

Dominion Energy Kewaunee, Inc.  
N490 Hwy 42, Kewaunee, WI 54216  
Web Address: www.dom.com

**MAY 11 2015**



ATTN: Document Control Desk  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Serial No. 15-234  
LIC/RR/R0  
Docket No.: 50-305  
License No.: DPR-43

**DOMINION ENERGY KEWAUNEE, INC.**  
**KEWAUNEE POWER STATION**  
**2014 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT**

Enclosed is the 2014 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 2014 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.

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

Sincerely,

A handwritten signature in black ink, appearing to read "T. Olson".

Timothy P. Olson  
Technical Support Manager, Kewaunee Power Station

Commitments made by this letter: NONE

TE25  
ark

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. Jason Hunt  
WI Division of Public Health  
Radiation Protection Section  
1 West Wilson St., Room 148  
Madison, WI 53701-2659

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



**Dominion<sup>®</sup>**

**2014  
Annual  
Radiological  
Environmental  
Operating  
Report**  
*Kewaunee Power Station*

Dominion Energy Kewaunee, Inc.



**Dominion<sup>®</sup>**

**2014  
Annual  
Radiological  
Environmental  
Operating  
Report**

*Kewaunee Power Station*

*Part I*

*Summary and  
Interpretation*

**Dominion Energy Kewaunee, Inc.**

ANNUAL RADIOLOGICAL ENVIRONMENTAL  
OPERATING REPORT

TO

DOMINION NUCLEAR

RADIOLOGICAL MONITORING PROGRAM FOR  
THE KEWAUNEE POWER STATION  
KEWAUNEE, WISCONSIN

PART I - SUMMARY AND INTERPRETATION

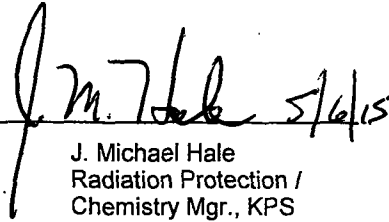
January 1 to December 31, 2014

Prepared and submitted by:

ATI ENVIRONMENTAL Inc.  
Midwest Laboratory  
Project No. 8002

Approved :

  
Bronia Grob  
Laboratory Manager

 5/6/15  
J. Michael Hale  
Radiation Protection /  
Chemistry Mgr., KPS

**This Page Intentionally Left Blank**

## 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.

**This Page Intentionally Left Blank**



## TABLE OF CONTENTS

	<u>Page</u>
Preface .....	ii
List of Figures .....	iv
List of Tables .....	iv
1.0 INTRODUCTION .....	1
2.0 SUMMARY .....	2
3.0 RADIOLOGICAL SURVEILLANCE PROGRAM .....	3
3.1 Methodology .....	3
3.1.1 The Air Program .....	3
3.1.2 The Terrestrial Program .....	4
3.1.3 The Aquatic Program .....	5
3.1.4 Program Execution .....	6
3.1.5 Program Modifications .....	6
3.2 Results and Discussion .....	6
3.2.1 Atmospheric Nuclear Detonations and Nuclear Accidents .....	7
3.2.2 The Air Environment .....	7
3.2.3 The Terrestrial Environment .....	9
3.2.4 The Aquatic Environment .....	11
3.3 Land Use Census .....	13
3.4 Laboratory Procedures .....	13
4.0 FIGURES AND TABLES .....	14
5.0 REFERENCES .....	27

## APPENDICES

A	Interlaboratory Comparison Program Results .....	A-1
B	Data Reporting Conventions .....	B-1
C	Effluent Concentrations .....	C-1

## LIST OF FIGURES

<u>No.</u>	<u>Caption</u>	<u>Page</u>
4-1	Sampling locations, Kewaunee Power Station .....	15
4-2	Ground Monitoring Wells, Kewaunee Power Station .....	16

## LIST OF TABLES

<u>No.</u>	<u>Title</u>	<u>Page</u>
4.1	Sampling locations, Kewaunee Power Station .....	17
4.2	Type and frequency of collection .....	18
4.3	Sample codes used in Table 4.2 .....	18
4.4	Sampling summary, January - December, 2014 .....	19
4.5	Environmental Radiological Monitoring Program Summary .....	20
4.6	Land Use Census .....	26

In addition, the following tables are in the Appendices:

### Appendix A

A-1	Interlaboratory Comparison Program Results .....	A1-1
A-2	Thermoluminescent dosimeters (TLDs) .....	A2-1
A-3	In-house Spiked Samples .....	A3-1
A-4	In-house "Blank" Samples .....	A4-1
A-5	In-house "Duplicate" Samples .....	A5-1
A-6	Department of Energy MAPEP comparison results .....	A6-1
A-7	Environmental Resources Associates, Crosscheck Program Results (MRAD) .....	A7-1
	Attachment A: Acceptance criteria for spiked samples .....	A-2

## 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 2014.

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 2014 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

###### Airborne Particulates

Airborne particulates are collected on 47 mm diameter, 1 $\mu$ m 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.

###### 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 4.25 miles west of the plant; K-25, located 1.9 miles southwest of the plant; K-27, located 1.5 miles northwest of the plant and K-30, located 1.0 miles north of the plant ) by thermoluminescent dosimetry (TLD). Two TLD cards, each having four main readout areas containing  $\text{CaSO}_4:\text{Dy}$  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.

###### 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 three herds grazing within three miles of the reactor site (K-34, K-38 and K-44); 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

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

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

#### 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

Annually, during the third quarter, five varieties of vegetables are collected from location K-26. Samples may also be obtained from other local sources to supplement the program. 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.

#### Grass and Cattle Feed

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). Cattle feed is collected during the first quarter from the same farms. 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

One-gallon 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. Ashed bone samples are analyzed for gross beta, strontium-89 and strontium-90.

#### Aquatic Slime

Periphyton (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 2014 as described in the preceding sections, with the following exceptions:

#### Air Particulates / Air Iodine

A partial air particulate / air iodine sample (303 m<sup>3</sup>) was collected at location K-31, for the weeks ending 5/6/15 and 5/13/15. A power outage for maintenance at the electric substation where the sampler is located resulted in a reduced runtime of 72 hours. (CR547860)

#### Surface Water

Surface water location K-1a could not be sampled for the January through March 2014 collection. The creek was frozen.

Surface water location K-1b could not be sampled for the January through March 2014 collection. The creek was frozen.

Surface water location K-1e could not be sampled for the January through March 2014 collection. The creek was frozen.

Surface water from location K-1k could not be sampled from January through March 2014, 2014. The pond was frozen or inaccessible for collection.

Surface water from location K-14a and K-14b could not be sampled January through March 2014 due to large shoreline ice formations making the sampling sites inaccessible.

### 3.1.5 Program Modifications

None.

## 3.2 RESULTS AND DISCUSSION

Results for the reporting period January to December, 2014 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 2014 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 2014 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 2014. The Chernobyl and Fukushima Daiichi nuclear accidents occurred on April 26, 1986 and March 11, 2011, respectively; and 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

#### Airborne Particulates

The annual gross beta concentration in air particulates averaged 0.019 pCi/m<sup>3</sup> at indicator locations and 0.019 pCi/m<sup>3</sup> at the control locations, similar to the means observed from 2002 (and prior to) through 2010, and slightly lower than means observed for 2013. 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 <sup>3</sup> )		
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

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 2014.

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 0.060 pCi/m<sup>3</sup> at the indicator locations and an average of 0.062 pCi/m<sup>3</sup> 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<sup>3</sup> at all locations. There was no indication of a plant effect on the local air environment.

### Ambient Gamma Radiation – TLDs

Ambient gamma radiation was monitored by TLDs at fourteen locations, eight indicators and six controls. Quarterly TLDs at the indicator locations measured a mean dose equivalent of (15.0 mR/91 days), in close agreement with the control locations (14.8 mR/91 days). The readings are similar to the averages obtained from 2002 (and prior to) through 2013.

For the eight TLDs monitoring the Independent Spent Fuel Storage Installation (protected area) (K-1L through K-1S), the measurements averaged 14.0 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 17.9 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
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

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

### Precipitation

Precipitation was monitored for tritium at indicator location, K-11. The concentration was below the LLD level of 177 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 1.4 pCi/L in all samples. Measurable levels of strontium-90 above an LLD level of 0.8 pCi/L were detected in twenty-eight of eighty-four samples tested. Mean values were identical for indicator and control locations (0.9 pCi/L) and are similar to or less than averages seen from 1990 through 2013.

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 almost identical at both the indicator and control locations (1350 and 1349 pCi/L, respectively), and are comparable to levels observed from 1990 through 2013.

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 1.00 g/L at both the indicator and control locations. Measured concentrations of stable potassium averaged 1.64 g/L at the indicator locations and 1.62 g/L at the control locations.

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

#### Well Water

All eight samples for gross alpha analysis, from well K-1g, were below an LLD of 3.7 pCi/L. Gross beta activity above a detection limit of 3.3 pCi/L, was measured in three of the twenty-four indicator samples tested. Concentrations ranged from 3.6 to 4.8 pCi/L, and averaged 4.0 pCi/L. The gross alpha and beta activities detected in the ground water are most likely contributions from naturally-occurring daughters of radium and thorium.

Levels of strontium-89 and strontium-90 were measured for the well K-1g. The concentrations measured below LLD values of 0.6 and 0.5 pCi/L, respectively.

Samples were tested for tritium and gamma emitting isotopes. All tritium concentrations measured below a detection level of 156 pCi/L. Gamma-emitting isotopes measured below respective LLDs.

Potassium-40 averages were generally in proportion to gross beta measurements and in agreement with previously measured values. No plant effect was indicated.

#### Domestic Meat

In domestic meat samples, gross alpha measured 0.063 and 0.040 pCi/g wet for indicator and control locations, respectively, while the gross beta concentrations measured 2.85 pCi/g wet and 2.19 pCi/g wet. Gamma-spectroscopic analyses showed that most beta activity was due to naturally occurring potassium-40 (2.77 pCi/g wet and 1.80 pCi/g wet respectively). All other gamma-emitting isotopes measured below detection limits.

### Eggs

In samples of eggs tested, the gross beta concentrations averaged 1.36 pCi/g wet at the indicator location and 1.65 pCi/g wet for the control location, similar to observed concentrations of naturally-occurring potassium-40 (1.35 and 1.29 pCi/g wet respectively). Other gamma-emitting isotopes were below their respective LLDs.

Levels of strontium-89 measured less than 0.011 pCi/g wet in all samples. Levels of strontium-90 measured less than 0.004 in all samples tested

### Vegetables and Grain

In vegetables, gross beta concentrations averaged 3.88 pCi/g wet at six indicator samples and 2.91 pCi/g wet for the six control locations, due primarily to potassium-40 and beryllium-7 activity. All other gamma emitting isotopes measured below detection levels. Strontium-89 was measured less than 0.021 pCi/g wet in all samples. Strontium-90 was found in one indicator sample tested, at a concentration of 0.009 pCi /g wet.

In two samples of wheat and clover collected from indicator location K-23, the gross beta concentrations averaged 4.78 pCi/g wet, due primarily to activity from potassium-40 and beryllium-7. Strontium-89 measured below an LLD of 0.021 pCi/g wet. Strontium-90 was detected in the wheat sample collected 08/04/14 at a concentration of 0.023 pCi/g wet. The clover measured below the LLD of 0.016 pCi/g wet.

### Grass and Cattle Feed

In grass, mean gross beta measured 6.45 and 7.64 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 and strontium-90 both tested below detection limits of 0.045 pCi/g wet and 0.015 pCi/g wet, respectively.

For cattlefeed, gross beta concentrations measured 13.32 and 6.64 pCi/g wet at the indicator and control locations respectively, and reflected potassium-40 levels observed of 11.23 and 5.29 pCi/g wet, respectively. No strontium-89 activity was detected. No strontium-90 was detected above an LLD of 0.016 pCi/g wet. With the exception of the naturally-occurring beryllium-7 and potassium-40, all gamma-emitting isotopes were below detection levels.

### Soil

Gross alpha concentrations in soil averaged 7.79 pCi/g dry at ten indicator sample and 7.80 pCi/g dry at the two control samples. Mean gross beta levels measured at indicator and control locations averaged 28.10 and 24.79 pCi/g dry, respectively, primarily due to potassium-40 activity. Strontium-89 was below an LLD level of 0.13 pCi/g dry in all samples. A low level of strontium-90 activity was detected in two of the ten indicator samples, at a mean concentration of 0.077 pCi/g and two of the four control samples at mean concentration of 0.119 pCi/g dry. Trace radiostrontium in the environment can still be attributed to nuclear testing from previous decades. Cesium-137 was detected in all fourteen soil samples, with similar results measured at both indicator and control locations (0.10 and 0.13 pCi/g dry, respectively). Potassium-40 was detected in all samples and averaged 19.83 and 17.51 pCi/g dry for indicator and control locations, respectively. All other gamma-emitting isotopes were below their respective LLD's. The levels of detected activities are similar to those observed from 1990 through 2013, therefore the data suggests no evidence of a plant effect.

### 3.2.4 The Aquatic Environment

#### Surface Water

Gross beta activity in surface water measured higher at the indicator locations (4.7 pCi/L) than at the control locations (1.9 pCi/L). A similar pattern of activity has been observed since 1978. In 2014, the highest activities measured were sampled from the K-1a North Creek. The average activity at K-1a North Creek was 8.9 pCi/L, with a range of 3.4 to 21.3 pCi/L, due primarily to potassium-40 activity. The potassium-40 concentrations averaged 6.9 pCi/L and ranged from 2.9 to 14.8 pCi/L at K-1a North Creek.

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	4.7	1.9

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 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.

In one of thirty indicator samples tested, (quarterly composites of monthly samples), a positive tritium activity was detected at a concentration of 192 pCi/L compared to an LLD for tritium of 178 pCi/L. The measurement was taken at location K-1e and is most likely due to tritium recapture of gaseous discharges of tritium from the plant which have been accounted for.

All analyses for strontium-89 measured below an LLD of 1.6 pCi/L. Two samples, from the K-1k pond, measured at an average of 0.7 pCi/L for strontium-90. All other samples were less than an LLD of 0.6 pCi/L.

Gamma-emitting isotopes measured below their respective LLDs in all samples.

### Fish

In fish, gross beta concentrations averaged 3.75 pCi/g wet in muscle and 3.19 pCi/g wet in bone fractions. In muscle, 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 0.34 pCi/g wet. Strontium-90 was detected in all three samples at an average of 0.29 pCi/g wet.

### Periphyton (Slime) or Aquatic Vegetation

In periphyton (slime) and aquatic vegetation samples, mean gross beta concentrations for indicator and control locations measured 5.15 and 5.96 pCi/g wet, respectively, due primarily to combined potassium-40 and beryllium-7 activity of 4.17 and 5.59 pCi/g wet, respectively.

Cesium-137 was measured in one of twelve indicator samples, at a level of 0.018 pCi/g wet. All 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 0.023 pCi/g wet. Strontium-90 activity was measured above detection level of 0.015 pCi/g wet, in two of twelve indicator samples with an average of 0.053 pCi/g wet.

### Bottom Sediments

In bottom sediment samples, the mean gross beta concentration measured 10.65 pCi/g dry at the indicator locations and 15.36 pCi/g dry at the control location.

Cs-134 measured below the LLD level of 0.028 pCi/g dry for all samples tested. Low levels of cesium-137 were observed in two indicator samples and one control sample and measured 0.031 and 0.080 pCi/g dry, respectively. On average, cesium-137 measurements are lower than or similar to levels observed from 1979 through 2013. Co-60 was detected in two of the eight indicator samples at an average of 0.080 pCi/g dry. Other gamma-emitting isotopes, with the exception of naturally-occurring potassium-40, were below their respective LLDs.

Strontium-89 was measured below the detection limit of 0.070 pCi/g dry for all samples.

Strontium-90 was measured on one of the two control samples at a concentration of 0.041 pCi/g dry as compared to an LLD of 0.040 pCi/g dry.

### 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<sup>2</sup> (500 ft<sup>2</sup>) producing broad leaf vegetation." (Figure 4-1)

The 2014 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 3, 2014. 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 2013 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, 2012). The QA Program includes participation in Interlaboratory Comparison (crosscheck) Programs. Results obtained are presented in Appendix A.

#### 4.0 FIGURES AND TABLES



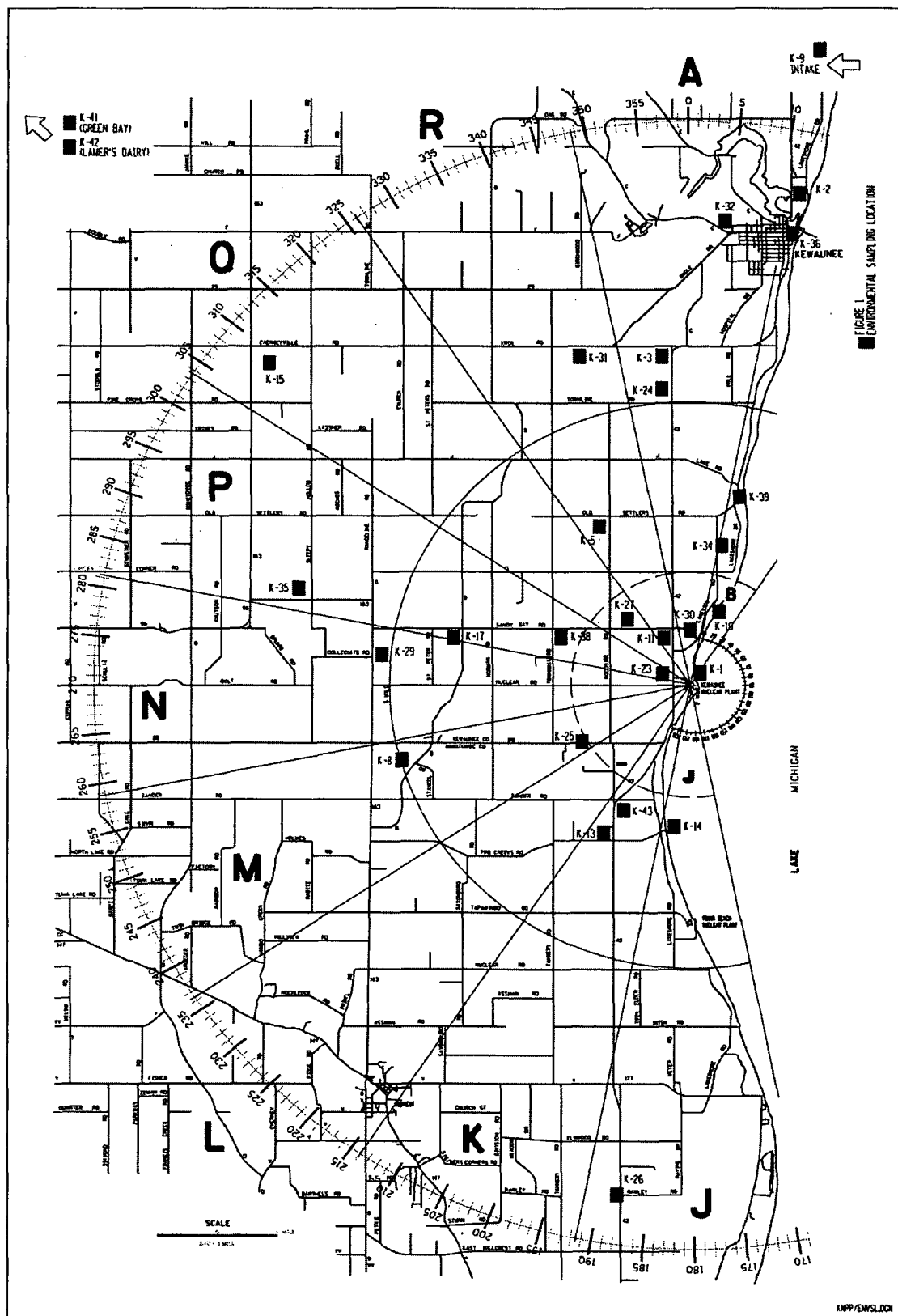


Figure 4-1. Sampling locations, Kewaunee Power Station.

