboratory results (4.66σ)		Acceptance
				LLD	Activity[c]	Criteria (4.66 σ)
SPW-1177	Water	3/29/2017	Ra-228	0.83	-0.14 ± 0.36	2
SPW-1231	Water	3/30/2017	H-3	150	24 ± 73	200
SPW-1245	Water	3/31/2017	Cs-134	3.73	0.43 ± 2.18	100
SPW-1245	Water	3/31/2017	Cs-137	3.01	-1.23 ± 2.12	100
SPW-1245	Water	3/31/2017	I-131(G)	5.39	0.92 ± 2.15	100
SPW-1245	Water	3/31/2017	I-131	0.32	0.03 ± 0.18	1
SPMI-1247	Milk	3/31/2017	Cs-134	3.70	1.23 ± 1.96	100
SPMI-1247	Milk	3/31/2017	Cs-137	3.62	-0.84 ± 2.15	100
SPMI-1247	Milk	3/31/2017	I-131(G)	4.42	0.39 ± 2.14	100
SPW-1294	Water	3/31/2017	Ra-226	0.02	0.18 ± 0.02	2
SPW-1303	Water	4/4/2017	H-3	151	8 ± 75	200
SPW-1377	Water	4/7/2017	H-3	150	29 ± 72	200
SPW-1390	Water	4/7/2017	Gr. Alpha	0.42	0.15 ± 0.31	2
SPW-1390	Water	4/7/2017	Gr. Beta	0.73	-0.17 ± 0.51	4
SPW-1479	Water	4/12/2017	H-3	151	89 ± 77	200
SPW-1574	Water	4/18/2017	H-3	144	55 ± 79	200
SPW-1625	Water	4/20/2017	Sr-89	0.59	-0.01 ± 0.50	5
SPW-1625	Water	4/20/2017	Sr-90	0.71	0.16 ± 0.35	1
SPW-1657	Water	4/21/2017	H-3	147	34 ± 73	200
SPW-1775	Water	4/26/2017	H-3	155	67 ± 80	200
SPW-1805	Water	4/27/2017	H-3	153	15 ± 74	200
SPW-1936	Water	5/3/2017	H-3	148	33 ± 71	200
SPW-1970	Water	5/5/2017	Sr-89	0.66	0.34 ± 0.54	5
SPW-1970	Water	5/5/2017	Sr-90	0.62	-0.08 ± 0.28	1
SPW-2032	Water	5/8/2017	H-3	147	66 ± 73	200
SPW-2419	Water	5/9/2017	Ra-226	0.03	0.01 ± 0.03	2
SPW-2283	Water	5/22/2017	H-3	155	24 ± 78	200
SPW-2353	Water	5/23/2017	H-3	151	56 ± 76	200
SPW-2890	Water	5/23/2017	Ra-226	0.03	-0.01 ± 0.02	2
SPMI-2377	Milk	5/24/2017	Sr-89	0.78	0.86 ± 0.93	5
SPMI-2377	Milk	5/24/2017	Sr-90	0.49	0.95 ± 0.33	1
SPW-2438	Water	5/25/2017	Ra-228	0.90	-0.28 ± 0.38	2
SPW-2467	Water	5/26/2017	H-3	152	27 ± 77	200
SPW-2417	Water	5/26/2017	Ra-228	0.80	1.58 ± 0.54	2
SPW-2447	Water	5/26/2017	I-131	0.21	-0.05 ± 0.12	1
SPW-2501	Water	6/1/2017	H-3	151	-23 ± 70	200
SPW-2658	Water	6/5/2017	H-3	152	107 ± 78	200
SPW-2789	Water	6/9/2017	H-3	150	52 ± 77	200
SPW-2797	Water	6/12/2017	H-3	177	7 ± 93	200
SPW-2847	Water	6/14/2017	I-131	0.18	0.03 ± 0.10	1

[a] Liquid sample results are reported in pCi/Liter, air filters (pCi/m^3), charcoal (pCi/charcoal canister), and solid samples (pCi/g).

[b] I-131(G); iodine-131 as analyzed by gamma spectroscopy.

[c] Activity reported is a net activity result.

TABLE A-4. In-House "Blank" Samples

Lab Code	Sample Type	Date	Analysis[b]	Concentration [a]		
				Laboratory results (4.66σ)		Acceptance
				LLD	Activity[c]	Criteria (4.66 σ)
SPW-3508	Water	6/15/2017	Ra-226	0.03	0.00 ± 0.02	2
SPW-2942	Water	6/19/2017	Sr-89	0.58	0.80 ± 0.53	5
SPW-2942	Water	6/19/2017	Sr-90	0.50	0.15 ± 0.25	1
SPW-3042	Water	6/23/2017	H-3	146	25 ± 74	200
SPW-3510	Water	6/23/2017	Ra-226	0.02	0.03 ± 0.02	2
SPW-3102	Water	6/28/2017	H-3	148	-7 ± 73	200
SPW-3116	Water	6/29/2017	Tc-99	5.91	-0.39 ± 3.58	10
SPW-3512	Water	6/29/2017	Ra-226	0.02	-0.01 ± 0.02	2
SPW-3187	Water	7/3/2017	Sr-89	0.62	0.00 ± 0.48	5
SPW-3187	Water	7/3/2017	Sr-90	0.48	0.07 ± 0.23	1
SPW-3282	Water	7/11/2017	H-3	178	-37 ± 84	200
SPW-4053	Water	7/11/2017	Ra-226	0.03	0.02 ± 0.02	2
SPW-3466	Water	7/14/2017	Gr. Alpha	0.42	-0.09 ± 0.28	2
SPW-3466	Water	7/14/2017	Gr. Beta	0.76	-0.18 ± 0.53	4
SPW-3448	Water	7/15/2017	H-3	150	54 ± 77	200
SPW-3727	Water	7/27/2017	Ni-63	90	18 ± 55	200
SPW-3793	Water	7/28/2017	H-3	151	47 ± 82	200
SPW-3904	Water	8/3/2017	Gr. Alpha	0.47	-0.02 ± 0.33	2
SPW-3904	Water	8/3/2017	Gr. Beta	0.75	-0.11 ± 0.52	4
SPW-4029	Water	8/9/2017	H-3	159	11 ± 79	200
SPW-4206	Water	8/17/2017	H-3	157	55 ± 76	200
SPW-4241	Water	8/19/2017	H-3	190	61 ± 96	200
SPW-4085	Water	8/14/2017	H-3	159	-28 ± 77	200
SPW-4206	Water	8/17/2017	H-3	157	55 ± 76	200
SPW-4241	Water	8/19/2017	H-3	190	61 ± 96	200
SPW-4457	Water	9/1/2017	Ra-228	0.78	-0.02 ± 0.36	2
SPW-4465	Water	9/6/2017	Sr-89	0.51	0.30 ± 0.37	5
SPW-4465	Water	9/6/2017	Sr-90	0.46	-0.09 ± 0.20	1
SPW-4585	Water	9/9/2017	H-3	187	-86 ± 83	200
SPW-5720	Water	9/13/2017	Ra-226	0.02	0.13 ± 0.02	2
SPW-4703	Water	9/15/2017	I-131	0.17	0.10 ± 0.10	1
SPW-4719	Water	9/16/2017	H-3	184	-86 ± 93	200
SPW-4833	Water	9/22/2017	H-3	150	5 ± 72	200
SPW-4934	Water	9/27/2017	H-3	148	5 ± 70	200
SPW-4936	Water	9/27/2017	Ra-228	0.80	0.55 ± 0.44	2
SPW-5000	Water	9/29/2017	H-3	183	-13 ± 90	200
SPW-5133	Water	10/6/2017	H-3	144	64 ± 71	200
SPW-5273	Water	10/12/2017	H-3	142	106 ± 72	200

[a] Liquid sample results are reported in pCi/Liter, air filters (pCi/m^3), charcoal (pCi/charcoal canister), and solid samples (pCi/g).

[b] I-131(G); iodine-131 as analyzed by gamma spectroscopy.

[c] Activity reported is a net activity result.

TABLE A-4. In-House "Blank" Samples

Lab Code	Sample Type	Date	Analysis[b]	Concentration [a]		
				Laboratory results (4.66σ)		Acceptance
				LLD	Activity[c]	Criteria (4.66 σ)
SPW-5407	Water	10/18/2017	Ni-63	69	43 ± 43	200
SPW-5429	Water	10/19/2017	H-3	148	54 ± 72	200
SPW-5603	Water	10/23/2017	Sr-89	0.57	0.16 ± 0.47	5
SPW-5603	Water	10/23/2017	Sr-90	0.70	-0.12 ± 0.31	1
SPW-5673	Water	10/25/2017	H-3	156	-36 ± 71	200
SPW-5718	Water	10/27/2017	H-3	182	45 ± 92	200
SPW-5943	Water	10/27/2017	Ra-226	0.02	0.08 ± 0.02	2
SPW-5723	Water	10/30/2017	I-131	0.10	0.03 ± 0.07	1
SPW-5914	Water	11/09/17	H-3	149	-39 ± 68	200
SPW-5988	Water	11/11/2017	H-3	183	-8 ± 88	200
SPW-6120	Water	11/16/2017	H-3	146	83 ± 75	200
SPW-6131	Water	11/20/2017	H-3	151	16 ± 72	200
SPW-6197	Water	11/29/2017	I-131	0.38	0.01 ± 0.18	1
SPW-6248	Water	11/30/2017	Ra-226	0.03	0.15 ± 0.03	2
SPW-6225	Water	12/1/2017	H-3	154	-10 ± 72	200
SPW-6317	Water	12/7/2017	H-3	148	44 ± 74	200
SPW-64	Water	12/11/2017	Ra-226	0.03	0.18 ± 0.03	2
SPW-6436	Water	12/13/2017	Gr. Alpha	0.54	-0.17 ± 0.37	2
SPW-6436	Water	12/13/2017	Gr. Beta	0.74	0.12 ± 0.52	4
SPW-6464	Water	12/15/2017	H-3	148	31 ± 75	200

[a] Liquid sample results are reported in pCi/Liter, air filters (pCi/m^3), charcoal (pCi/charcoal canister), and solid samples (pCi/g).

[b] I-131(G); iodine-131 as analyzed by gamma spectroscopy.

[c] Activity reported is a net activity result.

TABLE A-5. In-House "Duplicate" Samples

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
AP-7178,7179	1/3/2017	Be-7	0.047 ± 0.015	0.062 ± 0.017	0.054 ± 0.012	Pass
SW-6986,6987	1/3/2017	Gr. Beta	1.39 ± 0.41	0.77 ± 0.41	1.08 ± 0.29	Pass
E-66,67	1/3/2017	Gr. Beta	1.62 ± 0.05	1.45 ± 0.04	1.54 ± 0.11	Pass
E-66,67	1/3/2017	K-40	1.26 ± 0.14	1.39 ± 0.16	1.32 ± 0.11	Pass
CF-87,88	1/3/2017	Be-7	0.25 ± 0.11	0.30 ± 0.12	0.28 ± 0.08	Pass
CF-87,88	1/3/2017	K-40	7.77 ± 0.39	6.84 ± 0.37	7.31 ± 0.27	Pass
AP-011217	1/12/2017	Be-7	0.137 ± 0.078	0.139 ± 0.082	0.138 ± 0.056	Pass
MI-212,213	1/16/2017	K-40	1,515 ± 98	1,347 ± 107	1,431 ± 73	Pass
WW-321,322	1/19/2017	H-3	675 ± 118	506 ± 133	590 ± 89	Pass
WW-674,675	1/20/2017	H-3	7,326 ± 254	7,717 ± 259	7,522 ± 181	Pass
AP-012317	1/23/2017	Gr. Beta	0.034 ± 0.005	0.038 ± 0.005	0.036 ± 0.004	Pass
WW-298,299	1/24/2017	H-3	5,916 ± 239	5764 ± 237	5840 ± 168	Pass
AP-013117	1/30/2017	Gr. Beta	0.027 ± 0.004	0.028 ± 0.004	0.028 ± 0.003	Pass
WW-500,501	1/31/2017	H-3	1,058 ± 122	1,054 ± 121	1,056 ± 86	Pass
SW-391,392	1/31/2017	Gr. Beta	1.40 ± 0.56	1.62 ± 0.61	1.51 ± 0.41	Pass
SPS-370,371	2/1/2017	K-40	23.47 ± 0.66	23.11 ± 0.72	23.29 ± 0.49	Pass
AP-456,457	2/2/2017	Be-7	0.129 ± 0.076	0.167 ± 0.092	0.148 ± 0.060	Pass
AP-020217	2/2/2017	Gr. Beta	0.021 ± 0.004	0.027 ± 0.004	0.024 ± 0.003	Pass
SPS-414,415	2/3/2017	K-40	19.45 ± 1.85	21.58 ± 1.99	20.52 ± 1.36	Pass
AP-020617	2/6/2017	Gr. Beta	0.023 ± 0.004	0.023 ± 0.004	0.023 ± 0.003	Pass
AP-021417A	2/14/2017	Gr. Beta	0.031 ± 0.004	0.030 ± 0.004	0.030 ± 0.003	Pass
SPW-543	2/14/2017	Gr. Beta	7.99 ± 0.82	9.45 ± 0.88	8.72 ± 0.60	Pass
AP-021417B	2/14/2017	Gr. Beta	0.024 ± 0.004	0.028 ± 0.004	0.026 ± 0.003	Pass
WW-718,719	2/14/2017	H-3	737 ± 113	643 ± 110	690 ± 79	Pass
AP-022017	2/20/2017	Gr. Beta	0.018 ± 0.005	0.021 ± 0.005	0.020 ± 0.004	Pass
WW-755,756	2/22/2017	H-3	3,709 ± 196	3,823 ± 198	3,766 ± 139	Pass
AP-022717	2/27/2017	Gr. Beta	0.021 ± 0.004	0.019 ± 0.004	0.020 ± 0.003	Pass
SPDW-80011,2	3/2/2017	Ra-226	7.29 ± 0.32	6.76 ± 0.30	7.03 ± 0.22	Pass
SPDW-80011,2	3/2/2017	Ra-228	4.68 ± 0.82	6.29 ± 1.03	5.49 ± 0.66	Pass
SPDW-80013,4	3/2/2017	Gr. Alpha	13.57 ± 1.43	12.44 ± 1.37	13.01 ± 0.99	Pass
WW-845,846	3/2/2017	H-3	314 ± 93	249 ± 90	281 ± 65	Pass
AP-030617	3/6/2017	Gr. Beta	0.022 ± 0.004	0.019 ± 0.004	0.020 ± 0.003	Pass
WW-1050,1051	3/8/2017	H-3	14,994 ± 364	14,745 ± 362	14,870 ± 257	Pass
SPS-920,921	3/9/2017	K-40	23.30 ± 1.76	23.13 ± 1.64	23.21 ± 1.20	Pass
WW-1004,1005	3/13/2017	H-3	182 ± 80	158 ± 79	170 ± 56	Pass
SPS-1029,1030	3/15/2017	K-40	11.82 ± 0.68	12.01 ± 0.68	11.92 ± 0.48	Pass
AP-031517	3/15/2017	Gr. Beta	0.020 ± 0.003	0.020 ± 0.003	0.020 ± 0.002	Pass
SPDW-80037,8	3/20/2017	Gr. Alpha	4.54 ± 0.82	5.29 ± 0.91	4.91 ± 0.61	Pass
AP-032017	3/20/2017	Gr. Beta	0.021 ± 0.006	0.021 ± 0.006	0.021 ± 0.005	Pass
WW-1094,1095	3/20/2017	H-3	1,571 ± 137	1,595 ± 138	1,583 ± 175	Pass

TABLE A-5. In-House "Duplicate" Samples

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
WW-1175,1176	3/20/2017	H-3	218 ± 84	211 ± 84	214 ± 59	Pass
WW-1129,1130	3/21/2017	Gr. Beta	3.51 ± 1.24	2.99 ± 1.17	3.25 ± 0.85	Pass
WW-1219,1220	3/22/2017	H-3	11,467 ± 322	11,516 ± 323	11,492 ± 200	Pass
SPS-1152,1153	3/27/2017	Ac-228	20.39 ± 0.75	20.43 ± 0.88	20.41 ± 0.58	Pass
SPS-1152,1153	3/27/2017	Pb-214	17.22 ± 0.50	16.44 ± 0.52	16.83 ± 0.36	Pass
SPDW-80047,8	3/28/2017	Ra-226	2.06 ± 0.23	1.60 ± 0.32	1.83 ± 0.20	Pass
SPDW-80047,8	3/28/2017	Ra-228	0.53 ± 0.48	0.78 ± 0.49	0.66 ± 0.34	Pass
SWU-1242,1243	3/28/2017	Gr. Beta	2.04 ± 0.81	2.47 ± 0.69	2.26 ± 0.53	Pass
SPS-1198,1199	3/29/2017	K-40	16.95 ± 1.85	18.33 ± 1.71	17.64 ± 1.26	Pass
SPDW-80050,1	3/29/2017	Gr. Alpha	3.19 ± 0.80	3.39 ± 0.78	3.29 ± 0.56	Pass
SPDW-80050,1	3/29/2017	Gr. Beta	1.58 ± 0.60	2.08 ± 0.63	1.83 ± 0.44	Pass
AP-1706,1707	3/30/2017	Be-7	0.068 ± 0.018	0.072 ± 0.017	0.070 ± 0.012	Pass
SW-1381,1382	4/5/2017	H-3	402 ± 92	309 ± 88	356 ± 64	Pass
WW-1446,1447	4/6/2017	H-3	305 ± 89	358 ± 91	332 ± 64	Pass
WW-1532,1533	4/10/2017	H-3	19,124 ± 412	18,991 ± 410	19,058 ± 291	Pass
WW-1618,1619	4/12/2017	H-3	4,187 ± 203	4,305 ± 205	4,246 ± 144	Pass
SS-1553,1554	4/13/2017	Gr. Beta	7.16 ± 0.99	6.09 ± 0.91	6.63 ± 0.67	Pass
SS-1553,1554	4/13/2017	K-40	4.60 ± 0.32	4.84 ± 0.34	4.72 ± 0.23	Pass
SS-1553,1554	4/13/2017	Tl-208	0.038 ± 0.016	0.032 ± 0.011	0.035 ± 0.010	Pass
SS-1553,1554	4/13/2017	Pb-212	0.101 ± 0.015	0.096 ± 0.015	0.098 ± 0.010	Pass
SS-1553,1554	4/13/2017	Bi-214	0.094 ± 0.032	0.109 ± 0.022	0.101 ± 0.019	Pass
SS-1553,1554	4/13/2017	Ac-228	0.089 ± 0.042	0.111 ± 0.046	0.100 ± 0.031	Pass
P-2015,2016	5/4/2017	H-3	189 ± 80	212 ± 81	200 ± 57	Pass
WW-2336,2337	5/8/2017	H-3	422 ± 97	298 ± 91	360 ± 66	Pass
AP-051117	5/11/2017	Gr. Beta	0.018 ± 0.003	0.025 ± 0.004	0.021 ± 0.002	Pass
WW-2497,2498	5/23/2017	H-3	1,268 ± 127	1,247 ± 126	1,257 ± 89	Pass
WW-2583,2584	5/23/2017	H-3	5,159 ± 224	5,223 ± 126	5,191 ± 129	Pass
WW-2732,2733	5/23/2017	H-3	8,559 ± 282	8,570 ± 283	8,564 ± 200	Pass
XW-1218,1219	5/23/2017	H-3	11,467 ± 282	11,516 ± 283	11,492 ± 200	Pass
MI-2428,2429	5/24/2017	K-40	1,752 ± 137	1,805 ± 132	1,778 ± 95	Pass
SO-2562,2563	5/24/2017	K-40	7.87 ± 0.50	8.64 ± 0.49	8.25 ± 0.35	Pass
WW-3023,3024	5/24/2017	H-3	27,398 ± 486	27,733 ± 489	27,565 ± 344	Pass
SO-2453,2454	5/25/2017	Gr. Beta	14.38 ± 0.93	15.70 ± 1.06	15.04 ± 0.70	Pass
SO-2453,2454	5/25/2017	Cs-137	0.17 ± 0.03	0.18 ± 0.03	0.17 ± 0.02	Pass
SO-2453,2454	5/25/2017	K-40	9.80 ± 0.50	9.19 ± 0.57	9.50 ± 0.38	Pass
SO-2453,2454	5/25/2017	Tl-208	0.09 ± 0.02	0.10 ± 0.03	0.09 ± 0.02	Pass
SO-2453,2454	5/25/2017	Pb-212	0.29 ± 0.03	0.30 ± 0.03	0.29 ± 0.02	Pass
SO-2453,2454	5/25/2017	Bi-214	0.24 ± 0.03	0.18 ± 0.04	0.21 ± 0.03	Pass
SO-2453,2454	5/25/2017	Ra-226	0.82 ± 0.22	0.62 ± 0.27	0.72 ± 0.17	Pass
SO-2453,2454	5/25/2017	Ac-228	0.32 ± 0.07	0.28 ± 0.08	0.30 ± 0.05	Pass

TABLE A-5. In-House "Duplicate" Samples

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
SWT-2625,2626	5/30/2017	Gr. Beta	0.64 ± 0.53	1.08 ± 0.55	0.86 ± 0.38	Pass
AP-053117	5/31/2017	Gr. Beta	0.013 ± 0.003	0.011 ± 0.003	0.012 ± 0.002	Pass
G-2646,2647	6/1/2017	Be-7	1.02 ± 0.17	1.06 ± 0.26	1.04 ± 0.15	Pass
G-2646,2647	6/1/2017	K-40	7.51 ± 0.49	6.55 ± 0.51	7.03 ± 0.36	Pass
SL-2669,70	6/1/2017	Be-7	0.34 ± 0.06	0.30 ± 0.06	0.32 ± 0.04	Pass
SL-2669,70	6/1/2017	K-40	4.35 ± 0.14	4.39 ± 0.15	4.37 ± 0.10	Pass
F-2711,2712	6/2/2017	K-40	2.56 ± 0.32	2.77 ± 0.44	2.66 ± 0.27	Pass
AP-060617	6/6/2017	Gr. Beta	0.026 ± 0.005	0.027 ± 0.005	0.027 ± 0.004	Pass
SW-2849,50	6/8/2017	H-3	8,178 ± 273	8,563 ± 279	8,371 ± 195	Pass
AP-061217	6/12/2017	Gr. Beta	0.027 ± 0.005	0.027 ± 0.005	0.027 ± 0.004	Pass
BS-3446,3447	6/12/2017	K-40	8.30 ± 0.47	8.57 ± 0.47	8.44 ± 0.33	Pass
VE-2870,2871	6/13/2017	K-40	3.65 ± 0.25	3.90 ± 0.26	3.77 ± 0.18	Pass
AP-2914,5	6/15/2017	Be-7	0.269 ± 0.146	0.212 ± 0.123	0.240 ± 0.095	Pass
AP-3067,8	6/15/2017	Be-7	0.204 ± 0.113	0.328 ± 0.126	0.266 ± 0.085	Pass
AP-061917	6/19/2017	Gr. Beta	0.020 ± 0.004	0.019 ± 0.004	0.020 ± 0.003	Pass
AP-3610,1	6/26/2017	Be-7	0.107 ± 0.015	0.116 ± 0.021	0.111 ± 0.013	Pass
AP-062617	6/26/2017	Gr. Beta	0.017 ± 0.004	0.021 ± 0.004	0.019 ± 0.003	Pass
AP-3673,3674	7/3/2017	Be-7	0.087 ± 0.008	0.078 ± 0.008	0.083 ± 0.006	Pass
AP-3287,3288	7/6/2017	Be-7	0.207 ± 0.112	0.244 ± 0.096	0.226 ± 0.074	Pass
WW-3308,3309	7/7/2017	H-3	549 ± 108	501 ± 107	525 ± 76	Pass
VE-3362,3363	7/12/2017	K-40	2.32 ± 0.17	2.40 ± 0.16	2.36 ± 0.12	Pass
VE-3589,3590	7/18/2017	K-40	5.25 ± 0.33	4.64 ± 0.33	4.94 ± 0.23	Pass
SG-3631,3632	7/18/2017	Pb-214	3.03 ± 0.11	2.97 ± 0.11	3.00 ± 0.08	Pass
SG-3631,3632	7/18/2017	Ac-228	2.47 ± 0.22	2.56 ± 0.23	2.52 ± 0.16	Pass
WW-3846,3847	7/25/2017	H-3	505 ± 101	446 ± 98	475 ± 70	Pass
F-4509,4510	7/26/2017	K-40	0.85 ± 0.25	1.00 ± 0.25	0.93 ± 0.18	Pass
F-4509,4510	7/26/2017	Gr. Beta	1.19 ± 0.03	1.18 ± 0.03	1.18 ± 0.02	Pass
G-3804,3805	7/27/2017	Be-7	3.72 ± 0.39	3.47 ± 0.40	3.59 ± 0.28	Pass
G-3804,3805	7/27/2017	K-40	4.21 ± 0.52	4.46 ± 0.52	4.34 ± 0.33	Pass
SL-3888,3889	8/1/2017	Be-7	0.77 ± 0.04	0.73 ± 0.07	0.75 ± 0.04	Pass
SL-3888,3889	8/1/2017	K-40	0.94 ± 0.04	0.87 ± 0.08	0.90 ± 0.23	Pass
WW-4158,4159	8/8/2017	H-3	321 ± 90	270 ± 88	295 ± 63	Pass
VE-4179,4180	8/14/2017	K-40	1.84 ± 0.18	1.90 ± 0.21	1.87 ± 0.14	Pass
AP-4289,4290	8/17/2017	Be-7	0.212 ± 0.095	0.162 ± 0.080	0.187 ± 0.062	Pass
F-4333,4334	8/18/2017	K-40	3.22 ± 0.41	3.62 ± 0.42	3.42 ± 0.29	Pass
CF-4310,4311	8/21/2017	K-40	10.94 ± 0.74	11.48 ± 0.50	11.21 ± 0.45	Pass
DW-80161,80162	8/22/2017	Ra-226	1.22 ± 0.15	1.19 ± 0.17	1.21 ± 0.11	Pass
DW-80161,80162	8/22/2017	Ra-228	1.99 ± 0.63	0.70 ± 0.49	1.35 ± 0.40	Pass
VE-4398,4399	8/28/2017	Be-7	0.13 ± 0.07	0.13 ± 0.08	0.13 ± 0.05	Pass

TABLE A-5. In-House "Duplicate" Samples

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
VE-4398,4399	8/28/2017	K-40	3.32 ± 0.22	3.48 ± 0.25	3.40 ± 0.17	Pass
SW-4463,4464	8/29/2017	H-3	495 ± 106	491 ± 106	493 ± 75	Pass
LW-4486,4487	8/31/2017	Gr. Beta	0.425 ± 0.471	1.358 ± 0.571	0.892 ± 0.370	Pass
VE-4561,4562	9/6/2017	Be-7	5.89 ± 0.29	5.76 ± 0.25	5.83 ± 0.19	Pass
VE-4561,4562	9/6/2017	K-40	3.73 ± 0.34	3.77 ± 0.29	3.75 ± 0.22	Pass
BO-5122,5123	9/8/2017	K-40	4.50 ± 0.36	4.50 ± 0.36	4.50 ± 0.25	Pass
VE-4692,4693	9/12/2017	K-40	5.16 ± 0.13	5.31 ± 0.36	5.24 ± 0.19	Pass
SS-4650,4651	9/12/2017	K-40	10.55 ± 0.51	10.41 ± 0.54	10.48 ± 0.37	Pass
MI-4671,4672	9/13/2017	K-40	1,347 ± 115	1,283 ± 118	1,315 ± 82	Pass
MI-4671,4672	9/13/2017	Sr-90	0.7 ± 0.3	0.5 ± 0.3	0.6 ± 0.2	Pass
VE-4973,4974	9/17/2017	K-40	1.11 ± 0.15	1.17 ± 0.13	1.14 ± 0.10	Pass
F-4928,4929	9/19/2017	K-40	1.84 ± 0.31	1.68 ± 0.34	1.76 ± 0.23	Pass
S-4865,4866	9/20/2017	K-40	21.07 ± 2.39	19.09 ± 2.51	20.08 ± 1.73	Pass
VE-4907,4908	9/20/2017	K-40	3.83 ± 0.44	4.28 ± 0.31	4.05 ± 0.27	Pass
VE-4844,4845	9/21/2017	K-40	1.81 ± 0.22	1.88 ± 0.21	1.84 ± 0.15	Pass
AP-5572,5573	9/27/2017	Be-7	0.082 ± 0.015	0.075 ± 0.014	0.078 ± 0.010	Pass
LW-5145,5146	9/28/2017	Gr. Beta	0.84 ± 0.49	1.47 ± 0.57	1.16 ± 0.38	Pass
AP-092917	9/29/2017	Gr. Beta	0.038 ± 0.004	0.031 ± 0.004	0.035 ± 0.003	Pass
WW-5080,5081	10/2/2017	H-3	208 ± 79	223 ± 80	215 ± 56	Pass
AP-100217	10/2/2017	Gr. Beta	0.025 ± 0.005	0.028 ± 0.005	0.026 ± 0.003	Pass
AP-100317	10/3/2017	Gr. Beta	0.037 ± 0.004	0.033 ± 0.004	0.035 ± 0.003	Pass
S-5165,5166	10/4/2017	K-40	15.93 ± 2.30	20.34 ± 3.15	18.14 ± 1.95	Pass
VE-5228,5229	10/5/2017	K-40	3.25 ± 0.25	2.82 ± 0.24	3.04 ± 0.17	Pass
AP-100917	10/9/2017	Gr. Beta	0.021 ± 0.004	0.025 ± 0.004	0.023 ± 0.003	Pass
VE-5293,5294	10/10/2017	K-40	3.89 ± 0.30	4.08 ± 0.34	3.99 ± 0.22	Pass
DW-80184,80185	10/11/2017	Gr. Alpha	2.17 ± 0.81	2.50 ± 0.81	2.34 ± 0.57	Pass
DW-80184,80185	10/11/2017	Gr. Beta	9.45 ± 0.79	10.20 ± 0.83	9.83 ± 0.57	Pass
S-5421,5422	10/12/2017	K-40	8.82 ± 1.94	7.97 ± 0.72	8.40 ± 1.03	Pass
AP-101617	10/16/2017	Gr. Beta	0.025 ± 0.005	0.022 ± 0.004	0.024 ± 0.003	Pass
F-5658,5659	10/19/2017	K-40	2.44 ± 0.41	2.57 ± 0.39	2.51 ± 0.28	Pass
SO-5704,5705	10/25/2017	Cs-137	0.05 ± 0.02	0.04 ± 0.02	0.04 ± 0.01	Pass
SO-5704,5705	10/25/2017	K-40	10.08 ± 0.51	9.57 ± 0.56	9.83 ± 0.38	Pass
SO-5704,5705	10/25/2017	Tl-208	0.10 ± 0.02	0.09 ± 0.02	0.10 ± 0.01	Pass
SO-5704,5705	10/25/2017	Bi-214	0.34 ± 0.04	0.27 ± 0.04	0.30 ± 0.03	Pass
SO-5704,5705	10/25/2017	Pb-212	0.28 ± 0.03	0.27 ± 0.03	0.27 ± 0.02	Pass
SO-5704,5705	10/25/2017	Ra-226	1.15 ± 0.52	0.59 ± 0.22	0.87 ± 0.28	Pass
SO-5704,5705	10/25/2017	Ac-228	0.33 ± 0.05	0.31 ± 0.07	0.32 ± 0.04	Pass
SO-5704,5705	10/25/2017	Gr. Beta	18.34 ± 1.80	16.50 ± 1.03	17.42 ± 1.04	Pass
AP-5732,5733	10/26/2017	Be-7	0.139 ± 0.064	0.175 ± 0.075	0.157 ± 0.049	Pass

TABLE A-5. In-House "Duplicate" Samples

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
SW-5753,5754	10/31/2017	H-3	220 ± 83	279 ± 86	249 ± 60	Pass
SWU-5816,5817	10/31/2017	Gr. Beta	1.51 ± 1.00	2.02 ± 1.02	1.76 ± 0.71	Pass
AP-103117	10/31/2017	Gr. Beta	0.015 ± 0.004	0.014 ± 0.004	0.015 ± 0.003	Pass
SO-5923,5924	11/1/2017	Cs-137	0.30 ± 0.04	0.31 ± 0.04	0.31 ± 0.03	Pass
SO-5923,5924	11/1/2017	K-40	10.52 ± 0.61	10.56 ± 0.67	10.54 ± 0.45	Pass
AP-5858,5859	11/2/2017	Be-7	0.145 ± 0.075	0.146 ± 0.084	0.145 ± 0.056	Pass
AP-110717	11/7/2017	Be-7	0.026 ± 0.004	0.030 ± 0.004	0.028 ± 0.003	Pass
WW-6032,6033	11/7/2017	H-3	204 ± 86	298 ± 80	251 ± 59	Pass
WW-6074,6075	11/8/2017	H-3	72,247 ± 786	73,062 ± 791	72,655 ± 558	Pass
BS-6053,6054	11/13/2017	K-40	7.99 ± 0.62	9.20 ± 0.68	8.60 ± 0.46	Pass
BS-6053,6054	11/13/2017	Cs-137	0.07 ± 0.03	0.08 ± 0.03	0.07 ± 0.02	Pass
DW-80211,80212	11/14/2017	Gr. Alpha	2.30 ± 0.80	3.60 ± 1.00	2.95 ± 0.64	Pass
DW-80211,80212	11/14/2017	Gr. Beta	9.32 ± 0.81	8.99 ± 0.81	9.16 ± 0.57	Pass
DW-80214,80215	11/14/2017	Ra-226	1.36 ± 0.22	1.35 ± 0.15	1.355 ± 0.13	Pass
DW-80214,80215	11/14/2017	Ra-228	1.41 ± 0.51	0.90 ± 0.45	1.16 ± 0.34	Pass
WW-6152,6153	11/15/2017	H-3	416 ± 94	328 ± 90	372 ± 65	Pass
SWU-6219,6220	11/28/2017	Gr. Beta	1.04 ± 0.54	1.75 ± 0.58	1.39 ± 0.39	Pass
SS-6242,6243	11/29/2017	K-40	24.17 ± 1.05	22.31 ± 1.03	23.24 ± 0.74	Pass
SS-6242,6243	11/29/2017	Cs-137	0.11 ± 0.03	0.08 ± 0.03	0.10 ± 0.02	Pass
SG-6938,6939	11/28/2017	Pb-214	15.28 ± 0.34	14.96 ± 0.43	15.12 ± 0.27	Pass
SG-6938,6939	11/28/2017	Ac-228	18.99 ± 0.59	19.92 ± 0.79	19.46 ± 0.49	Pass
AP-112817	11/28/2017	Gr. Beta	0.026 ± 0.004	0.030 ± 0.004	0.028 ± 0.003	Pass
SQ-6286,6287	12/1/2017	Gr. Alpha	70.6 ± 6.2	60.9 ± 6.0	65.8 ± 4.3	Pass
SQ-6286,6287	12/1/2017	Gr. Beta	48.9 ± 2.7	53.7 ± 2.8	51.3 ± 1.9	Pass
SQ-6286,6287	12/1/2017	Ra-226	11.3 ± 0.4	10.7 ± 0.5	11.0 ± 0.3	Pass
SQ-6286,6287	12/1/2017	Ra-228	13.5 ± 0.9	13.2 ± 1.0	13.4 ± 0.7	Pass
SG-6286,6287	12/1/2017	K-40	5.10 ± 1.82	6.65 ± 1.53	5.88 ± 1.19	Pass
AP-120417	12/4/2017	Gr. Beta	0.037 ± 0.006	0.035 ± 0.005	0.036 ± 0.004	Pass
WW-6548,6549	12/19/2017	H-3	8,428 ± 280	8,604 ± 282	8,516 ± 199	Pass
AP-122717	12/27/2017	Gr. Beta	0.047 ± 0.004	0.043 ± 0.004	0.045 ± 0.003	Pass
XAP-6762,6763	12/31/2017	Co-60	2.43 ± 1.30	2.24 ± 0.82	2.34 ± 0.77	Pass
XAP-6762,6763	12/31/2017	Cs-137	4.21 ± 1.11	4.05 ± 0.96	4.14 ± 0.73	Pass

Note: Duplicate analyses are performed on every twentieth sample received in-house. Results are not listed for those analyses with activities that measure below the LLD.

