Dominion Energy Kewaunee, Inc.
N490 Highway 42, Kewaunee, WI 54216-9511

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DOMINION ENERGY KEWAUNEE, INC.
KEWAUNEE POWER STATION
2016 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

Enclosed is the 2016 Annual Radiological Environmental Operating Report for the Kewaunee Power Station (KPS). This report was prepared by ATI Environmental Inc. and satisfies the requirements of KPS Technical Specification 5.6.1.

The results of the 2016 Land Use Census, submitted in accordance with the KPS Radiological Environmental Monitoring Manual, Section 2.2.2/2.3.2, are also included in this report.

Please feel free to contact Mr. Richard Repshas at 920-388-8217 if you have questions or require additional information.

Sincerely,

Stewart J. Yuen
Plant Manager, Kewaunee Power Station

Commitments made by this letter: NONE

IE25
NRR

cc: Regional Administrator, Region III
U. S. Nuclear Regulatory Commission
2443 Warrenville Road
Suite 210
Lisle, IL 60532-4352

Mr. Ted H. Carter
NRC Senior Project Manager
U.S. Nuclear Regulatory Commission
Two White Flint North, Mail Stop T-8F5
11555 Rockville Pike
Rockville, MD 20852-2738

Mr. Robert Busch
Wisconsin Division of Public Health
Radiation Protection Section
Room 150
Madison, WI 53701-2659

Ms. Deborah Russo
American Nuclear Insurers
95 Glastonbury Blvd.
Glastonbury, CT 06033

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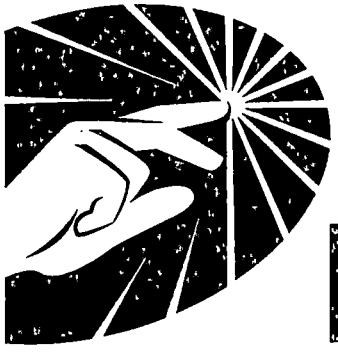
2016 Annual Radiological Environmental Operating Report

Kewaunee Power Station

Dominion Energy Kewaunee, Inc.



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2016 Annual Radiological Environmental Operating Report

Kewaunee Power Station

Part I

Summary and Interpretation

Dominion Energy Kewaunee, Inc.

ATI Environmental, Inc.
Midwest Laboratory
700 Landwehr Road • Northbrook, IL 60062-2310
phone (847) 564-0700 • fax (847) 564-4517

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, 2016

Prepared and submitted by:

ATI ENVIRONMENTAL Inc.
Midwest Laboratory
Project No. 8002

Approved :

Bronia Grob
Laboratory Manager

J. Michael Hale
Radiation Protection /
Chemistry Mgr., KPS

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.

This report summarizes the environmental operation data collected during the period January - December 2016.

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. J. Michael Hale, Radiation Protection / Chemistry Manager, at (920) 388-8103.

2.0 SUMMARY

Results of sample analyses during the period January - December 2016 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

Groundwater 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.

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 and samples of grain 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 2016 as described in the preceding sections, with the following exceptions:

Air Particulates / Air Iodine

No air particulate / air iodine sample (0 m3) was collected at location K-2, for the sample period ending 6/28/16. Power to the sample pump was found off. (CR 689)

A partial air particulate / air iodine sample (262 m3) was collected at location K-31, for the sample period ending 8/16/16. A mechanical failure with the sample pump resulted in a reduced runtime of 145 hours. (CR 746)

A partial air particulate / air iodine sample (281 m3) was collected at location K-41, for the sample period ending 8/16/16. A mechanical failure with the sample pump resulted in a reduced runtime of 156 hours. (CR 746)

A partial air particulate / air iodine sample (224 m3) was collected at location K-1f, for the sample period ending 8/23/16. A mechanical failure with the sample pump resulted in a reduced runtime of 124 hours. (CR 756)

A partial air particulate / air iodine sample (189 m3) was collected at location K-31, for the sample period ending 8/23/16. A mechanical failure with the sample pump resulted in a reduced runtime of 105 hours. (CR 756)

A partial air particulate / air iodine sample (155 m3) was collected at location K-41, for the sample period ending 8/23/16. A mechanical failure with the sample pump resulted in a reduced runtime of 86 hours. (CR 756)

A partial air particulate / air iodine sample (169 m3) was collected at location K-8, for the sample period ending 9/20/16. A mechanical failure with the sample pump resulted in a reduced runtime of 94 hours. (CR 784)

The mechanical failures on the air sample pumps were determined to be caused by failure of the carbon blades. (CR746, CR 756 and CR784). When discovered, the sample pumps were replaced with rebuilt pumps and a midweek check for proper operation was completed as a follow up action. Recurring failures happened after this midweek check. When the cause was determined to be a faulty batch of carbon blades, the sample pumps were rebuilt with a carbon blades from a different batch/lot.

3.1.5 Program Modifications

None.

3.2 RESULTS AND DISCUSSION

Results for the reporting period January to December, 2016 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 2016 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 2016 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 2016. 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

Ambient gamma radiation was monitored by TLDs at fourteen locations, eight indicators and six controls. TLDs at the indicator locations measured a mean dose equivalent of 16.5 mR/91 days, in close agreement with the control locations 15.9 mR/91 days. The readings are similar to the averages obtained from 2002 (and prior to) through 2015.

For eight TLDs monitoring the Independent Spent Fuel Storage Installation (Protected Area), (K-1L through K-1S), measurements averaged 14.5 mR/91 days.

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 18.0 mR/91 days, measured at indicator location K-27.

Year	Average (Indicators)	Average (Controls)
	Dose rate (mR/91 days)	
2002	16.1	15.1
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

Year	Average (Indicators)	Average (Controls)
	Dose rate (mR/91 days)	
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

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 2005 through 2015. 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.

2016 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) 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	12.9	12.0	16.1	14.6	16.3	ND	ND	ND	ND
K-5	17.3	14.7	17.7	17.0	17.7	ND	ND	ND	ND
K-17	14.9	13.9	17.6	17.4	17.3	ND	ND	ND	ND
K-25	17.3	13.9	18.8	16.9	18.7	ND	ND	ND	ND
K-27	16.0	16.3	17.6	20.5	17.6	ND	ND	ND	ND
K-30	15.2	15.3	17.3	16.7	17.0	ND	ND	ND	ND
K-39	15.6	15.5	18.7	17.0	18.3	ND	ND	ND	ND
K-43	16.6	14.9	14.3	14.0	13.9	ND	ND	ND	ND
K-2	15.7	15.9	16.4	17.9	16.8	ND	ND	ND	ND
K-3	17.0	16.6	17.1	17.5	17.6	ND	ND	ND	ND
K-8	14.9	14.8	17.0	17.0	16.9	ND	ND	ND	ND
K-15	14.2	12.4	15.7	14.9	15.0	ND	ND	ND	ND
K-31	12.5	12.7	13.3	14.5	13.2	ND	ND	ND	ND
K-41	14.6	14.9	16.9	20.2	16.0	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 indicator location and 0.020 pCi/m^3 at the control locations, similar to the means observed from 2002 (and prior to) through 2015. 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

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 0.070 pCi/m^3 at the indicator locations and an average of 0.069 pCi/m^3 at the control locations. All other gamma-emitting isotopes were below their respective LLD limits.

Airborne Iodine

Levels of airborne iodine-131 were below the lower limit of detection (LLD) 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 the LLD level of 180 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 LLD level of 0.5 pCi/L.

Strontium-89 concentrations measured below an LLD level of 1.5 pCi/L in all samples. Measurable levels of strontium-90 above an LLD level of 0.9 pCi/L were detected in six of eighty-four samples tested. Mean values were 0.9 pCi/L for indicator locations and 1.0 pCi/L for control locations and are similar to averages seen from 1990 through 2015.

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 (1376 and 1371 pCi/L, respectively), and are consistent with levels observed from 1990 through 2015.

Detection of strontium, iodine and potassium activity is consistent with findings of the National Center for Radiological Health (1968). Most radiocontaminants in cattlefeed 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 muscle 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 0.99 g/L at the indicator location and 0.96 at the control locations . Measured concentrations of stable Potassium were averaged 1.69 g/L at the indicator locations and 1.67 g/L at the control locations.

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

Well Water

One of eight samples tested for gross alpha from on-site well K-1h was slightly above the LLD of 4.8 pCi/L with an activity of 5.0 pCi/L. Gross beta activity above a detection limit of 3.7 pCi/L, was measured in three of the twenty-four indicator samples tested at an average of 12.9 pCi/L. The largest contribution to this average was the sample collected April 4th from location K-38 with a gross beta activity of 29.9 pCi/L. The primary contribution to this high gross beta result was due to naturally-occurring potassium-40 which was detected at an activity of 31.3 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 this result 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 ground water.

Levels of strontium-89 and strontium-90 were measured for the on-site well (K-1g). The concentrations measured below LLD values of 0.7 and 0.5 pCi/L, respectively.

Samples were tested for tritium and gamma emitting isotopes. All tritium concentrations measured below a detection level of 149 pCi/L. Gamma-emitting isotopes measured below respective LLDs.

Domestic Meat

In domestic meat samples, gross alpha measured below the LLD of 0.036 pCi/g wet for both samples tested, while the gross beta concentrations measured 2.79 pCi/g wet and 2.54 pCi/g wet for indicator and control samples respectively. Gamma-spectroscopic analyses showed that most beta activity was due to naturally occurring potassium-40 (2.53 pCi/g wet for the indicator and 2.29 pCi/g wet for the control). All other gamma-emitting isotopes measured below detection limits.

Eggs

In samples of eggs tested, the gross beta concentrations averaged 1.58 pCi/g wet at the indicator location and 1.38 pCi/g wet for the control location, similar to observed concentrations of naturally-occurring potassium-40 (1.36 and 1.35 pCi/g wet respectively). Other gamma-emitting isotopes were below their respective LLDs.

Levels of strontium-89 measured less than 0.008 pCi/g wet in all samples. Strontium-90 measured less than 0.003 pCi/g wet in all samples tested.

Vegetables and Grain

In vegetables an average gross beta concentration of 2.97 pCi/g wet was measured at the two indicator samples and an average of 2.70 pCi/g wet was measured for the six control samples from location K-26, due primarily to potassium-40 activity. All other gamma emitting isotopes measured below detection levels. No strontium-89 was detected above an LLD of 0.009 pCi/g wet. No strontium-90 was detected above an LLD of 0.005 pCi /g wet.

In two samples of grain consisting of clover and wheat collected from indicator location K-23, the gross beta concentrations averaged 7.31 pCi/g wet, due primarily to activity from potassium-40 and beryllium-7. Strontium-89 measured below an LLD of 0.031 pCi/g wet. Strontium-90 was measured at one of the two grain samples from indicator location K-23 at level of 0.031 pCi/g wet. The other sample measured below an LLD of 0.004 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 12.26 and 12.73 pCi/g wet at the indicator and control locations respectively, and reflected average potassium-40 levels observed of 9.98 and 10.54 pCi/g wet, at the indicator and control locations respectively. No strontium-89 activity was detected above an LLD of 0.044 pCi/g wet. Strontium-90 was measured in five of the eight indicator samples tested at an average activity of 0.018 pCi/g wet. Strontium-90 was also found in three of the four control location samples and averaged 0.017 pCi/g wet.

No plant effect is indicated.

Grass

In grass, mean gross beta measured 7.83 and 8.78 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. Other gamma-emitting isotopes were below respective LLDs. Strontium-89 tested below detection limits of 0.066 pCi/g wet for all samples and Strontium-90 was measured below the detection limit of 0.026 pCi/g in all samples.

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

Soil

Gross alpha concentrations in soil averaged 8.45 pCi/g dry in all ten indicator location samples and 6.96 pCi/g dry at the two control locations. Mean gross beta levels measured at indicator and control locations averaged 28.10 and 24.66 pCi/g dry, respectively, primarily due to potassium-40 activity. Strontium-89 was below an LLD level of 0.11 pCi/g dry in all samples. Strontium-90 was below an LLD of 0.039 pCi/g for all fourteen samples analyzed.

Cesium-137 was detected in all fourteen soil samples at an average of 0.10 pCi/g dry at both the indicator and 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 19.98 and 18.08 pCi/g dry for indicator and control locations, respectively. All other gamma-emitting isotopes were below respective LLD's. The levels of detected activities are similar to those observed from 1990 through 2015. 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 (5.2 pCi/L) than at the control locations (1.6 pCi/L). A similar pattern of activity has been observed since 1978. In 2016, the highest activities measured were sampled from the K-1a. The average activity was 13.4 pCi/L, with a range of 3.9 to 62.6 pCi/L, due primarily to potassium-40 activity. The potassium-40 concentrations averaged 12.1 pCi/L and ranged from 3.7 to 64.1 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

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.

No tritium was detected above an LLD of 173 pCi/L in the thirty-six samples tested, (quarterly composites of monthly samples).

All analyses for strontium-89 measured below an LLD of 2.0 pCi/L. All analyses for Strontium-90 measured below an LLD of 0.7 pCi/L.

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

Fish

In fish, gross beta concentrations averaged 4.00 pCi/g wet in flesh and 3.19 pCi/g wet in bone fractions. In flesh, the gross beta concentration was primarily due to potassium-40 activity.

Excluding potassium-40, gamma-emitting isotopes measured below their respective LLDs in all samples.

Strontium-89 concentrations in the bone were below an LLD of 0.33 pCi/g wet. Strontium-90 was detected in two of the three samples at an average of 0.18 pCi/g wet.

Aquatic Slime

In periphyton algae(slime) and aquatic vegetation samples, mean gross beta concentrations for indicator and control locations measured 3.01 and 6.15 pCi/g wet, respectively, due primarily to combined potassium-40 and beryllium-7 activity of 3.72 and 5.09 pCi/g wet, respectively.

Trace Antimony-125 activity was detected in one of fifteen indicator samples at 0.054 pCi/g wet compared to a detection level of 0.032 pCi/g wet. Cesium-137 was measured in eight of fifteen indicator samples, at a level of 0.012 pCi/g wet. Other gamma-emitting isotopes, with the exception of naturally-occurring beryllium-7 and potassium-40, were below their respective LLDs.

No strontium-89 was measured above the detection level of 0.056 pCi/g wet. Strontium-90 activity was measured at an average of 0.018 pCi/gwet at six of fifteen samples from the indicator locations. Strontium-90 was also measured at 0.018 pCi/g wet at one of the two control samples tested.

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 8.91 pCi/g dry at the indicator locations versus an average of 18.92 pCi/g dry at the control location.

Cesium-134 measured below the LLD level of 0.020 pCi/g dry for all samples tested. Cesium-137 measured below an LLD of 0.027 pCi/g dry for all locations. Other gamma-emitting isotopes, with the exception of naturally-occurring potassium-40, were below their respective LLDs.

Strontium-89 was measured below an LLD of 0.086 pCi/g dry for all samples. Strontium-90 was measured below an LLD of 0.037 pCi/g dry for all locations.

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 2016 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 6, 2016. The census is conducted annually during the growing season per Health Physics Procedure RP-KW-001-014.

In summary, the highest D/Q locations for nearest garden, nearest residence and nearest milk animal did not change from the 2015 census.

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, 2016). The QA Program includes participation in Interlaboratory Comparison (crosscheck) Programs. Results obtained are presented in Appendix A.

4.0 FIGURES AND TABLES

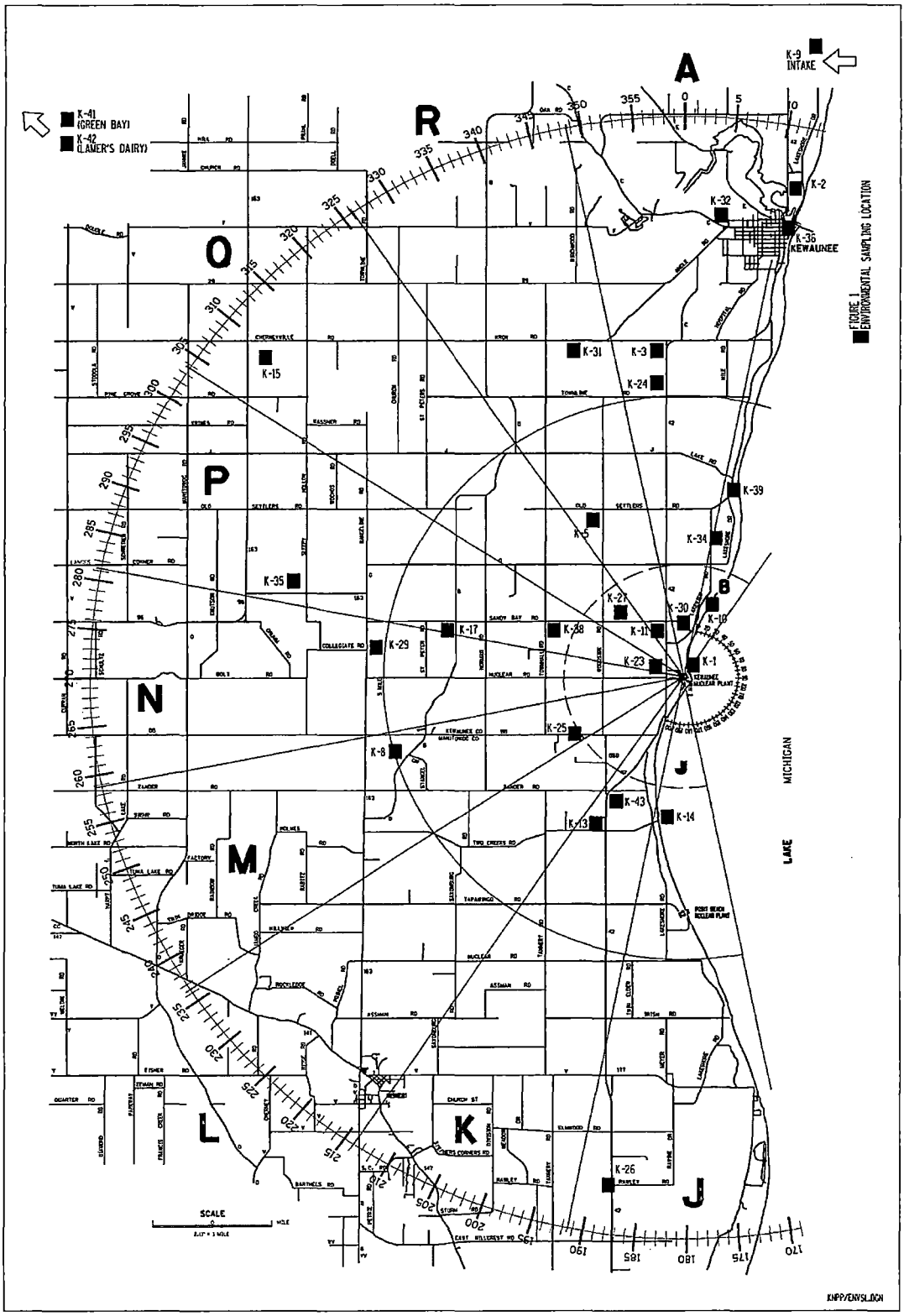

Figure 4-1. Sampling locations, Kewaunee Power Station.

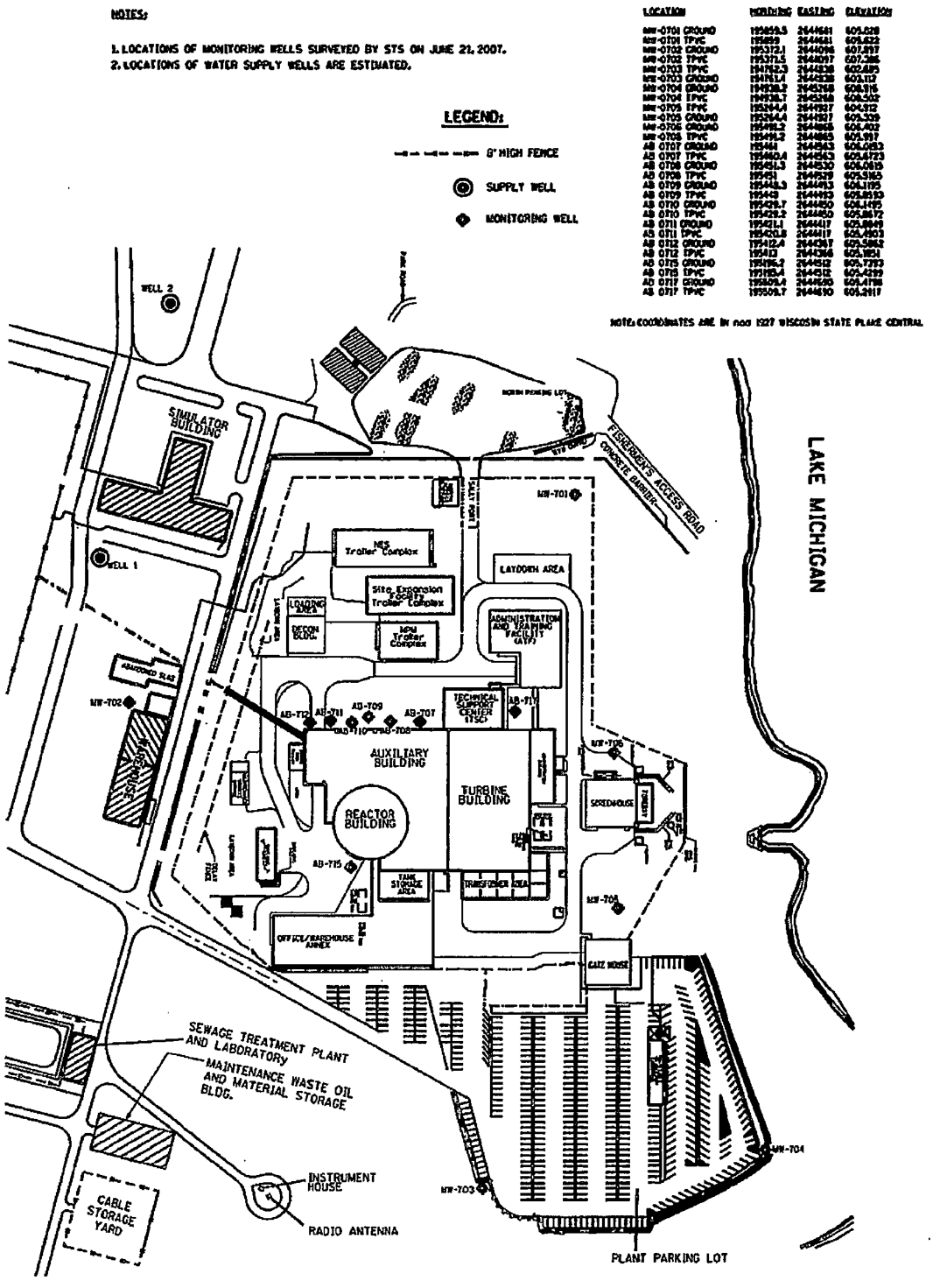

Figure 4-2. Groundwater Monitoring Wells, Kewaunee Power Station.

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 Northwest
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		
K-44		MI			

[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] Location dropped, dairy herd was sold in February, 2013.

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, 2016.

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	317	1
Airborne Iodine	C/W	6	317	1
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	2	6	0
Grain - clover	G/A	3	4	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	3	0
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	Docket No.	50-305
Location of Facility	Kewaunee County, Wisconsin (County, State)	Reporting Period	January-December, 2016

Sample Type (Units)	Type and Number of Analyses[a]	LLD[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	16.5 (32/32) (12.0-20.5)	K-27, Schlies Farm 1.53 NW	18.0 (4/4) (16.3-20.5)	15.9 (24/24) (12.4-20.2)	0
TLDs, Quarterly (Protected Area) (mR/91days)	Gamma 32	3.0	14.5 (32/32) (9.5-19.4)	K-1-S, ISFSI SW 0.12 N	18.6 (4/4) (17.6-19.4)	none	0
Airborne Particulates (pCi/m^3)	GB 317	0.005	0.021 (106/106) (0.005-0.044)	K-1f, Met. Tower 0.12 S	0.022 (53/53) (0.009-0.041)	0.020 (211/211) (0.004-0.045)	0
	GS 24						
	Be-7	0.020	0.070 (8/8) (0.045-0.092)	K-2, WPS Bldg. 8.91 NNE	0.074 (4/4) (0.047-0.093)	0.069 (16/16) (0.047-0.093)	0
	Nb-95	0.0024	< LLD	-	-	< LLD	0
	Zr-Nb-95	0.0023	< LLD	-	-	< LLD	0
	Ru-103	0.0019	< LLD	-	-	< LLD	0
	Ru-106	0.0097	< LLD	-	-	< LLD	0
	Cs-134	0.0011	< LLD	-	-	< LLD	0
	Cs-137	0.0011	< LLD	-	-	< LLD	0
	Ce-141	0.0029	< LLD	-	-	< LLD	0
	Ce-144	0.0053	< LLD	-	-	< LLD	0
Airborne Iodine (pCi/m^3)	I-131 317	0.03	< LLD	-	-	< LLD	0
Precipitation (pCi/L)	H-3 12	180	< LLD	-	-	none	0
Milk (pCi/L)	I-131 126	0.5	< LLD	-	-	< LLD	0
	Sr-89 84	1.5	< LLD	-	-	< LLD	0
	Sr-90 84	0.9	0.9 (4/48) (0.9-0.9)	K-3, Siegmund Farm 5.9 N	1.0 (2/12) (1.0-1.0)	1.0 (2/36) (1.0-1.0)	0
	GS 126						
	K-40	50	1376 (72/72) (1163-1535)	K-35, Ducat 6.71 mi. WNW	1396 (18/18) (1227-1505)	1371 (54/54) (1168-1505)	0
	Cs-134	8.1	< LLD	-	-	< LLD	0
	Cs-137	9.2	< LLD	-	-	< LLD	0
	Ba-La-140	15.0	< LLD	-	-	< LLD	0
(g/L)	K-stable 84	1.00	1.69 (48/48) (1.42-1.82)	K-5, Paplham Farm 3.2 NNW	1.70 (12/12) (1.59-1.80)	1.67 (36/36) (1.42-1.79)	0
(g/L)	Ca 84	0.40	0.99 (48/48) (0.87-1.11)	K-39, Wojta Farm, 3.46 mi. N	1.01 (12/12) (0.88-1.11)	0.96 (36/36) (0.80-1.10)	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, 2016

Sample Type (Units)	Type and Number of Analyses[a]	LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean Location[a]	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	4.8	5.0 (1/8)	K-1g, South Well 0.06 W	5 (1/4)	None	0
	GB 24	3.7	12.9 (3/20) (3.9-29.9)	K-38, Sinkula 2.45 mi. WNW	29.9 (1/4)	< LLD	0
	H-3 24	149	< LLD	-	-	< LLD	0
	K-40 24	0.30	3.65 (18/20) (0.60-31.32)	K-38, Sinkula 2.45 mi. WNW	11.39 (3/4) (1.08-31.32)	0.98 (4/4) (0.96-1.02)	0
	Sr-89 4	0.7	< LLD	-	-	None	0
	Sr-90 4	0.5	< LLD	-	-	None	0
	GS 24						
	Mn-54	5.1	< LLD	-	-	< LLD	0
	Fe-59	11.9	< LLD	-	-	< LLD	0
	Co-58	4.3	< LLD	-	-	< LLD	0
	Co-60	4.4	< LLD	-	-	< LLD	0
	Zn-65	7.9	< LLD	-	-	< LLD	0
	Zr-Nb-95	5.6	< LLD	-	-	< LLD	0
	Cs-134	6.1	< LLD	-	-	< LLD	0
	Cs-137	5.3	< LLD	-	-	< LLD	0
	Ba-La-140	7.5	< LLD	-	-	< LLD	0
Domestic Meat	GA 2	0.036	< LLD	-	-	< LLD	0
(pCi/gwet)	GB 2	0.10	2.79 (1/1)	K-24, Fictum Farm 5.4 mi. N	2.79 (1/1) -	2.54 (1/1) -	0
	GS 2						
	Be-7	0.32	< LLD	-	-	< LLD	0
	K-40	0.50	2.53 (1/1)	K-24, Fictum Farm 5.45 mi. N	2.53 (1/1)	2.29 (1/1) -	0
	Nb-95	0.044	< LLD	-	-	< LLD	0
	Zr-95	0.055	< LLD	-	-	< LLD	0
	Ru-103	0.037	< LLD	-	-	< LLD	0
	Ru-106	0.18	< LLD	-	-	< LLD	0
	Cs-134	0.022	< LLD	-	-	< LLD	0
	Cs-137	0.022	< LLD	-	-	< LLD	0
	Ce-141	0.067	< LLD	-	-	< LLD	0
	Ce-144	0.16	< LLD	-	-	< LLD	0
Eggs (pCi/gwet)	GB 8	0.008	1.58 (4/4) (1.42-1.72)	K-24, Fictum Farm 5.45 mi. N	1.58 (4/4) (1.42-1.72)	1.38 (4/4) (1.21-1.48)	0
	Sr-89 8	0.008	< LLD	-	-	< LLD	0
	Sr-90 8	0.003	< LLD	-	-	< LLD	0
	GS 8						
	Be-7	0.074	< LLD	-	-	< LLD	0
	K-40	0.50	1.36 (4/4) (1.18-1.69)	K-24, Fictum Farm 5.45 mi. N	1.36 (4/4) (1.18-1.69)	1.35 (4/4) (1.23-1.57)	0
	Nb-95	0.012	< LLD	-	-	< LLD	0
	Zr-95	0.017	< LLD	-	-	< LLD	0
	Ru-103	0.015	< LLD	-	-	< LLD	0
	Ru-106	0.058	< LLD	-	-	< LLD	0
	Cs-134	0.007	< LLD	-	-	< LLD	0
	Cs-137	0.006	< LLD	-	-	< LLD	0
	Ce-141	0.039	< LLD	-	-	< LLD	0
	Ce-144	0.063	< LLD	-	-	< LLD	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, 2016

Sample Type (Units)	Type and Number of Analyses [a]	LLD [b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean: Location [a]	Location with Highest Annual Mean: Mean (F)[c] Range[c]	Control Locations Mean (F)[c] Range[c]	Number Non-Routine Results[e]
Vegetables (pCi/gwet)	GB 8	0.010	2.97 (2/2) (2.75-3.15)	K-26, Wilfert Farms 9.1 SSW	2.70 (6/6) (1.88-4.37)	2.70 (6/6) (1.88-4.37)	0
	Sr-89 8	0.009	< LLD	-	-	< LLD	0
	Sr-90 8	0.005	< LLD	-	-	< LLD	0
	GS 8						0
	Be-7	0.16	< LLD	-	-	< LLD	0
	K-40	0.50	2.11 (2/2) (1.97-2.24)	K-26, Wilfert Farms 9.1 SSW	2.36 (6/6) (1.55-4.15)	2.36 (6/6) (1.55-4.15)	0
	Nb-95	0.012	< LLD	-	-	< LLD	0
	Zr-95	0.008	< LLD	-	-	< LLD	0
	Ru-103	0.006	< LLD	-	-	< LLD	0
	Ru-106	0.06	< LLD	-	-	< LLD	0
	Cs-134	0.006	< LLD	-	-	< LLD	0
	Cs-137	0.007	< LLD	-	-	< LLD	0
	Ce-141	0.016	< LLD	-	-	< LLD	0
	Ce-144	0.052	< LLD	-	-	< LLD	0
Grain - (Wheat, Clover)	GB 2	0.010	7.31 (2/2) (5.12-9.50)	K-23, Kewaunee Site, 0.5 mi. W	7.31 (2/2) (5.12-9.50)	-	0
(pCi/gwet)	Sr-89 2	0.031	< LLD	-	-	-	0
	Sr-90 2	0.004	0.031 (1/2)	K-23, Kewaunee Site, 0.5 mi. W	0.031 (1/2)	-	0
	GS 2						
	Be-7	0.082	0.76 (2/2) (0.58-0.94)	K-23, Kewaunee Site, 0.5 mi. W	0.76 (2/2) (0.58-0.94)		0
	K-40	0.50	4.92 (2/2) (3.85-5.99)	K-23, Kewaunee Site, 0.5 mi. W	4.92 (2/2) (3.85-5.99)	-	0
	Nb-95	0.011	< LLD	-	-	< LLD	0
	Zr-95	0.021	< LLD	-	-	< LLD	0
	Ru-103	0.013	< LLD	-	-	< LLD	0
	Ru-106	0.09	< LLD	-	-	< LLD	0
	Cs-134	0.011	< LLD	-	-	< LLD	0
	Cs-137	0.015	< LLD	-	-	< LLD	0
	Ce-141	0.019	< LLD	-	-	< LLD	0
	Ce-144	0.07	< LLD	-	-	< LLD	0
Cattlefeed (pCi/gwet)	GB 12	0.10	12.26 (8/8) (3.89-22.56)	K-39, Wojta Farm 3.46 mi. N	14.10 (2/2) (10.15-18.05)	12.73 (4/4) (4.92-19.34)	0
	Sr-89 12	0.044	< LLD	-	-	< LLD	0
	Sr-90 12	0.016	0.018 (5/8) (0.005-0.026)	K-38, Sinkula Farm 2.45 mi. WNW	0.026 (1/2)	0.017 (3/4) (0.005-0.023)	0
	GS 12						
	Be-7	0.23	0.50 (5/8) (0.13-1.37)	K-5, Paplham Farm 3.2 NNW	1.37 (1/2)	0.45 (2/4) (0.31-0.58)	0
	K-40	0.10	9.98 (8/8) (2.99-17.69)	K-39, Wojta Farm 3.46 mi. N	11.48 (2/2) (7.86-15.10)	10.54 (4/4) (3.50-18.30)	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, 2016

Sample Type (Units)	Type and Number of Analyses[a]	LLD[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]
Cattlefeed (continued)	Nb-95	0.029	< LLD	-	-	< LLD	0
	Zr-95	0.052	< LLD	-	-	< LLD	0
	Ru-103	0.029	< LLD	-	-	< LLD	0
	Ru-106	0.22	< LLD	-	-	< LLD	0
	Cs-134	0.030	< LLD	-	-	< LLD	0
	Cs-137	0.030	< LLD	-	-	< LLD	0
	Ce-141	0.051	< LLD	-	-	< LLD	0
	Ce-144	0.23	< LLD	-	-	< LLD	0
Grass (pCi/gwet)	GB 24	0.10	7.83 (18/18) (5.48-9.94)	K-3, Siegmund Farm 5.9 N	10.00 (3/3) (8.54-12.09)	8.78 (6/6) (6.4-12.09)	0
	Sr-89 24	0.066	< LLD	-	-	< LLD	0
	Sr-90 24	0.026	< LLD	-	-	< LLD	0
	GS 24						
	Be-7		2.36 (18/18) (0.36-6.31)	K-1b, Middle Creek 0.12 N	3.05 (3/3) (0.79-5.33)	1.63 (6/6) (0.26-3.81)	0
	K-40	0.50	6.59 (18/18) (4.67-8.72)	K-5, Paplham Farm 3.2 NNW	7.42 (3/3) (6.35-8.72)	7.16 (6/6) (6.97-9.11)	0
	Nb-95	0.010	< LLD	-	-	< LLD	0
	Zr-95	0.014	< LLD	-	-	< LLD	0
	Ru-103	0.012	< LLD		-	< LLD	0
	Ru-106	0.10	< LLD	-	-	< LLD	0
	Cs-134	0.009	< LLD	-	-	< LLD	0
	Cs-137	0.010	< LLD	-	-	< LLD	0
	Ce-141	0.013	< LLD	-	-	< LLD	0
	Ce-144	0.067	< LLD	-	-	< LLD	0
Soil (pCi/gdry)	GA 14	4.6	8.45 (10/10) (7.53-9.79)	K-1f, Met Tower 0.12 S	9.52 (2/2) (9.25-9.79)	6.96 (4/4) (4.12-7.98)	0
	GB 14	2.0	28.10 (10/10) (24.77-32.63)	K-38, Sinkula Farm 2.45 mi. WNW	31.46 (2/2) (30.29-32.63)	24.66 (4/4) (22.66-28.33)	0
	Sr-89 14	0.11	< LLD	-	-	< LLD	0
	Sr-90 14	0.039	< LLD	-	-	< LLD	0
	GS 14						
	Be-7	0.50	< LLD	-	-	< LLD	0
	K-40	1.4	19.98 (10/10) (17.75-23.22)	K-38, Sinkula Farm 2.45 mi. WNW	22.51 (2/2) (21.80-23.22)	18.08 (4/4) (16.22-19.50)	0
	Nb-95	0.080	< LLD	-	-	< LLD	0
	Zr-95	0.093	< LLD	-	-	< LLD	0
	Ru-103	0.068	< LLD		-	< LLD	0
	Ru-106	0.30	< LLD	-	-	< LLD	0
	Cs-134	0.034	< LLD	-	-	< LLD	0
	Cs-137	0.000	0.10 (10/10) (0.06-0.13)	K-3, Siegmund Farm 5.9 N	0.12 (2/2) (0.11-0.13)	0.10 (4/4) (0.07-0.13)	0
	Ce-141	0.15	< LLD	-	-	< LLD	0
	Ce-144	0.22	< LLD	-	-	< LLD	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, 2016

Sample Type (Units)	Type and Number of Analyses[a]	LLD[b]	Indicator Locations Mean (F)[c] Range[c]	Location with Highest Annual Mean: Location[a]	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	1.5	5.2 (84/84) (1.1-62.6)	K-1a, North Creek 0.62 N	13.4 (12/12) (3.9-62.6)	1.6 (24/24) (0.6-2.3)	0
(pCi/L)	GS 108						
	Mn-54	15	< LLD	-	-	< LLD	0
	Fe-59	30	< LLD	-	-	< LLD	0
	Co-58	15	< LLD	-	-	< LLD	0
	Co-60	15	< LLD	-	-	< LLD	0
	Zn-65	30	< LLD	-	-	< LLD	0
	Zr-Nb-95	15	< LLD	-	-	< LLD	0
	Cs-134	10	< LLD	-	-	< LLD	0
	Cs-137	10	< LLD	-	-	< LLD	0
	Ba-La-140	15	< LLD	-	-	< LLD	0
	H-3 36	173	< LLD	-	-	< LLD	0
	Sr-89 36	2.0	< LLD	-	-	< LLD	0
	Sr-90 36	0.7	< LLD	-	-	< LLD	0
	K-40 108	0.87	4.1 (84/84) (1.1-64.1)	K-1a, North Creek 0.62 N	12.1 (12/12) (3.7-64.1)	1.2 (24/24) (1.0-1.3)	0
Fish (Muscle) (pCi/gwet)	GB 3	0.5	4.00 (3/3) (3.45-4.51)	K-1d, Cond. Discharge 0.10 mi. E	4.00 (3/3) (3.45-4.51)	None	0
	GS 3						
	K-40	0.5	3.58 (3/3) (3.39-3.76)	K-1d, Cond. Discharge 0.10 mi. E	3.58 (3/3) (3.39-3.76)	None	0
	Mn-54	0.030	< LLD	-	-	None	0
	Fe-59	0.072	< LLD	-	-	None	0
	Co-58	0.026	< LLD	-	-	None	0
	Co-60	0.018	< LLD	-	-	None	0
	Cs-134	0.030	< LLD	-	-	None	0
	Cs-137	0.037	< LLD	-	-	None	0
Fish (Bones) (pCi/gwet)	GB 3	0.5	3.19 (3/3) (2.13-4.48)	K-1d, Cond. Discharge 0.10 mi. E	3.19 (3/3) (2.13-4.48)	None	0
	Sr-89 3	0.33	< LLD	-	-	None	0
	Sr-90 3	0.11	0.18 (2/3) (0.18-0.18)	K-1d, Cond. Discharge 0.10 mi. E	0.18 (2/3) (0.18-0.18)	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, 2016

Sample Type (Units)	Type and Number of Analyses[a]	LLD[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 17	0.10	3.01 (15/15) (0.87-5.28)	K-9, Rostok Intake 11.5 NNE	6.15 (2/2) (5.99-6.30)	6.15 (2/2) (5.99-6.30)	0
(pCi/gwet)	Sr-89 17	0.056	< LLD	-	-	< LLD	0
	Sr-90 17	0.014	0.018 (6/15) (0.007-0.030)	K-1b,Middle Creek 0.12 N	0.022 (3/5)	0.018 (1/2)	0
	GS 17						
	Be-7		0.75 (13/15) (0.15-2.29)	K-1e, South Creek 0.12 S	0.94 (4/4) (0.22-1.32)	0.37 (2/2) (0.16-0.58)	0
	K-40	0.5	2.97 (15/15) (1.00-4.73)	K-9, Rostok Intake 11.5 NNE	4.72 (2/2) (4.49-4.94)	4.72 (2/2) (4.49-4.94)	0
	Mn-54	0.008	< LLD	-	-	< LLD	0
	Co-58	0.008	< LLD	-	-	< LLD	0
	Co-60	0.018	< LLD	-	-	< LLD	0
			< LLD	-	-		
	Nb-95	0.019	< LLD	-	-	< LLD	0
	Zr-95	0.016	< LLD	-	-	< LLD	0
	Ru-103	0.013	< LLD	-	-	< LLD	0
	Ru-106	0.06	< LLD	-	-	< LLD	0
	Cs-134	0.007	< LLD	-	-	< LLD	0
	Cs-137	0.008	0.012 (8/15) (0.005-0.024)	K-1d, Cond. Discharge 0.10 mi. E	0.016 (3/3) (0.012-0.024)	< LLD	0
	Ce-141	0.025	< LLD	-	-	< LLD	0
	Ce-144	0.04	< LLD	-	-	< LLD	0
	Sb-125	0.032	0.054 (1/15)	K-1d, Cond. Discharge 0.10 mi. E	0.054 (1/3)		
Bottom Sediments	GB 10	1.0	8.91 (8/8) (6.08-10.26)	K-9, Rostok Intake 11.5 NNE	18.92 (2/2) (18.80-19.04)	18.92 (2/2) (18.8-19.04)	0
(pCi/gdry)	Sr-89 10	0.086	< LLD	-	-	< LLD	0
	Sr-90 10	0.037	< LLD	-	-	< LLD	0
	GS 10						
	K-40	0.5	5.76 (8/8) (3.66-6.86)	K-9, Rostok Intake 11.5 NNE	13.07 (2/2) (12.30-13.83)	13.07 (2/2) (12.30-13.83)	0
	Co-58	0.038	< LLD	-	-	< LLD	0
	Co-60	0.024	< LLD	-	-	< LLD	0
	Cs-134	0.020	< LLD	-	-	< LLD	0
	Cs-137	0.027	< LLD	-	-	< LLD	0

[a] GA = gross alpha, GB = gross beta, GS = gamma spectroscopy, TR = total residue.
[b] LLD = nominal lower limit of detection based on a 4.66 sigma counting error for background sample.
[c] Mean and range are based on detectable measurements only (i.e., >LLD) 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	1			X	4.62	
A	12		X		3.71	
A	24	X			1.12	
B	18			X	2.70	K-34
B	24	X			1.01	K-10
B	18		X		2.12	
R	23		X	X	2.16	
R	26	X			0.96	K-11
Q	23	X			1.27	
Q	23		X	X	1.53	K-27
P	27		X	X	2.45	K-38
P	26	X			1.35	
N	26		X		1.03	
N	28			X	2.37	
N	35	X			0.94	
M	3		X		2.47	
M	35	X			1.38	
M	4			X	2.89	
L	35	X	X		1.00	
L	4			X	3.26	
K	15			X	3.40	
K	36	X	X		0.91	
J	11	X	X	(Note 2)	2.72	

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

No changes to the nearest residence, nearest garden or nearest milk animal locations were identified.