**NOTES:**

1. LOCATIONS OF MONITORING WELLS SURVEYED BY STS ON JUNE 21, 2007.
2. LOCATIONS OF WATER SUPPLY WELLS ARE ESTIMATED.

**LEGEND:**

--- 6" HIGH FENCE

● SUPPLY WELL

◆ MONITORING WELL

LOCATION	NORTHING	EASTING	ELEVATION
MB-0704 GROUND	199859.5	254466.1	605.829
MB-0701 TPVC	199859.5	254466.1	605.829
MB-0702 GROUND	199872.1	2544076.1	607.897
MB-0702 TPVC	199872.1	2544076.1	607.896
MB-0703 TPVC	199872.1	2544076.1	607.896
MB-0703 GROUND	199872.1	2544076.1	607.896
MB-0704 GROUND	199872.1	2544076.1	607.896
MB-0704 TPVC	199872.1	2544076.1	607.896
MB-0705 TPVC	199872.1	2544076.1	607.896
MB-0706 GROUND	199872.1	2544076.1	607.896
MB-0706 TPVC	199872.1	2544076.1	607.896
MB-0707 GROUND	199872.1	2544076.1	607.896
MB-0707 TPVC	199872.1	2544076.1	607.896
MB-0708 GROUND	199872.1	2544076.1	607.896
MB-0708 TPVC	199872.1	2544076.1	607.896
MB-0709 GROUND	199872.1	2544076.1	607.896
MB-0709 TPVC	199872.1	2544076.1	607.896
MB-0710 GROUND	199872.1	2544076.1	607.896
MB-0710 TPVC	199872.1	2544076.1	607.896
MB-0711 GROUND	199872.1	2544076.1	607.896
MB-0711 TPVC	199872.1	2544076.1	607.896
MB-0712 GROUND	199872.1	2544076.1	607.896
MB-0712 TPVC	199872.1	2544076.1	607.896
MB-0713 GROUND	199872.1	2544076.1	607.896
MB-0713 TPVC	199872.1	2544076.1	607.896
MB-0714 GROUND	199872.1	2544076.1	607.896
MB-0714 TPVC	199872.1	2544076.1	607.896
MB-0715 GROUND	199872.1	2544076.1	607.896
MB-0715 TPVC	199872.1	2544076.1	607.896
MB-0716 GROUND	199872.1	2544076.1	607.896
MB-0716 TPVC	199872.1	2544076.1	607.896
MB-0717 GROUND	199872.1	2544076.1	607.896
MB-0717 TPVC	199872.1	2544076.1	607.896

NOTE: COORDINATES ARE IN NAD 83 DISCS IN STATE PLANE CENTRAL

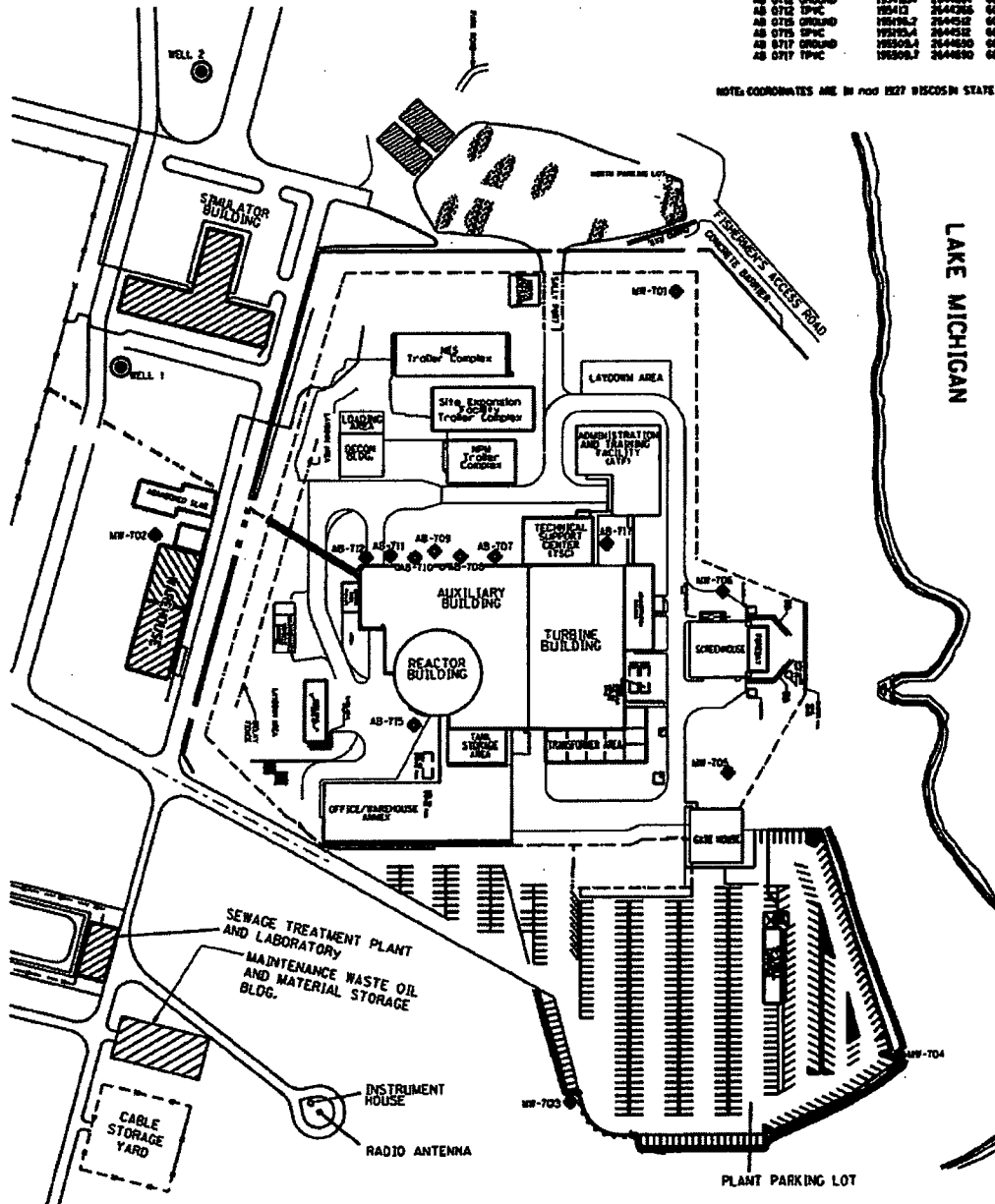


Figure 4-2. Ground Monitoring Wells, Kewaunee Power Station.

Table 4.1. Sampling locations, Kewaunee Power Station.

Code	Type <sup>a</sup>	Distance (miles) <sup>b</sup> 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 Papham 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	9.1 SSW	Sandy's 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		Fiala'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	KPS-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

<sup>a</sup> I = indicator; C = control<sup>b</sup> Distances are measured from reactor stack.

Table 4.2. Type and frequency of collection.

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

<sup>a</sup> Three times a year, second, third and fourth quarters.<sup>b</sup> Collected in May and November.<sup>c</sup> Monthly from November through April; semimonthly May through October.<sup>d</sup> First quarter (January, February, March) only.<sup>e</sup> Alternate, if milk is not available.<sup>f</sup> Second and third quarters.<sup>g</sup> The frequency may be increased dependent on the dust loading.<sup>h</sup> Two samples are collected, North (K-14a) and South (K-14b) of Two Creeks Road.<sup>i</sup> Two samples, raw and treated.<sup>j</sup> 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, 2014.

Sample Type	Collection Type and Frequency <sup>a</sup>	Number of Locations	Number of Samples Collected	Number of Samples Missed
<u>Air Environment</u>				
Airborne particulates	C/W	6	312	0
Airborne Iodine	C/W	6	312	0
TLD's	C/Q	22	88	0
Precipitation	C/M	1	12	0
<u>Terrestrial Environment</u>				
Milk (May-Oct)	G/SM	7	84	0
Milk (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	5	12	0
Grain - clover	G/A	1	2	0
Grass	G/TA	8	24	0
Cattle feed	G/A	6	12	0
Soil	G/SA	7	14	0
<u>Aquatic Environment</u>				
Surface water	G/M	7	90	18
Fish	G/TA	1	3	0
Algae	G/SA	7	14	0
Bottom sediments	G/SA	5	10	0

<sup>a</sup> Type of collection is coded as follows: C = continuous; G = grab.

Frequency is coded as follows: W = weekly; BW = bi-weekly; SM = semimonthly; M = monthly;

Q = quarterly; SA = semiannually; TA = three times per year; A = annually.

Table 4.5 Environmental Radiation Monitoring Program Summary.

Name of Facility Kewaunee Nuclear Power Plant  
 Location of Facility Kewaunee County, Wisconsin  
 (County, State)

Docket No. 50-305  
 Reporting Period January-December, 2014

Sample Type (Units)	Type and Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Location with Highest Annual Mean		Control Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Number Non-Routine Results <sup>e</sup>
				Location <sup>d</sup>	Mean (F) <sup>c</sup> Range <sup>c</sup>		
TLDs (Quarterly) (mR/91days)	Gamma 56	3.0	15.0 (32/32) (11.9-19.4)	K-27, Schlies Farm 1.53 NW	17.9 (4/4) (15.2-19.4)	14.8 (24/24) (10.9-17.5)	0
TLDs, Quarterly (Protected Area) (mR/91days)	Gamma 32	3.0	14.0 (32/32) (8.7-20.1)	K-1-M, ISFSI E 0.15 N	17.2 (4/4) (14.9-20.1)	none	0
Airborne Particulates (pCi/m <sup>3</sup> )	GB 312	0.005	0.019 (104/104) (0.007-0.041)	K-41, KPS-EOF 22 NW	0.020 (52/52) (0.010-0.040)	0.019 (208/208) (0.005-0.04)	0
	GS 24	0.020	0.060 (8/8) (0.040-0.082)	K-31, E. Krok Sub- 6.35 NNW	0.066 (4/4) (0.051-0.077)	0.062 (16/16) (0.044-0.082)	0
	Nb-95	0.0025	< LLD	-	-	< LLD	0
	Zr-Nb-95	0.0025	< LLD	-	-	< LLD	0
	Ru-103	0.0012	< LLD	-	-	< LLD	0
	Ru-106	0.0086	< LLD	-	-	< LLD	0
	Cs-134	0.0013	< LLD	-	-	< LLD	0
	Cs-137	0.0010	< LLD	-	-	< LLD	0
	Ce-141	0.0021	< LLD	-	-	< LLD	0
	Ce-144	0.0058	< LLD	-	-	< LLD	0
Airborne Iodine (pCi/m <sup>3</sup> )	I-131 312	0.03	< LLD	-	-	< LLD	0
Precipitation (pCi/L)	H-3 12	184	< LLD	-	-	none	0
Milk (pCi/L)	I-131 126	0.5	< LLD	-	-	< LLD	0
	Sr-89 84	1.4	< LLD	-	-	< LLD	0
	Sr-90 84	0.8	0.9 (14/48) (0.8-1.3)	K-34, Struck Farm 2.7 N	1 (2/12) (0.8-1.2)	0.9 (14/36) (0.8-1.1)	0
	GS 126	50	1350 (72/72) (1172-1565)	K-35, Ducat 6.71 mi. WNW	1378 (18/18) (1271-1478)	1349 (54/54) (1235-1478)	0
	K-40	6.9	< LLD	-	-	< LLD	0
	Cs-134	6.0	< LLD	-	-	< LLD	0
	Cs-137	7.2	< LLD	-	-	< LLD	0
	Ba-La-140	1.00	1.65 (48/48) (1.45-1.85)	K-34, Struck Farm 2.7 N	1.68 (12/12) (1.45-1.85)	1.64 (36/36) (1.53-1.76)	0
	(g/L)	84	1.02 (48/48) (0.00-1.30)	K-39, Wojta Farm, 3.46 mi. N	1.03 (12/12) (0.95-1.25)	1.00 (36/36) (0.85-1.31)	0
	(g/L)	84	0.40				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, 2014

Sample Type (Units)	Type and Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Location with Highest Annual Mean		Control Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Number Non-Routine Results <sup>e</sup>
				Location <sup>d</sup>	Mean (F) <sup>c</sup> Range <sup>c</sup>		
Well Water (pCi/L)	GA 8	3.7	< LLD	-	-	None	0
	GB 24	3.3	4.0 (3/20) (3.6-4.8)	K-1h, North Well 0.12 NW	4.8 (1/4)	< LLD	0
	H-3 24	156	< LLD	-	-	< LLD	0
	K-40 24	0.30	1.88 (20/20) (0.26-5.31)	K-1h, North Well 0.12 NW	2.35 (4/4) (2.30-2.40)	0.98 (4/4) (0.95-1.00)	0
	Sr-89 4	0.6	< LLD	-	-	None	0
	Sr-90 4	0.5	< LLD	-	-	None	0
	GS 24						
	Mn-54	4.7	< LLD	-	-	< LLD	0
	Fe-59	6.6	< LLD	-	-	< LLD	0
	Co-58	3.5	< LLD	-	-	< LLD	0
	Co-60	4.8	< LLD	-	-	< LLD	0
	Zn-65	10.1	< LLD	-	-	< LLD	0
	Zr-Nb-95	5.5	< LLD	-	-	< LLD	0
	Cs-134	5.5	< LLD	-	-	< LLD	0
	Cs-137	5.4	< LLD	-	-	< LLD	0
	Ba-La-140	6.9	< LLD	-	-	< LLD	0
Domestic Meat (pCi/gwet)	GA 2	0.010	0.063 (1/1)	K-24, Fictum Farm 5.4 mi. N	0.063 (1/1)	0.040 (1/1)	0
	GB 2	0.10	2.85 (1/1)	K-24, Fictum Farm 5.4 mi. N	2.85 (1/1)	2.19 (1/1)	0
	GS 2						
	Be-7	0.23	< LLD	-	-	< LLD	0
	K-40	0.50	2.77 (1/1)	K-24, Fictum Farm 5.45 mi. N	2.77 (1/1)	1.80 (1/1)	0
	Nb-95	0.032	< LLD	-	-	< LLD	0
	Zr-95	0.040	< LLD	-	-	< LLD	0
	Ru-103	0.020	< LLD	-	-	< LLD	0
	Ru-106	0.10	< LLD	-	-	< LLD	0
	Cs-134	0.018	< LLD	-	-	< LLD	0
	Cs-137	0.019	< LLD	-	-	< LLD	0
	Ce-141	0.061	< LLD	-	-	< LLD	0
	Ce-144	0.15	< LLD	-	-	< LLD	0
Eggs (pCi/gwet)	GB 8	0.011	1.36 (4/4) (0.97-1.57)	K-24, Fictum Farm 5.45 mi. N	1.36 (4/4) (0.97-1.57)	1.65 (4/4) (1.43-1.89)	0
	Sr-89 8	0.011	< LLD	-	-	< LLD	0
	Sr-90 8	0.004	< LLD	-	-	< LLD	0
	GS 8						
	Be-7	0.087	< LLD	-	-	< LLD	0
	K-40	0.50	1.35 (4/4) (1.21-1.54)	K-24, Fictum Farm 5.45 mi. N	1.35 (4/4) (1.21-1.54)	1.29 (4/4) (1.21-1.35)	0
	Nb-95	0.014	< LLD	-	-	< LLD	0
	Zr-95	0.016	< LLD	-	-	< LLD	0
	Ru-103	0.012	< LLD	-	-	< LLD	0
	Ru-106	0.072	< LLD	-	-	< LLD	0
	Cs-134	0.008	< LLD	-	-	< LLD	0
	Cs-137	0.009	< LLD	-	-	< LLD	0
	Ce-141	0.025	< LLD	-	-	< LLD	0
	Ce-144	0.058	< LLD	-	-	< LLD	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, 2014

Sample Type (Units)	Type and Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Location with Highest Annual Mean		Control Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Number Non-Routine Results <sup>e</sup>
				Location <sup>d</sup>	Mean (F) <sup>c</sup> Range <sup>c</sup>		
Vegetables (pCi/gwet)	GB 12	0.010	3.88 (6/6) (1.98-7.44)	K-24, Fictum Farm 5.45 mi. N	5.28 (2/2)	2.91 (6/6) (1.84-3.23)	0
	Sr-89 12	0.021	< LLD	-	-	< LLD	0
	Sr-90 12	0.007	0.009 (1/6)	K-24, Fictum Farm 5.45 mi. N	0.009 (1/2)	< LLD	0
	GS 12						0
	Be-7	0.06	0.37 (3/6)	K-23, Kewaunee Site, 0.5 mi. W	0.60 (2/2)	< LLD	0
	K-40	0.50	3.27 (6/6) (1.40-5.83)	K-24, Fictum Farm 5.45 mi. N	4.64 (2/2)	2.39 (6/6) (1.63-3.49)	0
	Nb-95	0.009	< LLD	-	-	< LLD	0
	Zr-95	0.015	< LLD	-	-	< LLD	0
	Ru-103	0.011	< LLD	-	-	< LLD	0
	Ru-106	0.07	< LLD	-	-	< LLD	0
	Cs-134	0.006	< LLD	-	-	< LLD	0
	Cs-137	0.009	< LLD	-	-	< LLD	0
	Ce-141	0.030	< LLD	-	-	< LLD	0
	Ce-144	0.053	< LLD	-	-	< LLD	0
Grain - (Wheat, Clover) (pCi/gwet)	GB 2	0.010	4.78 (2/2) (3.97-5.58)	K-23, Kewaunee Site, 0.5 mi. W	4.78 (2/2) (3.97-5.58)	None	0
	Sr-89 2	0.021	< LLD	-	-	None	0
	Sr-90 2	0.016	0.023 (1/2)	K-23, Kewaunee Site, 0.5 mi. W	0.023 (1/2)	None	0
	GS 2						
	Be-7	0.060	0.60 (2/2) (0.32-0.87)	K-23, Kewaunee Site, 0.5 mi. W	0.60 (2/2) (0.32-0.87)	None	0
	K-40	0.50	3.80 (2/2) (3.50-4.09)	K-23, Kewaunee Site, 0.5 mi. W	3.80 (2/2) (3.50-4.09)	None	0
	Nb-95	0.018	< LLD	-	-	None	0
	Zr-95	0.025	< LLD	-	-	None	0
	Ru-103	0.014	< LLD	-	-	None	0
	Ru-106	0.12	< LLD	-	-	None	0
	Cs-134	0.016	< LLD	-	-	None	0
	Cs-137	0.019	< LLD	-	-	None	0
	Ce-141	0.030	< LLD	-	-	None	0
	Ce-144	0.10	< LLD	-	-	None	0
Cattlefeed (pCi/gwet)	GB 12	0.10	13.32 (8/8) (4.07-26.89)	K-5, Paplham Farm 3.2 NNW	19.55 (2/2) (12.20-26.89)	6.64 (4/4) (3.04-12.01)	0
	Sr-89 12	0.028	< LLD	-	< LLD	< LLD	0
	Sr-90 12	0.016	< LLD	-	< LLD	< LLD	0
	GS 12						
	Be-7	0.12	0.31 (6/8) (0.13-0.68)	K-34, Struck Farm 2.7 N	0.41 (2/2) (0.13-0.68)	0.23 (3/4) (0.14-0.33)	0
	K-40	0.10	11.23 (8/8) (3.36-23.50)	K-5, Paplham Farm 3.2 NNW	16.03 (2/2) (8.55-23.50)	5.29 (4/4) (2.36-9.47)	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, 2014