[a] Results are reported in units of pCi/L, except for air filters (pCi/Filter or pCi/m3), food products, vegetation, soil and sediment (pCi/g).

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP).

			Concentration [a]			
Lab Code [b]	Reference Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MASO-903	2/1/2017	Am-241	60.9 ± 6.9	67.0	46.9 - 87.1	Pass
MASO-903	2/1/2017	Cs-134	1360 ± 14	1550	1085 - 2015	Pass
MASO-903	2/1/2017	Cs-137	678 ± 13	611	428 - 794	Pass
MASO-903	2/1/2017	Co-57	1.63 ± 1.69	0.00	NA [c]	Pass
MASO-903	2/1/2017	Co-60	909 ± 12	891	624 - 1158	Pass
MASO-903	2/1/2017	Mn-54	1052 ± 17	967	677 - 1257	Pass
MASO-903	2/1/2017	K-40	657 ± 68	607	425 - 789	Pass
MASO-903	2/1/2017	Zn-65	-0.52 ± 7.40	0.00	NA [c]	Pass
MASO-903	2/1/2017	Ni-63	3.25 ± 7.17	0.00	NA [c]	Pass
MASO-903	2/1/2017	Pu-238	0.46 ± 0.69	0.41	NA [e]	Pass
MASO-903	2/1/2017	Pu-239/240	56.8 ± 5.9	59.8	41.9 - 77.7	Pass
MASO-903	2/1/2017	Sr-90	501 ± 17	624	437 - 811	Pass
MASO-903	2/1/2017	Tc-99	748 ± 16	656	459 - 853	Pass
MAW-849	2/1/2017	I-129	-0.05 ± 0.12	0.00	NA [c]	Pass
MAVE-905	2/1/2017	Cs-134	6.61 ± 0.16	6.95	4.87 - 9.04	Pass
MAVE-905	2/1/2017	Cs-137	4.97 ± 0.18	4.60	3.22 - 5.98	Pass
MAVE-905	2/1/2017	Co-57	-0.01 ± 0.03	0.00	NA [c]	Pass
MAVE-905	2/1/2017	Co-60	9.51 ± 0.17	8.75	6.13 - 11.38	Pass
MAVE-905	2/1/2017	Mn-54	3.67 ± 0.17	3.28	2.30 - 4.26	Pass
MAVE-905	2/1/2017	Zn-65	6.12 ± 0.44	5.39	3.77 - 7.01	Pass
MAW-847	2/1/2017	Am-241	0.679 ± 0.079	0.846	0.592 - 1.100	Pass
MAW-847	2/1/2017	Cs-134	0.03 ± 0.10	0.00	NA [c]	Pass
MAW-847	2/1/2017	Cs-137	12.7 ± 0.4	11.1	7.8 - 14.4	Pass
MAW-847 [d]	2/1/2017	Co-57	2.7 ± 0.3	28.5	20.0 - 37.1	Fail
MAW-847	2/1/2017	Co-60	13.5 ± 0.3	12.3	8.6 - 16.0	Pass
MAW-847	2/1/2017	Mn-54	16.5 ± 0.4	14.9	10.4 - 19.4	Pass
MAW-847	2/1/2017	K-40	287 ± 6	254	178 - 330	Pass
MAW-847	2/1/2017	Zn-65	-0.15 ± 0.23	0.00	NA [c]	Pass
MAW-847	2/1/2017	H-3	275 ± 10	249	174 - 324	Pass
MAW-847	2/1/2017	Fe-55	2.4 ± 13.6	1.7	NA [e]	Pass
MAW-847	2/1/2017	Ni-63	10.1 ± 2.8	12.2	8.5 - 15.9	Pass
MAW-847	2/1/2017	Pu-238	0.729 ± 0.097	0.703	0.492 - 0.914	Pass
MAW-847	2/1/2017	Pu-239/240	0.866 ± 0.102	0.934	0.654 - 1.214	Pass
MAW-847	2/1/2017	Ra-226	0.506 ± 0.053	0.504	0.353 - 0.655	Pass
MAW-847	2/1/2017	Sr-90	10.0 ± 0.8	10.1	7.1 - 13.1	Pass

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP).

			Concentration [a]			
Lab Code [b]	Reference Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MAW-847	2/1/2017	Tc-99	4.77 ± 0.62	6.25	4.38 - 8.13	Pass
MAW-847	2/1/2017	U-234/233	1.19 ± 0.10	1.16	0.81 - 1.51	Pass
MAW-847	2/1/2017	U-238	1.15 ± 0.10	1.20	0.84 - 1.56	Pass
MAAP-907[f]	2/1/2017	Am-241	0.0540 ± 0.0140	0.0376	0.0263 - 0.0489	Fail
MAAP-907	2/1/2017	Cs-134	1.31 ± 0.06	1.42	0.99 - 1.85	Pass
MAAP-907	2/1/2017	Cs-137	0.797 ± 0.080	0.685	0.480 - 0.891	Pass
MAAP-907	2/1/2017	Co-57	1.86 ± 0.06	1.70	1.19 - 2.21	Pass
MAAP-907	2/1/2017	Co-60	0.86 ± 0.05	0.78	0.55 - 1.01	Pass
MAAP-907	2/1/2017	Mn-54	0.01 ± 0.03	0.00	NA [c]	Pass
MAAP-907	2/1/2017	Zn-65	1.62 ± 0.13	1.29	0.90 - 1.68	Pass
MAAP-907	2/1/2017	Pu-238	0.0530 ± 0.0190	0.0598	0.0419 - 0.0777	Pass
MAAP-907	2/1/2017	Pu-239/240	0.0490 ± 0.0160	0.0460	0.0322 - 0.0598	Pass
MAAP-907	2/1/2017	Sr-90	0.648 ± 0.120	0.651	0.456 - 0.846	Pass
MAAP-907	2/1/2017	U-234/233	0.086 ± 0.024	0.104	0.073 - 0.135	Pass
MAAP-907	2/1/2017	U-238	0.097 ± 0.024	0.107	0.075 - 0.139	Pass
MASO-4515	8/1/2017	Am-241	45.9 ± 7.0	58.8	41.2 - 76.4	Pass[g]
MASO-4515	8/1/2017	Cs-134	409 ± 7	448	314 - 582	Pass[g]
MASO-4515	8/1/2017	Cs-137	798 ± 12	722	505 - 939	Pass[g]
MASO-4515	8/1/2017	Co-57	1572 ± 10	1458	1021 - 1895	Pass[g]
MASO-4515	8/1/2017	Co-60	0.2 ± 1.4	0.00	NA [c]	Pass[g]
MASO-4515	8/1/2017	Mn-54	934 ± 13	825	578 - 1073	Pass[g]
MASO-4515	8/1/2017	K-40	704 ± 53	592	414 - 770	Pass[g]
MASO-4515	8/1/2017	Zn-65	667 ± 17	559	391 - 727	Pass[g]
MASO-4515	8/1/2017	Pu-238	101 ± 9	92	64 - 120	Pass[g]
MASO-4515	8/1/2017	Pu-239/240	74.8 ± 7.7	68.8	48.2 - 89.4	Pass[g]
MASO-4515	8/1/2017	Sr-90	252 ± 7	289	202 - 376	Pass[g]
MAW-4494	8/1/2017	I-129	2.31 ± 0.10	2.31	1.62 - 3.00	Pass
MAVE-4517	8/1/2017	Cs-134	2.40 ± 0.10	2.32	1.62 - 3.02	Pass
MAVE-4517	8/1/2017	Cs-137	-0.002 ± 0.048	0.000	NA [c]	Pass
MAVE-4517	8/1/2017	Co-57	3.3 ± 0.1	2.8	2.0 - 3.6	Pass
MAVE-4517	8/1/2017	Co-60	2.10 ± 0.10	2.07	1.45 - 2.69	Pass
MAVE-4517	8/1/2017	Mn-54	3.00 ± 0.20	2.62	1.83 - 3.41	Pass
MAVE-4517	8/1/2017	Zn-65	5.90 ± 0.30	5.37	3.76 - 6.98	Pass

TABLE A-6. Department of Energy's Mixed Analyte Performance Evaluation Program (MAPEP).

		Concentration [a]				
Lab Code [b]	Reference Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MAW-4513	8/1/2017	Am-241	0.820 ± 0.220	0.892	0.624 - 1.160	Pass
MAW-4513	8/1/2017	Cs-134	10.3 ± 0.3	11.5	8.1 - 15.0	Pass
MAW-4513	8/1/2017	Cs-137	17.2 ± 0.5	16.3	11.4 - 21.2	Pass
MAW-4513	8/1/2017	Co-57	12.7 ± 0.4	12.1	8.5 - 15.7	Pass
MAW-4513	8/1/2017	Co-60	10.6 ± 0.3	10.7	7.5 - 13.9	Pass
MAW-4513	8/1/2017	Mn-54	15.6 ± 0.4	14.9	10.4 - 19.4	Pass
MAW-4513	8/1/2017	Zn-65	15.9 ± 0.7	15.5	10.9 - 20.2	Pass
MAW-4513	8/1/2017	H-3	255 ± 9	258	181 - 335	Pass
MAW-4513	8/1/2017	Fe-55	21.6 ± 6.6	19.4	13.6 - 25.2	Pass
MAW-4513	8/1/2017	Ni-63	-0.1 ± 2.0	0.0	NA [c]	Pass
MAW-4513	8/1/2017	Pu-238	0.590 ± 0.080	0.603	0.422 - 0.784	Pass
MAW-4513	8/1/2017	Pu-239/240	0.740 ± 0.090	0.781	0.547 - 1.015	Pass
MAW-4513	8/1/2017	Ra-226	1.000 ± 0.100	0.858	0.601 - 1.115	Pass
MAW-4513	8/1/2017	Sr-90	7.80 ± 0.60	7.77	5.44 - 10.10	Pass
MAW-4513	8/1/2017	Tc-99	6.70 ± 0.40	6.73	4.71 - 8.75	Pass
MAW-4513	8/1/2017	U-2344/233	0.94 ± 0.06	1.01	0.71 - 1.31	Pass
MAW-4513	8/1/2017	U-238	0.97 ± 0.07	1.04	0.73 - 1.35	Pass
MAAP-4519[h]	8/1/2017	Am-241	0.0400 ± 0.0100	0.0612	0.0428 - 0.0796	Fail
MAAP-4519	8/1/2017	Cs-134	0.90 ± 0.10	1.00	0.70 - 1.30	Pass
MAAP-4519	8/1/2017	Cs-137	0.90 ± 0.10	0.82	0.57 - 1.07	Pass
MAAP-4519	8/1/2017	Co-57	0.01 ± 0.01	0.00	NA [c]	Pass
MAAP-4519	8/1/2017	Co-60	0.70 ± 0.10	0.68	0.48 - 0.88	Pass
MAAP-4519	8/1/2017	Mn-54	1.50 ± 0.10	1.30	0.91 - 1.69	Pass
MAAP-4519	8/1/2017	Zn-65	1.30 ± 0.10	1.08	0.76 - 1.40	Pass
MAAP-4519	8/1/2017	Pu-238	0.0300 ± 0.0100	0.0298	0.0209 - 0.0387	Pass
MAAP-4519	8/1/2017	Pu-239/240	0.0400 ± 0.0200	0.0468	0.0328 - 0.0608	Pass
MAAP-4519	8/1/2017	Sr-90	0.800 ± 0.100	0.801	0.561 - 1.041	Pass
MAAP-4519	8/1/2017	U-234/233	0.070 ± 0.010	0.084	0.059 - 0.109	Pass
MAAP-4519	8/1/2017	U-238	0.090 ± 0.010	0.087	0.061 - 0.113	Pass

[a] Results are reported in units of Bq/kg (soil), Bq/L (water) or Bq/total sample (filters, vegetation).

[b] Laboratory codes as follows: MAW (water), MAAP (air filter), MASO (soil), MAVE (vegetation).

[c] MAPEP results are presented as the known values and expected laboratory precision (1 sigma, 1 determination) and control limits as defined by the MAPEP. A known value of "zero" indicates an analysis was included in the testing series as a "false positive". MAPEP does not provide control limits.

[d] Decimal point was misplaced while performing a unit conversion. The result is within control limits when the proper unit conversion is performed.

[e] Provided in the series for "sensitivity evaluation". MAPEP does not provide control limits.

[f] Sample was reanalyzed in duplicate with acceptable results. Original plating was inferior to platings obtained during reanalysis. It is believed that isotopic tracer was not accurately quantified due to poor resolution of its peak.

[g] Data were erroneously submitted in units of Bq/g. All results pass MAPEP criteria when evaluated in units of Bq/Kg.

[h] Laboratory is not currently offering analysis for Am-241 in Air Particulate samples.

TABLE A-7. Interlaboratory Comparison Crosscheck Program, Environmental Resource Associates (ERA)[a].

MRAD Study

Lab Code [b]	Date	Analysis	Concentration [a] Laboratory Result	ERA Result	Control Limits [c]	Acceptance
ERAP-1112	3/20/2017	Am-241	55.3 ± 2.8	76.4	47.1 - 103.0	Pass
ERAP-1112	3/20/2017	Co-60	1,230 ± 8	1030	797 - 1290	Pass
ERAP-1112	3/20/2017	Cs-134	1,110 ± 9	1100	700 - 1360	Pass
ERAP-1112	3/20/2017	Cs-137	1,810 ± 12	1,390	1,040 - 1,830	Pass
ERAP-1112 [d]	3/20/2017	Fe-55	590 ± 385	256	79.4 - 500	Fail
ERAP-1112	3/20/2017	Mn-54	< 5.14	< 50.0	0.00 - 50.0	Pass
ERAP-1112	3/20/2017	Pu-238	54.6 ± 2.8	54.3	37.2 - 71.4	Pass
ERAP-1112	3/20/2017	Pu-239/240	63.6 ± 3.0	62.0	44.9 - 81.0	Pass
ERAP-1112	3/20/2017	Sr-90	55.3 ± 8.3	52.4	25.6 - 78.5	Pass
ERAP-1112	3/20/2017	U-233/234	65.7 ± 3.0	73.1	45.3 - 110	Pass
ERAP-1112	3/20/2017	U-238	67.3 ± 3.0	72.4	46.8 - 100	Pass
ERAP-1112	3/20/2017	Zn-65	1,355 ± 16	984	705 - 1,360	Pass
ERAP-1114	3/20/2017	Gr. Alpha	106 ± 5	85.5	28.6 - 133	Pass
ERAP-1114 [e]	3/20/2017	Gr. Beta	67.6 ± 3.0	45.2	28.6 - 65.9	Fail
ERSO-1116	3/20/2017	Am-241	418 ± 98	448	262 - 582	Pass
ERSO-1116	3/20/2017	Ac-228	1,540 ± 260	1,240	795 - 1,720	Pass
ERSO-1116	3/20/2017	Bi-212	1,550 ± 90	1,240	330 - 1,820	Pass
ERSO-1116	3/20/2017	Bi-214	2,560 ± 20	2,750	1,660 - 3,960	Pass
ERSO-1116	3/20/2017	Co-60	4,620 ± 100	4,430	3,000 - 6,100	Pass
ERSO-1116	3/20/2017	Cs-134	8,340 ± 100	8,860	5,790 - 10,600	Pass
ERSO-1116	3/20/2017	Cs-137	8,420 ± 100	7,500	5,750 - 9,650	Pass
ERSO-1116	3/20/2017	K-40	13,600 ± 900	10,600	7,740 - 14,200	Pass
ERSO-1116	3/20/2017	Mn-54	< 68.1	< 1000	0.00 - 1,000	Pass
ERSO-1116	3/20/2017	Pb-212	1,060 ± 70	1,240	812 - 1,730	Pass
ERSO-1116	3/20/2017	Pb-214	2,620 ± 160	2,890	1,690 - 4,310	Pass
ERSO-1116	3/20/2017	Pu-238	424 ± 154	648	390 - 894	Pass
ERSO-1116 [f]	3/20/2017	Pu-239/240	252 ± 112	484	316 - 669	Fail
ERSO-1116 [g]	3/20/2017	Pu-239/240	436 ± 106	484	316 - 669	Pass
ERSO-1116	3/20/2017	Sr-90	7,930 ± 250	9,150	3,490 - 14,500	Pass
ERSO-1116	3/20/2017	Th-234	1,820 ± 200	1,940	614 - 3,650	Pass
ERSO-1116 [h]	3/20/2017	U-233/234	1,030 ± 130	1,950	1,190 - 2,500	Fail
ERSO-1116 [i]	3/20/2017	U-233/234	1,820 ± 200	1,950	1,190 - 2,500	Pass
ERSO-1116	3/20/2017	U-238	1,240 ± 140	1,940	1,200 - 2,460	Pass
ERSO-1116 [i]	3/20/2017	U-238	1,930 ± 200	1,940	1,200 - 2,460	Pass
ERSO-1116	3/20/2017	Zn-65	7,190 ± 240	6,090	4,850 - 8,090	Pass
ERW-1122	3/20/2017	Gr. Alpha	65.3 ± 2.4	89.5	31.8 - 139	Pass
ERW-1122	3/20/2017	Gr. Beta	54.8 ± 1.5	61.0	34.9 - 90.4	Pass
ERW-1124	3/20/2017	H-3	19,000 ± 410	19,400	13,000 - 27,700	Pass

TABLE A-7. Interlaboratory Comparison Crosscheck Program, Environmental Resource Associates (ERA)[a].

MRAD Study

Lab Code [b]	Date	Analysis	Concentration [a] Laboratory Result	ERA Result	Control Limits [c]	Acceptance
ERVE-1118	3/20/2017	Am-241	1,560 ± 140	1,860	1,140 - 2,470	Pass
ERVE-1118	3/20/2017	Cm-244	530 ± 80	734	360 - 1,140	Pass
ERVE-1118	3/20/2017	Co-60	1,400 ± 350	1,390	959 - 1,940	Pass
ERVE-1118	3/20/2017	Cs-134	1,650 ± 460	1,830	1,180 - 2,380	Pass
ERVE-1118	3/20/2017	Cs-137	2,580 ± 540	2,500	1,810 - 3,480	Pass
ERVE-1118	3/20/2017	K-40	32,100 ± 700	30,900	22,300 - 43,400	Pass
ERVE-1118	3/20/2017	Mn-54	< 27.3	< 300	0.00 - 300	Pass
ERVE-1118	3/20/2017	Zn-65	889 ± 64	853	615 - 1,200	Pass
ERVE-1118	3/20/2017	Pu-238	3,250 ± 210	3,250	1,940 - 4,450	Pass
ERVE-1118	3/20/2017	Pu-239/240	2,180 ± 170	2,150	1,320 - 2,960	Pass
ERVE-1118	3/20/2017	Sr-90	665 ± 135	726	414 - 963	Pass
ERVE-1118	3/20/2017	U-233/234	2,840 ± 200	3,090	2,030 - 3,970	Pass
ERVE-1118	3/20/2017	U-238	2,990 ± 200	3,060	2,040 - 3,890	Pass
ERW-1120	3/20/2017	Am-241	108 ± 7	140	94.3 - 188	Pass
ERW-1120	3/20/2017	Co-60	2,600 ± 198	2,540	2,210 - 2,970	Pass
ERW-1120	3/20/2017	Cs-134	2,380 ± 250	2,510	1,840 - 2880	Pass
ERW-1120	3/20/2017	Cs-137	1,470 ± 243	1,400	1,190 - 1,680	Pass
ERW-1120	3/20/2017	Mn-54	< 12.3	< 100	0.00 - 100	Pass
ERW-1120	3/20/2017	Pu-238	117 ± 4	128	94.7 - 159	Pass
ERW-1120	3/20/2017	Pu-239/240	74.8 ± 3.3	85.8	66.6 - 108	Pass
ERW-1120	3/20/2017	U-233/234	75.3 ± 3.2	90.3	67.8 - 116	Pass
ERW-1120	3/20/2017	U-238	76.4 ± 3.2	89.5	68.2 - 110	Pass
ERW-1120	3/20/2017	Zn-65	2,130 ± 378	1,960	1630 - 2,470	Pass
ERW-1120 [j]	3/20/2017	Fe-55	1,400 ± 403	984	587 - 1,340	Fail
ERW-1120 [k]	3/20/2017	Fe-55	1,081 ± 383	984	587 - 1,340	Pass
ERW-1120	3/20/2017	Sr-90	652 ± 12	714	465 - 944	Pass

[a] Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the crosscheck program for proficiency testing administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the Environmental Measurements Laboratory Quality Assessment Program (EML).

[b] Laboratory codes as follows: ERW (water), ERAP (air filter), ERSO (soil), ERVE (vegetation). Results are reported in units of pCi/L, except for air filters (pCi/Filter), vegetation and soil (pCi/kg).

[c] Results are presented as the known values, expected laboratory precision (2 sigma, 1 determination) and control limits as provided by ERA.

[d] Fe-55 analysis result was outside the acceptable range. Recounting the sample disk for 1000 minutes resulted in 254 ± 364 with an LLD calculation of < 342. Insufficient sample was available after performing other required analyses on the sample to quantify the activity with an uncertainty less than the activity.

[e] ERA appears to have applied the standard material to the filter in a pattern closer to the center of the filter compared to previous studies and different from the filter efficiency utilized by the laboratory. This likely caused the efficency used the calculation to be understated and the result obtained by the laboratory to be overstated. For comparison the in-house spike for gross beta in AP (table A-3 SPAP-740 2/28/17) was acceptable with a ratio of 0.94 of lab result to known.

[f] Analysis result for Plutonium-239/240 was below the lower limit of acceptance.

[g] Samples were reanalyzed in duplicate with acceptable results for each. Original analysis had poor resolution possibly due to a poor elctroplating and is suspected in contributing to poor results.

[h] Analysis result for U-233/234 was below the lower limit of acceptance.

[i] The reanalysis result for U-233/234 was within the acceptance limits and U-238 reanalysis result was closer to the known value. Original analysis had poor resolution possibly due to a poor electroplating and is suspected in contributing to poor results.

[j] Fe-55 analysis result was outside acceptable range.

[k] Result of recounting was acceptable. No reason for intial failure determined.

APPENDIX B. DATA REPORTING CONVENTIONS

Data Reporting Conventions

1.0. All activities, except gross alpha and gross beta, are decay corrected to collection time or the end of the collection period.

2.0. Single Measurements

Each single measurement is reported as follows: $x \pm s$

where: x = value of the measurement;

$s = 2\sigma$ counting uncertainty (corresponding to the 95% confidence level).

In cases where the activity is less than the lower limit of detection L, it is reported as: < L, where L = the lower limit of detection based on 4.66σ uncertainty for a background sample.

3.0. Duplicate analyses

If duplicate analyses are reported, the convention is as follows. :

3.1 Individual results: For two analysis results; $x_1 \pm s_1$ and $x_2 \pm s_2$

Reported result: $x \pm s$; where $x = (1/2)(x_1 + x_2)$ and $s = (1/2)\sqrt{s_1^2 + s_2^2}$

3.2. Individual results: $< L_1$, $< L_2$ Reported result: < L, where L = lower of L_1 and L_2

3.3. Individual results: $x \pm s$, < L Reported result: $x \pm s$ if $x \geq L$; < L otherwise.

4.0. Computation of Averages and Standard Deviations

4.1 Averages and standard deviations listed in the tables are computed from all of the individual measurements over the period averaged; for example, an annual standard deviation would not be the average of quarterly standard deviations. The average $\bar{x}$ and standard deviation "s" of a set of n numbers $x_1, x_2 \ldots x_n$ are defined as follows:

$$\bar{x} = \frac{1}{n} \sum x \qquad s = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}}$$

4.2 Values below the highest lower limit of detection are not included in the average.

4.3 If all values in the averaging group are less than the highest LLD, the highest LLD is reported.

4.4 If all but one of the values are less than the highest LLD, the single value x and associated two sigma error is reported.

4.5 In rounding off, the following rules are followed:

4.5.1. If the number following those to be retained is less than 5, the number is dropped, and the retained numbers are kept unchanged. As an example, 11.443 is rounded off to 11.44.

4.5.2. If the number following those to be retained is equal to or greater than 5, the number is dropped and the last retained number is raised by 1. As an example, 11.445 is rounded off to 11.45.

APPENDIX C

Table C-1. Maximum permissible concentrations of radioactivity in air and water above natural background in unrestricted areas[a].

	Air (pCi/m^3)		Water (pCi/L)
Gross alpha	1×10^{-3}	Strontium-89	8,000
Gross beta	1	Strontium-90	500
Iodine-131[b]	2.8×10^{-1}	Cesium-137	1,000
		Barium-140	8,000
		Iodine-131	1,000
		Potassium-40[c]	4,000
		Gross alpha	2
		Gross beta	10
		Tritium	1×10^6

[a] Taken from Table 2 of Appendix B to Code of Federal Regulations Title 10, Part 20, and appropriate footnotes. Concentrations may be averaged over a period not greater than one year.

[b] Value adjusted by a factor of 700 to reduce the dose resulting from the air-grass-cow-milk-child pathway.

[c] A natural radionuclide.

Dominion Energy®

2017 Annual Radiological Environmental Operating Report

Kewaunee Power Station

Part II, Data Tabulations And Analyses

Dominion Energy Kewaunee, Inc.

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REPORT TO

DOMINION NUCLEAR

RADIOLOGICAL MONITORING PROGRAM FOR THE KEWAUNEE POWER STATION KEWAUNEE, WISCONSIN

ANNUAL REPORT - PART II
DATA TABULATIONS AND ANALYSES

January 1 to December 31, 2017

Prepared and submitted by

ATI ENVIRONMENTAL, Inc.
Midwest Laboratory
Project No. 8002

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PREFACE

Staff members of ATI Environmental, Inc., Midwest Laboratory were responsible for the acquisition of data presented in this report. Samples were collected by personnel of ATI Environmental, Inc., Midwest Laboratory and the Kewaunee Power Station.

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1.0 INTRODUCTION

The following constitutes Part II of the final report for the 2017 Radiological Monitoring Program conducted at the Kewaunee Power Station (KPS), Kewaunee, Wisconsin.

Included are tabulations of data for all samples collected in 2017 along with graphs of data trends. A summary and interpretation of the data presented here are published in Part I of the 2017 Annual Report on the Radiological Monitoring Program for the Kewaunee Power Station.

Figure 1. Sampling locations, Kewaunee Power Station

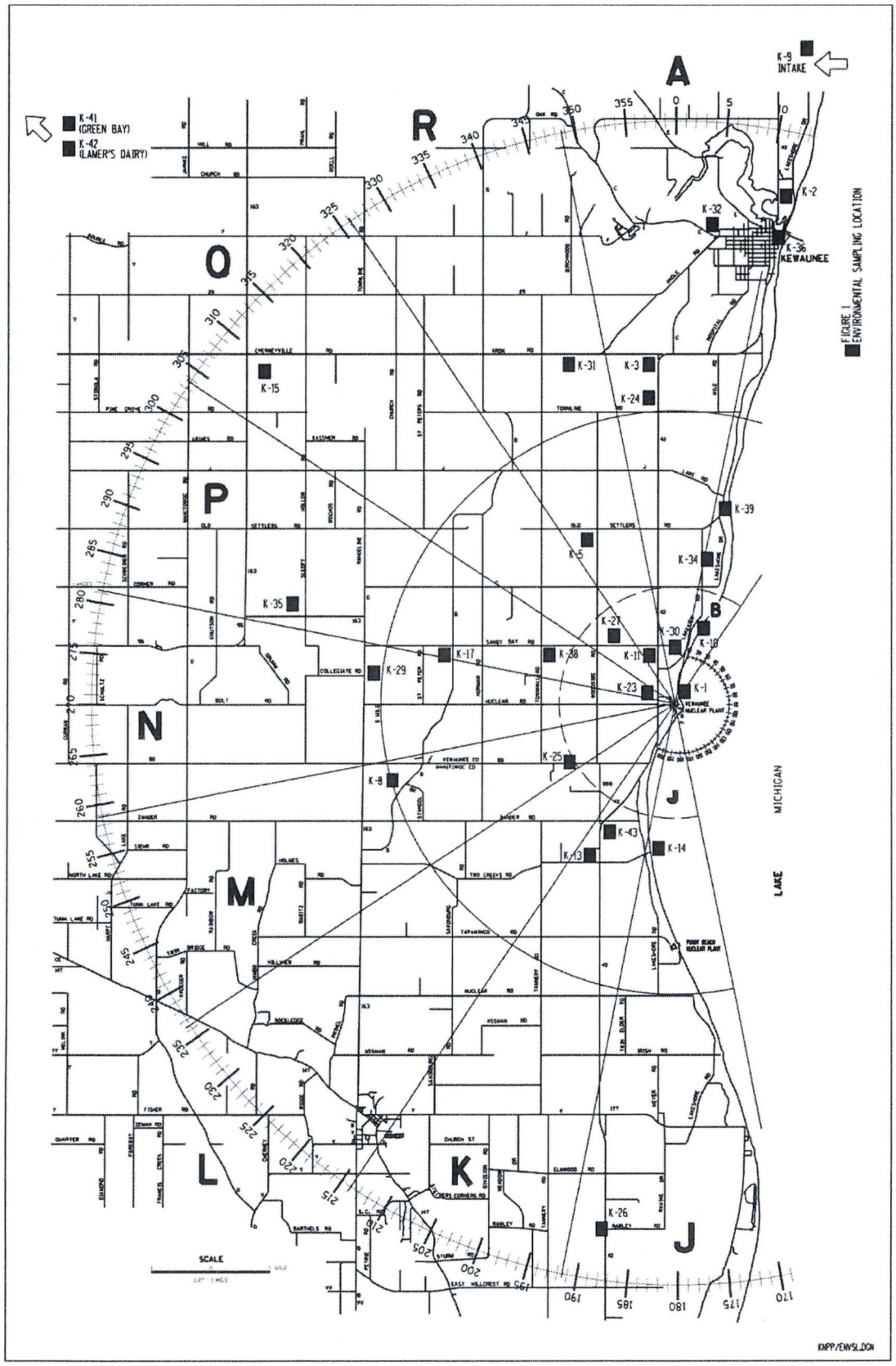

Table 1. Sampling locations, Kewaunee Power Station.

Code	Type[a]	Distance (miles)[b] and Sector	Location
K-1	I		Onsite
K-1a	I	0.62 N	North Creek
K-1b	I	0.12 N	Middle Creek
K-1c	I	0.10 N	500' north of condenser discharge
K-1d	I	0.10 E	Condenser discharge
K-1e	I	0.12 S	South Creek
K-1f	I	0.12 S	Meteorological Tower
K-1g	I	0.06 W	South Well
K-1h	I	0.12 NW	North Well
K-1j	I	0.10 S	500' south of condenser discharge
K-1k	I	0.60 SW	Drainage Pond, south of plant
K-1l	I	0.13 N	ISFSI Southeast
K-1m	I	0.15 N	ISFSI East
K-1n	I	0.16 N	ISFSI Northeast
K-1o	I	0.16 N	ISFSI North
K-1p	I	0.17 N	ISFSI Northwest
K-1q	I	0.16 N	ISFSI West
K-1r	I	0.13 N	ISFSI West
K-1s	I	0.12 N	ISFSI Southwest
K-2	C	8.91 NNE	WPS Operations Building in Kewaunee
K-3	C	5.9 N	Lyle and John Siegmund Farm, N2815 Hy 42, Kewaunee
K-5	I	3.2 NNW	Ed Paplham Farm, E4160 Old Settlers Rd, Kewaunee
K-8	C	4.85 WSW	St. Isadore the Farmer Church, 18424 Tisch Mills Rd, Tisch Mills
K-9	C	11.5 NNE	Green Bay Municipal Pumping Station, six miles east of Green Bay (sample source is Lake Michigan water from Rostok Intake, two miles north of Kewaunee).
K-10	I	1.35 NNE	Turner Farm, Kewaunee site
K-11	I	0.96 NW	Louise Ihlenfeld Farm, N879 Hy 42, Kewaunee
K-13	C	3.0 SSW	Rand's General Store, Two Creeks
K-14	I	2.6 S	Two Creeks Park, 2.6 miles south of site
K-15	C	9.25 NW	Gas Substation, 1.5 miles north of Stangelville
K-17	I	4.0 W	Klimesh's Farm, N885 Tk B, Kewaunee
K-23a	I	0.5 W	0.5 miles west of plant, Kewaunee site
K-23b	I	0.6 N	0.6 miles north of plant, Kewaunee site
K-24	I	5.4 N	Fictum Farm, N2653 Hy 42, Kewaunee
K-25	I	1.9 SW	Wotachek Farm, 3968 E. Cty Tk BB, Two Rivers
K-26	C	9.1 SSW	Wilfert Farms (9.1 miles south of "BB")

Table 1. Sampling locations, Kewaunee Power Station (continued).

Code	Type[a]	Distance (miles)[b] and Sector	Location
K-27	I	1.53 NW	Schleis Farm, E4298 Sandy Bay Rd, Kewaunee
K-29	I	5.34 W	Kunesh Farm, E3873 Cty Tk G, Kewaunee
K-30	I	0.8 N	End of site boundary
K-31	C	6.35 NNW	E. Krok Substation, Krok Road
K-32	C	7.8 N	Piggly Wiggly, 931 Marquette Dr., Kewaunee
K-34	I	2.7 N	Leon and Vicki Struck, N1549 Lakeshore Dr., Kewaunee
K-35	C	6.71 mi. WNW	Duane Ducat, N1215 Sleepy Hollow Rd., Kewaunee
K-36	I	8.0 mi. NNE	Lafond's Fish market, 216 Milwaukee, Kewaunee
K-38	I	2.45 mi. WNW	Dave Sinkula Farm, N890 Town Hall Road, Kewaunee
K-39	I	3.46 mi. N	Francis Wojta, N1859 Lakeshore Dr., Kewaunee
K-41	C	22 NW	Point Beach-EOF, 3060 Voyager Dr. , Green Bay
K-42	C	28.1 W	Lamers Dairy Products obtained from Green Bay markets.
K-43	I	2.71 SSW	Gary Maigatter Property, 17333 Hwy 42, Two Rivers
K-44	I	2.63 SW	Gerald Schleis Property, 4728 Schleis Rd., Two Rivers

[a] I = indicator; C = control.

[b] Distances are measured from reactor stack.

Table 2. Type and frequency of collection.

Location	Weekly	Monthly	Quarterly	Semiannually	Annually
K-1a		SW		SL [f]	
K-1b		SW	GR [a]	SL [f]	
K-1c				BS [b]	
K-1d		SW	FI [a]	SL [f] BS [b]	
K-1e		SW		SL [f]	
K-1f	AP [g], AI		GR [a] TLD	SO	
K-1g, K-1h			WW		
K-1j				BS [b]	
K-1k		SW		SL [f]	
K-1l through K-1s			TLD		
K-2	AP [g], AI		TLD		
K-3, K-5		MI [c]	GR [a] TLD	SO	CF [d]
K-8	AP [g], AI		TLD		
K-9		SW [i]		SL [f] BS [b]	
K-10, K-13			WW		
K-11		PR	WW		
K-14		SW [h]		SL [f] BS [b]	
K-15, K-17			TLD		
K-23a, b					GRN / GLV [e]
K-24			EG		DM
K-25			TLD		
K-26					VE / GLV [e]
K-27			TLD		
K-29					DM
K-30			TLD		
K-31	AP [g], AI		TLD		
K-32			EG		DM
K-34, K-35		MI [c]	GR [a]	SO	CF [d]
K-36			FI [a,j]		
K-38		MI [c]	GR [a] WW	SO	CF [d]
K-39		MI [c]	GR [a] TLD	SO	CF [d]
K-41	AP [g], AI		TLD		
K-42		MI [c]			
K-43	AP [g], AI		TLD		
K-44		MI [c]			

[a] Three times a year, second, third and fourth quarters.