5.0 REFERENCES

Arnold. J. R. and H. A. Al-Salih. 1955. Beryllium-7 Produced by Cosmic Rays. Science 121: 451-453.

Eisenbud, M. 1963. Environmental Radioactivity, McGraw-Hill, New York, New York, pp. 213, 275, and 276.

Gold, S., H. W. Barkhau, B. Shlein, and B. Kahn, 1964 Measurement of Naturally Occurring Radionuclides in Air, in the Natural Radiation Environment, University of Chicago Press, Chicago, Illinois, 369-382.

ATI Environmental, Inc., Midwest Laboratory.

_____ 2001 to 2014. Annual Report. Radiological Monitoring Program for the Kewaunee Power Station, Kewaunee, Wisconsin, Final Report, Part II, Data Tabulations and Analysis, January - December 2000 – 2014.

_____ 1984 to 2000. (formerly Teledyne Brown Engineering Environmental Services, Midwest Laboratory) Annual Reports. Radiological Monitoring Program for the Kewaunee Power Station, Kewaunee, Wisconsin, Final Report, Part II, Data Tabulations and Analysis, January - December 1983 through January - December 1999.

_____ 1979 to 1983. (formerly Hazleton Environmental Sciences Corporation) Annual Reports. Radiological Monitoring for the Kewaunee Power Station, Kewaunee, Wisconsin, Final Report - Part II, Data Tabulations and Analysis, January - December, 1978 through 1982.

_____ 1977 to 1978. (formerly NALCO Environmental Sciences Corporation) Annual Reports. Radiological Monitoring for the Kewaunee Power Station, Kewaunee, Wisconsin, Final Report - Part II, Data Tabulations and Analysis, January - December, 1976 to 1977.

_____ 2016. Quality Manual, Rev. 2, 9 May 2016.

_____ 2012. Quality Assurance Program Manual, Rev. 3, 14 November 2012.

_____ 2009. Quality Control Procedures Manual, Rev. 2, 08 July 2009.

_____ 2009. Quality Control Program, Rev. 2, 12 November 2009.

Industrial BIO-TEST Laboratories, Inc. 1974. Annual Report. Pre-operational Radiological Monitoring Program for the Kewaunee Power Station. Kewaunee, Wisconsin. January - December 1973.

Industrial BIO-TEST Laboratories, Inc. 1975 Semi-annual Report. Radiological Monitoring Program for the Kewaunee Power Station, Kewaunee, Wisconsin. Jan. - June, 1975.

National Center for Radiological Health. 1968. Section 1. Milk Surveillance. Radiological Health Data Rep., December 9: 730-746.

National Council on Radiation Protection and Measurements. 1975. Natural Radiation Background in the United States. NCRP Report No. 45.

Solon, L. R., W. M. Lowder, A. Shambron, and H. Blatz. 1960. Investigations of Natural Environmental Radiation. Science. 131: 903-906.

U.S. Environmental Protection Agency, 2007. RadNet, formerly Environmental Radiation Ambient Monitoring System, Gross Beta in Air (WI) 1981 – 2000.

Wilson, D.W., G. M. Ward, and J. E. Johnson, 1969. Environmental Contamination by Radioactive Materials. International Atomic Energy Agency, p. 125

American National Standards Institute/Health Physics Society (ANSI/HPS) N13.37 - 2014, Environmental Dosimetry – Criteria for System Design and Implementation.

ATI Environmental, Inc.
Midwest Laboratory
700 Landwehr Road • Northbrook, IL 60062-2310
phone (847) 564-0700 • fax (847) 564-4517

APPENDIX A

INTERLABORATORY COMPARISON PROGRAM RESULTS

NOTE: Environmental Inc., Midwest Laboratory participates in intercomparison studies administered by Environmental Resources Associates, and serves as a replacement for studies conducted previously by the U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. Results are reported in Appendix A. TLD Intercomparison results, in-house spikes, blanks, duplicates and mixed analyte performance evaluation program results are also reported. Appendix A is updated four times a year; the complete Appendix is included in March, June, September and December monthly progress reports only.

January, 2016 through December, 2016

Appendix A

Interlaboratory 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 REMP specific 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

LABORATORY PRECISION: ONE STANDARD DEVIATION VALUES FOR VARIOUS ANALYSES[a]

Analysis	Level	One standard deviation for single determination
Gamma Emitters	5 to 100 pCi/liter or kg	5.0 pCi/liter
	> 100 pCi/liter or kg	5% of known value
Strontium-89[b]	5 to 50 pCi/liter or kg	5.0 pCi/liter
	> 50 pCi/liter or kg	10% of known value
Strontium-90[b]	2 to 30 pCi/liter or kg	5.0 pCi/liter
	> 30 pCi/liter or kg	10% of known value
Potassium-40	≥ 0.1 g/liter or kg	5% of known value
Gross alpha	≤ 20 pCi/liter	5.0 pCi/liter
	> 20 pCi/liter	25% of known value
Gross beta	≤ 100 pCi/liter	5.0 pCi/liter
	> 100 pCi/liter	5% of known value
Tritium	≤ 4,000 pCi/liter	$\pm 1\sigma$ = 169.85 x (known)$^{0.0933}$
	> 4,000 pCi/liter	10% of known value
Radium-226,-228	≥ 0.1 pCi/liter	15% of known value
Plutonium	≥ 0.1 pCi/liter, gram, or sample	10% of known value
Iodine-131, Iodine-129[b]	≤ 55 pCi/liter	6 pCi/liter
	> 55 pCi/liter	10% of known value
Uranium-238, Nickel-63[b] Technetium-99[b]	≤ 35 pCi/liter	6 pCi/liter
	> 35 pCi/liter	15% of known value
Iron-55[b]	50 to 100 pCi/liter	10 pCi/liter
	> 100 pCi/liter	10% of known value
Other Analyses [b]	---	20% of known value

[a] From EPA publication, "Environmental Radioactivity Laboratory Intercomparison Studies Program", Fiscal Year, 1981-1982, EPA-600/4-81-004.

[b] Laboratory limit.

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

Lab Code	Date	Concentration (pCi/L)				
		Analysis	Laboratory Result	ERA Result	Control Limits	Acceptance
ERW-1392	4/4/2016	Sr-89	43.5 ± 4.3	48.2	37.8 - 55.6	Pass
ERW-1392	4/4/2016	Sr-90	27.5 ± 1.9	28.5	20.7 - 33.1	Pass
ERW-1394 [b]	4/4/2016	Ba-133	65.2 ± 3.8	58.8	48.7 - 64.9	Fail
ERW-1394 [c]	4/4/2016	Ba-133	57.8 ± 5.3	58.8	48.7 - 64.9	Pass
ERW-1394	4/4/2016	Cs-134	43.7 ± 3.0	43.3	34.6 - 47.6	Pass
ERW-1394	4/4/2016	Cs-137	86.1 ± 5.3	78.4	70.6 - 88.9	Pass
ERW-1394	4/4/2016	Co-60	108 ± 44	102	91.8 - 114	Pass
ERW-1394	4/4/2016	Zn-65	240 ± 13	214	193 - 251	Pass
ERW-1397	4/4/2016	Gr. Alpha	52.0 ± 2.2	62.7	32.9 - 77.8	Pass
ERW-1397	4/4/2016	Gr. Beta	33.9 ± 1.2	39.2	26.0 - 46.7	Pass
ERW-1400	4/4/2016	I-131	24.7 ± 0.6	26.6	22.1 - 31.3	Pass
ERW-1402	4/4/2016	Ra-226	15.6 ± 0.5	15.2	11.3 - 17.4	Pass
ERW-1402	4/4/2016	Ra-228	5.28 ± 0.76	5.19	3.12 - 6.93	Pass
ERW-1403	4/4/2016	Uranium	4.02 ± 0.42	4.64	3.39 - 5.68	Pass
ERW-1405	4/4/2016	H-3	8,150 ± 270	7,840	6,790 - 8,620	Pass
SPW-2845	7/7/2015	Ba-133	60.3 ± 5.7	64.7	53.9 - 71.2	Pass
SPW-2845	7/7/2015	Cs-134	48.8 ± 9.3	50.1	40.3 - 55.1	Pass
SPW-2845	7/7/2015	Cs-137	101 ± 8	89.8	80.8 - 101	Pass
SPW-2845	7/7/2015	Co-60	65.1 ± 5.8	59.9	53.9 - 68.4	Pass
SPW-2845	7/7/2015	Zn-65	288 ± 29	265	238 - 310	Pass
ERW-3485	7/11/2016	Sr-89	43.3 ± 6.5	53.3	42.3 - 60.9	Pass
ERW-3485	7/11/2016	Sr-90	39.0 ± 2.8	39.2	28.8 - 45.1	Pass
ERW-3487	7/11/2016	Ba-133	83.3 ± 4.9	82.9	69.7 - 91.2	Pass
ERW-3487	7/11/2016	Cs-134	62.5 ± 4.4	65.3	53.1 - 71.8	Pass
ERW-3487	7/11/2016	Cs-137	98.1 ± 5.6	95.2	85.7 - 107	Pass
ERW-3487	7/11/2016	Co-60	122 ± 5	117	105 - 131	Pass
ERW-3487	7/11/2016	Zn-65	124 ± 9	113	102 - 134	Pass
ERW-3490	7/11/2016	Gr. Alpha	46.6 ± 2.2	48.1	25.0 - 60.5	Pass
ERW-3490	7/11/2016	Gr. Beta	26.8 ± 1.1	28.6	18.2 - 36.4	Pass
ERW-3492	7/11/2016	I-131	23.7 ± 1.0	24.9	20.7 - 29.5	Pass
ERW-3493	7/11/2016	Ra-226	12.9 ± 0.4	12.3	9.2 - 14.2	Pass
ERW-3493	7/11/2016	Ra-228	5.8 ± 0.8	5.8	3.5 - 7.6	Pass
ERW-3493	7/11/2016	Uranium	32.8 ± 0.8	25.2	28.4 - 39.3	Pass
ERW-3495	7/11/2016	H-3	12,400 ± 334	12,400	10,800 - 13,600	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).

[b] No reason determined for failure of Ba-133 result.

[c] The result of reanalysis (Compare to original result, footnoted "b" above).

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

			mrem		
Lab Code	Irradiation Date	Description	Delivered Dose	Reported Dose	Performance [c] Quotient (P)
Environmental, Inc.		Group 1			
2016-1	10/7/2016	Spike 1	135.0	148.3	0.10
2016-1	10/7/2016	Spike 2	135.0	144.3	0.07
2016-1	10/7/2016	Spike 3	135.0	133.2	-0.01
2016-1	10/7/2016	Spike 4	135.0	139.6	0.03
2016-1	10/7/2016	Spike 5	135.0	128.4	-0.05
2016-1	10/7/2016	Spike 6	135.0	123.9	-0.08
2016-1	10/7/2016	Spike 7	135.0	124.0	-0.08
2016-1	10/7/2016	Spike 8	135.0	121.5	-0.10
2016-1	10/7/2016	Spike 9	135.0	148.3	0.10
2016-1	10/7/2016	Spike 10	135.0	126.8	-0.06
2016-1	10/7/2016	Spike 11	135.0	123.3	-0.09
2016-1	10/7/2016	Spike 12	135.0	137.9	0.02
2016-1	10/7/2016	Spike 13	135.0	126.0	-0.07
2016-1	10/7/2016	Spike 14	135.0	127.2	-0.06
2016-1	10/7/2016	Spike 15	135.0	144.5	0.07
2016-1	10/7/2016	Spike 16	135.0	140.5	0.04
2016-1	10/7/2016	Spike 17	135.0	146.0	0.08
2016-1	10/7/2016	Spike 18	135.0	127.7	-0.05
2016-1	10/7/2016	Spike 19	135.0	146.8	0.09
2016-1	10/7/2016	Spike 20	135.0	122.6	-0.09
2016-1	10/7/2016	Spike 21	135.0	108.6	-0.20
2016-1	10/7/2016	Spike 22	135.0	119.6	-0.11
2016-1	10/7/2016	Spike 23	135.0	135.1	0.00
2016-1	10/7/2016	Spike 24	135.0	116.2	-0.14
2016-1	10/7/2016	Spike 25	135.0	118.9	-0.12
2016-1	10/7/2016	Spike 26	135.0	128.5	-0.05
2016-1	10/7/2016	Spike 27	135.0	115.6	-0.14
2016-1	10/7/2016	Spike 28	135.0	126.4	-0.06
2016-1	10/7/2016	Spike 29	135.0	115.0	-0.15
2016-1	10/7/2016	Spike 30	135.0	147.3	0.09
Mean (Spike 1-30)				130.4	0.03 Pass[d]
Standard Deviation (Spike 1-30)				11.5	0.09 Pass[d]

[a] Table A-2 assumes 1 roentgen = 1 rem (NRC -Health Physics Questions and Answers 10 CFR Part 20 - Question 96 - Page Last Reviewed/Updated Thursday, October 01, 2015).

[b] 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.

[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 b]

			mrem		
Lab Code	Irradiation Date	Description	Delivered Dose	Reported Dose	Performance [c] Quotient (P)
Environmental, Inc.		Group 2			
2016-2	10/7/2016	Spike 31	87.0	83.0	-0.05
2016-2	10/7/2016	Spike 32	87.0	88.3	0.01
2016-2	10/7/2016	Spike 33	87.0	83.1	-0.04
2016-2	10/7/2016	Spike 34	87.0	81.4	-0.06
2016-2	10/7/2016	Spike 35	87.0	78.9	-0.09
2016-2	10/7/2016	Spike 36	87.0	80.3	-0.08
2016-2	10/7/2016	Spike 37	87.0	101.1	0.16
2016-2	10/7/2016	Spike 38	87.0	78.3	-0.10
2016-2	10/7/2016	Spike 39	87.0	86.6	0.00
2016-2	10/7/2016	Spike 40	87.0	81.8	-0.06
2016-2	10/7/2016	Spike 41	87.0	84.8	-0.03
2016-2	10/7/2016	Spike 42	87.0	79.9	-0.08
2016-2	10/7/2016	Spike 43	87.0	80.8	-0.07
2016-2	10/7/2016	Spike 44	87.0	80.2	-0.08
2016-2	10/7/2016	Spike 45	87.0	82.7	-0.05
2016-2	10/7/2016	Spike 46	87.0	104.0	0.20
2016-2	10/7/2016	Spike 47	87.0	86.1	-0.01
2016-2	10/7/2016	Spike 48	87.0	104.0	0.20
2016-2	10/7/2016	Spike 49	87.0	86.1	-0.01
2016-2	10/7/2016	Spike 50	87.0	90.8	0.04
2016-2	10/7/2016	Spike 51	87.0	85.7	-0.01
2016-2	10/7/2016	Spike 52	87.0	86.5	-0.01
2016-2	10/7/2016	Spike 53	87.0	86.4	-0.01
2016-2	10/7/2016	Spike 54	87.0	92.6	0.06
2016-2	10/7/2016	Spike 55	87.0	88.6	0.02
2016-2	10/7/2016	Spike 56	87.0	78.9	-0.09
2016-2	10/7/2016	Spike 57	87.0	82.6	-0.05
2016-2	10/7/2016	Spike 58	87.0	80.6	-0.07
2016-2	10/7/2016	Spike 59	87.0	89.9	0.03
2016-2	10/7/2016	Spike 60	87.0	85.0	-0.02
Mean (Spike 31-60)				86.0	0.01 Pass[d]
Standard Deviation (Spike 31-60)				6.9	0.08 Pass[d]

[a] Table A-2 assumes 1 roentgen = 1 rem (NRC -Health Physics Questions and Answers 10 CFR Part 20 - Question 96 - Page Last Reviewed/Updated Thursday, October 01, 2015).

[b] 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.

[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
SPW-290	1/21/2016	Sr-90	38.6 ± 1.5	37.3	22.4 - 52.2	Pass
SPW-292	1/21/2016	Sr-90	35.8 ± 1.6	37.3	22.4 - 52.2	Pass
SPW-294	1/21/2016	C-14	4,689 ± 18	4,735	2,841 - 6,629	Pass
SPW-414	2/1/2016	Ra-228	18.4 ± 2.2	17.7	10.6 - 24.8	Pass
W-020416	2/4/2016	Gr. Alpha	20.8 ± 0.4	20.1	12.0 - 28.1	Pass
W-020416	2/4/2016	Gr. Beta	29.7 ± 0.3	28.9	17.3 - 40.4	Pass
W-021716	2/17/2016	Ra-226	17.9 ± 0.5	16.7	10.0 - 23.4	Pass
W-030716	3/7/2016	Gr. Alpha	16.3 ± 0.8	20.1	12.0 - 28.1	Pass
W-030716	3/7/2016	Gr. Beta	27.0 ± 0.7	28.9	17.3 - 40.4	Pass
SPDW-70046	3/29/2016	Ra-226	13.4 ± 0.4	16.7	10.0 - 23.4	Pass
SPW-1163	3/22/2016	Ra-228	4.2 ± 0.7	4.4	2.6 - 6.2	Pass
SPW-1235	3/29/2016	Gr. Alpha	21.0 ± 0.4	20.1	12.0 - 28.1	Pass
SPW-1235	3/29/2016	Gr. Beta	29.4 ± 0.3	28.9	17.3 - 40.4	Pass
SPW-1739	4/21/2016	Ra-228	16.2 ± 2.0	17.7	10.6 - 24.8	Pass
SPW-2052	4/21/2016	Ra-226	16.0 ± 0.5	16.7	10.0 - 23.4	Pass
W-042616	4/21/2016	Fe-55	1,519 ± 61	1,482	889 - 2,075	Pass
SPW-1823	4/23/2016	Gr. Alpha	21.0 ± 0.4	20.1	12.0 - 28.1	Pass
SPW-1823	4/23/2016	Gr. Beta	26.6 ± 0.3	28.9	17.3 - 40.4	Pass
SPW-1998	4/29/2016	Cs-134	35.9 ± 6.0	36.2	21.7 - 50.6	Pass
SPW-1998	4/29/2016	Cs-137	82.5 ± 7.6	71.9	43.1 - 100.6	Pass
SPW-2097	5/3/2016	H-3	3,349 ± 184	3,280	1,968 - 4,592	Pass
SPW-2132	5/4/2016	H-3	3,174 ± 178	3,280	1,968 - 4,592	Pass
SPW-2229	5/7/2016	H-3	3,182 ± 179	3,280	1,968 - 4,592	Pass
SPW-2313	5/13/2016	H-3	3,183 ± 179	3,280	1,968 - 4,592	Pass
SPW-2341	5/13/2016	H-3	3,201 ± 178	3,280	1,968 - 4,592	Pass
SPW-2374	5/14/2016	H-3	3,037 ± 175	3,280	1,968 - 4,592	Pass
SPW-2411	5/17/2016	Sr-90	37.3 ± 1.6	37.3	22.4 - 52.2	Pass
SPW-2455	5/19/2016	Gr. Alpha	19.3 ± 0.4	20.1	12.0 - 28.1	Pass
SPW-2455	5/19/2016	Gr. Beta	28.6 ± 0.3	28.9	17.3 - 40.4	Pass
SPW-2457	5/19/2016	U-238	48.2 ± 2.4	41.7	25.0 - 58.4	Pass
SPW-2504	5/20/2016	H-3	3,181 ± 178	3,280	1,968 - 4,592	Pass
SPW-2528	5/23/2016	H-3	2,998 ± 175	3,280	1,968 - 4,592	Pass
SPW-2566	5/24/2016	Gr. Alpha	19.8 ± 0.5	20.1	12.0 - 28.1	Pass
SPW-2566	5/24/2016	Gr. Beta	30.4 ± 0.3	28.9	17.3 - 40.4	Pass
W-053116	4/29/2016	Cs-134	34.0 ± 5.0	36.2	21.7 - 50.6	Pass
W-053116	4/29/2016	Cs-137	78.8 ± 7.0	71.9	43.1 - 100.6	Pass
SPW-2704	6/1/2016	Sr-90	38.0 ± 1.6	37.3	22.4 - 52.2	Pass
SPW-2719	6/2/2016	Ra-228	18.1 ± 2.1	17.7	10.6 - 24.8	Pass
SPW-2749	6/3/2016	H-3	3,197 ± 180	3,280	1,968 - 4,592	Pass
SPW-2843	6/7/2016	H-3	3,133 ± 179	3,280	1,968 - 4,592	Pass
SPW-3227	6/17/2016	Ra-226	18.6 ± 0.4	16.7	10.0 - 23.4	Pass
W-061716	4/29/2016	Cs-134	37.3 ± 8.2	36.2	21.7 - 50.6	Pass
W-061716	4/29/2016	Cs-137	79.7 ± 10.8	71.9	43.1 - 100.6	Pass
SPW-3240	6/28/2016	Gr. Alpha	25.3 ± 0.5	20.1	12.0 - 28.1	Pass
SPW-3240	6/28/2016	Gr. Beta	27.1 ± 0.3	28.9	17.3 - 40.4	Pass

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
SPW-3241	7/1/2016	H-3	8,821 ± 283	8,650	5,190 - 12,110	Pass
SPW-3309	7/1/2016	H-3	8,619 ± 278	8,650	5,190 - 12,110	Pass
SPW-3313	7/1/2016	Ra-228	16.6 ± 2.0	17.7	10.6 - 24.8	Pass
SPW-3328	7/6/2016	Sr-89	13.4 ± 9.2	14.8	8.9 - 20.7	Pass
SPW-3328	7/6/2016	Sr-90	12.3 ± 1.3	11.4	6.8 - 16.0	Pass
SPAP-3365	7/7/2016	Gr. Beta	39.7 ± 0.1	42.2	25.3 - 59.0	Pass
SPAP-3367	7/7/2016	Cs-134	1.2 ± 0.7	1.2	0.7 - 1.7	Pass
SPAP-3367	7/7/2016	Cs-137	94.4 ± 2.8	94.0	56.4 - 131.6	Pass
SPW-3370	7/7/2016	C-14	4,444 ± 17	4,735	2,841 - 6,629	Pass
SPW-3373	7/7/2016	Ni-63	446 ± 5	401	241 - 561	Pass
SPW-3375	7/7/2016	Tc-99	545 ± 9	539	324 - 755	Pass
SPW-3519	7/14/2016	H-3	8,621 ± 279	8650	5,190 - 12,110	Pass
SPW-3688	6/29/2016	Ra-226	17.5 ± 0.4	16.7	10.0 - 23.4	Pass
SPW-3711	7/20/2016	H-3	44,368 ± 612	43,766	26,260 - 61,273	Pass
SPW-3774	7/22/2016	H-3	45,259 ± 619	43,766	26,260 - 61,273	Pass
SPW-3776	7/22/2016	Gr. Alpha	23.3 ± 0.5	20.1	12.0 - 28.1	Pass
SPW-3776	7/22/2016	Gr. Beta	27.5 ± 0.3	28.9	17.3 - 40.4	Pass
SPW-3884	7/26/2016	H-3	45,850 ± 623	43,766	26,260 - 61,273	Pass
SPW-3950	7/28/2016	Ra-228	17.8 ± 1.8	16.7	10 - 23	Pass
SPW-3982	7/29/2016	H-3	45,273 ± 619	43,766	26,260 - 61,273	Pass
W-073016	4/29/2016	Cs-134	36.5 ± 6.1	36.2	21.7 - 50.6	Pass
W-073016	4/29/2016	Cs-137	80.6 ± 7.5	71.9	43.1 - 100.6	Pass
SPW-4134	8/4/2016	Ra-228	5.5 ± 0.8	6.7	4.0 - 9.3	Pass
SPW-4340	8/17/2016	Ra-228	19.9 ± 2.0	16.7	10.0 - 23.4	Pass
SPW-4386	7/15/2016	Ra-226	18.0 ± 0.4	16.7	10.0 - 23.4	Pass
W-082716	4/29/2016	Ra-228	32.5 ± 5.2	36.2	21.7 - 50.6	Pass
W-082716	4/29/2016	Ra-226	78.5 ± 8.3	71.9	43.1 - 100.6	Pass
SPW-4642	9/6/2016	U-238	45.8 ± 2.5	41.7	25.0 - 58.4	Pass
SPW-4999	9/26/2016	Sr-90	35.1 ± 2.2	36.8	22.1 - 51.5	Pass
SPW-5091	9/12/2016	Ra-226	18.2 ± 0.4	16.7	10.0 - 23.4	Pass
W-092716	4/29/2016	Cs-134	37.3 ± 11.8	36.2	21.7 - 50.6	Pass
W-092716	4/29/2016	Cs-137	78.3 ± 11.2	71.9	43.1 - 100.6	Pass
SPW-5165	9/30/2016	Gr. Alpha	22.2 ± 0.4	20.1	12.0 - 28.1	Pass
SPW-5165	9/30/2016	Gr. Beta	27.2 ± 0.3	28.9	17.3 - 40.4	Pass
SPW-5426	9/28/2016	Ra-226	18.2 ± 0.4	16.7	10.0 - 23.4	Pass
SPW-5510	10/18/2016	H-3	44,398 ± 618	43,766	26,260 - 61273	Pass
SPW-5553	10/19/2016	U-238	50.0 ± 2.6	41.7	25.0 - 58.4	Pass
SPW-5555	10/19/2016	Ra-228	17.4 ± 1.9	16.7	10.0 - 23.4	Pass
SPW-5612	10/20/2016	H-3	44,681 ± 622	43,766	26,260 - 61,273	Pass
SPW-5741	10/25/2016	H-3	44,946 ± 624	43,766	26,260 - 61,273	Pass
SPU-5833	10/26/2016	H-3	10,018 ± 946	8,622	5,173 - 12,071	Pass
SPW-5862	10/28/2016	H-3	18,061 ± 374	17,244	10,346 - 24,141	Pass
W-103116	4/29/2016	Cs-134	36.0 ± 4.6	36.2	21.7 - 50.6	Pass
W-103116	4/29/2016	Cs-137	81.1 ± 7.3	71.9	43.1 - 100.6	Pass

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
SPW-5984	11/2/2016	H-3	17,727 ± 399	17,244	10,346 - 24,141	Pass
SPW-6008	11/4/2016	H-3	17,854 ± 402	17,244	10,346 - 24,141	Pass
SPW-6124	11/8/2016	Ra-228	14.4 ± 1.9	16.0	9.6 - 22.4	Pass
SPW-6132	11/9/2016	H-3	18,135 ± 374	17,243	10,346 - 24,140	Pass
SPW-6135	10/12/2016	Ra-226	18.9 ± 0.4	16.7	10.0 - 23.4	Pass
SPW-6146	11/10/2016	H-3	17,488 ± 398	17,243	10,346 - 24,140	Pass
SPW-6222	11/12/2016	H-3	17,787 ± 408	17,243	10,346 - 24,140	Pass
SPW-6318	11/16/2016	H-3	17,379 ± 408	17,243	10,346 - 24,140	Pass
SPW-6349	11/17/2016	H-3	17,893 ± 371	17,243	10,346 - 24,140	Pass
SPW-6424	11/19/2016	H-3	18,258 ± 379	17,243	10,346 - 24,140	Pass
W-112616	4/29/2016	Cs-134	35.0 ± 6.0	36.2	21.7 - 50.6	Pass
W-112616	4/29/2016	Cs-137	75.0 ± 7.1	71.9	43.1 - 100.6	Pass
SPW-6456	11/28/2016	Sr-90	41.9 ± 2.5	36.8	22.1 - 51.5	Pass
SPW-6486	11/30/2016	Sr-90	35.6 ± 2.2	36.6	21.9 - 51.2	Pass
SPW-6490	11/29/2016	Ra-226	18.8 ± 0.4	16.7	10.0 - 23.4	Pass
SPW-6519	11/30/2016	Ni-63	438 ± 4	400	240 - 560	Pass
SPW-6527	12/1/2016	U-238	49.5 ± 2.5	41.7	25.0 - 58.4	Pass
SPW-6616	12/3/2016	H-3	18,018 ± 374	17,243	10,346 - 24,140	Pass
SPW-6669	12/5/2016	H-3	18,237 ± 377	17,243	10,346 - 24,140	Pass
SPW-6735	12/9/2016	H-3	17,939 ± 396	17,243	10,346 - 24,140	Pass
SPW-6880	12/21/2016	H-3	17,835 ± 396	17,243	10,346 - 24,140	Pass
SPW-6947	12/22/2016	Ni-63	450 ± 4	400	240 - 560	Pass
W-122316	4/29/2016	Cs-134	36.0 ± 2.2	36.2	21.7 - 50.6	Pass
W-122316	4/29/2016	Cs-134	76.1 ± 2.9	71.9	43.1 - 100.6	Pass
SPW-6948	12/30/2016	H-3	17,999 ± 398	17,243	10,346 - 24,140	Pass
SPW-6974	12/29/2016	Ra-226	17.6 ± 0.4	16.7	10.0 - 23.4	Pass

[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 established from the precision values listed in Attachment A of this report, adjusted to ± 2s.

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-289	Water	1/21/2016	Sr-90	0.55	0.28 ± 0.29	1
SPW-291	Water	1/21/2016	Sr-90	0.61	0.15 ± 0.30	1
SPW-293	Water	1/21/2016	C-14	147	-12 ± 89	200
SPW-413	Water	2/1/2016	Ra-228	0.86	1.86 ± 0.60	2
W-020416	Water	2/4/2016	Gr. Alpha	0.43	-0.17 ± 0.28	2
W-020416	Water	2/4/2016	Gr. Beta	0.73	0.36 ± 0.53	4
W-020916	Water	2/9/2016	Ra-226	0.02	0.01 ± 0.01	2
W-030716	Water	3/7/2016	Gr. Alpha	0.90	-0.36 ± 0.32	2
W-030716	Water	3/7/2016	Gr. Beta	1.59	-0.62 ± 0.71	4
SPDW-70045	Water	3/29/2016	Ra-226	0.03	0.01 ± 0.02	2
SPDW-1234	Water	3/30/2016	Gr. Alpha	0.44	-0.05 ± 0.30	2
SPDW-1234	Water	3/30/2016	Gr. Beta	0.79	-0.54 ± 0.54	4
SPW-1738	Water	4/21/2016	Ra-228	1.05	0.13 ± 0.50	2
SPW-1822	Water	4/23/2016	Gr. Alpha	0.50	-0.18 ± 0.33	2
SPW-1822	Water	4/23/2016	Gr. Beta	0.08	-0.35 ± 0.51	4
SPW-2051	Water	4/12/2016	Ra-226	0.02	0.03 ± 0.02	2
SPW-2069	Water	5/3/2016	I-131	0.15	0.06 ± 0.09	1
SPW-2133	Water	5/4/2016	H-3	148	55 ± 76	200
SPW-2230	Water	5/7/2016	H-3	149	-11 ± 73	200
SPW-2314	Water	5/13/2016	H-3	150	-29 ± 72	200
SPW-2342	Water	5/13/2016	H-3	143	50 ± 74	200
SPW-2364	Water	5/13/2016	I-131	0.22	-0.03 ± 0.12	1
SPW-2375	Water	5/14/2016	H-3	146	1 ± 70	200
SPW-2410	Water	5/17/2016	Sr-90	0.59	0.10 ± 0.29	1
SPW-2454	Water	5/19/2016	Gr. Alpha	0.47	-0.21 ± 0.31	2
SPW-2454	Water	5/19/2016	Gr. Beta	0.77	-0.49 ± 0.52	4
SPW-2456	Water	5/19/2016	U-238	0.15	0.00 ± 0.09	1
SPW-2485	Water	5/20/2016	I-131	0.18	-0.01 ± 0.10	1
SPW-2505	Water	5/20/2016	H-3	144	64 ± 75	200
SPW-2529	Water	5/23/2016	H-3	152	-3 ± 75	200
SPW-2530	Water	5/23/2016	Ra-228	0.96	-0.12 ± 0.43	2
SPW-2565	Water	5/24/2016	Gr. Alpha	0.47	0.03 ± 0.33	2
SPW-2565	Water	5/24/2016	Gr. Beta	0.77	-0.23 ± 0.53	4
SPW-2703	Water	6/1/2016	Sr-89	0.68	-0.13 ± 0.50	5
SPW-2703	Water	6/1/2016	Sr-90	0.55	0.11 ± 0.27	1
SPW-2718	Water	6/2/2016	Ra-228	0.67	0.23 ± 0.34	2
SPW-2720	Water	6/2/2016	I-131	0.16	0.01 ± 0.09	1
SPW-2750	Water	6/3/2016	H-3	151	-31 ± 73	200
SPW-2844	Water	6/7/2016	H-3	148	-55 ± 75	200
SPMI-2959	Milk	6/14/2016	I-131	0.16	0.09 ± 0.10	1
SPW-3137	Water	6/23/2016	I-131	0.15	-0.03 ± 0.08	1
SPW-3226	Water	6/17/2016	Ra-226	0.02	-0.01 ± 0.04	2
SPW-3239	Water	6/28/2016	Gr. Alpha	0.40	-0.15 ± 0.26	2
SPW-3239	Water	6/28/2016	Gr. Beta	0.73	0.14 ± 0.52	4
SPW-3687	Water	6/29/2016	Ra-226	0.04	0.03 ± 0.03	2

[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-3312	Water	7/1/2016	Ra-228	0.67	0.35 ± 0.35	2
SPW-3327	Water	7/6/2016	Sr-89	0.67	0.51 ± 0.51	5
SPW-3327	Water	7/6/2016	Sr-90	0.60	-0.14 ± 0.26	1
SPAP-3364	AP	7/7/2016	Gr.Beta	0.002	0.005 ± 0.001	0.01
SPW-3370	Water	7/7/2016	C-14	115	49 ± 71	200
SPW-3372	Water	7/7/2016	Ni-63	122	115 ± 76	200
SPW-3374	Water	7/7/2016	Tc-99	6.07	1.00 ± 3.70	10
SPW-3710	Water	7/20/2016	H-3	147	35 ± 75	200
SPW-3775	Water	7/22/2016	Gr. Alpha	0.73	0.41 ± 0.53	2
SPW-3775	Water	7/22/2016	Gr. Beta	0.45	-0.14 ± 0.30	4
SPW-3884	Water	7/26/2016	H-3	151	-1 ± 73	200
SPW-3949	Water	7/28/2016	Ra-228	0.76	0.32 ± 0.39	2
SPW-3982	Water	7/29/2016	H-3	145	49 ± 75	200
SPW-4133	Water	8/4/2016	Ra-228	0.80	0.26 ± 0.40	2
SPW-4257	Water	8/11/2016	I-131	0.17	-0.01 ± 0.10	1
SPW-4339	Water	8/17/2016	Ra-228	0.73	0.36 ± 0.39	2
SPW-4385	Water	7/15/2016	Ra-226	0.09	0.75 ± 0.09	2
SPW-4641	Water	9/6/2016	U-238	0.21	0.00 ± 0.13	1
SPW-4684	Water	9/8/2016	H-3	151	48 ± 78	200
SPW-4872	Water	9/16/2016	I-131	0.21	0.05 ± 0.11	1
SPW-4998	Water	9/26/2016	Sr-89	0.54	0.06 ± 0.39	5
SPW-4998	Water	9/26/2016	Sr-90	0.53	-0.03 ± 0.24	1
SPW-5090	Water	8/19/2016	Ra-226	0.03	0.03 ± 0.02	2
SPW-5164	Water	9/30/2016	Gr. Alpha	0.46	-0.05 ± 0.32	2
SPW-5164	Water	9/30/2016	Gr. Beta	0.74	-0.02 ± 0.52	4
SPW-5425	Water	9/28/2016	Ra-226	0.02	0.07 ± 0.05	2
SPW-5323	Water	10/7/2016	H-3	157	-12 ± 75	200
SPW-5552	Water	10/19/2016	U-238	0.18	0.00 ± 0.11	1
SPW-5554	Water	10/19/2016	Ra-228	0.72	0.22 ± 0.36	2
SPW-5611	Water	10/20/2016	H-3	153	67 ± 80	200
SPW-5613	Water	10/21/2016	Gr. Alpha	0.76	-0.55 ± 0.51	2
SPW-5613	Water	10/21/2016	Gr. Beta	0.42	0.02 ± 0.29	4
SPW-5740	Water	10/25/2016	H-3	154	-2 ± 72	200
SPW-5743	Water	10/25/2016	Sr-90	1.26	0.72 ± 0.67	1
SPW-5861	Water	10/28/2016	H-3	179	129 ± 91	200
SPW-5983	Water	11/2/2016	H-3	156	8 ± 78	200
SPW-6007	Water	11/4/2016	H-3	156	-34 ± 73	200
SPW-6131	Water	11/9/2016	H-3	180	80 ± 92	200
SPW-6134	Water	10/12/2016	Ra-226	0.05	-0.02 ± 0.12	2
SPW-6145	Water	11/10/2016	H-3	171	-46 ± 80	200
SPW-6317	Water	11/16/2016	H-3	180	-43 ± 82	200
SPW-6348	Water	11/17/2016	H-3	182	-45 ± 88	200
SPW-6423	Water	11/19/2016	H-3	181	8 ± 95	200
SPW-6455	Water	11/28/2016	Sr-89	0.58	-0.15 ± 0.46	5
SPW-6455	Water	11/28/2016	Sr-90	0.67	0.09 ± 0.32	1
SPW-6489	Water	11/29/2016	Ra-226	0.03	0.03 ± 0.02	2

[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-6529	Water	12/1/2016	I-131	0.18	-0.03 ± 0.10	1
SPW-6616	Water	12/3/2016	H-3	180	72 ± 92	200
SPW-6670	Water	12/5/2016	H-3	174	28 ± 92	200
SPW-6735	Water	12/9/2016	H-3	152	2 ± 73	200
SPW-6792	Water	12/15/2016	I-131	0.17	0.03 ± 0.12	1
SPW-6819	Water	12/16/2016	H-3	158	14 ± 77	200
SPW-6879	Water	12/21/2016	H-3	147	80 ± 75	200
SPW-6947	Water	12/22/2016	Ni-63	93	26 ± 57	200
SPW-6973	Water	12/29/2016	Ra-226	0.03	0.03 ± 0.02	2

[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-010416	1/4/2016	Gr. Beta	0.044 ± 0.006	0.051 ± 0.006	0.047 ± 0.004	Pass
SPS-62, 63	1/7/2016	K-40	21.1 ± 1.9	21.2 ± 2.1	21.2 ± 1.4	Pass
WW-125, 126	1/7/2016	H-3	659 ± 102	748 ± 106	703 ± 74	Pass
SPS-199, 200	1/7/2016	Cs-137	0.09 ± 0.02	0.08 ± 0.03	0.08 ± 0.02	Pass
SPS-199, 200	1/7/2016	K-40	7.60 ± 0.60	8.62 ± 0.62	8.11 ± 0.43	Pass
AP-011116	1/11/2016	Gr. Beta	0.024 ± 0.005	0.027 ± 0.005	0.026 ± 0.003	Pass
AP-011216	1/12/2016	Gr. Beta	0.030 ± 0.004	0.034 ± 0.004	0.032 ± 0.003	Pass
WW-262, 263	1/14/2016	H-3	153 ± 78	141 ± 78	147 ± 55	Pass
WW-346, 347	1/14/2016	H-3	1,036 ± 117	959 ± 115	997 ± 82	Pass
WW-283, 284	1/18/2016	H-3	437 ± 92	427 ± 91	432 ± 65	Pass
AP-011916	1/19/2016	Gr. Beta	0.042 ± 0.005	0.037 ± 0.004	0.040 ± 0.003	Pass
AP-012016	1/20/2016	Gr. Beta	0.023 ± 0.003	0.030 ± 0.004	0.027 ± 0.002	Pass
AP-020116	2/1/2016	Gr. Beta	0.023 ± 0.005	0.023 ± 0.005	0.023 ± 0.004	Pass
SWU-472, 473	2/2/2016	Gr. Beta	4.37 ± 0.47	4.60 ± 0.49	4.49 ± 0.34	Pass
SG-493, 494	2/6/2016	Ac-228	2.10 ± 0.20	2.13 ± 0.20	2.12 ± 0.14	Pass
SG-493, 494	2/6/2016	K-40	5.79 ± 0.57	5.50 ± 0.69	5.65 ± 0.45	Pass
SG-493, 494	2/6/2016	Pb-214	1.84 ± 0.11	1.91 ± 0.11	1.88 ± 0.08	Pass
AP-020816	2/8/2016	Gr. Beta	0.020 ± 0.004	0.019 ± 0.004	0.020 ± 0.003	Pass
AP-020916	2/9/2016	Be-7	0.032 ± 0.005	0.041 ± 0.006	0.036 ± 0.004	Pass
SPS-619, 620	2/18/2016	K-40	20.0 ± 1.8	19.1 ± 1.6	19.5 ± 1.2	Pass
WW-640, 641	2/18/2016	H-3	90.1 ± 75.0	153.6 ± 78.4	121.8 ± 54.2	Pass
AP-021916	2/19/2016	Gr. Beta	0.021 ± 0.003	0.025 ± 0.004	0.023 ± 0.002	Pass
WW-822, 823	2/26/2016	H-3	2,770 ± 173	2,974 ± 178	2,872 ± 124	Pass
DW-70010, 70011	2/29/2016	Ra-226	4.88 ± 0.29	4.93 ± 0.28	4.91 ± 0.20	Pass
DW-70010, 70011	2/29/2016	Ra-228	3.00 ± 0.77	1.90 ± 0.62	2.45 ± 0.49	Pass
SW-934, 935	3/1/2016	Gr. Beta	0.94 ± 0.52	1.36 ± 0.60	1.15 ± 0.40	Pass
SPS-913, 914	3/3/2016	Cs-137	0.08 ± 0.03	0.10 ± 0.03	0.09 ± 0.02	Pass
SPS-913, 914	3/3/2016	K-40	17.45 ± 0.94	16.83 ± 0.95	17.14 ± 0.67	Pass
SPS-913, 914	3/3/2016	Ra-226	1.02 ± 0.08	1.13 ± 0.17	1.07 ± 0.09	Pass
SPS-913, 914	3/3/2016	Ra-228	1.09 ± 0.15	1.13 ± 0.17	1.11 ± 0.11	Pass
AP-030716	3/7/2016	Gr. Beta	0.018 ± 0.005	0.021 ± 0.005	0.019 ± 0.003	Pass
F-1303,1304	3/7/2016	K-40	3.320 ± 0.475	3.508 ± 0.396	3.414 ± 0.309	Pass
SG-976, 977	3/8/2016	Ra-226	6.75 ± 0.25	6.28 ± 0.22	6.52 ± 0.17	Pass
SG-976, 977	3/8/2016	Ra-228	9.21 ± 0.49	9.09 ± 0.49	9.15 ± 0.35	Pass
PM-1094, 1095	3/9/2016	K-40	14.01 ± 0.68	14.47 ± 0.72	14.24 ± 0.49	Pass
MI-1042,1043	3/7/2016	K-40	1,684 ± 124	1,804 ± 119	1,744 ± 86	Pass
DW-70023, 70024	3/7/2016	Ra-226	3.40 ± 0.43	2.68 ± 0.35	3.04 ± 0.28	Pass
DW-70023, 70024	3/7/2016	Ra-228	4.46 ± 0.83	5.74 ± 0.94	5.10 ± 0.63	Pass
DW-70014, 70015	3/7/2016	Gr. Alpha	13.38 ± 1.58	11.40 ± 1.43	12.39 ± 1.07	Pass
DW-70026, 70027	3/7/2016	Gr. Alpha	3.46 ± 0.79	3.08 ± 0.74	3.27 ± 0.54	Pass
DW-70038, 70039	3/8/2016	Gr. Alpha	1.14 ± 0.89	1.73 ± 0.95	1.44 ± 0.65	Pass
DW-70035, 70036	3/8/2016	Ra-226	0.47 ± 0.10	0.45 ± 0.09	0.46 ± 0.07	Pass
DW-70035, 70036	3/8/2016	Ra-228	0.56 ± 0.45	0.47 ± 0.44	0.52 ± 0.31	Pass
AP-031516	3/15/2016	Gr. Beta	0.014 ± 0.003	0.016 ± 0.004	0.015 ± 0.002	Pass
AP-032116	3/21/2016	Gr. Beta	0.014 ± 0.004	0.020 ± 0.004	0.017 ± 0.003	Pass
AP-1218,1219	3/24/2016	Be-7	0.135 ± 0.065	0.167 ± 0.081	0.151 ± 0.052	Pass
AP-1719,1720	3/28/2016	Be-7	0.075 ± 0.008	0.076 ± 0.007	0.076 ± 0.005	Pass
AP-033016	3/30/2016	Gr. Beta	0.023 ± 0.004	0.025 ± 0.004	0.024 ± 0.003	Pass
SPS-1260, 1261	3/30/2016	K-40	18.00 ± 1.92	19.67 ± 1.77	18.84 ± 1.30	Pass
XW-1467, 1468	3/30/2016	H-3	310 ± 87	295 ± 86	303 ± 61	Pass
XWW-1530, 1531	3/30/2016	H-3	198 ± 84	162 ± 82	180 ± 59	Pass
AP-1827, 1828	3/30/2016	Be-7	0.069 ± 0.011	0.072 ± 0.011	0.071 ± 0.008	Pass
AP-1323,1324	3/31/2016	Be-7	0.206 ± 0.120	0.197 ± 0.091	0.202 ± 0.076	Pass
LW-1446,1447	3/31/2016	Gr. Beta	2.36 ± 0.93	2.23 ± 1.01	2.29 ± 0.69	Pass