Sample Type (Units)	Type and Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Location with Highest Annual Mean		Control Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Number Non-Routine Results <sup>e</sup>
				Location <sup>d</sup>	Mean (F) <sup>c</sup> Range <sup>c</sup>		
Cattlefeed (continued)	Nb-95	0.013	< LLD	-	-	< LLD	0
	Zr-95	0.024	< LLD	-	-	< LLD	0
	Ru-103	0.010	< LLD	-	-	< LLD	0
	Ru-106	0.12	< LLD	-	-	< LLD	0
	Cs-134	0.011	< LLD	-	-	< LLD	0
	Cs-137	0.013	< LLD	-	-	< LLD	0
	Ce-141	0.021	< LLD	-	-	< LLD	0
	Ce-144	0.08	< LLD	-	-	< LLD	0
Grass (pCi/gwet)	GB 24	0.10	6.45 (18/18) (3.98-8.53)	K-3, Siegmund Farm 5.9 N	8.59 (3/3) (5.59-10.60)	7.64 (6/6) (4.94-10.60)	0
	Sr-89 24	0.045	< LLD	-	-	< LLD	0
	Sr-90 24	0.015	< LLD	-	-	< LLD	0
	GS 24						
	Be-7	0.12	1.49 (18/18) (0.27-5.18)	K-3, Siegmund Farm 5.9 N	2.15 (3/3) (0.42-5.30)	1.52 (6/6) (0.42-5.30)	0
	K-40	0.50	5.22 (18/18) (3.37-6.01)	K-3, Siegmund Farm 5.9 N	6.41 (3/3) (4.81-7.88)	7.31 (6/6) (3.76-7.88)	0
	Nb-95	0.012	< LLD	-	-	< LLD	0
	Zr-95	0.021	< LLD	-	-	< LLD	0
	Ru-103	0.011	< LLD	-	-	< LLD	0
	Ru-106	0.10	< LLD	-	-	< LLD	0
	Cs-134	0.011	< LLD	-	-	< LLD	0
	Cs-137	0.012	< LLD	-	-	< LLD	0
	Ce-141	0.023	< LLD	-	-	< LLD	0
	Ce-144	0.080	< LLD	-	-	< LLD	0
Soil (pCi/gdry)	GA 14	4.6	7.79 (10/10) (5.98-9.17)	K-35, Ducat 6.71 mi. WNW	8.77 (2/2) (8.75-8.79)	7.80 (4/4) (3.76-9.90)	0
	GB 14	2.0	28.10 (10/10) (24.80-31.05)	K-38, Sinkula Farm 2.45 mi. WNW	29.71 (2/2) (29.52-29.89)	24.79 (4/4) (22.72-29.27)	0
	Sr-89 14	0.13	< LLD	-	-	< LLD	0
	Sr-90 14	0.046	0.077 (2/10) (0.057-0.097)	K-3, Siegmund Farm 5.9 N	0.187 (1/2)	0.119 (2/4) (0.049-0.187)	0
	GS 14						
	Be-7	0.42	< LLD	-	-	< LLD	0
	K-40	1.4	19.83 (10/10) (17.75-21.81)	K-39, Wojta Farm 3.46 mi. N	20.39 (2/2) (18.97-21.81)	17.51 (4/4) (15.82-19.30)	0
	Nb-95	0.090	< LLD	-	-	< LLD	0
	Zr-95	0.087	< LLD	-	-	< LLD	0
	Ru-103	0.045	< LLD	-	-	< LLD	0
	Ru-106	0.19	< LLD	-	-	< LLD	0
	Cs-134	0.023	< LLD	-	-	< LLD	0
	Cs-137	0.0260	0.10 (10/10) (0.050-0.14)	K-3, Siegmund Farm 5.9 N	0.14 (2/2) (0.13-0.15)	0.13 (4/4) (0.10-0.15)	0
	Ce-141	0.14	< LLD	-	-	< LLD	0
	Ce-144	0.17	< LLD	-	-	< LLD	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, 2014

Sample Type (Units)	Type and Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Location with Highest Annual Mean		Control Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Number Non-Routine Results <sup>a</sup>
				Location <sup>d</sup>	Mean (F) <sup>c</sup> Range <sup>c</sup>		
Surface Water (pCi/L)	GB (TR) 90	1.3	4.7 (64/66) (1.3-21.3)	K-1a, North Creek 0.62 N	8.9 (9/9) (3.4-21.3)	1.9 (18/24) (1.3-2.6)	0
	GS 90						
	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 30	178	192 (1/22)	K-1e, South Creek 0.12 S	192 (1/30)	< LLD	0
	Sr-89 30	1.6	< LLD	-	-	< LLD	0
	Sr-90 30	0.6	0.7 (2/22) (0.6-0.7)	K-1k, Drainage Pond 0.60 SW	0.7 (2/3) (0.6-0.7)	< LLD	0
	K-40 90	0.87	3.5 (48/66) (1.1-14.8)	K-1a, North Creek 0.62 N	6.9 (9/9) (2.9-14.8)	1.2 (24/24) (1.1-1.3)	0
Fish (Muscle) (pCi/gwet)	GB 3	0.5	3.75 (3/3) (3.37-4.31)	K-1d, Cond. Discharge 0.10 mi. E	3.75 (3/3) (3.37-4.31)	None	0
	GS 3						
	K-40	0.5	3.14 (3/3) (2.69-3.41)	K-1d, Cond. Discharge 0.10 mi. E	3.14 (3/3) (2.69-3.41)	None	0
	Mn-54	0.018	< LLD	-	-	None	0
	Fe-59	0.062	< LLD	-	-	None	0
	Co-58	0.015	< LLD	-	-	None	0
	Co-60	0.012	< LLD	-	-	None	0
	Cs-134	0.018	< LLD	-	-	None	0
	Cs-137	0.020	< LLD	-	-	None	0
Fish (Bones) (pCi/gwet)	GB 3	0.5	3.19 (3/3) (2.86-3.62)	K-1d, Cond. Discharge 0.10 mi. E	3.19 (3/3) (2.86-3.62)	None	0
	Sr-89 3	0.34	< LLD	-	-	None	0
	Sr-90 3	0.07	0.29 (3/3) (0.22-0.40)	K-1d, Cond. Discharge 0.10 mi. E	0.29 (3/3) (0.22-0.40)	None	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, 2014

Sample Type (Units)	Type and Number of Analyses <sup>a</sup>	LLD <sup>b</sup>	Indicator Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Location with Highest Annual Mean		Control Locations Mean (F) <sup>c</sup> Range <sup>c</sup>	Number Non-Routine Results <sup>e</sup>
				Location <sup>d</sup>	Mean (F) <sup>c</sup> Range <sup>c</sup>		
Periphyton (Algae) (pCi/gwet)	GB 14	0.10	5.15 (12/12) (1.84-11.57)	K-14, Two Creeks Park 2.6 S	7.04 (2/2) (2.50-11.57)	5.96 (2/2) (4.20-7.72)	0
	Sr-89 14	0.023	< LLD	-	-	< LLD	0
	Sr-90 14	0.015	0.053 (2/12) (0.035-0.071)	K-14, Two Creeks Park 2.6 S	0.071 (1/1)	< LLD	0
	GS 14						
	Be-7		0.57 (9/12) (0.23-1.27)	K-1b, Middle Creek 0.12 N	0.90 (2/2) (0.52-1.27)	0.58 (2/2) (0.43-0.72)	0
	K-40	0.5	3.60 (12/12) (0.83-5.76)	K-1b, Middle Creek 0.12 N	5.46 (2/2) (5.15-5.76)	5.01 (2/2) (4.72-5.29)	0
	Mn-54	0.015	< LLD	-	-	< LLD	0
	Co-58	0.017	< LLD	-	-	< LLD	0
	Co-60	0.017	< LLD	-	-	< LLD	0
			< LLD	-	-		
	Nb-95	0.017	< LLD	-	-	< LLD	0
	Zr-95	0.028	< LLD	-	-	< LLD	0
	Ru-103	0.013	< LLD	-	-	< LLD	0
	Ru-106	0.16	< LLD	-	-	< LLD	0
	Cs-134	0.017	< LLD	-	-	< LLD	0
	Cs-137	0.016	0.018 (1/12)	K-1d, Cond. Discharge 0.10 mi. E	0.018 (1/2)	< LLD	0
	Ce-141	0.033	< LLD	-	-	< LLD	0
	Ce-144	0.11	< LLD	-	-	< LLD	0
Bottom Sediments (pCi/gdry)	GB 10	1.0	10.65 (8/8) (8.28-12.87)	K-9, Rostok Intake 2.0 N	15.36 (2/2) (15.22-15.49)	15.36 (2/2) (15.22-15.49)	0
	Sr-89 10	0.070	< LLD	-	-	< LLD	0
	Sr-90 10	0.040	< LLD	K-9, Rostok Intake 2.0 N	0.041 (1/2)	0.041 (1/2)	0
	GS 10						
	K-40	0.5	6.63 (8/8) (5.53-8.20)	K-9, Rostok Intake 2.0 N	9.75 (2/2) (8.99-10.50)	9.75 (2/2) (8.99-10.50)	0
	Co-58	0.034	< LLD	-	-	< LLD	0
	Co-60	0.031	0.08 (2/8) (0.08-0.08)	K-1j, 500' S. of cond. disch.	0.08 (1/2)	< LLD	0
			< LLD	-	-	< LLD	0
	Cs-134	0.028	< LLD	-	-	< LLD	0
	Cs-137	0.024	0.031 (2/12) (0.027-0.035)	K-9, Rostok Intake 2.0 N	0.080 (1/2)	0.080 (1/2)	0

<sup>a</sup> GA = gross alpha, GB = gross beta, GS = gamma spectroscopy, TR = total residue.

<sup>b</sup> LLD = nominal lower limit of detection based on a 4.66 sigma counting error for background sample.

<sup>c</sup> Mean and range are based on detectable measurements only (i.e., >LLD) Fraction of detectable measurements at specified locations is indicated in parentheses (F).

<sup>d</sup> Locations are specified by station code (Table 4.1) and distance (miles) and direction relative to reactor site.

<sup>e</sup> 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  $\geq 500 \text{ ft}^2$  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	
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 - 2013.
- \_\_\_\_\_. 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.
- \_\_\_\_\_. 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

**This Page Intentionally Left Blank**

## 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, 2014 through December, 2014

## Appendix A

### Interlaboratory Comparison Program Results

Environmental, Inc., Midwest Laboratory has participated in interlaboratory comparison (crosscheck) programs since the formulation of its 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 environmental sample crosscheck 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 International Intercomparison of Environmental Dosimeters, when available, and internal laboratory testing.

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 environmental sample crosscheck 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  $\pm 2$  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<sup>a</sup>

Analysis	Level	One standard deviation for single determination
Gamma Emitters	5 to 100 pCi/liter or kg > 100 pCi/liter or kg	5.0 pCi/liter 5% of known value
Strontium-89 <sup>b</sup>	5 to 50 pCi/liter or kg > 50 pCi/liter or kg	5.0 pCi/liter 10% of known value
Strontium-90 <sup>b</sup>	2 to 30 pCi/liter or kg > 30 pCi/liter or kg	5.0 pCi/liter 10% of known value
Potassium-40	≥ 0.1 g/liter or kg	5% of known value
Gross alpha	≤ 20 pCi/liter > 20 pCi/liter	5.0 pCi/liter 25% of known value
Gross beta	≤ 100 pCi/liter > 100 pCi/liter	5.0 pCi/liter 5% of known value
Tritium	≤ 4,000 pCi/liter > 4,000 pCi/liter	± 1σ = 169.85 x (known) <sup>0.0933</sup> 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 <sup>b</sup>	≤ 55 pCi/liter > 55 pCi/liter	6 pCi/liter 10% of known value
Uranium-238, Nickel-63 <sup>b</sup> Technetium-99 <sup>b</sup>	≤ 35 pCi/liter > 35 pCi/liter	6 pCi/liter 15% of known value
Iron-55 <sup>b</sup>	50 to 100 pCi/liter > 100 pCi/liter	10 pCi/liter 10% of known value
Other Analyses <sup>b</sup>	---	20% of known value

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

<sup>b</sup> Laboratory limit.

TABLE A-1. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)<sup>a</sup>.

Lab Code	Date	Analysis	Concentration (pCi/L)			Acceptance
			Laboratory Result <sup>b</sup>	ERA Result <sup>c</sup>	Control Limits	
ERW-1384	4/7/2014	Sr-89	40.29 ± 5.76	36.70	27.50 ± 43.60	Pass
ERW-1384	4/7/2014	Sr-90	24.08 ± 2.35	26.50	19.20 ± 30.90	Pass
ERW-1385	4/7/2014	Ba-133	78.23 ± 3.93	87.90	74.00 ± 96.70	Pass
ERW-1385	4/7/2014	Co-60	62.75 ± 3.53	64.20	57.80 ± 73.10	Pass
ERW-1385	4/7/2014	Cs-134	44.97 ± 3.99	44.30	35.50 ± 48.70	Pass
ERW-1385	4/7/2014	Cs-137	88.54 ± 4.93	89.10	80.20 ± 101.00	Pass
ERW-1385	4/7/2014	Zn-65	249.1 ± 10.4	235.0	212.0 - 275.0	Pass
ERW-1388	4/7/2014	Gr. Alpha	56.70 ± 2.47	61.00	31.90 ± 75.80	Pass
ERW-1388	4/7/2014	Gr. Beta	32.10 ± 1.20	33.00	21.40 ± 40.70	Pass
ERW-1391	4/7/2014	I-131	25.52 ± 1.12	25.70	21.30 ± 30.30	Pass
ERW-1394	4/7/2014	Ra-226	12.30 ± 0.61	12.40	9.26 ± 14.30	Pass
ERW-1394	4/7/2014	Ra-228	5.08 ± 1.16	4.26	2.46 ± 5.86	Pass
ERW-1394	4/7/2014	Uranium	10.76 ± 0.74	10.20	7.95 ± 11.80	Pass
ERW-1397	4/7/2014	H-3	8982 ± 279	8770	7610 - 9650	Pass
ERW-5382	10/6/2014	Sr-89	29.40 ± 5.32	31.40	22.80 ± 38.10	Pass
ERW-5382	10/6/2014	Sr-90	19.19 ± 1.85	21.80	15.60 ± 25.70	Pass
ERW-5385	10/6/2014	Ba-133	43.54 ± 4.54	49.10	40.30 ± 54.50	Pass
ERW-5385	10/6/2014	Cs-134	81.95 ± 7.49	89.80	73.70 ± 98.80	Pass
ERW-5385	10/6/2014	Cs-137	95.76 ± 5.50	98.80	88.90 ± 111.00	Pass
ERW-5385	10/6/2014	Co-60	90.25 ± 2.77	92.10	82.90 ± 104.00	Pass
ERW-5385	10/6/2014	Zn-65	327.4 ± 23.3	310.0	279.0 - 362.0	Pass
ERW-5388	10/6/2014	Gr. Alpha	30.88 ± 8.05	37.60	19.40 ± 46.10	Pass
ERW-5388	10/6/2014	G. Beta	20.47 ± 4.75	27.40	17.30 ± 35.30	Pass
ERW-5392	10/6/2014	I-131	19.58 ± 2.35	20.30	16.80 ± 24.40	Pass
ERW-5394	10/6/2014	Ra-226	15.10 ± 1.81	14.70	11.00 ± 16.90	Pass
ERW-5394	10/6/2014	Ra-228	4.42 ± 0.86	4.31	2.50 ± 5.92	Pass
ERW-5394	10/6/2014	Uranium	5.51 ± 0.37	5.80	4.34 ± 6.96	Pass
ERW-5397	10/6/2014	H-3	6876 ± 383	6880	5940 - 7570	Pass

<sup>a</sup> 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).

<sup>b</sup> Unless otherwise indicated, the laboratory result is given as the mean ± standard deviation for three determinations.

<sup>c</sup> Results are presented as the known values, expected laboratory precision (1 sigma, 1 determination) and control limits as provided by ERA.

TABLE A-2. Thermoluminescent Dosimetry, (TLD, CaSO<sub>4</sub>: Dy Cards).

Lab Code	Date	Description	Known Value	mR	Control Limits	Acceptance
				Lab Result ± 2 sigma		
<u>Environmental, Inc.</u>						
2014-1	5/15/2014	50 cm.	26.83	34.43 ± 3.76	18.78 - 34.88	Pass
2014-1	5/15/2014	60 cm.	18.63	22.20 ± 1.16	13.04 - 24.22	Pass
2014-1	5/15/2014	70 cm.	13.69	14.74 ± 0.80	9.58 - 17.80	Pass
2014-1	5/15/2014	75 cm.	11.93	12.68 ± 1.05	8.35 - 15.51	Pass
2014-1	5/15/2014	80 cm.	10.48	11.81 ± 0.91	7.34 - 13.62	Pass
2014-1	5/15/2014	90 cm.	8.28	7.72 ± 0.71	5.80 - 10.76	Pass
2014-1	5/15/2014	100 cm.	6.71	6.46 ± 0.71	4.70 - 8.72	Pass
2014-1	5/15/2014	110 cm.	5.54	5.25 ± 1.03	3.88 - 7.20	Pass
2014-1	5/15/2014	120 cm.	4.66	4.76 ± 0.48	3.26 - 6.06	Pass
2014-1	5/15/2014	135 cm.	3.68	2.87 ± 0.46	2.58 - 4.78	Pass
2014-1	5/15/2014	150 cm.	2.98	2.30 ± 0.15	2.09 - 3.87	Pass
2014-1	5/15/2014	165 cm.	2.46	2.09 ± 0.28	1.72 - 3.20	Pass
2014-1	5/15/2014	180 cm.	2.07	1.75 ± 0.21	1.45 - 2.69	Pass
<u>Environmental, Inc.</u>						
2014-2	12/9/2014	30 cm.	77.04	84.03 ± 8.47	53.90 - 100.20	Pass
2014-2	12/9/2014	30 cm.	77.04	83.74 ± 12.02	53.90 - 100.20	Pass
2014-2	12/9/2014	60 cm.	19.26	20.39 ± 2.37	13.50 - 25.00	Pass
2014-2	12/9/2014	60 cm.	19.26	20.33 ± 1.19	13.50 - 25.00	Pass
2014-2	12/9/2014	120 cm.	4.82	5.15 ± 0.20	3.40 - 6.30	Pass
2014-2	12/9/2014	120 cm.	4.82	5.20 ± 0.45	3.40 - 6.30	Pass
2014-2	12/9/2014	150 cm.	3.08	3.84 ± 0.61	2.20 - 4.00	Pass
2014-2	12/9/2014	150 cm.	3.08	3.17 ± 0.38	2.20 - 4.00	Pass
2014-2	12/9/2014	150 cm.	3.08	3.31 ± 0.32	2.00 - 4.00	Pass
2014-2	12/9/2014	180 cm.	2.14	2.27 ± 0.51	1.50 - 2.80	Pass
2014-2	12/9/2014	180 cm.	2.14	2.23 ± 0.12	1.50 - 2.80	Pass
2014-2	12/9/2014	180 cm.	2.14	2.74 ± 0.48	1.50 - 2.80	Pass
2014-2	12/9/2014	180 cm.	2.14	1.97 ± 0.41	1.50 - 2.80	Pass

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

Lab Code <sup>b</sup>	Date	Analysis	Concentration (pCi/L) <sup>a</sup>			
			Laboratory results 2s, n=1 <sup>c</sup>	Known Activity	Control Limits <sup>d</sup>	Acceptance
SPW-1011	1/13/2014	Ra-228	35.47 ± 2.55	30.85	21.60 - 40.11	Pass
SPAP-103	1/13/2014	Gr. Beta	43.91 ± 0.34	44.82	26.89 - 62.75	Pass
SPAP-105	1/13/2014	Cs-134	2.46 ± 0.67	2.82	1.69 - 3.95	Pass
SPAP-105	1/13/2014	Cs-137	102.4 ± 2.7	99.9	89.9 - 109.9	Pass
SPW-107	1/13/2014	H-3	62,380 ± 707	62,246	49,797 - 74,695	Pass
SPW-129	1/15/2014	Cs-134	69.90 ± 3.71	78.00	68.00 - 88.00	Pass
SPW-129	1/15/2014	Cs-137	84.36 ± 7.06	75.77	65.77 - 85.77	Pass
SPW-129	1/15/2014	Sr-90	39.48 ± 1.52	39.20	31.36 - 47.04	Pass
SPW-130	1/15/2014	Ni-63	255.8 ± 3.8	204.0	142.8 - 265.2	Pass
SPW-133	1/15/2014	C-14	3153 ± 15	4737	2842 - 6632	Pass
SPMI-135	1/15/2014	Cs-134	76.80 ± 4.04	78.00	68.00 - 88.00	Pass
SPMI-135	1/15/2014	Cs-137	80.44 ± 6.63	75.80	65.80 - 85.80	Pass
W-12014	1/20/2014	Gr. Alpha	19.69 ± 0.41	20.00	10.00 - 30.00	Pass
W-12014	1/20/2014	Gr. Beta	30.35 ± 0.33	30.90	20.90 - 40.90	Pass
SPW-297	1/29/2014	Tc-99	104.2 ± 1.7	107.8	75.5 - 140.2	Pass
SPW-657	2/25/2014	Ra-226	15.84 ± 0.45	16.70	11.69 - 21.71	Pass
SPW-1127	3/26/2014	U-238	43.28 ± 2.56	41.72	29.20 - 54.24	Pass
SPW-1917	3/28/2014	Pu-238	27.37 ± 2.13	23.80	14.28 - 33.32	Pass
SPW-1786	4/25/2014	Tc-99	531.1 ± 8.7	539.15	377.41 - 700.90	Pass
SPW-2168	5/21/2014	Cs-134	70.90 ± 5.81	69.50	59.50 - 79.50	Pass
SPW-2168	5/21/2014	Cs-137	79.72 ± 6.49	75.17	65.17 - 85.17	Pass
SPW-2168	5/21/2014	Sr-89	83.35 ± 5.05	72.85	58.28 - 87.42	Pass
SPW-2168	5/21/2014	Sr-90	33.37 ± 1.52	38.87	31.10 - 46.64	Pass
SPMI-2170	5/21/2014	Cs-134	64.15 ± 4.93	69.50	59.50 - 79.50	Pass
SPMI-2170	5/21/2014	Cs-137	76.21 ± 6.91	75.17	65.17 - 85.17	Pass
SPMI-2170	5/21/2014	Sr-89	65.82 ± 4.89	72.85	58.28 - 87.42	Pass
SPMI-2170	5/21/2014	Sr-90	40.90 ± 1.59	38.87	31.10 - 46.64	Pass
SPW-2792	6/18/2014	U-238	44.80 ± 1.54	41.70	29.19 - 54.21	Pass
SPW-2796	6/18/2014	C-14	3495 ± 9	4,737	2,842 - 6632	Pass
WW-2836	6/30/2014	Co-60	131.8 ± 6.9	140.90	126.81 - 154.99	Pass
WW-2836	6/30/2014	Cs-137	143.8 ± 9.1	145.60	131.04 - 160.16	Pass
WW-2836	6/30/2014	H-3	6220 ± 238	6,361	5,089 - 7633	Pass