[b] Collected in May and November.

[c] Monthly November - April; semimonthly May-October.

[d] First quarter (January, February or March) only.

[e] Alternate, if milk is not available.

[f] Second and third quarters.

[g] Frequency may be increased dependent on dust loading.

[h] Two samples are collected, North (K-14a) and South (K-14b) of Two Creeks Road.

[i] Two samples, raw and tap water.

[j] Collected at K-36 if K-1d is unavailable

Table 3. Sample Codes:

Code	Description
AI	Airborne Iodine
AP	Airborne particulates
BS	Bottom sediments
CF	Cattlefeed
DM	Domestic Meat
EG	Eggs
FI	Fish
GLV	Green Leafy Vegetables
GRN	Grain
GR	Grass
MI	Milk
PR	Precipitation
SL	Slime
SO	Soil
SW	Surface water
TLD	Thermoluminescent Dosimeter
VE	Vegetables
WW	Well water

GRAPHS OF DATA TRENDS

Note: Conventions used in trending data.

The following conventions should be used in the interpretation of the graphs of data trends:

1. Both solid and open data points may be used in the graphs. A solid point indicates an activity, an open point, a minimum dectable concentration (MDC) value.
2. Data points are connected by a solid line. A break in the plot indicates missing data.

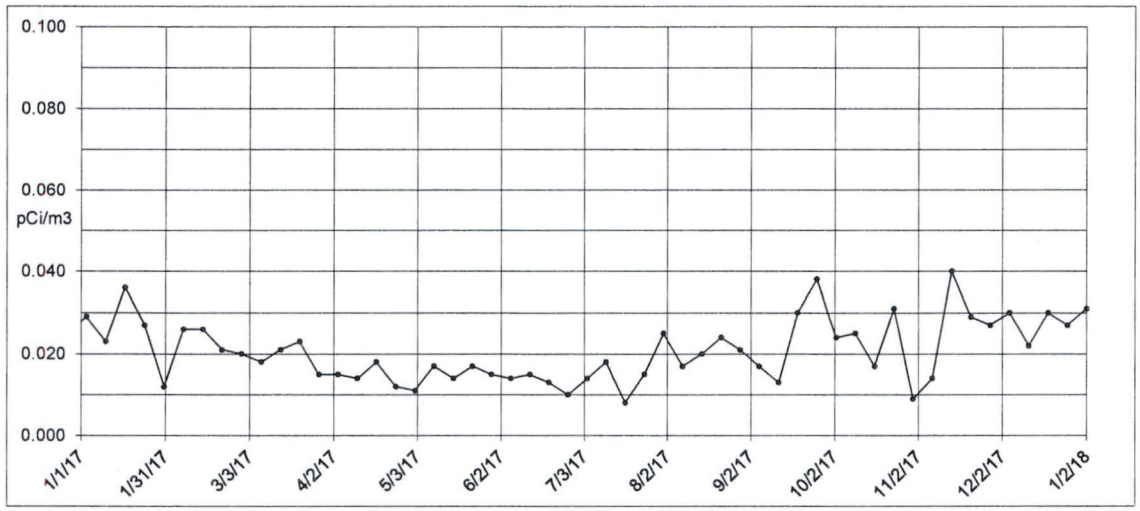

Figure 2. Location K-1f (weekly samples, 2017).

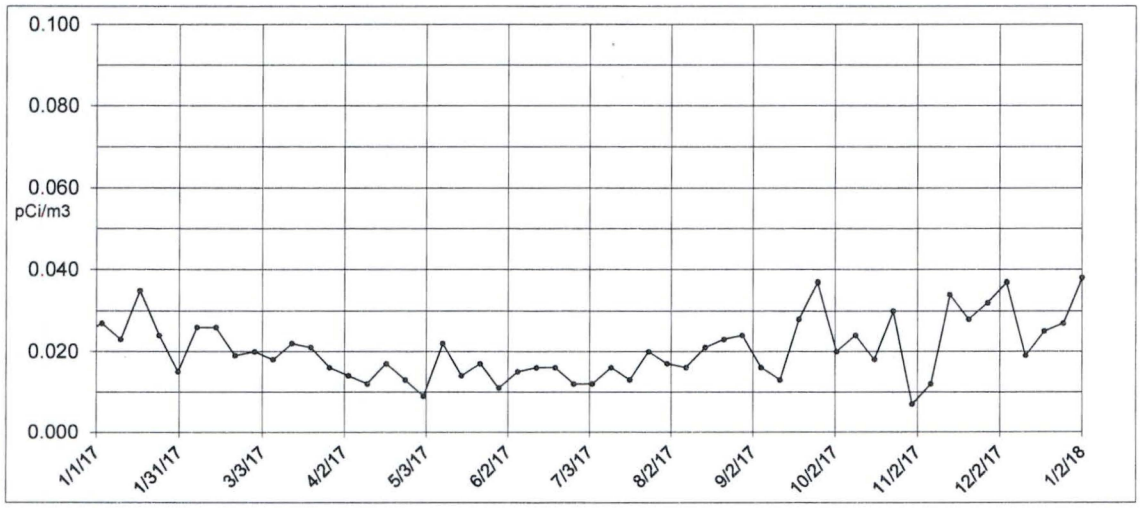

Figure 3. Location K-2 (weekly samples, 2017).

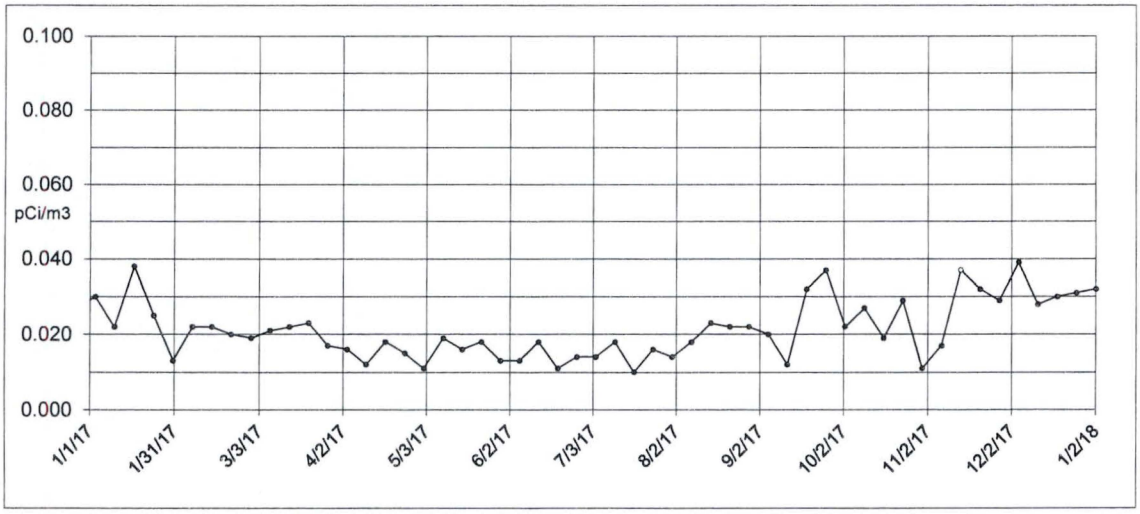

Figure 4. Location K-8 (weekly samples, 2017).

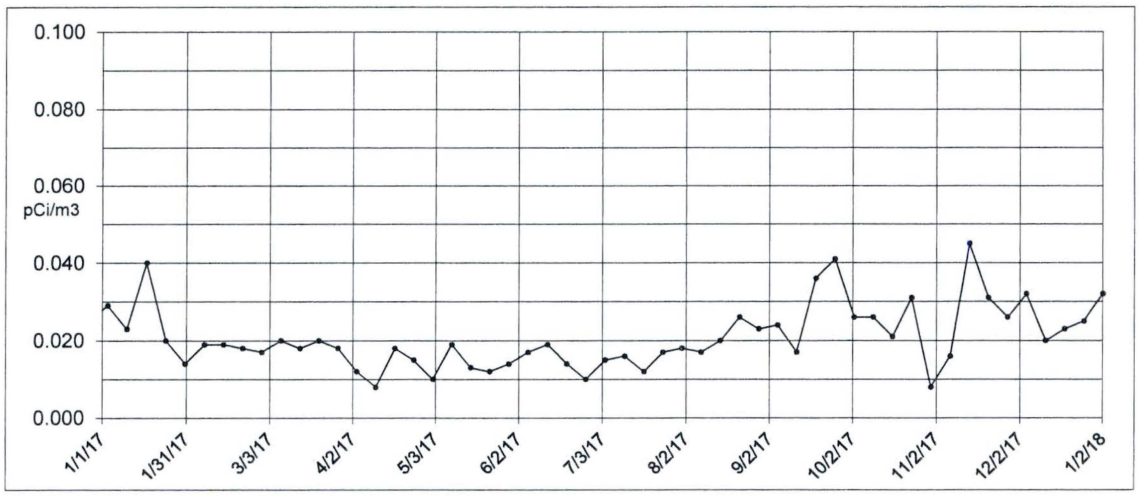

Figure 5. Location K-31 (weekly samples, 2017).

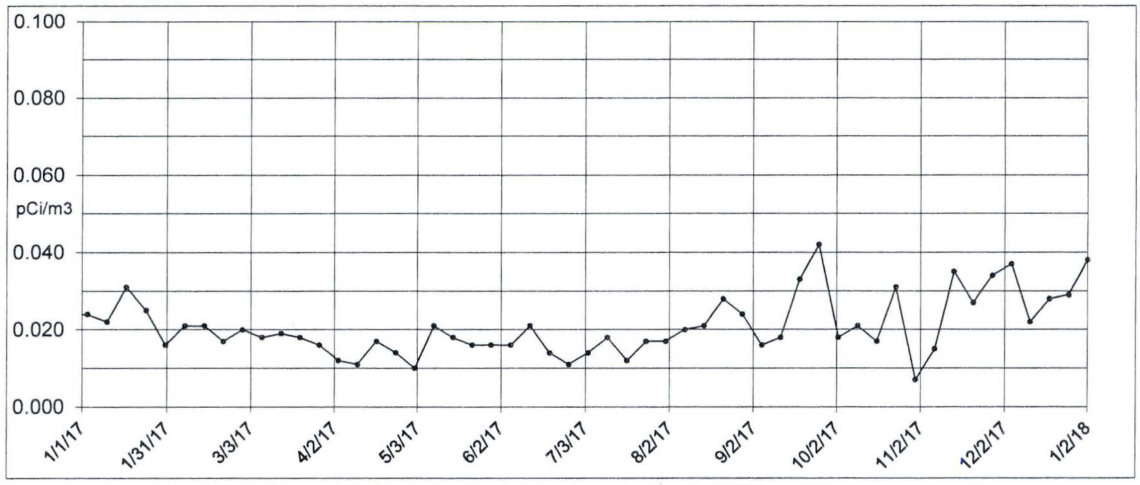

Figure 6. Location K-41 (weekly samples, 2017).

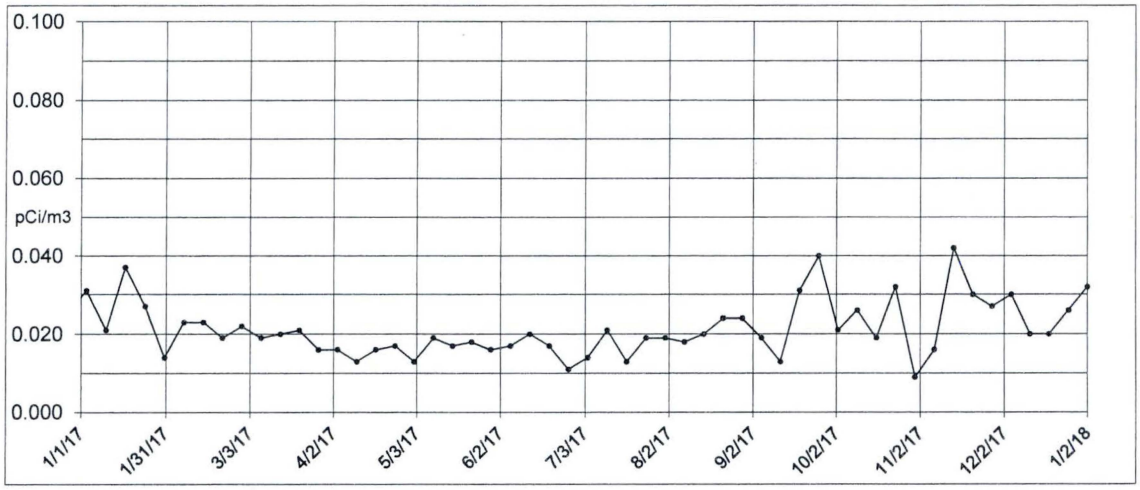

Figure 7. Location K-43 (weekly samples, 2017).

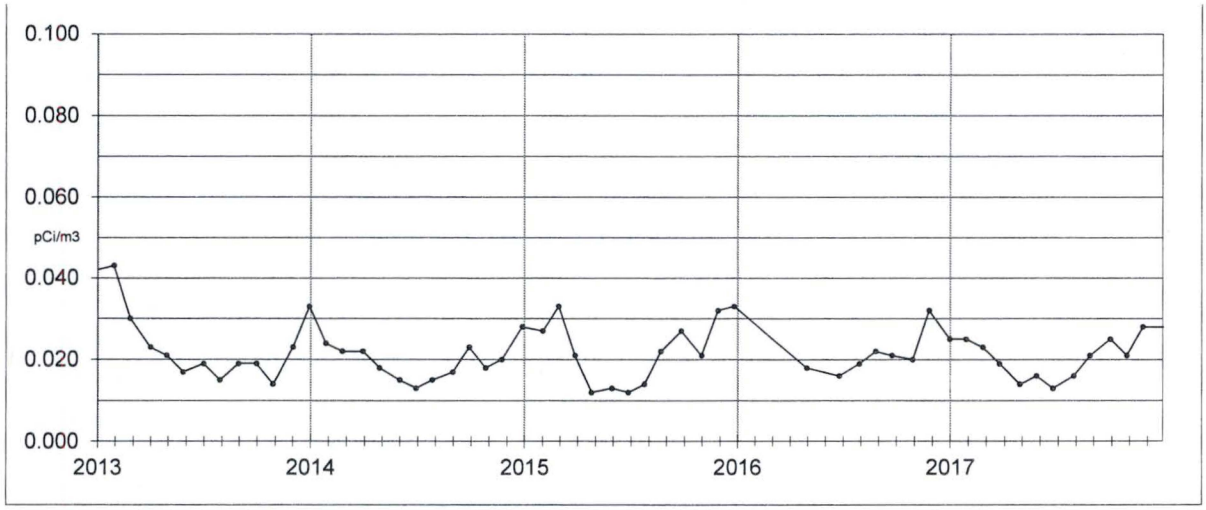

Figure 8. Location K-1f (monthly averages, 2013-2017).

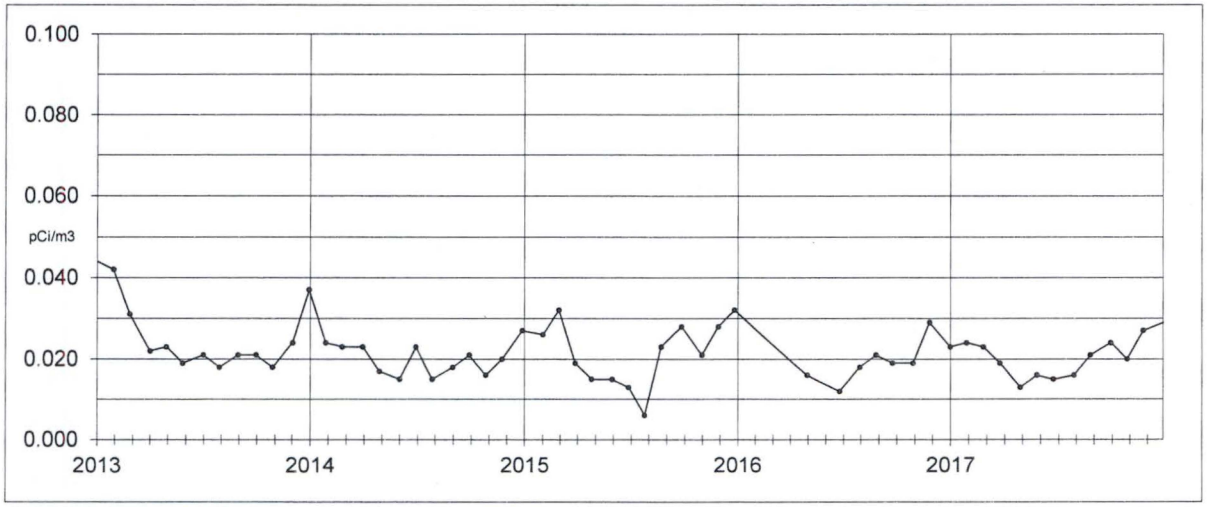

Figure 9. Location K-2 (monthly averages, 2013-2017).

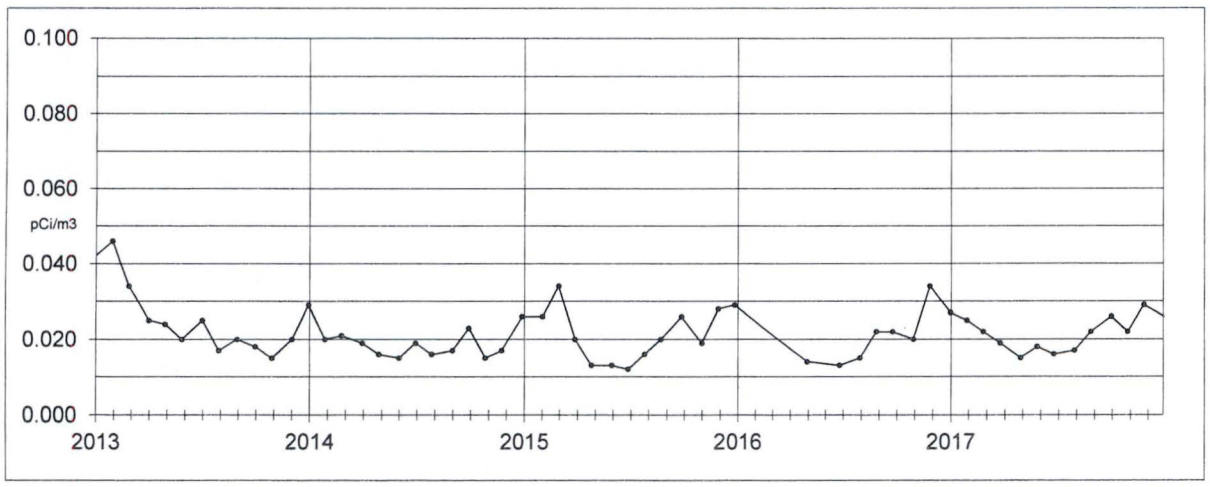

Figure 10. Location K-43 (monthly averages, 2013-2017).

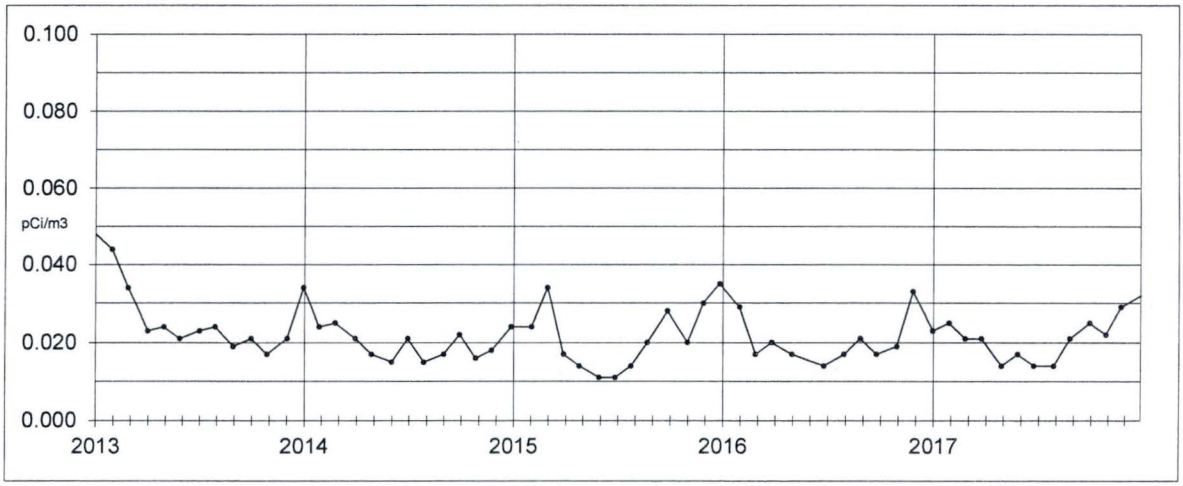

Figure 11. Location K-8 (monthly averages, 2013-2017).

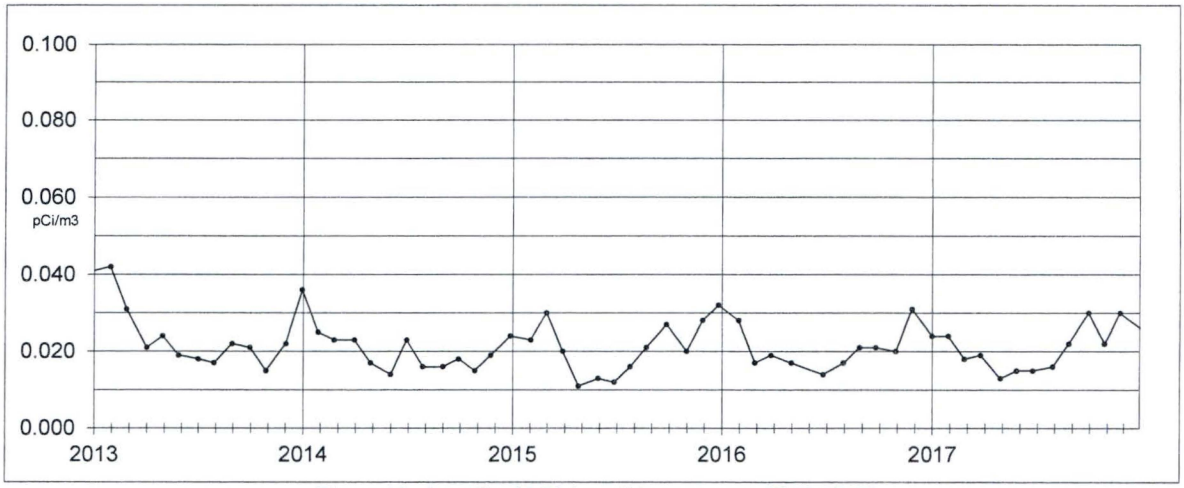

Figure 12. Location K-31 (monthly averages, 2013-2017).

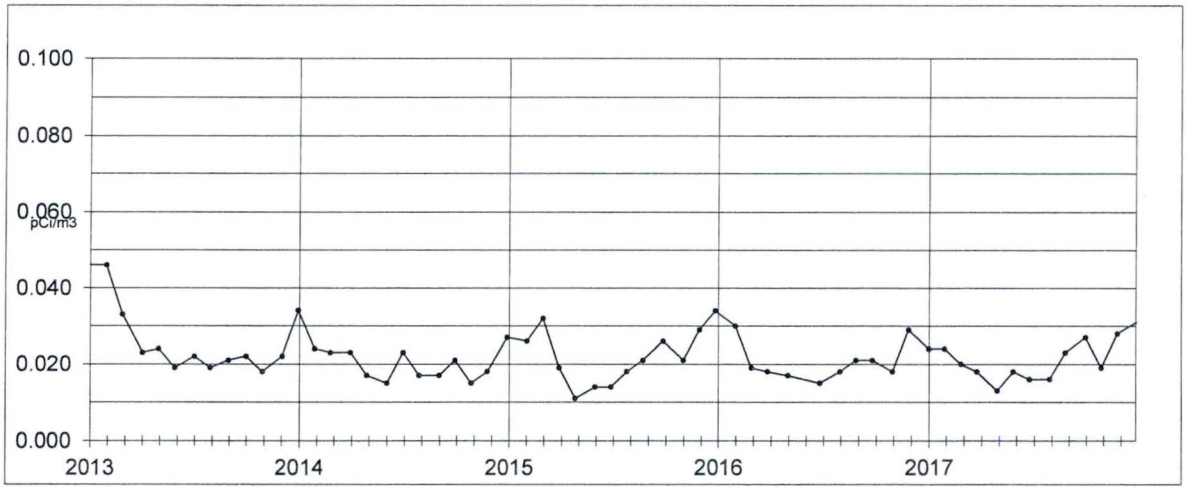

Figure 13. Location K-41 (monthly averages, 2013-2017).

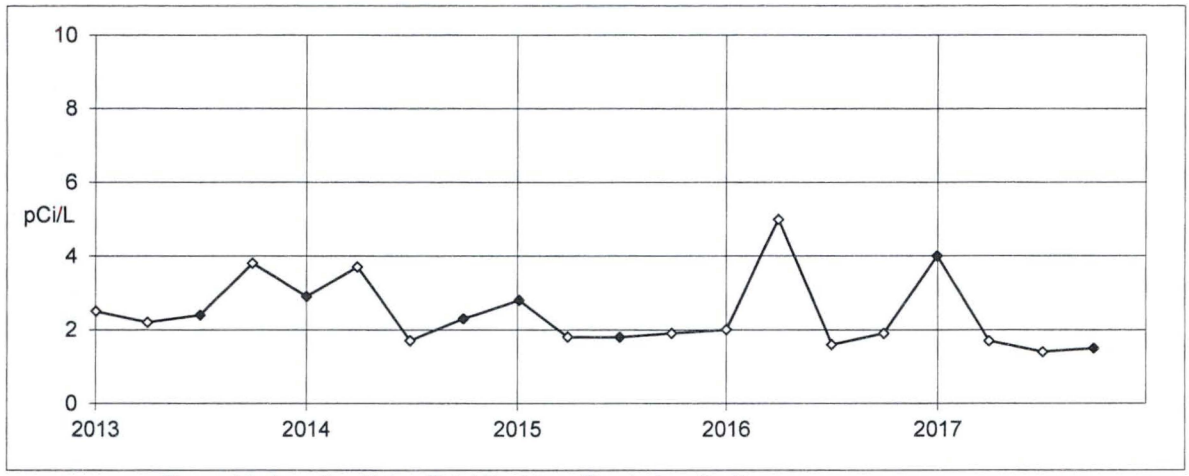

Figure 14. Location K-1g. Total Residue. Quarterly collection.

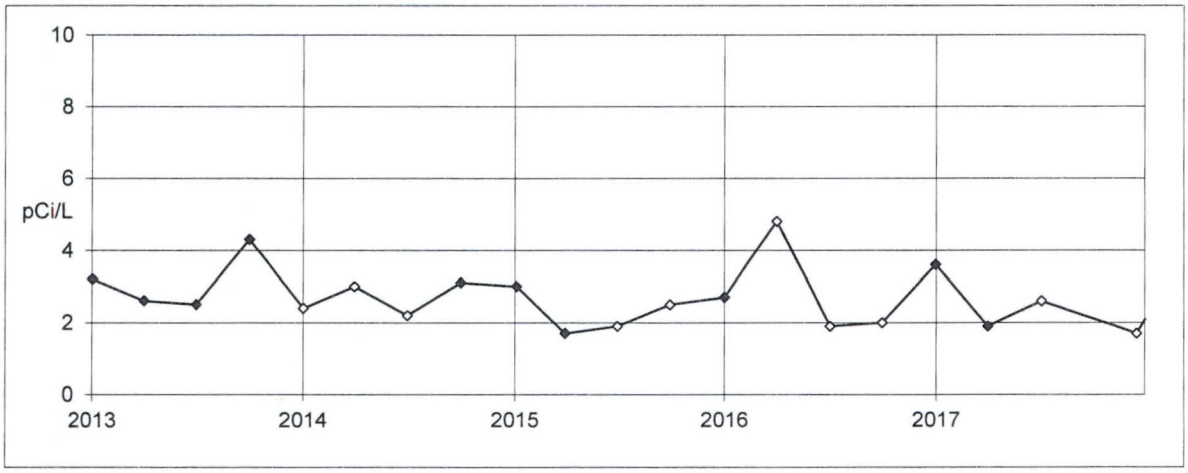

Figure 15. Location K-1h. Total Residue. Quarterly collection.

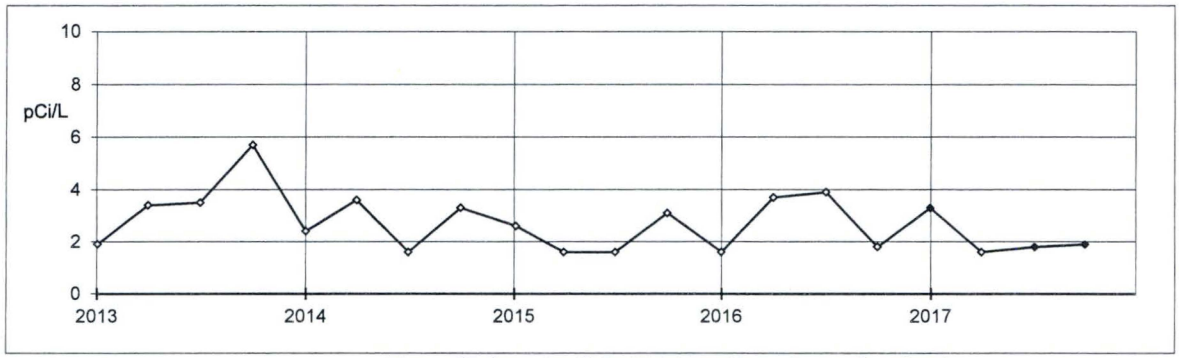

Figure 16. Location K-1g. Total Residue. Quarterly collection.

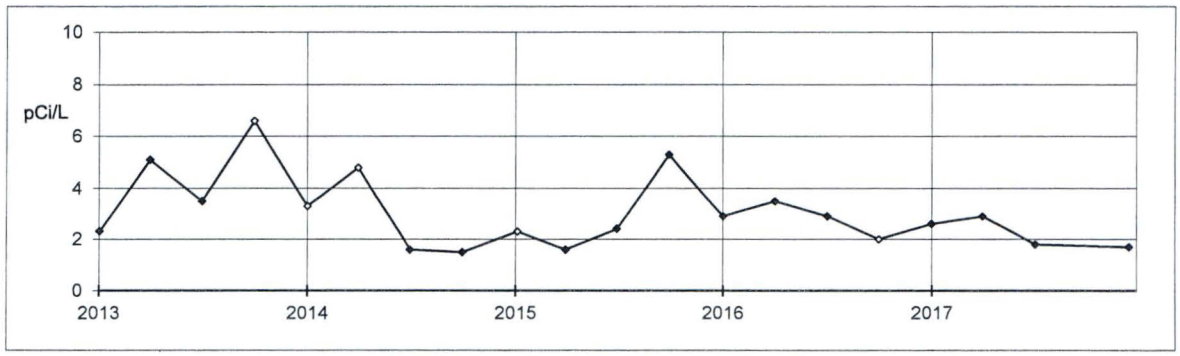

Figure 17. Location K-1h. Total Residue. Quarterly collection.

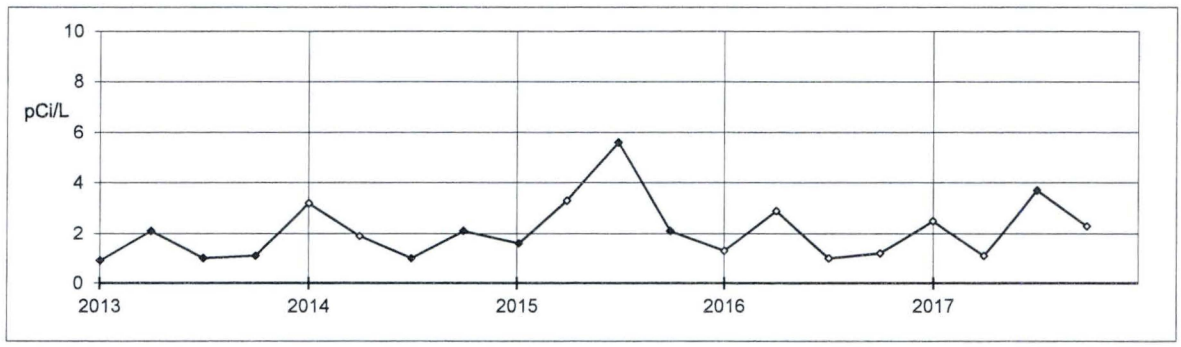

Figure 18. Location K-10. Total Residue. Quarterly collection.

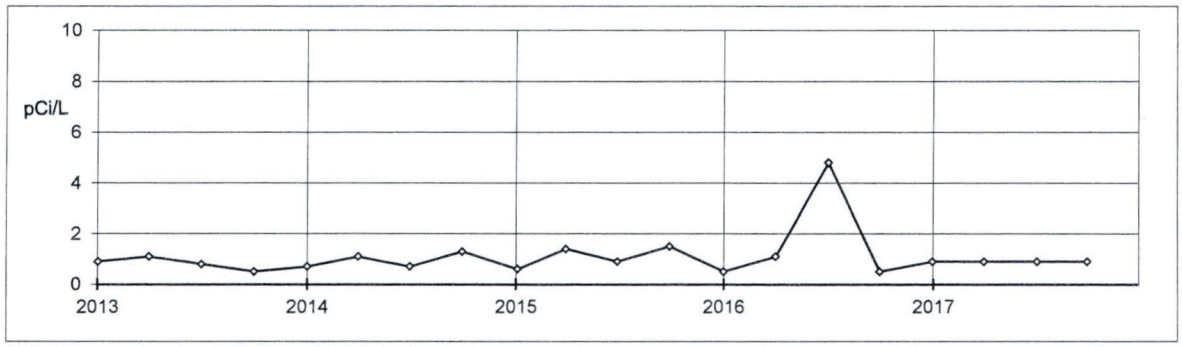

Figure 19. Location K-11. Total Residue. Quarterly collection.

Note: An open data point indicates activity less than the minimum detectable Concentration (MDC).

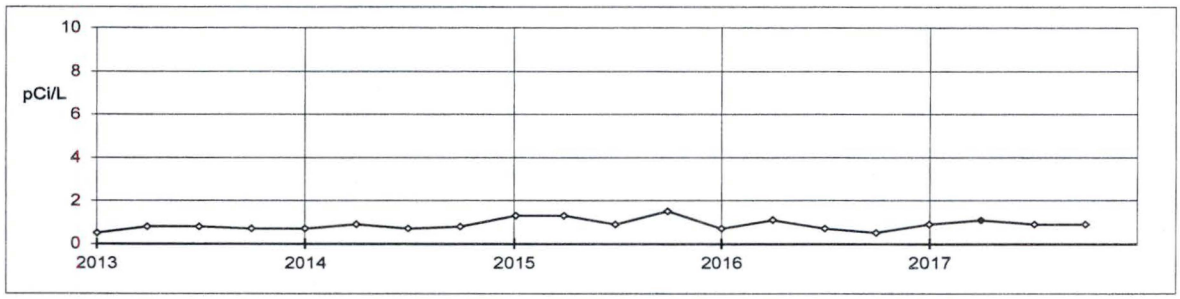

Figure 20. Location K-13. Total Residue. Quarterly collection.