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

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
AP-010416	1/4/2016	Gr. Beta	0.044 ± 0.006	0.051 ± 0.006	0.047 ± 0.004	Pass
SPS-62, 63	1/7/2016	K-40	21.1 ± 1.9	21.2 ± 2.1	21.2 ± 1.4	Pass
WW-125, 126	1/7/2016	H-3	659 ± 102	748 ± 106	703 ± 74	Pass
SPS-199, 200	1/7/2016	Cs-137	0.09 ± 0.02	0.08 ± 0.03	0.08 ± 0.02	Pass
SPS-199, 200	1/7/2016	K-40	7.60 ± 0.60	8.62 ± 0.62	8.11 ± 0.43	Pass
AP-011116	1/11/2016	Gr. Beta	0.024 ± 0.005	0.027 ± 0.005	0.026 ± 0.003	Pass
AP-011216	1/12/2016	Gr. Beta	0.030 ± 0.004	0.034 ± 0.004	0.032 ± 0.003	Pass
WW-262, 263	1/14/2016	H-3	153 ± 78	141 ± 78	147 ± 55	Pass
WW-346, 347	1/14/2016	H-3	1,036 ± 117	959 ± 115	997 ± 82	Pass
WW-283, 284	1/18/2016	H-3	437 ± 92	427 ± 91	432 ± 65	Pass
AP-011916	1/19/2016	Gr. Beta	0.042 ± 0.005	0.037 ± 0.004	0.040 ± 0.003	Pass
AP-012016	1/20/2016	Gr. Beta	0.023 ± 0.003	0.030 ± 0.004	0.027 ± 0.002	Pass
AP-020116	2/1/2016	Gr. Beta	0.023 ± 0.005	0.023 ± 0.005	0.023 ± 0.004	Pass
SWU-472, 473	2/2/2016	Gr. Beta	4.37 ± 0.47	4.60 ± 0.49	4.49 ± 0.34	Pass
SG-493, 494	2/6/2016	Ac-228	2.10 ± 0.20	2.13 ± 0.20	2.12 ± 0.14	Pass
SG-493, 494	2/6/2016	K-40	5.79 ± 0.57	5.50 ± 0.69	5.65 ± 0.45	Pass
SG-493, 494	2/6/2016	Pb-214	1.84 ± 0.11	1.91 ± 0.11	1.88 ± 0.08	Pass
AP-020816	2/8/2016	Gr. Beta	0.020 ± 0.004	0.019 ± 0.004	0.020 ± 0.003	Pass
AP-020916	2/9/2016	Be-7	0.032 ± 0.005	0.041 ± 0.006	0.036 ± 0.004	Pass
SPS-619, 620	2/18/2016	K-40	20.0 ± 1.8	19.1 ± 1.6	19.5 ± 1.2	Pass
WW-640, 641	2/18/2016	H-3	90.1 ± 75.0	153.6 ± 78.4	121.8 ± 54.2	Pass
AP-021916	2/19/2016	Gr. Beta	0.021 ± 0.003	0.025 ± 0.004	0.023 ± 0.002	Pass
WW-822, 823	2/26/2016	H-3	2,770 ± 173	2,974 ± 178	2,872 ± 124	Pass
DW-70010, 70011	2/29/2016	Ra-226	4.88 ± 0.29	4.93 ± 0.28	4.91 ± 0.20	Pass
DW-70010, 70011	2/29/2016	Ra-228	3.00 ± 0.77	1.90 ± 0.62	2.45 ± 0.49	Pass
SW-934, 935	3/1/2016	Gr. Beta	0.94 ± 0.52	1.36 ± 0.60	1.15 ± 0.40	Pass
SPS-913, 914	3/3/2016	Cs-137	0.08 ± 0.03	0.10 ± 0.03	0.09 ± 0.02	Pass
SPS-913, 914	3/3/2016	K-40	17.45 ± 0.94	16.83 ± 0.95	17.14 ± 0.67	Pass
SPS-913, 914	3/3/2016	Ra-226	1.02 ± 0.08	1.13 ± 0.17	1.07 ± 0.09	Pass
SPS-913, 914	3/3/2016	Ra-228	1.09 ± 0.15	1.13 ± 0.17	1.11 ± 0.11	Pass
AP-030716	3/7/2016	Gr. Beta	0.018 ± 0.005	0.021 ± 0.005	0.019 ± 0.003	Pass
F-1303,1304	3/7/2016	K-40	3.320 ± 0.475	3.508 ± 0.396	3.414 ± 0.309	Pass
SG-976, 977	3/8/2016	Ra-226	6.75 ± 0.25	6.28 ± 0.22	6.52 ± 0.17	Pass
SG-976, 977	3/8/2016	Ra-228	9.21 ± 0.49	9.09 ± 0.49	9.15 ± 0.35	Pass
PM-1094, 1095	3/9/2016	K-40	14.01 ± 0.68	14.47 ± 0.72	14.24 ± 0.49	Pass
MI-1042,1043	3/7/2016	K-40	1,684 ± 124	1,804 ± 119	1,744 ± 86	Pass
DW-70023, 70024	3/7/2016	Ra-226	3.40 ± 0.43	2.68 ± 0.35	3.04 ± 0.28	Pass
DW-70023, 70024	3/7/2016	Ra-228	4.46 ± 0.83	5.74 ± 0.94	5.10 ± 0.63	Pass
DW-70014, 70015	3/7/2016	Gr. Alpha	13.38 ± 1.58	11.40 ± 1.43	12.39 ± 1.07	Pass
DW-70026, 70027	3/7/2016	Gr. Alpha	3.46 ± 0.79	3.08 ± 0.74	3.27 ± 0.54	Pass
DW-70038, 70039	3/8/2016	Gr. Alpha	1.14 ± 0.89	1.73 ± 0.95	1.44 ± 0.65	Pass
DW-70035, 70036	3/8/2016	Ra-226	0.47 ± 0.10	0.45 ± 0.09	0.46 ± 0.07	Pass
DW-70035, 70036	3/8/2016	Ra-228	0.56 ± 0.45	0.47 ± 0.44	0.52 ± 0.31	Pass
AP-031516	3/15/2016	Gr. Beta	0.014 ± 0.003	0.016 ± 0.004	0.015 ± 0.002	Pass
AP-032116	3/21/2016	Gr. Beta	0.014 ± 0.004	0.020 ± 0.004	0.017 ± 0.003	Pass
AP-1218,1219	3/24/2016	Be-7	0.135 ± 0.065	0.167 ± 0.081	0.151 ± 0.052	Pass
AP-1719,1720	3/28/2016	Be-7	0.075 ± 0.008	0.076 ± 0.007	0.076 ± 0.005	Pass
AP-033016	3/30/2016	Gr. Beta	0.023 ± 0.004	0.025 ± 0.004	0.024 ± 0.003	Pass
SPS-1260, 1261	3/30/2016	K-40	18.00 ± 1.92	19.67 ± 1.77	18.84 ± 1.30	Pass
XW-1467, 1468	3/30/2016	H-3	310 ± 87	295 ± 86	303 ± 61	Pass
XWW-1530, 1531	3/30/2016	H-3	198 ± 84	162 ± 82	180 ± 59	Pass
AP-1827, 1828	3/30/2016	Be-7	0.069 ± 0.011	0.072 ± 0.011	0.071 ± 0.008	Pass
AP-1323,1324	3/31/2016	Be-7	0.206 ± 0.120	0.197 ± 0.091	0.202 ± 0.076	Pass
LW-1446,1447	3/31/2016	Gr. Beta	2.36 ± 0.93	2.23 ± 1.01	2.29 ± 0.69	Pass

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

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
WW-1740,1741	4/2/2016	H-3	21,162 ± 120	21,091 ± 427	21,126 ± 222	Pass
SPS-1344, 1345	4/4/2016	K-40	17.98 ± 0.93	17.14 ± 0.96	17.56 ± 0.67	Pass
SPS-1344, 1345	4/4/2016	Pb-214	1.12 ± 0.09	1.04 ± 0.08	1.08 ± 0.06	Pass
SPS-1344, 1345	4/4/2016	Ac-228	1.23 ± 0.15	1.33 ± 0.19	1.28 ± 0.12	Pass
SPS-1344, 1345	4/4/2016	Cs-137	0.13 ± 0.03	0.13 ± 0.03	0.13 ± 0.02	Pass
P-1509,1510	4/8/2016	H-3	1,084 ± 120	1,038 ± 119	1,061 ± 85	Pass
AP-041116	4/11/2016	Gr. Beta	0.020 ± 0.004	0.019 ± 0.004	0.019 ± 0.003	Pass
SS-1551,1552	4/12/2016	Gr. Beta	8.71 ± 1.11	8.88 ± 1.13	8.80 ± 0.79	Pass
SS-1551,1552	4/12/2016	K-40	3.50 ± 0.25	3.06 ± 0.28	3.28 ± 0.19	Pass
SS-1551,1552	4/12/2016	Tl-208	0.05 ± 0.02	0.05 ± 0.02	0.05 ± 0.01	Pass
SS-1551,1552	4/12/2016	Bi-214	0.10 ± 0.02	0.09 ± 0.02	0.10 ± 0.02	Pass
SS-1551,1552	4/12/2016	Pb-212	0.13 ± 0.02	0.11 ± 0.02	0.12 ± 0.01	Pass
SS-1551,1552	4/12/2016	Ra-226	0.35 ± 0.17	0.30 ± 0.17	0.32 ± 0.12	Pass
SS-1551,1552	4/12/2016	Ac-228	0.16 ± 0.05	0.17 ± 0.05	0.17 ± 0.04	Pass
SS-1593,1594	4/12/2016	K-40	14.80 ± 0.73	14.89 ± 0.78	14.85 ± 0.53	Pass
WW-1677, 1678	4/14/2016	Ra-226	0.23 ± 0.13	0.35 ± 0.15	0.29 ± 0.10	Pass
WW-1783,1784	4/14/2016	H-3	768 ± 111	632 ± 107	700 ± 77	Pass
BS-1804,1805	4/18/2016	K-40	0.79 ± 0.02	0.87 ± 0.19	0.83 ± 0.10	Pass
WW-2021,2022	4/18/2016	H-3	5,548 ± 221	5,707 ± 224	5,627 ± 157	Pass
XWW-2240, 2241	4/18/2016	H-3	638 ± 104	543 ± 101	591 ± 72	Pass
XWW-2109, 2110	4/19/2016	H-3	3461 ± 185	3250 ± 180	3356 ± 129	Pass
SPS-2130, 2131	4/25/2016	K-40	7.80 ± 0.84	6.80 ± 0.60	7.30 ± 0.52	Pass
AP-042516	4/25/2016	Gr. Beta	0.020 ± 0.004	0.023 ± 0.004	0.022 ± 0.003	Pass
BS-2065, 2066	4/25/2016	K-40	14.40 ± 1.50	14.72 ± 1.19	14.56 ± 0.96	Pass
AP-042716	4/27/2016	Gr. Beta	0.023 ± 0.003	0.019 ± 0.003	0.021 ± 0.002	Pass
SPS-1999, 2000	4/28/2016	K-40	19.84 ± 1.76	18.963 ± 2.42	19.40 ± 1.50	Pass
SO-2153,2154	5/2/2016	K-40	21.80 ± 0.81	21.17 ± 0.85	21.48 ± 0.59	Pass
SO-2153,2154	5/2/2016	Cs-137	0.11 ± 0.03	0.11 ± 0.07	0.11 ± 0.04	Pass
SO-2153,2154	5/2/2016	Ra-226	1.50 ± 0.29	1.22 ± 0.29	1.36 ± 0.21	Pass
SO-2153,2154	5/2/2016	Pb-214	0.56 ± 0.06	0.57 ± 0.06	0.57 ± 0.04	Pass
W-2394,2395	5/5/2016	H-3	736 ± 106	631 ± 102	683 ± 74	Pass
VE-2284,2285	5/9/2016	K-40	3.50 ± 0.25	3.06 ± 0.28	3.28 ± 0.19	Pass
AP-051016	5/10/2016	Gr. Beta	0.020 ± 0.005	0.018 ± 0.005	0.019 ± 0.003	Pass
SG-2261, 2262	5/10/2016	Ac-228	34.4 ± 1.2	34.4 ± 1.4	34.4 ± 0.9	Pass
SG-2261, 2262	5/10/2016	Pb-214	29.5 ± 3.0	31.9 ± 3.3	30.7 ± 2.2	Pass
BS-2439, 2440	5/12/2016	K-40	9.96 ± 0.91	10.27 ± 0.76	10.11 ± 0.59	Pass
WW-2534,2535	5/16/2016	H-3	14,342 ± 354	14,613 ± 357	14,477 ± 252	Pass
AP-051716	5/17/2016	Gr. Beta	0.014 ± 0.004	0.015 ± 0.004	0.014 ± 0.003	Pass
SPS-2945, 2946	5/19/2016	K-40	30.71 ± 0.74	31.75 ± 0.78	31.23 ± 0.54	Pass
SPS-2945, 2946	5/19/2016	Be-7	1.55 ± 0.24	1.90 ± 0.35	1.73 ± 0.21	Pass
SPS-2578, 2579	5/24/2016	Pb-214	0.96 ± 0.12	0.80 ± 0.14	0.88 ± 0.09	Pass
AP-052516	5/25/2016	Gr. Beta	0.022 ± 0.004	0.022 ± 0.004	0.022 ± 0.003	Pass
G-2642,2643	5/26/2016	Be-7	0.443 ± 0.178	0.247 ± 0.247	0.345 ± 0.152	Pass
SO-2663, 2664	5/26/2016	Cs-137	0.08 ± 0.03	0.07 ± 0.03	0.07 ± 0.02	Pass
SO-2663, 2664	5/26/2016	K-40	12.44 ± 0.68	11.64 ± 0.63	12.04 ± 0.46	Pass
SO-2663, 2664	5/26/2016	Tl-208	0.13 ± 0.02	0.14 ± 0.03	0.14 ± 0.02	Pass
SO-2663, 2664	5/26/2016	Pb-212	0.43 ± 0.04	0.41 ± 0.04	0.42 ± 0.03	Pass
SO-2663, 2664	5/26/2016	Ra-226	1.19 ± 0.34	0.87 ± 0.28	1.03 ± 0.22	Pass
SO-2663, 2664	5/26/2016	Ac-228	0.45 ± 0.09	0.53 ± 0.10	0.49 ± 0.07	Pass
SPS-2817, 2818	5/31/2016	K-40	12.10 ± 0.70	11.05 ± 0.70	11.58 ± 0.49	Pass
DW-70091, 70092	6/1/2016	Ra-226	5.61 ± 0.29	5.53 ± 0.30	5.57 ± 0.21	Pass
DW-70091, 70092	6/1/2016	Ra-228	1.45 ± 0.58	1.91 ± 0.62	1.68 ± 0.42	Pass
BS-2925,2926	6/3/2016	K-40	7.74 ± 0.44	7.86 ± 0.42	7.80 ± 0.30	Pass
SPS-2796, 2797	6/2/2016	K-40	20.91 ± 2.38	21.16 ± 1.82	21.04 ± 1.50	Pass
SPS-2882, 2883	6/7/2016	K-40	14.64 ± 0.52	14.60 ± 0.52	14.62 ± 0.37	Pass
SPS-2882, 2883	6/7/2016	Be-7	2.00 ± 0.25	1.94 ± 0.20	1.97 ± 0.16	Pass
DW-70102, 70103	6/13/2016	Ra-226	0.34 ± 0.09	0.36 ± 0.08	0.35 ± 0.06	Pass

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

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
DW-70102, 70103	6/13/2016	Ra-228	0.93 ± 0.47	1.11 ± 0.53	1.02 ± 0.35	Pass
AP-061416	6/14/2016	Gr. Beta	0.026 ± 0.004	0.023 ± 0.004	0.024 ± 0.003	Pass
SG-3144, 3145	6/17/2016	Be-7	2.23 ± 0.12	2.24 ± 0.12	2.24 ± 0.08	Pass
SG-3144, 3145	6/17/2016	K-40	7.57 ± 0.25	7.09 ± 0.23	7.33 ± 0.17	Pass
SPS-3165, 3166	6/22/2016	K-40	21.14 ± 2.27	22.88 ± 1.60	22.01 ± 1.39	Pass
SPS-3323, 3324	6/24/2016	K-40	18.67 ± 1.57	21.53 ± 1.65	20.10 ± 1.14	Pass
WW-3231, 3232	6/27/2016	H-3	414 ± 104	498 ± 108	456 ± 75	Pass
AP-3830,3831	6/29/2016	Gr. Beta	0.088 ± 0.012	0.093 ± 0.015	0.091 ± 0.010	Pass
AP-070516A	7/5/2016	Gr. Beta	0.018 ± 0.002	0.014 ± 0.002	0.016 ± 0.002	Pass
AP-070516B	7/5/2016	Gr. Beta	0.025 ± 0.005	0.026 ± 0.005	0.025 ± 0.004	Pass
XWW-3605,3606	7/7/2016	H-3	3,316 ± 186	3,316 ± 181	3,316 ± 130	Pass
DW-70135,70136	7/8/2016	Gr. Alpha	3.68 ± 1.01	2.76 ± 0.98	3.22 ± 0.70	Pass
DW-70132,70133	7/8/2016	Ra-226	1.32 ± 0.14	1.11 ± 0.15	1.22 ± 0.10	Pass
DW-70132,70133	7/8/2016	Ra-228	3.92 ± 0.94	2.94 ± 0.90	3.43 ± 0.65	Pass
AP-071216	7/12/2016	Gr. Beta	0.014 ± 0.004	0.018 ± 0.004	0.016 ± 0.003	Pass
DW-70150,70151	7/14/2016	Gr. Alpha	5.00 ± 1.06	4.43 ± 1.04	4.72 ± 0.74	Pass
SPS-3649,3650	7/15/2016	Cs-137	0.12 ± 0.03	0.12 ± 0.03	0.12 ± 0.02	Pass
SPS-3649,3650	7/15/2016	K-40	16.68 ± 0.79	16.52 ± 0.86	16.6 ± 0.58	Pass
SPS-3649,3650	7/15/2016	Pb-214	1.20 ± 0.08	1.17 ± 0.08	1.19 ± 0.06	Pass
SPS-3649,3650	7/15/2016	Ac-228	1.28 ± 0.16	1.28 ± 0.16	1.28 ± 0.11	Pass
AP-071816	7/18/2016	Gr. Beta	0.022 ± 0.005	0.024 ± 0.005	0.023 ± 0.003	Pass
DW-70163,70164	7/19/2016	Gr. Alpha	1.08 ± 0.66	1.36 ± 0.70	1.22 ± 0.48	Pass
WW-3761,3762	7/20/2016	H-3	347 ± 90	466 ± 96	407 ± 66	Pass
SPS-4003,4004	7/23/2016	K-40	7.15 ± 1.59	6.86 ± 1.21	7.00 ± 1.00	Pass
AP-072516	7/25/2016	Gr. Beta	0.023 ± 0.004	0.020 ± 0.004	0.022 ± 0.003	Pass
VE-3936,3937	7/25/2016	Sr-90	0.048 ± 0.007	0.058 ± 0.010	0.053 ± 0.006	Pass
VE-3936,3937	7/25/2016	Be-7	0.49 ± 0.15	0.51 ± 0.15	0.50 ± 0.10	Pass
VE-3936,3937	7/25/2016	K-40	4.70 ± 0.35	4.86 ± 0.37	4.78 ± 0.25	Pass
VE-3959,3960	7/27/2016	Sr-90	0.002 ± 0.002	0.003 ± 0.001	0.003 ± 0.001	Pass
VE-3959,3960	7/27/2016	Be-7	0.30 ± 0.14	0.25 ± 0.12	0.27 ± 0.09	Pass
VE-3959,3960	7/27/2016	K-40	4.01 ± 0.37	4.16 ± 0.34	4.08 ± 0.25	Pass
DW-70169,70170	7/28/2016	Ra-226	0.83 ± 0.11	0.69 ± 0.11	0.76 ± 0.08	Pass
DW-70169,70170	7/28/2016	Ra-228	1.85 ± 0.63	1.31 ± 0.84	1.58 ± 0.53	Pass
AP-080116	8/1/2016	Gr. Beta	0.029 ± 0.003	0.033 ± 0.003	0.031 ± 0.002	Pass
SS-4131,4132	8/1/2016	K-40	12.47 ± 0.71	13.24 ± 0.81	12.86 ± 0.54	Pass
SS-4131,4132	8/1/2016	Cs-137	0.10 ± 0.03	0.13 ± 0.04	0.12 ± 0.02	Pass
SPS-4087,4088	8/2/2016	K-40	17.06 ± 1.58	19.5 ± 1.97	18.28 ± 1.26	Pass
WW-4976,4977	8/4/2016	H-3	17,043 ± 390	16,821 ± 388	16,932 ± 275	Pass
SPS-4266,4267	8/10/2016	K-40	1.06 ± 0.47	1.69 ± 0.52	1.375 ± 0.35	Pass
AP-081616	8/16/2016	Gr. Beta	0.029 ± 0.005	0.025 ± 0.004	0.027 ± 0.003	Pass
VE-4399,4400	8/18/2016	K-40	3.85 ± 0.23	3.27 ± 0.41	3.56 ± 0.24	Pass
VE-4399,4400	8/18/2016	Be-7	0.30 ± 0.08	0.45 ± 0.20	0.37 ± 0.11	Pass
WW-5394,5395	8/18/2016	H-3	947 ± 122	846 ± 119	896 ± 85	Pass
SPS-4441,4442	8/22/2016	K-40	20.55 ± 2.23	19.69 ± 1.74	20.12 ± 1.41	Pass
AP-082216	8/22/2016	Gr. Beta	0.021 ± 0.005	0.015 ± 0.005	0.018 ± 0.003	Pass
VE-4462,4463	8/22/2016	Be-7	0.91 ± 0.09	0.89 ± 0.11	0.90 ± 0.07	Pass
VE-4462,4463	8/22/2016	K-40	7.48 ± 0.26	7.60 ± 0.23	7.54 ± 0.17	Pass
WW-4594,4595	8/26/2016	H-3	675 ± 107	788 ± 111	731 ± 77	Pass
WW-4663,4664	8/26/2016	H-3	607 ± 104	501 ± 100	554 ± 72	Pass
SPS-4529,4530	8/26/2016	K-40	21.98 ± 2.52	21.85 ± 1.56	21.92 ± 1.48	Pass
AP-083016A	8/30/2016	Gr. Beta	0.030 ± 0.003	0.035 ± 0.004	0.033 ± 0.002	Pass
AP-083016B	8/30/2016	Gr. Beta	0.032 ± 0.009	0.026 ± 0.004	0.029 ± 0.005	Pass
VE-4615,4616	8/31/2016	K-40	2.96 ± 0.16	3.11 ± 0.17	3.03 ± 0.11	Pass

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

			Concentration [a]			
Lab Code	Date	Analysis	First Result	Second Result	Averaged Result	Acceptance
AP-110116	11/1/2016	Gr. Beta	0.021 ± 0.004	0.024 ± 0.004	0.023 ± 0.003	Pass
S-5963, 5964	11/1/2016	K-40	20.35 ± 2.29	18.59 ± 1.90	19.47 ± 1.49	Pass
SG-6119, 6120	11/1/2016	Ac-228	5.70 ± 0.44	6.28 ± 0.57	5.99 ± 0.36	Pass
SG-6119, 6120	11/1/2016	Gr. Alpha	21.59 ± 1.88	24.35 ± 1.93	22.97 ± 1.35	Pass
SG-6119, 6120	11/1/2016	K-40	4.89 ± 1.10	5.90 ± 1.08	5.40 ± 0.77	Pass
SG-6119, 6120	11/1/2016	Pb-214	3.99 ± 0.21	4.35 ± 0.32	4.17 ± 0.19	Pass
S-6051, 6052	11/4/2016	K-40	7.05 ± 0.60	7.56 ± 0.53	7.31 ± 0.40	Pass
WW-6297, 6298	11/8/2016	H-3	207 ± 98	165 ± 97	186 ± 69	Pass
WW-6341,6342	11/8/2016	H-3	1,356 ± 140	1,404 ± 141	1,380 ± 99	Pass
SO-6406,6407	11/9/2016	Cs-137	0.36 ± 0.04	0.43 ± 0.05	0.40 ± 0.03	Pass
SO-6406,6407	11/9/2016	K-40	10.90 ± 0.68	11.29 ± 0.74	11.09 ± 0.50	Pass
AP-111416	11/14/2016	Gr. Beta	0.024 ± 0.005	0.021 ± 0.006	0.022 ± 0.004	Pass
WW-6829,6830	11/15/2016	H-3	39,982 ± 589	40,315 ± 591	40,149 ± 417	Pass
DW-70239, 70240	11/17/2016	Gr. Alpha	7.99 ± 1.15	6.41 ± 1.05	7.20 ± 0.78	Pass
AP-112216	11/22/2016	Gr. Beta	0.049 ± 0.005	0.045 ± 0.005	0.047 ± 0.003	Pass
S-6473, 6474	11/24/2016	K-40	19.37 ± 1.97	23.80 ± 3.54	21.58 ± 2.02	Pass
SG-6938, 6939	11/28/2016	Ac-228	18.99 ± 0.59	19.92 ± 0.79	19.46 ± 0.49	Pass
SG-6938, 6939	11/28/2016	Pb-214	15.28 ± 0.34	14.96 ± 0.43	15.12 ± 0.27	Pass
AP-120116	12/1/2016	Gr. Beta	0.029 ± 0.003	0.030 ± 0.003	0.030 ± 0.002	Pass
F-6567,6568	12/1/2016	K-40	3.76 ± 0.40	3.83 ± 0.46	3.80 ± 0.30	Pass
S-6522, 6523	12/1/2016	Ac-228	1.08 ± 0.13	1.29 ± 0.16	1.19 ± 0.10	Pass
S-6522, 6523	12/1/2016	Pb-214	1.00 ± 0.08	1.01 ± 0.09	1.01 ± 0.06	Pass
S-6609, 6610	12/1/2016	K-40	15.57 ± 1.01	15.99 ± 0.78	15.78 ± 0.64	Pass
S-6718, 6719	12/7/2016	K-40	18.19 ± 2.13	18.76 ± 1.80	18.48 ± 1.39	Pass
WW-6784, 6785	12/7/2016	H-3	922 ± 117	905 ± 116	914 ± 82	Pass
AP-121216	12/12/2016	Gr. Beta	0.026 ± 0.005	0.028 ± 0.005	0.027 ± 0.003	Pass
AP-7178,7179	1/3/2017	Be-7	0.047 ± 0.015	0.062 ± 0.017	0.054 ± 0.012	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-1053	2/1/2016	Ni-63	1,206 ± 20	1250	875 - 1625	Pass
MASO-1053	2/1/2016	Sr-90	0.65 ± 1.27	0.00	NA [c]	Pass
MASO-1053	2/1/2016	Tc-99	0.1 ± 5.5	0.0	NA [c]	Pass
MASO-1053	2/1/2016	Cs-134	908 ± 26	1030	721 - 1339	Pass
MASO-1053	2/1/2016	Cs-137	0.10 ± 6.20	0.00	NA [c]	Pass
MASO-1053	2/1/2016	Co-57	1058 ± 26	992	694 - 1290	Pass
MASO-1053	2/1/2016	Co-60	1229 ± 28	1190	833 - 1547	Pass
MASO-1053	2/1/2016	Mn-54	1235 ± 43	1160	812 - 1508	Pass
MASO-1053	2/1/2016	Zn-65	753 ± 64	692	484 - 900	Pass
MASO-1053	2/1/2016	K-40	753 ± 140	607	425 - 789	Pass
MASO-1053	2/1/2016	Am-241	79 ± 6	103	72 - 134	Pass
MASO-1053	2/1/2016	Pu-238	73.9 ± 9.2	63.6	44.5 - 82.7	Pass
MASO-1053	2/1/2016	Pu-239/240	0.76 ± 1.34	0.21	NA [d]	Pass
MASO-1053	2/1/2016	U-234/233	45.0 ± 5.1	45.9	32.1 - 59.7	Pass
MASO-1053	2/1/2016	U-238	129 ± 9	146	102 - 190	Pass
MAW-989	2/1/2016	Am-241	0.018 ± 0.015	0.00	NA [c]	Pass
MAW-989	2/1/2016	H-3	0.2 ± 2.8	0.0	NA [c]	Pass
MAW-989	2/1/2016	Ni-63	12.8 ± 2.7	12.3	8.6 - 16.0	Pass
MAW-989	2/1/2016	Sr-90	8.70 ± 1.20	8.74	6.12 - 11.36	Pass
MAW-989	2/1/2016	Tc-99	-1.1 ± 0.6	0.0	NA [c]	Pass
MAW-989	2/1/2016	Cs-134	15.5 ± 0.3	16.1	11.3 ± 20.9	Pass
MAW-989	2/1/2016	Cs-137	23.7 ± 0.5	21.2	14.8 - 27.6	Pass
MAW-989[e]	2/1/2016	Co-57	1.38 ± 0.12	0.00	NA [c]	Fail
MAW-989	2/1/2016	Co-60	12.5 ± 0.3	11.8	8.3 - 15.3	Pass
MAW-989	2/1/2016	Mn-54	12.2 ± 0.4	11.1	7.8 - 14.4	Pass
MAW-989	2/1/2016	Zn-65	15.7 ± 0.7	13.6	9.5 - 17.7	Pass
MAW-989	2/1/2016	K-40	288 ± 5	251	176 - 326	Pass
MAW-989	2/1/2016	Fe-55	17.3 ± 7.0	16.2	11.3 - 21.1	Pass
MAW-989	2/1/2016	Ra-226	0.710 ± 0.070	0.718	0.503 - 0.933	Pass
MAW-989	2/1/2016	Pu-238	1.280 ± 0.110	1.244	0.871 ± 1.617	Pass
MAW-989	2/1/2016	Pu-239/240	0.640 ± 0.080	0.641	0.449 - 0.833	Pass
MAW-989	2/1/2016	U-234/233	1.39 ± 0.12	1.48	1.04 - 1.92	Pass
MAW-989	2/1/2016	U-238	1.43 ± 0.12	1.53	1.07 - 1.99	Pass
MAW-893	2/1/2016	Gross Alpha	0.600 ± 0.050	0.673	0.202 - 1.144	Pass
MAW-893	2/1/2016	Gross Beta	2.10 ± 0.06	2.15	1.08 - 3.23	Pass
MAW-896	2/1/2016	I-129	3.67 ± 0.20	3.85	2.70 - 5.01	Pass
MAAP-1056	2/1/2016	Gross Alpha	0.39 ± 0.05	1.20	0.36 - 2.04	Pass
MAAP-1056	2/1/2016	Gross Beta	1.03 ± 0.07	0.79	0.40 - 1.19	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
MAAP-1057	2/1/2016	Sr-90	1.34 ± 0.15	1.38	0.97 ± 1.79	Pass
MAAP-1057	2/1/2016	Cs-134	-0.01 ± 0.03	0.00	NA [c]	Pass
MAAP-1057	2/1/2016	Cs-137	2.57 ± 0.10	2.30	1.61 - 2.99	Pass
MAAP-1057	2/1/2016	Co-57	3.01 ± 0.06	2.94	2.06 - 3.82	Pass
MAAP-1057	2/1/2016	Co-60	4.28 ± 0.10	4.02	2.81 - 5.23	Pass
MAAP-1057	2/1/2016	Mn-54	4.90 ± 0.13	4.53	3.17 - 5.89	Pass
MAAP-1057	2/1/2016	Zn-65	4.09 ± 0.18	3.57	2.50 - 4.64	Pass
MAAP-1057	2/1/2016	Am-241	0.059 ± 0.015	0.0805	0.0564 - 0.1047	Pass
MAAP-1057	2/1/2016	Pu-238	0.066 ± 0.020	0.0637	0.0446 - 0.0828	Pass
MAAP-1057	2/1/2016	Pu-239/240	0.074 ± 0.020	0.099	NA [d]	Pass
MAAP-1057	2/1/2016	U-234/233	0.151 ± 0.026	0.165	0.116 - 0.215	Pass
MAAP-1057	2/1/2016	U-238	0.160 ± 0.026	0.172	0.120 - 0.224	Pass
MAVE-1050	2/1/2016	Cs-134	9.83 ± 0.19	10.62	7.43 - 13.81	Pass
MAVE-1050	2/1/2016	Cs-137	6.06 ± 0.19	5.62	3.93 - 7.31	Pass
MAVE-1050	2/1/2016	Co-57	13.8 ± 0.2	11.8	8.3 - 15.3	Pass
MAVE-1050	2/1/2016	Co-60	0.022 ± 0.040	0.00	NA [c]	Pass
MAVE-1050	2/1/2016	Mn-54	0.009 ± 0.044	0.000	NA [c]	Pass
MAVE-1050	2/1/2016	Zn-65	10.67 ± 0.39	9.60	6.70 - 12.50	Pass
MASO-4780[f]	8/1/2016	Ni-63	648 ± 14	990	693 - 1287	Fail
MASO-4780[g]	8/1/2016	Ni-63	902 ± 46	990	693 - 1287	Pass
MASO-4780	8/1/2016	Sr-90	757 ± 16	894	626 - 1162	Pass
MASO-4780	8/1/2016	Tc-99	559 ± 12	556	389 - 723	Pass
MASO-4780	8/1/2016	Cs-134	0.93 ± 2.92	0.00	NA [c]	Pass
MASO-4780	8/1/2016	Cs-137	1061 ± 12	1067	747 - 1387	Pass
MASO-4780	8/1/2016	Co-57	1178 ± 8	1190	833 - 1547	Pass
MASO-4780	8/1/2016	Co-60	841 ± 9	851	596 - 1106	Pass
MASO-4780	8/1/2016	Mn-54	0.69 ± 2.53	0.00	NA [c]	Pass
MASO-4780	8/1/2016	Zn-65	724 ± 19	695	487 - 904	Pass
MASO-4780	8/1/2016	K-40	566 ± 52	588	412 - 764	Pass
MASO-4780	8/1/2016	Am-241	0.494 ± 0.698	0.000	NA [c]	Pass
MASO-4780	8/1/2016	Pu-238	69.7 ± 7.4	70.4	49.3 - 91.5	Pass
MASO-4780	8/1/2016	Pu-239/240	53.9 ± 6.3	53.8	37.7 - 69.9	Pass
MASO-4780[h]	8/1/2016	U-233/234	46.8 ± 3.9	122	85 - 159	Fail
MASO-4780[h]	8/1/2016	U-238	46.6 ± 3.9	121	85 - 157	Fail
MAW-4776	8/1/2016	I-129	4.40 ± 0.20	4.54	3.18 - 5.90	Pass
MAVE-4782	8/1/2016	Cs-134	-0.01 ± 0.05	0.00	NA [c]	Pass
MAVE-4782	8/1/2016	Cs-137	6.18 ± 0.20	5.54	3.88 - 7.20	Pass
MAVE-4782	8/1/2016	Co-57	8.13 ± 0.16	6.81	4.77 - 8.85	Pass
MAVE-4782	8/1/2016	Co-60	5.30 ± 0.15	4.86	3.40 - 6.32	Pass
MAVE-4782	8/1/2016	Mn-54	8.08 ± 0.24	7.27	5.09 - 9.45	Pass
MAVE-4782	8/1/2016	Zn-65	6.24 ± 0.36	5.40	3.78 - 7.02	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
MAAP-4784	8/1/2016	Sr-90	1.18 ± 0.10	1.03	0.72 - 1.34	Pass
MAAP-4784	8/1/2016	Cs-134	1.58 ± 0.08	2.04	1.43 - 2.65	Pass
MAAP-4784	8/1/2016	Cs-137	1.85 ± 0.09	1.78	1.25 - 2.31	Pass
MAAP-4784	8/1/2016	Co-57	2.39 ± 0.52	2.48	1.74 - 3.22	Pass
MAAP-4784	8/1/2016	Co-60	3.22 ± 0.08	3.26	2.28 - 4.24	Pass
MAAP-4784	8/1/2016	Mn-54	2.82 ± 0.12	2.75	1.93 - 3.58	Pass
MAAP-4784	8/1/2016	Zn-65	-0.015 ± 0.062	0.00	NA [c]	Pass
MAAP-4784	8/1/2016	Am-241	-0.001 ± 0.006	0.00	NA [c]	Pass
MAAP-4784	8/1/2016	Pu-238	0.075 ± 0.022	0.069	0.049 - 0.090	Pass
MAAP-4784	8/1/2016	Pu-239/240	0.048 ± 0.015	0.054	0.038 - 0.070	Pass
MAAP-4784	8/1/2016	U-234/233	0.151 ± 0.036	0.150	0.105 - 0.195	Pass
MAAP-4784	8/1/2016	U-238	0.147 ± 0.034	0.156	0.109 - 0.203	Pass
MAW-4778	8/1/2016	H-3	365 ± 11	334	234 - 434	Pass
MAW-4778	8/1/2016	Fe-55	23.6 ± 16.3	21.5	15.1 ± 28.0	Pass
MAW-4778	8/1/2016	Ni-63	17.0 ± 2.8	17.2	12.0 ± 22.4	Pass
MAW-4778	8/1/2016	Sr-90	0.17 ± 0.28	0.00	NA [c]	Pass
MAW-4778	8/1/2016	Tc-99	9.50 ± 0.41	11.60	8.10 - 15.10	Pass
MAW-4778	8/1/2016	Cs-134	22.6 ± 0.4	23.9	16.7 - 31.1	Pass
MAW-4778	8/1/2016	Cs-137	0.018 ± 0.117	0.00	NA [c]	Pass
MAW-4778	8/1/2016	Co-57	27.6 ± 0.2	27.3	19.1 ± 35.5	Pass
MAW-4778	8/1/2016	Co-60	0.018 ± 0.090	0.00	NA [c]	Pass
MAW-4778	8/1/2016	Mn-54	16.2 ± 0.4	14.8	10.4 - 19.2	Pass
MAW-4778	8/1/2016	Zn-65	19.3 ± 0.7	17.4	12.2 - 22.6	Pass
MAW-4778	8/1/2016	K-40	286 ± 6	252	176 - 328	Pass
MAW-4778	8/1/2016	Ra-226	1.48 ± 0.09	1.33	0.93 - 1.73	Pass
MAW-4778	8/1/2016	Pu-238	1.09 ± 0.13	1.13	0.79 - 1.47	Pass
MAW-4778	8/1/2016	Pu-239/240	0.003 ± 0.011	0.016	NA [d]	Pass
MAW-4778	8/1/2016	U-234/233	1.80 ± 0.13	1.86	1.30 - 2.42	Pass
MAW-4778	8/1/2016	U-238	1.77 ± 0.13	1.92	1.34 - 2.50	Pass
MAW-4778	8/1/2016	Am-241	0.678 ± 0.086	0.814	0.570 ± 1.058	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] Provided in the series for "sensitivity evaluation". MAPEP does not provide control limits.

[e] The laboratory properly identified the Sn-75 interfering peak in the vicinity of Co-57 and stated so in the comment field. MAPEP requires results to be reported as an activity with an uncertainty. Since the calculated uncertainty was less than the activity MAPEP interpreted the submitted result as a "false positive" resulting in a failure.

[f] Original analysis for Ni-63 failed.

[g] Reanalysis with a smaller aliquot resulted in acceptable results. An investigation is in process to identify better techniques for analyzing samples with complex matrices.

[h] MAPEP states that samples contain two fractions of Uranium; one that is soluble in concentrated HNO^3 and HCl acid and one that is "fundamentally insoluble in these acids". They also state that HF treatment can not assure complete dissolution. Results are consistent with measuring the soluble form.