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

Lab Code <sup>b</sup>	Date	Analysis	Concentration (pCi/L) <sup>a</sup>				Acceptance
			Laboratory results 2s, n=1 <sup>c</sup>	Known Activity	Control Limits <sup>d</sup>		
SPW-3486	7/17/2014	Fe-55	2211 ± 72	2319	1855 - 2783		Pass
SPW-080714	8/7/2014	Gr. Alpha	18.42 ± 0.40	20.10	10.05 - 30.15		Pass
SPW-080714	8/7/2014	Gr. Beta	31.70 ± 0.40	32.40	22.40 - 42.40		Pass
SPW-081214	8/12/2014	Pu-238	22.59 ± 2.15	22.70	18.16 - 27.24		Pass
SPW-4093	8/13/2014	I-131(G)	59.95 ± 6.17	59.62	49.62 - 69.62		Pass
SPW-4093	8/13/2014	Sr-90	39.46 ± 1.55	38.65	28.65 - 48.65		Pass
SPW-4093	8/13/2014	Sr-89	105.5 ± 4.9	115.0	92.0 - 149.5		Pass
SPMI-4095	8/13/2014	I-131(G)	59.92 ± 6.17	59.62	49.62 - 69.62		Pass
SPMI-4095	8/13/2014	I-131	60.05 ± 0.72	59.62	47.70 - 71.54		Pass
SPW-4104	8/13/2014	Ni-63	200.1 ± 3.4	203.2	142.2 - 264.1		Pass
SPW-4106	8/13/2014	H-3	59,597 ± 695	60,261	48209 - 72313		Pass
SPW-4108	8/13/2014	Cs-134	2.45 ± 0.81	2.32	0.00 - 12.32		Pass
SPW-4108	8/13/2014	Cs-137	90.20 ± 3.74	98.56	88.56 - 108.56		Pass
SPAP-4110	8/13/2014	Gr. Beta	43.65 ± 0.11	44.19	34.19 - 54.19		Pass
SPF-4112	8/13/2014	I-131	2.64 ± 0.38	2.86	0.00 - 12.86		Pass
SPF-4112	8/13/2014	Cs-134	0.91 ± 0.03	1.03	0.00 - 11.03		Pass
SPF-4112	8/13/2014	Cs-137	2.61 ± 0.06	2.39	0.00 - 12.39		Pass
SPW-081414	8/14/2014	H-3	14,663 ± 788	17,700	14160 - 21240		Pass
W081614	8/16/2014	Ra-226	14.30 ± 0.37	16.70	11.69 - 21.71		Pass
W082614	8/26/2014	Ra-228	27.18 ± 2.13	30.49	20.49 - 40.49		Pass
SPW-090414	9/4/2014	Gr. Alpha	17.85 ± 0.39	20.10	10.05 - 30.15		Pass
SPW-090414	9/4/2014	Gr. Beta	30.03 ± 0.33	30.90	20.90 - 40.90		Pass
SPW-5124	9/29/2014	Ra-228	32.93 ± 2.38	31.94	21.94 - 41.94		Pass
W100714	10/7/2014	Gr. Alpha	18.56 ± 0.40	20.10	10.05 - 30.15		Pass
W100714	10/7/2014	Gr. Beta	27.71 ± 0.32	30.90	20.90 - 40.90		Pass
W111014	11/10/2014	Gr. Alpha	17.84 ± 0.38	20.10	10.05 - 30.15		Pass
W111014	11/10/2014	Gr. Beta	30.12 ± 0.33	30.90	20.90 - 40.90		Pass
W112514	11/25/2014	Ra-226	16.63 ± 0.41	16.70	11.69 - 21.71		Pass
W120814	12/8/2014	Gr. Alpha	19.29 ± 0.41	20.10	10.05 - 30.15		Pass
W120814	12/8/2014	Gr. Beta	27.93 ± 0.32	30.90	20.90 - 40.90		Pass
SPW-7149	12/26/2014	Ni-63	217.53 ± 3.25	203.10	142.17 - 264.03		Pass

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

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

<sup>c</sup> Results are based on single determinations.

<sup>d</sup> Control limits are established from the precision values listed in Attachment A of this report, adjusted to ± 2s.

NOTE: For fish, Jello 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 <sup>b</sup>	Concentration (pCi/L) <sup>a</sup>		
				Laboratory results (4.66σ)		Acceptance Criteria (4.66 σ)
				LLD	Activity <sup>c</sup>	
SPW-1001	Water	1/13/2014	Ra-228	0.74	0.39 ± 0.39	2
SPAP-102	Air Particulate	1/13/2014	Gr. Beta	0.003	0.015 ± 0.003	0.01
SPAP-104	Air Particulate	1/13/2014	Cs-134	0.006	0.005 ± 0.005	0.05
SPAP-104	Air Particulate	1/13/2014	Cs-137	0.004	-0.002 ± 0.005	0.05
SPW-106	Water	1/13/2014	H-3	151.0	115.0 ± 97.0	200
SPW-128	Water	1/15/2014	Cs-134	2.85	0.59 ± 1.46	10
SPW-128	Water	1/15/2014	Cs-137	2.52	0.68 ± 1.64	10
SPW-128	Water	1/15/2014	Sr-90	0.61	0.74 ± 0.36	1
SPW-130	Water	1/15/2014	Ni-63	10.85	1.57 ± 6.60	20
SPW-133	Water	1/15/2014	C-14	13.51	3.10 ± 8.27	200
SPMI-134	Milk	1/15/2014	Cs-134	4.43	0.14 ± 2.46	10
SPMI-134	Milk	1/15/2014	Cs-137	1.92	-2.07 ± 2.48	10
W-12014	Water	1/20/2014	Gr. Alpha	0.48	-0.31 ± 0.31	2
W-12014	Water	1/20/2014	Gr. Beta	0.78	-0.24 ± 0.54	4
SPW-297	Water	1/29/2014	Tc-99	5.63	-4.42 ± 3.34	10
SPW-656	Water	2/25/2014	Ra-226	0.03	0.01 ± 0.02	1
SPW-1126	Water	3/26/2014	U-238	0.13	0.08 ± 0.12	1
SPW-1127	Water	3/26/2014	U-233/234	0.13	0.11 ± 0.13	1
SPW-1127	Water	3/26/2014	U-238	0.00	0.08 ± 0.12	1
SPW-1917	Water	3/28/2014	Pu-238	0.02	0.01 ± 0.01	1
SPW-1785	Water	4/25/2014	Tc-99	5.61	-4.33 ± 3.33	10
SPW-1831	Water	4/30/2014	I-131	0.21	0.07 ± 0.12	0.5
SPW-2167	Water	5/21/2014	Cs-134	2.29	-0.79 ± 1.35	10
SPW-2167	Water	5/21/2014	Cs-137	2.46	0.36 ± 1.48	10
SPW-2167	Water	5/21/2014	I-131(G)	2.77	0.25 ± 1.53	20
SPW-2167	Water	5/21/2014	Sr-89	0.81	0.01 ± 0.62	5
SPW-2167	Water	5/21/2014	Sr-90	0.52	0.03 ± 0.24	1
SPMI-2169	Milk	5/21/2014	Cs-134	4.45	-0.55 ± 2.39	10
SPMI-2169	Milk	5/21/2014	Cs-137	3.91	-0.52 ± 2.60	10
SPMI-2169	Milk	5/21/2014	I-131(G)	4.31	2.57 ± 2.21	20
SPMI-2169	Milk	5/21/2014	Sr-89	0.98	-0.02 ± 0.83	5
SPMI-2169	Milk	5/21/2014	Sr-90	0.61	0.35 ± 0.32	1
SPW-2793	Water	6/18/2014	U-238	0.08	0.02 ± 0.06	1

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

Lab Code	Sample Type	Date	Analysis <sup>b</sup>	Concentration (pCi/L) <sup>a</sup>		
				Laboratory results (4.66σ)		Acceptance Criteria (4.66 σ)
				LLD	Activity <sup>c</sup>	
SPW-3485	Water	7/17/2014	Fe-55	597.6	10.3 ± 363.3	1000
SPW-4092	Water	8/13/2014	I-131(G)	3.59	0.91 ± 1.95	20
SPW-4092	Water	8/13/2014	Cs-134	3.71	-0.31 ± 1.77	10
SPW-4092	Water	8/13/2014	Cs-137	2.71	-2.20 ± 1.98	10
SPW-4092	Water	8/13/2014	Sr-89	0.89	0.11 ± 0.63	5
SPW-4092	Water	8/13/2014	Sr-90	0.52	-0.05 ± 0.23	1
SPMI-4094	Milk	8/13/2014	I-131	0.35	0.03 ± 0.20	0.5
SPMI-4094	Milk	8/13/2014	I-131(G)	4.50	-0.41 ± 2.44	20
SPMI-4094	Milk	8/13/2014	Cs-134	4.30	-0.84 ± 2.02	10
SPMI-4094	Milk	8/13/2014	Cs-137	3.45	0.96 ± 2.51	10
SPMI-4094	Milk	8/13/2014	Sr-89	0.80	-0.19 ± 0.79	5
SPMI-4094	Milk	8/13/2014	Sr-90	0.47	0.71 ± 0.30	1
SPW-4103	Water	8/13/2014	Ni-63	0.12	0.02 ± 0.07	20
SPW-4105	Water	8/13/2014	H-3	138.1	104.1 ± 78.1	200
SPW-4107	Water	8/13/2014	I-131(G)	3.21	-3.68 ± 1.33	20
SPW-4107	Water	8/13/2014	Cs-134	2.72	-0.62 ± 1.49	10
SPW-4107	Water	8/13/2014	Cs-137	2.56	0.75 ± 1.62	10
SPAP-4109	Air Particulate	8/13/2014	Gr. Beta	0.004	-0.003 ± 0.00	0.01
SPF-4111	Fish	8/13/2014	Cs-134	0.01	0.00 ± 0.01	100
SPF-4111	Fish	8/13/2014	Cs-137	0.01	-0.01 ± 0.01	100
SPF-4111	Fish	8/13/2014	Co-60	0.01	0.00 ± 0.01	100
W-081614	Water	8/16/2014	Ra-226	0.04	0.05 ± 0.03	1
W-082614	Water	8/16/2014	Ra-228	0.62	0.29 ± 0.40	2
W-092314	Water	9/23/2014	Ra-226	0.02	0.04 ± 0.02	1
W-5123	Water	9/29/2014	Ra-228	0.70	0.43 ± 0.38	2
W-100714	Water	10/7/2014	Gr. Alpha	0.39	0.04 ± 0.28	2
W-100714	Water	10/7/2014	Gr. Beta	0.76	-0.06 ± 0.53	4
W-111014	Water	11/10/2014	Gr. Alpha	0.39	0.01 ± 0.28	2
W-111014	Water	11/10/2014	Gr. Beta	0.75	-0.25 ± 0.52	4
W-112514	Water	11/25/2014	Ra-226	0.05	0.02 ± 0.03	2
W-120814	Water	12/8/2014	Gr. Alpha	0.42	0.04 ± 0.30	2
W-120814	Water	12/8/2014	Gr. Beta	0.74	-0.42 ± 0.51	4
SPW-7148	Water	12/26/2014	Ni-63	10.80	-1.80 ± 6.50	20

<sup>a</sup> Liquid sample results are reported in pCi/Liter, air filters (pCi/m<sup>3</sup>), charcoal (pCi/charcoal canister), and solid samples (pCi/kg).

<sup>b</sup> I-131(G); iodine-131 as analyzed by gamma spectroscopy.

<sup>c</sup> Activity reported is a net activity result.

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

Lab Code	Date	Analysis	Concentration (pCi/L) <sup>a</sup>		Averaged Result	Acceptance
			First Result	Second Result		
AP-7829, 7830	1/2/2014	Be-7	0.08 ± 0.02	0.06 ± 0.01	0.07 ± 0.01	Pass
AP-7913, 7914	1/2/2014	Be-7	0.07 ± 0.01	0.06 ± 0.01	0.06 ± 0.01	Pass
AP-7871, 7872	1/3/2014	Be-7	0.05 ± 0.02	0.06 ± 0.01	0.06 ± 0.01	Pass
S-43, 44	1/9/2014	K-40	19.28 ± 0.57	19.24 ± 0.57	19.26 ± 0.40	Pass
SG-64, 65	1/9/2014	Gr. Alpha	686.08 ± 69.97	642.46 ± 65.59	664.27 ± 47.95	Pass
SG-64, 65	1/9/2014	Ra-226	97.30 ± 9.78	92.20 ± 9.27	94.75 ± 6.74	Pass
SG-64, 65	1/9/2014	Ra-228	91.90 ± 9.30	97.10 ± 9.87	94.50 ± 6.78	Pass
S-136, 137	1/13/2014	Be-7	14.90 ± 0.39	14.88 ± 0.38	14.89 ± 0.27	Pass
S-136, 137	1/13/2014	K-40	3.29 ± 0.36	3.93 ± 0.36	3.61 ± 0.25	Pass
WW-220, 221	1/13/2014	H-3	231.85 ± 80.45	273.46 ± 82.47	252.66 ± 57.60	Pass
WW-262, 263	1/21/2014	H-3	294.80 ± 89.80	265.00 ± 88.47	279.90 ± 63.03	Pass
WW-346, 347	1/24/2014	H-3	934.97 ± 118.47	965.59 ± 119.52	950.28 ± 84.14	Pass
SWU-367, 368	1/29/2014	Gr. Beta	0.74 ± 0.38	1.31 ± 0.42	1.02 ± 0.28	Pass
F-409, 410	2/2/2014	Cs-137	0.05 ± 0.02	0.05 ± 0.02	0.05 ± 0.01	Pass
F-409, 410	2/2/2014	Gr. Beta	3.60 ± 0.07	3.72 ± 0.07	3.66 ± 0.05	Pass
AP-7829, 7830	1/2/2014	Be-7	0.08 ± 0.02	0.06 ± 0.01	0.07 ± 0.01	Pass
AP-7913, 7914	1/2/2014	Be-7	0.07 ± 0.01	0.06 ± 0.01	0.06 ± 0.01	Pass
AP-7871, 7872	1/3/2014	Be-7	0.05 ± 0.02	0.06 ± 0.01	0.06 ± 0.01	Pass
S-43, 44	1/9/2014	K-40	19.28 ± 0.57	19.24 ± 0.57	19.26 ± 0.40	Pass
SG-64, 65	1/9/2014	Gr. Alpha	686.08 ± 69.97	642.46 ± 65.59	664.27 ± 47.95	Pass
SG-64, 65	1/9/2014	Ra-226	97.30 ± 9.78	92.20 ± 9.27	94.75 ± 6.74	Pass
SG-64, 65	1/9/2014	Ra-228	91.90 ± 9.30	97.10 ± 9.87	94.50 ± 6.78	Pass
S-136, 137	1/13/2014	Be-7	14.90 ± 0.39	14.88 ± 0.38	14.89 ± 0.27	Pass
S-136, 137	1/13/2014	K-40	3.29 ± 0.36	3.93 ± 0.36	3.61 ± 0.25	Pass
WW-220, 221	1/13/2014	H-3	231.85 ± 80.45	273.46 ± 82.47	252.66 ± 57.60	Pass
WW-262, 263	1/21/2014	H-3	294.80 ± 89.80	265.00 ± 88.47	279.90 ± 63.03	Pass
WW-346, 347	1/24/2014	H-3	934.97 ± 118.47	965.59 ± 119.52	950.28 ± 84.14	Pass
SWU-367, 368	1/29/2014	Gr. Beta	0.74 ± 0.38	1.31 ± 0.42	1.02 ± 0.28	Pass
F-409, 410	2/2/2014	Cs-137	0.05 ± 0.02	0.05 ± 0.02	0.05 ± 0.01	Pass
F-409, 410	2/2/2014	Gr. Beta	3.60 ± 0.07	3.72 ± 0.07	3.66 ± 0.05	Pass
WW-491, 492	2/6/2014	H-3	474.00 ± 101.10	583.10 ± 105.30	528.55 ± 72.99	Pass
WW-575, 576	2/13/2014	H-3	196.69 ± 82.94	154.68 ± 80.89	175.69 ± 57.93	Pass
W-617, 618	2/14/2014	H-3	526.29 ± 97.65	579.51 ± 99.77	552.90 ± 69.80	Pass
SWU-743, 744	2/25/2014	Gr. Beta	1.61 ± 0.65	1.73 ± 0.71	1.67 ± 0.48	Pass
S-700, 701	2/26/2014	K-40	21.32 ± 0.64	21.15 ± 0.59	21.24 ± 0.44	Pass
S-806, 807	3/4/2014	K-40	24.79 ± 0.57	24.17 ± 0.59	24.48 ± 0.41	Pass
SG-928, 929	3/11/2014	Ac-228	6.78 ± 0.34	6.94 ± 0.35	6.86 ± 0.24	Pass
SG-928, 929	3/11/2014	Bi-214	5.32 ± 0.20	5.34 ± 0.22	5.33 ± 0.15	Pass
SG-928, 929	3/11/2014	K-40	4.79 ± 0.80	6.24 ± 1.01	5.52 ± 0.64	Pass
SG-928, 929	3/11/2014	Pb-212	2.70 ± 0.09	2.75 ± 0.09	2.73 ± 0.06	Pass
SG-928, 929	3/11/2014	Pb-214	5.39 ± 0.17	5.53 ± 0.17	5.46 ± 0.12	Pass
SG-928, 929	3/11/2014	Th-228	6.10 ± 2.07	4.76 ± 1.93	5.43 ± 1.42	Pass
SG-928, 929	3/11/2014	Tl-208	0.92 ± 0.06	0.91 ± 0.06	0.92 ± 0.04	Pass