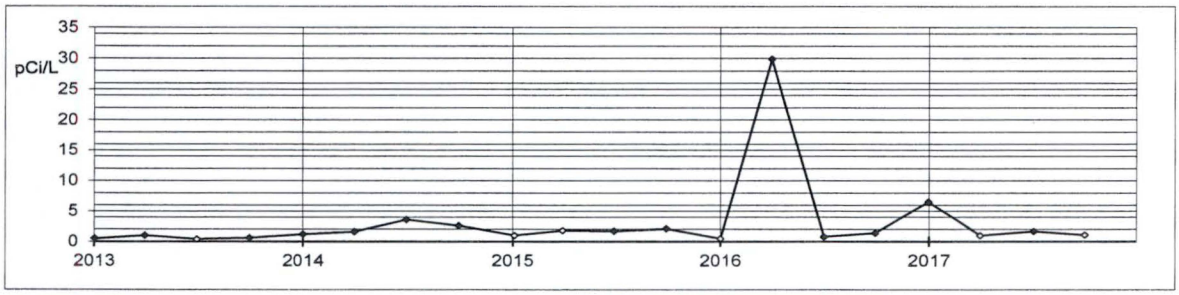

Figure 21. Location K-38. Total Residue. Quarterly collection.

Note: An open data point indicates activity less than the minimum detectable Concentration (MDC).

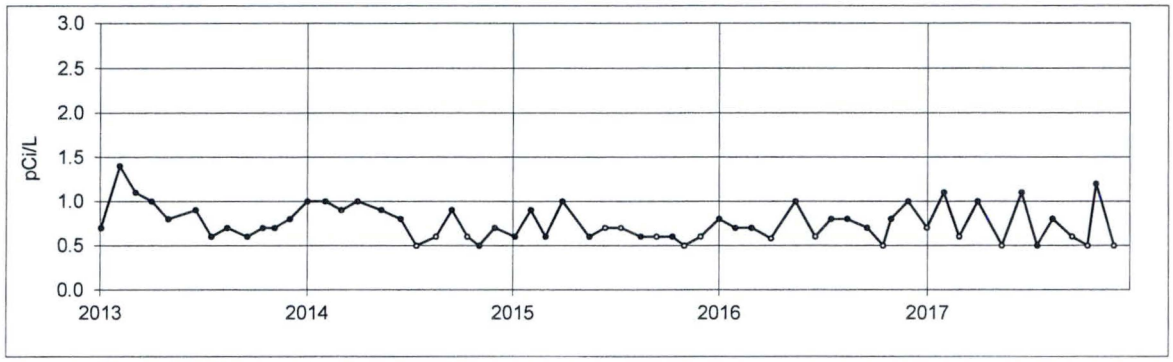

Figure 22. Milk samples. Location K-3.

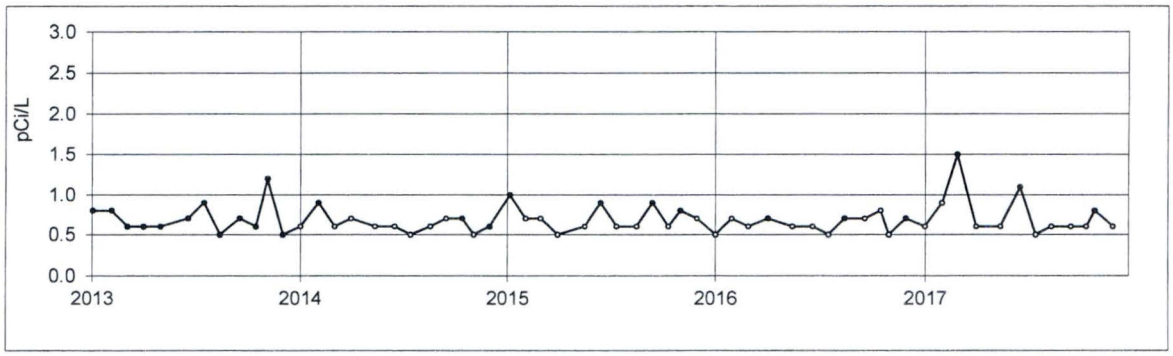

Figure 23. Milk samples. Location K-5.

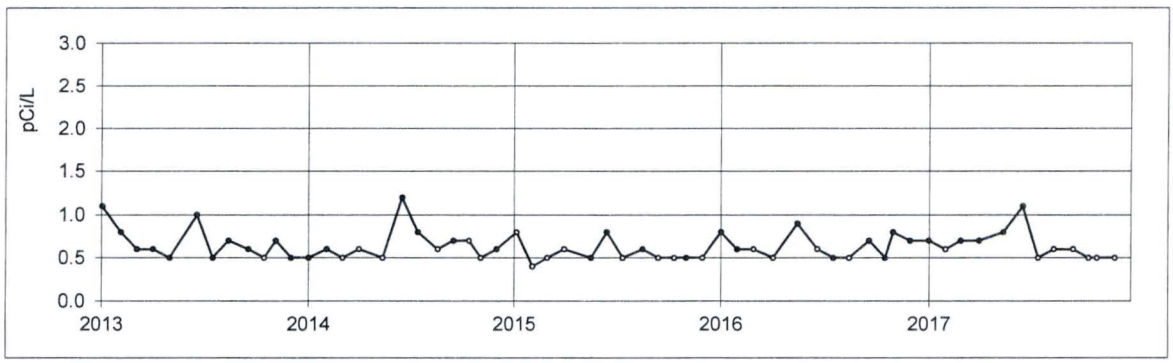

Figure 24. Milk samples. Location K-34.

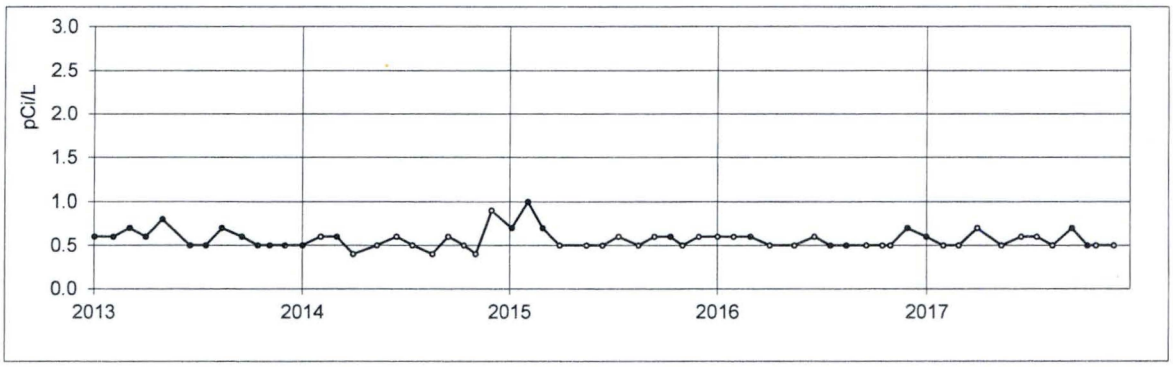

Figure 25. Milk samples. Location K-35.

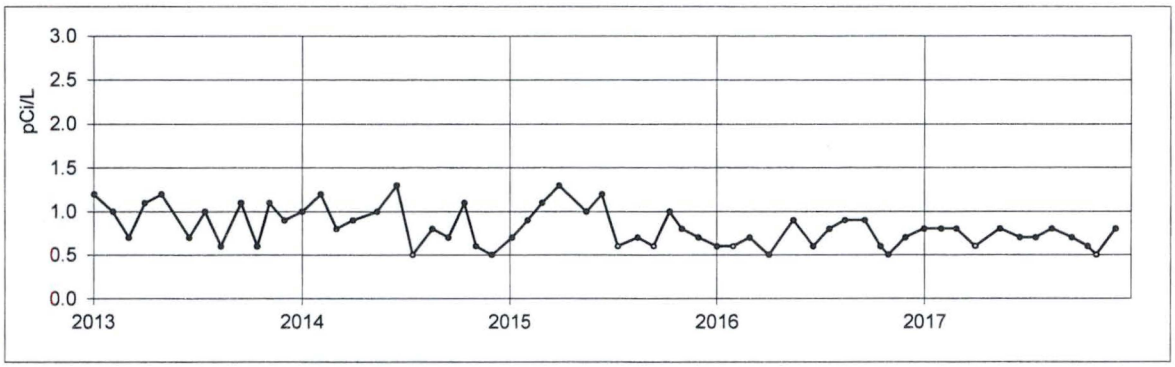

Figure 26. Milk samples. Location K-38.

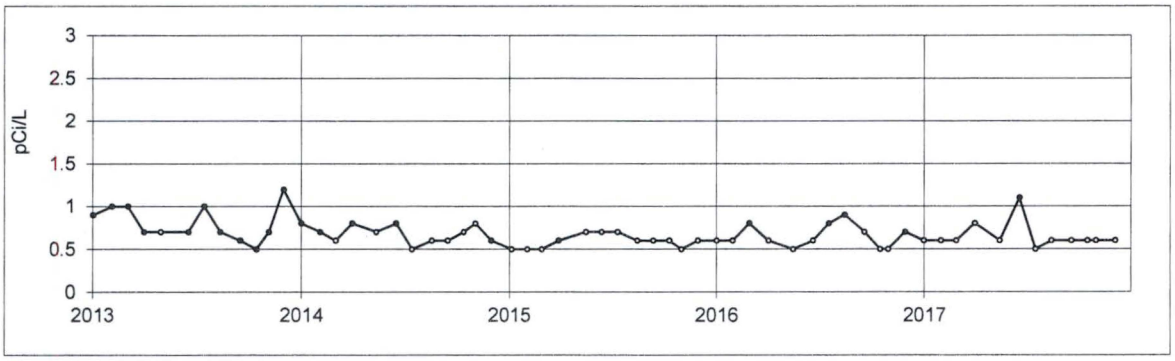

Figure 27. Milk samples. Location K-39.

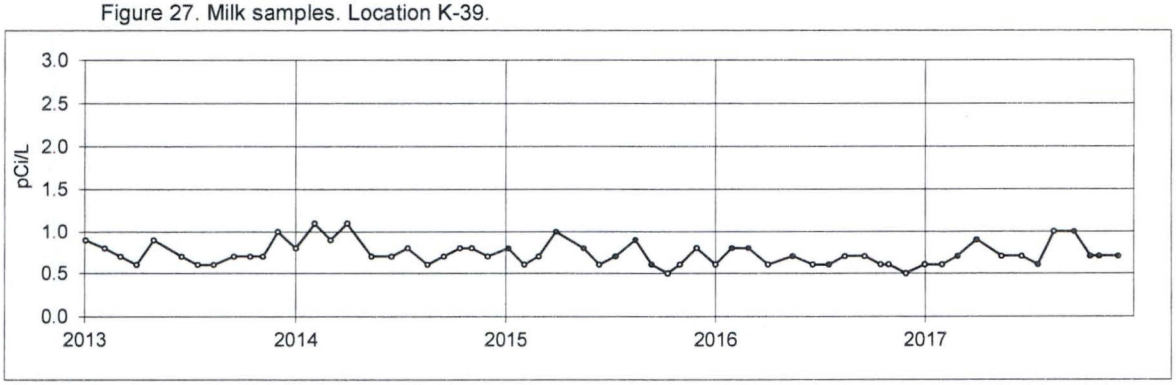

Figure 28. Milk samples. Location K-42.

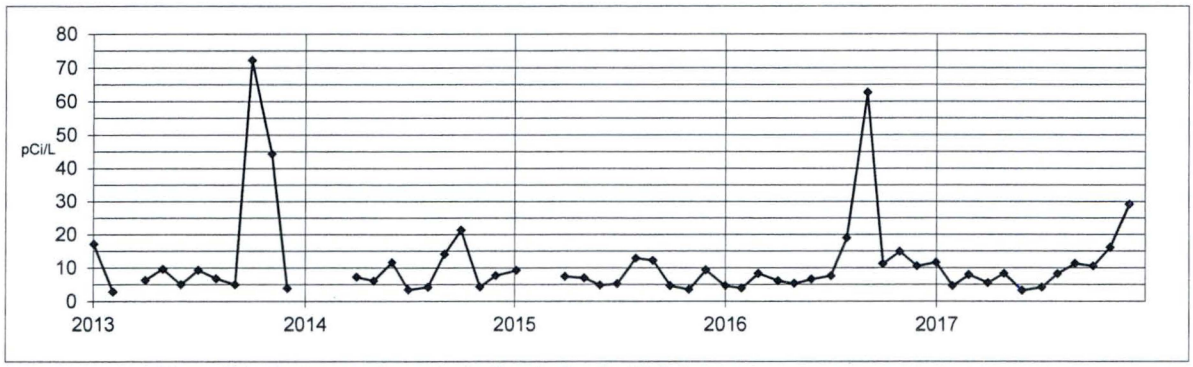

Figure 29. Surface water . North Creek, Onsite (K-1a).

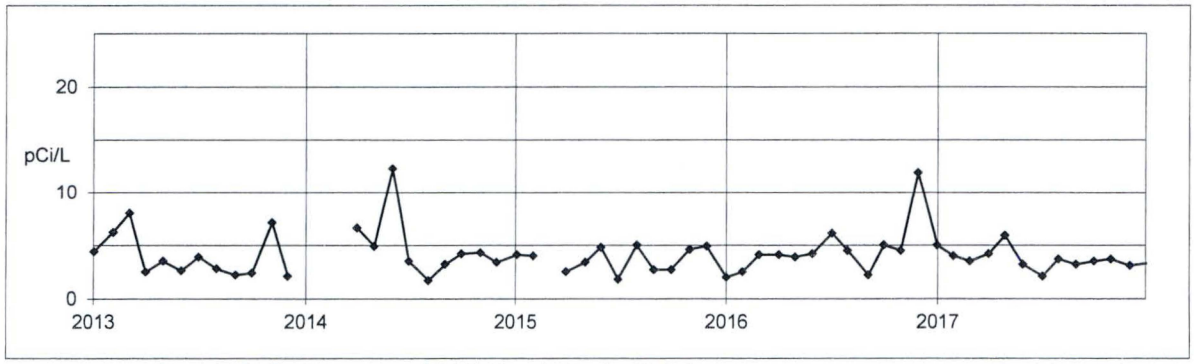

Figure 30. Surface water . Middle Creek, Onsite (K-1b).

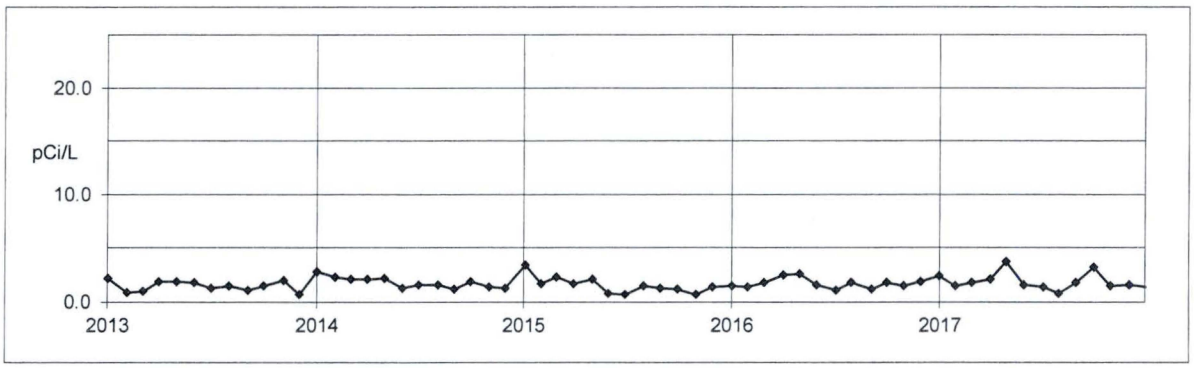

Figure 31. Surface water. Lake Michigan, condenser discharge, Onsite (K-1d).

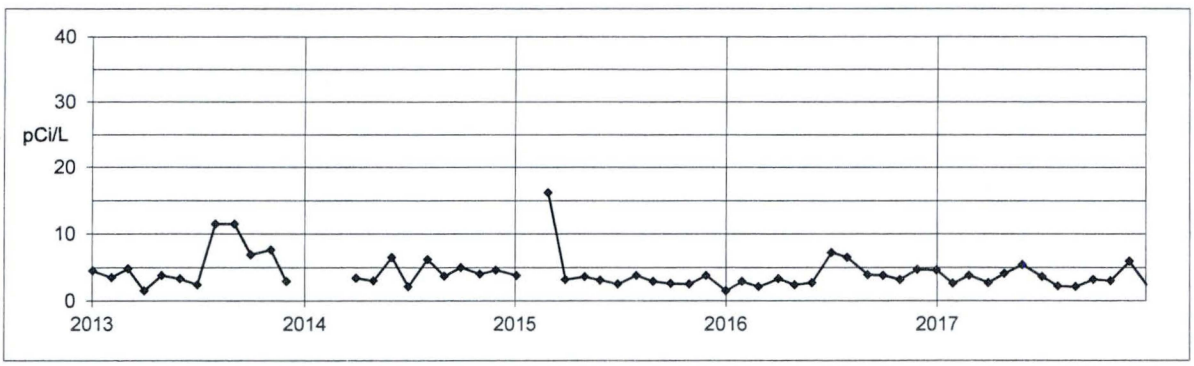

Figure 32. Surface water. South Creek, Onsite (K-1e).

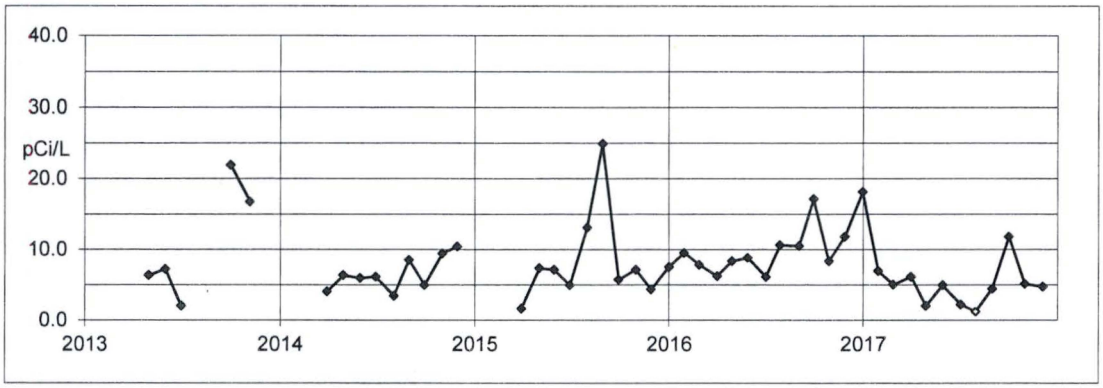

Figure 33. Surface water. School Forest Pond (K-1k).

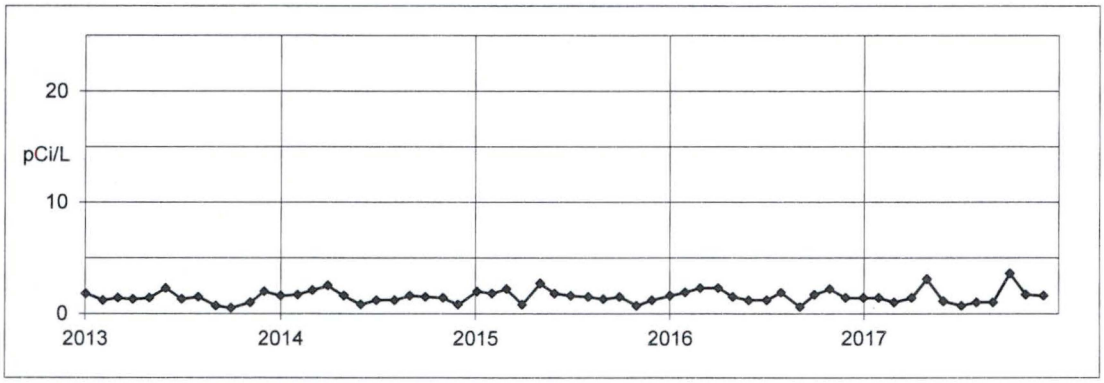

Figure 34. Surface water (raw). Lake Michigan, Rostok Intake (K-9)

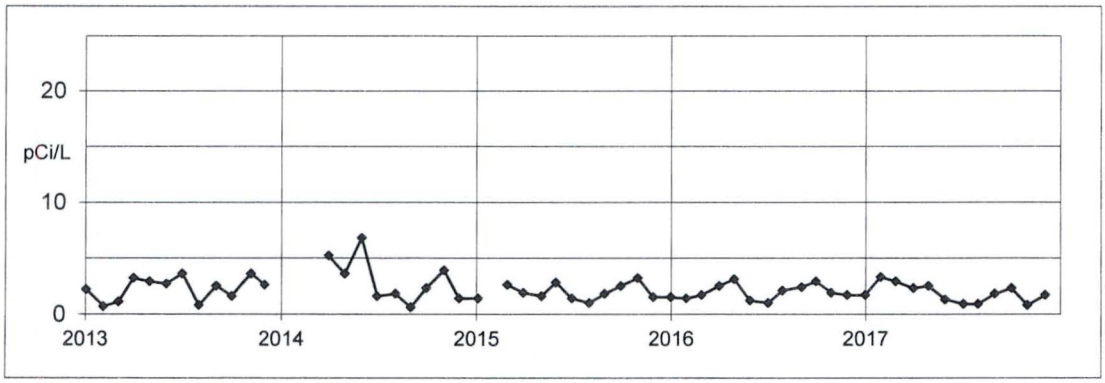

Figure 35. Surface water . Lake Michigan, Two Creeks Park (K-14a).

Note: An open data point indicates activity less than the minimum detectable concentration (MDC).

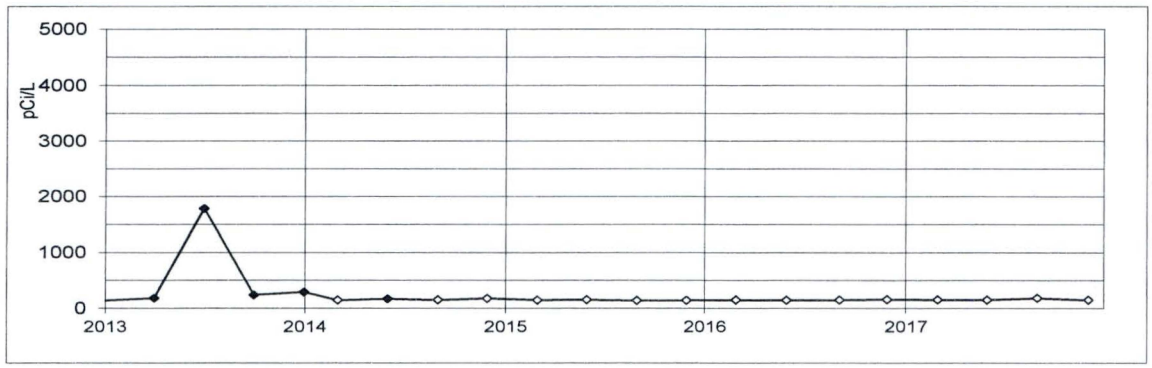

Figure 36. Surface water. Lake Michigan, condenser discharge, K-1d. Quarterly collection.

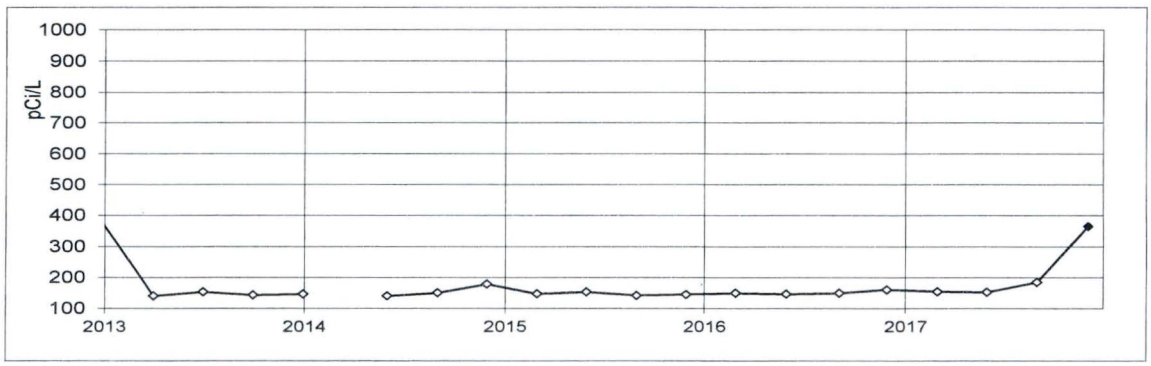

Figure 37. Surface water. Lake Michigan, Two Creeks Park, K-14a. Quarterly collection.

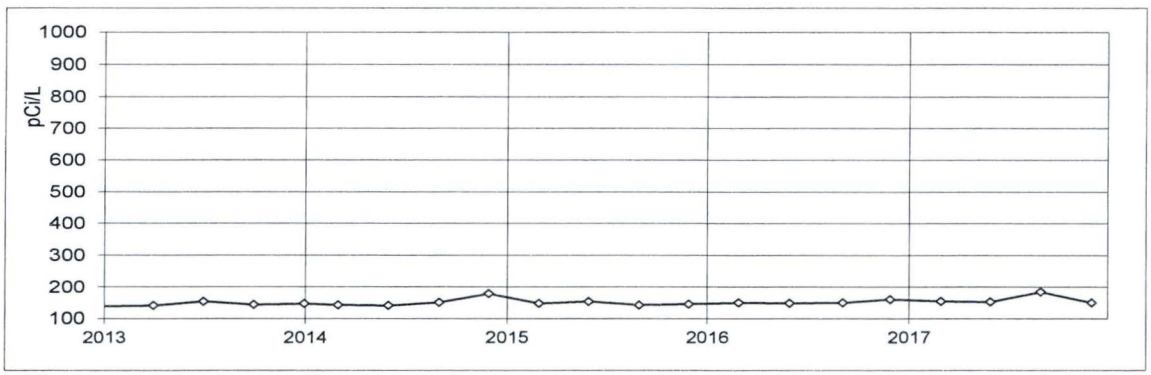

Figure 38. Surface water. Lake Michigan, Rostok Intake, K-9. Quarterly collection.

DATA TABULATIONS

Table 4. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: K-1f

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-10-17	302	0.023 ± 0.004	07-04-17	307	0.014 ± 0.003
01-17-17	303	0.036 ± 0.005	07-11-17	298	0.018 ± 0.004
01-24-17	302	0.027 ± 0.004	07-18-17	302	0.008 ± 0.004
01-31-17	315	0.012 ± 0.004	07-25-17	303	0.015 ± 0.004
			08-01-17	302	0.025 ± 0.004
02-07-17	295	0.026 ± 0.004			
02-14-17	299	0.026 ± 0.004	08-08-17	302	0.017 ± 0.004
02-21-17	300	0.021 ± 0.004	08-15-17	302	0.020 ± 0.004
02-28-17	307	0.020 ± 0.004	08-22-17	302	0.024 ± 0.004
			08-29-17	306	0.021 ± 0.004
03-07-17	298	0.018 ± 0.004			
03-14-17	301	0.021 ± 0.004	09-05-17	298	0.017 ± 0.004
03-21-17	302	0.023 ± 0.004	09-12-17	305	0.013 ± 0.004
03-28-17	303	0.015 ± 0.004	09-19-17	302	0.030 ± 0.005
			09-26-17	302	0.038 ± 0.005
			10-03-17	303	0.024 ± 0.004
1st Quarter Mean ± s.d.		0.022 ± 0.006	3rd Quarter Mean ± s.d.		0.020 ± 0.008
04-04-17	305	0.015 ± 0.004	10-10-17	302	0.025 ± 0.004
04-11-17	300	0.014 ± 0.004	10-17-17	303	0.017 ± 0.004
04-18-17	302	0.018 ± 0.004	10-24-17	302	0.031 ± 0.004
04-25-17	305	0.012 ± 0.004	10-31-17	304	0.009 ± 0.004
05-02-17	305	0.011 ± 0.004			
			11-07-17	303	0.014 ± 0.004
05-09-17	297	0.017 ± 0.004	11-14-17	300	0.040 ± 0.005
05-16-17	303	0.014 ± 0.003	11-21-17	300	0.029 ± 0.004
05-23-17	301	0.017 ± 0.004	11-28-17	303	0.027 ± 0.004
05-30-17	303	0.015 ± 0.004			
			12-05-17	302	0.030 ± 0.005
06-06-17	302	0.014 ± 0.004	12-12-17	304	0.022 ± 0.004
06-13-17	302	0.015 ± 0.004	12-19-17	302	0.030 ± 0.005
06-20-17	303	0.013 ± 0.004	12-26-17	302	0.027 ± 0.004
06-27-17	302	0.010 ± 0.003	01-02-18	303	0.031 ± 0.005
2nd Quarter Mean ± s.d.		0.014 ± 0.002	4th Quarter Mean ± s.d.		0.026 ± 0.008
			Cumulative Average		0.021

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless otherwise noted.

Table 5. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: K-2

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-10-17	304	0.023 ± 0.004	07-04-17	307	0.012 ± 0.003
01-17-17	293	0.035 ± 0.005	07-11-17	298	0.016 ± 0.004
01-24-17	302	0.024 ± 0.004	07-18-17	301	0.013 ± 0.004
01-31-17	315	0.015 ± 0.004	07-25-17	303	0.020 ± 0.004
			08-01-17	302	0.017 ± 0.004
02-07-17	295	0.026 ± 0.004			
02-14-17	299	0.026 ± 0.004	08-08-17	302	0.016 ± 0.004
02-21-17	306	0.019 ± 0.004	08-15-17	302	0.021 ± 0.004
02-28-17	302	0.020 ± 0.004	08-22-17	303	0.023 ± 0.004
			08-29-17	306	0.024 ± 0.004
03-07-17	305	0.018 ± 0.004			
03-14-17	301	0.022 ± 0.004	09-05-17	297	0.016 ± 0.004
03-21-17	300	0.021 ± 0.004	09-12-17	303	0.013 ± 0.004
03-28-17	303	0.016 ± 0.004	09-19-17	302	0.028 ± 0.004
			09-26-17	302	0.037 ± 0.005
			10-03-17	308	0.020 ± 0.004
1st Quarter Mean ± s.d.		0.022 ± 0.005	3rd Quarter Mean ± s.d.		0.020 ± 0.007
04-04-17	299	0.014 ± 0.004	10-10-17	304	0.024 ± 0.004
04-11-17	308	0.012 ± 0.003	10-17-17	296	0.018 ± 0.004
04-18-17	293	0.017 ± 0.004	10-24-17	309	0.030 ± 0.004
04-25-17	308	0.013 ± 0.004	10-31-17	298	0.007 ± 0.004
05-02-17	305	0.009 ± 0.004			
			11-07-17	304	0.012 ± 0.004
05-09-17	297	0.022 ± 0.004	11-14-17	307	0.034 ± 0.005
05-16-17	303	0.014 ± 0.003	11-21-17	307	0.028 ± 0.004
05-23-17	302	0.017 ± 0.004	11-28-17	304	0.032 ± 0.005
05-30-17	303	0.011 ± 0.004			
			12-05-17	302	0.037 ± 0.005
06-06-17	302	0.015 ± 0.004	12-12-17	291	0.019 ± 0.004
06-13-17	303	0.016 ± 0.004	12-19-17	302	0.025 ± 0.004
06-20-17	302	0.016 ± 0.004	12-26-17	302	0.027 ± 0.004
06-27-17	303	0.012 ± 0.003	01-02-18	303	0.038 ± 0.005
2nd Quarter Mean ± s.d.		0.014 ± 0.003	4th Quarter Mean ± s.d.		0.025 ± 0.009
			Cumulative Average		0.020

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless otherwise noted.

Table 6. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: K-8

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-10-17	302	0.022 ± 0.004	07-04-17	307	0.014 ± 0.003
01-17-17	303	0.038 ± 0.005	07-11-17	298	0.018 ± 0.004
01-24-17	302	0.025 ± 0.004	07-18-17	303	0.010 ± 0.004
01-31-17	315	0.013 ± 0.004	07-25-17	301	0.016 ± 0.004
			08-01-17	302	0.014 ± 0.004
02-07-17	295	0.022 ± 0.004			
02-14-17	299	0.022 ± 0.004	08-08-17	302	0.018 ± 0.004
02-21-17	301	0.020 ± 0.004	08-15-17	305	0.023 ± 0.004
02-28-17	307	0.019 ± 0.004	08-22-17	299	0.022 ± 0.004
			08-29-17	306	0.022 ± 0.004
03-07-17	298	0.021 ± 0.004			
03-14-17	301	0.022 ± 0.004	09-05-17	299	0.020 ± 0.004
03-21-17	302	0.023 ± 0.004	09-12-17	304	0.012 ± 0.004
03-28-17	302	0.017 ± 0.004	09-19-17	302	0.032 ± 0.005
			09-26-17	301	0.037 ± 0.005
			10-03-17	302	0.022 ± 0.004
1st Quarter Mean ± s.d.		0.022 ± 0.006	3rd Quarter Mean ± s.d.		0.020 ± 0.007
04-04-17	305	0.016 ± 0.004	10-10-17	302	0.027 ± 0.004
04-11-17	300	0.012 ± 0.003	10-17-17	306	0.019 ± 0.004
04-18-17	302	0.018 ± 0.004	10-24-17	307	0.029 ± 0.004
04-25-17	305	0.015 ± 0.004	10-31-17	296	0.011 ± 0.004
05-02-17	305	0.011 ± 0.004			
			11-07-17	304	0.017 ± 0.004
05-09-17	298	0.019 ± 0.004	11-14-17	300	0.037 ± 0.005
05-16-17	305	0.016 ± 0.004	11-21-17	300	0.032 ± 0.004
05-23-17	300	0.018 ± 0.004	11-28-17	304	0.029 ± 0.005
05-30-17	250	0.013 ± 0.004			
			12-05-17	302	0.039 ± 0.005
06-06-17	302	0.013 ± 0.004	12-12-17	305	0.028 ± 0.005
06-13-17	303	0.018 ± 0.004	12-19-17	302	0.030 ± 0.005
06-20-17	304	0.011 ± 0.004	12-26-17	301	0.031 ± 0.005
06-27-17	122	0.014 ± 0.008 [b]	01-02-18	303	0.032 ± 0.005
2nd Quarter Mean ± s.d.		0.015 ± 0.003	4th Quarter Mean ± s.d.		0.028 ± 0.008
			Cumulative Average		0.021

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless otherwise noted.

[b] GFI found off.

Table 7. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: K-31

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-10-17	303	0.023 ± 0.004	07-04-17	307	0.015 ± 0.004
01-17-17	293	0.040 ± 0.005	07-11-17	298	0.016 ± 0.004
01-24-17	302	0.020 ± 0.004	07-18-17	301	0.012 ± 0.004
01-31-17	315	0.014 ± 0.004	07-25-17	303	0.017 ± 0.004
			08-01-17	302	0.018 ± 0.004
02-07-17	295	0.019 ± 0.004			
02-14-17	299	0.019 ± 0.004	08-08-17	302	0.017 ± 0.004
02-21-17	307	0.018 ± 0.004	08-15-17	302	0.020 ± 0.004
02-28-17	301	0.017 ± 0.004	08-22-17	303	0.026 ± 0.004
			08-29-17	306	0.023 ± 0.004
03-07-17	305	0.020 ± 0.004			
03-14-17	301	0.018 ± 0.004	09-05-17	298	0.024 ± 0.005
03-21-17	300	0.020 ± 0.004	09-12-17	304	0.017 ± 0.004
03-28-17	303	0.018 ± 0.004	09-19-17	301	0.036 ± 0.005
			09-26-17	302	0.041 ± 0.005
			10-03-17	308	0.026 ± 0.004
1st Quarter Mean ± s.d.		0.021 ± 0.007	3rd Quarter Mean ± s.d.		0.022 ± 0.008
04-04-17	299	0.012 ± 0.004	10-10-17	304	0.026 ± 0.004
04-11-17	149	0.008 ± 0.006 [b]	10-17-17	296	0.021 ± 0.004
04-18-17	289	0.018 ± 0.004	10-24-17	309	0.031 ± 0.004
04-25-17	307	0.015 ± 0.004	10-31-17	298	0.008 ± 0.004
05-02-17	305	0.010 ± 0.004			
			11-07-17	304	0.016 ± 0.004
05-09-17	297	0.019 ± 0.004	11-14-17	307	0.045 ± 0.005
05-16-17	303	0.013 ± 0.003	11-21-17	307	0.031 ± 0.004
05-23-17	302	0.012 ± 0.003	11-28-17	297	0.026 ± 0.004
05-30-17	303	0.014 ± 0.004			
			12-05-17	303	0.032 ± 0.005
06-06-17	302	0.017 ± 0.004	12-12-17	303	0.020 ± 0.004
06-13-17	303	0.019 ± 0.004	12-19-17	301	0.023 ± 0.004
06-20-17	302	0.014 ± 0.004	12-26-17	306	0.025 ± 0.004
06-27-17	302	0.010 ± 0.003	01-02-18	304	0.032 ± 0.005
2nd Quarter Mean ± s.d.		0.014 ± 0.004	4th Quarter Mean ± s.d.		0.026 ± 0.009
			Cumulative Average		0.021

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless otherwise noted.