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	Acceptance
ERAP-1101	3/14/2016	Am-241	37.3	45.9	28.3 - 62.1	Pass
ERAP-1101	3/14/2016	Co-60	637	623	482 - 778	Pass
ERAP-1101	3/14/2016	Cs-134	251	304	193 - 377	Pass
ERAP-1101	3/14/2016	Cs-137	1,273	1,150	864 - 1,510	Pass
ERAP-1101	3/14/2016	Fe-55	< 162	126	39.1 - 246	Pass
ERAP-1101	3/14/2016	Mn-54	< 2.64	< 50.0	0.00 - 50.0	Pass
ERAP-1101	3/14/2016	Pu-238	68.0	70.5	48.3 - 92.7	Pass
ERAP-1101	3/14/2016	Pu-239/240	54.1	54.8	39.70 - 71.60	Pass
ERAP-1101	3/14/2016	Sr-90	139	150	73.3 - 225.0	Pass
ERAP-1101	3/14/2016	U-233/234	59.3	64.8	40.2 - 97.7	Pass
ERAP-1101	3/14/2016	U-238	55.5	64.2	41.5 - 88.8	Pass
ERAP-1101	3/14/2016	Zn-65	428	356	255 - 492	Pass
ERAP-1101	3/14/2016	Gr. Alpha	98.0	70.1	23.5 - 109	Pass
ERAP-1101	3/14/2016	Gr. Beta	78.6	54.4	34.4 - 79.3	Pass
ERSO-1105	3/14/2016	Am-241	1,030	1,360	796 - 1,770	Pass
ERSO-1105	3/14/2016	Ac-228	1,540	1,240	795 - 1,720	Pass
ERSO-1105	3/14/2016	Bi-212	1,550	1,240	330 - 1,820	Pass
ERSO-1105	3/14/2016	Bi-214	3,100	3,530	2,130 - 5,080	Pass
ERSO-1105	3/14/2016	Co-60	5,600	5,490	3,710 - 7,560	Pass
ERSO-1105	3/14/2016	Cs-134	3,030	3,450	2,260 - 4,140	Pass
ERSO-1105	3/14/2016	Cs-137	4,440	4,310	3,300 - 5,550	Pass
ERSO-1105	3/14/2016	K-40	10,300	10,600	7,740 - 14,200	Pass
ERSO-1105	3/14/2016	Mn-54	< 50.8	< 1000	0.0 - 1,000	Pass
ERSO-1105	3/14/2016	Pb-212	1,140	1,240	812 - 1,730	Pass
ERSO-1105	3/14/2016	Pb-214	3,190	3,710	2,170 - 5,530	Pass
ERSO-1105	3/14/2016	Pu-238	680	658	396 - 908	Pass
ERSO-1105	3/14/2016	Pu-239/240	460	496	324 - 0,685	Pass
ERSO-1105	3/14/2016	Sr-90	7,740	8,560	3,260 - 13,500	Pass
ERSO-1105	3/14/2016	Th-234	3,630	3,430	1,080 - 6,450	Pass
ERSO-1105	3/14/2016	U-233/234	3,090	3,460	2,110 - 4,430	Pass
ERSO-1105	3/14/2016	U-238	3,280	3,430	2,120 - 4,350	Pass
ERSO-1105	3/14/2016	Zn-65	2,940	2,450	1,950 - 3,260	Pass
ERW-1115	3/14/2016	Gr. Alpha	105.0	117.0	41.5 - 181.0	Pass
ERW-1115	3/14/2016	Gr. Beta	76.2	75.5	43.2 - 112.0	Pass
ERW-1117	3/14/2016	H-3	8,870	8,650	5,800 - 12,300	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	Acceptance
ERVE-1108	3/14/2016	Am-241	1,930	2,120	1,300 - 2,820	Pass
ERVE-1108	3/14/2016	Cm-244	1,294	1,560	764 - 2,430	Pass
ERVE-1108	3/14/2016	Co-60	1,164	1,100	759 - 1,540	Pass
ERVE-1108	3/14/2016	Cs-134	1,056	1,070	687 - 1,390	Pass
ERVE-1108	3/14/2016	Cs-137	930	838	608 - 1,170	Pass
ERVE-1108	3/14/2016	K-40	32,200	31,000	22,400 - 43,500	Pass
ERVE-1108	3/14/2016	Mn-54	< 24.5	< 300	0.00 - 300	Pass
ERVE-1108	3/14/2016	Zn-65	3,320	2,820	2,030 - 3,960	Pass
ERVE-1108	3/14/2016	Pu-238	3,410	2,810	1,680 - 3,850	Pass
ERVE-1108	3/14/2016	Pu-239/240	4,120	3,640	2,230 - 5,010	Pass
ERVE-1108	3/14/2016	Sr-90	8,120	8,710	4,960 - 11,500	Pass
ERVE-1108	3/14/2016	U-233/234	4,350	4,160	2,740 - 5,340	Pass
ERVE-1108	3/14/2016	U-238	4,220	4,120	2,750 - 5,230	Pass
ERW-1111	3/14/2016	Am-241	113	121	81.5 - 162	Pass
ERW-1111	3/14/2016	Co-60	1,120	1,050	912 - 1,230	Pass
ERW-1111	3/14/2016	Cs-134	806	842	618 - 968	Pass
ERW-1111	3/14/2016	Cs-137	1,190	1,100	934 - 1,320	Pass
ERW-1111	3/14/2016	Mn-54	< 5.89	< 100	0.00 - 100	Pass
ERW-1111	3/14/2016	Pu-238	159	138	102 - 172	Pass
ERW-1111	3/14/2016	Pu-239/240	113	98.7	76.6 - 124	Pass
ERW-1111	3/14/2016	U-233/234	46.9	52.7	39.6 - 68.0	Pass
ERW-1111	3/14/2016	U-238	50.4	52.3	39.9 - 64.2	Pass
ERW-1111	3/14/2016	Zn-65	1,160	1,010	842 - 1,270	Pass
ERW-1111	3/14/2016	Fe-55	1,600	1,650	984 - 2,240	Pass
ERW-1111	3/14/2016	Sr-90	430	434	283 - 574	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 (1 sigma, 1 determination) and control limits as provided by ERA.

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 = 2σ 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

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®

2016 Annual Radiological Environmental Operating Report

Kewaunee Power Station
Part II, Data Tabulations And Analyses

Dominion Energy Kewaunee, Inc.

ATI Environmental, Inc.
Midwest Laboratory
700 Landwehr Road • Northbrook, IL 60062-2310
phone (847) 564-0700 • fax (847) 564-4517

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, 2016

Prepared and submitted by

ATI ENVIRONMENTAL, Inc.
Midwest Laboratory
Project No. 8002

Approved :

Bronia Grob
Laboratory Manager

J. Michael Hale
Radiation Protection / Chemistry Mgr., KPS

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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 2016 Radiological Monitoring Program conducted at the Kewaunee Power Station (KPS), Kewaunee, Wisconsin.

Included are tabulations of data for all samples collected in 2016 along with graphs of data trends. A summary and interpretation of the data presented here are published in Part I of the 2016 Annual Report on the Radiological Monitoring Program for the Kewaunee Power Station.

Figure 1. Sampling locations, Kewaunee Power Station

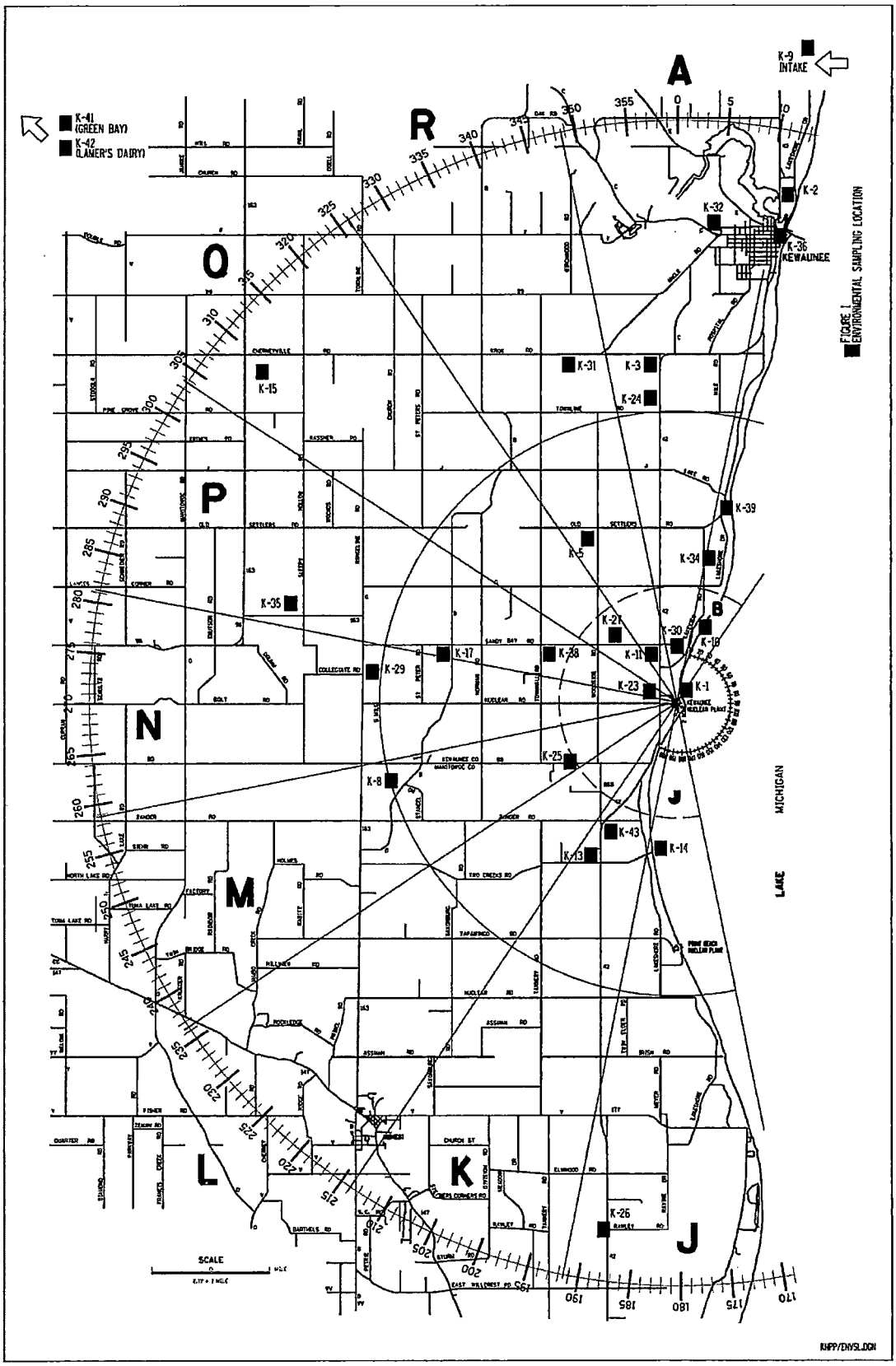

Table 1. Sampling locations, Kewaunee Power Station.

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 Northwest
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 lower limit of detection (LLD) value.
2. Data points are connected by a solid line. A break in the plot indicates missing data.

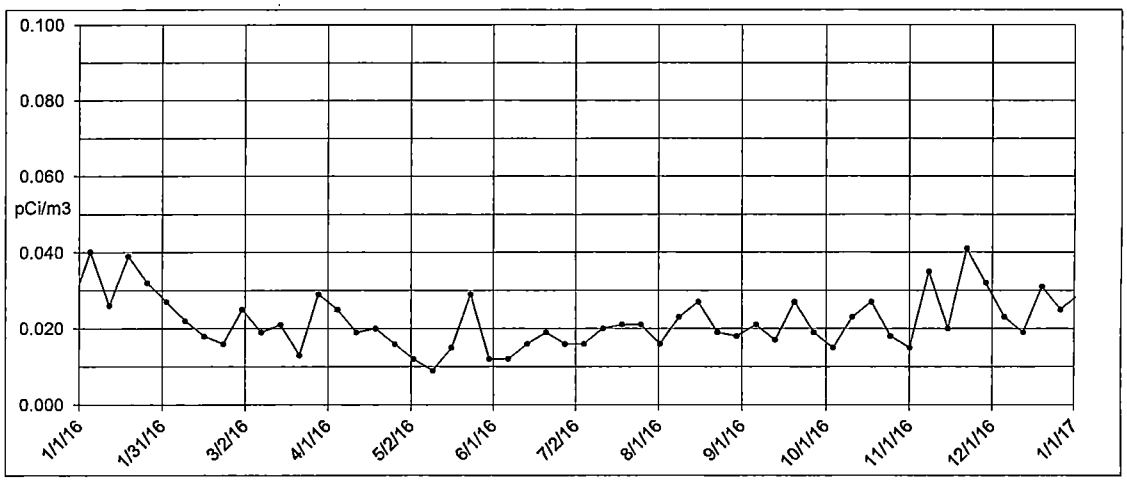

Figure 2. Location K-1f (weekly samples, 2016).

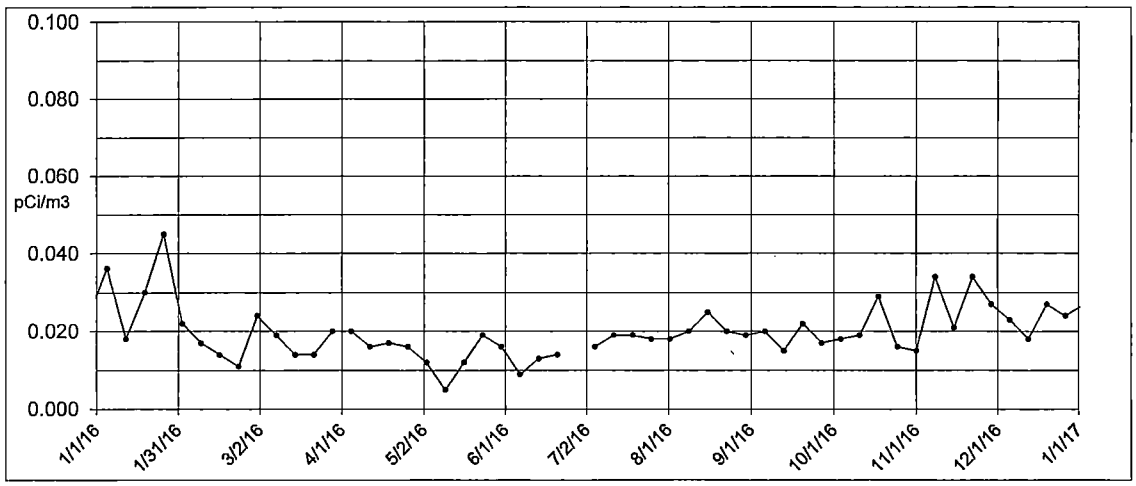

Figure 3. Location K-2 (weekly samples, 2016).

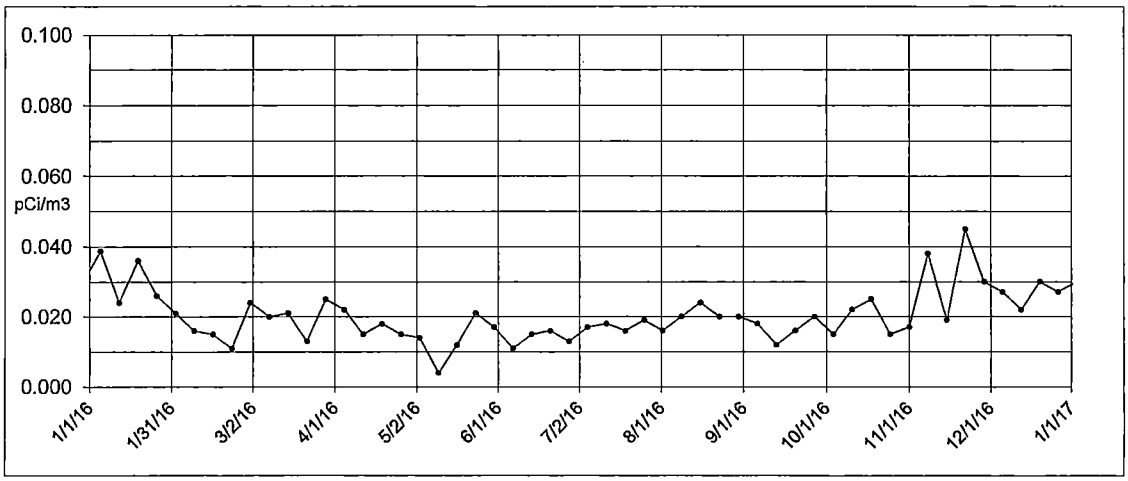

Figure 4. Location K-8 (weekly samples, 2016).

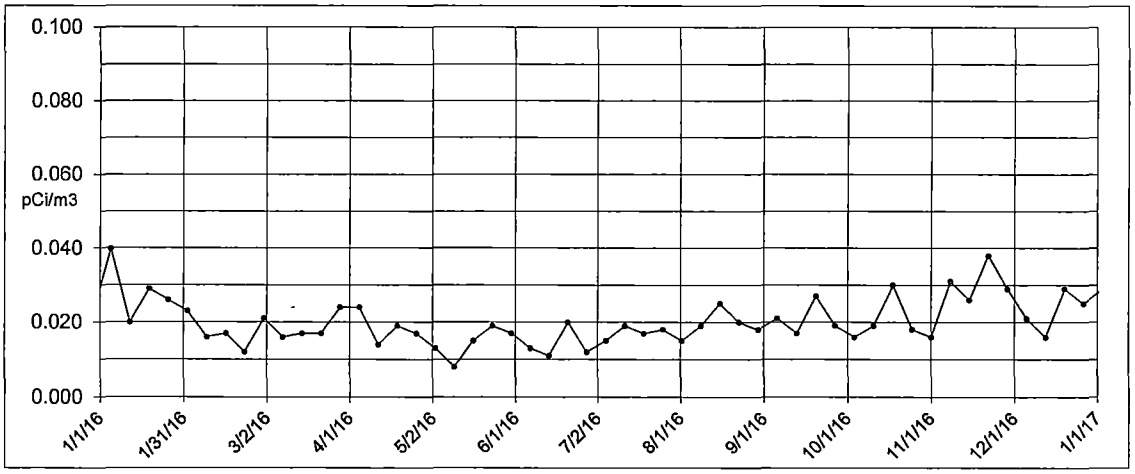

Figure 5. Location K-31 (weekly samples, 2016).

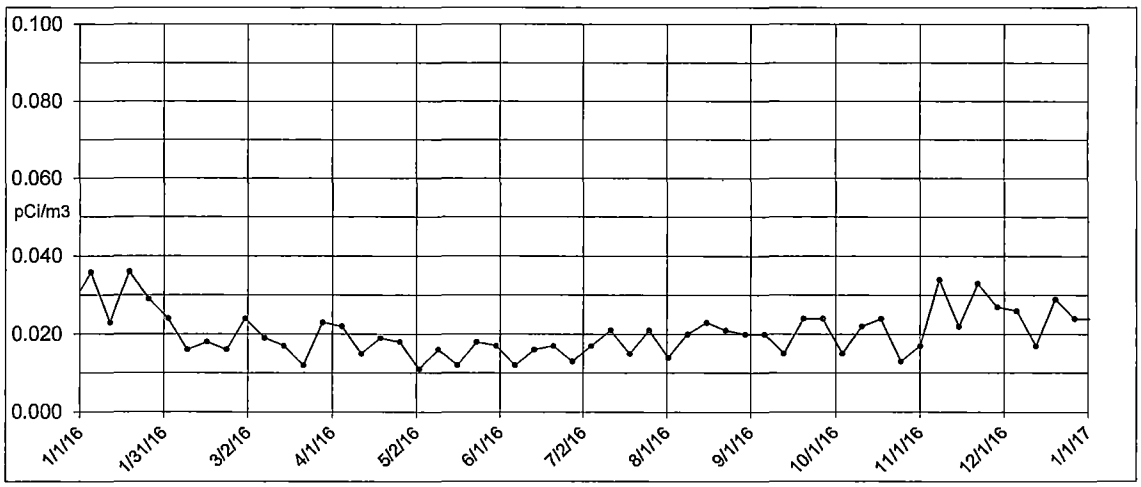

Figure 6. Location K-41 (weekly samples, 2016).

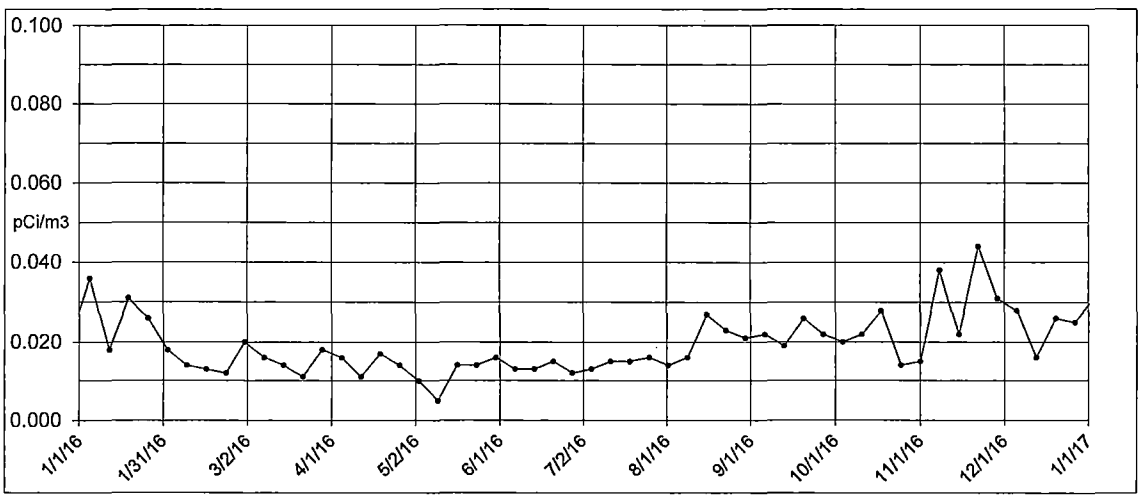

Figure 7. Location K-43 (weekly samples, 2016).

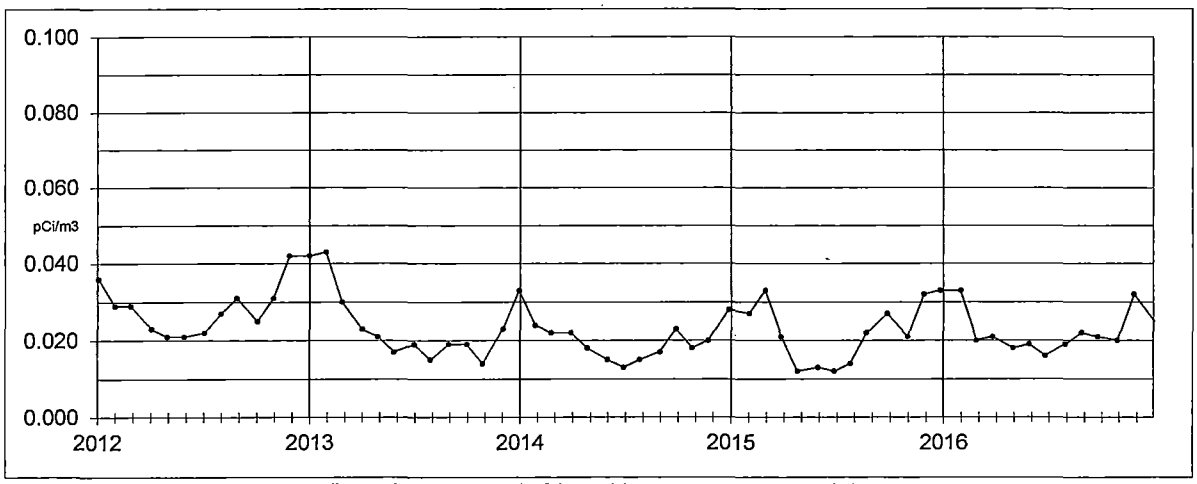

Figure 8. Location K-1f (monthly averages, 2012-2016).

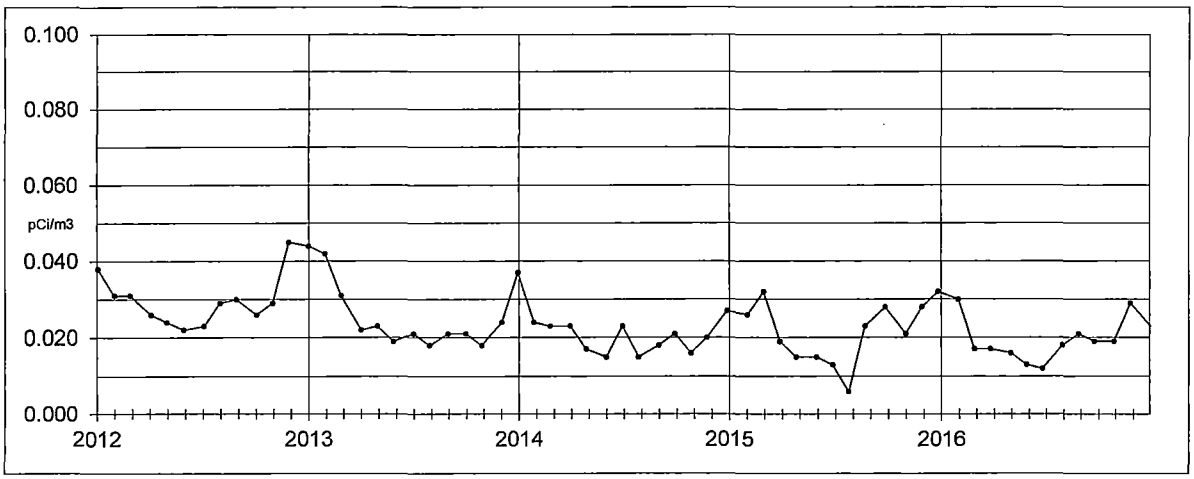

Figure 9. Location K-2 (monthly averages, 2012-2016).

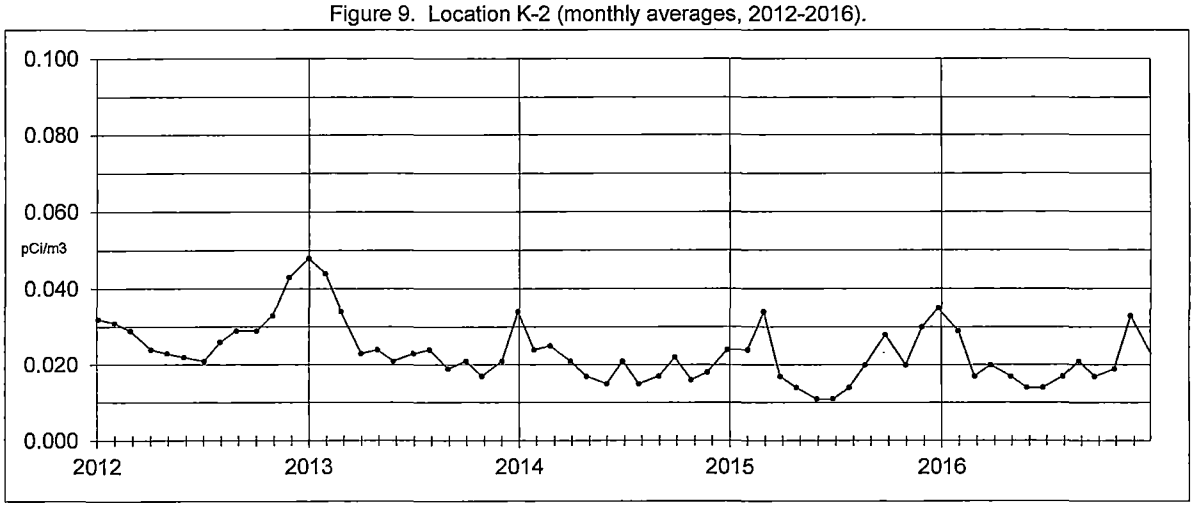

Figure 10. Location K-8 (monthly averages, 2012-2016).

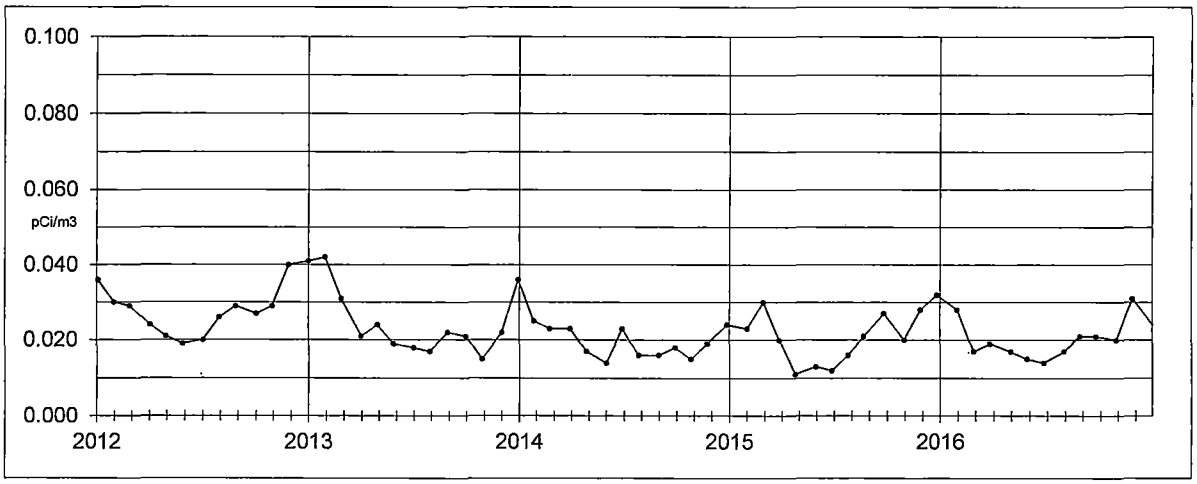

Figure 11. Location K-31 (monthly averages, 2012-2016).

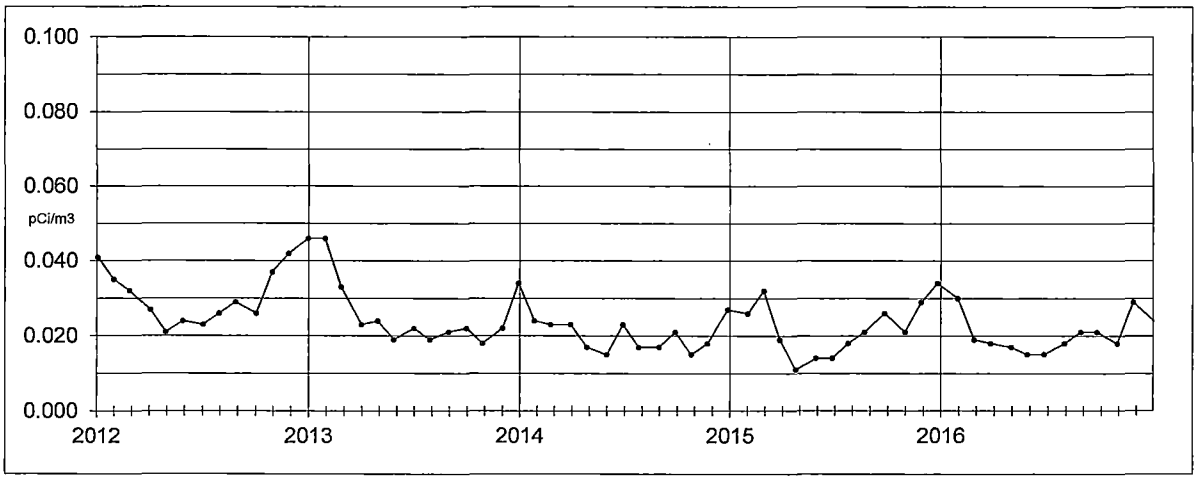

Figure 12. Location K-41 (monthly averages, 2012-2016).

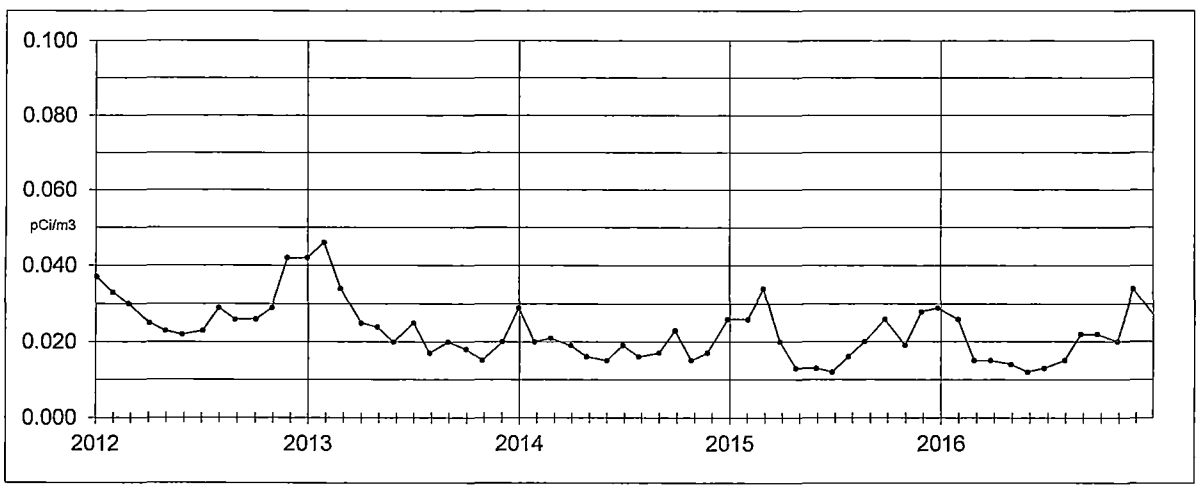

Figure 13. Location K-43 (monthly averages, 2012-2016).

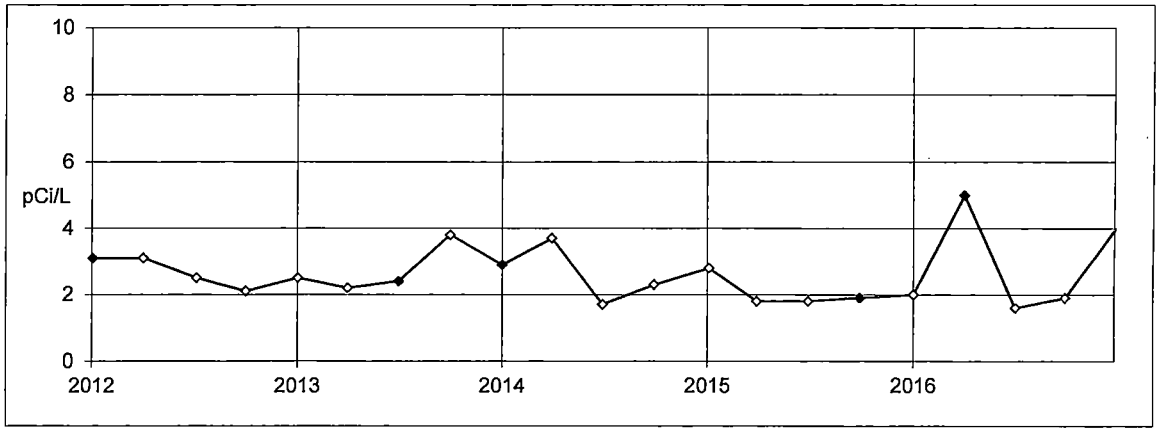

Figure 14. Location K-1g. Total Residue. Quarterly collection.

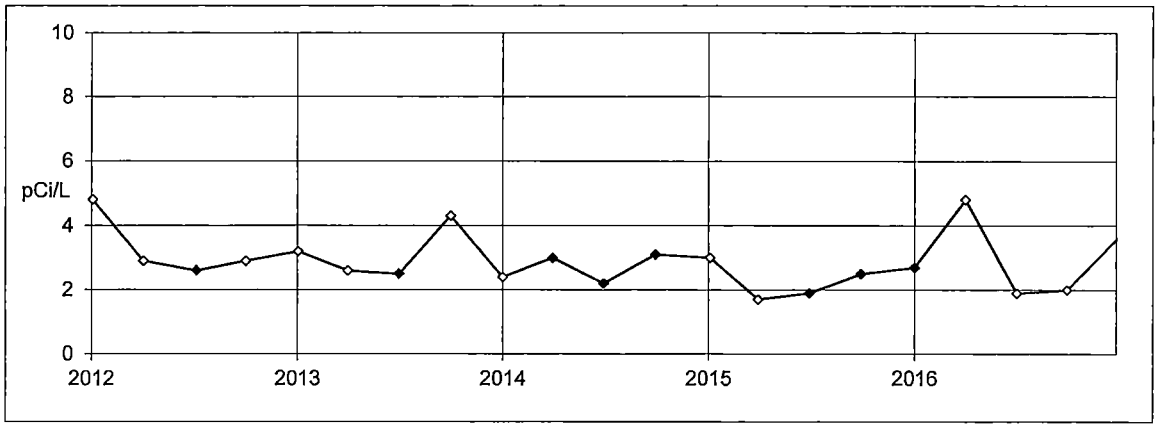

Figure 15. Location K-1h. Total Residue. Quarterly collection.

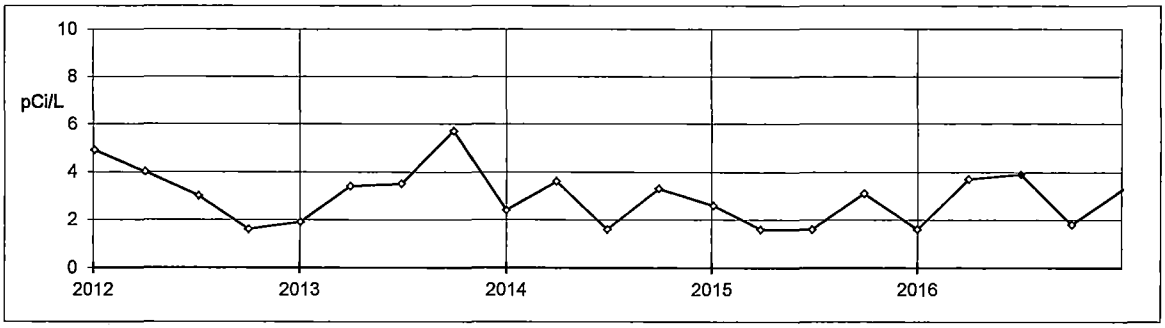

Figure 16. Location K-1g. Total Residue. Quarterly collection.

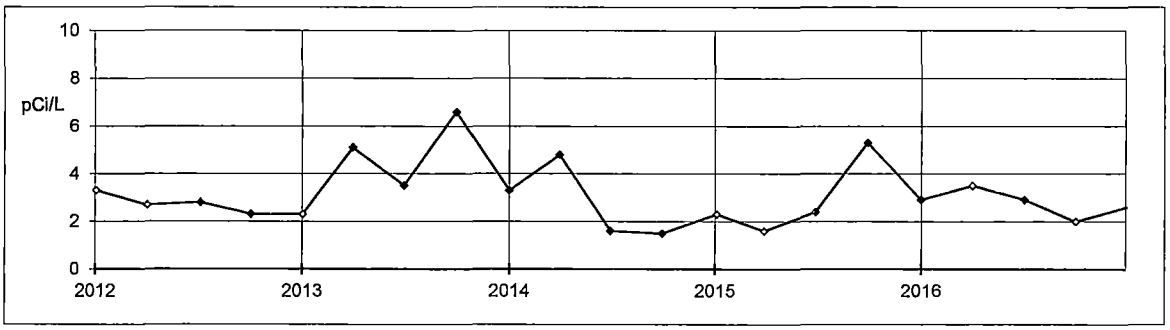

Figure 17. Location K-1h. Total Residue. Quarterly collection.

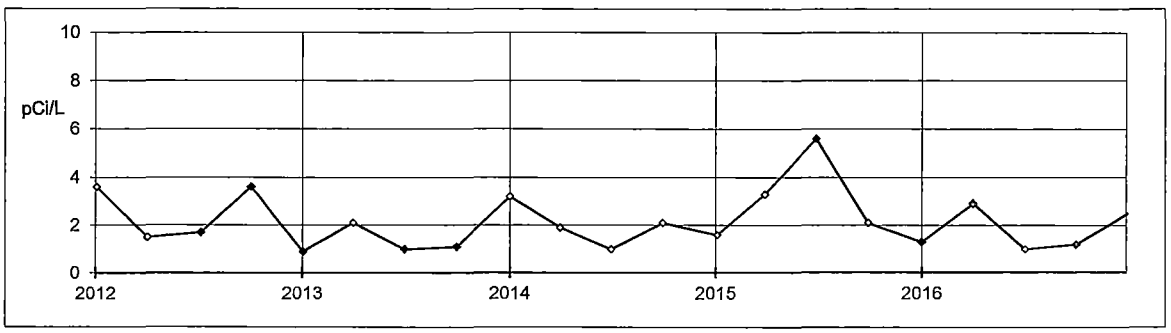

Figure 18. Location K-10. Total Residue. Quarterly collection.

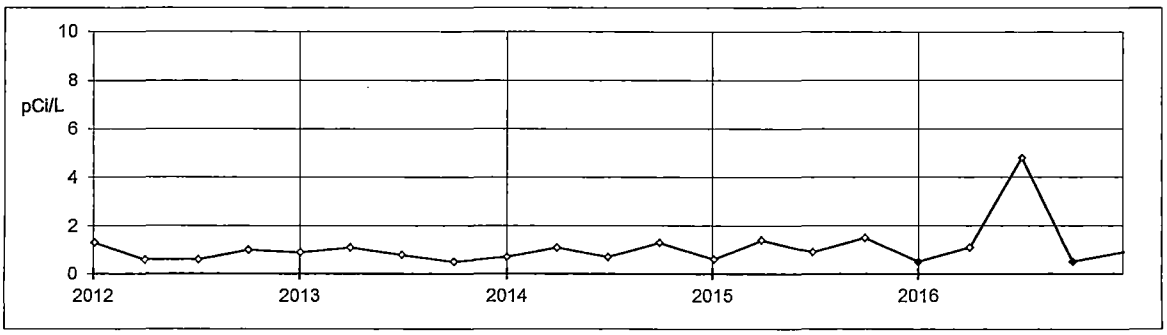

Figure 19. Location K-11. Total Residue. Quarterly collection.

Note: An open data point indicates activity less than the lower limit of detection (LLD).