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

Lab Code	Date	Analysis	Concentration (pCi/L) <sup>a</sup>		Averaged Result	Acceptance
			First Result	Second Result		
S-2119, 2120	3/12/2014	Ac-228	0.76 ± 0.20	0.73 ± 0.21	0.75 ± 0.15	Pass
S-2119, 2120	3/12/2014	Cs-137	0.13 ± 0.05	0.11 ± 0.05	0.12 ± 0.04	Pass
S-2119, 2120	3/12/2014	K-40	17.48 ± 1.48	18.39 ± 1.53	17.94 ± 1.06	Pass
S-2119, 2120	3/12/2014	Pb-214	0.73 ± 0.18	0.63 ± 0.12	0.68 ± 0.11	Pass
F-1594, 1595	3/16/2014	Cs-137	0.02 ± 0.01	0.03 ± 0.02	0.03 ± 0.01	Pass
SO-1115, 1116	3/18/2014	Cs-137	0.06 ± 0.01	0.06 ± 0.00	0.06 ± 0.00	Pass
SO-1115, 1116	3/18/2014	Gr. Beta	23.30 ± 2.10	24.40 ± 2.20	23.85 ± 1.52	Pass
SO-1115, 1116	3/18/2014	K-40	12.63 ± 0.18	12.84 ± 0.15	12.74 ± 0.12	Pass
SO-1115, 1116	3/18/2014	U-233/4	0.11 ± 0.02	0.12 ± 0.02	0.12 ± 0.01	Pass
SO-1115, 1116	3/18/2014	U-238	0.13 ± 0.02	0.14 ± 0.02	0.14 ± 0.01	Pass
S-1033, 1034	3/19/2014	Ac-228	0.99 ± 0.20	1.13 ± 0.26	1.06 ± 0.16	Pass
S-1033, 1034	3/19/2014	Bi-214	1.02 ± 0.18	0.98 ± 0.16	1.00 ± 0.12	Pass
S-1033, 1034	3/19/2014	Cs-137	0.15 ± 0.04	0.14 ± 0.04	0.15 ± 0.03	Pass
S-1033, 1034	3/19/2014	K-40	15.39 ± 1.19	15.13 ± 1.19	15.26 ± 0.84	Pass
S-1033, 1034	3/19/2014	Pb-214	1.09 ± 0.13	0.88 ± 0.17	0.99 ± 0.11	Pass
S-1033, 1034	3/19/2014	Ti-208	0.36 ± 0.05	0.31 ± 0.05	0.34 ± 0.04	Pass
W-1094, 1095	3/23/2014	Ra-226	0.30 ± 0.20	0.70 ± 0.20	0.50 ± 0.14	Pass
W-1094, 1095	3/23/2014	Ra-228	1.10 ± 0.79	1.13 ± 0.86	1.12 ± 0.58	Pass
AP-1197, 1198	3/27/2014	Be-7	0.17 ± 0.08	0.14 ± 0.08	0.15 ± 0.05	Pass
AP-1698, 1699	3/31/2014	Be-7	0.06 ± 0.02	0.07 ± 0.02	0.07 ± 0.01	Pass
E-1218, 1219	4/1/2014	Gr. Beta	1.57 ± 0.04	1.57 ± 0.04	1.57 ± 0.03	Pass
E-1218, 1219	4/1/2014	K-40	1.26 ± 0.14	1.31 ± 0.18	1.29 ± 0.11	Pass
SWU-1260, 1261	4/1/2014	Gr. Beta	2.81 ± 0.51	2.94 ± 0.50	2.88 ± 0.36	Pass
AP-1615, 1616	4/1/2014	Be-7	0.07 ± 0.01	0.07 ± 0.02	0.07 ± 0.01	Pass
AP-1657, 1658	4/2/2014	Be-7	0.07 ± 0.01	0.08 ± 0.01	0.07 ± 0.01	Pass
AP-1804, 1805	4/3/2014	Be-7	0.05 ± 0.02	0.06 ± 0.01	0.06 ± 0.01	Pass
P-1489, 1490	4/7/2014	H-3	582.31 ± 101.85	505.07 ± 98.72	543.69 ± 70.92	Pass
BS-1531, 1532	4/16/2014	K-40	0.51 ± 0.19	0.58 ± 0.23	0.54 ± 0.15	Pass
S-1909, 1910	4/22/2014	K-40	14.71 ± 0.54	14.78 ± 0.53	14.75 ± 0.38	Pass
SWU-1867, 1868	4/29/2014	Gr. Beta	2.28 ± 0.40	1.67 ± 0.35	1.98 ± 0.27	Pass
AP-1930, 1931	5/1/2014	Be-7	0.16 ± 0.09	0.19 ± 0.11	0.17 ± 0.07	Pass
SL-1888, 1889	5/1/2014	Be-7	0.80 ± 0.04	0.76 ± 0.08	0.78 ± 0.05	Pass
SL-1888, 1889	5/1/2014	Cs-137	0.01 ± 0.00	0.01 ± 0.00	0.01 ± 0.00	Pass
SL-1888, 1889	5/1/2014	Gr. Beta	11.57 ± 0.72	12.67 ± 0.78	12.12 ± 0.53	Pass
SL-1888, 1889	5/1/2014	K-40	1.04 ± 0.05	1.00 ± 0.09	1.02 ± 0.05	Pass
SO-1972, 1973	5/1/2014	Cs-137	0.12 ± 0.03	0.10 ± 0.02	0.11 ± 0.02	Pass
SO-1972, 1973	5/1/2014	Gr. Alpha	7.51 ± 3.24	9.09 ± 3.63	8.30 ± 2.43	Pass
SO-1972, 1973	5/1/2014	Gr. Beta	29.89 ± 3.25	31.42 ± 3.04	30.66 ± 2.23	Pass
SO-1972, 1973	5/1/2014	K-40	20.45 ± 0.85	20.88 ± 0.76	20.66 ± 0.57	Pass
W-617, 618	5/8/2014	H-3	175.13 ± 83.82	177.17 ± 83.92	176.15 ± 59.31	Pass
AP-2077, 2078	5/8/2014	Be-7	0.23 ± 0.11	0.18 ± 0.11	0.20 ± 0.08	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L) <sup>a</sup>		Averaged Result	Acceptance
			First Result	Second Result		
S-2205, 2206	5/15/2014	Be-7	0.50 ± 0.19	0.70 ± 0.18	0.60 ± 0.13	Pass
S-2205, 2206	5/15/2014	K-40	33.60 ± 0.79	33.52 ± 0.70	33.56 ± 0.53	Pass
VE-2184, 2185	5/19/2014	Be-7	0.62 ± 0.18	0.53 ± 0.17	0.58 ± 0.12	Pass
VE-2184, 2185	5/19/2014	K-40	5.30 ± 0.44	5.14 ± 0.44	5.22 ± 0.31	Pass
DW-50102, 50103	5/20/2014	Ra-226	7.07 ± 0.76	8.31 ± 0.90	7.69 ± 0.59	Pass
DW-50102, 50103	5/20/2014	Ra-228	5.44 ± 0.85	6.02 ± 0.67	5.73 ± 0.54	Pass
SW-2226, 2227	5/21/2014	H-3	14318.00 ± 347.00	14350.00 ± 347.00	14334.00 ± 245.37	Pass
DW-50087, 50088	5/21/2014	Gr. Alpha	1.76 ± 1.09	2.67 ± 1.01	2.22 ± 0.74	Pass
DW-50090, 50091	5/21/2014	Ra-226	0.61 ± 0.09	0.47 ± 0.09	0.54 ± 0.06	Pass
DW-50090, 50091	5/21/2014	Ra-228	0.97 ± 0.41	1.26 ± 0.52	1.12 ± 0.33	Pass
DW-50098, 50099	5/21/2014	Gr. Alpha	13.04 ± 1.36	10.76 ± 1.26	11.90 ± 0.93	Pass
AP-2289, 2290	5/22/2014	Be-7	0.14 ± 0.08	0.24 ± 0.10	0.19 ± 0.06	Pass
PM-3174, 3175	5/28/2014	K-40	30.68 ± 1.30	32.64 ± 1.24	31.66 ± 0.90	Pass
G-2415, 2416	6/2/2014	Be-7	0.73 ± 0.16	0.62 ± 0.28	0.68 ± 0.16	Pass
G-2415, 2416	6/2/2014	Gr. Beta	5.89 ± 0.09	5.90 ± 0.09	5.89 ± 0.06	Pass
G-2415, 2416	6/2/2014	K-40	5.30 ± 0.49	5.19 ± 0.65	5.25 ± 0.41	Pass
WW-2541, 2542	6/4/2014	H-3	5107.00 ± 223.00	5029.00 ± 222.00	5068.00 ± 157.33	Pass
SW-2817, 2818	6/16/2014	H-3	13303.00 ± 336.00	13130.00 ± 334.00	13216.50 ± 236.88	Pass
SS-2943, 2944	6/24/2014	K-40	11.49 ± 0.79	11.81 ± 0.70	11.65 ± 0.53	Pass
S-3048, 3049	6/27/2014	K-40	42.51 ± 1.31	40.04 ± 1.39	41.28 ± 0.95	Pass
SWT-3216, 3217	7/1/2014	Gr. Beta	2.27 ± 0.94	2.53 ± 1.05	2.40 ± 0.70	Pass
AP-3699,3700	7/3/2014	Be-7	0.06 ± 0.01	0.07 ± 0.02	0.07 ± 0.01	Pass
S-3300, 3301	7/8/2014	K-40	4.85 ± 0.97	5.91 ± 1.17	5.38 ± 0.76	Pass
S-3300, 3301	7/8/2014	Ac-228	10.23 ± 0.43	10.18 ± 0.32	10.21 ± 0.27	Pass
S-3300, 3301	7/8/2014	Ra-226	70.14 ± 2.37	72.01 ± 2.38	71.08 ± 1.68	Pass
VE-3237,3238	7/8/2014	K-40	2.54 ± 0.27	2.63 ± 0.24	2.59 ± 0.18	Pass
CF-3384,3385	7/14/2014	K-40	11.10 ± 0.58	10.69 ± 0.60	10.90 ± 0.42	Pass
S-3447,3448	7/16/2014	K-40	19.63 ± 0.64	21.03 ± 0.96	20.33 ± 0.58	Pass
WW-3573,3574	7/18/2014	H-3	381.58 ± 85.76	401.30 ± 86.67	391.44 ± 60.96	Pass
VE-3594,3595	7/22/2014	K-40	3.04 ± 0.19	3.21 ± 0.15	3.13 ± 0.12	Pass
WW-3762,3763	7/25/2014	H-3	315.47 ± 87.02	327.30 ± 87.56	321.39 ± 61.72	Pass
SWT-3867, 3868	7/29/2014	Gr. Beta	1.10 ± 0.53	1.51 ± 0.58	1.31 ± 0.39	Pass
S-3804, 3805	7/30/2014	Ac-228	0.67 ± 0.11	0.61 ± 0.10	0.64 ± 0.07	Pass
S-3804, 3805	7/30/2014	Pb-214	0.56 ± 0.05	0.51 ± 0.04	0.54 ± 0.03	Pass
LW-3931, 3932	7/31/2014	Gr. Beta	1.04 ± 0.40	0.95 ± 0.41	1.00 ± 0.29	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L) <sup>a</sup>		Averaged Result	Acceptance
			First Result	Second Result		
G-3952,3953	8/4/2014	K-40	5.42 ± 0.42	5.35 ± 0.34	5.38 ± 0.27	Pass
G-3952,3953	8/4/2014	Be-7	1.29 ± 0.19	1.24 ± 0.16	1.27 ± 0.13	Pass
G-3952,3953	8/4/2014	Gr. Beta	8.53 ± 0.20	8.63 ± 0.20	8.58 ± 0.14	Pass
G-3952,3953	8/4/2014	H-3	140.16 ± 93.50	127.25 ± 92.99	133.70 ± 65.94	Pass
WW-4036, 4037	8/5/2014	H-3	190.60 ± 82.60	164.70 ± 81.30	177.65 ± 57.95	Pass
VE-4204,4205	8/11/2014	K-40	6.28 ± 0.38	6.60 ± 0.37	6.44 ± 0.27	Pass
WW-4394,4395	8/13/2014	H-3	1540.26 ± 136.52	1499.15 ± 135.43	1519.71 ± 96.15	Pass
VE-4183,4184	8/14/2014	K-40	5.70 ± 0.41	5.73 ± 0.34	5.72 ± 0.27	Pass
AV-4455, 4456	8/22/2014	Be-7	286.67 ± 102.30	251.99 ± 98.94	269.33 ± 71.16	Pass
AV-4455, 4456	8/22/2014	K-40	2547.90 ± 255.70	2201.40 ± 203.90	2374.65 ± 163.52	Pass
WW-4500, 4501	8/26/2014	H-3	347.00 ± 100.00	321.00 ± 98.00	334.00 ± 70.01	Pass
AP-090214A/B	9/2/2014	Gr. Beta	0.03 ± 0.04	0.03 ± 0.04	0.03 ± 0.00	Pass
SG-5089, 5090	9/19/2014	Ac-228	8.26 ± 0.63	9.48 ± 0.68	8.87 ± 0.46	Pass
SG-5089, 5090	9/19/2014	Bi-214	4.71 ± 0.29	4.41 ± 0.31	4.56 ± 0.21	Pass
SG-5194,5	10/1/2014	Gr. Alpha	276.20 ± 9.51	258.60 ± 9.26	267.40 ± 6.64	Pass
SG-5194,5	10/1/2014	Pb-214	43.56 ± 0.73	43.94 ± 0.78	43.75 ± 0.53	Pass
SG-5194,5	10/1/2014	Ac-228	59.90 ± 1.37	62.80 ± 1.73	61.35 ± 1.10	Pass
S-5632,3	10/8/2014	K-40	19.28 ± 0.88	17.94 ± 0.89	18.61 ± 0.63	Pass
S-5632,3	10/8/2014	Cs-137	0.15 ± 0.03	0.13 ± 0.03	0.14 ± 0.02	Pass
S-5632,3	10/8/2014	Tl-208	0.32 ± 0.03	0.34 ± 0.03	0.33 ± 0.02	Pass
S-5632,3	10/8/2014	Pb-212	0.92 ± 0.05	0.92 ± 0.05	0.92 ± 0.03	Pass
S-5632,3	10/8/2014	Pb-214	1.25 ± 0.08	1.09 ± 0.09	1.17 ± 0.06	Pass
S-5632,3	10/8/2014	Bi-212	1.25 ± 0.29	1.34 ± 0.47	1.29 ± 0.27	Pass
S-5632,3	10/8/2014	Ac-228	1.08 ± 0.14	1.10 ± 0.14	1.09 ± 0.10	Pass
DW-50243,4	10/13/2014	Gr. Alpha	2.99 ± 0.94	4.98 ± 1.17	3.99 ± 0.75	Pass
AP-101414A/B	10/14/2014	Gr. Beta	0.02 ± 0.00	0.02 ± 0.00	0.02 ± 0.00	Pass
SG-5590,1	10/15/2014	Pb-214	80.30 ± 8.08	73.40 ± 7.51	76.85 ± 5.52	Pass
SG-5590,1	10/15/2014	Ac-228	64.50 ± 1.87	62.80 ± 1.15	63.65 ± 1.10	Pass
DW-50251,2	10/16/2014	Ra-226	0.55 ± 0.13	0.32 ± 0.10	0.44 ± 0.08	Pass
U-5842,3	10/20/2014	H-3	7376 ± 949	7342 ± 947	7359 ± 670	Pass
CF-6074,5	10/21/2014	H-3	7509 ± 283	7969 ± 291	7739 ± 203	Pass
CF-6074,5	10/21/2014	K-40	3.09 ± 0.31	3.30 ± 0.38	3.20 ± 0.25	Pass

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

Lab Code	Date	Analysis	Concentration (pCi/L) <sup>a</sup>		Averaged Result	Acceptance
			First Result	Second Result		
VE-6269,70	11/3/2014	K-40	6.25 ± 0.54	6.56 ± 0.49	6.41 ± 0.36	Pass
VE-6269,70	11/3/2014	Be-7	0.81 ± 0.28	0.74 ± 0.18	0.77 ± 0.17	Pass
SO-6500,1	11/5/2014	Sr-90	0.07 ± 0.03	0.07 ± 0.02	0.07 ± 0.02	Pass
SO-6500,1	11/5/2014	Gr. Alpha	11.77 ± 1.73	12.18 ± 1.62	11.98 ± 1.19	Pass
SO-6500,1	11/5/2014	Gr. Beta	26.69 ± 1.62	24.19 ± 1.13	25.44 ± 0.99	Pass
SO-6500,1	11/5/2014	U-233/4	0.14 ± 0.04	0.14 ± 0.05	0.14 ± 0.03	Pass
SO-6500,1	11/5/2014	U-238	0.18 ± 0.05	0.13 ± 0.04	0.15 ± 0.03	Pass
SO-6500,1	11/5/2014	Th-228	0.47 ± 0.11	0.34 ± 0.06	0.41 ± 0.06	Pass
SO-6500,1	11/5/2014	Th-230	0.38 ± 0.07	0.29 ± 0.05	0.34 ± 0.04	Pass
SO-6500,1	11/5/2014	Th-232	0.41 ± 0.08	0.41 ± 0.06	0.41 ± 0.05	Pass
SO-6500,1	11/5/2014	Bi-214	0.75 ± 0.02	0.78 ± 0.02	0.77 ± 0.01	Pass
SO-6500,1	11/5/2014	Pb-214	0.78 ± 0.08	0.86 ± 0.09	0.82 ± 0.06	Pass
SO-6500,1	11/5/2014	Ac-228	1.02 ± 0.11	1.13 ± 0.13	1.08 ± 0.09	Pass
SO-6500,1	11/5/2014	Cs-137	0.40 ± 0.01	0.39 ± 0.01	0.39 ± 0.01	Pass
DW-50262,3	11/10/2014	Gr. Alpha	8.95 ± 1.26	7.84 ± 1.24	8.40 ± 0.88	Pass
DW-50264,5	11/10/2014	Ra-226	3.89 ± 0.24	3.71 ± 0.20	3.80 ± 0.16	Pass
DW-50264,5	11/10/2014	Ra-228	2.96 ± 0.63	2.33 ± 0.59	2.65 ± 0.43	Pass
AP-120214A/B	12/2/2014	Gr. Beta	0.03 ± 0.00	0.03 ± 0.00	0.03 ± 0.00	Pass
AP-120814A/B	12/8/2014	Gr. Beta	0.03 ± 0.01	0.03 ± 0.01	0.03 ± 0.00	Pass
SG-7068,9	12/19/2014	Pb-214	4.27 ± 0.23	4.38 ± 0.33	4.33 ± 0.20	Pass
SG-7068,9	12/19/2014	Ac-228	2.72 ± 0.36	3.27 ± 0.49	3.00 ± 0.30	Pass
S-7152,3	12/25/2014	K-40	20.83 ± 0.88	20.16 ± 0.62	20.49 ± 0.54	Pass

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

Lab Code <sup>b</sup>	Date	Analysis	Laboratory result	Concentration <sup>a</sup>		Acceptance
				Known Activity	Control Limits <sup>c</sup>	
MAW-1140	2/1/2014	Gr. Alpha	0.77 ± 0.06	0.85	0.26 - 1.44	Pass
MAW-1140	2/1/2014	Gr. Beta	4.31 ± 0.08	4.19	2.10 - 6.29	Pass
MAW-1142	2/1/2014	I-129	-0.01 ± 8.00	0.00	NA	Pass
MAW-1184	2/1/2014	Fe-55	0.40 ± 3.20	0.00	-0.01 - 2.00	Pass
MAW-1184	2/1/2014	H-3	345.10 ± 10.60	321.00	225.00 - 417.00	Pass
MAW-1184	2/1/2014	Ni-63	32.40 ± 3.20	34.00	23.80 - 44.20	Pass
MAW-1184 <sup>f</sup>	2/1/2014	Pu-238	1.28 ± 0.12	0.83	0.58 - 1.08	Fail
MAW-1184 <sup>f</sup>	2/1/2014	Pu-239/240	0.91 ± 0.10	0.68	0.47 - 0.88	Fail
MAW-1184	2/1/2014	Sr-90	7.00 ± 0.70	8.51	5.96 - 11.06	Pass
MAW-1184	2/1/2014	Tc-99	8.10 ± 0.60	10.30	7.20 - 13.40	Pass
MAW-1184	2/1/2014	U-233/234	0.20 ± 0.07	0.23	0.16 - 0.29	Pass
MAW-1184	2/1/2014	U-238	1.25 ± 0.18	1.45	1.02 - 1.89	Pass
MAW-1184	2/1/2014	Co-57	27.86 ± 0.38	27.50	19.30 - 35.80	Pass
MAW-1184	2/1/2014	Co-60	15.99 ± 0.27	16.00	11.20 - 20.80	Pass
MAW-1184	2/1/2014	Cs-134	21.85 ± 0.54	23.10	16.20 - 30.00	Pass
MAW-1184	2/1/2014	Cs-137	28.74 ± 0.49	28.90	20.20 - 37.60	Pass
MAW-1184	2/1/2014	K-40	1.80 ± 2.00	0.00	0.00 - 10.00	Pass
MAW-1184	2/1/2014	Mn-54	14.06 ± 0.40	13.90	9.70 - 18.10	Pass
MAW-1184	2/1/2014	Zn-65	0.00 ± 0.19	0.00	-0.01 - 0.00	Pass
MAVE-1148	2/1/2014	Co-57	11.63 ± 0.19	10.10	7.10 - 13.10	Pass
MAVE-1148	2/1/2014	Co-60	7.28 ± 0.18	6.93	4.85 - 9.01	Pass
MAVE-1148	2/1/2014	Cs-134	6.29 ± 0.29	6.04	4.23 - 7.85	Pass
MAVE-1148	2/1/2014	Cs-137	5.18 ± 0.20	4.74	3.32 - 6.16	Pass
MAVE-1148	2/1/2014	Mn-54	9.22 ± 0.26	8.62	6.03 - 11.21	Pass
MAVE-1148	2/1/2014	Zn-65	8.59 ± 0.40	7.86	5.50 - 10.22	Pass
MAAP-1151	2/1/2014	Am-241	0.09 ± 0.02	0.09	0.06 - 0.12	Pass
MAAP-1151 <sup>d</sup>	2/1/2014	Co-57	1.60 ± 0.05	0.00	NA	Fail
MAAP-1151	2/1/2014	Co-60	1.38 ± 0.08	1.39	0.97 - 1.81	Pass
MAAP-1151	2/1/2014	Cs-134	1.75 ± 0.11	1.91	1.34 - 2.48	Pass
MAAP-1151	2/1/2014	Cs-137	1.81 ± 0.10	1.76	1.23 - 2.29	Pass
MAAP-1151	2/1/2014	Mn-54	0.01 ± 0.03	0.00	NA	Pass
MAAP-1151 <sup>f</sup>	2/1/2014	Pu-238	0.08 ± 0.02	0.00	NA	Fail
MAAP-1151	2/1/2014	Pu-239/240	0.10 ± 0.02	0.08	0.05 - 0.10	Pass
MAAP-1151	2/1/2014	Zn-65	-0.24 ± 0.09	0.00	-0.50 - 1.00	Pass