[b] Power failure to sample pump.

Table 8. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: K-41

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-10-17	302	0.022 ± 0.004	07-04-17	307	0.014 ± 0.003
01-17-17	299	0.031 ± 0.005	07-11-17	298	0.018 ± 0.004
01-24-17	303	0.025 ± 0.004	07-18-17	304	0.012 ± 0.004
01-31-17	314	0.016 ± 0.004	07-25-17	301	0.017 ± 0.004
			08-01-17	302	0.017 ± 0.004
02-07-17	295	0.021 ± 0.004			
02-14-17	299	0.021 ± 0.004	08-08-17	300	0.020 ± 0.004
02-21-17	303	0.017 ± 0.004	08-15-17	305	0.021 ± 0.004
02-28-17	305	0.020 ± 0.004	08-22-17	300	0.028 ± 0.005
			08-29-17	306	0.024 ± 0.004
03-07-17	303	0.018 ± 0.004			
03-14-17	301	0.019 ± 0.004	09-05-17	299	0.016 ± 0.004
03-21-17	301	0.018 ± 0.004	09-12-17	303	0.018 ± 0.004
03-28-17	303	0.016 ± 0.004	09-19-17	303	0.033 ± 0.005
			09-26-17	304	0.042 ± 0.005
			10-03-17	302	0.018 ± 0.004
1st Quarter Mean ± s.d.		0.020 ± 0.004	3rd Quarter Mean ± s.d.		0.021 ± 0.008
04-04-17	305	0.012 ± 0.003	10-10-17	303	0.021 ± 0.004
04-11-17	300	0.011 ± 0.003	10-17-17	303	0.017 ± 0.004
04-18-17	311	0.017 ± 0.004	10-24-17	301	0.031 ± 0.004
04-25-17	293	0.014 ± 0.004	10-31-17	301	0.007 ± 0.004
05-02-17	305	0.010 ± 0.004			
			11-07-17	304	0.015 ± 0.004
05-09-17	297	0.021 ± 0.004	11-14-17	303	0.035 ± 0.005
05-16-17	306	0.018 ± 0.004	11-21-17	303	0.027 ± 0.004
05-23-17	299	0.016 ± 0.004	11-28-17	301	0.034 ± 0.005
05-30-17	303	0.016 ± 0.004			
			12-05-17	309	0.037 ± 0.005
06-06-17	305	0.016 ± 0.004	12-12-17	297	0.022 ± 0.004
06-13-17	300	0.021 ± 0.004	12-19-17	306	0.028 ± 0.005
06-20-17	304	0.014 ± 0.004	12-26-17	298	0.029 ± 0.004
06-27-17	300	0.011 ± 0.003	01-02-18	304	0.038 ± 0.005
2nd Quarter Mean ± s.d.		0.015 ± 0.004	4th Quarter Mean ± s.d.		0.026 ± 0.009
			Cumulative Average		0.021

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless otherwise noted.

Table 9. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131[a].

Location: K-43

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-10-17	302	0.021 ± 0.004	07-04-17	307	0.014 ± 0.003
01-17-17	303	0.037 ± 0.005	07-11-17	298	0.021 ± 0.004
01-24-17	302	0.027 ± 0.004	07-18-17	304	0.013 ± 0.004
01-31-17	315	0.014 ± 0.004	07-25-17	301	0.019 ± 0.004
			08-01-17	302	0.019 ± 0.004
02-07-17	295	0.023 ± 0.004			
02-14-17	299	0.023 ± 0.004	08-08-17	302	0.018 ± 0.004
02-21-17	301	0.019 ± 0.004	08-15-17	304	0.020 ± 0.004
02-28-17	307	0.022 ± 0.004	08-22-17	301	0.024 ± 0.004
			08-29-17	305	0.024 ± 0.004
03-07-17	298	0.019 ± 0.004			
03-14-17	301	0.020 ± 0.004	09-05-17	300	0.019 ± 0.004
03-21-17	302	0.021 ± 0.004	09-12-17	304	0.013 ± 0.004
03-28-17	302	0.016 ± 0.004	09-19-17	302	0.031 ± 0.005
			09-26-17	301	0.040 ± 0.005
			10-03-17	308	0.021 ± 0.004
1st Quarter Mean ± s.d.		0.022 ± 0.006	3rd Quarter Mean ± s.d.		0.021 ± 0.007
04-04-17	305	0.016 ± 0.004	10-10-17	302	0.026 ± 0.004
04-11-17	300	0.013 ± 0.004	10-17-17	306	0.019 ± 0.004
04-18-17	302	0.016 ± 0.004	10-24-17	307	0.032 ± 0.004
04-25-17	305	0.017 ± 0.004	10-31-17	296	0.009 ± 0.004
05-02-17	305	0.013 ± 0.004			
			11-07-17	304	0.016 ± 0.004
05-09-17	298	0.019 ± 0.004	11-14-17	300	0.042 ± 0.005
05-16-17	305	0.017 ± 0.004	11-21-17	300	0.030 ± 0.004
05-23-17	300	0.018 ± 0.004	11-28-17	304	0.027 ± 0.004
05-30-17	303	0.016 ± 0.004			
			12-05-17	302	0.030 ± 0.005
06-06-17	302	0.017 ± 0.004	12-12-17	305	0.020 ± 0.004
06-13-17	303	0.020 ± 0.004	12-19-17	302	0.020 ± 0.004
06-20-17	304	0.017 ± 0.004	12-26-17	300	0.026 ± 0.004
06-27-17	300	0.011 ± 0.003	01-02-18	303	0.032 ± 0.005
2nd Quarter Mean ± s.d.		0.016 ± 0.003	4th Quarter Mean ± s.d.		0.025 ± 0.008
			Cumulative Average		0.021

[a] Iodine-131 concentrations are < 0.03 pCi/m^3 unless otherwise noted.

Table 10. Airborne particulate data, gross beta analyses, monthly averages, minima and maxima.

January

Location	Average	Minima	Maxima
Indicators	0.025	0.012	0.037
K-1f	0.025	0.012	0.036
K-43	0.025	0.014	0.037
Controls	0.024	0.013	0.040
K-2	0.024	0.015	0.035
K-8	0.025	0.013	0.038
K-31	0.024	0.014	0.040
K-41	0.024	0.016	0.031

February

Location	Average	Minima	Maxima
Indicators	0.023	0.019	0.026
K-1f	0.023	0.020	0.026
K-43	0.022	0.019	0.023
Controls	0.021	0.017	0.026
K-2	0.023	0.019	0.026
K-8	0.021	0.019	0.022
K-31	0.018	0.017	0.019
K-41	0.020	0.017	0.021

March

Location	Average	Minima	Maxima
Indicators	0.019	0.015	0.023
K-1f	0.019	0.015	0.023
K-43	0.019	0.016	0.021
Controls	0.019	0.016	0.023
K-2	0.019	0.016	0.022
K-8	0.021	0.017	0.023
K-31	0.019	0.018	0.020
K-41	0.018	0.016	0.019

April

Location	Average	Minima	Maxima
Indicators	0.015	0.011	0.018
K-1f	0.014	0.011	0.018
K-43	0.015	0.013	0.017
Controls	0.013	0.008	0.018
K-2	0.013	0.009	0.017
K-8	0.014	0.011	0.018
K-31	0.013	0.008	0.018
K-41	0.013	0.008	0.018

May

Location	Average	Minima	Maxima
Indicators	0.016	0.007	0.032
K-1f	0.016	0.014	0.017
K-43	0.018	0.016	0.019
Controls	0.017	0.011	0.022
K-2	0.016	0.011	0.022
K-8	0.017	0.013	0.019
K-31	0.015	0.012	0.019
K-41	0.018	0.016	0.021

June

Location	Average	Minima	Maxima
Indicators	0.015	0.010	0.020
K-1f	0.013	0.010	0.015
K-43	0.016	0.011	0.020
Controls	0.018	0.007	0.032
K-2	0.015	0.012	0.016
K-8	0.014	0.011	0.018
K-31	0.015	0.010	0.019
K-41	0.016	0.011	0.021

Note: Samples collected on the first, second or third day of the month are grouped with data of the previous month.

Table 10. Airborne particulate data, gross beta analyses, monthly averages, minima and maxima.

July

Location	Average	Minima	Maxima
Indicators	0.017	0.008	0.025
K-1f	0.016	0.008	0.025
K-43	0.017	0.013	0.021
Controls	0.016	0.010	0.020
K-2	0.016	0.012	0.020
K-8	0.014	0.010	0.018
K-31	0.016	0.012	0.018
K-41	0.016	0.012	0.018

August

Location	Average	Minima	Maxima
Indicators	0.022	0.017	0.024
K-1f	0.021	0.017	0.024
K-43	0.022	0.018	0.024
Controls	0.022	0.016	0.028
K-2	0.021	0.016	0.024
K-8	0.021	0.018	0.023
K-31	0.022	0.017	0.026
K-41	0.023	0.020	0.028

September

Location	Average	Minima	Maxima
Indicators	0.026	0.013	0.040
K-1f	0.025	0.013	0.038
K-43	0.026	0.013	0.040
Controls	0.027	0.012	0.042
K-2	0.024	0.013	0.037
K-8	0.025	0.012	0.037
K-31	0.030	0.017	0.041
K-41	0.027	0.016	0.042

October

Location	Average	Minima	Maxima
Indicators	0.022	0.009	0.032
K-1f	0.021	0.009	0.031
K-43	0.022	0.009	0.032
Controls	0.021	0.007	0.031
K-2	0.020	0.007	0.030
K-8	0.022	0.011	0.029
K-31	0.022	0.008	0.031
K-41	0.019	0.007	0.031

November

Location	Average	Minima	Maxima
Indicators	0.029	0.014	0.042
K-1f	0.028	0.014	0.040
K-43	0.029	0.016	0.042
Controls	0.029	0.012	0.045
K-2	0.027	0.012	0.034
K-8	0.029	0.017	0.037
K-31	0.030	0.016	0.045
K-41	0.028	0.015	0.035

December

Location	Average	Minima	Maxima
Indicators	0.027	0.020	0.032
K-1f	0.028	0.022	0.031
K-43	0.026	0.020	0.032
Controls	0.030	0.019	0.039
K-2	0.029	0.019	0.038
K-8	0.032	0.028	0.039
K-31	0.026	0.020	0.032
K-41	0.031	0.022	0.038

Note: Samples collected on the first, second or third day of the month are grouped with data of the previous month.

Table 11. Airborne particulate samples, quarterly composites of weekly samples, analysis for gamma-emitting isotopes.

	Sample Description and Concentration (pCi/m^3)			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Indicator				
K-1f				
Lab Code	KAP- 1681	KAP- 3694	KAP- 5545	KAP- 6791
Volume (m^3)	3627	3930	3931	3930
Be-7	0.059 ± 0.019	0.085 ± 0.016	0.075 ± 0.014	0.072 ± 0.015
Nb-95	< 0.0030	< 0.0012	< 0.0008	< 0.0011
Zr-95	< 0.0011	< 0.0012	< 0.0014	< 0.0016
Ru-103	< 0.0022	< 0.0008	< 0.0011	< 0.0010
Ru-106	< 0.0136	< 0.0090	< 0.0083	< 0.0060
Cs-134	< 0.0013	< 0.0008	< 0.0009	< 0.0009
Cs-137	< 0.0010	< 0.0007	< 0.0005	< 0.0008
Ce-141	< 0.0038	< 0.0016	< 0.0012	< 0.0015
Ce-144	< 0.0076	< 0.0033	< 0.0040	< 0.0031
K-43				
Lab Code	KAP- 1687	KAP- 3700	KAP- 5550	KAP- 6796
Volume (m^3)	3627	3932	3931	3931
Be-7	0.071 ± 0.016	0.101 ± 0.017	0.088 ± 0.015	0.067 ± 0.016
Nb-95	< 0.0010	< 0.0015	< 0.0010	< 0.0007
Zr-95	< 0.0018	< 0.0014	< 0.0011	< 0.0018
Ru-103	< 0.0017	< 0.0009	< 0.0011	< 0.0009
Ru-106	< 0.0057	< 0.0062	< 0.0070	< 0.0057
Cs-134	< 0.0010	< 0.0008	< 0.0008	< 0.0010
Cs-137	< 0.0007	< 0.0008	< 0.0005	< 0.0009
Ce-141	< 0.0024	< 0.0015	< 0.0018	< 0.0019
Ce-144	< 0.0057	< 0.0035	< 0.0035	< 0.0042

Table 11. Airborne particulate samples, quarterly composites of weekly samples, analysis for gamma-emitting isotopes, (continued).

	Sample Description and Concentration (pCi/m^3)			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Control				
K-2				
Lab Code	KAP- 1682	KAP- 3696	KAP- 5546	KAP- 6792
Volume (m^3)	3625	3928	3928	3929
Be-7	0.065 ± 0.015	0.078 ± 0.015	0.075 ± 0.013	0.069 ± 0.015
Nb-95	< 0.0013	< 0.0012	< 0.0008	< 0.0013
Zr-95	< 0.0020	< 0.0018	< 0.0014	< 0.0010
Ru-103	< 0.0014	< 0.0008	< 0.0009	< 0.0010
Ru-106	< 0.0082	< 0.0085	< 0.0055	< 0.0074
Cs-134	< 0.0011	< 0.0008	< 0.0007	< 0.0009
Cs-137	< 0.0009	< 0.0008	< 0.0007	< 0.0005
Ce-141	< 0.0016	< 0.0015	< 0.0011	< 0.0023
Ce-144	< 0.0053	< 0.0036	< 0.0028	< 0.0049
K-8				
Lab Code	KAP- 1683	KAP- 3697	KAP- 5547	KAP- 6793
Volume (m^3)	3627	3701	3929	3932
Be-7	0.074 ± 0.016	0.076 ± 0.016	0.071 ± 0.012	0.068 ± 0.015
Nb-95	< 0.0015	< 0.0011	< 0.0007	< 0.0008
Zr-95	< 0.0016	< 0.0013	< 0.0012	< 0.0015
Ru-103	< 0.0012	< 0.0008	< 0.0007	< 0.0013
Ru-106	< 0.0070	< 0.0040	< 0.0027	< 0.0081
Cs-134	< 0.0010	< 0.0012	< 0.0007	< 0.0007
Cs-137	< 0.0006	< 0.0003	< 0.0005	< 0.0009
Ce-141	< 0.0024	< 0.0017	< 0.0010	< 0.0020
Ce-144	< 0.0042	< 0.0039	< 0.0027	< 0.0029

Table 11. Airborne particulate samples, quarterly composites of weekly samples, analysis for gamma-emitting isotopes, (continued).

	Sample Description and Concentration (pCi/m^3)			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Control				
K-31				
Lab Code	KAP- 1684	KAP- 3698	KAP- 5548	KAP- 6794
Volume (m^3)	3624	3763	3929	3939
Be-7	0.063 ± 0.018	0.076 ± 0.016	0.093 ± 0.020	0.067 ± 0.013
Nb-95	< 0.0009	< 0.0016	< 0.0009	< 0.0012
Zr-95	< 0.0023	< 0.0017	< 0.0015	< 0.0014
Ru-103	< 0.0009	< 0.0007	< 0.0009	< 0.0014
Ru-106	< 0.0074	< 0.0073	< 0.0042	< 0.0058
Cs-134	< 0.0009	< 0.0009	< 0.0009	< 0.0010
Cs-137	< 0.0008	< 0.0007	< 0.0009	< 0.0007
Ce-141	< 0.0023	< 0.0014	< 0.0021	< 0.0019
Ce-144	< 0.0040	< 0.0039	< 0.0054	< 0.0050
K-41				
Lab Code	KAP- 1685	KAP- 3699	KAP- 5549	KAP- 6795
Volume (m^3)	3628	3928	3932	3933
Be-7	0.072 ± 0.017	0.088 ± 0.017	0.086 ± 0.014	0.068 ± 0.016
Nb-95	< 0.0008	< 0.0015	< 0.0006	< 0.0006
Zr-95	< 0.0017	< 0.0012	< 0.0020	< 0.0015
Ru-103	< 0.0017	< 0.0010	< 0.0011	< 0.0010
Ru-106	< 0.0077	< 0.0058	< 0.0063	< 0.0073
Cs-134	< 0.0011	< 0.0008	< 0.0008	< 0.0008
Cs-137	< 0.0009	< 0.0004	< 0.0010	< 0.0007
Ce-141	< 0.0016	< 0.0016	< 0.0015	< 0.0020
Ce-144	< 0.0050	< 0.0038	< 0.0037	< 0.0049

Table 12. Ambient gamma radiation (TLD), quarterly exposure.

	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	
Date Placed	01-03-17	04-03-17	07-05-17	10-02-17	
Date Removed	04-03-17	07-05-17	10-02-17	01-02-18	
	mR/91 days				
Indicator					Mean±s.d.
K-1f	15.6 ± 0.8	14.9 ± 0.6	14.4 ± 0.7	15.4 ± 1.1	15.1 ± 0.5
K-5	16.0 ± 0.6	17.2 ± 0.5	14.5 ± 0.7	16.6 ± 0.5	16.1 ± 1.2
K-17	18.4 ± 0.5	17.0 ± 0.7	16.4 ± 0.5	16.5 ± 0.9	17.1 ± 0.9
K-25	17.8 ± 0.8	18.9 ± 1.1	16.3 ± 0.7	17.5 ± 0.8	17.6 ± 1.1
K-27	17.7 ± 0.5	17.2 ± 0.7	16.2 ± 0.2	14.7 ± 0.4	16.5 ± 1.3
K-30	18.0 ± 0.9	15.3 ± 0.7	16.0 ± 0.9	14.3 ± 0.6	15.9 ± 1.6
K-39	18.4 ± 1.2	17.2 ± 0.6	16.6 ± 1.0	16.1 ± 0.6	17.1 ± 1.0
K-43	15.1 ± 0.8	14.1 ± 0.6	13.1 ± 0.7	13.1 ± 0.7	13.9 ± 1.0
Mean ± s.d.	17.1 ± 1.3	16.5 ± 1.6	15.4 ± 1.3	15.5 ± 1.4	16.1 ± 0.8
Control					
K-2	16.8 ± 0.8	17.2 ± 0.6	15.8 ± 0.7	17.4 ± 0.8	16.8 ± 0.7
K-3	18.3 ± 1.1	17.0 ± 0.9	17.4 ± 0.9	16.8 ± 0.7	17.4 ± 0.7
K-8	18.3 ± 1.2	17.2 ± 0.7	16.2 ± 1.0	16.6 ± 0.7	17.1 ± 0.9
K-15	15.5 ± 0.7	14.9 ± 0.7	14.5 ± 0.5	14.1 ± 0.4	14.8 ± 0.6
K-31	13.5 ± 0.6	13.3 ± 0.4	11.7 ± 0.5	12.3 ± 0.3	12.7 ± 0.8
K-41	14.2 ± 1.0	14.3 ± 0.8	12.7 ± 0.8	13.4 ± 0.7	13.7 ± 0.8
Mean ± s.d.	16.1 ± 2.0	15.7 ± 1.7	14.7 ± 2.2	15.1 ± 2.1	15.4 ± 0.6
Inside the Protected Area					
Date Placed	01-01-17	03-31-17	07-02-17	10-02-17	
Date Removed	03-31-17	07-02-17	10-02-17	01-01-18	Mean±s.d.
K-1l	174.3 ± 7.9	103.9 ± 7.2	99.0 ± 5.3	91.3 ± 7.5	117.1 ± 38.5
K-1m	115.8 ± 2.3	223.7 ± 15.0	271.9 ± 8.5	243.5 ± 15.2	213.7 ± 68.2
K-1n	49.1 ± 2.5	255.1 ± 22.3	389.9 ± 13.8	371.6 ± 30.1	266.4 ± 156.7
K-1o	25.5 ± 0.7	112.0 ± 7.7	212.3 ± 4.7	214.8 ± 12.9	141.2 ± 90.8
K-1p	29.9 ± 0.6	63.6 ± 4.1	73.9 ± 0.4	73.1 ± 4.7	60.1 ± 20.7
K-1q	19.1 ± 1.4	21.2 ± 0.6	25.4 ± 1.8	27.8 ± 0.9	23.4 ± 3.9
K-1r	24.0 ± 0.8	25.3 ± 1.3	20.7 ± 0.6	22.4 ± 1.0	23.1 ± 2.0
K-1s	42.2 ± 2.6	42.2 ± 2.2	42.1 ± 1.8	39.5 ± 1.8	41.5 ± 1.3
Mean ± s.d.	60.0 ± 55.7	105.9 ± 89.2	141.9 ± 135.2	135.5 ± 127.1	110.8 ± 106.6

Table 13. Precipitation samples collected at Location K-11; analysis for tritium.

Date Collected	Lab Code	H-3	
		pCi/L	T.U. (100 T.U. = 320 pCi/L)
01/03/17	KP- 62	< 154	< 48
02/01/17	KP- 387	< 155	< 48
03/01/17	KP- 823	< 155	< 48
04/03/17	KP- 1329	< 150	< 47
05/01/17	KP- 1927	< 148	< 46
06/01/17	KP- 2635	< 152	< 48
07/05/17	KP- 3220	< 178	< 56
08/01/17	KP- 3863	< 157	< 49
09/06/17	KP- 4578	< 187	< 58
10/02/17	KP- 5057	< 143	< 45
11/01/17	KP- 5791	< 158	< 49
12/04/17	KP- 6285	< 148	< 46

Table 14. Milk, analyses for iodine-131 and gamma-emitting isotopes.
Collection: Semimonthly during grazing season, monthly at other times.

Collection Date	Lab Code	Concentration (pCi/L) I-131	Cs-134	Cs-137	Ba-La-140	K-40
Indicators						
K-5						
01-04-17	KMI- 2	< 0.3	< 3.9	< 3.3	< 4.8	1269 ± 111
02-02-17	KMI- 358	< 0.2	< 3.9	< 3.6	< 1.9	1345 ± 117
03-02-17	KMI- 817	< 0.2	< 4.6	< 3.5	< 6.6	1586 ± 131
04-03-17	KMI- 1322	< 0.3	< 4.0	< 4.0	< 3.9	1425 ± 109
05-01-17	KMI- 1912	< 0.5	< 3.7	< 3.9	< 3.9	1255 ± 96
05-16-17	KMI- 2195	< 0.3	< 6.1	< 6.9	< 3.9	1371 ± 160
06-02-17	KMI- 2607	< 0.3	< 4.7	< 4.6	< 2.9	1501 ± 132
06-20-17	KMI- 2991	< 0.2	< 4.6	< 3.5	< 1.4	1464 ± 123
07-06-17	KMI- 3214	< 0.2	< 3.5	< 3.4	< 1.5	1409 ± 120
07-18-17	KMI- 3518	< 0.2	< 5.6	< 6.4	< 5.2	1275 ± 152
08-01-17	KMI- 3857	< 0.3	< 3.5	< 2.8	< 2.2	1433 ± 108
08-15-17	KMI- 4183	< 0.3	< 3.3	< 2.4	< 1.7	1349 ± 120
09-07-17	KMI- 4553	< 0.2	< 2.9	< 2.1	< 2.8	1289 ± 107
09-19-17	KMI- 4782	< 0.4	< 3.1	< 4.1	< 2.1	1269 ± 115
10-03-17	KMI- 5029	< 0.4	< 3.6	< 4.3	< 3.2	1378 ± 107
10-17-17	KMI- 5410	< 0.4	< 4.0	< 3.6	< 3.3	1254 ± 116
11-02-17	KMI- 5763	< 0.3	< 3.6	< 3.3	< 3.4	1305 ± 116
12-05-17	KMI- 6289	< 0.4	< 3.6	< 2.9	< 2.0	1266 ± 118
K-34						
01-03-17	KMI- 3	< 0.4	< 3.0	< 2.1	< 3.5	1484 ± 121
02-01-17	KMI- 359	< 0.4	< 3.0	< 2.1	< 2.2	1350 ± 105
03-01-17	KMI- 818	< 0.2	< 3.6	< 4.1	< 4.0	1357 ± 106
04-03-17	KMI- 1323	< 0.3	< 3.0	< 4.0	< 3.4	1463 ± 98
05-01-17	KMI- 1913	< 0.4	< 3.8	< 3.2	< 4.2	1353 ± 107
05-16-17	KMI- 2196	< 0.4	< 3.1	< 2.1	< 1.2	1427 ± 114
06-01-17	KMI- 2608	< 0.4	< 4.2	< 3.4	< 2.3	1435 ± 123
06-20-17	KMI- 2992	< 0.2	< 4.5	< 3.4	< 3.0	1403 ± 129
07-05-17	KMI- 3215	< 0.2	< 3.4	< 3.5	< 1.8	1472 ± 113
07-18-17	KMI- 3519	< 0.2	< 3.5	< 3.7	< 1.5	1306 ± 115
08-01-17	KMI- 3858	< 0.3	< 3.1	< 3.2	< 3.8	1442 ± 113
08-15-17	KMI- 4184	< 0.4	< 4.4	< 4.1	< 1.8	1436 ± 122
09-06-17	KMI- 4554	< 0.3	< 3.1	< 3.7	< 4.4	1355 ± 103
09-19-17	KMI- 4783	< 0.4	< 5.0	< 5.1	< 2.0	1543 ± 132
10-02-17	KMI- 5030	< 0.3	< 4.2	< 4.2	< 4.4	1389 ± 112
10-17-17	KMI- 5411	< 0.4	< 3.1	< 3.1	< 2.1	1390 ± 108
11-01-17	KMI- 5764	< 0.3	< 3.6	< 2.5	< 4.3	1406 ± 115
12-04-17	KMI- 6290	< 0.3	< 3.2	< 2.4	< 1.7	1436 ± 117

Table 14. Milk, analyses for iodine-131 and gamma-emitting isotopes (continued).

Collection Date	Lab Code	Concentration (pCi/L) I-131	Cs-134	Cs-137	Ba-La-140	K-40
Indicators						
K-38						
01-04-17	KMI- 5	< 0.3	< 3.5	< 3.5	< 2.3	1332 ± 108
02-01-17	KMI- 361	< 0.4	< 3.4	< 3.6	< 1.2	1336 ± 106
03-01-17	KMI- 820	< 0.2	< 3.2	< 3.7	< 1.5	1384 ± 106
04-04-17	KMI- 1325	< 0.3	< 3.1	< 3.4	< 2.5	1453 ± 107
05-01-17	KMI- 1915	< 0.4	< 3.4	< 2.4	< 2.9	1537 ± 113
05-16-17	KMI- 2198	< 0.2	< 3.5	< 2.6	< 2.1	1416 ± 117
06-01-17	KMI- 2610	< 0.3	< 4.2	< 3.1	< 1.5	1306 ± 116
06-20-17	KMI- 2994	< 0.2	< 3.6	< 3.8	< 2.4	1433 ± 111
07-05-17	KMI- 3217	< 0.2	< 3.1	< 2.5	< 4.5	1419 ± 118
07-18-17	KMI- 3521	< 0.2	< 3.4	< 2.8	< 1.3	1337 ± 109
08-01-17	KMI- 3860	< 0.2	< 3.7	< 2.8	< 3.8	1339 ± 110
08-15-17	KMI- 4186	< 0.4	< 3.4	< 3.7	< 1.8	1352 ± 120
09-07-17	KMI- 4556	< 0.2	< 3.8	< 2.6	< 4.3	1389 ± 111
09-19-17	KMI- 4785	< 0.2	< 3.2	< 3.9	< 1.6	1303 ± 101
10-02-17	KMI- 5032	< 0.5	< 4.4	< 5.8	< 1.9	1307 ± 120
10-17-17	KMI- 5413	< 0.4	< 4.4	< 3.6	< 1.4	1330 ± 123
11-02-17	KMI- 5766	< 0.2	< 4.1	< 2.8	< 7.5	1353 ± 117
12-04-17	KMI- 6292	< 0.2	< 2.9	< 3.1	< 2.6	1308 ± 116
K-39						
01-03-17	KMI- 6	< 0.4	< 3.2	< 3.3	< 4.5	1359 ± 112
02-02-17	KMI- 362	< 0.3	< 3.3	< 3.8	< 1.7	1332 ± 114
03-02-17	KMI- 821	< 0.2	< 3.5	< 2.9	< 3.6	1298 ± 100
04-03-17	KMI- 1326	< 0.3	< 3.3	< 3.7	< 3.1	1382 ± 104
05-01-17	KMI- 1916	< 0.2	< 3.2	< 2.7	< 4.2	1263 ± 101
05-16-17	KMI- 2199	< 0.2	< 3.6	< 3.3	< 2.3	1377 ± 114
06-02-17	KMI- 2611	< 0.4	< 4.7	< 3.1	< 1.7	1322 ± 116
06-20-17	KMI- 2995	< 0.3	< 6.7	< 7.2	< 4.8	1263 ± 153
07-06-17	KMI- 3218	< 0.2	< 3.2	< 3.9	< 3.8	1333 ± 100
07-18-17	KMI- 3522	< 0.2	< 6.7	< 7.1	< 4.8	1242 ± 142
08-01-17	KMI- 3861	< 0.4	< 3.9	< 1.8	< 3.3	1308 ± 107
08-15-17	KMI- 4187	< 0.3	< 3.4	< 2.5	< 2.6	1311 ± 112
09-06-17	KMI- 4557	< 0.2	< 2.9	< 3.1	< 3.6	1306 ± 105
09-19-17	KMI- 4786	< 0.3	< 4.4	< 4.1	< 3.6	1380 ± 122
10-02-17	KMI- 5033	< 0.5	< 4.6	< 3.3	< 2.7	1316 ± 128
10-17-17	KMI- 5414	< 0.4	< 4.1	< 4.2	< 1.6	1435 ± 118
11-01-17	KMI- 5767	< 0.3	< 3.3	< 3.9	< 5.5	1285 ± 112
12-05-17	KMI- 6293	< 0.4	< 3.2	< 3.2	< 1.1	1403 ± 116

Table 14. Milk, analyses for iodine-131 and gamma-emitting isotopes (continued).

Collection Date	Lab Code	Concentration (pCi/L) I-131	Cs-134	Cs-137	Ba-La-140	K-40
Controls						
K-3						
01-04-17	KMI- 1	< 0.4	< 3.4	< 3.2	< 4.3	1346 ± 109
02-01-17	KMI- 357	< 0.2	< 4.0	< 3.6	< 2.9	1417 ± 115
03-01-17	KMI- 816	< 0.2	< 3.1	< 2.4	< 1.5	1380 ± 100
04-03-17	KMI- 1321	< 0.4	< 3.0	< 3.0	< 2.2	1453 ± 97
05-01-17	KMI- 1911	< 0.4	< 4.0	< 3.5	< 2.6	1514 ± 118
05-16-17	KMI- 2194	< 0.5	< 3.9	< 2.4	< 1.4	1438 ± 123
06-02-17	KMI- 2606	< 0.3	< 3.8	< 4.2	< 1.7	1386 ± 106
06-20-17	KMI- 2990	< 0.2	< 6.7	< 6.3	< 4.4	1300 ± 179
07-05-17	KMI- 3213	< 0.3	< 3.5	< 3.6	< 1.9	1549 ± 121
07-18-17	KMI- 3517	< 0.2	< 3.2	< 3.5	< 1.5	1451 ± 112
08-01-17	KMI- 3856	< 0.4	< 3.8	< 4.6	< 3.9	1565 ± 115
08-15-17	KMI- 4182	< 0.4	< 4.1	< 3.4	< 1.4	1439 ± 117
09-06-17	KMI- 4552	< 0.2	< 3.4	< 3.9	< 3.6	1447 ± 116
09-19-17	KMI- 4781	< 0.3	< 4.0	< 3.2	< 2.7	1371 ± 115
10-02-17	KMI- 5028	< 0.4	< 4.4	< 3.3	< 1.5	1462 ± 108
10-17-17	KMI- 5409	< 0.5	< 4.0	< 5.0	< 3.2	1522 ± 127
11-01-17	KMI- 5762	< 0.3	< 3.3	< 3.6	< 3.1	1337 ± 120
12-05-17	KMI- 6288	< 0.4	< 4.8	< 4.6	< 3.8	1361 ± 127
K-35						
01-04-17	KMI- 4	< 0.3	< 4.8	< 3.9	< 3.2	1568 ± 131
02-02-17	KMI- 360	< 0.1	< 4.6	< 2.3	< 2.7	1417 ± 121
03-02-17	KMI- 819	< 0.2	< 2.8	< 3.8	< 3.4	1426 ± 104
04-04-17	KMI- 1324	< 0.3	< 3.5	< 4.3	< 3.3	1384 ± 100
05-02-17	KMI- 1914	< 0.4	< 3.6	< 3.0	< 3.1	1498 ± 121
05-16-17	KMI- 2197	< 0.3	< 3.9	< 5.0	< 2.2	1313 ± 124
06-02-17	KMI- 2609	< 0.4	< 4.5	< 4.7	< 1.4	1423 ± 120
06-20-17	KMI- 2993	< 0.2	< 4.1	< 2.2	< 3.2	1414 ± 118
07-06-17	KMI- 3216	< 0.2	< 3.7	< 3.5	< 4.1	1431 ± 129
07-18-17	KMI- 3520	< 0.2	< 3.6	< 3.3	< 2.6	1443 ± 125
08-02-17	KMI- 3859	< 0.4	< 4.2	< 4.4	< 4.0	1579 ± 120
08-15-17	KMI- 4185	< 0.5	< 4.2	< 5.3	< 1.7	1514 ± 136
09-07-17	KMI- 4555	< 0.3	< 3.9	< 3.1	< 3.0	1359 ± 109
09-19-17	KMI- 4784	< 0.3	< 6.8	< 3.8	< 4.8	1218 ± 153
10-02-17	KMI- 5031	< 0.3	< 5.0	< 4.9	< 2.3	1637 ± 145
10-17-17	KMI- 5412	< 0.4	< 3.0	< 3.9	< 1.9	1284 ± 112
11-02-17	KMI- 5765	< 0.3	< 3.7	< 1.8	< 2.8	1445 ± 112
12-05-17	KMI- 6291	< 0.4	< 4.6	< 5.0	< 3.9	1425 ± 127

Table 14. Milk, analyses for iodine-131 and gamma-emitting isotopes (continued).