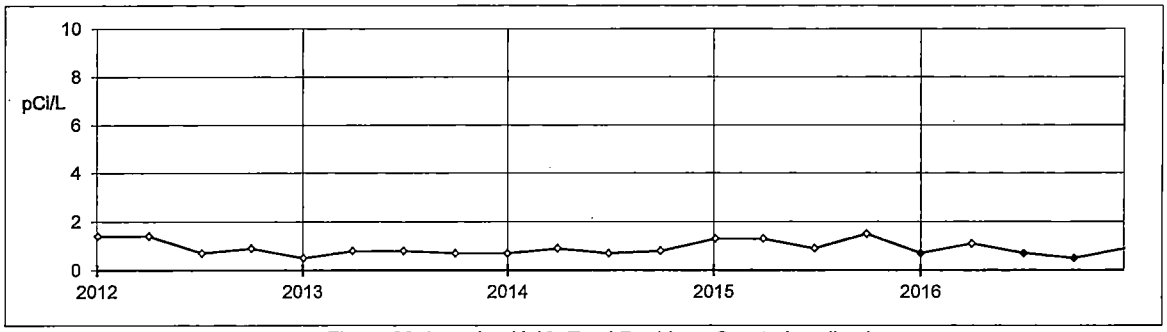

Figure 20. Location K-13. Total Residue. Quarterly collection.

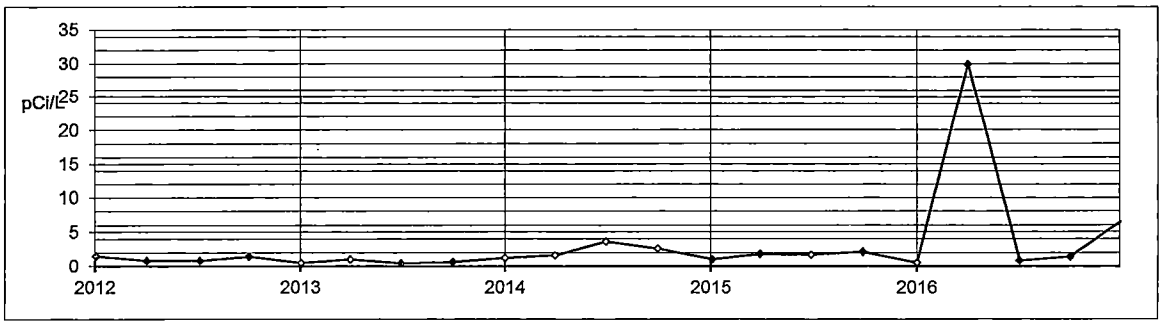

Figure 21. Location K-38. Total Residue. Quarterly collection.

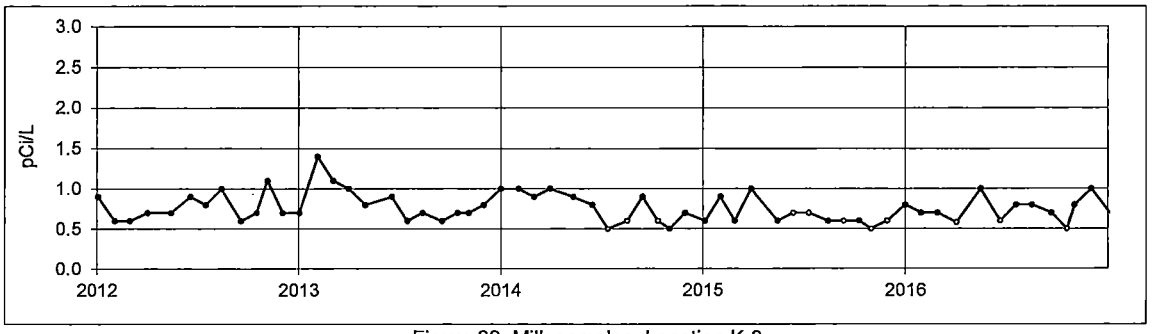

Figure 22. Milk samples. Location K-3.

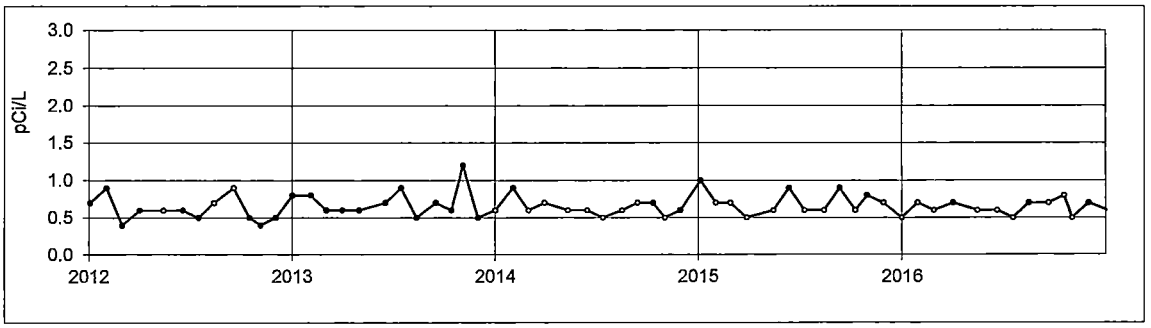

Figure 23. Milk samples. Location K-5.

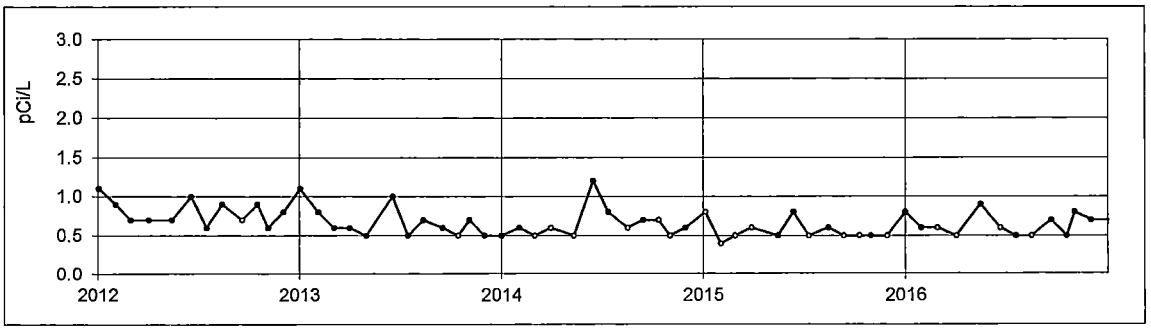

Figure 24. Milk samples. Location K-34.

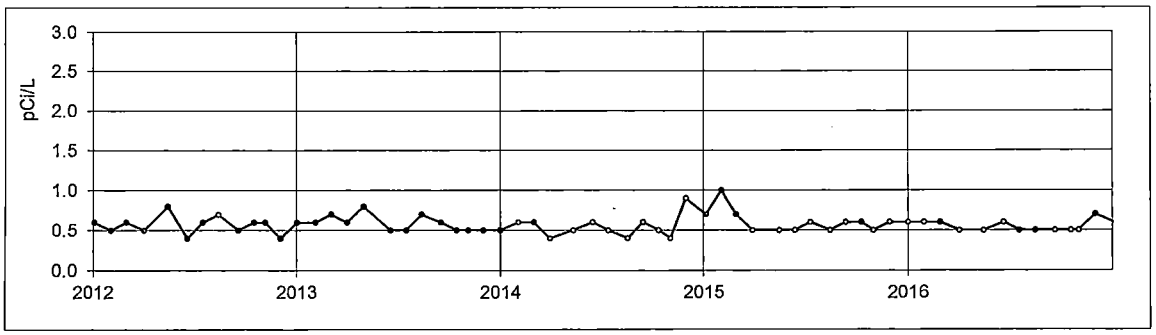

Figure 25. Milk samples. Location K-35.

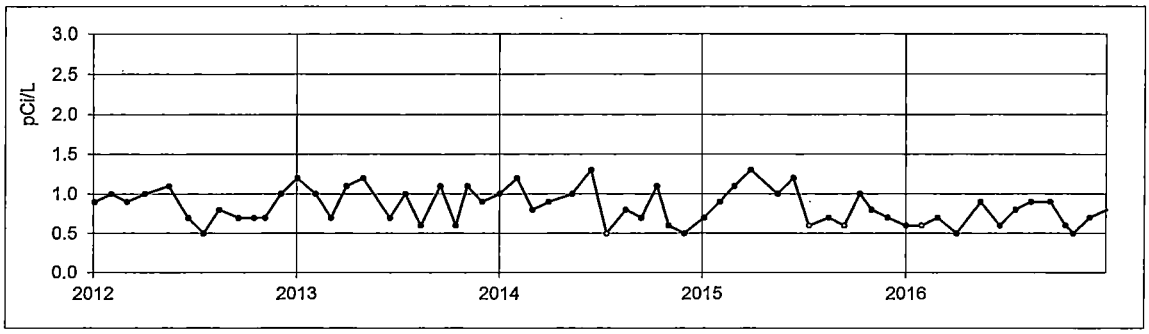

Figure 26. Milk samples. Location K-38.

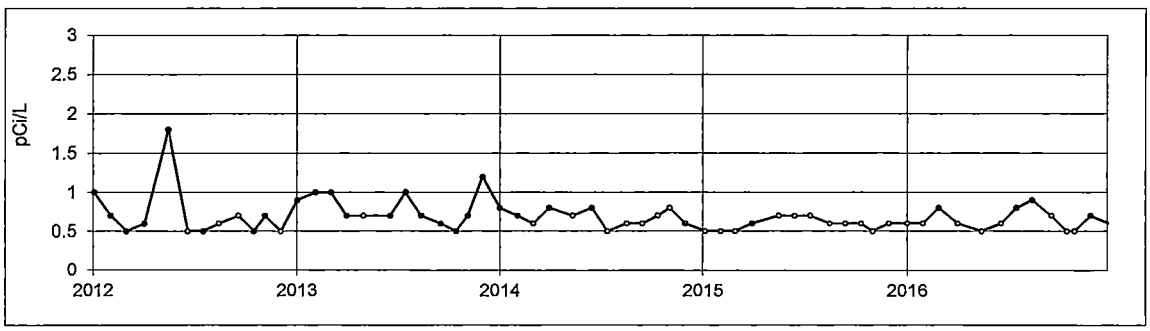

Figure 27. Milk samples. Location K-39.

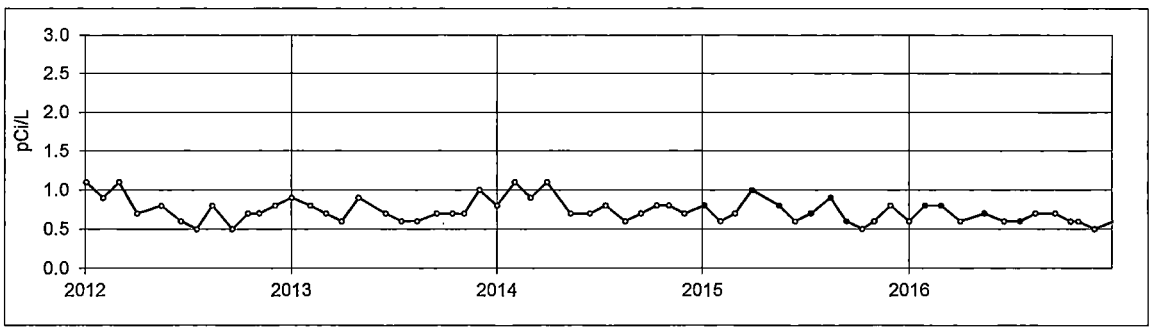

Figure 28. Milk samples. Location K-42.

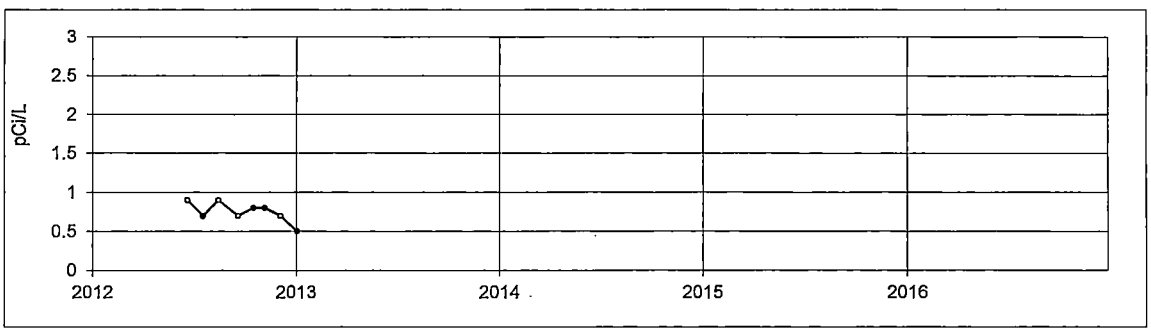

Figure 29. Milk samples. Location K-44.[a]

[a] Last collection Jan. 2013. Dairy out of business. Cows sold.

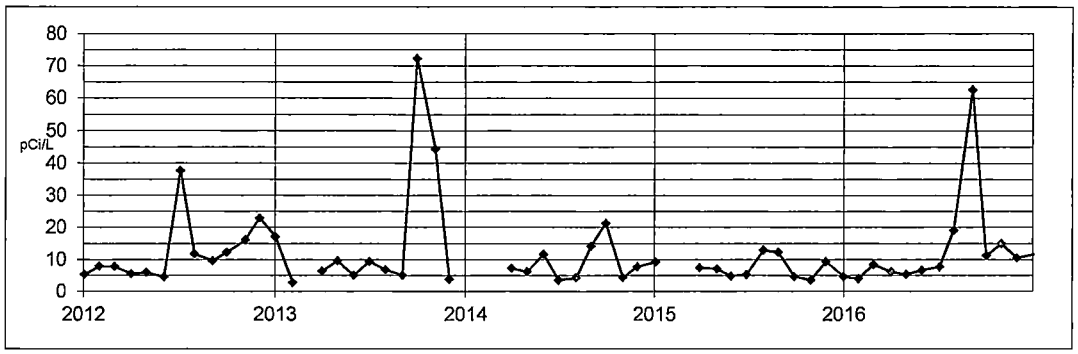

Figure 30. Surface water . North Creek, Onsite (K-1a).

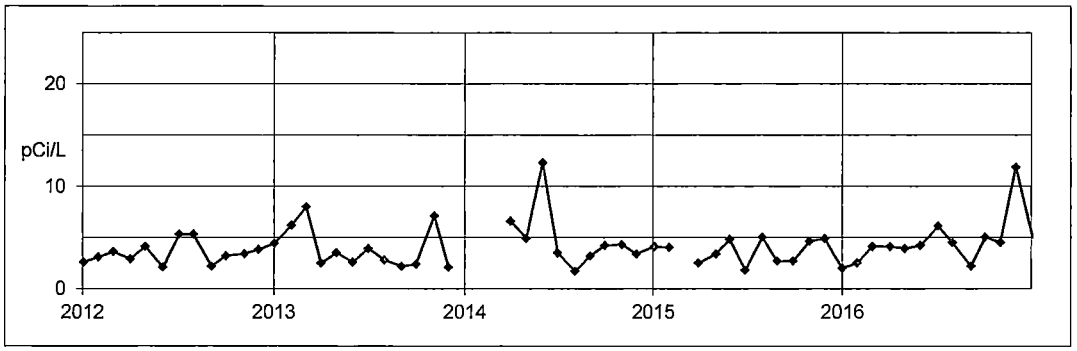

Figure 31. Surface water . Middle Creek, Onsite (K-1b).

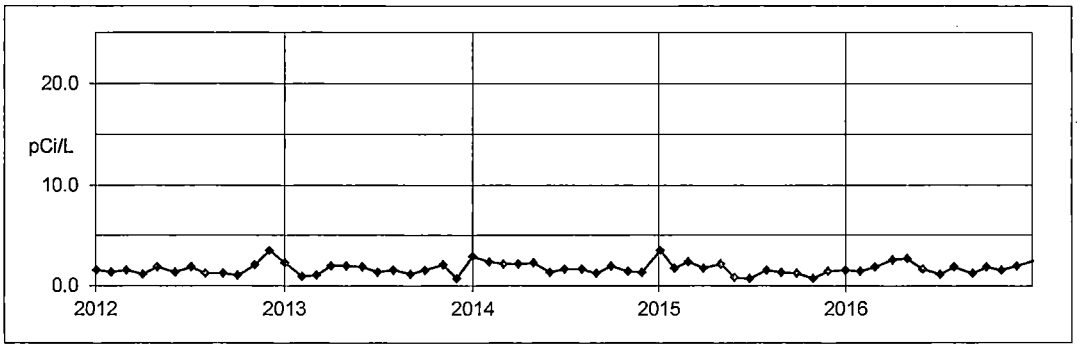

Figure 32. Surface water. Lake Michigan, condenser discharge, Onsite (K-1d).

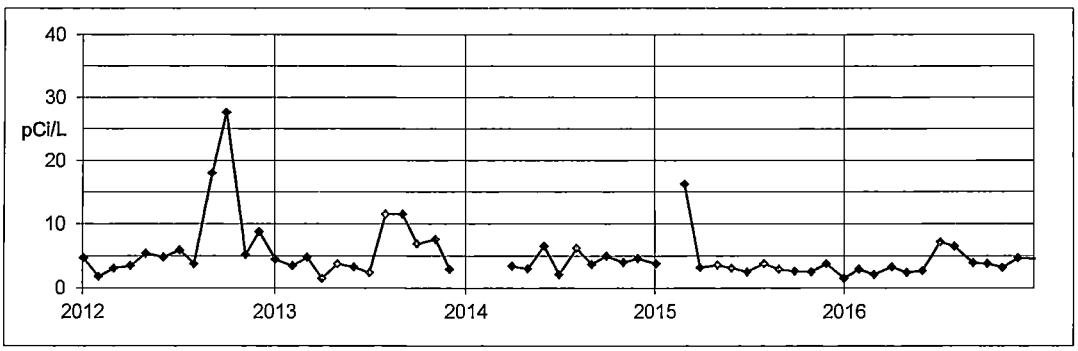

Figure 33. Surface water. South Creek, Onsite (K-1e).

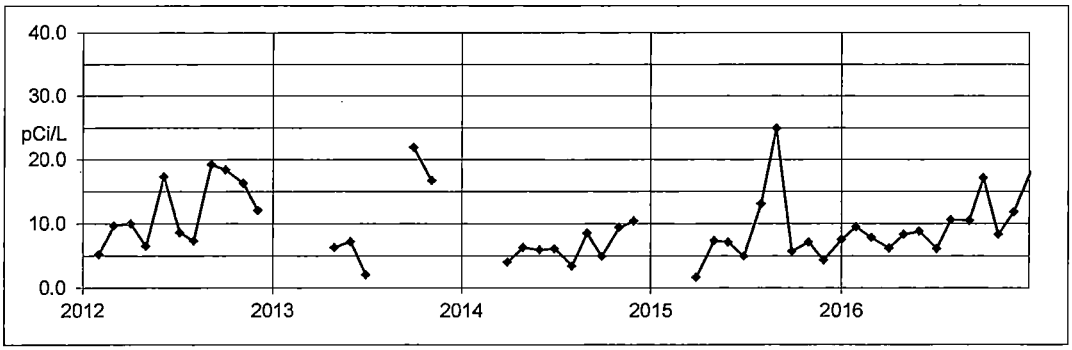

Figure 34. Surface water. School Forest Pond (K-1k).

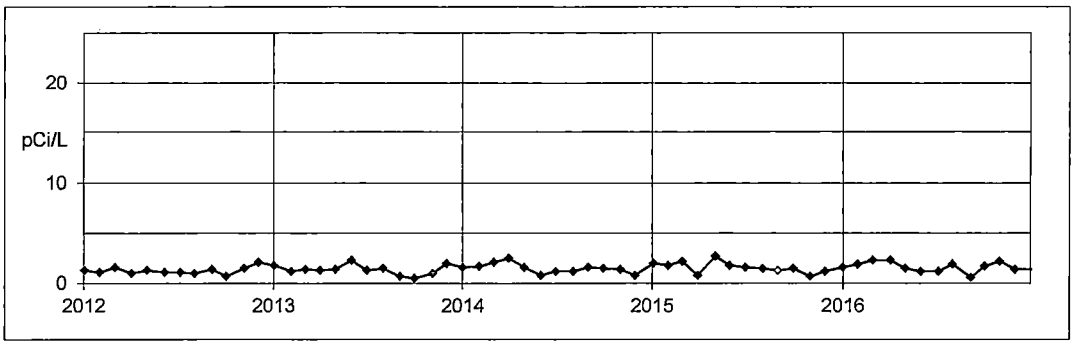

Figure 35. Surface water (raw). Lake Michigan, Rostok Intake (K-9)

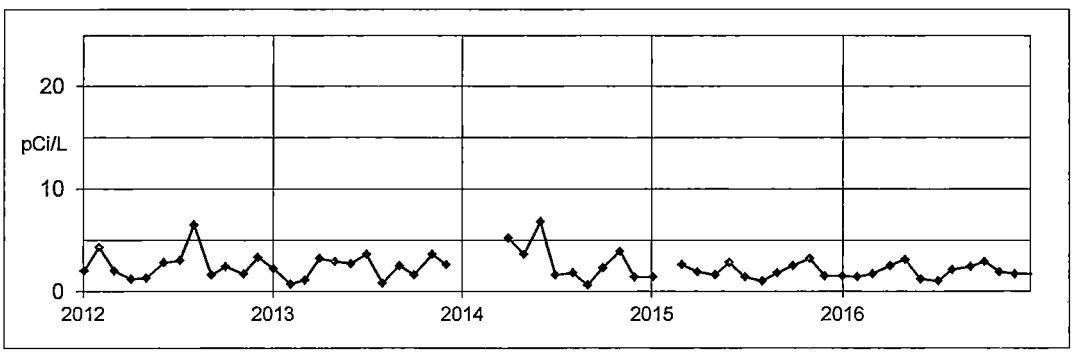

Figure 36. Surface water . Lake Michigan, Two Creeks Park (K-14a).

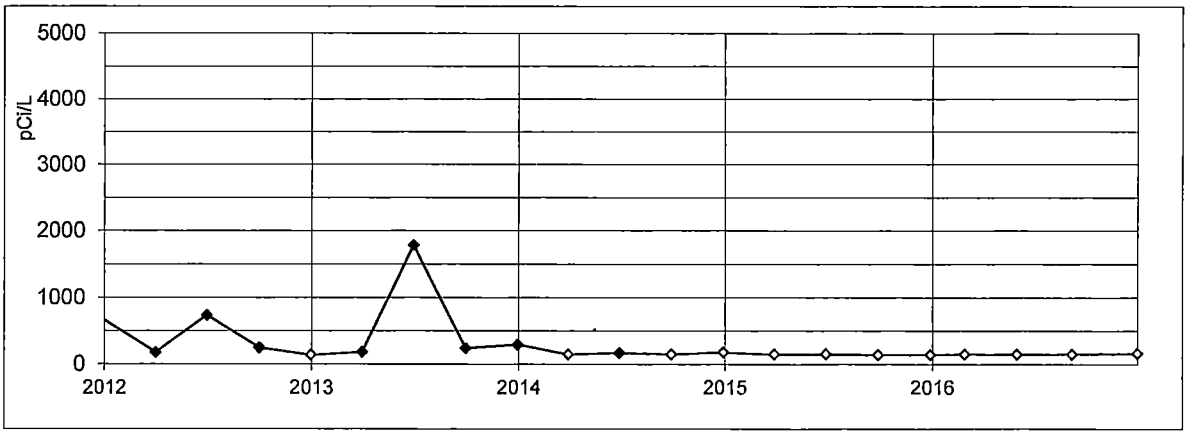

Figure 37. Surface water. Lake Michigan, condenser discharge, K-1d. Quarterly collection.

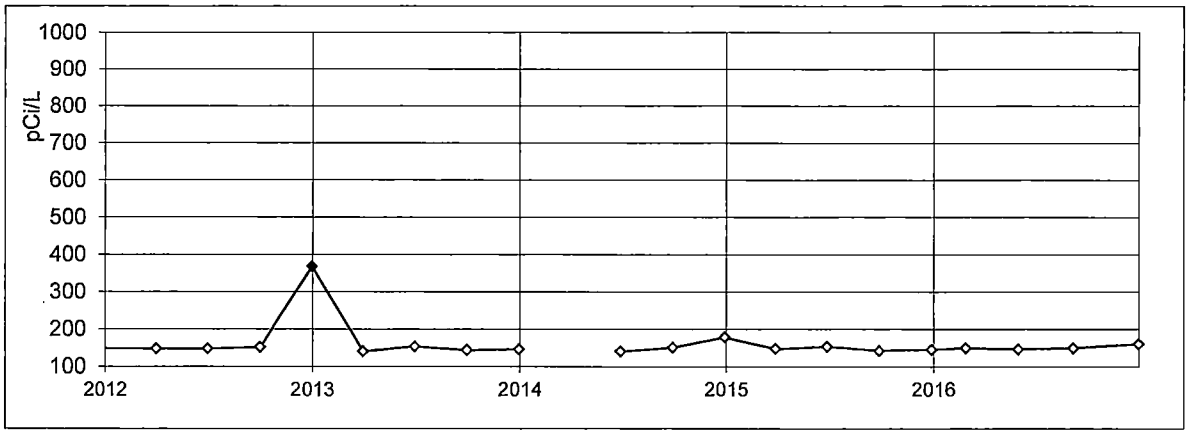

Figure 38. Surface water. Lake Michigan, Two Creeks Park, K-14a. Quarterly collection.

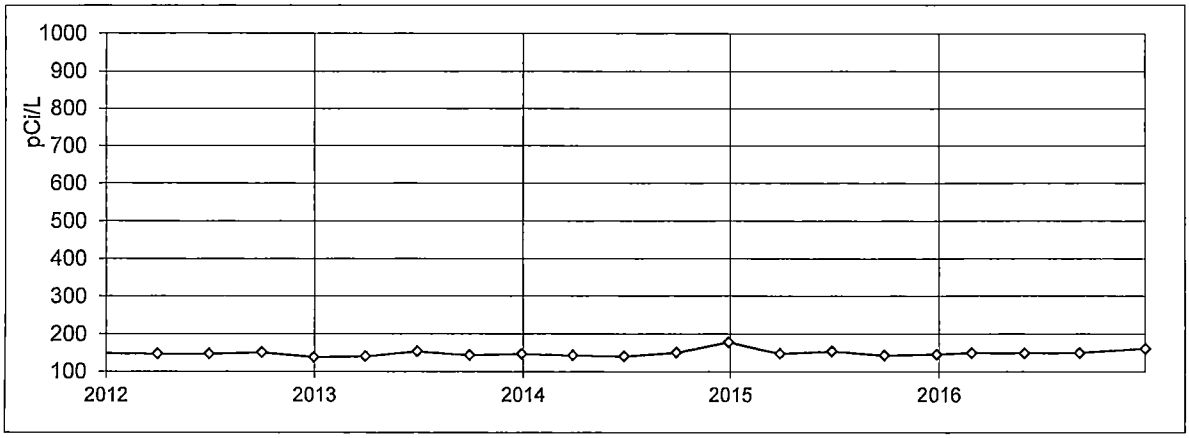

Figure 39. Surface water. Lake Michigan, Rostok Intake, K-9. Quarterly collection.

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
01-05-16	294	0.040 ± 0.005	07-05-16	303	0.016 ± 0.004
01-12-16	302	0.026 ± 0.004	07-12-16	302	0.020 ± 0.004
01-19-16	301	0.039 ± 0.005	07-19-16	303	0.021 ± 0.004
01-26-16	303	0.032 ± 0.005	07-26-16	303	0.021 ± 0.004
02-02-16	301	0.027 ± 0.005	08-02-16	303	0.016 ± 0.004
02-09-16	303	0.022 ± 0.005	08-09-16	302	0.023 ± 0.004
02-16-16	302	0.018 ± 0.004	08-16-16	302	0.027 ± 0.004
02-23-16	303	0.016 ± 0.005	08-23-16	224	0.019 ± 0.005
03-01-16	302	0.025 ± 0.004	08-30-16	305	0.018 ± 0.004
03-08-16	312	0.019 ± 0.004	09-06-16	302	0.021 ± 0.004
03-15-16	291	0.021 ± 0.005	09-13-16	301	0.017 ± 0.004
03-22-16	304	0.013 ± 0.004	09-20-16	302	0.027 ± 0.004
03-29-16	302	0.029 ± 0.004	09-27-16	303	0.019 ± 0.004
1st Quarter Mean ± s.d.		0.025 ± 0.008	3rd Quarter Mean ± s.d.		0.020 ± 0.004
04-05-16	302	0.025 ± 0.004	10-04-16	304	0.015 ± 0.004
04-12-16	304	0.019 ± 0.004	10-11-16	300	0.023 ± 0.004
04-19-16	304	0.020 ± 0.004	10-18-16	302	0.027 ± 0.004
04-26-16	301	0.016 ± 0.004	10-25-16	303	0.018 ± 0.004
05-03-16	299	0.012 ± 0.004	11-01-16	301	0.015 ± 0.004
05-10-16	301	0.009 ± 0.004	11-08-16	307	0.035 ± 0.005
05-17-16	303	0.015 ± 0.004	11-15-16	300	0.020 ± 0.004
05-24-16	302	0.029 ± 0.005	11-22-16	302	0.041 ± 0.005
05-31-16	303	0.021 ± 0.004	11-29-16	304	0.032 ± 0.005
06-07-16	302	0.012 ± 0.003	12-06-16	302	0.023 ± 0.004
06-14-16	302	0.016 ± 0.004	12-13-16	302	0.019 ± 0.004
06-21-16	303	0.019 ± 0.004	12-20-16	304	0.031 ± 0.005
06-28-16	305	0.016 ± 0.004	12-27-16	302	0.025 ± 0.004
			01-03-17	302	0.029 ± 0.004
2nd Quarter Mean ± s.d.		0.018 ± 0.005	4th Quarter Mean ± s.d.		0.025 ± 0.008
			Cumulative Average		0.022

[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
01-05-16	295	0.036 ± 0.005	07-05-16	300	0.016 ± 0.004
01-12-16	299	0.018 ± 0.004	07-12-16	302	0.019 ± 0.004
01-19-16	306	0.030 ± 0.005	07-19-16	258	0.019 ± 0.004
01-26-16	303	0.045 ± 0.005	07-26-16	303	0.018 ± 0.004
02-02-16	302	0.022 ± 0.004	08-02-16	303	0.018 ± 0.004
02-09-16	302	0.017 ± 0.005	08-09-16	301	0.020 ± 0.004
02-16-16	303	0.014 ± 0.004	08-16-16	302	0.025 ± 0.004
02-23-16	296	0.011 ± 0.004	08-23-16	303	0.020 ± 0.004
03-01-16	304	0.024 ± 0.004	08-30-16	305	0.019 ± 0.004
03-08-16	301	0.019 ± 0.004	09-06-16	302	0.020 ± 0.004
03-15-16	300	0.014 ± 0.004	09-13-16	301	0.015 ± 0.004
03-22-16	298	0.014 ± 0.004	09-20-16	305	0.022 ± 0.004
03-29-16	302	0.020 ± 0.004	09-27-16	301	0.017 ± 0.004
1st Quarter Mean ± s.d.		0.022 ± 0.010	3rd Quarter Mean ± s.d.		0.019 ± 0.003
04-05-16	303	0.020 ± 0.004	10-04-16	304	0.018 ± 0.004
04-12-16	304	0.016 ± 0.004	10-11-16	299	0.019 ± 0.004
04-19-16	304	0.017 ± 0.004	10-18-16	302	0.029 ± 0.004
04-26-16	301	0.016 ± 0.004	10-25-16	303	0.016 ± 0.004
05-03-16	299	0.012 ± 0.004	11-01-16	303	0.015 ± 0.004
05-10-16	260	0.005 ± 0.004	11-08-16	305	0.034 ± 0.005
05-17-16	313	0.012 ± 0.004	11-15-16	308	0.021 ± 0.004
05-24-16	292	0.019 ± 0.004	11-22-16	300	0.034 ± 0.005
05-31-16	303	0.016 ± 0.004	11-29-16	305	0.027 ± 0.004
06-07-16	303	0.009 ± 0.003	12-06-16	295	0.023 ± 0.004
06-14-16	302	0.013 ± 0.004	12-13-16	303	0.018 ± 0.004
06-21-16	302	0.014 ± 0.004	12-20-16	303	0.027 ± 0.004
06-28-16		ND[b]	12-27-16	308	0.024 ± 0.004
			01-03-17	305	0.027 ± 0.004
2nd Quarter Mean ± s.d.		0.014 ± 0.004	4th Quarter Mean ± s.d.		0.024 ± 0.006
			Cumulative Average		0.020

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

[b] ND - No Data. 6/28/16 Power was found off. Power was restored and filter changed.

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	
01-05-16	294	0.039 ± 0.005	07-05-16	300	0.017 ± 0.004	
01-12-16	302	0.024 ± 0.004	07-12-16	302	0.018 ± 0.004	
01-19-16	300	0.036 ± 0.005	07-19-16	305	0.016 ± 0.004	
01-26-16	312	0.026 ± 0.005	07-26-16	301	0.019 ± 0.004	
02-02-16	294	0.021 ± 0.004	08-02-16	303	0.016 ± 0.004	
02-09-16	300	0.016 ± 0.005	08-09-16	303	0.020 ± 0.004	
02-16-16	302	0.015 ± 0.004	08-16-16	305	0.024 ± 0.004	
02-23-16	303	0.011 ± 0.004	08-23-16	300	0.020 ± 0.004	
03-01-16	302	0.024 ± 0.004	08-30-16	305	0.020 ± 0.004	
03-08-16	311	0.020 ± 0.004	09-06-16	302	0.018 ± 0.004	
03-15-16	293	0.021 ± 0.005	09-13-16	301	0.012 ± 0.004	
03-22-16	304	0.013 ± 0.004	09-20-16	169	0.016 ± 0.006	[b]
03-29-16	302	0.025 ± 0.004	09-27-16	256	0.020 ± 0.005	[c]
1st Quarter Mean ± s.d.		0.022 ± 0.008	3rd Quarter Mean ± s.d.		0.018 ± 0.003	
04-05-16	302	0.022 ± 0.004	10-04-16	304	0.015 ± 0.004	
04-12-16	304	0.015 ± 0.004	10-11-16	300	0.022 ± 0.004	
04-19-16	304	0.018 ± 0.004	10-18-16	305	0.025 ± 0.004	
04-26-16	301	0.015 ± 0.004	10-25-16	300	0.015 ± 0.004	
05-03-16	299	0.014 ± 0.004	11-01-16	302	0.017 ± 0.004	
05-10-16	241	0.004 ± 0.004	11-08-16	306	0.038 ± 0.005	
05-17-16	304	0.012 ± 0.004	11-15-16	300	0.019 ± 0.004	
05-24-16	301	0.021 ± 0.004	11-22-16	303	0.045 ± 0.005	
05-31-16	303	0.017 ± 0.004	11-29-16	304	0.030 ± 0.004	
06-07-16	302	0.011 ± 0.003	12-06-16	301	0.027 ± 0.004	
06-14-16	302	0.015 ± 0.004	12-13-16	303	0.022 ± 0.004	
06-21-16	304	0.016 ± 0.004	12-20-16	303	0.030 ± 0.005	
06-28-16	303	0.013 ± 0.004	12-27-16	302	0.027 ± 0.004	
			01-03-17	302	0.030 ± 0.004	
2nd Quarter Mean ± s.d.		0.015 ± 0.005	4th Quarter Mean ± s.d.		0.026 ± 0.009	
			Cumulative Average		0.020	

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

[b] Sample pump found not running 9/20/16.

[c] Sample pump replaced 9/21/16.

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
01-05-16	295	0.040 ± 0.005	07-05-16	300	0.015 ± 0.004
01-12-16	299	0.020 ± 0.004	07-12-16	302	0.019 ± 0.004
01-19-16	306	0.029 ± 0.005	07-19-16	303	0.017 ± 0.004
01-26-16	305	0.026 ± 0.005	07-26-16	303	0.018 ± 0.004
02-02-16	301	0.023 ± 0.004	08-02-16	304	0.015 ± 0.004
02-09-16	302	0.016 ± 0.005	08-09-16	301	0.019 ± 0.004
02-16-16	303	0.017 ± 0.004	08-16-16	262	0.025 ± 0.005
02-23-16	302	0.012 ± 0.004	08-23-16	189	0.020 ± 0.006
03-01-16	304	0.021 ± 0.004	08-30-16	304	0.018 ± 0.004
03-08-16	301	0.016 ± 0.004	09-06-16	302	0.021 ± 0.004
03-15-16	301	0.017 ± 0.004	09-13-16	301	0.017 ± 0.004
03-22-16	297	0.017 ± 0.004	09-20-16	305	0.027 ± 0.004
03-29-16	302	0.024 ± 0.004	09-27-16	300	0.019 ± 0.004
1st Quarter Mean ± s.d.		0.021 ± 0.007	3rd Quarter Mean ± s.d.		0.019 ± 0.003
04-05-16	303	0.024 ± 0.004	10-04-16	304	0.016 ± 0.004
04-12-16	304	0.014 ± 0.004	10-11-16	299	0.019 ± 0.004
04-19-16	304	0.019 ± 0.004	10-18-16	302	0.030 ± 0.004
04-26-16	301	0.017 ± 0.004	10-25-16	303	0.018 ± 0.004
05-03-16	299	0.013 ± 0.004	11-01-16	303	0.016 ± 0.004
05-10-16	291	0.008 ± 0.004	11-08-16	305	0.031 ± 0.005
05-17-16	313	0.015 ± 0.004	11-15-16	307	0.026 ± 0.004
05-24-16	293	0.019 ± 0.004	11-22-16	301	0.038 ± 0.005
05-31-16	303	0.017 ± 0.004	11-29-16	304	0.029 ± 0.004
06-07-16	303	0.013 ± 0.003	12-06-16	296	0.021 ± 0.004
06-14-16	301	0.011 ± 0.004	12-13-16	303	0.016 ± 0.004
06-21-16	302	0.020 ± 0.004	12-20-16	303	0.029 ± 0.004
06-28-16	305	0.012 ± 0.004	12-27-16	308	0.025 ± 0.004
			01-03-17	305	0.029 ± 0.004
2nd Quarter Mean ± s.d.		0.016 ± 0.004	4th Quarter Mean ± s.d.		0.025 ± 0.007
			Cumulative Average		0.020

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

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
01-05-16	294	0.036 ± 0.005	07-05-16	300	0.017 ± 0.004
01-12-16	303	0.023 ± 0.004	07-12-16	302	0.021 ± 0.004
01-19-16	304	0.036 ± 0.005	07-19-16	306	0.015 ± 0.004
01-26-16	303	0.029 ± 0.005	07-26-16	300	0.021 ± 0.004
02-02-16	302	0.024 ± 0.004	08-02-16	303	0.014 ± 0.004
02-09-16	302	0.016 ± 0.005	08-09-16	301	0.020 ± 0.004
02-16-16	304	0.018 ± 0.004	08-16-16	281	0.023 ± 0.005
02-23-16	302	0.016 ± 0.005	08-23-16	155	0.021 ± 0.007
03-01-16	303	0.024 ± 0.004	08-30-16	304	0.020 ± 0.004
03-08-16	302	0.019 ± 0.004	09-06-16	302	0.020 ± 0.004
03-15-16	300	0.017 ± 0.004	09-13-16	304	0.015 ± 0.004
03-22-16	302	0.012 ± 0.004	09-20-16	302	0.024 ± 0.004
03-29-16	301	0.023 ± 0.004	09-27-16	300	0.024 ± 0.004
1st Quarter Mean ± s.d.		0.023 ± 0.007	3rd Quarter Mean ± s.d.		0.020 ± 0.003
04-05-16	303	0.022 ± 0.004	10-04-16	304	0.015 ± 0.004
04-12-16	305	0.015 ± 0.004	10-11-16	300	0.022 ± 0.004
04-19-16	304	0.019 ± 0.004	10-18-16	307	0.024 ± 0.004
04-26-16	303	0.018 ± 0.004	10-25-16	298	0.013 ± 0.004
05-03-16	299	0.011 ± 0.004	11-01-16	307	0.017 ± 0.004
05-10-16	342	0.013 ± 0.004	11-08-16	301	0.034 ± 0.005
05-17-16	305	0.012 ± 0.004	11-15-16	304	0.022 ± 0.004
05-24-16	300	0.018 ± 0.004	11-22-16	301	0.033 ± 0.005
05-31-16	303	0.017 ± 0.004	11-29-16	304	0.027 ± 0.004
06-07-16	303	0.012 ± 0.003	12-06-16	297	0.026 ± 0.004
06-14-16	302	0.016 ± 0.004	12-13-16	302	0.017 ± 0.004
06-21-16	305	0.017 ± 0.004	12-20-16	303	0.029 ± 0.004
06-28-16	303	0.013 ± 0.004	12-27-16	305	0.024 ± 0.004
			01-03-17	303	0.024 ± 0.004
2nd Quarter Mean ± s.d.		0.016 ± 0.003	4th Quarter Mean ± s.d.		0.023 ± 0.006
			Cumulative Average		0.020

[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
01-05-16	294	0.036 ± 0.005	07-05-16	300	0.013 ± 0.004
01-12-16	302	0.018 ± 0.004	07-12-16	302	0.015 ± 0.004
01-19-16	301	0.031 ± 0.005	07-19-16	305	0.015 ± 0.004
01-26-16	311	0.026 ± 0.005	07-26-16	300	0.016 ± 0.004
02-02-16	302	0.018 ± 0.004	08-02-16	303	0.014 ± 0.004
02-09-16	302	0.014 ± 0.004	08-09-16	301	0.016 ± 0.004
02-16-16	302	0.013 ± 0.004	08-16-16	305	0.027 ± 0.004
02-23-16	303	0.012 ± 0.004	08-23-16	300	0.023 ± 0.004
03-01-16	302	0.020 ± 0.004	08-30-16	304	0.021 ± 0.004
03-08-16	311	0.016 ± 0.004	09-06-16	303	0.022 ± 0.004
03-15-16	293	0.014 ± 0.004	09-13-16	301	0.019 ± 0.004
03-22-16	304	0.011 ± 0.004	09-20-16	302	0.026 ± 0.004
03-29-16	302	0.018 ± 0.004	09-27-16	303	0.022 ± 0.004
1st Quarter Mean ± s.d.		0.019 ± 0.008	3rd Quarter Mean ± s.d.		0.019 ± 0.005
04-05-16	302	0.016 ± 0.004	10-04-16	304	0.020 ± 0.004
04-12-16	304	0.011 ± 0.004	10-11-16	300	0.022 ± 0.004
04-19-16	304	0.017 ± 0.004	10-18-16	305	0.028 ± 0.004
04-26-16	301	0.014 ± 0.004	10-25-16	300	0.014 ± 0.004
05-03-16	299	0.010 ± 0.004	11-01-16	302	0.015 ± 0.004
05-10-16	257	0.005 ± 0.004	11-08-16	306	0.038 ± 0.005
05-17-16	304	0.014 ± 0.004	11-15-16	300	0.022 ± 0.004
05-24-16	301	0.014 ± 0.004	11-22-16	303	0.044 ± 0.005
05-31-16	303	0.016 ± 0.004	11-29-16	304	0.031 ± 0.005
06-07-16	302	0.013 ± 0.003	12-06-16	301	0.028 ± 0.004
06-14-16	302	0.013 ± 0.004	12-13-16	303	0.016 ± 0.004
06-21-16	304	0.015 ± 0.004	12-20-16	303	0.026 ± 0.004
06-28-16	303	0.012 ± 0.004	12-27-16	302	0.025 ± 0.004
			01-03-17	302	0.031 ± 0.004
2nd Quarter Mean ± s.d.		0.013 ± 0.003	4th Quarter Mean ± s.d.		0.026 ± 0.009
			Cumulative Average		0.019