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

Lab Code <sup>b</sup>	Date	Analysis	Laboratory result	Concentration <sup>a</sup>		Acceptance
				Known Activity	Control Limits <sup>c</sup>	
MAAP-1151	2/1/2014	U-233/234	0.03 ± 0.01	0.02	0.01 - 0.03	Pass
MAAP-1151	2/1/2014	U-238	0.13 ± 0.02	0.13	0.09 - 0.17	Pass
MAAP-1151	2/1/2014	Sr-90	1.11 ± 0.14	1.18	0.83 - 1.53	Pass
MAAP-1154	2/1/2014	Gr. Alpha	0.56 ± 0.06	1.77	0.53 - 3.01	Pass
MAAP-1154	2/1/2014	Gr. Beta	0.98 ± 0.06	0.77	0.39 - 1.16	Pass
MASO-1146	2/1/2014	Co-57	1064.50 ± 3.60	966.00	676.00 - 1256.00	Pass
MASO-1146	2/1/2014	Co-60	1.70 ± 0.50	1.22	NA <sup>e</sup>	Pass
MASO-1146 <sup>g</sup>	2/1/2014	Cs-134	6.10 ± 1.80	0.00	NA	Fail
MASO-1146	2/1/2014	Cs-137	1364.30 ± 5.30	1238.00	867.00 - 1609.00	Pass
MASO-1146	2/1/2014	K-40	728.90 ± 15.90	622.00	435.00 - 809.00	Pass
MASO-1146	2/1/2014	Mn-54	1588.00 ± 6.00	1430.00	1001.00 - 1859.00	Pass
MASO-1146	2/1/2014	Zn-65	763.50 ± 6.80	695.00	487.00 - 904.00	Pass
MASO-1146	2/1/2014	Am-241	68.20 ± 9.00	68.00	47.60 - 88.40	Pass
MASO-1146	2/1/2014	Ni-63	4.80 ± 15.30	0.00	NA	Pass
MASO-1146 <sup>f</sup>	2/1/2014	Pu-238	140.60 ± 15.50	96.00	67.00 - 125.00	Fail
MASO-1146 <sup>f</sup>	2/1/2014	Pu-239/240	102.00 ± 13.10	76.80	53.80 - 99.80	Fail
MASO-1146	2/1/2014	Sr-90	1.23 ± 1.37	0.00	NA	Pass
MASO-1146	2/1/2014	Tc-99	-0.30 ± 12.00	0.00	NA	Pass
MASO-1146 <sup>h</sup>	2/1/2014	U-233/234	22.90 ± 3.00	81.00	57.00 - 105.00	Fail
MASO-1146 <sup>h</sup>	2/1/2014	U-238	32.00 ± 3.60	83.00	58.00 - 108.00	Fail
MASO-4439	8/1/2014	Am-241	65.90 ± 6.70	85.50	59.90 - 111.20	Pass
MASO-4439	8/1/2014	Ni-63	771.62 ± 23.29	980.00	686.00 - 1274.00	Pass
MASO-4439	8/1/2014	Pu-239/240	55.63 ± 5.81	58.60	41.00 - 76.20	Pass
MASO-4439	8/1/2014	Sr-90	778.34 ± 17.82	858.00	601.00 - 1115.00	Pass
MASO-4439	8/1/2014	Tc-99	458.20 ± 9.20	589.00	412.00 - 766.00	Pass
MASO-4439	8/1/2014	Cs-134	520.60 ± 7.09	622.00	435.00 - 809.00	Pass
MASO-4439	8/1/2014	Co-57	1135.00 ± 7.40	1116.00	781.00 - 1451.00	Pass
MASO-4439	8/1/2014	Co-60	768.20 ± 7.70	779.00	545.00 - 1013.00	Pass
MASO-4439	8/1/2014	Mn-54	1050.70 ± 12.60	1009.00	706.00 - 1312.00	Pass
MASO-4439	8/1/2014	Zn-65	407.89 ± 15.03	541.00	379.00 - 703.00	Pass
MAW-4431	8/1/2014	Am-241	0.79 ± 0.08	0.88	0.62 - 1.14	Pass
MAW-4431	8/1/2014	Cs-137	18.62 ± 0.54	18.40	12.90 - 23.90	Pass
MAW-4431	8/1/2014	Co-57	24.85 ± 0.42	24.70	17.30 - 32.10	Pass
MAW-4431	8/1/2014	Co-60	12.27 ± 0.38	12.40	8.70 - 16.10	Pass
MAW-4431	8/1/2014	H-3	207.20 ± 10.60	208.00	146.00 - 270.00	Pass
MAW-4431 <sup>i</sup>	8/1/2014	Fe-55	55.10 ± 14.80	31.50	22.10 - 41.00	Fail
MAW-4431	8/1/2014	Mn-54	14.36 ± 0.53	14.00	9.80 - 18.20	Pass
MAW-4431	8/1/2014	Zn-65	11.46 ± 0.78	10.90	7.60 - 14.20	Pass

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

Lab Code <sup>b</sup>	Date	Analysis	Laboratory result	Concentration <sup>a</sup>		Acceptance
				Known Activity	Control Limits <sup>c</sup>	
MAW-4431	8/1/2014	Tc-99	6.10 ± 0.50	6.99	4.89 - 9.09	Pass
MAW-4431	8/1/2014	Pu-238	0.59 ± 0.07	0.62	0.43 - 0.80	Pass
MAW-4431	8/1/2014	U-233/234	0.22 ± 0.04	0.21	0.14 - 0.27	Pass
MAW-4431	8/1/2014	U-238	1.25 ± 0.10	1.42	0.99 - 1.85	Pass
MAW-4493	8/1/2014	Gr. Alpha	0.93 ± 0.07	1.40	0.42 - 2.38	Pass
MAW-4493	8/1/2014	Gr. Beta	6.31 ± 1.35	6.50	3.25 - 9.75	Pass
MAAP-4433	8/1/2014	Am-241	0.06 ± 0.02	0.07	0.05 - 0.09	Pass
MAAP-4433	8/1/2014	Pu-238	0.10 ± 0.03	0.11	0.08 - 0.14	Pass
MAAP-4433	8/1/2014	Pu-239/240	0.04 ± 0.02	0.05	0.03 - 0.06	Pass
MAAP-4433	8/1/2014	Sr-90	0.74 ± 0.10	0.70	0.49 - 0.91	Pass
MAAP-4433	8/1/2014	U-233/234	0.03 ± 0.01	0.04	0.03 - 0.05	Pass
MAAP-4433	8/1/2014	U-238	0.21 ± 0.03	0.25	0.18 - 0.33	Pass
MAAP-4444	8/1/2014	Sr-89	7.82 ± 0.52	9.40	6.60 - 12.20	Pass
MAAP-4444	8/1/2014	Sr-90	0.76 ± 0.10	0.76	0.53 - 0.99	Pass
MAVE-4436	8/1/2014	Cs-134	7.49 ± 0.18	7.38	5.17 - 9.59	Pass
MAVE-4436	8/1/2014	Co-57	11.20 ± 0.19	9.20	6.40 - 12.00	Pass
MAVE-4436	8/1/2014	Co-60	6.84 ± 0.17	6.11	4.28 - 7.94	Pass
MAVE-4436	8/1/2014	Mn-54	8.11 ± 0.26	7.11	4.97 - 9.23	Pass
MAVE-4436	8/1/2014	Zn-65	7.76 ± 0.43	6.42	4.49 - 8.35	Pass

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

<sup>b</sup> Laboratory codes as follows: MAW (water), MAAP (air filter), MASO (soil), MAVE (vegetation).

<sup>c</sup> 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.

<sup>d</sup> Interference from Eu-152 resulted in misidentification of Co-57.

<sup>e</sup> Provided in the series for "sensitivity evaluation". MAPEP does not provide control limits.

<sup>f</sup> The high bias on the plutonium crosscheck samples was traced to contamination from a newly purchased standard.

The results of reanalysis with replacement tracer purchased from NIST:

MAW-1184	Pu-238	0.68 ± 0.10	Bq / L
MAW-1184	Pu-239/240	0.66 ± 0.10	Bq / L
MASO-1146	Pu-238	95.15 ± 8.98	Bq / kg
MASO-1146	Pu-239/240	67.21 ± 7.54	Bq / kg

Insufficient sample remained to reanalyze the Air filter sample(MAAP-1151). High bias results due to same contaminated tracer

<sup>g</sup> False positive test. Long sample counting time lead to interference from naturalizing occurring Bi-214 in sample matrix with a close spectral energy.

<sup>h</sup> 80% of participating laboratories were outside the acceptable range.

Parallel reanalysis was run on ERA spiked sample with acceptable results.

<sup>i</sup> Result of reanalysis Fe-55 32.63 ± 16.30 Bq / L

TABLE A-7. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)<sup>a</sup>.

Lab Code <sup>b</sup>	Date	Analysis	Concentration (pCi/L) <sup>b</sup>		Control Limits	Acceptance
			Laboratory Result <sup>c</sup>	ERA Result <sup>d</sup>		
ERAP-1044	3/17/2014	Am-241	54.2 ± 3.0	59.7	36.8 - 80.8	Pass
ERAP-1044	3/17/2014	Co-60	1177.9 ± 14.3	1120.0	867.0 - 1400.0	Pass
ERAP-1044	3/17/2014	Cs-134	1010.5 ± 15.8	1010.0	643.0 - 1250.0	Pass
ERAP-1044	3/17/2014	Cs-137	938.3 ± 45.7	828.0	622.0 - 1090.0	Pass
ERAP-1044	3/17/2014	Fe-55	142.3 ± 87.3	240.0	74.4 - 469.0	Pass
ERAP-1044	3/17/2014	Gr. Alpha	52.3 ± 0.5	46.0	15.4 - 71.4	Pass
ERAP-1044	3/17/2014	Gr. Beta	64.4 ± 2.6	53.8	34.0 - 78.4	Pass
ERAP-1044	3/17/2014	Mn-54	< 4.9	0.0	NA	Pass
ERAP-1044	3/17/2014	Pu-238	63.0 ± 2.6	56.3	38.6 - 74.0	Pass
ERAP-1044	3/17/2014	Pu-239/240	52.8 ± 1.9	48.6	35.2 - 63.5	Pass
ERAP-1044	3/17/2014	Sr-90	81.4 ± 1.6	78.9	38.6 - 118.0	Pass
ERAP-1044	3/17/2014	U-233/234	30.4 ± 1.7	36.4	22.6 - 54.9	Pass
ERAP-1044	3/17/2014	U-238	30.4 ± 1.4	36.1	23.3 - 49.9	Pass
ERAP-1044	3/17/2014	Uranium	62.0 ± 3.5	74.3	41.1 - 113.0	Pass
ERAP-1044	3/17/2014	Zn-65	852.2 ± 26.1	667.0	478.0 - 921.0	Pass
ERSO-1050	3/17/2014	Am-241	426.6 ± 155.5	399.0	233.0 - 518.0	Pass
ERSO-1050	3/17/2014	Ac-228	1260.0 ± 107.0	1240.0	795.0 - 1720.0	Pass
ERSO-1050	3/17/2014	Bi-212	1331.9 ± 309.7	1240.0	330.0 - 1820.0	Pass
ERSO-1050	3/17/2014	Bi-214	1804.5 ± 50.4	1960.0	1180.0 - 2820.0	Pass
ERSO-1050	3/17/2014	Co-60	6738.8 ± 167.6	6830.0	4620.0 - 9400.0	Pass
ERSO-1050	3/17/2014	Cs-134	3262.9 ± 108.8	3390.0	2220.0 - 4070.0	Pass
ERSO-1050	3/17/2014	Cs-137	8538.6 ± 55.0	8490.0	6510.0 - 10900.0	Pass
ERSO-1050	3/17/2014	K-40	11241.3 ± 296.6	10500.0	7660.0 - 14100.0	Pass
ERSO-1050	3/17/2014	Mn-54	< 21.6	0.0	NA	Pass
ERSO-1050	3/17/2014	Pb-212	1119.6 ± 26.1	1240.0	812.0 - 1730.0	Pass
ERSO-1050	3/17/2014	Pb-214	1861.7 ± 54.9	2070.0	1210.0 - 3090.0	Pass
ERSO-1050 <sup>e</sup>	3/17/2014	Pu-238	1085.5 ± 167.7	578.0	348.0 - 797.0	Fail
ERSO-1050 <sup>e</sup>	3/17/2014	Pu-239/240	681.6 ± 128.6	471.0	308.0 - 651.0	Fail
ERSO-1050	3/17/2014	Sr-90	2338.0 ± 144.0	2780.0	1060.0 - 4390.0	Pass
ERSO-1050	3/17/2014	Th-234	3474.9 ± 226.0	3360.0	1060.0 - 6320.0	Pass
ERSO-1050	3/17/2014	U-233/234	3319.5 ± 250.2	2780.0	1060.0 - 4390.0	Pass
ERSO-1050	3/17/2014	U-238	3375.6 ± 252.6	3360.0	2080.0 - 4260.0	Pass
ERSO-1050	3/17/2014	Uranium	6810.6 ± 551.1	6910.0	3750.0 - 9120.0	Pass
ERSO-1050	3/17/2014	Zn-65	5968.0 ± 226.1	5400.0	4300.0 - 7180.0	Pass



TABLE A-7. Interlaboratory Comparison Crosscheck program, Environmental Resource Associates (ERA)<sup>a</sup>.

Lab Code <sup>b</sup>	Date	Analysis	Concentration (pCi/L) <sup>b</sup>		Control Limits	Acceptance
			Laboratory Result <sup>c</sup>	ERA Result <sup>d</sup>		
ERVE-1051	3/17/2014	Am-241	1532.0 ± 149.5	1490.0	911.0 - 1980.0	Pass
ERVE-1051	3/17/2014	Cm-244	519.8 ± 94.6	516.0	253.0 - 804.0	Pass
ERVE-1051	3/17/2014	Co-60	981.2 ± 41.8	926.0	639.0 - 1290.0	Pass
ERVE-1051	3/17/2014	Cs-134	701.4 ± 58.6	646.0	415.0 - 839.0	Pass
ERVE-1051	3/17/2014	Cs-137	961.9 ± 46.3	880.0	638.0 - 1220.0	Pass
ERVE-1051	3/17/2014	K-40	32789.7 ± 758.2	31900.0	23000.0 - 44800.0	Pass
ERVE-1051	3/17/2014	Mn-54	< 25.9	0.0	NA	Pass
ERVE-1051	3/17/2014	Pu-238	2724.1 ± 259.4	2110.0	1260.0 - 2890.0	Pass
ERVE-1051	3/17/2014	Pu-239/240	4361.4 ± 323.4	3740.0	2300.0 - 5150.0	Pass
ERVE-1051	3/17/2014	Sr-90	2405.7 ± 263.2	2580.0	1470.0 - 3420.0	Pass
ERVE-1051	3/17/2014	U-233/234	1612.2 ± 162.0	1760.0	1160.0 - 2260.0	Pass
ERVE-1051	3/17/2014	U-238	1574.3 ± 159.6	1750.0	1170.0 - 2220.0	Pass
ERVE-1051	3/17/2014	Uranium	3255.4 ± 356.7	3580.0	2430.0 - 4460.0	Pass
ERVE-1051	3/17/2014	Zn-65	1124.1 ± 101.2	919.0	663.0 - 1290.0	Pass
ERW-1054	3/17/2014	Am-241	104.6 ± 3.4	114.0	76.8 - 153.0	Pass
ERW-1054	3/17/2014	Co-60	1195.2 ± 18.9	1270.0	1100.0 - 1490.0	Pass
ERW-1054	3/17/2014	Cs-134	1474.9 ± 47.5	1660.0	1220.0 - 1910.0	Pass
ERW-1054	3/17/2014	Cs-137	2591.0 ± 23.4	2690.0	2280.0 - 3220.0	Pass
ERW-1054	3/17/2014	Mn-54	< 4.3	0.0	NA	Pass
ERW-1054	3/17/2014	Pu-238	54.1 ± 3.6	44.1	32.6 - 54.9	Pass
ERW-1054	3/17/2014	Pu-239/240	185.9 ± 17.6	160.0	124.0 - 202.0	Pass
ERW-1054	3/17/2014	U-233/234	74.8 ± 6.3	82.4	61.9 - 106.0	Pass
ERW-1054	3/17/2014	U-238	76.4 ± 7.8	81.8	62.4 - 100.0	Pass
ERW-1054	3/17/2014	Uranium	154.3 ± 14.6	168.0	123.0 - 217.0	Pass
ERW-1054	3/17/2014	Zn-65	1818.5 ± 56.4	1800.0	1500.0 - 2270.0	Pass
ERW-1055 <sup>f</sup>	3/17/2014	Fe-55	636.3 ± 176.0	1200.0	716.0 - 1630.0	Fail
ERW-1055	3/17/2014	Gr. Alpha	120.9 ± 3.5	133.0	47.2 - 206.0	Pass
ERW-1055	3/17/2014	Gr. Beta	141.6 ± 2.3	174.0	99.6 - 258.0	Pass
ERW-1055	3/17/2014	Sr-90	873.9 ± 56.9	890.0	580.0 - 1180.0	Pass
ERW-1060	3/17/2014	H-3	5818.0 ± 230.0	5580.0	3740.0 - 7960.0	Pass

<sup>a</sup> 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).

<sup>b</sup> 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).

<sup>c</sup> Unless otherwise indicated, the laboratory result is given as the mean ± standard deviation for three determinations.

<sup>d</sup> Results are presented as the known values, expected laboratory precision (1 sigma, 1 determination) and control limits as provided by ERA. A known value of "zero" indicates an analysis was included in the testing series as a "false positive". Control limits are not provided.

<sup>e</sup> The high bias on the plutonium crosscheck samples was traced to contamination from a newly purchased standard.

The results of reanalysis with replacement tracer purchased from NIST:

ERSO-1050	Pu-238	634.7 ± 98.50	Bq / kg
ERSO-1050	Pu-239/240	451.8 ± 82.80	Bq / kg

<sup>f</sup> An error in the efficiency calculation was found. The result of recalculation was 932 pCi/L.

The sample was repeated, result of reanalysis, 1066 pCi/L.

## APPENDIX B. DATA REPORTING CONVENTIONS

### Data Reporting Conventions

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

### 2.0. Single Measurements

Each single measurement is reported as follows:  $x \pm s$   
where:  $x$  = value of the measurement;  
 $s$  =  $2\sigma$  counting uncertainty (corresponding to the 95% confidence level).