Collection Date	Lab Code	Concentration (pCi/L) I-131	Cs-134	Cs-137	Ba-La-140	K-40
Control						
K-42						
01-03-17	KMI- 7	< 0.4	< 4.0	< 4.0	< 3.9	1422 ± 114
02-01-17	KMI- 363	< 0.3	< 3.2	< 2.6	< 2.5	1373 ± 108
03-01-17	KMI- 822	< 0.2	< 3.2	< 4.6	< 2.9	1293 ± 104
04-03-17	KMI- 1327	< 0.3	< 4.0	< 4.0	< 2.8	1388 ± 113
05-01-17	KMI- 1917	< 0.2	< 3.9	< 2.4	< 1.8	1346 ± 105
05-16-17	KMI- 2200	< 0.2	< 3.4	< 3.3	< 2.2	1261 ± 108
06-01-17	KMI- 2612	< 0.3	< 3.8	< 4.9	< 4.7	1271 ± 114
06-20-17	KMI- 2996	< 0.2	< 4.0	< 5.0	< 1.6	1338 ± 114
07-05-17	KMI- 3219	< 0.4	< 3.3	< 3.4	< 2.4	1337 ± 112
07-18-17	KMI- 3523	< 0.1	< 4.1	< 4.8	< 1.2	1285 ± 117
08-01-17	KMI- 3862	< 0.2	< 3.2	< 3.4	< 3.3	1275 ± 101
08-15-17	KMI- 4188	< 0.3	< 3.4	< 2.0	< 1.3	1441 ± 124
09-06-17	KMI- 4558	< 0.3	< 3.1	< 2.2	< 2.1	1443 ± 106
09-19-17	KMI- 4787	< 0.5	< 7.0	< 4.5	< 5.5	1374 ± 160
10-02-17	KMI- 5034	< 0.2	< 4.8	< 4.3	< 5.4	1349 ± 124
10-17-17	KMI- 5415	< 0.4	< 3.8	< 3.6	< 2.6	1432 ± 120
11-01-17	KMI- 5768	< 0.2	< 3.8	< 3.9	< 4.5	1340 ± 114
12-04-17	KMI- 6294	< 0.2	< 3.5	< 3.5	< 2.6	1382 ± 118

Table 15. Milk, analyses for strontium-89, strontium-90, stable potassium, stable calcium, and ratios of strontium-90 per gram of calcium and cesium-137 per gram of potassium. Collection: Monthly composites.

Collection Period	Lab Code	Concentration				Ratios	
		Sr-89 (pCi/L)	Sr-90 (pCi/L)	K (g/L)	Ca (g/L)	Sr-90 per gram Ca	Cs-137 per gram K
Indicators							
				K-5			
January	KMI - 2	< 0.9	< 0.6	1.55 ± 0.14	1.00	< 0.60	< 6.45
February	KMI - 358	< 1.0	< 0.9	1.64 ± 0.14	0.90	< 1.00	< 6.10
March	KMI - 817	< 0.9	1.5 ± 0.7	1.93 ± 0.16	0.89	1.69	< 5.18
April	KMI - 1322	< 0.7	< 0.6	1.74 ± 0.13	0.95	< 0.63	< 5.75
May	KMI - 2370	< 0.9	< 0.6	1.60 ± 0.16	0.90	< 0.67	< 6.25
June	KMI - 3076	< 0.8	1.1 ± 0.4	1.81 ± 0.16	0.83	1.33	< 5.52
July	KMI - 3895	< 0.7	< 0.5	1.64 ± 0.17	0.87	< 0.57	< 6.10
August	KMI - 4190	< 0.9	< 0.6	1.70 ± 0.14	0.94	< 0.64	< 5.88
September	KMI - 4851	< 0.9	< 0.6	1.56 ± 0.14	0.92	< 0.65	< 6.41
October	KMI - 5435	< 0.9	< 0.6	1.60 ± 0.14	0.97	< 0.62	< 6.25
November	KMI - 5763	< 1.0	0.8 ± 0.4	1.59 ± 0.14	0.95	0.84	< 6.29
December	KMI - 6289	< 1.0	< 0.6	1.54 ± 0.14	0.94	< 0.64	< 6.49
				K-34			
January	KMI - 3	< 0.8	0.7 ± 0.3	1.81 ± 0.15	0.95	0.74	< 5.52
February	KMI - 359	< 0.9	< 0.6	1.65 ± 0.13	0.85	< 0.71	< 6.06
March	KMI - 818	< 0.9	0.7 ± 0.3	1.65 ± 0.13	0.95	0.74	< 6.06
April	KMI - 1323	< 0.7	0.7 ± 0.4	1.78 ± 0.12	0.88	0.80	< 5.62
May	KMI - 2371	< 0.7	0.8 ± 0.3	1.70 ± 0.13	0.97	0.82	< 5.88
June	KMI - 3077	< 0.8	1.1 ± 0.4	1.73 ± 0.15	0.84	1.31	< 5.78
July	KMI - 3896	< 0.7	< 0.5	1.69 ± 0.14	0.93	< 0.54	< 5.92
August	KMI - 4191	< 0.8	< 0.6	1.75 ± 0.14	0.85	< 0.71	< 5.71
September	KMI - 4852	< 0.7	< 0.6	1.77 ± 0.14	1.07	< 0.56	< 5.65
October	KMI - 5436	< 0.7	< 0.5	1.69 ± 0.13	1.00	< 0.50	< 5.92
November	KMI - 5764	< 0.8	< 0.5	1.71 ± 0.14	0.95	< 0.53	< 5.85
December	KMI - 6290	< 0.8	< 0.5	1.75 ± 0.14	1.08	< 0.46	< 5.71

Table 15. Milk, analyses for strontium-89, strontium-90, stable potassium, stable calcium, and ratios of strontium-90 per gram of calcium and cesium-137 per gram of potassium (continued).

Collection Period	Lab Code	Concentration				Ratios	
		Sr-89 (pCi/L)	Sr-90 (pCi/L)	K (g/L)	Ca (g/L)	Sr-90 per gram Ca	Cs-137 per gram K
Indicators							
				K-38			
January	KMI - 5	< 0.7	0.8 ± 0.3	1.62 ± 0.13	0.93	0.86	< 6.17
February	KMI - 361	< 0.8	0.8 ± 0.3	1.63 ± 0.13	1.04	0.77	< 6.13
March	KMI - 820	< 0.8	0.8 ± 0.3	1.69 ± 0.13	0.99	0.81	< 5.92
April	KMI - 1325	< 0.6	< 0.6	1.77 ± 0.13	0.99	< 0.61	< 5.65
May	KMI - 2373	< 0.9	0.8 ± 0.4	1.80 ± 0.14	0.92	0.87	< 5.56
June	KMI - 3079	< 0.8	0.7 ± 0.4	1.67 ± 0.14	0.95	0.74	< 5.99
July	KMI - 3898	< 0.8	0.7 ± 0.3	1.68 ± 0.14	1.00	0.70	< 5.95
August	KMI - 4193	< 0.8	0.8 ± 0.4	1.64 ± 0.14	0.93	0.86	< 6.10
September	KMI - 4854	< 0.8	0.7 ± 0.4	1.64 ± 0.13	0.95	0.74	< 6.10
October	KMI - 5438	< 0.7	0.6 ± 0.3	1.61 ± 0.15	0.85	0.71	< 6.21
November	KMI - 5766	< 0.8	< 0.5	1.65 ± 0.14	0.94	< 0.53	< 6.06
December	KMI - 6292	< 0.9	0.8 ± 0.3	1.60 ± 0.14	1.01	0.79	< 6.25
				K-39			
January	KMI - 6	< 0.9	< 0.6	1.66 ± 0.14	1.02	< 0.59	< 6.02
February	KMI - 362	< 0.9	< 0.6	1.62 ± 0.14	1.05	< 0.57	< 6.17
March	KMI - 821	< 0.9	< 0.6	1.58 ± 0.12	1.00	< 0.60	< 6.33
April	KMI - 1326	< 0.9	< 0.8	1.69 ± 0.13	0.87	< 0.92	< 5.92
May	KMI - 2374	< 0.8	< 0.6	1.61 ± 0.13	0.95	< 0.63	< 6.21
June	KMI - 3080	< 0.9	1.1 ± 0.4	1.58 ± 0.16	0.88	1.25	< 6.33
July	KMI - 3899	< 0.7	< 0.5	1.57 ± 0.15	0.93	< 0.54	< 6.37
August	KMI - 4194	< 0.8	< 0.6	1.60 ± 0.13	0.95	< 0.63	< 6.25
September	KMI - 4855	< 0.8	< 0.6	1.64 ± 0.14	1.08	< 0.56	< 6.10
October	KMI - 5439	< 0.8	< 0.6	1.68 ± 0.15	0.86	< 0.70	< 5.95
November	KMI - 5767	< 1.0	< 0.6	1.57 ± 0.14	1.02	< 0.59	< 6.37
December	KMI - 6293	< 1.0	< 0.6	1.71 ± 0.14	1.00	< 0.60	< 5.85

Table 15. Milk, analyses for strontium-89, strontium-90, stable potassium, stable calcium, and ratios of strontium-90 per gram of calcium and cesium-137 per gram of potassium (continued).

Collection Period	Lab Code	Concentration Sr-89 (pCi/L)	Sr-90 (pCi/L)	K (g/L)	Ca (g/L)	Ratios Sr-90 per gram Ca	Cs-137 per gram K
Control				K-3			
January	KMI - 1	< 1.1	< 0.7	1.64 ± 0.13	0.99	< 0.71	< 6.10
February	KMI - 357	< 1.3	1.1 ± 0.5	1.73 ± 0.14	0.97	1.13	< 5.78
March	KMI - 816	< 0.9	< 0.6	1.68 ± 0.12	0.96	< 0.63	< 5.95
April	KMI - 1321	< 0.8	1.0 ± 0.4	1.77 ± 0.12	0.81	1.23	< 5.65
May	KMI - 2369	< 0.8	< 0.5	1.80 ± 0.15	1.01	< 0.5	< 5.56
June	KMI - 3075	< 0.7	1.1 ± 0.4	1.64 ± 0.17	0.90	1.22	< 6.10
July	KMI - 3894	< 0.7	0.5 ± 0.3	1.83 ± 0.14	0.92	0.54	< 5.46
August	KMI - 4189	< 0.8	0.8 ± 0.4	1.83 ± 0.14	1.04	0.77	< 5.46
September	KMI - 4850	< 0.8	< 0.6	1.72 ± 0.14	1.02	< 0.59	< 5.81
October	KMI - 5434	< 0.8	< 0.5	1.82 ± 0.14	1.03	< 0.49	< 5.49
November	KMI - 5762	< 0.9	1.2 ± 0.4	1.63 ± 0.15	1.10	1.09	< 6.13
December	KMI - 6288	< 1.0	< 0.5	1.66 ± 0.15	0.95	< 0.53	< 6.02
				K-35			
January	KMI - 4	< 0.8	0.6 ± 0.3	1.91 ± 0.16	0.88	0.68	< 5.24
February	KMI - 360	< 0.9	< 0.5	1.73 ± 0.15	1.02	< 0.49	< 5.78
March	KMI - 819	< 0.8	< 0.5	1.74 ± 0.13	0.94	< 0.53	< 5.75
April	KMI - 1324	< 0.7	< 0.7	1.69 ± 0.12	0.95	< 0.74	< 5.92
May	KMI - 2372	< 0.8	< 0.5	1.71 ± 0.15	0.93	< 0.54	< 5.85
June	KMI - 3078	< 0.8	< 0.6	1.73 ± 0.15	0.93	< 0.65	< 5.78
July	KMI - 3897	< 0.8	< 0.6	1.75 ± 0.15	0.95	< 0.63	< 5.71
August	KMI - 4192	< 0.7	< 0.5	1.89 ± 0.16	0.91	< 0.55	< 5.29
September	KMI - 4853	< 0.8	0.7 ± 0.4	1.57 ± 0.16	1.18	0.59	< 6.37
October	KMI - 5437	< 0.7	0.5 ± 0.3	1.78 ± 0.16	0.91	0.55	< 5.62
November	KMI - 5765	< 0.8	< 0.5	1.76 ± 0.14	1.08	< 0.46	< 5.68
December	KMI - 6291	< 0.9	< 0.5	1.74 ± 0.15	0.95	< 0.53	< 5.75
				K-42			
January	KMI - 7	< 0.9	< 0.6	1.73 ± 0.14	0.98	< 0.61	< 5.78
February	KMI - 363	< 1.0	< 0.6	1.67 ± 0.13	0.88	< 0.68	< 5.99
March	KMI - 822	< 1.0	0.7 ± 0.3	1.58 ± 0.13	0.97	0.72	< 6.33
April	KMI - 1327	< 0.8	0.9 ± 0.5	1.69 ± 0.14	0.86	1.05	< 5.92
May	KMI - 2375	< 1.0	< 0.7	1.59 ± 0.13	0.85	< 0.82	< 6.29
June	KMI - 3081	< 0.8	< 0.7	1.59 ± 0.14	0.86	< 0.81	< 6.29
July	KMI - 3900	< 0.7	0.6 ± 0.3	1.60 ± 0.14	0.95	0.63	< 6.25
August	KMI - 4195	< 1.3	< 1.0	1.66 ± 0.13	0.93	< 1.08	< 6.02
September	KMI - 4856	< 1.0	1.0 ± 0.4	1.72 ± 0.14	0.90	1.11	< 5.81
October	KMI - 5440	< 0.8	0.7 ± 0.3	1.70 ± 0.17	0.89	0.79	< 5.88
November	KMI - 5768	< 1.1	0.7 ± 0.4	1.63 ± 0.14	1.05	0.67	< 6.13
December	KMI - 6294	< 1.1	0.7 ± 0.3	1.69 ± 0.14	1.07	0.65	< 5.92

Table 16. Well water, analyses for gross alpha, gross beta, tritium, strontium-89[a], strontium-90[a], potassium-40 and gamma-emitting isotopes.
Collection: Quarterly.

Sample Description and Concentration (pCi/L)				
Indicator				
K-1g				
Date Collected	01-03-17	04-03-17	07-05-17	10-02-17
Lab Code	KWW- 37	KWW- 1347	KWW- 3233	KWW- 5049
Gross alpha	4.0 ± 1.6	< 1.7	< 1.4	1.5 ± 1.1
Gross beta	3.3 ± 1.2	< 1.6	1.8 ± 1.1	1.9 ± 1.4
H-3	< 179	< 150	< 178	< 143
Sr-89	< 0.6	< 0.6	< 0.6	< 0.5
Sr-90	< 0.5	< 0.4	< 0.5	< 0.4
K-40 (ICP)	1.86	1.68	1.50	1.88
Mn-54	< 2.9	< 1.9	< 2.5	< 2.6
Fe-59	< 6.1	< 4.2	< 3.5	< 3.0
Co-58	< 2.4	< 1.1	< 2.2	< 1.5
Co-60	< 2.5	< 2.3	< 2.1	< 2.0
Zn-65	< 5.7	< 4.2	< 4.9	< 6.6
Zr-Nb-95	< 3.2	< 2.6	< 2.4	< 2.3
Cs-134	< 3.0	< 2.7	< 2.6	< 3.4
Cs-137	< 3.7	< 2.5	< 1.7	< 3.0
Ba-La-140	< 3.7	< 1.7	< 2.3	< 3.7
K-1h				
Date Collected	01-03-17	04-03-17	07-05-17	12-18-17
Lab Code	KWW- 38	KWW- 1348	KWW- 3234	KWW- 6655
Gross alpha	3.6 ± 1.8	1.9 ± 1.4	< 2.6	< 1.7
Gross beta	2.6 ± 1.2	2.9 ± 1.2	1.8 ± 1.3	< 1.7
H-3	< 179	< 150	< 178	< 155
K-40 (ICP)	2.30	2.32	2.28	1.60
Mn-54	< 2.6	< 3.1	< 2.0	< 1.9
Fe-59	< 3.9	< 6.2	< 3.2	< 4.3
Co-58	< 2.5	< 3.5	< 1.9	< 2.5
Co-60	< 3.6	< 2.5	< 1.6	< 2.5
Zn-65	< 4.8	< 7.3	< 3.5	< 2.5
Zr-Nb-95	< 3.3	< 3.1	< 4.3	< 4.2
Cs-134	< 3.2	< 4.1	< 2.3	< 2.4
Cs-137	< 3.0	< 3.7	< 3.3	< 2.5
Ba-La-140	< 5.4	< 3.1	< 4.8	< 7.3

[a] Strontium analyses required on samples from K-1g only.

Table 17. Well water, analyses for gross beta, tritium, potassium-40, and gamma-emitting isotopes.

Collection: Quarterly.

Sample Description and Concentration (pCi/L)				
Indicator				
K-10				
Date Collected	01-03-17	04-03-17	07-05-17	10-02-17
Lab Code	KWW- 39	KWW- 1349	KWW- 3235	KWW- 5051
Gross beta	2.5 ± 0.8	< 1.1	3.7 ± 1.5	< 2.3
H-3	< 179	< 150	< 178	< 143
K-40 (ICP)	0.78	0.77	3.71	0.82
Mn-54	< 2.8	< 2.7	< 2.4	< 2.6
Fe-59	< 4.8	< 3.8	< 4.2	< 3.2
Co-58	< 3.6	< 2.5	< 2.5	< 2.6
Co-60	< 1.5	< 1.4	< 2.2	< 1.7
Zn-65	< 2.8	< 4.2	< 2.2	< 7.2
Zr-Nb-95	< 1.9	< 3.6	< 3.7	< 3.1
Cs-134	< 2.9	< 2.7	< 2.4	< 2.6
Cs-137	< 2.2	< 3.0	< 1.8	< 3.0
Ba-La-140	< 5.5	< 1.8	< 7.3	< 4.8
K-11				
Date Collected	01-03-17	04-03-17	07-05-17	10-02-17
Lab Code	KWW- 40	KWW- 1350	KWW- 3236	KWW- 5052
Gross beta	< 0.9	< 0.9	< 0.9	< 0.9
H-3	< 179	< 150	< 178	< 143
K-40 (ICP)	< 0.30	0.28	< 0.30	< 0.30
Mn-54	< 2.8	< 2.1	< 2.4	< 1.9
Fe-59	< 2.9	< 2.9	< 7.4	< 3.5
Co-58	< 2.6	< 1.9	< 2.2	< 2.1
Co-60	< 2.6	< 2.1	< 1.6	< 1.5
Zn-65	< 4.2	< 1.7	< 3.8	< 3.7
Zr-Nb-95	< 3.3	< 3.4	< 4.6	< 2.3
Cs-134	< 2.9	< 2.8	< 2.8	< 2.8
Cs-137	< 3.4	< 3.0	< 3.1	< 3.5
Ba-La-140	< 3.3	< 4.4	< 13.4	< 4.7

Table 17. Well water, analyses for gross beta, tritium, potassium-40, and gamma-emitting isotopes.

Collection: Quarterly.

Sample Description and Concentration (pCi/L)				
Indicator				
K-38				
Date Collected	01-03-17	04-03-17	07-05-17	10-02-17
Lab Code	KWW- 42	KWW- 1352	KWW- 3238	KWW- 5054
Gross beta	6.5 ± 0.9	< 1.0	1.7 ± 0.8	< 1.1
H-3	< 179	< 150	< 178	< 143
K-40 (ICP)	8.86	0.46	1.31	1.30
Mn-54	< 2.2	< 3.4	< 2.2	< 2.5
Fe-59	< 4.0	< 4.1	< 5.9	< 3.7
Co-58	< 1.9	< 3.0	< 2.3	< 2.6
Co-60	< 1.6	< 2.5	< 2.1	< 1.5
Zn-65	< 3.1	< 2.6	< 2.7	< 4.1
Zr-Nb-95	< 2.9	< 2.5	< 4.0	< 2.8
Cs-134	< 2.8	< 3.4	< 2.1	< 2.9
Cs-137	< 1.6	< 2.1	< 1.8	< 3.1
Ba-La-140	< 3.7	< 3.2	< 10.2	< 5.2
Control				
K-13				
Date Collected	01-03-17	04-03-17	07-05-17	10-02-17
Lab Code	KWW- 41	KWW- 1351	KWW- 3237	KWW- 5053
Gross beta	< 0.9	1.1 ± 0.6	< 0.9	< 0.9
H-3	< 179	< 150	< 178	< 143
K-40 (ICP)	1.02	1.05	1.06	0.99
Mn-54	< 1.7	< 3.1	< 1.9	< 2.9
Fe-59	< 4.4	< 6.3	< 5.1	< 6.0
Co-58	< 2.6	< 1.8	< 3.7	< 4.2
Co-60	< 1.7	< 1.5	< 1.4	< 4.0
Zn-65	< 4.0	< 5.7	< 2.6	< 8.6
Zr-Nb-95	< 2.3	< 3.6	< 3.6	< 4.1
Cs-134	< 2.9	< 3.1	< 2.8	< 4.2
Cs-137	< 2.6	< 2.8	< 2.3	< 4.9
Ba-La-140	< 3.5	< 4.0	< 9.4	< 5.5

Table 18. Domestic meat samples (chickens), analyses of flesh for gross alpha, gross beta, and gamma-emitting isotopes. Annual collection.

Sample Description and Concentration (pCi/g wet)		
	Indicator	Control
Location	K-24	K-32
Date Collected	09-06-17	09-06-17
Lab Code	KME- 4579	KME- 4580
Gross Alpha	< 0.033	< 0.034
Gross Beta	2.01 ± 0.087	1.31 ± 0.072
Be-7	< 0.18	< 0.11
K-40	2.00 ± 0.26	1.76 ± 0.34
Nb-95	< 0.028	< 0.025
Zr-95	< 0.020	< 0.020
Ru-103	< 0.020	< 0.023
Ru-106	< 0.076	< 0.099
Cs-134	< 0.014	< 0.013
Cs-137	< 0.013	< 0.017
Ce-141	< 0.036	< 0.027
Ce-144	< 0.090	< 0.117

Table 19. Eggs, analyses for gross beta, strontium-89, strontium-90 and gamma emitting isotopes.
Collection: Quarterly

Sample Description and Concentration (pCi/g wet)

Location	K-24			
Date Collected	01-03-17	04-03-17	07-05-17	10-02-17
Lab Code	KE- 66	KE- 1330	KE- 3221	KE- 5055
Gross beta	1.52 ± 0.04	1.46 ± 0.04	1.59 ± 0.04	1.63 ± 0.04
Sr-89	< 0.005	< 0.003	< 0.006	< 0.014
Sr-90	< 0.004	< 0.002	< 0.002	< 0.005
Be-7	< 0.056	< 0.040	< 0.069	< 0.048
K-40	1.26 ± 0.14	1.30 ± 0.14	1.13 ± 0.17	1.05 ± 0.12
Nb-95	< 0.008	< 0.005	< 0.010	< 0.005
Zr-95	< 0.013	< 0.007	< 0.016	< 0.010
Ru-103	< 0.005	< 0.003	< 0.008	< 0.007
Ru-106	< 0.044	< 0.028	< 0.064	< 0.045
Cs-134	< 0.006	< 0.005	< 0.006	< 0.004
Cs-137	< 0.006	< 0.006	< 0.004	< 0.004
Ce-141	< 0.016	< 0.012	< 0.014	< 0.014
Ce-144	< 0.044	< 0.036	< 0.054	< 0.036

Location	K-32			
Date Collected	01-03-17	04-03-17	07-05-17	10-02-17
Lab Code	KE- 68	KE- 1331	KE- 3222	KE- 5056
Gross beta	1.45 ± 0.04	1.40 ± 0.04	1.54 ± 0.05	1.97 ± 0.06
Sr-89	< 0.004	< 0.003	< 0.006	< 0.019
Sr-90	< 0.003	< 0.002	< 0.002	< 0.009
Be-7	< 0.050	< 0.051	< 0.045	< 0.044
K-40	1.31 ± 0.14	1.16 ± 0.13	1.37 ± 0.14	1.17 ± 0.13
Nb-95	< 0.004	< 0.007	< 0.006	< 0.005
Zr-95	< 0.010	< 0.009	< 0.012	< 0.006
Ru-103	< 0.005	< 0.006	< 0.006	< 0.005
Ru-106	< 0.053	< 0.035	< 0.046	< 0.046
Cs-134	< 0.005	< 0.005	< 0.005	< 0.006
Cs-137	< 0.006	< 0.005	< 0.004	< 0.004
Ce-141	< 0.009	< 0.017	< 0.013	< 0.016
Ce-144	< 0.029	< 0.033	< 0.043	< 0.031

Table 20. Vegetable and grain samples, analyses for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes. Annual collection.

Sample Description and Concentration (pCi/g wet)			
	Indicator		
Location	K-23		K-1a
Date Collected	08-01-17	08-01-17	09-06-17
Lab Code	KVE- 3902	KVE- 3903	KVE- 4572
Type	Clover	Wheat	Corn
Gross beta	5.32 ± 0.16	7.72 ± 0.33	3.48 ± 0.07
Sr-89	< 0.006	< 0.024	< 0.008
Sr-90	< 0.004	< 0.013	< 0.005
Be-7	1.05 ± 0.19	2.03 ± 0.270	< 0.077
K-40	5.11 ± 0.42	4.99 ± 0.50	1.79 ± 0.16
Nb-95	< 0.017	< 0.014	< 0.006
Zr-95	< 0.024	< 0.025	< 0.010
Ru-103	< 0.018	< 0.019	< 0.004
Ru-106	< 0.124	< 0.191	< 0.046
Cs-134	< 0.016	< 0.018	< 0.005
Cs-137	< 0.013	< 0.020	< 0.004
Ce-141	< 0.026	< 0.035	< 0.015
Ce-144	< 0.151	< 0.086	< 0.050

Table 20. Vegetable and grain samples, analyses for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/g wet)				
Location	K-26 (control)			
Date Collected	09-07-17	09-07-17	09-07-17	09-07-17
Lab Code	KVE- 4573	KVE- 4574	KVE- 4575	KVE- 4576
Type	Cabbage	Green Beans	Carrots	Melons
Gross beta	2.81 ± 0.05	3.94 ± 0.07	3.76 ± 0.07	3.52 ± 0.06
Sr-89	< 0.006	< 0.009	< 0.012	< 0.010
Sr-90	< 0.003	< 0.004	< 0.007	< 0.006
Be-7	< 0.056	< 0.077	< 0.069	< 0.050
K-40	2.12 ± 0.16	2.07 ± 0.20	3.12 ± 0.21	2.47 ± 0.16
Nb-95	< 0.005	< 0.008	< 0.008	< 0.004
Zr-95	< 0.009	< 0.011	< 0.012	< 0.009
Ru-103	< 0.007	< 0.008	< 0.007	< 0.007
Ru-106	< 0.048	< 0.037	< 0.051	< 0.043
Cs-134	< 0.005	< 0.007	< 0.006	< 0.004
Cs-137	< 0.006	< 0.008	< 0.005	< 0.003
Ce-141	< 0.013	< 0.010	< 0.012	< 0.010
Ce-144	< 0.038	< 0.035	< 0.051	< 0.029

	K-26 (control)	K-26 (control)
Date Collected	09-07-17	10-03-17
Lab Code	KVE- 4577	KVE- 5058
Type	Kohlrabi	Pumpkin
Gross beta	3.70 ± 0.07	2.61 ± 0.05
Sr-89	< 0.008	< 0.011
Sr-90	< 0.004	< 0.006
Be-7	< 0.052	< 0.045
K-40	2.69 ± 0.20	2.33 ± 0.17
Nb-95	< 0.007	< 0.007
Zr-95	< 0.009	< 0.008
Ru-103	< 0.008	< 0.005
Ru-106	< 0.039	< 0.028
Cs-134	< 0.006	< 0.005
Cs-137	< 0.006	< 0.003
Ce-141	< 0.012	< 0.011
Ce-144	< 0.032	< 0.036

Table 21. Cattlefeed, analyses for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes.
Collection: First Quarter.

	Sample Description and Concentration (pCi/g wet)			
	Control			
Location	K-3	K-35	K-3	K-35
Date Collected	01-03-17	01-03-17	01-04-17	01-03-17
Lab Code	KCF- 76	KCF- 79	KCF- 82	KCF- 85
Type	Hay	Hay	Silage	Silage
Gross beta	10.88 ± 0.25	7.80 ± 0.20	4.60 ± 0.09	11.07 ± 0.23
Sr-89	< 0.016	< 0.036	< 0.010	< 0.022
Sr-90	0.022 ± 0.007	< 0.022	0.006 ± 0.003	< 0.013
Be-7	0.27 ± 0.155	0.61 ± 0.15	0.38 ± 0.11	< 0.10
K-40	9.26 ± 0.47	6.41 ± 0.33	3.97 ± 0.29	9.27 ± 0.35
Nb-95	< 0.013	< 0.015	< 0.007	< 0.010
Zr-95	< 0.018	< 0.023	< 0.016	< 0.021
Ru-103	< 0.009	< 0.017	< 0.008	< 0.008
Ru-106	< 0.070	< 0.103	< 0.059	< 0.075
Cs-134	< 0.013	< 0.013	< 0.008	< 0.008
Cs-137	< 0.009	< 0.014	< 0.010	< 0.008
Ce-141	< 0.019	< 0.028	< 0.018	< 0.022
Ce-144	< 0.063	< 0.117	< 0.056	< 0.061
	Indicator			
Location	K-5	K-34	K-38	K-39
Date Collected	01-04-17	01-03-17	01-03-17	01-03-17
Lab Code	KCF- 77	KCF- 78	KCF- 80	KCF- 81
Type	Hay	Hay	Hay	Hay
Gross beta	18.33 ± 0.38	5.52 ± 0.29	12.99 ± 0.34	14.38 ± 0.32
Sr-89	< 0.023	< 0.048	< 0.024	< 0.031
Sr-90	0.027 ± 0.013	< 0.030	< 0.016	< 0.018
Be-7	< 0.14	1.60 ± 0.23	< 0.07	0.67 ± 0.12
K-40	12.90 ± 0.57	4.14 ± 0.47	11.76 ± 0.31	10.31 ± 0.33
Nb-95	< 0.018	< 0.018	< 0.006	< 0.012
Zr-95	< 0.024	< 0.033	< 0.011	< 0.021
Ru-103	< 0.011	< 0.019	< 0.007	< 0.010
Ru-106	< 0.108	< 0.165	< 0.089	< 0.102
Cs-134	< 0.015	< 0.018	< 0.009	< 0.010
Cs-137	< 0.013	< 0.020	< 0.008	< 0.009
Ce-141	< 0.027	< 0.030	< 0.017	< 0.021
Ce-144	< 0.096	< 0.099	< 0.054	< 0.054

Table 21. Cattlefeed, analyses for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes (continued).

	Sample Description and Concentration (pCi/g wet)			
	Indicator			
Location	K-5	K-34	K-38	K-39
Date Collected	01-03-17	01-03-17	01-03-17	01-03-17
Lab Code	KCF- 83	KCF- 84	KCF- 86	KCF- 87
Type	Silage	Silage	Silage	Silage
Gross beta	11.68 ± 0.26	11.88 ± 0.25	7.30 ± 0.20	9.05 ± 0.21
Sr-89	< 0.021	< 0.022	< 0.025	< 0.020
Sr-90	0.012 ± 0.007	< 0.012	< 0.014	< 0.012
Be-7	< 0.10	1.52 ± 0.19	0.41 ± 0.09	0.25 ± 0.11
K-40	8.60 ± 0.40	9.92 ± 0.50	4.39 ± 0.25	7.77 ± 0.39
Nb-95	< 0.006	< 0.012	< 0.007	< 0.010
Zr-95	< 0.019	< 0.015	< 0.016	< 0.021
Ru-103	< 0.008	< 0.014	< 0.009	< 0.011
Ru-106	< 0.084	< 0.142	< 0.034	< 0.090
Cs-134	< 0.010	< 0.012	< 0.007	< 0.011
Cs-137	< 0.009	< 0.010	< 0.007	< 0.010
Ce-141	< 0.017	< 0.027	< 0.014	< 0.015
Ce-144	< 0.042	< 0.091	< 0.077	< 0.079

Table 22. Grass, analyses for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes.
Collection: Quarterly, April through December
Units: pCi/g wet

Sample Description and Concentration

	Indicator			
Location	K-1b	K-1f	K-5	K-34
Date Collected	06-01-17	06-01-17	06-01-17	06-01-17
Lab Code	KG- 2641	KG- 2642	KG- 2644	KG- 2645
Gross beta	7.93 ± 0.17	6.70 ± 0.13	6.55 ± 0.13	7.88 ± 0.15
Sr-89	< 0.010	< 0.008	< 0.006	< 0.008
Sr-90	< 0.005	< 0.003	< 0.003	< 0.004
Be-7	0.67 ± 0.25	0.50 ± 0.16	0.64 ± 0.14	0.69 ± 0.12
K-40	6.61 ± 0.56	5.40 ± 0.44	5.69 ± 0.38	5.30 ± 0.34
Mn-54	< 0.019	< 0.013	< 0.012	< 0.010
Co-58	< 0.017	< 0.008	< 0.009	< 0.008
Co-60	< 0.022	< 0.013	< 0.013	< 0.008
Nb-95	< 0.012	< 0.011	< 0.014	< 0.011
Zr-95	< 0.025	< 0.024	< 0.013	< 0.020
Ru-103	< 0.022	< 0.013	< 0.009	< 0.009
Ru-106	< 0.147	< 0.078	< 0.053	< 0.089
Cs-134	< 0.019	< 0.014	< 0.009	< 0.009
Cs-137	< 0.016	< 0.019	< 0.013	< 0.009
Ce-141	< 0.039	< 0.028	< 0.025	< 0.023
Ce-144	< 0.113	< 0.084	< 0.054	< 0.087

	Indicator		Control	
Location	K-38	K-39	K-3	K-35
Date Collected	06-01-17	06-01-17	06-01-17	06-01-17
Lab Code	KG- 2648	KG- 2649	KG- 2643	KG- 2646
Gross beta	9.83 ± 0.23	6.91 ± 0.13	7.86 ± 0.15	7.74 ± 0.14
Sr-89	< 0.014	< 0.008	< 0.008	< 0.008
Sr-90	< 0.007	< 0.004	< 0.004	< 0.004
Be-7	3.10 ± 0.21	0.82 ± 0.19	0.54 ± 0.12	1.02 ± 0.17
K-40	7.77 ± 0.36	5.43 ± 0.44	7.00 ± 0.39	7.51 ± 0.49
Mn-54	< 0.010	< 0.018	< 0.013	< 0.016
Co-58	< 0.011	< 0.011	< 0.008	< 0.013
Co-60	< 0.007	< 0.013	< 0.010	< 0.009
Nb-95	< 0.012	< 0.027	< 0.014	< 0.018
Zr-95	< 0.019	< 0.018	< 0.016	< 0.019
Ru-103	< 0.011	< 0.020	< 0.007	< 0.018
Ru-106	< 0.084	< 0.137	< 0.054	< 0.109
Cs-134	< 0.010	< 0.018	< 0.011	< 0.014
Cs-137	< 0.011	< 0.016	< 0.006	< 0.014
Ce-141	< 0.018	< 0.036	< 0.019	< 0.030
Ce-144	< 0.091	< 0.131	< 0.055	< 0.122

Table 22. Grass samples, analyses for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes (continued).