[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	0.030	0.018	0.040
K-1f	0.033	0.026	0.040
K-43	0.026	0.018	0.036
Controls	0.029	0.018	0.045
K-2	0.030	0.018	0.045
K-8	0.029	0.021	0.039
K-31	0.028	0.020	0.040
K-41	0.030	0.023	0.036

February

Location	Average	Minima	Maxima
Indicators	0.018	0.012	0.025
K-1f	0.020	0.016	0.025
K-43	0.015	0.012	0.020
Controls	0.018	0.011	0.024
K-2	0.017	0.011	0.024
K-8	0.017	0.011	0.024
K-31	0.017	0.012	0.021
K-41	0.019	0.016	0.024

March

Location	Average	Minima	Maxima
Indicators	0.018	0.011	0.029
K-1f	0.021	0.013	0.029
K-43	0.015	0.011	0.018
Controls	0.019	0.012	0.025
K-2	0.017	0.014	0.020
K-8	0.020	0.013	0.025
K-31	0.019	0.016	0.024
K-41	0.018	0.012	0.023

April

Location	Average	Minima	Maxima
Indicators	0.016	0.010	0.025
K-1f	0.018	0.012	0.025
K-43	0.014	0.010	0.017
Controls	0.017	0.012	0.024
K-2	0.016	0.012	0.020
K-8	0.017	0.014	0.022
K-31	0.017	0.013	0.024
K-41	0.017	0.013	0.024

May

Location	Average	Minima	Maxima
Indicators	0.015	0.004	0.030
K-1f	0.019	0.009	0.029
K-43	0.012	0.005	0.016
Controls	0.014	0.004	0.021
K-2	0.013	0.005	0.019
K-8	0.014	0.004	0.021
K-31	0.015	0.008	0.019
K-41	0.015	0.012	0.018

June

Location	Average	Minima	Maxima
Indicators	0.015	0.012	0.019
K-1f	0.016	0.012	0.019
K-43	0.013	0.012	0.015
Controls	0.017	0.009	0.030
K-2	0.012	0.009	0.014
K-8	0.014	0.011	0.016
K-31	0.014	0.011	0.020
K-41	0.015	0.012	0.017

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	0.013	0.021
K-1f	0.019	0.016	0.021
K-43	0.015	0.013	0.016
Controls	0.018	0.014	0.021
K-2	0.018	0.016	0.019
K-8	0.017	0.016	0.019
K-31	0.017	0.015	0.019
K-41	0.018	0.014	0.021

August

Location	Average	Minima	Maxima
Indicators	0.022	0.016	0.027
K-1f	0.022	0.018	0.027
K-43	0.022	0.016	0.027
Controls	0.021	0.018	0.025
K-2	0.021	0.019	0.025
K-8	0.021	0.020	0.024
K-31	0.021	0.018	0.025
K-41	0.021	0.020	0.023

September

Location	Average	Minima	Maxima
Indicators	0.022	0.017	0.027
K-1f	0.021	0.017	0.027
K-43	0.022	0.019	0.026
Controls	0.020	0.012	0.027
K-2	0.019	0.015	0.022
K-8	0.017	0.012	0.020
K-31	0.021	0.017	0.027
K-41	0.021	0.015	0.024

October

Location	Average	Minima	Maxima
Indicators	0.020	0.014	0.028
K-1f	0.020	0.015	0.027
K-43	0.020	0.014	0.028
Controls	0.019	0.013	0.030
K-2	0.019	0.015	0.029
K-8	0.019	0.015	0.025
K-31	0.020	0.016	0.030
K-41	0.018	0.013	0.024

November

Location	Average	Minima	Maxima
Indicators	0.033	0.020	0.044
K-1f	0.032	0.020	0.041
K-43	0.034	0.022	0.044
Controls	0.031	0.019	0.045
K-2	0.029	0.021	0.034
K-8	0.033	0.019	0.045
K-31	0.031	0.026	0.038
K-41	0.029	0.022	0.034

December

Location	Average	Minima	Maxima
Indicators	0.025	0.016	0.031
K-1f	0.025	0.019	0.031
K-43	0.024	0.016	0.028
Controls	0.024	0.016	0.030
K-2	0.023	0.018	0.027
K-8	0.027	0.022	0.030
K-31	0.023	0.016	0.029
K-41	0.024	0.017	0.029

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- 1724	KAP- 3832	KAP- 5678	KAP- 7177
Volume (m^3)	3920	3931	3855	4235
Be-7	0.059 ± 0.014	0.092 ± 0.017	0.085 ± 0.023	0.050 ± 0.013
Nb-95	< 0.0009	< 0.0019	< 0.0012	< 0.0010
Zr-95	< 0.0015	< 0.0019	< 0.0012	< 0.0014
Ru-103	< 0.0009	< 0.0006	< 0.0010	< 0.0011
Ru-106	< 0.0081	< 0.0096	< 0.0097	< 0.0051
Cs-134	< 0.0009	< 0.0009	< 0.0009	< 0.0008
Cs-137	< 0.0006	< 0.0007	< 0.0004	< 0.0008
Ce-141	< 0.0017	< 0.0019	< 0.0021	< 0.0013
Ce-144	< 0.0033	< 0.0029	< 0.0031	< 0.0037
K-43				
Lab Code	KAP- 1729	KAP- 3837	KAP- 5684	KAP- 7183
Volume (m^3)	3929	3886	3929	4235
Be-7	0.045 ± 0.012	0.085 ± 0.014	0.082 ± 0.020	0.056 ± 0.014
Nb-95	< 0.0008	< 0.0008	< 0.0014	< 0.0010
Zr-95	< 0.0015	< 0.0011	< 0.0017	< 0.0015
Ru-103	< 0.0010	< 0.0011	< 0.0011	< 0.0011
Ru-106	< 0.0044	< 0.0025	< 0.0055	< 0.0066
Cs-134	< 0.0007	< 0.0008	< 0.0009	< 0.0007
Cs-137	< 0.0005	< 0.0003	< 0.0006	< 0.0007
Ce-141	< 0.0010	< 0.0015	< 0.0029	< 0.0018
Ce-144	< 0.0022	< 0.0023	< 0.0033	< 0.0031

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- 1725	KAP- 3833	KAP- 5679	KAP- 7178
Volume (m^3)	3911	3586	3886	4243
Be-7	0.070 ± 0.022	0.084 ± 0.018	0.093 ± 0.016	0.047 ± 0.015
Nb-95	< 0.0012	< 0.0017	< 0.0016	< 0.0009
Zr-95	< 0.0016	< 0.0016	< 0.0020	< 0.0013
Ru-103	< 0.0009	< 0.0015	< 0.0012	< 0.0010
Ru-106	< 0.0079	< 0.0090	< 0.0030	< 0.0074
Cs-134	< 0.0010	< 0.0011	< 0.0006	< 0.0008
Cs-137	< 0.0009	< 0.0011	< 0.0006	< 0.0005
Ce-141	< 0.0011	< 0.0028	< 0.0018	< 0.0011
Ce-144	< 0.0053	< 0.0050	< 0.0029	< 0.0036
K-8				
Lab Code	KAP- 1726	KAP- 3834	KAP- 5680	KAP- 7180
Volume (m^3)	3919	3870	3752	4235
Be-7	0.058 ± 0.014	0.091 ± 0.015	0.060 ± 0.012	0.048 ± 0.010
Nb-95	< 0.0010	< 0.0011	< 0.0009	< 0.0011
Zr-95	< 0.0020	< 0.0014	< 0.0012	< 0.0013
Ru-103	< 0.0014	< 0.0011	< 0.0010	< 0.0011
Ru-106	< 0.0078	< 0.0045	< 0.0052	< 0.0055
Cs-134	< 0.0009	< 0.0009	< 0.0006	< 0.0007
Cs-137	< 0.0007	< 0.0007	< 0.0004	< 0.0005
Ce-141	< 0.0021	< 0.0018	< 0.0012	< 0.0013
Ce-144	< 0.0039	< 0.0035	< 0.0020	< 0.0021

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- 1727	KAP- 3835	KAP- 5681	KAP- 7181
Volume (m^3)	3918	3922	3776	4243
Be-7	0.057 ± 0.016	0.088 ± 0.017	0.079 ± 0.019	0.051 ± 0.015
Nb-95	< 0.0014	< 0.0013	< 0.0024	< 0.0012
Zr-95	< 0.0023	< 0.0017	< 0.0016	< 0.0009
Ru-103	< 0.0012	< 0.0010	< 0.0014	< 0.0011
Ru-106	< 0.0068	< 0.0061	< 0.0078	< 0.0032
Cs-134	< 0.0009	< 0.0008	< 0.0011	< 0.0008
Cs-137	< 0.0010	< 0.0007	< 0.0006	< 0.0005
Ce-141	< 0.0021	< 0.0022	< 0.0026	< 0.0014
Ce-144	< 0.0052	< 0.0037	< 0.0030	< 0.0046
K-41				
Lab Code	KAP- 1728	KAP- 3836	KAP- 5683	KAP- 7182
Volume (m^3)	3922	3977	3760	4236
Be-7	0.056 ± 0.012	0.080 ± 0.017	0.082 ± 0.018	0.050 ± 0.016
Nb-95	< 0.0007	< 0.0024	< 0.0012	< 0.0018
Zr-95	< 0.0012	< 0.0015	< 0.0014	< 0.0016
Ru-103	< 0.0011	< 0.0019	< 0.0013	< 0.0008
Ru-106	< 0.0045	< 0.0080	< 0.0076	< 0.0066
Cs-134	< 0.0009	< 0.0011	< 0.0008	< 0.0011
Cs-137	< 0.0008	< 0.0008	< 0.0009	< 0.0009
Ce-141	< 0.0016	< 0.0025	< 0.0025	< 0.0015
Ce-144	< 0.0034	< 0.0039	< 0.0038	< 0.0045

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

	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	
Date Placed	01-04-16	04-04-16	07-05-16	10-03-16	
Date Removed	04-04-16	07-05-16	10-03-16	01-03-17	
	mR/91 days				
Indicator					Mean±s.d.
K-1f	12.0 ± 0.6	16.1 ± 0.6	14.6 ± 0.8	16.3 ± 0.9	14.8 ± 2.0
K-5	14.7 ± 0.5	17.7 ± 0.9	17.0 ± 0.8	17.7 ± 0.7	16.8 ± 1.4
K-17	13.9 ± 0.5	17.6 ± 0.9	17.4 ± 0.6	17.3 ± 0.9	16.6 ± 1.8
K-25	13.9 ± 0.6	18.8 ± 0.7	16.9 ± 0.6	18.7 ± 1.0	17.1 ± 2.3
K-27	16.3 ± 0.5	17.6 ± 0.8	20.5 ± 0.7	17.6 ± 0.8	18.0 ± 1.8
K-30	15.3 ± 1.0	17.3 ± 0.7	16.7 ± 1.2	17.0 ± 0.7	16.6 ± 0.9
K-39	15.5 ± 1.0	18.7 ± 0.4	17.0 ± 0.9	18.3 ± 0.7	17.4 ± 1.4
K-43	14.9 ± 0.7	14.3 ± 0.6	14.0 ± 0.8	13.9 ± 0.5	14.3 ± 0.5
Mean ± s.d.	14.6 ± 1.3	17.3 ± 1.5	16.8 ± 2.0	17.1 ± 1.5	16.5 ± 1.3
Control					
K-2	15.9 ± 0.6	16.4 ± 0.6	17.9 ± 1.0	16.8 ± 0.6	16.8 ± 0.9
K-3	16.6 ± 1.0	17.1 ± 0.6	17.5 ± 0.8	17.6 ± 1.0	17.2 ± 0.5
K-8	14.8 ± 1.0	17.0 ± 0.6	17.0 ± 0.9	16.9 ± 0.5	16.4 ± 1.1
K-15	12.4 ± 0.6	15.7 ± 0.5	14.9 ± 0.7	15.0 ± 0.8	14.5 ± 1.4
K-31	12.7 ± 0.7	13.3 ± 0.3	14.5 ± 0.6	13.2 ± 0.3	13.4 ± 0.8
K-41	14.9 ± 0.9	16.9 ± 0.9	20.2 ± 1.1	16.0 ± 0.9	17.0 ± 2.3
Mean ± s.d.	14.6 ± 1.7	16.1 ± 1.5	17.0 ± 2.1	15.9 ± 1.6	15.9 ± 1.0
Inside the Protected Area					
Date Placed	01-01-16	04-01-16	07-03-16	10-01-16	
Date Removed	04-01-16	07-03-16	10-01-16	01-01-17	Mean±s.d.
K-1L	16.0 ± 1.0	14.4 ± 1.4	15.1 ± 1.4	14.5 ± 1.6	15.0 ± 0.7
K-1M	16.1 ± 0.6	14.8 ± 0.8	15.2 ± 1.3	14.3 ± 0.8	15.1 ± 0.8
K-1N	13.8 ± 0.8	13.5 ± 1.2	13.6 ± 1.3	14.4 ± 1.5	13.8 ± 0.4
K-1O	10.3 ± 0.3	12.3 ± 1.1	12.3 ± 1.1	13.7 ± 0.7	12.2 ± 1.4
K-1P	12.3 ± 0.4	13.5 ± 1.5	12.0 ± 1.2	12.7 ± 1.2	12.6 ± 0.7
K-1Q	9.5 ± 1.1	11.1 ± 0.5	12.4 ± 1.5	11.4 ± 0.4	11.1 ± 1.2
K-1R	18.2 ± 0.9	18.6 ± 0.7	17.5 ± 1.2	17.3 ± 1.0	17.9 ± 0.6
K-1S	19.4 ± 1.0	19.0 ± 0.8	18.5 ± 1.4	17.6 ± 0.8	18.6 ± 0.8
Mean ± s.d.	14.5 ± 3.6	14.7 ± 2.8	14.6 ± 2.5	14.5 ± 2.1	14.5 ± 2.7

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)
01/04/16	KP- 104	< 145	< 45
02/01/16	KP- 451	< 148	< 46
03/01/16	KP- 843	< 155	< 48
04/04/16	KP- 1343	< 152	< 48
05/02/16	KP- 2096	< 148	< 46
06/01/16	KP- 2748	< 151	< 47
07/05/16	KP- 3348	< 146	< 46
08/01/16	KP- 4040	< 150	< 47
09/06/16	KP- 4709	< 155	< 48
10/03/16	KP- 5177	< 157	< 49
11/01/16	KP- 5986	< 180	< 56
12/01/16	KP- 6607	< 180	< 56

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						
01-05-16	KMI- 2	< 0.2	< 4.4	< 4.4	< 8.5	1463 ± 135
02-02-16	KMI- 435	< 0.2	< 2.9	< 3.7	< 1.9	1300 ± 100
03-01-16	KMI- 846	< 0.3	< 4.0	< 3.7	< 2.4	1447 ± 109
04-04-16	KMI- 1349	< 0.5	< 3.8	< 3.1	< 1.4	1360 ± 108
05-03-16	KMI- 2075	< 0.5	< 3.3	< 3.3	< 3.2	1394 ± 103
05-17-16	KMI- 2423	< 0.3	< 4.2	< 3.5	< 1.9	1414 ± 112
06-02-16	KMI- 2738	< 0.2	< 4.1	< 4.1	< 3.0	1437 ± 121
06-21-16	KMI- 3128	< 0.4	< 3.6	< 4.0	< 1.2	1214 ± 108
07-05-16	KMI- 3338	< 0.2	< 3.7	< 3.4	< 2.8	1402 ± 108
07-19-16	KMI- 3713	< 0.2	< 3.0	< 2.9	< 1.6	1402 ± 109
08-02-16	KMI- 4048	< 0.2	< 4.1	< 3.9	< 9.4	1397 ± 118
08-16-16	KMI- 4344	< 0.3	< 4.0	< 4.4	< 2.3	1333 ± 114
09-07-16	KMI- 4712	< 0.3	< 3.6	< 3.0	< 9.2	1298 ± 105
09-20-16	KMI- 4928	< 0.4	< 3.6	< 3.5	< 1.5	1311 ± 112
10-03-16	KMI- 5180	< 0.2	< 2.7	< 3.2	< 3.2	1535 ± 101
10-18-16	KMI- 5557	< 0.4	< 3.9	< 2.5	< 2.2	1412 ± 120
11-02-16	KMI- 5994	< 0.2	< 3.9	< 3.3	< 6.0	1441 ± 111
12-02-16	KMI- 6570	< 0.3	< 3.6	< 2.3	< 6.4	1423 ± 119
K-34						
01-04-16	KMI- 3	< 0.4	< 6.6	< 3.2	< 4.0	1163 ± 199
02-01-16	KMI- 436	< 0.4	< 4.1	< 3.6	< 2.4	1434 ± 109
03-01-16	KMI- 847	< 0.3	< 3.5	< 3.4	< 1.7	1492 ± 113
04-04-16	KMI- 1350	< 0.5	< 4.0	< 2.7	< 1.3	1473 ± 114
05-02-16	KMI- 2076	< 0.3	< 3.1	< 3.5	< 5.5	1390 ± 106
05-17-16	KMI- 2424	< 0.3	< 3.8	< 2.5	< 1.2	1393 ± 116
06-01-16	KMI- 2739	< 0.4	< 3.7	< 3.3	< 2.2	1407 ± 108
06-21-16	KMI- 3129	< 0.2	< 3.5	< 3.5	< 1.4	1396 ± 110
07-05-16	KMI- 3339	< 0.5	< 3.2	< 3.8	< 1.1	1339 ± 111
07-19-16	KMI- 3714	< 0.4	< 3.5	< 2.3	< 2.7	1313 ± 110
08-01-16	KMI- 4049	< 0.2	< 3.6	< 2.5	< 7.3	1423 ± 105
08-16-16	KMI- 4345	< 0.3	< 4.0	< 3.3	< 2.3	1361 ± 114
09-06-16	KMI- 4713	< 0.3	< 4.7	< 2.7	< 4.0	1442 ± 127
09-20-16	KMI- 4929	< 0.3	< 8.0	< 5.4	< 5.6	1354 ± 170
10-03-16	KMI- 5181	< 0.5	< 2.9	< 3.0	< 11.4	1390 ± 97
10-18-16	KMI- 5558	< 0.4	< 4.1	< 4.1	< 1.6	1499 ± 120
11-01-16	KMI- 5995	< 0.5	< 3.7	< 1.9	< 10.4	1397 ± 104
12-01-16	KMI- 6571	< 0.4	< 3.6	< 3.0	< 5.1	1433 ± 115

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						
01-05-16	KMI- 5	< 0.2	< 4.6	< 5.1	< 8.1	1370 ± 138
02-02-16	KMI- 438	< 0.4	< 3.2	< 3.4	< 5.3	1486 ± 105
03-02-16	KMI- 849	< 0.3	< 3.1	< 1.9	< 4.5	1315 ± 95
04-05-16	KMI- 1352	< 0.2	< 3.0	< 3.0	< 1.4	1472 ± 107
05-03-16	KMI- 2078	< 0.2	< 3.7	< 3.6	< 5.1	1317 ± 110
05-17-16	KMI- 2426	< 0.3	< 3.4	< 3.2	< 2.2	1377 ± 116
06-01-16	KMI- 2741	< 0.3	< 3.1	< 2.8	< 2.4	1257 ± 110
06-21-16	KMI- 3131	< 0.2	< 3.4	< 3.0	< 4.1	1412 ± 116
07-05-16	KMI- 3341	< 0.3	< 4.4	< 3.1	< 3.1	1534 ± 136
07-19-16	KMI- 3716	< 0.3	< 3.4	< 4.1	< 1.9	1413 ± 119
08-01-16	KMI- 4051	< 0.2	< 2.8	< 2.6	< 9.4	1352 ± 104
08-16-16	KMI- 4347	< 0.4	< 5.1	< 4.4	< 4.8	1311 ± 124
09-06-16	KMI- 4715	< 0.2	< 3.5	< 2.0	< 7.7	1322 ± 106
09-20-16	KMI- 4931	< 0.2	< 3.9	< 3.7	< 2.0	1272 ± 113
10-03-16	KMI- 5183	< 0.4	< 3.7	< 3.6	< 7.9	1439 ± 109
10-18-16	KMI- 5560	< 0.3	< 6.2	< 7.6	< 1.9	1266 ± 154
11-01-16	KMI- 5997	< 0.2	< 3.7	< 3.5	< 10.5	1385 ± 109
12-01-16	KMI- 6573	< 0.3	< 3.0	< 3.6	< 3.7	1350 ± 102
K-39						
01-05-16	KMI- 6	< 0.2	< 4.3	< 3.9	< 2.0	1399 ± 121
02-02-16	KMI- 439	< 0.2	< 3.6	< 3.5	< 4.6	1394 ± 104
03-01-16	KMI- 850	< 0.4	< 2.7	< 3.0	< 2.0	1469 ± 103
04-04-16	KMI- 1353	< 0.2	< 2.9	< 3.6	< 1.2	1350 ± 111
05-02-16	KMI- 2079	< 0.2	< 3.5	< 3.8	< 3.6	1370 ± 101
05-17-16	KMI- 2427	< 0.3	< 8.1	< 9.2	< 4.1	1235 ± 174
06-01-16	KMI- 2742	< 0.3	< 3.6	< 3.0	< 4.2	1384 ± 106
06-21-16	KMI- 3132	< 0.4	< 4.3	< 2.0	< 1.6	1333 ± 118
07-05-16	KMI- 3342	< 0.4	< 3.2	< 3.6	< 3.2	1358 ± 104
07-19-16	KMI- 3717	< 0.3	< 4.5	< 4.2	< 2.0	1284 ± 124
08-02-16	KMI- 4052	< 0.2	< 3.9	< 2.7	< 9.2	1317 ± 101
08-16-16	KMI- 4348	< 0.4	< 4.1	< 2.7	< 2.8	1283 ± 117
09-07-16	KMI- 4716	< 0.3	< 3.4	< 3.7	< 9.2	1321 ± 104
09-20-16	KMI- 4932	< 0.5	< 3.7	< 3.6	< 1.5	1301 ± 108
10-03-16	KMI- 5184	< 0.2	< 3.0	< 2.3	< 10.8	1412 ± 83
10-18-16	KMI- 5561	< 0.2	< 4.5	< 4.1	< 3.2	1331 ± 114
11-02-16	KMI- 5998	< 0.2	< 3.5	< 2.5	< 15.0	1399 ± 111
12-02-16	KMI- 6574	< 0.4	< 3.6	< 3.9	< 5.3	1374 ± 109

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						
01-04-16	KMI- 1	< 0.2	< 7.5	< 8.4	< 7.5	1168 ± 176
02-01-16	KMI- 434	< 0.2	< 3.4	< 3.9	< 1.3	1305 ± 116
03-01-16	KMI- 845	< 0.2	< 3.7	< 4.1	< 2.2	1280 ± 99
04-04-16	KMI- 1348	< 0.2	< 4.2	< 4.4	< 1.6	1400 ± 120
05-03-16	KMI- 2074	< 0.4	< 3.6	< 2.6	< 2.3	1316 ± 100
05-17-16	KMI- 2422	< 0.5	< 5.9	< 5.4	< 1.8	1320 ± 143
06-02-16	KMI- 2737	< 0.2	< 3.1	< 2.7	< 1.7	1367 ± 98
06-21-16	KMI- 3127	< 0.2	< 4.1	< 3.9	< 1.7	1409 ± 119
07-06-16	KMI- 3337	< 0.2	< 4.6	< 4.9	< 2.5	1311 ± 120
07-19-16	KMI- 3712	< 0.3	< 3.7	< 4.2	< 1.9	1421 ± 114
08-01-16	KMI- 4047	< 0.2	< 3.9	< 3.9	< 11.0	1394 ± 106
08-16-16	KMI- 4343	< 0.3	< 3.6	< 2.8	< 4.0	1489 ± 123
09-06-16	KMI- 4711	< 0.3	< 5.1	< 3.6	< 3.8	1454 ± 129
09-20-16	KMI- 4927	< 0.2	< 4.3	< 4.4	< 2.4	1487 ± 116
10-03-16	KMI- 5179	< 0.5	< 4.6	< 3.0	< 5.1	1288 ± 124
10-18-16	KMI- 5556	< 0.2	< 4.3	< 3.2	< 1.4	1426 ± 130
11-01-16	KMI- 5993	< 0.2	< 3.3	< 4.3	< 5.1	1429 ± 111
12-01-16	KMI- 6569	< 0.3	< 4.0	< 2.5	< 3.8	1325 ± 121
K-35						
01-05-16	KMI- 4	< 0.5	< 3.8	< 2.5	< 5.4	1377 ± 116
02-02-16	KMI- 437	< 0.4	< 3.3	< 3.1	< 3.2	1339 ± 103
03-02-16	KMI- 848	< 0.4	< 3.4	< 3.8	< 1.9	1462 ± 106
04-05-16	KMI- 1351	< 0.4	< 3.5	< 2.2	< 1.3	1378 ± 112
05-03-16	KMI- 2077	< 0.2	< 4.5	< 4.5	< 7.6	1483 ± 121
05-17-16	KMI- 2425	< 0.3	< 3.6	< 2.9	< 1.9	1375 ± 116
06-01-16	KMI- 2740	< 0.4	< 3.9	< 3.4	< 2.9	1227 ± 101
06-21-16	KMI- 3130	< 0.2	< 4.5	< 4.7	< 3.6	1425 ± 130
07-06-16	KMI- 3340	< 0.3	< 2.9	< 4.0	< 2.0	1405 ± 117
07-19-16	KMI- 3715	< 0.2	< 3.5	< 3.8	< 2.7	1404 ± 108
08-02-16	KMI- 4050	< 0.2	< 3.5	< 3.3	< 8.3	1326 ± 106
08-16-16	KMI- 4346	< 0.5	< 7.0	< 5.7	< 2.6	1479 ± 179
09-07-16	KMI- 4714	< 0.3	< 3.8	< 2.8	< 11.6	1505 ± 114
09-20-16	KMI- 4930	< 0.3	< 5.2	< 4.3	< 2.0	1437 ± 121
10-04-16	KMI- 5182	< 0.4	< 1.4	< 1.6	< 8.1	1408 ± 43
10-18-16	KMI- 5559	< 0.4	< 3.3	< 3.7	< 3.3	1360 ± 122
11-02-16	KMI- 5996	< 0.2	< 3.3	< 3.3	< 10.4	1367 ± 108
12-01-16	KMI- 6572	< 0.4	< 3.9	< 4.6	< 5.3	1366 ± 114

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						
01-04-16	KMI- 7	< 0.2	< 4.9	< 3.9	< 9.1	1369 ± 124
02-01-16	KMI- 440	< 0.2	< 3.6	< 2.7	< 2.2	1415 ± 112
03-01-16	KMI- 851	< 0.5	< 3.0	< 3.7	< 2.9	1315 ± 95
04-04-16	KMI- 1354	< 0.2	< 4.1	< 3.4	< 2.3	1394 ± 121
05-02-16	KMI- 2080	< 0.2	< 3.0	< 3.5	< 7.7	1411 ± 110
05-17-16	KMI- 2428	< 0.3	< 3.9	< 2.7	< 1.2	1421 ± 103
06-01-16	KMI- 2743	< 0.2	< 2.8	< 3.4	< 2.9	1261 ± 95
06-21-16	KMI- 3133	< 0.2	< 3.7	< 2.3	< 2.4	1316 ± 110
07-05-16	KMI- 3343	< 0.4	< 3.8	< 3.8	< 3.2	1347 ± 117
07-19-16	KMI- 3718	< 0.3	< 3.9	< 3.7	< 1.9	1341 ± 121
08-01-16	KMI- 4053	< 0.2	< 3.7	< 3.5	< 9.4	1358 ± 110
08-16-16	KMI- 4349	< 0.4	< 5.0	< 3.5	< 2.7	1356 ± 125
09-06-16	KMI- 4717	< 0.3	< 3.2	< 2.5	< 13.1	1308 ± 96
09-20-16	KMI- 4933	< 0.3	< 7.5	< 6.2	< 4.9	1311 ± 160
10-03-16	KMI- 5185	< 0.2	< 1.6	< 1.9	< 5.6	1373 ± 45
10-18-16	KMI- 5562	< 0.2	< 3.5	< 3.1	< 3.1	1345 ± 108
11-01-16	KMI- 5999	< 0.2	< 3.3	< 2.9	< 5.7	1379 ± 105
12-01-16	KMI- 6575	< 0.3	< 3.9	< 3.9	< 5.2	1320 ± 108

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	< 1.2	< 0.5	1.78 ± 0.16	0.92	< 0.54	< 5.62
February	KMI - 435	< 1.5	< 0.7	1.59 ± 0.12	1.03	< 0.68	< 6.29
March	KMI - 846	< 1.0	< 0.6	1.76 ± 0.13	1.08	< 0.56	< 5.68
April	KMI - 1349	< 1.0	0.7 ± 0.3	1.66 ± 0.13	1.00	0.70	< 6.02
May	KMI - 2820	< 0.9	< 0.6	1.71 ± 0.13	0.96	< 0.63	< 5.85
June	KMI - 3640	< 0.7	< 0.6	1.62 ± 0.14	1.03	< 0.58	< 6.17
July	KMI - 3995	< 0.7	< 0.5	1.71 ± 0.13	0.94	< 0.53	< 5.85
August	KMI - 4563	< 0.9	0.7 ± 0.4	1.66 ± 0.14	0.95	0.74	< 6.02
September	KMI - 5027	< 0.7	< 0.7	1.59 ± 0.13	0.94	< 0.74	< 6.29
October	KMI - 5968	< 1.1	< 0.8	1.80 ± 0.13	0.90	< 0.89	< 5.56
November	KMI - 5994	< 1.0	< 0.5	1.76 ± 0.14	0.90	< 0.56	< 5.68
December	KMI - 6570	< 0.9	0.7 ± 0.3	1.74 ± 0.15	0.95	0.74	< 5.75
				K-34			
January	KMI - 3	< 0.9	0.8 ± 0.4	1.42 ± 0.24	0.92	0.87	< 7.04
February	KMI - 436	< 1.2	0.6 ± 0.3	1.75 ± 0.13	1.00	0.60	< 5.71
March	KMI - 847	< 0.9	< 0.6	1.82 ± 0.14	0.98	< 0.61	< 5.49
April	KMI - 1350	< 0.8	< 0.5	1.80 ± 0.14	0.99	< 0.51	< 5.56
May	KMI - 2821	< 0.7	0.9 ± 0.3	1.70 ± 0.14	1.11	0.81	< 5.88
June	KMI - 3641	< 0.7	< 0.6	1.71 ± 0.13	0.87	< 0.69	< 5.85
July	KMI - 3996	< 0.6	0.5 ± 0.3	1.62 ± 0.13	1.00	0.50	< 6.17
August	KMI - 4564	< 0.6	< 0.5	1.70 ± 0.13	0.95	< 0.53	< 5.88
September	KMI - 5028	< 0.6	0.7 ± 0.4	1.70 ± 0.18	0.94	0.74	< 5.88
October	KMI - 5969	< 0.6	0.5 ± 0.3	1.76 ± 0.13	0.96	0.52	< 5.68
November	KMI - 5995	< 0.9	0.8 ± 0.3	1.70 ± 0.13	1.02	0.78	< 5.88
December	KMI - 6571	< 0.9	0.7 ± 0.4	1.75 ± 0.14	0.90	0.78	< 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	0.6 ± 0.3	1.67 ± 0.17	1.03	0.58	< 5.99
February	KMI - 438	< 0.8	< 0.6	1.81 ± 0.13	0.98	< 0.61	< 5.52
March	KMI - 849	< 0.9	0.7 ± 0.4	1.60 ± 0.12	0.93	0.75	< 6.25
April	KMI - 1352	< 0.8	0.5 ± 0.3	1.80 ± 0.13	1.05	0.48	< 5.56
May	KMI - 2823	< 0.7	0.9 ± 0.4	1.64 ± 0.14	0.99	0.91	< 6.10
June	KMI - 3643	< 0.6	0.6 ± 0.3	1.63 ± 0.14	0.98	0.61	< 6.13
July	KMI - 3998	< 0.6	0.8 ± 0.3	1.80 ± 0.16	1.03	0.78	< 5.56
August	KMI - 4566	< 0.6	0.9 ± 0.3	1.62 ± 0.14	0.95	0.95	< 6.17
September	KMI - 5030	< 0.9	< 0.9	1.58 ± 0.13	1.00	< 0.90	< 6.33
October	KMI - 5971	< 0.6	0.6 ± 0.3	1.65 ± 0.16	1.05	0.57	< 6.06
November	KMI - 5997	< 0.9	< 0.5	1.69 ± 0.13	0.98	< 0.51	< 5.92
December	KMI - 6573	< 1.0	0.7 ± 0.4	1.65 ± 0.12	1.04	0.67	< 6.06
				K-39			
January	KMI - 6	< 0.9	< 0.6	1.71 ± 0.15	1.11	< 0.54	< 5.85
February	KMI - 439	< 0.8	< 0.6	1.70 ± 0.13	1.06	< 0.57	< 5.88
March	KMI - 850	< 1.1	0.8 ± 0.4	1.79 ± 0.13	0.99	0.81	< 5.59
April	KMI - 1353	< 0.9	< 0.6	1.65 ± 0.14	1.08	< 0.56	< 6.06
May	KMI - 2824	< 0.7	< 0.5	1.59 ± 0.17	1.07	< 0.47	< 6.29
June	KMI - 3644	< 0.7	< 0.6	1.66 ± 0.14	1.03	< 0.58	< 6.02
July	KMI - 3999	< 0.7	0.8 ± 0.4	1.61 ± 0.14	0.99	0.81	< 6.21
August	KMI - 4567	< 0.9	0.9 ± 0.4	1.59 ± 0.13	0.88	1.02	< 6.29
September	KMI - 5031	< 0.7	< 0.7	1.60 ± 0.13	0.98	< 0.71	< 6.25
October	KMI - 5972	< 0.7	< 0.5	1.67 ± 0.12	0.94	< 0.53	< 5.99
November	KMI - 5998	< 0.9	< 0.5	1.71 ± 0.14	1.02	< 0.49	< 5.85
December	KMI - 6574	< 1.0	< 0.7	1.68 ± 0.13	0.98	< 0.71	< 5.95

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
Control				K-3			
January	KMI - 1	< 0.8	0.8 ± 0.3	1.42 ± 0.21	0.97	0.82	< 7.04
February	KMI - 434	< 1.0	0.7 ± 0.4	1.59 ± 0.14	1.00	0.70	< 6.29
March	KMI - 845	< 1.3	0.7 ± 0.3	1.56 ± 0.12	1.08	0.65	< 6.41
April	KMI - 1348	< 1.0	< 0.6	1.71 ± 0.15	1.01	< 0.59	< 5.85
May	KMI - 2819	< 0.8	1.0 ± 0.4	1.61 ± 0.15	0.98	1.02	< 6.21
June	KMI - 3639	< 0.7	< 0.6	1.69 ± 0.13	0.99	< 0.61	< 5.92
July	KMI - 3994	< 0.7	0.8 ± 0.4	1.67 ± 0.14	1.00	0.80	< 5.99
August	KMI - 4562	< 0.8	0.8 ± 0.3	1.76 ± 0.14	0.97	0.82	< 5.68
September	KMI - 5026	< 0.7	0.7 ± 0.3	1.79 ± 0.15	0.93	0.75	< 5.59
October	KMI - 5967	< 0.7	< 0.5	1.65 ± 0.15	0.92	< 0.54	< 6.06
November	KMI - 5993	< 1.0	0.8 ± 0.3	1.74 ± 0.14	0.95	0.84	< 5.75
December	KMI - 6569	< 0.9	1.0 ± 0.4	1.62 ± 0.15	0.99	1.01	< 6.17
				K-35			
January	KMI - 4	< 1.0	< 0.6	1.68 ± 0.14	0.95	< 0.63	< 5.95
February	KMI - 437	< 0.9	< 0.6	1.63 ± 0.13	1.07	< 0.56	< 6.13
March	KMI - 848	< 0.9	0.6 ± 0.3	1.78 ± 0.13	1.10	0.55	< 5.62
April	KMI - 1351	< 0.8	< 0.5	1.68 ± 0.14	1.01	< 0.50	< 5.95
May	KMI - 2822	< 0.7	< 0.5	1.74 ± 0.14	1.00	< 0.50	< 5.75
June	KMI - 3642	< 0.7	< 0.6	1.62 ± 0.14	0.95	< 0.63	< 6.17
July	KMI - 3997	< 0.6	0.5 ± 0.3	1.71 ± 0.14	0.94	0.53	< 5.85
August	KMI - 4565	< 0.7	0.5 ± 0.3	1.71 ± 0.17	0.98	0.51	< 5.85
September	KMI - 5029	< 0.6	< 0.5	1.79 ± 0.14	1.01	< 0.50	< 5.59
October	KMI - 5970	< 0.7	< 0.5	1.69 ± 0.10	0.95	< 0.53	< 5.92
November	KMI - 5996	< 0.9	< 0.5	1.67 ± 0.13	0.94	< 0.53	< 5.99
December	KMI - 6572	< 0.9	0.7 ± 0.3	1.67 ± 0.14	0.90	0.78	< 5.99
				K-42			
January	KMI - 7	< 0.9	< 0.6	1.67 ± 0.15	0.89	< 0.67	< 5.99
February	KMI - 440	< 1.0	0.8 ± 0.4	1.73 ± 0.14	0.89	0.90	< 5.78
March	KMI - 851	< 1.0	0.8 ± 0.4	1.60 ± 0.12	0.95	0.84	< 6.25
April	KMI - 1354	< 1.1	< 0.6	1.70 ± 0.15	0.94	< 0.64	< 5.88
May	KMI - 2825	< 0.9	0.7 ± 0.4	1.73 ± 0.13	0.96	0.73	< 5.78
June	KMI - 3645	< 0.7	< 0.6	1.57 ± 0.13	0.97	< 0.62	< 6.37
July	KMI - 4000	< 0.8	0.6 ± 0.4	1.64 ± 0.14	1.01	0.59	< 6.10
August	KMI - 4568	< 1.0	< 0.7	1.65 ± 0.14	0.80	< 0.88	< 6.06
September	KMI - 5032	< 0.8	< 0.7	1.60 ± 0.13	0.87	< 0.80	< 6.25
October	KMI - 5973	< 0.8	< 0.6	1.66 ± 0.13	0.91	< 0.66	< 6.02
November	KMI - 5999	< 1.6	< 0.6	1.68 ± 0.13	0.90	< 0.67	< 5.95
December	KMI - 6575	< 0.9	< 0.5	1.61 ± 0.13	0.88	< 0.57	< 6.21

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	01-04-16	04-04-16	07-05-16	10-03-16
Lab Code	KWW- 96	KWW- 1367	KWW- 3358	KWW- 5317
Gross alpha	< 2.0	5.0 ± 3.3	< 1.6	< 1.9
Gross beta	< 1.6	< 3.7	3.9 ± 1.2	< 1.8
H-3	< 145	< 148	< 149	< 142
Sr-89	< 0.6	< 0.7	< 0.7	< 0.7
Sr-90	< 0.5	< 0.4	< 0.4	< 0.4
K-40 (ICP)	2.19	2.07	1.44	1.67
Mn-54	< 3.3	< 3.4	< 2.1	< 3.0
Fe-59	< 1.8	< 3.2	< 5.4	< 3.3
Co-58	< 1.2	< 4.0	< 2.6	< 1.7
Co-60	< 2.4	< 2.9	< 2.6	< 1.8
Zn-65	< 2.3	< 3.4	< 4.0	< 3.8
Zr-Nb-95	< 2.3	< 3.5	< 1.5	< 3.4
Cs-134	< 2.9	< 3.9	< 2.7	< 4.3
Cs-137	< 2.8	< 2.5	< 2.5	< 3.2
Ba-La-140	< 2.1	< 4.2	< 4.3	< 4.8
K-1h				
Date Collected	01-04-16	04-04-16	07-05-16	10-03-16
Lab Code	KWW- 97	KWW- 1368	KWW- 3359	KWW- 5318
Gross alpha	2.7 ± 1.6	< 4.8	< 1.9	< 2.0
Gross beta	2.9 ± 1.2	< 3.5	2.9 ± 1.1	< 1.7
H-3	< 145	< 148	< 149	< 142
K-40 (ICP)	2.36	2.09	2.15	2.28
Mn-54	< 3.6	< 3.0	< 1.9	< 2.8
Fe-59	< 3.7	< 5.5	< 2.1	< 3.4
Co-58	< 2.3	< 4.0	< 0.9	< 2.4
Co-60	< 2.0	< 3.5	< 1.9	< 2.6
Zn-65	< 5.2	< 5.8	< 1.2	< 2.5
Zr-Nb-95	< 2.6	< 5.0	< 2.6	< 2.1
Cs-134	< 3.8	< 3.4	< 1.9	< 3.0
Cs-137	< 3.1	< 2.8	< 1.7	< 3.4
Ba-La-140	< 3.8	< 6.6	< 2.0	< 4.8

[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	01-04-16	04-04-16	07-05-16	10-03-16
Lab Code	KWW- 98	KWW- 1369	KWW- 3360	KWW- 5319
Gross beta	1.3 ± 0.8	2.9 ± 1.4	< 1.0	1.2 ± 0.3
H-3	< 145	< 148	< 149	< 142
K-40 (ICP)	2.43	2.83	0.60	1.01
Mn-54	< 3.0	< 2.5	< 2.2	< 3.8
Fe-59	< 4.0	< 5.4	< 3.7	< 11.9
Co-58	< 2.7	< 2.2	< 1.7	< 4.3
Co-60	< 3.1	< 1.7	< 1.6	< 4.4
Zn-65	< 2.6	< 4.0	< 1.7	< 4.7
Zr-Nb-95	< 2.0	< 3.0	< 2.1	< 5.1
Cs-134	< 3.2	< 2.5	< 2.3	< 6.1
Cs-137	< 1.8	< 2.8	< 2.1	< 4.7
Ba-La-140	< 1.9	< 4.0	< 3.8	< 3.7
K-11				
Date Collected	01-04-16	04-04-16	07-05-16	10-03-16
Lab Code	KWW- 99	KWW- 1370	KWW- 3361	KWW- 5320
Gross beta	0.5 ± 0.3	< 1.1	4.8 ± 0.4	0.5 ± 0.3
H-3	< 145	< 148	< 149	< 142
K-40 (ICP)	0.90	0.95	6.42	< 0.30
Mn-54	< 2.6	< 2.5	< 4.6	< 2.0
Fe-59	< 8.3	< 4.4	< 6.1	< 4.3
Co-58	< 3.6	< 1.9	< 3.1	< 2.7
Co-60	< 4.4	< 2.0	< 3.6	< 2.6
Zn-65	< 5.0	< 4.1	< 4.6	< 4.8
Zr-Nb-95	< 5.6	< 3.7	< 3.4	< 4.1
Cs-134	< 5.2	< 2.2	< 4.0	< 3.0
Cs-137	< 5.3	< 2.8	< 3.4	< 3.1
Ba-La-140	< 4.8	< 3.7	< 4.4	< 3.0