In cases where the activity is less than the lower limit of detection  $L$ , it is reported as:  $< L$ ,  
where  $L$  = the lower limit of detection based on  $4.66\sigma$  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  $x_1, x_2, \dots, x_n$  are defined as follows:

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

- 4.2 Values below the highest lower limit of detection are not included in the average.
- 4.3 If all values in the averaging group are less than the highest LLD, the highest LLD is reported.
- 4.4 If all but one of the values are less than the highest LLD, the single value  $x$  and associated two sigma error is reported.
- 4.5 In rounding off, the following rules are followed:
- 4.5.1. If the number following those to be retained is less than 5, the number is dropped, and the retained numbers are kept unchanged. As an example, 11.443 is rounded off to 11.44.
- 4.5.2. If the number following those to be retained is equal to or greater than 5, the number is dropped and the last retained number is raised by 1. As an example, 11.445 is rounded off to 11.45.

## APPENDIX C

Table C-1. Maximum permissible concentrations of radioactivity in air and water above natural background in unrestricted areas<sup>a</sup>.

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

<sup>a</sup> 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.

<sup>b</sup> Value adjusted by a factor of 700 to reduce the dose resulting from the air-grass-cow-milk-child pathway.

<sup>c</sup> A natural radionuclide.

**This Page Intentionally Left Blank**



**Dominion<sup>®</sup>**

**2014  
Annual  
Radiological  
Environmental  
Operating  
Report**

*Kewaunee Power Station  
Part II, Data  
Tabulations And  
Analyses*

**Dominion Energy Kewaunee, Inc.**

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, 2014

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

**This Page Intentionally Left Blank**

## 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.



**This Page Intentionally Left Blank**

## TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
Preface.....	ii
List of Figures.....	iv
List of Tables.....	v
1.0 INTRODUCTION.....	1
2.0 GRAPHS OF DATA TRENDS.....	7
3.0 DATA TABULATIONS.....	20

# LIST OF FIGURES

No.	Caption	Page
1	Sampling locations, Kewaunee Power Station .....	2
2	Airborne particulates, weekly averages; gross beta, Location K-1f .....	8
3	Location K-2 .....	8
4	Location K-8 .....	8
5	Location K-31 .....	9
6	Location K-41 .....	9
7	Location K-43 .....	9
8	Airborne particulates, gross beta, monthly averages, Location K-1f .....	10
9	Location K-2 .....	10
10	Location K-8 .....	10
11	Location K-31 .....	11
12	Location K-41 .....	11
13	Location K-43 .....	11
14	Well water, gross alpha in total residue, Location K-1g .....	12
15	Location K-1h .....	12
16	Well water, gross beta in total residue, Location K-1g .....	13
17	Location K-1h .....	13
18	Location K-10 .....	13
19	Location K-11 .....	13
20	Location K-13 .....	14
21	Location K-38 .....	14
22	Milk, strontium-90 activity, Location K-3 .....	15
23	Location K-5 .....	15
24	Location K-28/42 .....	15
25	Location K-34 .....	15
26	Location K-35 .....	16
27	Location K-38 .....	16
28	Location K-39 .....	16
29	Location K-44 .....	16
30	Surface water, gross beta (total residue), Location K-1a .....	17
31	Location K-1b .....	17
32	Location K-1d .....	17
33	Location K-1e .....	17
34	Location K-9 .....	18
35	Location K-14a .....	18
36	Location K-1k .....	18
37	Surface water, tritium activity, Location K-1d .....	19
38	Location K-14a .....	19
39	Location K-9 .....	19

# LIST OF TABLES

No.	Title	Page
1	Sampling locations, Kewaunee Power Station	3
2	Type and frequency of collection	5
3	Sample codes used in Table 2	6
	Airborne particulates and iodine, analysis for gross beta and iodine-131	
4	Location K-1f	21
5	Location K-2	22
6	Location K-8	23
7	Location K-31	24
8	Location K-41	25
9	Location K-43	26
10	Airborne particulates, gross beta, monthly averages, minima and maxima	27
11	Airborne particulates, quarterly composites of weekly samples, analysis for gamma-emitting isotopes	29
12	Ambient gamma radiation (TLD), quarterly exposure	32
13	Precipitation, collected at Location K-11, analysis for tritium	33
14	Milk, analysis for iodine-131 and gamma emitting isotopes	34
15	Milk, analysis for strontium-89, strontium-90, calcium and potassium-40	38
16	Well water, analysis for gross alpha, gross beta, tritium, strontium-89, strontium-90, potassium-40, and gamma-emitting isotopes.	41
17	Well water, analysis for gross beta, tritium, potassium-40 and gamma-emitting isotopes	42
18	Domestic meat, analysis of flesh for gross alpha, gross beta, and gamma-emitting isotopes	44
19	Eggs, analysis for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes	45
20	Vegetables, analysis for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes	46
21	Cattlefeed, analysis for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes	48
22	Grass, analysis for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes	50
23	Soil, analysis for gross alpha, gross beta, strontium-89, strontium-90 and gamma-emitting isotopes	53
24	Surface water, analysis for gross beta, potassium-40, and gamma-emitting isotopes	56
25	Surface water, analysis for tritium, strontium-89, and strontium-90	74
26	Fish samples, analysis for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes	76
27	Slime, analysis for gross beta, strontium-89, strontium-90 and gamma emitting isotopes	77
28	Bottom sediments, analysis for gross beta, strontium-89, strontium-90, and gamma-emitting isotopes	79

**This Page Intentionally Left Blank**

## 1.0 INTRODUCTION

The following constitutes Part II of the final report for the 2014 Radiological Monitoring Program conducted at the Kewaunee Power Station (KPS), Kewaunee, Wisconsin.

Included are tabulations of data for all samples collected in 2014 along with graphs of data trends. A summary and interpretation of the data presented here are published in Part I of the 2014 Annual Report on the Radiological Monitoring Program for the Kewaunee Power Station.

Figure 1. Sampling locations, Kewaunee Power Station

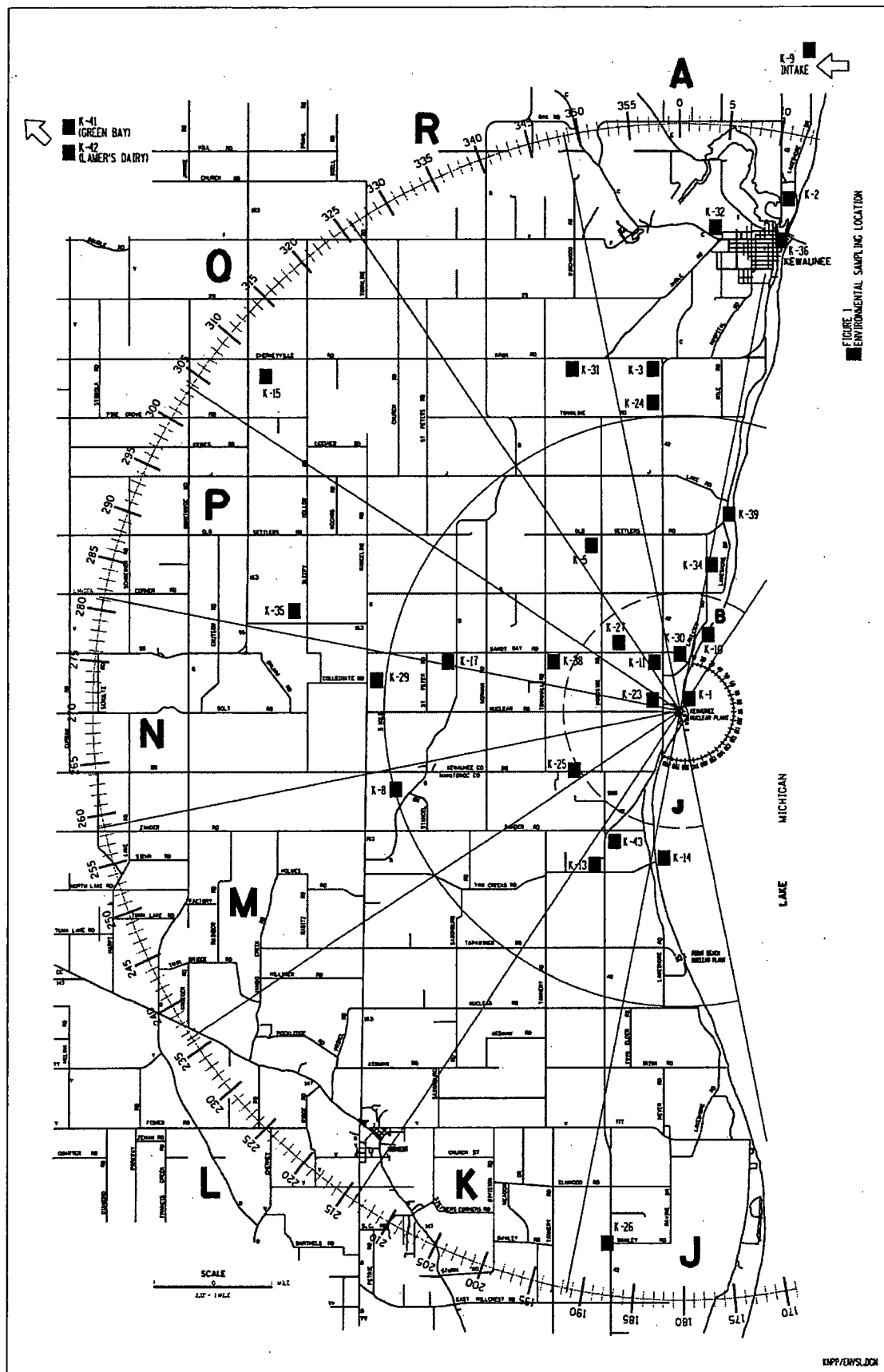


Table 1. Sampling locations, Kewaunee Power Station.

Code	Type <sup>a</sup>	Distance (miles) <sup>b</sup> 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	Harlan 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	Jansky'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	Sandy's Vegetable Stand (8.0 miles south of "BB")



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

Code	Type <sup>a</sup>	Distance (miles) <sup>b</sup> 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		Fiala'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	KPS-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

<sup>a</sup> I = indicator; C = control.

<sup>b</sup> Distances are measured from reactor stack.

Table 2. Type and frequency of collection.

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

<sup>a</sup> Three times a year, second, third and fourth quarters.<sup>b</sup> Collected in May and November.<sup>c</sup> Monthly November - April; semimonthly May - October.<sup>d</sup> First quarter (January, February, March) only.<sup>e</sup> Alternate, if milk is not available.<sup>f</sup> Second and third quarters.<sup>g</sup> Frequency may be increased dependent on dust loading.<sup>h</sup> Two samples are collected, North (K-14a) and South (K-14b) of Two Creeks Road.<sup>i</sup> Two samples, raw and treated.

Table 3. Sample Codes:

---

<u>Code</u>	<u>Description</u>
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.

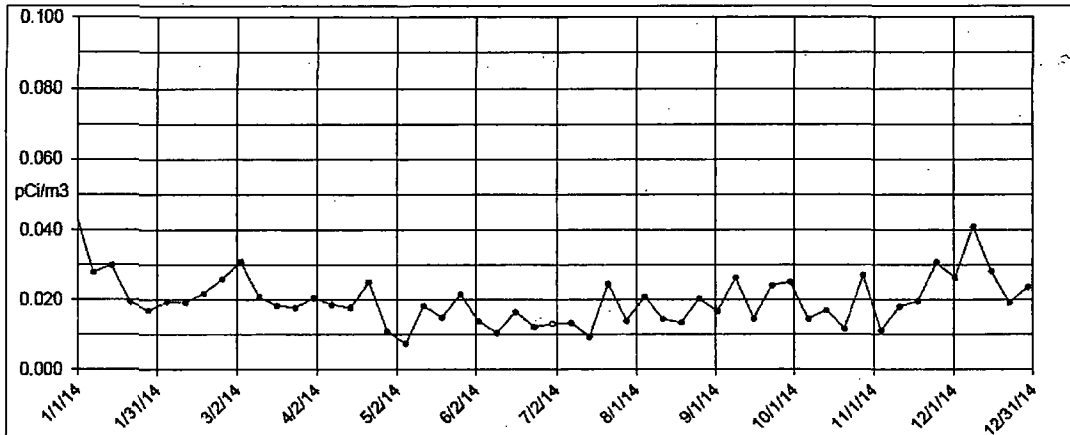


Figure 2. Location K-1f (weekly samples, 2014).

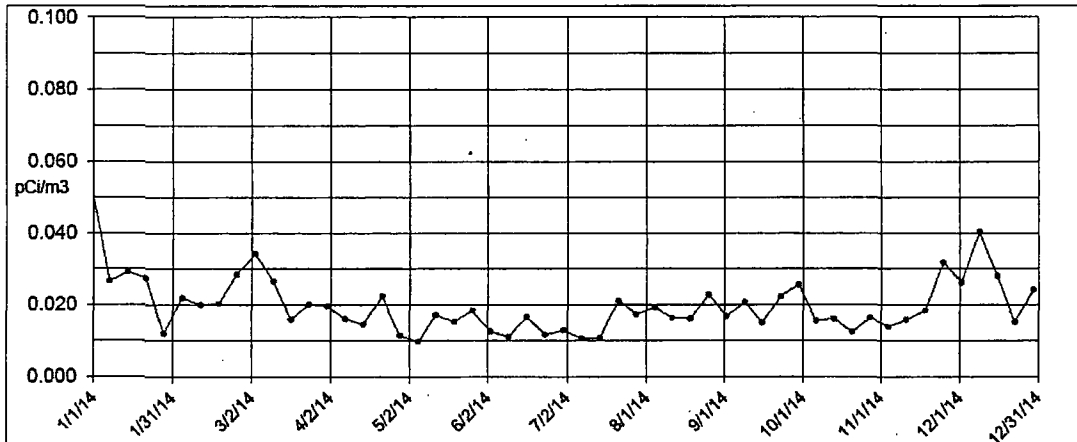


Figure 3. Location K-2 (weekly samples, 2014).

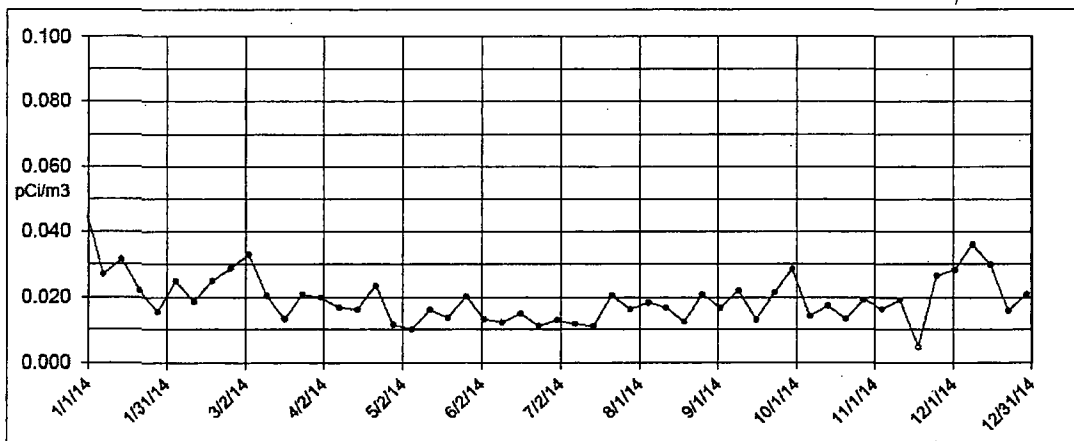


Figure 4. Location K-8 (weekly samples, 2014).

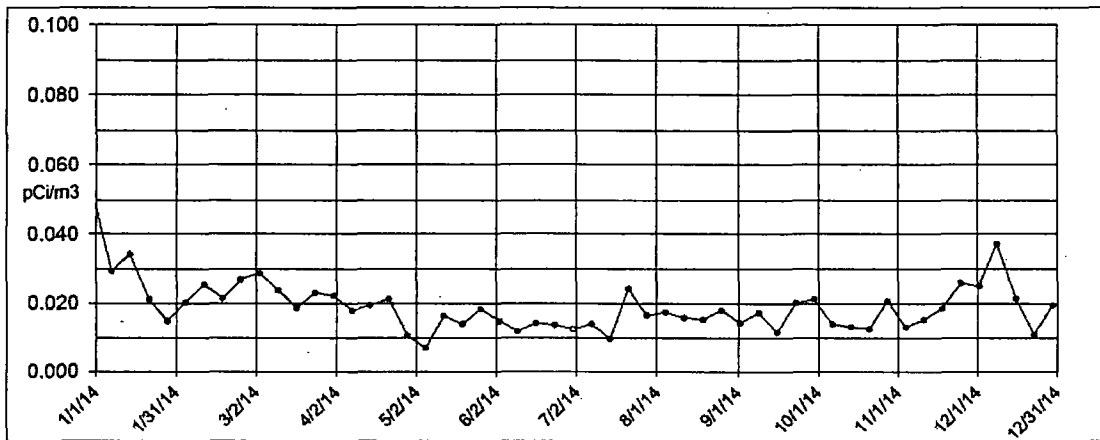


Figure 5. Location K-31 (weekly samples, 2014).

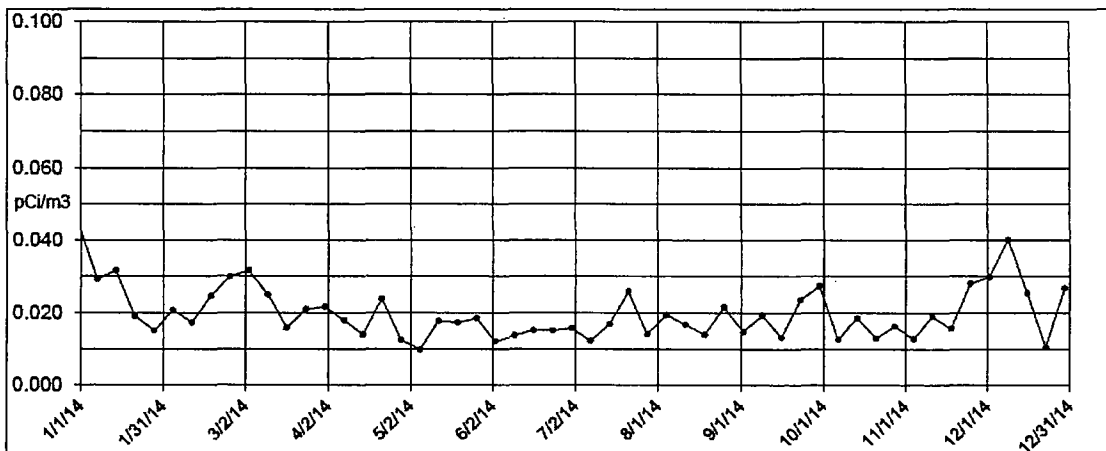


Figure 6. Location K-41 (weekly samples, 2014).

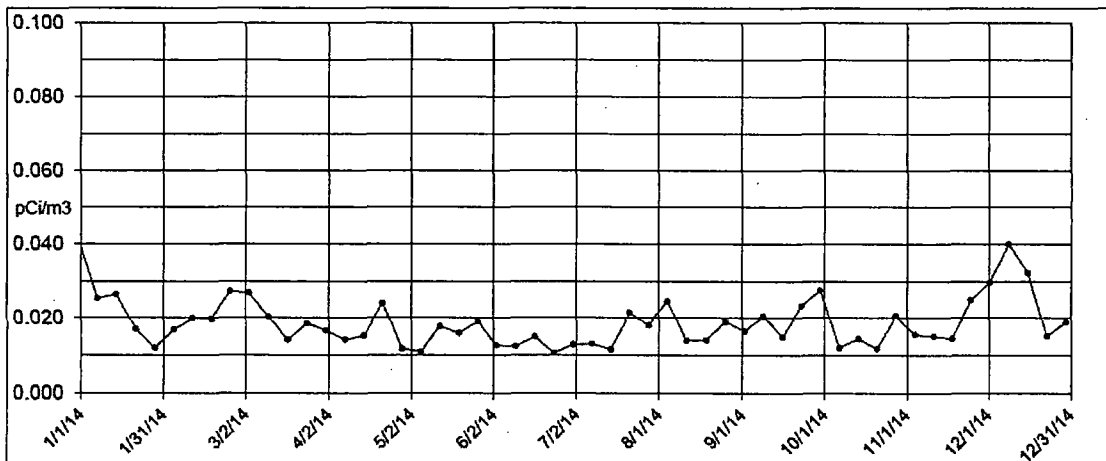


Figure 7. Location K-43 (weekly samples, 2014).