Sample Description and Concentration				
	Indicator			
Location	K-1b	K-1f	K-5	K-34
Date Collected	08-01-17	08-01-17	08-01-17	08-01-17
Lab Code	KG- 3878	KG- 3879	KG- 3881	KG- 3882
Gross beta	8.49 ± 0.29	13.33 ± 0.48	8.12 ± 0.27	6.06 ± 0.21
Sr-89	< 0.013	< 0.024	< 0.013	< 0.008
Sr-90	< 0.006	0.014 ± 0.006	< 0.006	< 0.004
Be-7	4.29 ± 0.36	6.72 ± 0.22	2.70 ± 0.11	2.21 ± 0.11
K-40	7.91 ± 0.62	12.27 ± 0.39	6.52 ± 0.20	5.01 ± 0.17
Mn-54	< 0.017	< 0.011	< 0.006	< 0.006
Co-58	< 0.017	< 0.008	< 0.005	< 0.006
Co-60	< 0.011	< 0.014	< 0.007	< 0.006
Nb-95	< 0.023	< 0.013	< 0.005	< 0.007
Zr-95	< 0.028	< 0.023	< 0.008	< 0.010
Ru-103	< 0.015	< 0.008	< 0.009	< 0.007
Ru-106	< 0.180	< 0.106	< 0.056	< 0.060
Cs-134	< 0.018	< 0.011	< 0.006	< 0.006
Cs-137	< 0.017	< 0.011	< 0.008	< 0.006
Ce-141	< 0.035	< 0.025	< 0.010	< 0.014
Ce-144	< 0.120	< 0.092	< 0.055	< 0.053
	Indicator		Control	
Location	K-38	K-39	K-3	K-35
Date Collected	08-01-17	08-01-17	08-01-17	08-01-17
Lab Code	KG- 3884	KG- 3885	KG- 3880	KG- 3883
Gross beta	5.69 ± 0.22	6.73 ± 0.23	8.73 ± 0.25	22.80 ± 0.70
Sr-89	< 0.011	< 0.010	< 0.008	< 0.027
Sr-90	< 0.004	< 0.005	< 0.004	< 0.013
Be-7	3.15 ± 0.33	3.31 ± 0.29	1.45 ± 0.25	6.52 ± 0.46
K-40	3.92 ± 0.48	5.41 ± 0.49	7.41 ± 0.54	19.05 ± 0.92
Mn-54	< 0.023	< 0.009	< 0.018	< 0.018
Co-58	< 0.015	< 0.017	< 0.017	< 0.023
Co-60	< 0.018	< 0.015	< 0.014	< 0.023
Nb-95	< 0.023	< 0.013	< 0.020	< 0.022
Zr-95	< 0.030	< 0.029	< 0.031	< 0.030
Ru-103	< 0.023	< 0.017	< 0.017	< 0.017
Ru-106	< 0.094	< 0.128	< 0.118	< 0.183
Cs-134	< 0.018	< 0.015	< 0.016	< 0.022
Cs-137	< 0.020	< 0.016	< 0.007	< 0.022
Ce-141	< 0.030	< 0.034	< 0.030	< 0.037
Ce-144	< 0.125	< 0.118	< 0.106	< 0.182

Table 22. Grass samples, analyses for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/g wet)				
	Indicator			
Location	K-1b	K-1f	K-5	K-34
Date Collected	10-02-17	10-02-17	10-02-17	10-02-17
Lab Code	KG- 5059	KG- 5061	KG- 5063	KG- 5064
Gross beta	9.04 ± 0.25	7.93 ± 0.21	16.77 ± 0.40	6.52 ± 0.18
Sr-89	< 0.053	< 0.025	< 0.044	< 0.025
Sr-90	< 0.040	0.034 ± 0.017	< 0.035	< 0.018
Be-7	7.50 ± 0.50	4.06 ± 0.40	4.80 ± 0.51	3.40 ± 0.30
K-40	8.58 ± 0.70	5.75 ± 0.66	12.46 ± 1.03	5.73 ± 0.49
Mn-54	< 0.018	< 0.022	< 0.031	< 0.011
Co-58	< 0.017	< 0.017	< 0.033	< 0.010
Co-60	< 0.019	< 0.021	< 0.018	< 0.013
Nb-95	< 0.017	< 0.018	< 0.022	< 0.019
Zr-95	< 0.024	< 0.033	< 0.055	< 0.025
Ru-103	< 0.022	< 0.025	< 0.035	< 0.016
Ru-106	< 0.129	< 0.171	< 0.272	< 0.146
Cs-134	< 0.024	< 0.023	< 0.033	< 0.017
Cs-137	< 0.030	< 0.026	< 0.038	< 0.015
Ce-141	< 0.049	< 0.040	< 0.044	< 0.037
Ce-144	< 0.156	< 0.122	< 0.168	< 0.094
	Indicator		Control	
Location	K-38	K-39	K-3	K-35
Date Collected	10-02-17	10-02-17	10-02-17	10-02-17
Lab Code	KG- 5066	KG- 5067	KG- 5062	KG- 5065
Gross beta	27.36 ± 1.02	9.43 ± 0.25	13.61 ± 0.30	31.96 ± 0.63
Sr-89	< 0.270	< 0.040	< 0.032	< 0.067
Sr-90	< 0.213	< 0.030	< 0.024	< 0.046
Be-7	6.36 ± 0.51	3.83 ± 0.16	2.33 ± 0.25	3.00 ± 0.19
K-40	10.81 ± 0.88	7.40 ± 0.28	10.93 ± 0.61	28.03 ± 0.64
Mn-54	< 0.020	< 0.010	< 0.016	< 0.018
Co-58	< 0.029	< 0.009	< 0.008	< 0.014
Co-60	< 0.023	< 0.011	< 0.007	< 0.017
Nb-95	< 0.038	< 0.006	< 0.019	< 0.023
Zr-95	< 0.050	< 0.016	< 0.025	< 0.034
Ru-103	< 0.029	< 0.007	< 0.018	< 0.017
Ru-106	< 0.210	< 0.080	< 0.109	< 0.151
Cs-134	< 0.028	< 0.009	< 0.015	< 0.016
Cs-137	< 0.025	< 0.010	< 0.016	< 0.019
Ce-141	< 0.043	< 0.018	< 0.024	< 0.025
Ce-144	< 0.243	< 0.055	< 0.127	< 0.096

Table 23. Soil samples, analyses for gross alpha, gross beta, strontium-89, strontium-90, and gamma-emitting isotopes.

Collection: Semiannually

Sample Description and Concentration (pCi/g dry)

	Indicator	
Location	K-1f	K-5
Date Collected	05-01-17	05-01-17
Lab Code	KSO- 1963	KSO- 1965
Gross alpha	8.30 ± 2.96	9.83 ± 3.11
Gross beta	28.14 ± 3.02	26.92 ± 2.91
Sr-89	< 0.088	< 0.110
Sr-90	< 0.030	< 0.039
Be-7	< 0.16	< 0.19
K-40	17.70 ± 0.81	19.39 ± 0.88
Nb-95	< 0.037	< 0.039
Zr-95	< 0.040	< 0.048
Ru-103	< 0.020	< 0.023
Ru-106	< 0.161	< 0.136
Cs-134	< 0.020	< 0.016
Cs-137	0.14 ± 0.03	0.07 ± 0.02
Ce-141	< 0.067	< 0.084
Ce-144	< 0.097	< 0.107
Date Collected	10-02-17	10-02-17
Lab Code	KSO- 5086	KSO- 5088
Gross alpha	20.68 ± 1.53	11.17 ± 5.34
Gross beta	25.82 ± 1.51	33.83 ± 4.24
Sr-89	< 0.106	< 0.108
Sr-90	< 0.039	< 0.037
Be-7	< 0.19	< 0.17
K-40	18.38 ± 0.89	19.58 ± 0.85
Nb-95	< 0.028	< 0.028
Zr-95	< 0.048	< 0.043
Ru-103	< 0.024	< 0.021
Ru-106	< 0.154	< 0.141
Cs-134	< 0.016	< 0.015
Cs-137	0.06 ± 0.02	0.05 ± 0.02
Ce-141	< 0.069	< 0.043
Ce-144	< 0.098	< 0.096

Table 23. Soil samples, analyses for gross alpha, gross beta, strontium-89, strontium-90, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/g dry)

	Indicator		
Location	K-34	K-38	K-39
Date Collected	05-01-17	05-01-17	05-01-17
Lab Code	KSO- 1966	KSO- 1968	KSO- 1969
Gross alpha	8.91 ± 3.44	11.67 ± 3.40	9.16 ± 3.53
Gross beta	26.06 ± 3.06	28.71 ± 2.91	27.62 ± 3.19
Sr-89	< 0.095	< 0.118	< 0.240
Sr-90	< 0.036	0.062 ± 0.029	< 0.061
Be-7	< 0.19	< 0.20	< 0.15
K-40	20.05 ± 0.85	19.66 ± 0.83	19.45 ± 0.83
Nb-95	< 0.042	< 0.038	< 0.032
Zr-95	< 0.042	< 0.042	< 0.041
Ru-103	< 0.023	< 0.025	< 0.023
Ru-106	< 0.127	< 0.133	< 0.130
Cs-134	< 0.016	< 0.018	< 0.016
Cs-137	0.09 ± 0.03	0.11 ± 0.03	0.10 ± 0.02
Ce-141	< 0.082	< 0.079	< 0.070
Ce-144	< 0.095	< 0.103	< 0.098
Date Collected	10-02-17	10-02-17	10-02-17
Lab Code	KSO- 5089	KSO- 5091	KSO- 5092
Gross alpha	7.20 ± 3.90	6.68 ± 2.71	6.79 ± 3.16
Gross beta	26.98 ± 3.96	21.66 ± 2.78	27.96 ± 3.09
Sr-89	< 0.122	< 0.110	< 0.112
Sr-90	< 0.044	< 0.036	0.044 ± 0.024
Be-7	< 0.17	< 0.16	< 0.15
K-40	17.95 ± 0.85	15.90 ± 0.79	18.99 ± 0.78
Nb-95	< 0.033	< 0.027	< 0.028
Zr-95	< 0.038	< 0.045	< 0.035
Ru-103	< 0.021	< 0.021	< 0.020
Ru-106	< 0.139	< 0.144	< 0.142
Cs-134	< 0.017	< 0.018	< 0.015
Cs-137	0.08 ± 0.02	0.07 ± 0.02	0.06 ± 0.02
Ce-141	< 0.070	< 0.068	< 0.058
Ce-144	< 0.106	< 0.097	< 0.089

Table 23. Soil samples, analyses for gross alpha, gross beta, strontium-89, strontium-90, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/g dry)		
	Control	
Location	K-3	K-35
Date Collected	05-01-17	05-01-17
Lab Code	KSO- 1964	KSO- 1967
Gross alpha	6.89 ± 2.98	9.92 ± 4.09
Gross beta	23.83 ± 2.87	26.39 ± 3.01
Sr-89	< 0.128	< 0.078
Sr-90	< 0.046	< 0.031
Be-7	< 0.18	< 0.16
K-40	17.89 ± 0.81	16.43 ± 0.82
Nb-95	< 0.034	< 0.033
Zr-95	< 0.045	< 0.042
Ru-103	< 0.019	< 0.023
Ru-106	< 0.158	< 0.119
Cs-134	< 0.018	< 0.018
Cs-137	0.12 ± 0.03	0.06 ± 0.02
Ce-141	< 0.066	< 0.073
Ce-144	< 0.094	< 0.100
Date Collected	10-02-17	10-02-17
Lab Code	KSO- 5087	KSO- 5090
Gross alpha	23.04 ± 6.92	5.63 ± 1.65
Gross beta	34.10 ± 4.55	20.68 ± 1.53
Sr-89	< 0.150	< 0.104
Sr-90	< 0.050	< 0.036
Be-7	< 0.16	0.88 ± 0.30
K-40	18.12 ± 0.83	12.84 ± 0.78
Nb-95	< 0.026	< 0.036
Zr-95	< 0.039	< 0.040
Ru-103	< 0.022	< 0.020
Ru-106	< 0.144	< 0.128
Cs-134	< 0.017	< 0.022
Cs-137	0.12 ± 0.02	0.10 ± 0.02
Ce-141	< 0.043	< 0.069
Ce-144	< 0.105	< 0.106

Table 24. Surface water samples, analyses for gross beta, potassium-40 and gamma-emitting isotopes.
Collection: Monthly

Sample Description and Concentration (pCi/L)			
Indicator			
K-1a			
Date Collected	01-03-17	02-01-17	03-01-17
Lab Code	KSW- 53	KSW- 378	KSW- 825
Gross beta			
Suspended Solids	< 0.7	< 0.7	2.5 ± 0.6
Dissolved Solids	11.6 ± 1.4	4.6 ± 1.0	5.4 ± 1.0
Total Residue	11.6 ± 1.4	4.6 ± 1.0	7.9 ± 1.2
K-40 (ICP)	5.19	5.47	6.98
Mn-54	< 3.5	< 3.4	< 2.6
Fe-59	< 3.4	< 3.6	< 5.2
Co-58	< 2.4	< 1.6	< 2.0
Co-60	< 1.9	< 2.8	< 2.4
Zn-65	< 4.6	< 3.1	< 3.1
Zr-Nb-95	< 3.6	< 4.6	< 2.3
Cs-134	< 3.0	< 3.4	< 3.4
Cs-137	< 3.0	< 3.3	< 3.7
Ba-La-140	< 4.1	< 3.2	< 3.5
K-1b			
Date Collected	01-03-17	02-01-17	03-01-17
Lab Code	KSW- 54	KSW- 379	KSW- 826
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.9
Dissolved Solids	5.0 ± 0.9	4.0 ± 0.8	3.5 ± 0.5
Total Residue	5.0 ± 0.9	4.0 ± 0.8	3.5 ± 0.5
K-40 (ICP)	5.30	3.19	5.17
Mn-54	< 1.7	< 2.6	< 2.1
Fe-59	< 4.9	< 4.2	< 5.4
Co-58	< 2.0	< 3.1	< 2.1
Co-60	< 1.9	< 2.1	< 2.2
Zn-65	< 5.1	< 1.6	< 4.6
Zr-Nb-95	< 4.5	< 3.0	< 3.7
Cs-134	< 2.4	< 3.2	< 3.5
Cs-137	< 2.5	< 3.1	< 2.3
Ba-La-140	< 5.0	< 2.3	< 5.1

Table 24. Surface water samples, analyses for gross beta, potassium-40, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Indicator			
K-1a			
Date Collected	04-03-17	05-01-17	06-01-17
Lab Code	KSW- 1338	KSW- 1918	KSW- 2613
Gross beta			
Suspended Solids	0.8 ± 0.4	0.9 ± 0.4	< 0.7
Dissolved Solids	4.7 ± 1.0	7.4 ± 1.1	3.2 ± 0.9
Total Residue	5.5 ± 1.1	8.3 ± 1.2	3.2 ± 0.9
K-40 (ICP)	4.65	5.66	4.49
Mn-54	< 1.8	< 5.6	< 1.9
Fe-59	< 2.6	< 4.6	< 3.6
Co-58	< 2.6	< 3.5	< 2.8
Co-60	< 2.3	< 4.7	< 2.1
Zn-65	< 2.8	< 4.8	< 7.0
Zr-Nb-95	< 1.6	< 4.2	< 3.0
Cs-134	< 2.4	< 5.1	< 3.0
Cs-137	< 2.8	< 5.5	< 3.6
Ba-La-140	< 1.9	< 5.2	< 1.4
K-1b			
Date Collected	04-03-17	05-01-17	06-01-17
Lab Code	KSW- 1339	KSW- 1919	KSW- 2614
Gross beta			
Suspended Solids	< 0.7	< 0.8	< 0.8
Dissolved Solids	4.2 ± 0.9	5.9 ± 0.9	3.2 ± 0.8
Total Residue	4.2 ± 0.9	5.9 ± 0.9	3.2 ± 0.8
K-40 (ICP)	2.58	3.59	1.92
Mn-54	< 3.6	< 2.4	< 2.5
Fe-59	< 6.6	< 6.1	< 3.4
Co-58	< 1.9	< 2.4	< 1.6
Co-60	< 2.8	< 2.8	< 2.0
Zn-65	< 3.4	< 3.6	< 3.9
Zr-Nb-95	< 3.2	< 2.2	< 2.3
Cs-134	< 3.8	< 3.7	< 2.7
Cs-137	< 3.1	< 2.5	< 2.8
Ba-La-140	< 1.5	< 4.3	< 3.0

Table 24. Surface water samples, analyses for gross beta, potassium-40, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Indicator			
K-1a			
Date Collected	07-05-17	08-01-17	09-06-17
Lab Code	KSW- 3224	KSW- 3869	KSW- 4563
Gross beta			
Suspended Solids	< 0.8	< 0.3	< 0.7
Dissolved Solids	4.2 ± 1.0	8.2 ± 1.3	11.3 ± 1.4
Total Residue	4.2 ± 1.0	8.2 ± 1.3	11.3 ± 1.4
K-40 (ICP)	5.58	10.74	11.89
Mn-54	< 5.0	< 2.9	< 3.3
Fe-59	< 10.2	< 5.4	< 5.3
Co-58	< 3.9	< 2.5	< 1.3
Co-60	< 5.8	< 3.3	< 2.2
Zn-65	< 8.6	< 6.6	< 5.1
Zr-Nb-95	< 5.6	< 4.5	< 3.6
Cs-134	< 5.3	< 3.1	< 3.2
Cs-137	< 5.5	< 3.0	< 3.3
Ba-La-140	< 9.2	< 3.2	< 2.4
K-1b			
Date Collected	07-05-17	08-01-17	09-06-17
Lab Code	KSW- 3225	KSW- 3870	KSW- 4564
Gross beta			
Suspended Solids	< 0.7	1.0 ± 0.2	< 0.8
Dissolved Solids	2.1 ± 0.7	2.7 ± 0.7	3.2 ± 0.7
Total Residue	2.1 ± 0.7	3.7 ± 0.7	3.2 ± 0.7
K-40 (ICP)	2.87	2.67	2.69
Mn-54	< 3.7	< 2.1	< 2.4
Fe-59	< 4.3	< 3.5	< 2.4
Co-58	< 4.7	< 2.5	< 1.7
Co-60	< 4.3	< 1.9	< 2.0
Zn-65	< 4.5	< 5.0	< 3.2
Zr-Nb-95	< 4.7	< 3.1	< 3.5
Cs-134	< 4.8	< 2.6	< 3.0
Cs-137	< 3.8	< 2.7	< 2.8
Ba-La-140	< 7.4	< 4.4	< 2.9

Table 24. Surface water samples, analyses for gross beta, potassium-40, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Indicator			
K-1a			
Date Collected	10-02-17	11-01-17	12-04-17
Lab Code	KSW- 5040	KSW- 5781	KSW- 6296
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	10.5 ± 1.4	16.1 ± 1.6	29.1 ± 2.1
Total Residue	10.5 ± 1.4	16.1 ± 1.6	29.1 ± 2.1
K-40 (ICP)	9.68	14.02	27.22
Mn-54	< 3.4	< 2.5	< 2.1
Fe-59	< 7.6	< 2.6	< 4.2
Co-58	< 2.7	< 3.1	< 2.5
Co-60	< 2.7	< 1.4	< 3.3
Zn-65	< 3.1	< 5.4	< 4.0
Zr-Nb-95	< 4.2	< 2.5	< 3.2
Cs-134	< 4.0	< 3.0	< 2.5
Cs-137	< 3.9	< 2.7	< 2.5
Ba-La-140	< 5.2	< 3.8	< 1.3
K-1b			
Date Collected	10-02-17	11-01-17	12-04-17
Lab Code	KSW- 5041	KSW- 5782	KSW- 6297
Gross beta			
Suspended Solids	< 0.8	0.8 ± 0.4	< 0.8
Dissolved Solids	3.5 ± 0.8	2.9 ± 0.7	3.1 ± 0.7
Total Residue	3.5 ± 0.8	3.7 ± 0.8	3.1 ± 0.7
K-40 (ICP)	2.38	2.54	2.37
Mn-54	< 2.0	< 4.8	< 2.5
Fe-59	< 2.6	< 9.8	< 4.7
Co-58	< 2.1	< 6.0	< 3.9
Co-60	< 1.7	< 3.9	< 4.2
Zn-65	< 2.2	< 17.0	< 6.0
Zr-Nb-95	< 3.2	< 8.1	< 3.9
Cs-134	< 2.4	< 6.8	< 3.9
Cs-137	< 3.0	< 6.3	< 2.8
Ba-La-140	< 5.0	< 2.3	< 3.0

Table 24. Surface water samples, analyses for gross beta, potassium-40 and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Indicator			
K-1d			
Date Collected	01-03-17	02-01-17	03-01-17
Lab Code	KSW- 55	KSW- 380	KSW- 827
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	2.4 ± 0.5	1.5 ± 0.4	1.8 ± 0.5
Total Residue	2.4 ± 0.5	1.5 ± 0.4	1.8 ± 0.5
K-40 (ICP)	1.25	1.34	1.64
Mn-54	< 1.9	< 6.3	< 2.5
Fe-59	< 4.5	< 7.4	< 4.7
Co-58	< 2.4	< 4.9	< 3.0
Co-60	< 2.8	< 4.5	< 2.3
Zn-65	< 8.3	< 5.4	< 3.6
Zr-Nb-95	< 3.7	< 6.6	< 2.9
Cs-134	< 3.2	< 5.7	< 2.8
Cs-137	< 2.7	< 5.4	< 2.1
Ba-La-140	< 4.7	< 4.5	< 2.3
K-1e			
Date Collected	01-03-17	02-01-17	03-01-17
Lab Code	KSW- 56	KSW- 381	KSW- 828
Gross beta			
Suspended Solids	< 0.8	< 0.7	1.3 ± 0.4
Dissolved Solids	4.6 ± 1.0	2.6 ± 0.9	2.5 ± 0.8
Total Residue	4.6 ± 1.0	2.6 ± 0.9	3.8 ± 0.9
K-40 (ICP)	2.28	2.40	3.00
Mn-54	< 1.6	< 2.0	< 2.9
Fe-59	< 3.4	< 4.5	< 5.1
Co-58	< 2.1	< 2.2	< 1.3
Co-60	< 1.1	< 2.5	< 1.9
Zn-65	< 2.3	< 5.1	< 3.8
Zr-Nb-95	< 4.0	< 1.7	< 3.6
Cs-134	< 3.3	< 2.9	< 2.9
Cs-137	< 3.3	< 3.1	< 3.0
Ba-La-140	< 5.4	< 2.3	< 2.9

Table 24. Surface water samples, analyses for gross beta, potassium-40, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Indicator			
K-1d			
Date Collected	04-03-17	05-01-17	06-01-17
Lab Code	KSW- 1340	KSW- 1920	KSW- 2615
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	2.1 ± 0.5	3.7 ± 0.6	1.6 ± 0.4
Total Residue	2.1 ± 0.5	3.7 ± 0.6	1.6 ± 0.4
K-40 (ICP)	1.51	1.71	1.14
Mn-54	< 1.8	< 3.8	< 1.7
Fe-59	< 6.6	< 2.7	< 3.5
Co-58	< 2.0	< 3.2	< 0.9
Co-60	< 1.5	< 1.6	< 2.4
Zn-65	< 6.3	< 2.5	< 4.0
Zr-Nb-95	< 2.3	< 3.9	< 2.7
Cs-134	< 2.8	< 3.3	< 2.8
Cs-137	< 2.3	< 2.7	< 1.9
Ba-La-140	< 5.4	< 3.0	< 2.4
K-1e			
Date Collected	04-03-17	05-01-17	06-01-17
Lab Code	KSW- 1341	KSW- 1921	KSW- 2616
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	2.7 ± 0.9	4.1 ± 0.9	5.4 ± 1.2
Total Residue	2.7 ± 0.9	4.1 ± 0.9	5.4 ± 1.2
K-40 (ICP)	1.89	2.29	2.06
Mn-54	< 2.4	< 2.3	< 3.0
Fe-59	< 5.4	< 6.9	< 2.5
Co-58	< 2.6	< 1.7	< 2.8
Co-60	< 2.9	< 1.2	< 2.2
Zn-65	< 5.6	< 4.3	< 2.8
Zr-Nb-95	< 2.7	< 2.3	< 2.6
Cs-134	< 2.4	< 3.2	< 2.5
Cs-137	< 3.0	< 3.2	< 1.4
Ba-La-140	< 4.1	< 2.4	< 3.5

Table 24. Surface water samples, analyses for gross beta, potassium-40, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Indicator			
K-1d			
Date Collected	07-05-17	08-01-17	09-06-17
Lab Code	KSW- 3226	KSW- 3871	KSW- 4565
Gross beta			
Suspended Solids	< 0.8	< 0.3	< 0.7
Dissolved Solids	1.4 ± 0.4	0.8 ± 0.4	1.8 ± 0.4
Total Residue	1.4 ± 0.4	0.8 ± 0.4	1.8 ± 0.4
K-40 (ICP)	1.27	1.21	1.32
Mn-54	< 2.5	< 1.0	< 2.3
Fe-59	< 7.0	< 3.8	< 3.7
Co-58	< 2.4	< 1.8	< 2.1
Co-60	< 2.6	< 1.3	< 1.8
Zn-65	< 5.9	< 2.8	< 3.2
Zr-Nb-95	< 3.4	< 3.1	< 2.4
Cs-134	< 2.9	< 1.6	< 2.8
Cs-137	< 3.2	< 1.7	< 1.8
Ba-La-140	< 5.5	< 7.8	< 1.7
K-1e			
Date Collected	07-05-17	08-01-17	09-06-17
Lab Code	KSW- 3227	KSW- 3872	KSW- 4566
Gross beta			
Suspended Solids	< 0.7	< 0.3	< 0.7
Dissolved Solids	3.6 ± 1.0	2.2 ± 0.8	2.1 ± 0.8
Total Residue	3.6 ± 1.0	2.2 ± 0.8	2.1 ± 0.8
K-40 (ICP)	2.30	3.10	2.95
Mn-54	< 1.6	< 1.6	< 1.4
Fe-59	< 5.1	< 3.7	< 3.7
Co-58	< 2.5	< 1.7	< 1.8
Co-60	< 1.6	< 1.4	< 1.9
Zn-65	< 3.3	< 3.4	< 2.8
Zr-Nb-95	< 3.0	< 2.7	< 2.0
Cs-134	< 3.3	< 1.5	< 3.1
Cs-137	< 3.0	< 1.8	< 3.0
Ba-La-140	< 6.0	< 7.4	< 2.6

Table 24. Surface water samples, analyses for gross beta, potassium-40, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Indicator			
K-1d			
Date Collected	10-02-17	11-01-17	12-04-17
Lab Code	KSW- 5042	KSW- 5783	KSW- 6298
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	3.2 ± 0.6	1.5 ± 0.4	1.6 ± 0.5
Total Residue	3.2 ± 0.6	1.5 ± 0.4	1.6 ± 0.5
K-40 (ICP)	1.30	1.15	1.18
Mn-54	< 4.3	< 2.6	< 3.1
Fe-59	< 5.2	< 2.1	< 6.5
Co-58	< 3.7	< 1.6	< 2.7
Co-60	< 2.2	< 1.8	< 2.8
Zn-65	< 3.7	< 3.5	< 5.3
Zr-Nb-95	< 5.1	< 3.3	< 3.9
Cs-134	< 3.9	< 3.0	< 3.3
Cs-137	< 3.7	< 1.9	< 2.5
Ba-La-140	< 5.6	< 2.9	< 2.2
K-1e			
Date Collected	10-02-17	11-01-17	12-04-17
Lab Code	KSW- 5043	KSW- 5784	KSW- 6299
Gross beta			
Suspended Solids	< 0.7	< 0.8	< 0.8
Dissolved Solids	3.2 ± 0.9	3.0 ± 0.9	5.9 ± 1.1
Total Residue	3.2 ± 0.9	3.0 ± 0.9	5.9 ± 1.1
K-40 (ICP)	2.15	2.69	2.82
Mn-54	< 2.4	< 3.0	< 2.0
Fe-59	< 5.6	< 4.9	< 4.0
Co-58	< 1.5	< 1.9	< 2.1
Co-60	< 2.5	< 1.3	< 2.6
Zn-65	< 4.2	< 4.3	< 4.9
Zr-Nb-95	< 3.3	< 2.5	< 2.0
Cs-134	< 2.9	< 3.4	< 3.0
Cs-137	< 2.8	< 2.9	< 3.7
Ba-La-140	< 3.7	< 3.1	< 2.3

Table 24. Surface water samples, analyses for gross beta, potassium-40 and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Indicator			
K-1k			
Date Collected	01-03-17	02-01-17	03-01-17
Lab Code	KSW- 57	KSW- 382	KSW- 829
Gross beta			
Suspended Solids	< 0.7	< 1.0	< 0.7
Dissolved Solids	18.1 ± 1.5	6.9 ± 1.1	5.0 ± 1.0
Total Residue	18.1 ± 1.5	6.9 ± 1.1	5.0 ± 1.0
K-40 (ICP)	9.59	7.62	4.85
Mn-54	< 1.9	< 1.8	< 2.0
Fe-59	< 4.8	< 5.0	< 3.1
Co-58	< 3.0	< 2.3	< 2.3
Co-60	< 2.4	< 1.3	< 1.7
Zn-65	< 3.3	< 4.0	< 2.1
Zr-Nb-95	< 2.4	< 2.1	< 1.9
Cs-134	< 2.8	< 3.0	< 3.0
Cs-137	< 2.7	< 3.6	< 3.0
Ba-La-140	< 5.3	< 1.2	< 3.8
Date Collected	04-03-17	05-01-17	06-01-17
Lab Code	KSW- 1342	KSW- 1922	KSW- 2617
Gross beta			
Suspended Solids	< 0.6	< 0.8	< 0.8
Dissolved Solids	6.1 ± 1.1	2.0 ± 0.8	4.9 ± 1.0
Total Residue	6.1 ± 1.1	2.0 ± 0.8	4.9 ± 1.0
K-40 (ICP)	5.40	2.70	6.42
Mn-54	< 3.2	< 2.0	< 2.9
Fe-59	< 4.9	< 6.0	< 3.6
Co-58	< 2.5	< 1.9	< 2.0
Co-60	< 2.5	< 1.9	< 2.4
Zn-65	< 2.2	< 2.1	< 3.7
Zr-Nb-95	< 3.9	< 3.6	< 3.0
Cs-134	< 3.4	< 2.9	< 2.8
Cs-137	< 3.9	< 3.2	< 2.8
Ba-La-140	< 6.3	< 2.5	< 1.7

Table 24. Surface water samples, analyses for gross beta, potassium-40, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Indicator			
K-1k			
Date Collected	07-05-17	08-01-17	09-06-17
Lab Code	KSW- 3228	KSW- 3873	KSW- 4567
Gross beta			
Suspended Solids	< 0.6	< 0.3	< 0.8
Dissolved Solids	2.2 ± 0.8	< 1.2	4.4 ± 1.0
Total Residue	2.2 ± 0.8	< 1.2	4.4 ± 1.0
K-40 (ICP)	2.42	0.28	3.05
Mn-54	< 2.0	< 1.5	< 3.3
Fe-59	< 3.2	< 4.1	< 5.6
Co-58	< 2.2	< 1.6	< 2.2
Co-60	< 1.8	< 0.9	< 2.6
Zn-65	< 4.1	< 2.1	< 3.6
Zr-Nb-95	< 3.7	< 2.6	< 4.5
Cs-134	< 3.3	< 1.3	< 4.0
Cs-137	< 1.9	< 1.3	< 4.4
Ba-La-140	< 7.0	< 6.8	< 3.5
Date Collected	10-02-17	11-01-17	12-04-17
Lab Code	KSW- 5044	KSW- 5785	KSW- 6300
Gross beta			
Suspended Solids	< 0.8	< 0.7	< 0.7
Dissolved Solids	11.8 ± 1.4	5.1 ± 1.0	4.7 ± 1.0
Total Residue	11.8 ± 1.4	5.1 ± 1.0	4.7 ± 1.0
K-40 (ICP)	4.29	4.17	3.23
Mn-54	< 2.1	< 3.1	< 3.1
Fe-59	< 4.2	< 4.4	< 4.1
Co-58	< 2.6	< 2.9	< 2.0
Co-60	< 1.3	< 1.8	< 3.0
Zn-65	< 2.4	< 2.2	< 6.4
Zr-Nb-95	< 2.5	< 1.9	< 3.2
Cs-134	< 2.6	< 2.9	< 3.1
Cs-137	< 2.5	< 2.7	< 3.1
Ba-La-140	< 4.1	< 3.4	< 3.6

Table 24. Surface water samples, analyses for gross beta, potassium-40 and gamma-emitting isotopes.
Collection: Monthly

Sample Description and Concentration (pCi/L)			
Control			
K-9 (Raw)			
Date Collected	01-03-17	02-01-17	03-01-17
Lab Code	KSW- 58	KSW- 383	KSW- 830
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.8
Dissolved Solids	1.4 ± 0.4	1.4 ± 0.4	1.0 ± 0.4
Total Residue	1.4 ± 0.4	1.4 ± 0.4	1.0 ± 0.4
K-40 (ICP)	1.16	1.18	1.20
Mn-54	< 1.8	< 4.3	< 2.2
Fe-59	< 5.5	< 4.7	< 4.8
Co-58	< 1.8	< 2.4	< 3.0
Co-60	< 1.9	< 3.2	< 2.8
Zn-65	< 2.1	< 4.3	< 3.3
Zr-Nb-95	< 3.1	< 3.2	< 3.0
Cs-134	< 2.2	< 4.0	< 3.8
Cs-137	< 2.5	< 4.0	< 2.7
Ba-La-140	< 3.5	< 3.9	< 3.7
K-9 (Tap)			
Date Collected	01-03-17	02-01-17	03-01-17
Lab Code	KSW- 59	KSW- 384	KSW- 831
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	0.9 ± 0.4	2.4 ± 0.7	1.0 ± 0.4
Total Residue	0.9 ± 0.4	2.4 ± 0.7	1.0 ± 0.4
K-40 (ICP)	1.21	1.19	1.17
Mn-54	< 1.9	< 2.0	< 2.1
Fe-59	< 6.5	< 6.7	< 4.5
Co-58	< 1.4	< 2.7	< 2.6
Co-60	< 2.5	< 3.9	< 2.6
Zn-65	< 3.2	< 6.2	< 4.2
Zr-Nb-95	< 3.2	< 3.8	< 2.4
Cs-134	< 2.5	< 3.9	< 3.3
Cs-137	< 2.9	< 2.9	< 3.3
Ba-La-140	< 4.4	< 3.4	< 3.1

Table 24. Surface water samples, analyses for gross beta, potassium-40, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Control			
K-9 (Raw)			
Date Collected	04-03-17	05-01-17	06-01-17
Lab Code	KSW- 1343	KSW- 1923	KSW- 2618
Gross beta			
Suspended Solids	< 0.8	< 0.6	< 0.6
Dissolved Solids	1.4 ± 0.4	3.1 ± 0.6	1.1 ± 0.2
Total Residue	1.4 ± 0.4	3.1 ± 0.6	1.1 ± 0.2
K-40 (ICP)	1.16	1.15	1.10
Mn-54	< 2.9	< 2.4	< 3.7
Fe-59	< 3.4	< 5.5	< 7.2
Co-58	< 2.9	< 1.6	< 3.0
Co-60	< 3.1	< 2.7	< 2.7
Zn-65	< 2.7	< 7.1	< 4.4
Zr-Nb-95	< 3.1	< 3.4	< 4.4
Cs-134	< 3.1	< 3.4	< 4.3
Cs-137	< 2.5	< 3.9	< 3.7
Ba-La-140	< 3.5	< 4.2	< 3.8
K-9 (Tap)			
Date Collected	04-03-17	05-01-17	06-01-17
Lab Code	KSW- 1344	KSW- 1924	KSW- 2619
Gross beta			
Suspended Solids	< 0.7	< 0.8	< 0.8
Dissolved Solids	1.5 ± 0.4	1.4 ± 0.4	1.4 ± 0.4
Total Residue	1.5 ± 0.4	1.4 ± 0.4	1.4 ± 0.4
K-40 (ICP)	1.23	1.16	1.09
Mn-54	< 2.9	< 3.0	< 2.4
Fe-59	< 5.0	< 4.9	< 3.7
Co-58	< 2.8	< 1.9	< 2.9
Co-60	< 2.5	< 2.5	< 2.0
Zn-65	< 3.2	< 2.3	< 5.1
Zr-Nb-95	< 3.2	< 3.2	< 1.8
Cs-134	< 2.9	< 3.2	< 3.2
Cs-137	< 2.8	< 2.4	< 3.1
Ba-La-140	< 2.3	< 4.0	< 1.7

Table 24. Surface water samples, analyses for gross beta, potassium-40, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Control			
K-9 (Raw)			
Date Collected	07-05-17	08-01-17	09-06-17
Lab Code	KSW- 3229	KSW- 3874	KSW- 4568
Gross beta			
Suspended Solids	< 0.8	< 0.4	< 0.6
Dissolved Solids	0.7 ± 0.4	1.0 ± 0.4	1.0 ± 0.4
Total Residue	0.7 ± 0.4	1.0 ± 0.4	1.0 ± 0.4
K-40 (ICP)	1.17	1.15	1.41
Mn-54	< 4.8	< 1.2	< 2.8
Fe-59	< 8.5	< 2.1	< 4.4
Co-58	< 5.8	< 1.7	< 1.4
Co-60	< 6.2	< 1.2	< 1.9
Zn-65	< 4.1	< 2.2	< 2.1
Zr-Nb-95	< 6.5	< 2.0	< 2.3
Cs-134	< 5.2	< 1.1	< 3.5
Cs-137	< 6.1	< 1.1	< 2.5
Ba-La-140	< 11.5	< 4.6	< 3.6
K-9 (Tap)			
Date Collected	07-05-17	08-01-17	09-06-17
Lab Code	KSW- 3230	KSW- 3875	KSW- 4569
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	0.9 ± 0.4	0.8 ± 0.4	0.8 ± 0.4
Total Residue	0.9 ± 0.4	0.8 ± 0.4	0.8 ± 0.4
K-40 (ICP)	1.18	1.18	1.44
Mn-54	< 2.9	< 1.1	< 2.3
Fe-59	< 11.5	< 2.9	< 1.7
Co-58	< 4.0	< 1.0	< 1.2
Co-60	< 3.2	< 0.9	< 1.7
Zn-65	< 5.4	< 1.7	< 4.0
Zr-Nb-95	< 2.9	< 1.8	< 3.0
Cs-134	< 4.2	< 1.1	< 2.8
Cs-137	< 4.2	< 1.0	< 2.4
Ba-La-140	< 3.1	< 5.9	< 3.1

Table 24. Surface water samples, analyses for gross beta, potassium-40, and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Control			
K-9 (Raw)			
Date Collected	10-02-17	11-01-17	12-04-17
Lab Code	KSW- 5045	KSW- 5786	KSW- 6301
Gross beta			
Suspended Solids	< 0.7	< 0.6	< 0.6
Dissolved Solids	3.6 ± 0.6	1.7 ± 0.6	1.6 ± 0.4
Total Residue	3.6 ± 0.6	1.7 ± 0.6	1.6 ± 0.4
K-40 (ICP)	1.19	1.08	1.16
Mn-54	< 2.8	< 2.0	< 1.3
Fe-59	< 5.2	< 2.1	< 2.9
Co-58	< 3.1	< 2.8	< 2.7
Co-60	< 2.8	< 1.0	< 2.3
Zn-65	< 3.7	< 3.3	< 3.4
Zr-Nb-95	< 3.9	< 2.5	< 3.3
Cs-134	< 3.6	< 2.9	< 3.0
Cs-137	< 3.8	< 2.7	< 2.8
Ba-La-140	< 4.4	< 3.1	< 2.5
K-9 (Tap)			
Date Collected	10-02-17	11-01-17	12-04-17
Lab Code	KSW- 5046	KSW- 5787	KSW- 6302
Gross beta			
Suspended Solids	< 0.8	< 0.8	< 0.8
Dissolved Solids	1.9 ± 0.5	0.9 ± 0.4	1.4 ± 0.4
Total Residue	1.9 ± 0.5	0.9 ± 0.4	1.4 ± 0.4
K-40 (ICP)	1.17	1.10	1.16
Mn-54	< 3.4	< 2.0	< 2.6
Fe-59	< 5.3	< 3.8	< 3.8
Co-58	< 1.9	< 2.9	< 2.1
Co-60	< 2.6	< 2.0	< 1.9
Zn-65	< 3.1	< 2.8	< 1.6
Zr-Nb-95	< 3.6	< 2.9	< 2.5
Cs-134	< 3.4	< 2.6	< 2.6
Cs-137	< 3.6	< 2.5	< 2.9
Ba-La-140	< 3.7	< 2.8	< 2.5

Table 24. Surface water, analyses for gross beta, potassium-40 and gamma-emitting isotopes (continued).