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	01-04-16	04-04-16	07-05-16	10-03-16
Lab Code	KWW- 101	KWW- 1372	KWW- 3363	KWW- 5322
Gross beta	< 0.5	29.9 ± 2.1 [a]	0.8 ± 0.4	1.4 ± 0.4
H-3	< 145	< 148	< 149	< 142
K-40 (ICP)	< 0.30	31.32	1.08	1.76
Mn-54	< 2.7	< 1.7	< 1.0	< 3.2
Fe-59	< 4.2	< 5.1	< 3.8	< 3.3
Co-58	< 2.6	< 3.0	< 1.8	< 3.5
Co-60	< 2.5	< 1.9	< 1.5	< 1.8
Zn-65	< 3.3	< 4.5	< 2.6	< 3.5
Zr-Nb-95	< 3.0	< 3.3	< 1.9	< 3.1
Cs-134	< 2.6	< 2.4	< 2.1	< 3.4
Cs-137	< 3.8	< 2.4	< 2.0	< 3.2
Ba-La-140	< 3.0	< 2.1	< 3.3	< 2.9
Control				
K-13				
Date Collected	01-04-16	04-04-16	07-05-16	10-03-16
Lab Code	KWW- 100	KWW- 1371	KWW- 3362	KWW- 5321
Gross beta	0.7 ± 0.3	< 1.1	0.7 ± 0.3	0.5 ± 0.3
H-3	< 145	< 148	< 149	< 142
K-40 (ICP)	0.97	0.97	0.96	1.02
Mn-54	< 2.9	< 5.1	< 1.8	< 2.2
Fe-59	< 4.2	< 10.5	< 2.2	< 2.7
Co-58	< 2.8	< 4.2	< 1.5	< 2.6
Co-60	< 1.9	< 4.0	< 1.5	< 3.3
Zn-65	< 4.9	< 7.9	< 2.3	< 2.6
Zr-Nb-95	< 2.9	< 4.9	< 1.7	< 3.3
Cs-134	< 2.8	< 5.1	< 2.0	< 4.5
Cs-137	< 3.4	< 3.3	< 2.3	< 4.0
Ba-La-140	< 2.5	< 7.5	< 3.6	< 5.4

[a] Result of reanalysis 22.9 ± 0.9

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	09-06-16	09-06-16
Lab Code	KME- 4758	KME- 4759
Gross Alpha	< 0.023	< 0.036
Gross Beta	2.79 ± 0.044	2.54 ± 0.073
Be-7	< 0.32	< 0.26
K-40	2.53 ± 0.48	2.29 ± 0.35
Nb-95	< 0.044	< 0.029
Zr-95	< 0.055	< 0.027
Ru-103	< 0.037	< 0.030
Ru-106	< 0.179	< 0.137
Cs-134	< 0.022	< 0.020
Cs-137	< 0.014	< 0.022
Ce-141	< 0.045	< 0.067
Ce-144	< 0.163	< 0.108

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	01-04-16	04-04-16	07-05-16	10-03-16
Lab Code	KE- 102	KE- 1364	KE- 3345	KE- 5175
Gross beta	1.62 ± 0.05	1.42 ± 0.04	1.55 ± 0.06	1.72 ± 0.07
Sr-89	< 0.004	< 0.005	< 0.003	< 0.008
Sr-90	< 0.002	< 0.002	< 0.001	< 0.003
Be-7	< 0.034	< 0.050	< 0.074	< 0.047
K-40	1.18 ± 0.12	1.69 ± 0.16	1.25 ± 0.14	1.33 ± 0.15
Nb-95	< 0.006	< 0.008	< 0.011	< 0.011
Zr-95	< 0.006	< 0.012	< 0.009	< 0.015
Ru-103	< 0.005	< 0.007	< 0.010	< 0.013
Ru-106	< 0.043	< 0.030	< 0.053	< 0.058
Cs-134	< 0.004	< 0.006	< 0.005	< 0.006
Cs-137	< 0.003	< 0.006	< 0.004	< 0.005
Ce-141	< 0.016	< 0.015	< 0.024	< 0.029
Ce-144	< 0.031	< 0.050	< 0.032	< 0.048

Location	K-32			
Date Collected	01-04-16	04-04-16	07-05-16	10-03-16
Lab Code	KE- 103	KE- 1365	KE- 3346	KE- 5176
Gross beta	1.44 ± 0.04	1.38 ± 0.04	1.21 ± 0.05	1.48 ± 0.06
Sr-89	< 0.004	< 0.004	< 0.005	< 0.007
Sr-90	< 0.002	< 0.002	< 0.002	< 0.002
Be-7	< 0.065	< 0.053	< 0.065	< 0.062
K-40	1.26 ± 0.14	1.23 ± 0.13	1.35 ± 0.16	1.57 ± 0.17
Nb-95	< 0.007	< 0.004	< 0.012	< 0.010
Zr-95	< 0.011	< 0.010	< 0.014	< 0.017
Ru-103	< 0.006	< 0.006	< 0.006	< 0.015
Ru-106	< 0.049	< 0.037	< 0.040	< 0.053
Cs-134	< 0.005	< 0.006	< 0.007	< 0.005
Cs-137	< 0.003	< 0.006	< 0.005	< 0.004
Ce-141	< 0.011	< 0.011	< 0.022	< 0.039
Ce-144	< 0.027	< 0.048	< 0.043	< 0.063

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	K-43
Date Collected	08-01-16	08-01-16	09-06-16	10-03-16
Lab Code	KVE- 4044	KVE- 4045	KVE- 4742	KVE- 5306
Type	Clover	Wheat	Corn	Pumpkin
Gross beta	5.12 ± 0.11	9.50 ± 0.23	3.19 ± 0.07	2.75 ± 0.07
Sr-89	< 0.011	< 0.031	< 0.009	< 0.007
Sr-90	< 0.004	0.031 ± 0.010	< 0.005	< 0.002
Be-7	0.58 ± 0.15	0.94 ± 0.155	< 0.082	< 0.039
K-40	3.85 ± 0.35	5.99 ± 0.37	2.24 ± 0.20	1.97 ± 0.13
Nb-95	< 0.011	< 0.011	< 0.009	< 0.006
Zr-95	< 0.021	< 0.017	< 0.008	< 0.004
Ru-103	< 0.013	< 0.007	< 0.005	< 0.005
Ru-106	< 0.081	< 0.092	< 0.038	< 0.018
Cs-134	< 0.011	< 0.011	< 0.006	< 0.004
Cs-137	< 0.015	< 0.011	< 0.007	< 0.005
Ce-141	< 0.019	< 0.014	< 0.016	< 0.008
Ce-144	< 0.065	< 0.050	< 0.052	< 0.021

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	09-06-16	09-06-16	09-06-16	09-06-16
Lab Code	KVE- 4743	KVE- 4744	KVE- 4745	KVE- 4746
Type	Carrots	Zucchini	Kohlrabi	Watermelon
Gross beta	4.37 ± 0.08	2.35 ± 0.04	3.25 ± 0.06	2.21 ± 0.04
Sr-89	< 0.006	< 0.005	< 0.004	< 0.003
Sr-90	< 0.003	< 0.002	< 0.002	< 0.002
Be-7	< 0.068	< 0.037	< 0.053	< 0.036
K-40	4.15 ± 0.25	1.96 ± 0.14	2.85 ± 0.16	1.74 ± 0.13
Nb-95	< 0.005	< 0.008	< 0.005	< 0.006
Zr-95	< 0.008	< 0.005	< 0.006	< 0.009
Ru-103	< 0.005	< 0.006	< 0.004	< 0.004
Ru-106	< 0.057	< 0.041	< 0.032	< 0.034
Cs-134	< 0.006	< 0.005	< 0.005	< 0.004
Cs-137	< 0.003	< 0.004	< 0.005	< 0.004
Ce-141	< 0.013	< 0.016	< 0.014	< 0.010
Ce-144	< 0.043	< 0.043	< 0.051	< 0.028

	K-26 (control)	K-26 (control)
Date Collected	09-07-16	10-04-16
Lab Code	KVE- 4747	KVE- 5305
Type	Corn	Pumpkin
Gross beta	2.11 ± 0.04	1.88 ± 0.05
Sr-89	< 0.005	< 0.002
Sr-90	< 0.002	< 0.001
Be-7	< 0.073	< 0.035
K-40	1.90 ± 0.18	1.55 ± 0.11
Nb-95	< 0.012	< 0.006
Zr-95	< 0.008	< 0.006
Ru-103	< 0.006	< 0.003
Ru-106	< 0.069	< 0.020
Cs-134	< 0.006	< 0.003
Cs-137	< 0.005	< 0.003
Ce-141	< 0.011	< 0.011
Ce-144	< 0.031	< 0.033

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	01-04-16	01-04-16	01-04-16	01-04-16
Lab Code	KCF- 25	KCF- 28	KCF- 31	KCF- 34
Type	Hay	Hay	Silage	Silage
Gross beta	19.34 ± 0.42	14.75 ± 0.36	4.92 ± 0.11	11.90 ± 0.24
Sr-89	< 0.034	< 0.044	< 0.010	< 0.032
Sr-90	< 0.015	0.022 ± 0.012	0.005 ± 0.003	0.023 ± 0.009
Be-7	< 0.232	0.58 ± 0.27	0.31 ± 0.10	< 0.10
K-40	18.13 ± 0.96	11.04 ± 0.92	3.50 ± 0.23	9.47 ± 0.41
Nb-95	< 0.025	< 0.029	< 0.012	< 0.014
Zr-95	< 0.048	< 0.038	< 0.012	< 0.011
Ru-103	< 0.019	< 0.029	< 0.008	< 0.010
Ru-106	< 0.170	< 0.215	< 0.039	< 0.068
Cs-134	< 0.022	< 0.030	< 0.007	< 0.008
Cs-137	< 0.030	< 0.028	< 0.008	< 0.008
Ce-141	< 0.034	< 0.046	< 0.020	< 0.015
Ce-144	< 0.112	< 0.225	< 0.050	< 0.039
	Indicator			
Location	K-5	K-34	K-38	K-39
Date Collected	01-04-16	01-04-16	01-04-16	01-04-16
Lab Code	KCF- 26	KCF- 27	KCF- 29	KCF- 30
Type	Hay	Hay	Hay	Hay
Gross beta	19.41 ± 0.44	22.56 ± 0.47	14.23 ± 0.31	18.05 ± 0.45
Sr-89	< 0.034	< 0.028	< 0.021	< 0.039
Sr-90	< 0.013	0.015 ± 0.007	0.026 ± 0.007	< 0.016
Be-7	1.37 ± 0.19	< 0.23	0.32 ± 0.16	0.40 ± 0.23
K-40	15.28 ± 0.71	17.69 ± 0.87	13.24 ± 0.67	15.10 ± 0.82
Nb-95	< 0.011	< 0.022	< 0.019	< 0.017
Zr-95	< 0.027	< 0.052	< 0.035	< 0.027
Ru-103	< 0.017	< 0.017	< 0.020	< 0.024
Ru-106	< 0.096	< 0.189	< 0.110	< 0.199
Cs-134	< 0.018	< 0.026	< 0.018	< 0.022
Cs-137	< 0.014	< 0.029	< 0.009	< 0.022
Ce-141	< 0.020	< 0.051	< 0.037	< 0.044
Ce-144	< 0.116	< 0.136	< 0.100	< 0.116

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	01-04-16	01-04-16	01-04-16	01-04-16
Lab Code	KCF- 32	KCF- 33	KCF- 35	KCF- 36
Type	Silage	Silage	Silage	Silage
Gross beta	3.89 ± 0.08	3.89 ± 0.08	5.86 ± 0.15	10.15 ± 0.24
Sr-89	< 0.009	< 0.013	< 0.022	< 0.021
Sr-90	0.012 ± 0.003	0.006 ± 0.003	< 0.009	0.009 ± 0.005
Be-7	< 0.04	< 0.06	0.13 ± 0.09	0.30 ± 0.09
K-40	2.99 ± 0.20	3.10 ± 0.22	4.61 ± 0.21	7.86 ± 0.36
Nb-95	< 0.007	< 0.007	< 0.008	< 0.009
Zr-95	< 0.007	< 0.013	< 0.015	< 0.017
Ru-103	< 0.004	< 0.006	< 0.007	< 0.012
Ru-106	< 0.044	< 0.066	< 0.044	< 0.073
Cs-134	< 0.005	< 0.007	< 0.007	< 0.008
Cs-137	< 0.007	< 0.007	< 0.008	< 0.008
Ce-141	< 0.008	< 0.018	< 0.011	< 0.019
Ce-144	< 0.040	< 0.048	< 0.034	< 0.064

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	06-01-16	06-01-16	06-01-16	06-01-16
Lab Code	KG- 2728	KG- 2729	KG- 2731	KG- 2733
Gross beta	7.77 ± 0.15	6.41 ± 0.12	8.24 ± 0.15	6.47 ± 0.11
Sr-89	< 0.010	< 0.006	< 0.012	< 0.006
Sr-90	< 0.007	< 0.004	< 0.008	< 0.004
Be-7	0.79 ± 0.22	0.38 ± 0.19	0.61 ± 0.17	0.58 ± 0.24
K-40	6.44 ± 0.53	4.98 ± 0.43	7.18 ± 0.47	5.13 ± 0.59
Mn-54	< 0.021	< 0.014	< 0.011	< 0.020
Co-58	< 0.016	< 0.014	< 0.009	< 0.017
Co-60	< 0.012	< 0.009	< 0.011	< 0.013
Nb-95	< 0.017	< 0.009	< 0.014	< 0.015
Zr-95	< 0.022	< 0.027	< 0.027	< 0.036
Ru-103	< 0.015	< 0.015	< 0.014	< 0.018
Ru-106	< 0.161	< 0.128	< 0.124	< 0.133
Cs-134	< 0.019	< 0.017	< 0.015	< 0.020
Cs-137	< 0.019	< 0.019	< 0.016	< 0.020
Ce-141	< 0.033	< 0.031	< 0.025	< 0.036
Ce-144	< 0.095	< 0.122	< 0.106	< 0.157

	Indicator		Control	
Location	K-38	K-39	K-3	K-35
Date Collected	06-01-16	06-01-16	06-01-16	06-01-16
Lab Code	KG- 2735	KG- 2736	KG- 2730	KG- 2734
Gross beta	8.01 ± 0.15	5.48 ± 0.10	12.09 ± 0.21	6.40 ± 0.12
Sr-89	< 0.008	< 0.004	< 0.006	< 0.007
Sr-90	< 0.004	< 0.002	< 0.004	< 0.004
Be-7	0.36 ± 0.11	0.39 ± 0.13	0.26 ± 0.11	0.50 ± 0.18
K-40	5.98 ± 0.34	4.67 ± 0.32	6.23 ± 0.42	5.54 ± 0.41
Mn-54	< 0.007	< 0.010	< 0.008	< 0.011
Co-58	< 0.011	< 0.005	< 0.009	< 0.011
Co-60	< 0.003	< 0.009	< 0.008	< 0.009
Nb-95	< 0.009	< 0.011	< 0.009	< 0.012
Zr-95	< 0.014	< 0.010	< 0.018	< 0.021
Ru-103	< 0.007	< 0.011	< 0.013	< 0.015
Ru-106	< 0.105	< 0.087	< 0.115	< 0.138
Cs-134	< 0.008	< 0.010	< 0.011	< 0.013
Cs-137	< 0.008	< 0.010	< 0.014	< 0.010
Ce-141	< 0.017	< 0.023	< 0.021	< 0.032
Ce-144	< 0.059	< 0.058	< 0.063	< 0.088

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	08-01-16	08-01-16	08-01-16	08-01-16
Lab Code	KG- 4098	KG- 4099	KG- 4101	KG- 4102
Gross beta	8.05 ± 0.19	7.40 ± 0.17	8.90 ± 0.18	8.88 ± 0.18
Sr-89	< 0.025	< 0.017	< 0.014	< 0.023
Sr-90	< 0.014	< 0.009	< 0.008	< 0.014
Be-7	3.02 ± 0.32	1.48 ± 0.26	0.96 ± 0.19	1.11 ± 0.29
K-40	6.67 ± 0.51	7.43 ± 0.55	8.72 ± 0.49	8.31 ± 0.70
Mn-54	< 0.014	< 0.012	< 0.013	< 0.023
Co-58	< 0.017	< 0.010	< 0.017	< 0.023
Co-60	< 0.014	< 0.015	< 0.016	< 0.014
Nb-95	< 0.021	< 0.022	< 0.009	< 0.026
Zr-95	< 0.024	< 0.036	< 0.028	< 0.037
Ru-103	< 0.020	< 0.015	< 0.013	< 0.027
Ru-106	< 0.101	< 0.111	< 0.144	< 0.260
Cs-134	< 0.018	< 0.018	< 0.016	< 0.026
Cs-137	< 0.014	< 0.017	< 0.016	< 0.019
Ce-141	< 0.031	< 0.026	< 0.037	< 0.044
Ce-144	< 0.119	< 0.120	< 0.117	< 0.142
	Indicator		Control	
Location	K-38	K-39	K-3	K-35
Date Collected	08-01-16	08-01-16	08-01-16	08-01-16
Lab Code	KG- 4104	KG- 4105	KG- 4100	KG- 4103
Gross beta	9.94 ± 0.20	7.10 ± 0.18	9.38 ± 0.19	8.55 ± 0.19
Sr-89	< 0.021	< 0.022	< 0.026	< 0.015
Sr-90	< 0.012	< 0.012	< 0.015	< 0.008
Be-7	2.09 ± 0.34	2.58 ± 0.23	1.40 ± 0.21	1.70 ± 0.31
K-40	8.03 ± 0.73	4.71 ± 0.37	7.26 ± 0.50	9.11 ± 0.75
Mn-54	< 0.022	< 0.012	< 0.012	< 0.021
Co-58	< 0.022	< 0.011	< 0.007	< 0.019
Co-60	< 0.009	< 0.013	< 0.010	< 0.016
Nb-95	< 0.019	< 0.017	< 0.010	< 0.023
Zr-95	< 0.032	< 0.019	< 0.016	< 0.035
Ru-103	< 0.025	< 0.014	< 0.011	< 0.019
Ru-106	< 0.158	< 0.099	< 0.131	< 0.115
Cs-134	< 0.024	< 0.014	< 0.015	< 0.022
Cs-137	< 0.026	< 0.013	< 0.009	< 0.027
Ce-141	< 0.040	< 0.028	< 0.031	< 0.042
Ce-144	< 0.173	< 0.103	< 0.125	< 0.099

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	10-03-16	10-03-16	10-03-16	10-03-16
Lab Code	KG- 5297	KG- 5298	KG- 5300	KG- 5301
Gross beta	7.60 ± 0.27	6.74 ± 0.30	8.51 ± 0.26	9.29 ± 0.28
Sr-89	< 0.021	< 0.040	< 0.016	< 0.019
Sr-90	< 0.013	< 0.026	< 0.009	< 0.012
Be-7	5.33 ± 0.34	4.59 ± 0.37	3.72 ± 0.30	5.32 ± 0.18
K-40	5.01 ± 0.38	5.83 ± 0.50	6.35 ± 0.45	8.24 ± 0.26
Mn-54	< 0.012	< 0.017	< 0.017	< 0.010
Co-58	< 0.010	< 0.021	< 0.009	< 0.009
Co-60	< 0.010	< 0.014	< 0.009	< 0.005
Nb-95	< 0.015	< 0.021	< 0.013	< 0.011
Zr-95	< 0.017	< 0.032	< 0.033	< 0.016
Ru-103	< 0.018	< 0.019	< 0.019	< 0.008
Ru-106	< 0.098	< 0.195	< 0.085	< 0.084
Cs-134	< 0.013	< 0.019	< 0.015	< 0.008
Cs-137	< 0.015	< 0.022	< 0.019	< 0.009
Ce-141	< 0.030	< 0.045	< 0.030	< 0.018
Ce-144	< 0.078	< 0.109	< 0.101	< 0.070

	Indicator		Control	
Location	K-38	K-39	K-3	K-35
Date Collected	10-03-16	10-03-16	10-03-16	10-03-16
Lab Code	KG- 5303	KG- 5304	KG- 5299	KG- 5302
Gross beta	9.06 ± 0.34	7.12 ± 0.24	8.54 ± 0.27	7.72 ± 0.20
Sr-89	< 0.019	< 0.016	< 0.021	< 0.013
Sr-90	< 0.012	< 0.010	< 0.013	< 0.008
Be-7	6.31 ± 0.32	2.87 ± 0.26	3.81 ± 0.31	2.12 ± 0.25
K-40	7.75 ± 0.44	7.15 ± 0.51	8.53 ± 0.54	6.26 ± 0.43
Mn-54	< 0.010	< 0.015	< 0.017	< 0.013
Co-58	< 0.014	< 0.014	< 0.015	< 0.012
Co-60	< 0.011	< 0.013	< 0.011	< 0.015
Nb-95	< 0.018	< 0.013	< 0.016	< 0.008
Zr-95	< 0.022	< 0.027	< 0.026	< 0.016
Ru-103	< 0.011	< 0.018	< 0.013	< 0.020
Ru-106	< 0.107	< 0.130	< 0.112	< 0.113
Cs-134	< 0.012	< 0.015	< 0.015	< 0.013
Cs-137	< 0.015	< 0.017	< 0.018	< 0.011
Ce-141	< 0.017	< 0.034	< 0.029	< 0.031
Ce-144	< 0.071	< 0.106	< 0.093	< 0.113

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	05-02-16	05-02-16
Lab Code	KSO- 2148	KSO- 2150
Gross alpha	9.79 ± 3.30	8.69 ± 3.29
Gross beta	26.93 ± 2.95	30.13 ± 3.17
Sr-89	< 0.111	< 0.066
Sr-90	< 0.039	< 0.022
Be-7	< 0.35	< 0.30
K-40	21.86 ± 1.02	20.92 ± 0.79
Nb-95	< 0.066	< 0.072
Zr-95	< 0.093	< 0.051
Ru-103	< 0.063	< 0.034
Ru-106	< 0.216	< 0.134
Cs-134	< 0.025	< 0.017
Cs-137	0.10 ± 0.04	0.06 ± 0.02
Ce-141	< 0.147	< 0.096
Ce-144	< 0.124	< 0.157
Date Collected	10-03-16	10-03-16
Lab Code	KSO- 5349	KSO- 5352
Gross alpha	9.25 ± 1.62	7.96 ± 1.49
Gross beta	26.75 ± 1.53	24.77 ± 1.26
Sr-89	< 0.070	< 0.073
Sr-90	< 0.028	< 0.029
Be-7	< 0.22	< 0.37
K-40	18.94 ± 0.80	17.75 ± 0.87
Nb-95	< 0.048	< 0.051
Zr-95	< 0.057	< 0.046
Ru-103	< 0.038	< 0.049
Ru-106	< 0.186	< 0.207
Cs-134	< 0.014	< 0.024
Cs-137	0.13 ± 0.02	0.07 ± 0.03
Ce-141	< 0.093	< 0.082
Ce-144	< 0.173	< 0.112

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	05-02-16	05-02-16	05-02-16
Lab Code	KSO- 2151	KSO- 2153	KSO- 2155
Gross alpha	7.75 ± 3.67	8.63 ± 2.37	7.77 ± 3.34
Gross beta	26.65 ± 2.96	30.29 ± 2.22	30.07 ± 3.32
Sr-89	< 0.054	< 0.095	< 0.092
Sr-90	< 0.018	< 0.033	< 0.032
Be-7	< 0.28	< 0.26	< 0.26
K-40	19.41 ± 0.73	21.80 ± 0.81	21.29 ± 0.86
Nb-95	< 0.058	< 0.076	< 0.070
Zr-95	< 0.038	< 0.035	< 0.072
Ru-103	< 0.034	< 0.040	< 0.045
Ru-106	< 0.153	< 0.192	< 0.162
Cs-134	< 0.013	< 0.014	< 0.016
Cs-137	0.10 ± 0.02	0.11 ± 0.03	0.10 ± 0.03
Ce-141	< 0.092	< 0.088	< 0.108
Ce-144	< 0.142	< 0.154	< 0.133
Date Collected	10-03-16	10-03-16	10-03-16
Lab Code	KSO- 5353	KSO- 5355	KSO- 5356
Gross alpha	7.89 ± 1.89	9.23 ± 1.63	7.53 ± 1.94
Gross beta	27.63 ± 1.69	32.63 ± 1.50	28.37 ± 1.83
Sr-89	< 0.096	< 0.083	< 0.067
Sr-90	< 0.036	< 0.033	< 0.028
Be-7	< 0.34	< 0.50	< 0.41
K-40	19.09 ± 0.79	23.22 ± 1.21	21.42 ± 1.07
Nb-95	< 0.073	< 0.047	< 0.051
Zr-95	< 0.057	< 0.088	< 0.053
Ru-103	< 0.048	< 0.056	< 0.063
Ru-106	< 0.243	< 0.301	< 0.279
Cs-134	< 0.024	< 0.029	< 0.031
Cs-137	0.11 ± 0.03	0.11 ± 0.06	0.12 ± 0.05
Ce-141	< 0.106	< 0.115	< 0.119
Ce-144	< 0.140	< 0.134	< 0.179

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	05-02-16	05-02-16
Lab Code	KSO- 2149	KSO- 2152
Gross alpha	4.12 ± 2.39	7.98 ± 3.12
Gross beta	24.79 ± 2.99	22.87 ± 2.74
Sr-89	< 0.076	< 0.060
Sr-90	< 0.025	< 0.022
Be-7	< 0.41	< 0.31
K-40	19.50 ± 1.14	16.22 ± 0.68
Nb-95	< 0.080	< 0.031
Zr-95	< 0.061	< 0.031
Ru-103	< 0.055	< 0.041
Ru-106	< 0.292	< 0.164
Cs-134	< 0.024	< 0.015
Cs-137	0.13 ± 0.04	0.08 ± 0.02
Ce-141	< 0.148	< 0.100
Ce-144	< 0.224	< 0.131
Date Collected	10-03-16	10-03-16
Lab Code	KSO- 5350	KSO- 5354
Gross alpha	7.80 ± 1.75	7.95 ± 2.21
Gross beta	28.33 ± 1.69	22.66 ± 1.59
Sr-89	< 0.090	< 0.079
Sr-90	< 0.036	< 0.032
Be-7	< 0.32	< 0.44
K-40	19.45 ± 1.13	17.15 ± 0.97
Nb-95	< 0.078	< 0.070
Zr-95	< 0.090	< 0.072
Ru-103	< 0.068	< 0.040
Ru-106	< 0.213	< 0.163
Cs-134	< 0.034	< 0.026
Cs-137	0.11 ± 0.05	0.07 ± 0.03
Ce-141	< 0.125	< 0.118
Ce-144	< 0.117	< 0.197

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	01-04-16	02-01-16	03-01-16
Lab Code	KSW- 87	KSW- 441	KSW- 853
Gross beta			
Suspended Solids	< 0.7	< 0.7	0.9 ± 0.4
Dissolved Solids	4.6 ± 1.0	3.9 ± 0.7	7.4 ± 0.9
Total Residue	4.6 ± 1.0	3.9 ± 0.7	8.3 ± 1.0
K-40 (ICP)	4.38	4.44	4.12
Mn-54	< 2.7	< 2.5	< 2.6
Fe-59	< 6.7	< 7.2	< 6.2
Co-58	< 2.4	< 2.7	< 3.7
Co-60	< 4.0	< 2.4	< 1.9
Zn-65	< 4.5	< 4.1	< 4.2
Zr-Nb-95	< 4.6	< 2.4	< 2.8
Cs-134	< 3.5	< 4.4	< 3.5
Cs-137	< 4.3	< 3.1	< 2.0
Ba-La-140	< 3.9	< 4.2	< 2.1
K-1b			
Date Collected	01-04-16	02-01-16	03-01-16
Lab Code	KSW- 88	KSW- 442	KSW- 854
Gross beta			
Suspended Solids	< 0.8	< 0.7	< 0.7
Dissolved Solids	2.0 ± 0.6	2.5 ± 0.5	4.1 ± 0.7
Total Residue	2.0 ± 0.6	2.5 ± 0.5	4.1 ± 0.7
K-40 (ICP)	2.17	1.85	2.52
Mn-54	< 2.3	< 2.3	< 2.3
Fe-59	< 2.9	< 6.6	< 4.7
Co-58	< 2.5	< 1.6	< 2.3
Co-60	< 2.1	< 2.6	< 2.4
Zn-65	< 1.9	< 4.9	< 4.7
Zr-Nb-95	< 4.5	< 2.8	< 3.3
Cs-134	< 3.0	< 3.0	< 3.1
Cs-137	< 3.2	< 2.4	< 3.1
Ba-La-140	< 2.2	< 5.2	< 2.7

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

Sample Description and Concentration (pCi/L)			
Indicator			
K-1a			
Date Collected	04-04-16	05-02-16	06-01-16
Lab Code	KSW- 1355	KSW- 2134	KSW- 2826
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	6.1 ± 1.1	5.3 ± 1.5	6.6 ± 1.5
Total Residue	6.1 ± 1.1	5.3 ± 1.5	6.6 ± 1.5
K-40 (ICP)	3.69	3.93	4.59
Mn-54	< 1.9	< 1.5	< 4.3
Fe-59	< 6.2	< 6.6	< 7.5
Co-58	< 1.7	< 3.3	< 3.9
Co-60	< 2.3	< 1.8	< 2.9
Zn-65	< 2.0	< 2.1	< 14.8
Zr-Nb-95	< 3.5	< 4.6	< 5.3
Cs-134	< 2.9	< 3.2	< 5.5
Cs-137	< 2.0	< 2.6	< 3.0
Ba-La-140	< 5.6	< 7.3	< 3.6
K-1b			
Date Collected	04-04-16	05-02-16	06-01-16
Lab Code	KSW- 1356	KSW- 2135	KSW- 2827
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	4.1 ± 0.9	3.9 ± 1.1	4.2 ± 1.2
Total Residue	4.1 ± 0.9	3.9 ± 1.1	4.2 ± 1.2
K-40 (ICP)	1.93	2.04	2.02
Mn-54	< 1.7	< 1.7	< 2.7
Fe-59	< 4.1	< 3.1	< 3.9
Co-58	< 2.7	< 2.3	< 1.4
Co-60	< 1.1	< 2.0	< 2.5
Zn-65	< 2.6	< 2.4	< 4.3
Zr-Nb-95	< 3.4	< 4.4	< 2.9
Cs-134	< 2.8	< 2.8	< 3.7
Cs-137	< 3.6	< 3.1	< 3.6
Ba-La-140	< 2.6	< 5.9	< 3.6

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

Sample Description and Concentration (pCi/L)			
Indicator			
K-1a			
Date Collected	07-05-16	08-01-16	09-06-16
Lab Code	KSW- 3349	KSW- 4076	KSW- 4733
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 1.5
Dissolved Solids	7.6 ± 0.9	19.0 ± 1.7	62.6 ± 3.6
Total Residue	7.6 ± 0.9	19.0 ± 1.7	62.6 ± 3.6
K-40 (ICP)	6.00	20.50	64.12
Mn-54	< 2.4	< 2.2	< 4.8
Fe-59	< 5.1	< 4.6	< 4.7
Co-58	< 2.6	< 2.1	< 2.0
Co-60	< 1.1	< 0.9	< 3.8
Zn-65	< 2.4	< 3.9	< 6.3
Zr-Nb-95	< 2.8	< 4.0	< 3.0
Cs-134	< 2.6	< 3.1	< 4.6
Cs-137	< 2.0	< 3.3	< 5.8
Ba-La-140	< 4.5	< 7.5	< 4.1
K-1b			
Date Collected	07-05-16	08-01-16	09-06-16
Lab Code	KSW- 3350	KSW- 4077	KSW- 4734
Gross beta			
Suspended Solids	1.5 ± 0.5	< 0.7	< 0.7
Dissolved Solids	3.1 ± 0.7	4.5 ± 0.9	2.2 ± 0.6
Total Residue	4.6 ± 0.9	4.5 ± 0.9	2.2 ± 0.6
K-40 (ICP)	2.04	2.17	1.71
Mn-54	< 2.4	< 2.4	< 2.7
Fe-59	< 3.7	< 2.5	< 4.9
Co-58	< 2.2	< 2.4	< 3.9
Co-60	< 2.2	< 1.1	< 2.0
Zn-65	< 4.2	< 4.7	< 1.7
Zr-Nb-95	< 3.3	< 3.1	< 2.6
Cs-134	< 2.3	< 2.8	< 4.0
Cs-137	< 2.9	< 1.8	< 3.0
Ba-La-140	< 2.9	< 5.2	< 2.1

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	10-03-16	11-01-16	12-01-16
Lab Code	KSW- 5308	KSW- 5974	KSW- 6642
Gross beta			
Suspended Solids	< 0.5	< 1.0	< 0.7
Dissolved Solids	11.2 ± 1.5	14.9 ± 1.9	10.5 ± 0.9
Total Residue	11.2 ± 1.5	14.9 ± 1.9	10.5 ± 0.9
K-40 (ICP)	6.55	14.76	7.81
Mn-54	< 2.0	< 4.0	< 3.5
Fe-59	< 1.8	< 5.0	< 5.0
Co-58	< 1.8	< 3.8	< 4.3
Co-60	< 1.6	< 3.7	< 4.1
Zn-65	< 2.5	< 4.5	< 7.7
Zr-Nb-95	< 3.2	< 3.8	< 4.1
Cs-134	< 3.1	< 4.1	< 4.4
Cs-137	< 2.6	< 3.3	< 3.8
Ba-La-140	< 4.3	< 4.9	< 4.0
K-1b			
Date Collected	10-03-16	11-01-16	12-01-16
Lab Code	KSW- 5309	KSW- 5975	KSW- 6643
Gross beta			
Suspended Solids	< 0.5	0.7 ± 0.5	< 0.7
Dissolved Solids	5.0 ± 0.9	3.8 ± 0.9	5.5 ± 0.6
Total Residue	5.0 ± 0.9	4.5 ± 1.0	5.5 ± 0.6
K-40 (ICP)	3.47	3.44	4.71
Mn-54	< 5.0	< 4.4	< 3.6
Fe-59	< 10.6	< 6.2	< 7.0
Co-58	< 3.9	< 2.2	< 3.1
Co-60	< 3.9	< 3.2	< 3.0
Zn-65	< 9.6	< 5.5	< 4.1
Zr-Nb-95	< 4.2	< 4.5	< 5.0
Cs-134	< 6.4	< 4.4	< 3.9
Cs-137	< 5.3	< 2.7	< 4.6
Ba-La-140	< 3.8	< 2.0	< 3.9

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	01-04-16	02-01-16	03-01-16
Lab Code	KSW- 89	KSW- 443	KSW- 855
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.8
Dissolved Solids	1.5 ± 0.4	1.4 ± 0.3	1.8 ± 0.3
Total Residue	1.5 ± 0.4	1.4 ± 0.3	1.8 ± 0.3
K-40 (ICP)	1.49	1.21	1.60
Mn-54	< 3.6	< 2.9	< 2.8
Fe-59	< 12.0	< 5.2	< 4.1
Co-58	< 5.2	< 1.1	< 2.9
Co-60	< 3.8	< 3.3	< 1.0
Zn-65	< 7.5	< 3.1	< 3.3
Zr-Nb-95	< 2.8	< 3.1	< 3.6
Cs-134	< 6.0	< 3.1	< 2.7
Cs-137	< 4.6	< 1.9	< 3.2
Ba-La-140	< 7.4	< 2.6	< 2.4
K-1e			
Date Collected	01-04-16	02-01-16	03-01-16
Lab Code	KSW- 90	KSW- 444	KSW- 856
Gross beta			
Suspended Solids	< 0.7	< 0.8	< 0.7
Dissolved Solids	1.6 ± 0.8	2.9 ± 0.7	2.1 ± 0.8
Total Residue	1.6 ± 0.8	2.9 ± 0.7	2.1 ± 0.8
K-40 (ICP)	1.66	2.16	1.80
Mn-54	< 3.0	< 6.0	< 3.3
Fe-59	< 3.9	< 8.6	< 5.7
Co-58	< 2.9	< 5.7	< 1.2
Co-60	< 2.4	< 3.7	< 1.9
Zn-65	< 2.2	< 10.0	< 2.8
Zr-Nb-95	< 3.3	< 5.6	< 2.0
Cs-134	< 3.3	< 5.3	< 3.0
Cs-137	< 1.9	< 5.0	< 2.8
Ba-La-140	< 2.7	< 5.8	< 1.6

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	04-04-16	05-02-16	06-01-16
Lab Code	KSW- 1357	KSW- 2136	KSW- 2828
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	2.5 ± 0.5	2.6 ± 0.8	1.6 ± 0.6
Total Residue	2.5 ± 0.5	2.6 ± 0.8	1.6 ± 0.6
K-40 (ICP)	1.35	1.34	1.16
Mn-54	< 3.1	< 2.0	< 2.2
Fe-59	< 4.4	< 6.6	< 6.1
Co-58	< 2.8	< 2.8	< 2.6
Co-60	< 2.1	< 2.6	< 2.1
Zn-65	< 3.1	< 3.7	< 5.2
Zr-Nb-95	< 3.5	< 5.6	< 3.2
Cs-134	< 2.6	< 3.7	< 3.0
Cs-137	< 2.0	< 2.5	< 2.5
Ba-La-140	< 3.2	< 3.8	< 3.0
K-1e			
Date Collected	04-04-16	05-02-16	06-01-16
Lab Code	KSW- 1358	KSW- 2137	KSW- 2829
Gross beta			
Suspended Solids	< 0.7	< 0.8	< 0.7
Dissolved Solids	3.3 ± 1.1	2.4 ± 1.3	2.7 ± 1.3
Total Residue	3.3 ± 1.1	2.4 ± 1.3	2.7 ± 1.3
K-40 (ICP)	1.47	1.65	1.56
Mn-54	< 2.4	< 2.4	< 4.0
Fe-59	< 6.5	< 8.8	< 13.1
Co-58	< 1.7	< 2.7	< 3.8
Co-60	< 1.6	< 1.9	< 4.2
Zn-65	< 3.1	< 3.7	< 6.0
Zr-Nb-95	< 2.4	< 2.9	< 4.2
Cs-134	< 3.0	< 2.9	< 6.2
Cs-137	< 2.1	< 3.0	< 7.5
Ba-La-140	< 3.2	< 7.4	< 10.0

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	07-05-16	08-01-16	09-06-16
Lab Code	KSW- 3351	KSW- 4078	KSW- 4735
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	1.1 ± 0.4	1.8 ± 0.5	1.2 ± 0.4
Total Residue	1.1 ± 0.4	1.8 ± 0.5	1.2 ± 0.4
K-40 (ICP)	1.12	1.17	1.08
Mn-54	< 1.8	< 1.6	< 3.1
Fe-59	< 6.9	< 4.0	< 7.1
Co-58	< 3.1	< 2.6	< 3.2
Co-60	< 3.2	< 1.4	< 2.8
Zn-65	< 7.0	< 5.5	< 5.8
Zr-Nb-95	< 2.8	< 2.4	< 3.5
Cs-134	< 3.0	< 2.6	< 4.7
Cs-137	< 3.2	< 3.7	< 5.0
Ba-La-140	< 3.2	< 6.7	< 2.8
K-1e			
Date Collected	07-05-16	08-01-16	09-06-16
Lab Code	KSW- 3352	KSW- 4079	KSW- 4736
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	2.9 ± 0.9	6.5 ± 1.3	3.9 ± 0.9
Total Residue	2.9 ± 0.9	6.5 ± 1.3	3.9 ± 0.9
K-40 (ICP)	2.50	4.09	2.03
Mn-54	< 2.0	< 2.1	< 3.1
Fe-59	< 3.7	< 4.0	< 6.4
Co-58	< 1.9	< 1.8	< 2.7
Co-60	< 1.2	< 2.2	< 2.3
Zn-65	< 4.5	< 5.8	< 3.2
Zr-Nb-95	< 2.8	< 4.0	< 2.4
Cs-134	< 3.0	< 3.2	< 3.5
Cs-137	< 2.6	< 3.0	< 2.4
Ba-La-140	< 1.9	< 4.6	< 1.6

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	10-03-16	11-01-16	12-01-16
Lab Code	KSW- 5310	KSW- 5976	KSW- 6644
Gross beta			
Suspended Solids	< 0.5	< 0.7	< 0.7
Dissolved Solids	1.8 ± 0.5	1.5 ± 0.4	1.9 ± 0.4
Total Residue	1.8 ± 0.5	1.5 ± 0.4	1.9 ± 0.4
K-40 (ICP)	1.19	1.16	1.16
Mn-54	< 2.6	< 2.8	< 6.5
Fe-59	< 4.0	< 6.1	< 7.9
Co-58	< 2.6	< 3.5	< 3.8
Co-60	< 2.6	< 3.7	< 4.9
Zn-65	< 4.6	< 3.7	< 6.2
Zr-Nb-95	< 2.7	< 3.3	< 3.5
Cs-134	< 3.2	< 4.7	< 6.2
Cs-137	< 2.9	< 2.5	< 3.1
Ba-La-140	< 3.0	< 2.6	< 6.9
K-1e			
Date Collected	10-03-16	11-01-16	12-01-16
Lab Code	KSW- 5311	KSW- 5977	KSW- 6645
Gross beta			
Suspended Solids	< 0.5	< 0.7	< 0.7
Dissolved Solids	3.8 ± 1.2	3.2 ± 0.9	4.7 ± 0.8
Total Residue	3.8 ± 1.2	3.2 ± 0.9	4.7 ± 0.8
K-40 (ICP)	3.43	2.66	2.71
Mn-54	< 2.7	< 5.2	< 3.6
Fe-59	< 3.1	< 7.5	< 4.5
Co-58	< 3.4	< 3.7	< 3.1
Co-60	< 3.7	< 4.0	< 3.0
Zn-65	< 7.4	< 7.4	< 2.9
Zr-Nb-95	< 2.9	< 4.9	< 3.6
Cs-134	< 3.9	< 6.6	< 4.0
Cs-137	< 5.4	< 5.2	< 3.8
Ba-La-140	< 3.3	< 4.0	< 2.2

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	01-04-16	02-01-16	03-01-16
Lab Code	KSW- 91	KSW- 445	KSW- 857
Gross beta			
Suspended Solids	< 0.8	< 0.7	< 0.8
Dissolved Solids	7.5 ± 0.8	9.5 ± 0.8	7.8 ± 0.6
Total Residue	7.5 ± 0.8	9.5 ± 0.8	7.8 ± 0.6
K-40 (ICP)	7.12	8.36	7.17
Mn-54	< 3.0	< 2.1	< 2.7
Fe-59	< 6.5	< 6.5	< 4.4
Co-58	< 2.4	< 1.3	< 2.7
Co-60	< 2.1	< 2.5	< 1.4
Zn-65	< 2.7	< 1.9	< 6.3
Zr-Nb-95	< 3.2	< 4.0	< 2.6
Cs-134	< 3.3	< 2.3	< 3.6
Cs-137	< 3.5	< 2.1	< 3.9
Ba-La-140	< 3.5	< 4.7	< 2.5
Date Collected	04-04-16	05-02-16	06-01-16
Lab Code	KSW- 1359	KSW- 2138	KSW- 2830
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	6.2 ± 0.7	8.3 ± 1.1	8.8 ± 1.0
Total Residue	6.2 ± 0.7	8.3 ± 1.1	8.8 ± 1.0
K-40 (ICP)	4.13	7.58	5.77
Mn-54	< 2.2	< 1.8	< 2.6
Fe-59	< 5.8	< 4.0	< 6.4
Co-58	< 3.0	< 3.8	< 2.7
Co-60	< 1.7	< 2.1	< 2.2
Zn-65	< 5.3	< 3.3	< 2.5
Zr-Nb-95	< 4.3	< 4.9	< 2.2
Cs-134	< 3.0	< 3.6	< 3.2
Cs-137	< 2.6	< 3.4	< 2.4
Ba-La-140	< 2.8	< 10.0	< 1.8

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	07-05-16	08-01-16	09-06-16
Lab Code	KSW- 3353	KSW- 4080	KSW- 4737
Gross beta			
Suspended Solids	< 0.7	< 0.7	1.4 ± 0.4
Dissolved Solids	6.1 ± 0.7	10.6 ± 0.8	9.1 ± 0.8
Total Residue	6.1 ± 0.7	10.6 ± 0.8	10.5 ± 0.9
K-40 (ICP)	5.66	9.59	11.64
Mn-54	< 2.7	< 1.8	< 3.6
Fe-59	< 4.5	< 4.3	< 3.1
Co-58	< 3.0	< 1.8	< 3.0
Co-60	< 1.3	< 1.4	< 2.9
Zn-65	< 3.1	< 2.8	< 5.9
Zr-Nb-95	< 3.2	< 3.1	< 2.9
Cs-134	< 2.7	< 3.4	< 4.0
Cs-137	< 2.5	< 2.7	< 3.0
Ba-La-140	< 5.6	< 6.2	< 2.9
Date Collected	10-03-16	11-01-16	12-01-16
Lab Code	KSW- 5312	KSW- 5978	KSW- 6646
Gross beta			
Suspended Solids	< 0.5	< 1.2	< 0.3
Dissolved Solids	17.1 ± 1.2	8.3 ± 1.5	11.8 ± 1.0
Total Residue	17.1 ± 1.2	8.3 ± 1.5	11.8 ± 1.0
K-40 (ICP)	9.27	6.74	7.10
Mn-54	< 2.9	< 5.2	< 6.8
Fe-59	< 2.9	< 3.3	< 3.8
Co-58	< 3.2	< 4.5	< 2.7
Co-60	< 2.0	< 4.6	< 3.6
Zn-65	< 5.7	< 8.4	< 5.1
Zr-Nb-95	< 3.3	< 5.8	< 2.9
Cs-134	< 3.6	< 7.1	< 5.1
Cs-137	< 2.5	< 6.7	< 3.7
Ba-La-140	< 2.1	< 5.9	< 3.9

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	01-04-16	02-01-16	03-01-16
Lab Code	KSW- 92	KSW- 446	KSW- 858
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	1.6 ± 0.4	1.9 ± 0.3	2.3 ± 0.4
Total Residue	1.6 ± 0.4	1.9 ± 0.3	2.3 ± 0.4
K-40 (ICP)	1.17	1.21	1.16
Mn-54	< 2.2	< 3.7	< 1.8
Fe-59	< 3.5	< 8.8	< 4.4
Co-58	< 4.8	< 5.2	< 2.3
Co-60	< 2.8	< 3.4	< 2.2
Zn-65	< 4.7	< 4.4	< 1.7
Zr-Nb-95	< 4.1	< 5.4	< 3.2
Cs-134	< 4.4	< 5.6	< 2.8
Cs-137	< 2.8	< 5.2	< 2.7
Ba-La-140	< 8.4	< 5.3	< 3.2
K-9 (Tap)			
Date Collected	01-04-16	02-01-16	03-01-16
Lab Code	KSW- 93	KSW- 447	KSW- 859
Gross beta			
Suspended Solids	< 0.8	< 0.7	< 0.8
Dissolved Solids	1.0 ± 0.4	1.7 ± 0.4	1.7 ± 0.5
Total Residue	1.0 ± 0.4	1.7 ± 0.4	1.7 ± 0.5
K-40 (ICP)	1.18	1.17	1.31
Mn-54	< 2.7	< 1.9	< 3.3
Fe-59	< 4.3	< 5.1	< 6.3
Co-58	< 2.7	< 2.8	< 2.1
Co-60	< 2.7	< 2.2	< 1.0
Zn-65	< 4.7	< 4.7	< 6.6
Zr-Nb-95	< 3.0	< 3.0	< 3.3
Cs-134	< 3.5	< 2.3	< 3.4
Cs-137	< 2.4	< 3.0	< 3.1
Ba-La-140	< 2.7	< 5.0	< 1.5

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	04-04-16	05-02-16	06-01-16
Lab Code	KSW- 1360	KSW- 2139	KSW- 2831
Gross beta			
Suspended Solids	< 0.7	< 0.8	< 0.8
Dissolved Solids	2.3 ± 0.5	1.5 ± 0.7	1.2 ± 0.6
Total Residue	2.3 ± 0.5	1.5 ± 0.7	1.2 ± 0.6
K-40 (ICP)	1.12	1.21	1.11
Mn-54	< 2.6	< 2.3	< 3.4
Fe-59	< 6.5	< 7.1	< 4.1
Co-58	< 3.0	< 1.9	< 2.6
Co-60	< 1.2	< 2.5	< 2.5
Zn-65	< 4.8	< 5.1	< 3.7
Zr-Nb-95	< 3.6	< 4.5	< 5.7
Cs-134	< 2.9	< 3.3	< 4.5
Cs-137	< 2.4	< 2.9	< 5.2
Ba-La-140	< 4.2	< 5.4	< 4.7
K-9 (Tap)			
Date Collected	04-04-16	05-02-16	06-01-16
Lab Code	KSW- 1361	KSW- 2140	KSW- 2832
Gross beta			
Suspended Solids	< 0.8	< 0.7	< 0.7
Dissolved Solids	2.1 ± 0.6	2.2 ± 0.7	1.9 ± 0.7
Total Residue	2.1 ± 0.6	2.2 ± 0.7	1.9 ± 0.7
K-40 (ICP)	1.12	1.21	1.13
Mn-54	< 2.0	< 1.9	< 2.3
Fe-59	< 4.8	< 6.2	< 5.5
Co-58	< 2.2	< 2.1	< 2.4
Co-60	< 2.3	< 1.7	< 1.6
Zn-65	< 4.1	< 4.3	< 2.7
Zr-Nb-95	< 3.1	< 4.2	< 3.8
Cs-134	< 2.5	< 2.7	< 2.6
Cs-137	< 2.8	< 2.3	< 1.9
Ba-La-140	< 4.2	< 6.5	< 3.5

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	07-05-16	08-01-16	09-06-16
Lab Code	KSW- 3354	KSW- 4081	KSW- 4738
Gross beta			
Suspended Solids	< 0.7	< 0.6	< 0.7
Dissolved Solids	1.2 ± 0.4	1.9 ± 0.5	0.6 ± 0.4
Total Residue	1.2 ± 0.4	1.9 ± 0.5	0.6 ± 0.4
K-40 (ICP)	1.06	1.16	1.03
Mn-54	< 2.7	< 1.9	< 2.4
Fe-59	< 3.7	< 4.6	< 2.7
Co-58	< 2.7	< 2.3	< 2.4
Co-60	< 1.7	< 1.2	< 2.0
Zn-65	< 3.8	< 1.6	< 3.9
Zr-Nb-95	< 3.3	< 3.5	< 2.9
Cs-134	< 2.4	< 2.7	< 3.2
Cs-137	< 2.9	< 2.7	< 2.9
Ba-La-140	< 3.3	< 7.8	< 2.7
K-9 (Tap)			
Date Collected	07-05-16	08-01-16	09-06-16
Lab Code	KSW- 3355	KSW- 4082	KSW- 4739
Gross beta			
Suspended Solids	< 0.7	< 0.8	< 0.7
Dissolved Solids	1.0 ± 0.4	2.0 ± 0.6	1.3 ± 0.4
Total Residue	1.0 ± 0.4	2.0 ± 0.6	1.3 ± 0.4
K-40 (ICP)	1.11	1.21	1.06
Mn-54	< 3.3	< 1.5	< 3.1
Fe-59	< 5.6	< 4.0	< 3.3
Co-58	< 3.0	< 2.8	< 2.9
Co-60	< 5.7	< 1.7	< 1.7
Zn-65	< 4.1	< 5.0	< 4.7
Zr-Nb-95	< 5.3	< 3.8	< 1.9
Cs-134	< 5.7	< 3.4	< 2.7
Cs-137	< 4.1	< 1.7	< 2.8
Ba-La-140	< 5.2	< 6.5	< 2.6

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	10-03-16	11-01-16	12-01-16
Lab Code	KSW- 5313	KSW- 5979	KSW- 6647
Gross beta			
Suspended Solids	< 0.5	< 0.6	< 0.7
Dissolved Solids	1.7 ± 0.5	2.2 ± 0.5	1.2 ± 0.3
Total Residue	1.7 ± 0.5	2.2 ± 0.5	1.2 ± 0.3
K-40 (ICP)	1.16	1.16	1.13
Mn-54	< 2.3	< 3.4	< 3.8
Fe-59	< 5.0	< 5.9	< 3.3
Co-58	< 2.1	< 2.9	< 3.9
Co-60	< 2.3	< 3.9	< 3.5
Zn-65	< 2.4	< 5.0	< 3.6
Zr-Nb-95	< 2.5	< 4.4	< 4.3
Cs-134	< 3.0	< 4.5	< 3.8
Cs-137	< 2.9	< 4.1	< 4.6
Ba-La-140	< 4.2	< 5.1	< 2.3
K-9 (Tap)			
Date Collected	10-03-16	11-01-16	12-01-16
Lab Code	KSW- 5314	KSW- 5980	KSW- 6648
Gross beta			
Suspended Solids	< 0.7	< 0.8	< 0.6
Dissolved Solids	1.9 ± 0.5	1.0 ± 0.2	1.4 ± 0.3
Total Residue	1.9 ± 0.5	1.0 ± 0.2	1.4 ± 0.3
K-40 (ICP)	1.18	1.13	1.19
Mn-54	< 5.0	< 2.8	< 4.3
Fe-59	< 8.6	< 5.3	< 3.4
Co-58	< 3.0	< 1.8	< 4.2
Co-60	< 4.1	< 1.9	< 4.3
Zn-65	< 6.1	< 3.0	< 7.4
Zr-Nb-95	< 4.4	< 2.3	< 4.8
Cs-134	< 6.1	< 2.3	< 6.7
Cs-137	< 6.6	< 3.9	< 6.6
Ba-La-140	< 4.1	< 4.0	< 3.2

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	01-04-16	02-01-16	03-01-16
Lab Code	KSW- 94	KSW- 448	KSW- 860
Gross beta			
Suspended Solids	< 0.7	< 0.8	< 0.7
Dissolved Solids	2.4 ± 0.5	1.5 ± 0.4	1.5 ± 0.3
Total Residue	2.4 ± 0.5	1.5 ± 0.4	1.5 ± 0.3
K-40 (ICP)	1.35	1.38	1.45
Mn-54	< 3.0	< 2.3	< 2.9
Fe-59	< 3.9	< 3.2	< 2.7
Co-58	< 2.1	< 1.7	< 1.4
Co-60	< 2.1	< 1.7	< 2.0
Zn-65	< 2.5	< 3.3	< 3.0
Zr-Nb-95	< 2.7	< 2.5	< 2.3
Cs-134	< 3.1	< 2.7	< 3.2
Cs-137	< 1.9	< 2.5	< 2.5
Ba-La-140	< 5.7	< 3.3	< 3.9
K-14b			
Date Collected	01-04-16	02-01-16	03-01-16
Lab Code	KSW- 95	KSW- 449	KSW- 861
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.8
Dissolved Solids	2.9 ± 0.5	1.4 ± 0.4	2.3 ± 0.5
Total Residue	2.9 ± 0.5	1.4 ± 0.4	2.3 ± 0.5
K-40 (ICP)	1.38	1.36	1.54
Mn-54	< 4.0	< 3.3	< 2.4
Fe-59	< 4.5	< 5.4	< 6.0
Co-58	< 3.2	< 3.5	< 1.9
Co-60	< 4.2	< 3.7	< 2.3
Zn-65	< 6.3	< 2.8	< 3.9
Zr-Nb-95	< 5.9	< 2.9	< 3.5
Cs-134	< 5.0	< 3.3	< 2.8
Cs-137	< 5.5	< 2.8	< 2.8
Ba-La-140	< 5.8	< 4.0	< 1.9

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	04-04-16	05-02-16	06-01-16
Lab Code	KSW- 1362	KSW- 2141	KSW- 2833
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	2.5 ± 0.4	3.1 ± 0.7	1.2 ± 0.6
Total Residue	2.5 ± 0.4	3.1 ± 0.7	1.2 ± 0.6
K-40 (ICP)	1.94	1.75	1.16
Mn-54	< 2.1	< 1.7	< 3.9
Fe-59	< 4.4	< 6.0	< 9.6
Co-58	< 1.9	< 2.1	< 4.7
Co-60	< 1.4	< 1.9	< 6.4
Zn-65	< 2.9	< 2.1	< 2.8
Zr-Nb-95	< 2.3	< 4.0	< 4.3
Cs-134	< 2.3	< 2.3	< 4.8
Cs-137	< 1.9	< 3.0	< 4.4
Ba-La-140	< 5.9	< 6.6	< 4.0
K-14b			
Date Collected	04-04-16	05-02-16	06-01-16
Lab Code	KSW- 1363	KSW- 2142	KSW- 2834
Gross beta			
Suspended Solids	< 0.8	< 0.7	< 0.8
Dissolved Solids	2.3 ± 0.4	3.3 ± 0.8	2.3 ± 0.7
Total Residue	2.3 ± 0.4	3.3 ± 0.8	2.3 ± 0.7
K-40 (ICP)	1.91	1.81	1.15
Mn-54	< 1.9	< 1.6	< 2.4
Fe-59	< 6.0	< 4.2	< 3.4
Co-58	< 1.8	< 2.1	< 2.3
Co-60	< 1.7	< 2.5	< 2.4
Zn-65	< 5.9	< 3.1	< 3.4
Zr-Nb-95	< 2.7	< 2.6	< 4.2
Cs-134	< 2.8	< 2.7	< 2.7
Cs-137	< 2.1	< 2.6	< 3.7
Ba-La-140	< 3.1	< 3.2	< 4.3

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	07-05-16	08-01-16	09-06-16
Lab Code	KSW- 3356	KSW- 4083	KSW- 4740
Gross beta			
Suspended Solids	< 0.7	< 0.5	< 0.7
Dissolved Solids	1.0 ± 0.4	2.1 ± 0.5	2.4 ± 0.5
Total Residue	1.0 ± 0.4	2.1 ± 0.5	2.4 ± 0.5
K-40 (ICP)	1.12	1.21	1.12
Mn-54	< 2.1	< 2.7	< 2.8
Fe-59	< 4.2	< 6.5	< 4.4
Co-58	< 2.3	< 1.8	< 1.9
Co-60	< 1.8	< 1.4	< 2.7
Zn-65	< 3.2	< 3.1	< 2.2
Zr-Nb-95	< 2.3	< 3.3	< 2.4
Cs-134	< 2.6	< 3.3	< 3.8
Cs-137	< 2.5	< 1.7	< 2.6
Ba-La-140	< 3.9	< 8.6	< 2.9
K-14b			
Date Collected	07-05-16	08-01-16	09-06-16
Lab Code	KSW- 3357	KSW- 4084	KSW- 4741
Gross beta			
Suspended Solids	< 0.7	< 0.5	1.3 ± 0.4
Dissolved Solids	1.1 ± 0.4	1.9 ± 0.6	2.7 ± 0.5
Total Residue	1.1 ± 0.4	1.9 ± 0.6	4.0 ± 0.6
K-40 (ICP)	1.11	1.19	1.11
Mn-54	< 3.5	< 1.9	< 3.1
Fe-59	< 4.7	< 5.8	< 5.0
Co-58	< 2.3	< 2.5	< 3.7
Co-60	< 1.7	< 1.4	< 2.9
Zn-65	< 4.7	< 4.6	< 6.5
Zr-Nb-95	< 4.8	< 4.1	< 4.1
Cs-134	< 3.2	< 2.9	< 4.7
Cs-137	< 3.1	< 2.4	< 4.0
Ba-La-140	< 2.3	< 7.6	< 1.9

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	10-03-16	11-01-16	12-01-16
Lab Code	KSW- 5315	KSW- 5981	KSW- 6649
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.8
Dissolved Solids	2.9 ± 0.6	1.9 ± 0.2	1.7 ± 0.3
Total Residue	2.9 ± 0.6	1.9 ± 0.2	1.7 ± 0.3
K-40 (ICP)	1.25	1.33	1.96
Mn-54	< 1.8	< 4.8	< 2.5
Fe-59	< 3.3	< 7.8	< 3.6
Co-58	< 2.7	< 2.8	< 2.3
Co-60	< 1.2	< 4.2	< 3.4
Zn-65	< 4.2	< 4.4	< 4.4
Zr-Nb-95	< 3.9	< 2.7	< 2.8
Cs-134	< 2.5	< 5.4	< 4.4
Cs-137	< 2.2	< 5.1	< 4.3
Ba-La-140	< 4.6	< 6.5	< 3.2
K-14b			
Date Collected	10-03-16	11-01-16	12-01-16
Lab Code	KSW- 5316	KSW- 5982	KSW- 6650
Gross beta			
Suspended Solids	< 0.8	< 0.7	< 0.4
Dissolved Solids	2.8 ± 0.5	2.5 ± 0.7	2.1 ± 0.4
Total Residue	2.8 ± 0.5	2.5 ± 0.7	2.1 ± 0.4
K-40 (ICP)	1.26	1.30	1.94
Mn-54	< 3.4	< 3.7	< 3.5
Fe-59	< 5.4	< 7.3	< 2.4
Co-58	< 2.8	< 2.7	< 3.2
Co-60	< 3.6	< 3.1	< 2.6
Zn-65	< 5.4	< 2.8	< 5.3
Zr-Nb-95	< 2.7	< 4.2	< 4.0
Cs-134	< 3.9	< 3.9	< 3.4
Cs-137	< 3.3	< 3.4	< 3.9
Ba-La-140	< 3.0	< 4.3	< 3.1

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

Location and Collection Period	Lab Code	Concentration pCi/L H-3	Sr-89	Sr-90
Indicator				
K-1a				
1st Quarter	KSW -1081	< 149	< 1.3	< 0.5
2nd Quarter	KSW -3065	< 148	< 1.3	< 0.5
3rd Quarter	KSW -4851	< 149	< 1.9	< 0.7
4th Quarter	KSW -6810	< 160	< 1.1	< 0.6
K-1b				
1st Quarter	KSW -1082	< 149	< 1.4	< 0.5
2nd Quarter	KSW -3066	< 148	< 1.7	< 0.6
3rd Quarter	KSW -4852	< 149	< 2.0	< 0.7
4th Quarter	KSW -6811	< 160	< 1.2	< 0.6
K-1d				
1st Quarter	KSW -1083	< 149	< 1.2	< 0.5
2nd Quarter	KSW -3067	< 148	< 1.3	< 0.5
3rd Quarter	KSW -4853	< 149	< 1.6	< 0.6
4th Quarter	KSW -6812	< 160	< 1.0	< 0.5
K-1e				
1st Quarter	KSW -1084	< 149	< 1.2	< 0.4
2nd Quarter	KSW -3068	< 146	< 1.1	< 0.4
3rd Quarter	KSW -4854	< 173	< 1.3	< 0.4
4th Quarter	KSW -6813	< 160	< 1.0	< 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 -1088	< 149	< 1.1	< 0.4
2nd Quarter	KSW -3072	< 146	< 1.3	< 0.5
3rd Quarter	KSW -4858	< 149	< 1.5	< 0.5
4th Quarter	KSW -6817	< 160	< 1.4	< 0.5
K-14b				
1st Quarter	KSW -1089	< 149	< 1.1	< 0.4
2nd Quarter	KSW -3073	< 146	< 1.4	< 0.6
3rd Quarter	KSW -4859	< 149	< 1.3	< 0.5
4th Quarter	KSW -6818	< 160	< 1.0	< 0.5
K-1k				
1st Quarter	KSW -1086	< 149	< 1.4	< 0.5
2nd Quarter	KSW -3069	< 148	< 1.1	< 0.4
3rd Quarter	KSW -4855	< 173	< 1.3	< 0.5
4th Quarter	KSW -6814	< 160	< 1.0	< 0.6
Control				
K-9				
1st Quarter	KSW -1087 (Raw)	< 149	< 1.1	< 0.4
	KSW -1088 (Tap)	< 149	< 1.1	< 0.4
2nd Quarter	KSW -3070 (Raw)	< 148	< 1.4	< 0.6
	KSW -3071 (Tap)	< 148	< 1.7	< 0.6
3rd Quarter	KSW -4856 (Raw)	< 149	< 1.5	< 0.5
	KSW -4857 (Tap)	< 149	< 1.5	< 0.5
4th Quarter	KSW -6815 (Raw)	< 160	< 1.1	< 0.6
	KSW -6816 (Tap)	< 160	< 1.2	< 0.6

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	04-21-16		09-29-16	
Lab Code	KF- 2072		KF- 5173	
Type	Brown Trout		Salmon	
Portion	Flesh	Bones	Flesh	Bones
Gross beta	3.45 ± 0.07	2.96 ± 0.87	4.04 ± 0.08	4.48 ± 0.74
Sr-89	NA[a]	< 0.33	NA[a]	< 0.25
Sr-90	NA	0.18 ± 0.07	NA	0.18 ± 0.06
K-40	3.39 ± 0.44	NA[a]	3.58 ± 0.62	NA[a]
Mn-54	< 0.016	NA	< 0.030	NA
Fe-59	< 0.072	NA	< 0.059	NA
Co-58	< 0.026	NA	< 0.024	NA
Co-60	< 0.018	NA	< 0.017	NA
Cs-134	< 0.020	NA	< 0.030	NA
Cs-137	< 0.021	NA	< 0.037	NA

Collected	12-01-16	
Lab Code	KF- 6566	
Type	Coho Salmon	
Portion	Flesh	Bones
Gross beta	4.51 ± 0.09	2.13 ± 0.49
Sr-89	NA[a]	< 0.18
Sr-90	NA	< 0.11
K-40	3.76 ± 0.40	NA[a]
Mn-54	< 0.009	NA
Fe-59	< 0.029	NA
Co-58	< 0.015	NA
Co-60	< 0.010	NA
Cs-134	< 0.016	NA
Cs-137	< 0.013	NA

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

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	06-01-16	06-01-16	06-01-16	06-01-16
Lab Code	KSL- 2757	KSL- 2758	KSL- 2759	KSL- 2762
Gross beta	4.56 ± 0.09	5.03 ± 0.09	1.18 ± 0.05	5.99 ± 0.12
Sr-89	< 0.006	< 0.006	< 0.014	< 0.015
Sr-90	< 0.002	< 0.002	0.007 ± 0.003	< 0.007
Be-7	0.53 ± 0.06	0.15 ± 0.049	0.44 ± 0.06	0.16 ± 0.06
K-40	3.89 ± 0.14	4.73 ± 0.14	3.80 ± 0.13	4.49 ± 0.13
Mn-54	< 0.004	< 0.004	< 0.005	< 0.005
Co-58	< 0.005	< 0.005	< 0.004	< 0.005
Co-60	< 0.005	< 0.005	< 0.005	< 0.003
Nb-95	< 0.007	< 0.006	< 0.007	< 0.005
Zr-95	< 0.005	< 0.010	< 0.010	< 0.009
Ru-103	< 0.004	< 0.005	< 0.003	< 0.006
Ru-106	< 0.042	< 0.035	< 0.039	< 0.041
Cs-134	< 0.005	< 0.005	< 0.004	< 0.004
Cs-137	< 0.005	< 0.004	0.013 ± 0.005	< 0.004
Ce-141	< 0.011	< 0.008	< 0.011	< 0.012
Ce-144	< 0.033	< 0.036	< 0.029	< 0.034
Sb-125	< 0.026	< 0.025	< 0.017	< 0.021

Location	K-1e	K-1k	K-14
Date Collected	06-01-16	06-01-16	06-01-16
Lab Code	KSL- 2760	KSL- 2761	KSL- 2763
Gross beta	2.87 ± 0.15	4.44 ± 0.08	1.71 ± 0.10
Sr-89	< 0.036	< 0.004	< 0.022
Sr-90	< 0.014	< 0.002	< 0.009
Be-7	1.32 ± 0.05	< 0.05	0.91 ± 0.07
K-40	1.90 ± 0.08	3.49 ± 0.13	2.44 ± 0.11
Mn-54	< 0.003	< 0.005	< 0.005
Co-58	< 0.003	< 0.005	< 0.005
Co-60	< 0.004	< 0.002	< 0.005
Nb-95	< 0.004	< 0.006	< 0.006
Zr-95	< 0.005	< 0.009	< 0.010
Ru-103	< 0.004	< 0.006	< 0.003
Ru-106	< 0.026	< 0.043	< 0.041
Cs-134	< 0.003	< 0.005	< 0.004
Cs-137	0.005 ± 0.003	< 0.005	0.011 ± 0.005
Ce-141	< 0.008	< 0.013	< 0.013
Ce-144	< 0.021	< 0.036	< 0.035
Sb-125	< 0.013	< 0.023	< 0.024

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-1b	K-1b	K-1a	
Date Collected	06-16-16	06-23-16	08-01-16	
Lab Code	KSL- 3378	KSL- 3379	KSL- 4041	
Gross beta	1.38 ± 0.07	1.33 ± 0.10	5.28 ± 0.11	
Sr-89	< 0.010	< 0.041	< 0.02	
Sr-90	0.016 ± 0.003	0.020 ± 0.010	< 0.007	
Be-7	0.22 ± 0.06	1.37 ± 0.06	< 0.11	
K-40	1.84 ± 0.09	2.39 ± 0.08	3.96 ± 0.17	
Mn-54	< 0.002	< 0.003	< 0.006	
Co-58	< 0.006	< 0.004	< 0.008	
Co-60	< 0.003	< 0.003	< 0.005	
Nb-95	< 0.007	< 0.006	< 0.014	
Zr-95	< 0.007	< 0.005	< 0.016	
Ru-103	< 0.006	< 0.005	< 0.009	
Ru-106	< 0.025	< 0.026	< 0.056	
Cs-134	< 0.003	< 0.003	< 0.007	
Cs-137	< 0.004	0.011 ± 0.003	< 0.008	
Ce-141	< 0.015	< 0.012	< 0.025	
Ce-144	< 0.021	< 0.021	< 0.039	
Sb-125	< 0.019	< 0.012	< 0.030	

Location	K-1d	K-1k
Date Collected	08-01-16	08-01-16
Lab Code	KSL- 4042	KSL- 4043
Gross beta	2.84 ± 0.22	6.27 ± 0.12
Sr-89	< 0.056	< 0.018
Sr-90	0.026 ± 0.013	0.008 ± 0.004
Be-7	2.29 ± 0.20	0.18 ± 0.05
K-40	2.63 ± 0.20	4.60 ± 0.17
Mn-54	< 0.008	< 0.005
Co-58	< 0.008	< 0.007
Co-60	< 0.018	< 0.007
Nb-95	< 0.019	< 0.012
Zr-95	< 0.013	< 0.011
Ru-103	< 0.013	< 0.007
Ru-106	< 0.045	< 0.050
Cs-134	< 0.007	< 0.005
Cs-137	0.024 ± 0.010	< 0.006
Ce-141	< 0.023	< 0.018
Ce-144	< 0.039	< 0.047
Sb-125	0.054 ± 0.018	< 0.032

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-1b	K-1b	K-14	K-9
Date Collected	09-06-16	09-06-16	09-06-16	09-06-16
Lab Code	KSL- 4728	KSL- 4729	KSL- 4732	KSL- 4730
Gross beta	1.72 ± 0.08	3.15 ± 0.12	2.52 ± 0.12	6.30 ± 0.10
Sr-89	< 0.018	< 0.035	< 0.025	< 0.017
Sr-90	0.030 ± 0.006	< 0.014	< 0.011	0.018 ± 0.005
Be-7	0.29 ± 0.06	0.83 ± 0.09	0.91 ± 0.07	0.58 ± 0.11
K-40	1.00 ± 0.07	2.82 ± 0.11	3.03 ± 0.12	4.94 ± 0.19
Mn-54	< 0.004	< 0.004	< 0.005	< 0.008
Co-58	< 0.003	< 0.006	< 0.005	< 0.008
Co-60	< 0.003	< 0.004	< 0.005	< 0.007
Nb-95	< 0.006	< 0.009	< 0.009	< 0.013
Zr-95	< 0.010	< 0.012	< 0.006	< 0.009
Ru-103	< 0.004	< 0.004	< 0.006	< 0.009
Ru-106	< 0.032	< 0.038	< 0.028	< 0.047
Cs-134	< 0.003	< 0.005	< 0.004	< 0.006
Cs-137	< 0.004	0.010 ± 0.004	0.008 ± 0.004	< 0.007
Ce-141	< 0.010	< 0.015	< 0.015	< 0.017
Ce-144	< 0.028	< 0.035	< 0.023	< 0.047
Sb-125	< 0.016	< 0.018	< 0.020	< 0.030

Location	K-1d
Date Collected	10-21-16
Lab Code	KSL- 5985
Gross beta	0.87 ± 0.03
Sr-89	< 0.015
Sr-90	< 0.007
Be-7	0.27 ± 0.04
K-40	2.00 ± 0.07
Mn-54	< 0.003
Co-58	< 0.003
Co-60	< 0.003
Nb-95	< 0.006
Zr-95	< 0.008
Ru-103	< 0.003
Ru-106	< 0.022
Cs-134	< 0.003
Cs-137	0.012 ± 0.003
Ce-141	< 0.011
Ce-144	< 0.018
Sb-125	< 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	05-02-16	05-02-16	05-02-16	05-02-16	05-02-16
Lab Code	KBS- 2143	KBS- 2144	KBS- 2145	KBS- 2147	KBS- 2146
Gross beta	6.08 ± 1.04	8.74 ± 1.18	9.66 ± 1.23	9.59 ± 1.26	19.04 ± 1.39
Sr-89	< 0.073	< 0.050	< 0.050	< 0.058	< 0.066
Sr-90	< 0.029	< 0.020	< 0.021	0.033 ± 0.014	< 0.028
K-40	5.79 ± 0.49	4.41 ± 0.48	6.86 ± 0.55	6.80 ± 0.39	13.83 ± 0.83
Co-58	< 0.030	< 0.027	< 0.029	< 0.022	< 0.038
Co-60	< 0.017	< 0.017	< 0.011	< 0.011	< 0.024
Cs-134	< 0.013	< 0.017	< 0.012	< 0.011	< 0.020
Cs-137	< 0.016	< 0.016	< 0.017	< 0.014	< 0.027
Location					
Collection Date	11-01-16	11-01-16	11-01-16	11-01-16	11-01-16
Lab Code	KBS- 5988	KBS- 5989	KBS- 5990	KBS- 5992	KBS- 5991
Gross beta	9.75 ± 1.53	10.26 ± 1.63	9.18 ± 1.52	8.04 ± 1.60	18.80 ± 1.98
Sr-89	< 0.073	< 0.086	< 0.060	< 0.082	< 0.071
Sr-90	< 0.032	< 0.037	< 0.025	< 0.034	< 0.031
K-40	6.52 ± 0.58	5.98 ± 0.41	6.05 ± 0.61	3.66 ± 0.48	12.30 ± 0.72
Co-58	< 0.024	< 0.018	< 0.026	< 0.021	< 0.030
Co-60	< 0.012	< 0.013	< 0.014	< 0.012	< 0.023
Cs-134	< 0.016	< 0.011	< 0.018	< 0.015	< 0.017
Cs-137	< 0.018	< 0.020	< 0.022	< 0.017	< 0.027

Dominion®

2016 Annual Radiological Environmental Operating Report

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

Dominion Energy Kewaunee, Inc.

Kewaunee CRS ▸ CR: Power found off at K-2 Environmental air sampler

Print

CR_ID	689
Short description	Power found off at K-2 Environmental air sampler
Site	Kewaunee
Discovery Date/Time	6/28/2016 9:00 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	Power found off at K-2 Environmental air sampler . It appears that power was not turned back on after 6/21/16 filter change. Air sampler is now working as expected .
Initial Actions	Notifed Chemistry supervision. Replaced filter and returned power to air sampler .
Recom Actions:	Document this event in the 2016 Environmental Monitoring Report (Holschbach/Shannon). Recommended due date end of May 2017.
MR Function Exists:	
additional Contacts	
Tag #:	
Is this CR associated with Boric Acid Corrosion Control Program Y/N	No
Is the Boric Acid wet, glistening moist or dripping? (ER-AP-BAC-101)	No
Is the boric acid deposit excessive? (ER-AP-BAC-01)	No
Is the boric acid discolored (e.g, non-white) or is there any visible degredation? (ER-AP-BAC-01)	No
Does the boric acid appear to originate froma crack pinhole leek or through a welded connection? (ER-AP-BAC-101)	No
Does the boric acid appear to come from under insulation or has it run under insulation or is the source of the leak unknown? (ER-AP-BAC-101)	No
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	Search by "K-2 Environmental Air Sampler" identified the following: CR88 - K-2 Environmental Air sampler found not working (07/28/2015)
CRT Comments	K-2 Environmental Air Sampler was returned to service on 06/28/2016. CA(249) to RP (Holschbach/Shannon) to include K-2 Environmental Air Sampler being out of service in the 2016 Annual Radiological Environmental Operating Report. Due Date: 05/15/2017
Work Order #	
Comments	
Status	Pending

Content Type: Item
Version: 17.0
Created at 6/29/2016 11:13 AM by Paul A Simon (Generation - 4) ...
Last modified at 7/12/2016 5:00 PM by System Account

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Kewaunee CRS ▸ CR: Environmental air samplers found not running

Print

CR_ID	746
Short description	Environmental air samplers found not running
Site	Kewaunee
Discovery Date/Time	8/16/2016 7:00 AM
Submitter	Paul A Simon (Generation - 4)
Submitters Dept	2. Radiation Protection
Supervisor	Dan J Shannon (Generation - 4)
Unit 1 Mode	N/A
Unit ISFSI?	No
Revision #	
Long Description	Two of the six environmental air samplers were found not running: K-31 (East Krok substation) and K 41 (Point Beach EOF in Green Bay). The fuses were blown. The hour meter on both of them were noted to be at approximately 150 hours, so that means they ran most of the week and failed around 24 hours before replacement. Enough sampling time was accumulated to send the sample media to the environmental monitoring program lab for analysis.
Initial Actions	Contact SME and RP supervision. RP Instrument Technician replaced both air sample pumps. Initial investigation shows that both pump motors had seized up and required repair.
Recom Actions:	CA to document this event in the 2016 Annual Radiological Environmental Operating Report (Holschbach/Shannon) - due date May 31, 2017.
MR Function Exists:	
additional Contacts	
Tag #:	
Is this CR associated with Boric Acid Corrosion Control Program Y/N	No
Is the Boric Acid wet, glistening moist or dripping? (ER-AP-BAC-101)	No
Is the boric acid deposit excessive? (ER-AP-BAC-01)	No
is the boric acid discolored (e.g, non-white) or is there any visible degredation? (ER-AP-BAC-01)	No
Does the boric acid appear to originate froma crack pinhole leek or through a welded connection? (ER-AP-BAC-101)	No
Does the boric acid appear to come from under insulation or has it run under insulation or is the source of the leak unknown? (ER-AP-BAC-101)	No
Equipment Location	
Equipment Description	
Plant System	
OP-AA-102 Review Reqd?	No
Operability Assesment	N/A
Operability Comments	N/A
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: 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	RP Tech replaced both pumps and will repair the non-functional pumps. CA(268) to RP (Holschbach/Shannon) to document this event in the 2016 Annual Radiological Environmental Operating Report. Due Date: 05/31/2017

Work Order #	
Comments	
Status	Pending

Content Type: Item
Version: 13.0
Created at 8/18/2016 9:02 AM by Paul A Simon (Generation - 4)
Last modified at 8/31/2016 5:04 PM by System Account

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Kewaunee CRS › CR: Three REMP Environmental Air Samplers Found Not Running

Print

CR_ID	756
Short description	Three REMP Environmental Air Samplers Found Not Running
Site	Kewaunee
Discovery Date/Time	8/22/2016 9:00 AM
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	Three of the six Radiological Environmental Monitoring Program (REMP) air samplers were found not running on 8/22/16. The environmental air samplers are required by the REMP. Sample collection is performed in accordance with procedure SP-63-164, Environmental Sample Collection. Air sample pumps at the following locations were found not running prior to a normal weekly run time of 168 hours: -K1f at Kewaunee Power Station Meteorological Tower failed after 124 hours. -K-31 at East Krok Electric Substation failed after 105 Hours -K41 at Point Beach Emergency off-site Facility (EOF) in Green Bay failed after 86 Hours. This is a repeat occurrence (see CR 746). A faulty batch/lot of carbon blades used for air sample pump annual maintenance is suspected to be the cause. As a follow on action to this previous issue, the sample pumps at all six locations were checked and verified to be running properly on 8/19/16. All three failures occurred after this check was completed. The failed sample pumps have been replaced with rebuilt sample pumps. The sample pumps are being rebuilt with a different batch/lot of carbon vanes.
Initial Actions	Contacted SME and RP supervision. RP Instrument Technician replaced all three air sample pumps. More frequent monitoring of air sampler performance in the field is in progress. There is also telemetric monitoring on the pumps which notifies RP/CY Personel if pump failure occurs.
Recom Actions:	CA to document this event in the 2016 Annual Radiological Environmental Operating Report (Holschbach/Shannon) - due date May 31, 2017.
MR Function Exists:	
additional Contacts	
Tag #:	
Is this CR associated with Boric Acid Corrosion Control Program Y/N	No
Is the Boric Acid wet, glistening moist or dripping? (ER-AP-BAC-101)	No
Is the boric acid deposit excessive? (ER-AP-BAC-01)	No
Is the boric acid discolored (e.g, non-white) or is there any visible degredation? (ER-AP-BAC-01)	No
Does the boric acid appear to originate froma crack pinhole leek or through a welded connection? (ER-AP-BAC-101)	No
Does the boric acid appear to come from under insulation or has it run under insulation or is the source of the leak unknown? (ER-AP-BAC-101)	No
Equipment Location	
Equipment Description	
Plant System	63
OP-AA-102 Review Reqd?	No
Operability Assesment	N/A
Operability Comments	N/A
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: 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	As stated, all 3 sample pumps were replaced with rebuilt pumps using a different lot of carbon blades. CA(269) to RP (Holschbach/Shannon) to document this event in the 2016 Annual Radiological Environmental Operating Report. Due Date: 05/31/2017
Work Order #	
Comments	
Status	Pending

Content Type: Item
Version: 17.0
Created at 8/24/2016 10:57 AM by Darryl M Holschbach (Generation - 4)
Last modified at 8/31/2016 5:08 PM by System Account

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Kewaunee CRS ▸ CR: K-8 REMP Environmental Air Samplers Found Not Running

Print

CR_ID	784
Short description	K-8 REMP Environmental Air Samplers Found Not Running
Site	Kewaunee
Discovery Date/Time	9/20/2016 7:40 AM
Submitter	Darryl M Holschbach (Generation - 4)
Submitters Dept	2. Radiation Protection
Supervisor	Dan J Shannon (Generation - 4)
Unit 1 Mode	DEF
Unit ISFSI?	No
Revision #	
Long Description	One of the six Radiological Environmental Monitoring Program (REMP) air samplers was found not running on 9/20/16. The environmental air samplers are required by the REMP. Sample collection is performed in accordance with procedure SP-63-164, Environmental Sample Collection. The air sample pump at location K-8 was found not running prior to a normal weekly run time of 168 hours. K-8 at Saint Isadore the Farmer Church, 18424 Tisch Mills Rd, Tisch Mills stopped running after 93 hours. The sample pump has been replaced with a rebuilt sample pump on 9/21/16
Initial Actions	Contacted SME and RP supervision. RP Instrument Technician replaced the air sample pump
Recom Actions:	CA to document this event in the 2016 Annual Radiological Environmental Operating Report (Holschbach/Shannon) - due date May 31, 2017.
MR Function Exists:	
additional Contacts	
Tag #:	
Is this CR associated with Boric Acid Corrosion Control Program Y/N	No
Is the Boric Acid wet, glistening moist or dripping? (ER-AP-BAC-101)	No
Is the boric acid deposit excessive? (ER-AP-BAC-01)	No
Is the boric acid discolored (e.g, non-white) or is there any visible degredation? (ER-AP-BAC-01)	No
Does the boric acid appear to originate froma crack pinhole leek or through a welded connection? (ER-AP-BAC-101)	No
Does the boric acid appear to come from under insulation or has it run under insulation or is the source of the leak unknown? (ER-AP-BAC-101)	No
Equipment Location	
Equipment Description	
Plant System	63
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: 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	

As stated, pump was replaced with a rebuilt pump with acceptable carbon vanes and returned to service.

CA(283) to RP (Holschbach/Shannon) to document this event in the 2016 Annual Radiological Environmental Operating Report. Due Date: 05/31/2017

Work Order #	
Comments	
Status	Pending

Content Type: Item
Version: 14.0
Created at 9/21/2016 5:20 PM by Darryl M Holschbach (Generation - 4)
Last modified at 9/27/2016 4:58 PM by System Account

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