Indicator	Sample Description and Concentration (pCi/L)		
K-14a			
Date Collected	01-03-17	02-01-17	03-01-17
Lab Code	KSW- 60	KSW- 385	KSW- 832
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	1.7 ± 0.5	3.3 ± 0.8	2.9 ± 0.6
Total Residue	1.7 ± 0.5	3.3 ± 0.8	2.9 ± 0.6
K-40 (ICP)	1.34	1.96	1.99
Mn-54	< 2.5	< 2.6	< 4.0
Fe-59	< 5.9	< 4.6	< 5.8
Co-58	< 2.0	< 2.4	< 3.4
Co-60	< 1.3	< 2.1	< 1.9
Zn-65	< 3.9	< 3.1	< 3.9
Zr-Nb-95	< 3.3	< 2.0	< 3.2
Cs-134	< 2.7	< 3.2	< 3.7
Cs-137	< 1.7	< 2.6	< 3.3
Ba-La-140	< 4.8	< 2.6	< 3.8
K-14b			
Date Collected	01-03-17	02-01-17	03-01-17
Lab Code	KSW- 61	KSW- 386	KSW- 833
Gross beta			
Suspended Solids	< 0.8	< 0.7	< 0.7
Dissolved Solids	1.7 ± 0.4	3.0 ± 0.8	3.3 ± 0.6
Total Residue	1.7 ± 0.4	3.0 ± 0.8	3.3 ± 0.6
K-40 (ICP)	1.32	1.96	2.16
Mn-54	< 2.1	< 1.4	< 3.4
Fe-59	< 3.0	< 5.3	< 8.2
Co-58	< 1.8	< 2.3	< 2.1
Co-60	< 1.9	< 2.4	< 3.2
Zn-65	< 3.5	< 2.1	< 3.4
Zr-Nb-95	< 3.2	< 1.8	< 3.8
Cs-134	< 2.3	< 2.8	< 3.4
Cs-137	< 2.4	< 2.6	< 4.0
Ba-La-140	< 5.8	< 3.5	< 5.2

Table 24. Surface water, analyses for gross beta, potassium-40 and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Indicator			
K-14a			
Date Collected	04-03-17	05-01-17	06-01-17
Lab Code	KSW- 1345	KSW- 1925	KSW- 2620
Gross beta			
Suspended Solids	< 0.8	0.9 ± 0.4	< 0.7
Dissolved Solids	2.3 ± 0.5	1.6 ± 0.4	1.3 ± 0.4
Total Residue	2.3 ± 0.5	2.5 ± 0.6	1.3 ± 0.4
K-40 (ICP)	1.71	1.50	1.13
Mn-54	< 2.9	< 2.0	< 4.2
Fe-59	< 2.6	< 6.6	< 6.1
Co-58	< 3.4	< 2.0	< 3.5
Co-60	< 1.9	< 1.8	< 3.3
Zn-65	< 4.8	< 5.2	< 4.0
Zr-Nb-95	< 2.6	< 3.2	< 4.7
Cs-134	< 2.5	< 2.7	< 4.0
Cs-137	< 3.1	< 2.4	< 3.5
Ba-La-140	< 4.6	< 4.4	< 2.0
K-14b			
Date Collected	04-03-17	05-01-17	06-01-17
Lab Code	KSW- 1346	KSW- 1926	KSW- 2621
Gross beta			
Suspended Solids	< 0.7	< 0.8	< 0.8
Dissolved Solids	3.1 ± 0.6	2.4 ± 0.5	1.0 ± 0.4
Total Residue	3.1 ± 0.6	2.4 ± 0.5	1.0 ± 0.4
K-40 (ICP)	1.66	1.54	1.14
Mn-54	< 2.3	< 2.7	< 2.6
Fe-59	< 7.0	< 6.4	< 7.9
Co-58	< 3.6	< 2.5	< 2.0
Co-60	< 3.0	< 2.0	< 2.9
Zn-65	< 4.6	< 2.6	< 4.5
Zr-Nb-95	< 2.9	< 3.9	< 4.4
Cs-134	< 3.3	< 2.8	< 3.6
Cs-137	< 2.0	< 2.4	< 2.5
Ba-La-140	< 3.7	< 3.3	< 3.4

Table 24. Surface water, analyses for gross beta, potassium-40 and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Indicator			
K-14a			
Date Collected	07-05-17	08-01-17	09-06-17
Lab Code	KSW- 3231	KSW- 3876	KSW- 4570
Gross beta			
Suspended Solids	< 0.8	< 0.7	< 0.8
Dissolved Solids	0.9 ± 0.4	0.9 ± 0.4	1.8 ± 0.5
Total Residue	0.9 ± 0.4	0.9 ± 0.4	1.8 ± 0.5
K-40 (ICP)	1.30	1.19	1.56
Mn-54	< 2.0	< 0.7	< 2.8
Fe-59	< 3.6	< 2.2	< 6.6
Co-58	< 2.0	< 1.2	< 2.5
Co-60	< 2.1	< 1.1	< 2.3
Zn-65	< 3.0	< 2.3	< 3.7
Zr-Nb-95	< 3.0	< 1.6	< 2.2
Cs-134	< 2.5	< 1.1	< 2.9
Cs-137	< 1.8	< 1.0	< 2.8
Ba-La-140	< 3.5	< 6.9	< 2.0
K-14b			
Date Collected	07-05-17	08-01-17	09-06-17
Lab Code	KSW- 3232	KSW- 3877	KSW- 4571
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	1.2 ± 0.4	1.1 ± 0.4	1.0 ± 0.4
Total Residue	1.2 ± 0.4	1.1 ± 0.4	1.0 ± 0.4
K-40 (ICP)	1.25	1.19	1.55
Mn-54	< 2.8	< 1.1	< 1.9
Fe-59	< 3.7	< 3.2	< 2.9
Co-58	< 2.4	< 1.0	< 2.8
Co-60	< 1.5	< 0.9	< 1.0
Zn-65	< 2.8	< 1.8	< 6.0
Zr-Nb-95	< 3.6	< 2.2	< 2.0
Cs-134	< 2.6	< 1.1	< 2.5
Cs-137	< 2.8	< 1.3	< 2.0
Ba-La-140	< 3.7	< 5.0	< 1.6

Table 24. Surface water, analyses for gross beta, potassium-40 and gamma-emitting isotopes (continued).

Sample Description and Concentration (pCi/L)			
Indicator			
K-14a			
Date Collected	10-02-17	11-01-17	12-04-17
Lab Code	KSW- 5047	KSW- 5788	KSW- 6303
Gross beta			
Suspended Solids	< 0.7	< 0.3	< 0.3
Dissolved Solids	2.3 ± 0.5	0.8 ± 0.4	1.7 ± 0.5
Total Residue	2.3 ± 0.5	0.8 ± 0.4	1.7 ± 0.5
K-40 (ICP)	1.21	1.08	1.22
Mn-54	< 3.2	< 2.2	< 4.4
Fe-59	< 2.4	< 2.7	< 4.9
Co-58	< 3.0	< 1.9	< 4.7
Co-60	< 2.2	< 1.6	< 4.1
Zn-65	< 1.7	< 2.9	< 4.3
Zr-Nb-95	< 2.3	< 2.0	< 3.6
Cs-134	< 2.7	< 2.8	< 5.4
Cs-137	< 2.8	< 2.6	< 6.0
Ba-La-140	< 4.8	< 3.8	< 6.7
K-14b			
Date Collected	10-02-17	11-01-17	12-04-17
Lab Code	KSW- 5048	KSW- 5789	KSW- 6304
Gross beta			
Suspended Solids	< 0.8	< 0.3	< 0.3
Dissolved Solids	2.0 ± 0.5	1.6 ± 0.4	1.4 ± 0.4
Total Residue	2.0 ± 0.5	1.6 ± 0.4	1.4 ± 0.4
K-40 (ICP)	1.19	1.07	1.23
Mn-54	< 4.7	< 2.5	< 2.1
Fe-59	< 8.7	< 6.3	< 5.5
Co-58	< 3.8	< 2.3	< 1.3
Co-60	< 4.8	< 1.5	< 2.6
Zn-65	< 4.5	< 2.3	< 3.1
Zr-Nb-95	< 5.0	< 2.7	< 2.8
Cs-134	< 6.3	< 3.0	< 2.1
Cs-137	< 3.9	< 3.1	< 2.8
Ba-La-140	< 9.7	< 3.2	< 2.6

Table 25. Surface water, analyses for tritium, strontium-89 and strontium-90.
Collection: Quarterly composites of monthly samples.

Location and		Concentration pCi/L		
Collection Period	Lab Code	H-3	Sr-89	Sr-90
Indicator				
K-1a				
1st Quarter	KSW -985	< 154	< 0.8	< 0.5
2nd Quarter	KSW -2926	< 152	< 0.9	< 0.5
3rd Quarter	KSW -4655	< 184	< 0.9	< 0.5
4th Quarter	KSW -6415	< 149	< 1.0	< 0.5
K-1b				
1st Quarter	KSW -986	< 154	< 1.0	< 0.5
2nd Quarter	KSW -2927	< 152	< 1.0	< 0.5
3rd Quarter	KSW -4656	< 184	< 0.9	< 0.5
4th Quarter	KSW -6416	< 149	< 1.0	< 0.5
K-1d				
1st Quarter	KSW -987	< 154	< 0.9	< 0.5
2nd Quarter	KSW -2928	< 152	< 0.9	< 0.4
3rd Quarter	KSW -4657	< 184	< 1.3	< 0.8
4th Quarter	KSW -6418	< 149	< 1.1	< 0.5
K-1e				
1st Quarter	KSW -988	< 154	< 0.8	< 0.4
2nd Quarter	KSW -2929	< 152	< 0.8	< 0.4
3rd Quarter	KSW -4658	< 184	< 0.7	< 0.4
4th Quarter	KSW -6419	< 149	< 0.9	< 0.5

Table 25. Surface water, analyses for tritium, strontium-89 and strontium-90 (continued).

Location and Collection Period		Concentration pCi/L H-3	Sr-89	Sr-90
Indicator				
K-14a				
1st Quarter	KSW -992	< 154	< 0.8	< 0.5
2nd Quarter	KSW -2933	< 152	< 0.9	< 0.5
3rd Quarter	KSW -4662	< 184	< 0.8	< 0.5
4th Quarter	KSW -6423	365 ± 92 [a]	< 0.9	< 0.4
K-14b				
1st Quarter	KSW -993	< 154	< 0.8	< 0.5
2nd Quarter	KSW -2934	< 152	< 0.8	< 0.4
3rd Quarter	KSW -4663	< 184	< 0.8	< 0.5
4th Quarter	KSW -6424	457 ± 97 [b]	< 1.2	< 0.7
K-1k				
1st Quarter	KSW -989	< 154	< 0.8	< 0.5
2nd Quarter	KSW -2930	< 152	< 0.8	< 0.4
3rd Quarter	KSW -4659	< 184	< 0.9	< 0.5
4th Quarter	KSW -6420	< 149	< 0.9	< 0.5
Control				
K-9				
1st Quarter	KSW -990 (Raw)	< 154	< 0.8	< 0.5
	KSW -991 (Tap)	< 154	< 0.9	< 0.5
2nd Quarter	KSW -2931 (Raw)	< 152	< 0.9	< 0.4
	KSW -2932 (Tap)	< 152	< 1.1	< 0.5
3rd Quarter	KSW -4660 (Raw)	< 184	< 0.9	< 0.5
	KSW -4661 (Tap)	< 184	< 0.9	< 0.5
4th Quarter	KSW -6421 (Raw)	< 149	< 1.0	< 0.5
	KSW -6422 (Tap)	< 149	< 0.9	< 0.5

[a] H-3 analysis was performed on the monthly samples, results as follows:

KSW-5047 collected 10/02/17 < 154 pCi/L.

KSW-5788 collected 11/01/17 217 ± 87 pCi/L.

KSW-6303 collected 12/04/17 744 ± 110 pCi/L.

[b] H-3 analysis was performed on the monthly sample, results as follows:

KSW-5048 collected 10/02/17 < 154 pCi/L.

KSW-5789 collected 11/01/17 206 ± 86 pCi/L.

KSW-6304 collected 12/04/17 872 ± 115 pCi/L.

Table 26. Fish, collected at K-1d, analyses for gross beta, strontium-89, strontium-90 and gamma-emitting isotopes.
Collection: Three times a year

Sample Description and Concentration (pCi/g wet)				
Collected	04-16-17		07-05-17	
Lab Code	KF- 1972		KF- 3866	
Type	Carpsucker		Lake Trout	
Portion	Flesh	Bones	Flesh	Bones
Gross beta	3.78 ± 0.08	3.05 ± 0.74	3.43 ± 0.10	0.60 ± 0.37
Sr-89	NA[a]	< 0.33	NA[a]	< 0.41
Sr-90	NA	0.18 ± 0.07	NA	0.20 ± 0.08
K-40	2.93 ± 0.56	NA[a]	2.81 ± 0.38	NA[a]
Mn-54	< 0.033	NA	< 0.021	NA
Fe-59	< 0.126	NA	< 0.098	NA
Co-58	< 0.036	NA	< 0.022	NA
Co-60	< 0.012	NA	< 0.015	NA
Cs-134	< 0.029	NA	< 0.017	NA
Cs-137	< 0.024	NA	< 0.024	NA

Collected	
Lab Code	NS[b]
Type	
Portion	
Gross beta	
Sr-89	
Sr-90	
K-40	
Mn-54	
Fe-59	
Co-58	
Co-60	
Cs-134	
Cs-137	

[a] NA = Not analyzed; analyses not required.

[b] NS - No sample. No fish sample was able to be collected during the fourth quarter due to unfavorable conditions.

Table 27. Slime or aquatic vegetation, analyses for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes.
Collection: Semiannually

Sample Description and Concentration (pCi/g wet)

	Indicators			Control
Location	K-1a	K-1b	K-1d	K-9
Date Collected	06-01-17	06-01-17	06-01-17	06-01-17
Lab Code	KSL- 2665	KSL- 2666	KSL- 2667	KSL- 2671
Gross beta	4.74 ± 0.13	5.97 ± 0.15	0.87 ± 0.08	7.01 ± 0.17
Sr-89	< 0.006	< 0.011	< 0.010	< 0.011
Sr-90	< 0.002	< 0.004	< 0.004	< 0.004
Be-7	0.57 ± 0.07	0.24 ± 0.083	0.98 ± 0.14	0.58 ± 0.08
K-40	5.14 ± 0.17	5.02 ± 0.16	1.32 ± 0.16	5.25 ± 0.16
Mn-54	< 0.006	< 0.005	< 0.006	< 0.005
Co-58	< 0.004	< 0.006	< 0.007	< 0.005
Co-60	< 0.006	< 0.005	< 0.005	< 0.005
Nb-95	< 0.005	< 0.009	< 0.010	< 0.007
Zr-95	< 0.009	< 0.010	< 0.014	< 0.009
Ru-103	< 0.008	< 0.008	< 0.006	< 0.005
Ru-106	< 0.051	< 0.051	< 0.050	< 0.047
Cs-134	< 0.006	< 0.005	< 0.007	< 0.005
Cs-137	< 0.007	< 0.005	< 0.008	< 0.006
Ce-141	< 0.013	< 0.016	< 0.021	< 0.013
Ce-144	< 0.049	< 0.043	< 0.048	< 0.054
Sb-125	< 0.030	< 0.027	< 0.035	< 0.025

Location	K-1e	K-1k	K-14
Date Collected	06-01-17	06-01-17	06-01-17
Lab Code	KSL- 2668	KSL- 2669	KSL- 2672
Gross beta	1.17 ± 0.09	6.24 ± 0.16	4.65 ± 0.22
Sr-89	< 0.016	< 0.010	< 0.021
Sr-90	< 0.006	< 0.004	< 0.008
Be-7	0.47 ± 0.11	0.34 ± 0.06	0.42 ± 0.07
K-40	0.82 ± 0.12	4.35 ± 0.14	3.73 ± 0.12
Mn-54	< 0.004	< 0.005	< 0.005
Co-58	< 0.006	< 0.005	< 0.003
Co-60	< 0.003	< 0.004	< 0.004
Nb-95	< 0.010	< 0.006	< 0.004
Zr-95	< 0.014	< 0.009	< 0.009
Ru-103	< 0.007	< 0.006	< 0.004
Ru-106	< 0.052	< 0.044	< 0.044
Cs-134	< 0.006	< 0.004	< 0.004
Cs-137	< 0.006	< 0.005	< 0.004
Ce-141	< 0.024	< 0.014	< 0.009
Ce-144	< 0.045	< 0.032	< 0.031
Sb-125	< 0.027	< 0.026	< 0.019

Table 27. Slime or aquatic vegetation, analyses for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes.
Collection: Semiannually

Sample Description and Concentration (pCi/g wet)

	Indicators			Control
Location	K-1a	K-1b	K-1d	K-9
Date Collected	08-01-17	08-01-17	08-01-17	09-06-17
Lab Code	KSL- 3886	KSL- 3887	KSL- 3888	KSL- 4581
Gross beta	5.10 ± 0.15	6.69 ± 0.21	1.41 ± 0.13	5.11 ± 0.13
Sr-89	< 0.006	< 0.013	< 0.012	< 0.029
Sr-90	< 0.003	< 0.006	< 0.005	< 0.018
Be-7	< 0.16	0.85 ± 0.18	0.77 ± 0.04	1.22 ± 0.21
K-40	4.87 ± 0.41	5.47 ± 0.35	0.94 ± 0.04	4.92 ± 0.52
Mn-54	< 0.017	< 0.013	< 0.002	< 0.014
Co-58	< 0.013	< 0.005	< 0.002	< 0.017
Co-60	< 0.011	< 0.010	< 0.002	< 0.017
Nb-95	< 0.015	< 0.013	< 0.004	< 0.019
Zr-95	< 0.022	< 0.016	< 0.005	< 0.016
Ru-103	< 0.017	< 0.007	< 0.002	< 0.020
Ru-106	< 0.112	< 0.064	< 0.010	< 0.138
Cs-134	< 0.016	< 0.013	< 0.002	< 0.021
Cs-137	< 0.013	< 0.011	0.006 ± 0.002	< 0.020
Ce-141	< 0.022	< 0.026	< 0.008	< 0.029
Ce-144	< 0.127	< 0.104	< 0.015	< 0.110
Sb-125	< 0.072	< 0.054	< 0.010	< 0.104

Location	K-1e	K-1k	K-14
Date Collected	08-01-17	08-01-17	09-06-17
Lab Code	KSL- 3890	KSL- 3891	KSL- 4582
Gross beta	2.23 ± 0.18	5.10 ± 0.14	1.62 ± 0.11
Sr-89	< 0.017	< 0.008	< 0.074
Sr-90	< 0.008	0.005 ± 0.002	< 0.038
Be-7	0.16 ± 0.03	< 0.11	1.13 ± 0.06
K-40	1.98 ± 0.06	3.88 ± 0.34	2.97 ± 0.10
Mn-54	< 0.002	< 0.012	< 0.004
Co-58	< 0.002	< 0.010	< 0.004
Co-60	< 0.002	< 0.012	< 0.003
Nb-95	< 0.004	< 0.015	< 0.006
Zr-95	< 0.005	< 0.013	< 0.006
Ru-103	< 0.004	< 0.013	< 0.005
Ru-106	< 0.017	< 0.105	< 0.040
Cs-134	< 0.002	< 0.012	< 0.004
Cs-137	< 0.002	< 0.012	0.010 ± 0.004
Ce-141	< 0.009	< 0.025	< 0.010
Ce-144	< 0.017	< 0.085	< 0.029
Sb-125	< 0.011	< 0.063	< 0.015

Table 28. Bottom sediment samples, analyses for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes.
Collection: May and November

	Sample Description and Concentration (pCi/g dry)				
	Indicator				Control
Location	K-1c	K-1d	K-1j	K-14	K-9
Collection Date	05-01-17	05-01-17	05-01-17	05-01-17	05-01-17
Lab Code	KBS- 1958	KBS- 1959	KBS- 1960	KBS- 1962	KBS- 1961
Gross beta	6.67 ± 0.85	7.29 ± 0.91	8.40 ± 0.88	5.44 ± 0.86	20.21 ± 1.13
Sr-89	< 0.116	< 0.105	< 0.079	< 0.085	< 0.098
Sr-90	< 0.044	< 0.042	< 0.030	0.040 ± 0.023	< 0.040
K-40	3.98 ± 0.33	4.71 ± 0.32	4.62 ± 0.36	5.10 ± 0.37	11.35 ± 0.73
Co-58	< 0.009	< 0.010	< 0.014	< 0.010	< 0.022
Co-60	< 0.012	< 0.012	< 0.011	< 0.010	< 0.022
Cs-134	< 0.007	< 0.008	< 0.009	< 0.008	< 0.015
Cs-137	0.019 ± 0.010	< 0.010	0.018 ± 0.010	< 0.008	< 0.017
Location					
Collection Date	11-01-17	11-01-17	11-01-17	11-01-17	11-01-17
Lab Code	KBS- 5792	KBS- 5793	KBS- 5794	KBS- 5797	KBS- 5795
Gross beta	6.42 ± 0.86	9.67 ± 0.95	9.30 ± 0.90	5.37 ± 0.75	24.65 ± 1.19
Sr-89	< 0.073	< 0.058	< 0.067	< 0.056	< 0.080
Sr-90	< 0.038	< 0.034	< 0.037	< 0.028	< 0.042
K-40	4.98 ± 0.34	7.25 ± 0.46	5.22 ± 0.36	3.72 ± 0.32	15.05 ± 0.83
Co-58	< 0.011	< 0.018	< 0.010	< 0.014	< 0.027
Co-60	< 0.011	< 0.013	< 0.013	< 0.009	< 0.015
Cs-134	< 0.011	< 0.010	< 0.010	< 0.008	< 0.016
Cs-137	< 0.013	< 0.016	0.026 ± 0.014	< 0.009	< 0.031

Dominion Energy®

2017 Annual Radiological Environmental Operating Report

Kewaunee Power Station
Part III, Corrective Actions written during reporting period

Dominion Energy Kewaunee, Inc.

Kewaunee CRS › CR: Enviromental Air sample K- 31 sampled Per SP-63-164 weekly cartrage change found OFF with no power

Print

CR_ID	1139
Short description	Enviromental Air sample K- 31 sampled Per SP-63-164 weekly cartrage change found OFF with no power
Site	Kewaunee
Discovery Date/Time	4/11/2017 10:45 AM
Submitter	Paul A Simon (Generation - 4)
Submitters Dept	2. Radiation Protection
Supervisor	Dan J Shannon (Generation - 4)
Unit 1 Mode	DEF
Unit ISFSI?	No
Revision #	
Long Description	Enviromental Air sample K- 31 sampled Per SP-63-164 weekly cartridge change on 4/11/17 and was found OFF with no power. Sampler ran 82.5 hours, so sometime Friday breaker tripped. Normal run time is 168 hours. Storms were in the area and caused power failure to sampler. Called WPS to report power failure. Restored power at 14:08. Checked sampler on way home - operating normal. No issuses found.
Initial Actions	Had power restored and checked operation.
Recom Actions:	Document event in annual enviromental report. CA to Steckler/Shannon due May 31, 2018.
additional Contacts	
Tag #:	
Equipment Location	
Equipment Description	
Plant System	
OP-AA-102 Review Reqd?	No
Operability Assesment	N/A
Operability Comments	
Functionality Assessment	N/A
Reportable Condition	None
Reportability Comments	
Is Equipment Important to Emergency Response WM-KW-100 values	No
O/R Comments	
Significance (screening)	3
Potential Repeat (screening)	Yes
Previous Issue	CR Search by "Environmental Air Sampler" identified the following: CR784 - K-8 REMP Environmental Air Samplers Found Not Running (09/20/2016) CR756 - Three REMP Environmental Air Samplers Found Not Running (08/22/2016) CR746 - Environmental air samplers found not running (08/16/2016) CR689 - Power found off at K-2 Environmental air sampler (06/28/2016) CR338 - Hour Meter on Environmental Air Sampler K-41 Was Not Reset (11/17/2015) CR88 - K-2 Enviromental Air sampler found not working (07/28/2015) CR547860 - K-31 Environmental Air Sampler lost power (05/06/2014)
CRT Comments	Power was lost due to recent storms in the area. Power was restored on 04/11/2017 and sampler was returned to service. CA(387) to RP(Steckler/Shannon) to Document Loss of Power to Environmental Air Sampler K-31 Annual Environmental Report. Due Date: 05/31/2018
Work Order #	
Comments	
Status	Pending

Content Type: Item
Version: 15.0
Created at 4/12/2017 12:05 PM by Paul A Simon (Generation - 4)
Last modified at 4/18/2017 3:50 PM by System Account

Close

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Kewaunee CRS › CR: K-8 Enviromental Air Sampler found not running

Print

CR_ID	1285
Short description	K-8 Enviromental Air Sampler found not running
Site	Kewaunee
Discovery Date/Time	6/26/2017 10:00 AM
Submitter	Paul A Simon (Generation - 4)
Submitters Dept	2. Radiation Protection
Supervisor	Dan J Shannon (Generation - 4)
Unit 1 Mode	
Unit ISFSI?	No
Revision #	
Long Description	K-8 Environmental Air Sampler (Nativity Blessed Virgin Mary Church,Tisch Mills) was found not running by RP Tech sent out to check air flows. A recent electical storm may have tripped the breaker. A partial air particulate/iodine sample was collected at location K-8 for the sample period ending 6/27/17. The failure resulted in a run time of 67.53 hours. No other issuses found.
Initial Actions	Reset breaker and restarted sampler. Inspection completed the following day found sampler still running with no issues.
Recom Actions:	Report this event in the annual enviromental report (Holschbach/Shannon - end of May 2018)
additional Contacts	
Tag #:	
Equipment Location	
Equipment Description	
Plant System	
OP-AA-102 Review Reqd?	No
Operability Assesment	N/A
Operability Comments	
Functionality Assessment	N/A
Reportable Condition	No
Reportability Comments	
Is Equipment Important to Emergency Response WM-KW-100 values	No
O/R Comments	
Significance (screening)	3
Potential Repeat (screening)	Yes
Previous Issue	CR Search by "Environmental Air Sampler" identified the following: CR1139 - Enviromental Air sample K- 31 sampled Per SP-63-164 weekly cartrage change found OFF with no power (04/11/2017) CR784 - K-8 REMP Environmental Air Samplers Found Not Running (09/20/2016) CR756 - Three REMP Environmental Air Samplers Found Not Running (08/22/2016) CR746 - Environmental air samplers found not running (08/16/2016) CR689 - Power found off at K-2 Environmental air sampler (06/28/2016) CR338 - Hour Meter on Environmental Air Sampler K-41 Was Not Reset (11/17/2015) CR88 - K-2 Enviromental Air sampler found not working (07/28/2015) CR547860 - K-31 Environmental Air Sampler lost power (05/06/2014)
CRT Comments	CA(426) to RP(Holschbach/Shannon) to Document Loss of Power to Environmental Air Sampler K-8 Annual Environmental Report. Due Date: 05/31/2018
Work Order #	
Comments	
Status	Pending

Content Type: Item
Version: 13.0
Created at 6/29/2017 11:14 AM by Paul A Simon (Generation - 4)
Last modified at 7/20/2017 11:25 AM by System Account

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Kewaunee CRS ▸ CR: No Fish Sample Collected for Fourth Quarter 2017 per Kewaunee REMM

Print

CR_ID	1571
Short description	No Fish Sample Collected for Fourth Quarter 2017 per Kewaunee REMM
Site	Kewaunee
Discovery Date/Time	1/4/2018 3:00 PM
Submitter	Darryl M Holschbach (Generation - 4)
Submitters Dept	2. Radiation Protection
Supervisor	Dan J Shannon (Generation - 4)
Unit 1 Mode	N/A
Unit ISFSI?	No
Revision #	
Long Description	There was not a fish sample available for collection for the fourth quarter 2017. Attempts were unsuccessful through both commercial and sport fishing. Low discharge flow and weather conditions affected availability near the plant. Per the Radiological Environmental Monitoring Manual (REMM) Rev 20, 3 random samplings of commercially and recreationally important species are collected in the vicinity of the discharge. Fish are collected three times per year (second, third, and fourth quarters) near the discharge area (K-1d). The missing fish sample is to be documented as an exception in the 2017 Annual Radiological Environmental Operating Report, Section 3.1.4 Program Execution.
Initial Actions	Initiate CR for documentation of Issue
Recom Actions:	Revision 21 of the REMM was issued 01/01/2018 and requires a fish sample to be collected only once per year in the third quarter. A fish sample is no longer required during the unfavorable fourth quarter. No further action is required.
additional Contacts	
Tag #:	
Equipment Location	
Equipment Description	
Plant System	
OP-AA-102 Review Reqd?	No
Operability Assesment	N/A
Operability Comments	None
Functionality Assessment	N/A
Reportable Condition	No
Reportability Comments	None
Is Equipment Important to Emergency Response WM-KW-100 values	No
O/R Comments	None
Significance (screening)	3
Potential Repeat (screening)	No
Previous Issue	No History based on CR Search by "Fish Sample".
CRT Comments	CA(514) to RP(Steckler/Shannon) to Document missing fourth quarter 2017 fish sample in the Annual Radiological Environmental Operating Report. Due Date: 05/31/2018
Work Order #	
Comments	
Status	Pending

Content Type: Item
Version: 13.0
Created at 1/4/2018 5:20 PM by Darryl M Holschbach (Generation - 4)
Last modified at 1/16/2018 3:39 PM by System Account

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Kewaunee CRS ▸ CR: Detectable levels of tritium identified in REMM locations K-14a and K-14b during 4th QTR 2017

Print

CR_ID	1684
Short description	Detectable levels of tritium identified in REMM locations K-14a and K-14b during 4th QTR 2017
Site	Kewaunee
Discovery Date/Time	5/3/2018 2:00 PM
Submitter	Dan J Shannon (Generation - 4)
Submitters Dept	2. Radiation Protection
Supervisor	Bart R Steckler (Generation - 4)
Unit 1 Mode	
Unit ISFSI?	No
Revision #	
Long Description	During the review of the 2017 Annual Radiological Environmental Operating Report (AREOR), it was noted that there were detectable levels of tritium identified in surface water samples taken from Radiological Environmental Monitoring Manual (REMM) locations K-14a and K-14b (Two Creeks Park, 2.6 miles south of site) during November and December 2017. The two fourth quarter composite results from locations K-14a and K-14b were 365 and 457 pCi/L, respectively. Analysis of the constituent monthly samples resulted in values of 217 and 206 pCi/L for the November samples at locations K-14a and K-14b, respectively, and 744 and 872 pCi/L for the December samples at locations K-14a and K-14b respectively. The Minimum Detectable Concentration (MDC) for these samples was 184 pCi/L. These results are less than 5% of the REMM required Reporting Levels for tritium (20,000 pCi/L). The most likely cause of the detectable tritium concentrations at this location was from the multiple batch discharges of water from the Refueling Water Storage Tank (RWST) which occurred during the fourth quarter of 2017. These batch discharges contained tritium. All discharges were completed in accordance with the KPS Offsite Dose Calculation Manual and site procedures, which ensure compliance with 10CFR20 (discharge concentration limits), 10CFR50 (dose limits), and 40CFR190 (dose limits) for radioactive effluent discharges. The identification and probable cause of the detectable levels of tritium at REMM locations K-14a and K-14b was documented in the 2017 AREOR, Part 1, Summary and Interpretation.
Initial Actions	Discussed results with REMP owner. Documented results and probable cause in 2017 AREOR. Initiated CR.
Recom Actions:	Evaluate the identification of detectable levels of tritium in the surface water samples at REMM location K-14a and K-14b (Two Creeks Park) and determine if any additional actions are needed.
additional Contacts	
Tag #:	
Equipment Location	
Equipment Description	
Plant System	
OP-AA-102 Review Reqd?	No
Operability Assesment	N/A
Operability Comments	
Functionality Assessment	N/A
Reportable Condition	No
Reportability Comments	Levels are not reportable per REMM Table 2.2.1-D
Is Equipment Important to Emergency Response WM-KW-100 values	No
O/R Comments	Agree with recomended actions
Significance (screening)	3
Potential Repeat (screening)	No
Previous Issue	No history for tritium in these locations identified.
CRT Comments	Discussed with owner the values are above minimum detectable and below reportabiilty issues, no regulatory actions required. CA567, DDI evaluate the identification of detectable levels of tritium in the surface water samples at REMM location K-14a and K-14b (Two Creeks Park) and determine if any additional actions are needed. to Steckler/Shannon.
Work Order #	
Comments	
Status	CAART Review

Content Type: Item
Version: 15.0
Created at 5/3/2018 4:05 PM by Dan J Shannon (Generation - 4)
Last modified at 5/7/2018 2:07 PM by System Account

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