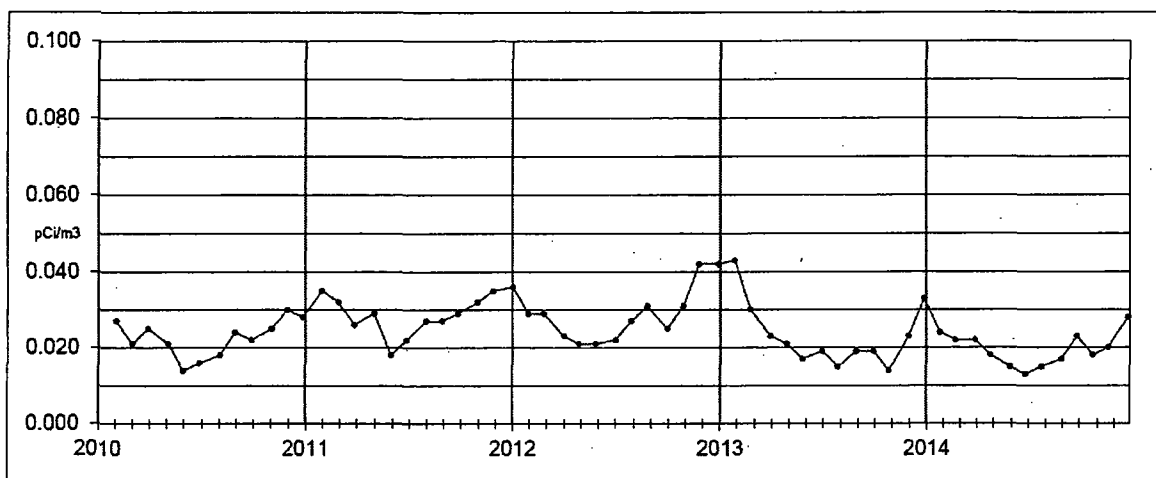


Figure 8. Location K-1f (monthly averages, 2010-2014).

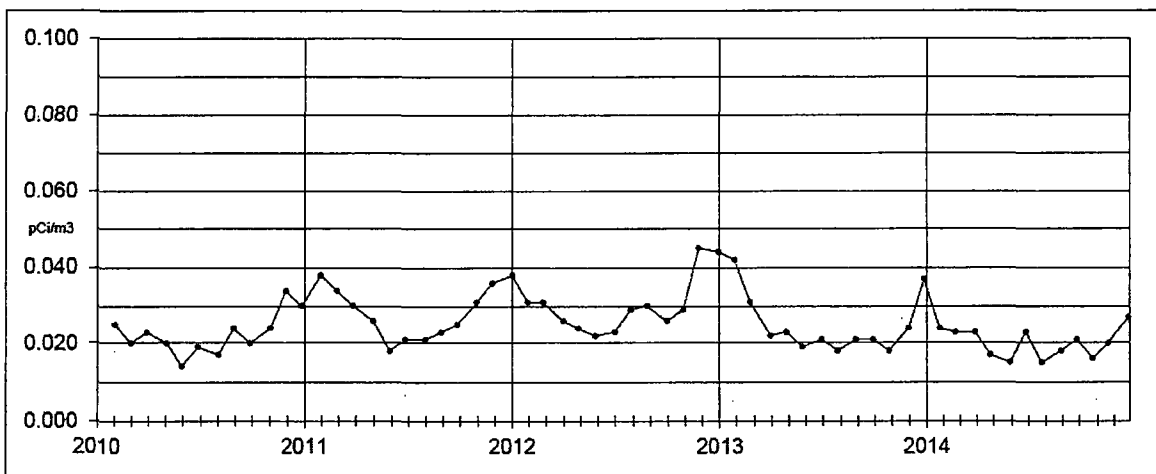


Figure 9. Location K-2 (monthly averages, 2010-2014).

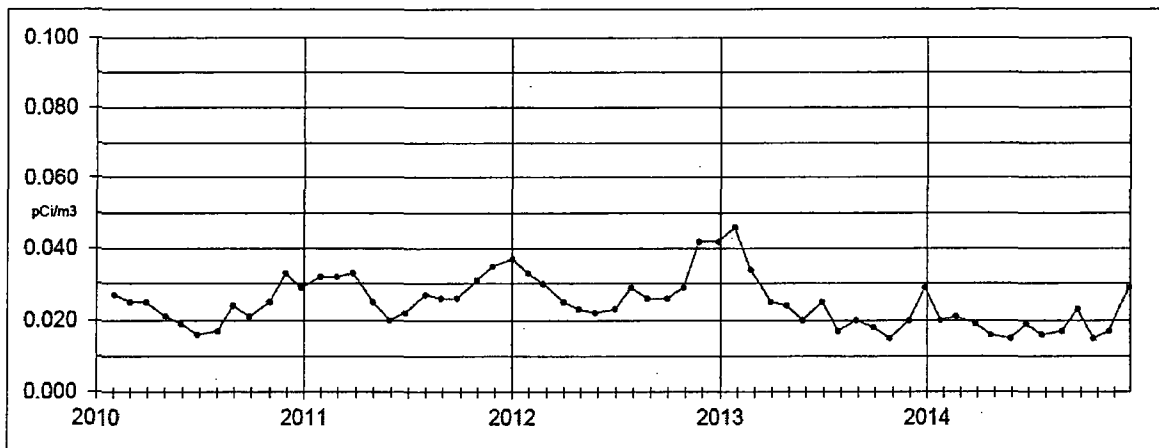


Figure 10. Location K-7/K-43 (monthly averages, 2010-2014).

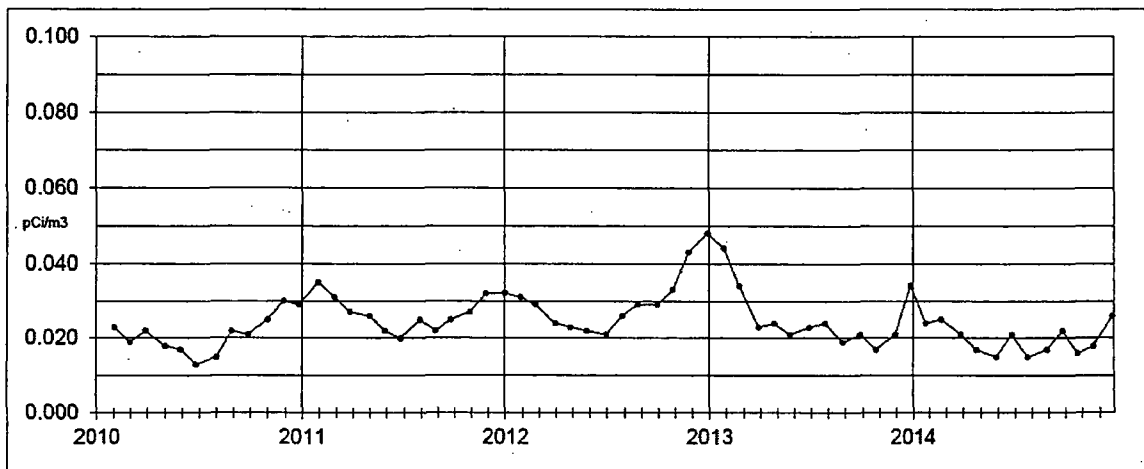


Figure 11. Location K-8 (monthly averages, 2010-2014).

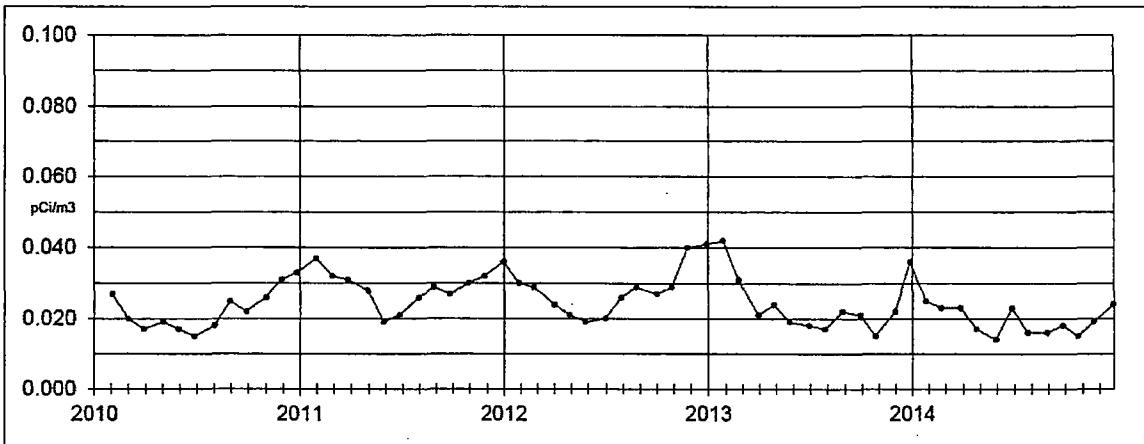


Figure 12. Location K-31 (monthly averages, 2010-2014).

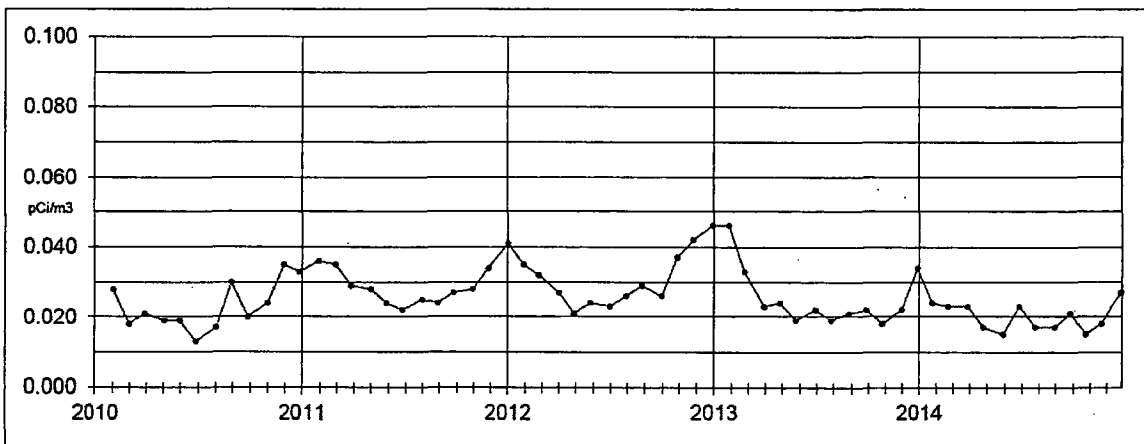


Figure 13. Location K-41 (monthly averages, 2010-2014).



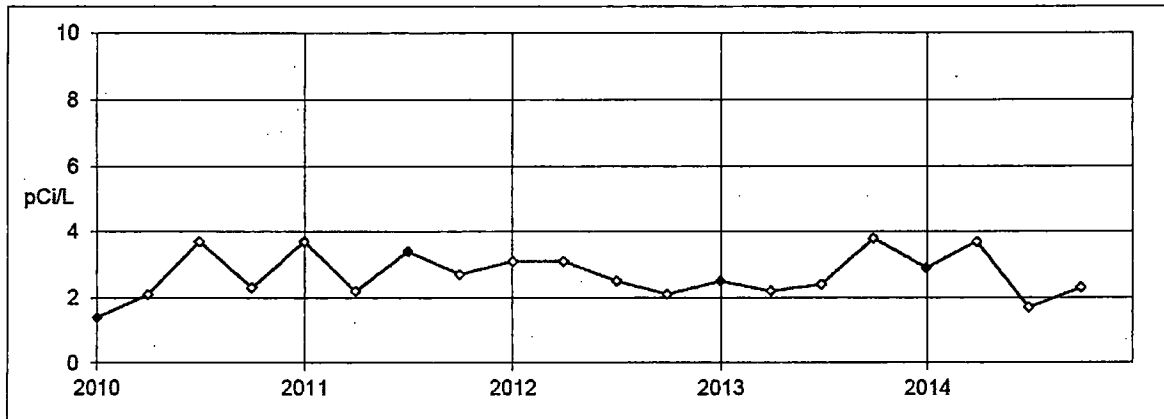


Figure 14. Location K-1g. Total Residue. Quarterly collection.

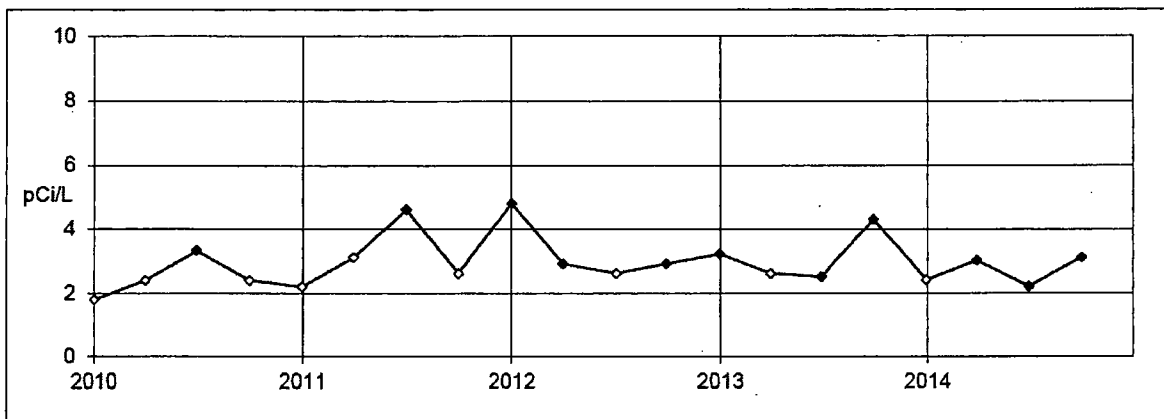


Figure 15. Location K-1h. Total Residue. Quarterly collection.

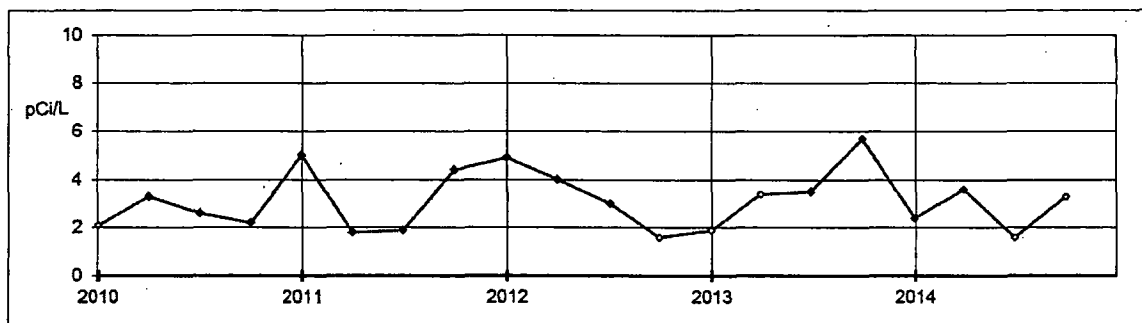


Figure 16. Location K-1g. Total Residue. Quarterly collection.

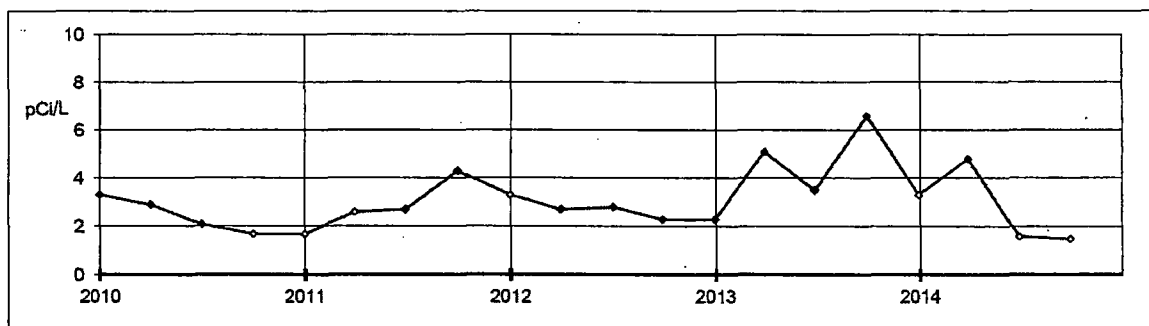


Figure 17. Location K-1h. Total Residue. Quarterly collection.

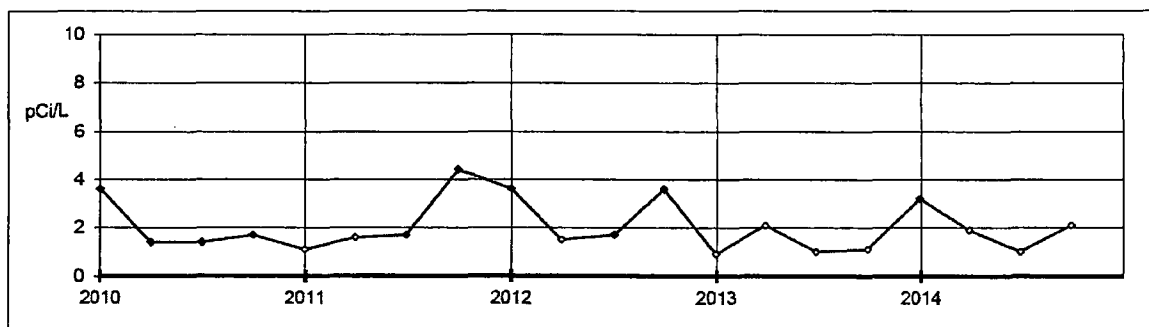


Figure 18. Location K-10. Total Residue. Quarterly collection.

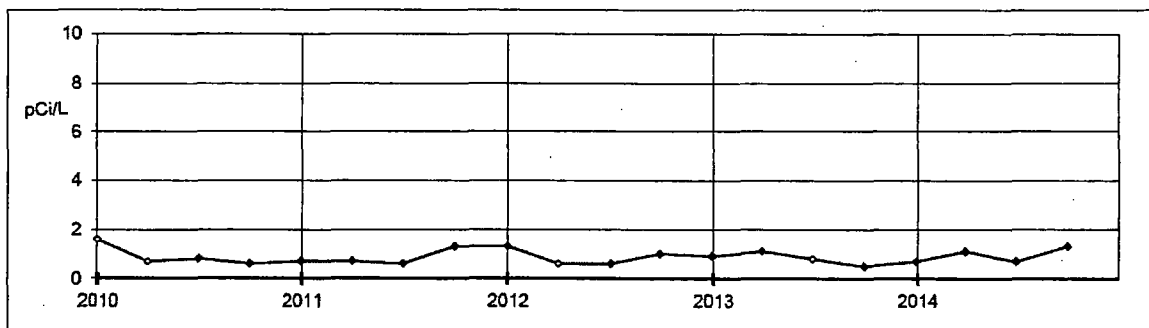


Figure 19. Location K-11. Total Residue. Quarterly collection.

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

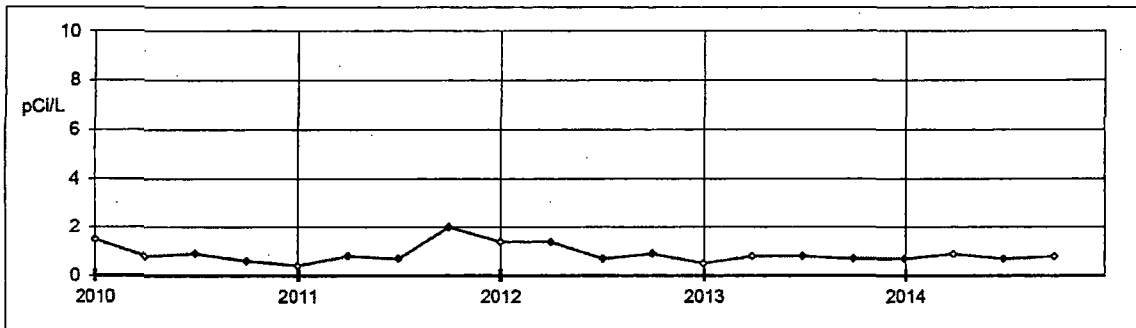


Figure 20. Location K-13. Total Residue. Quarterly collection.

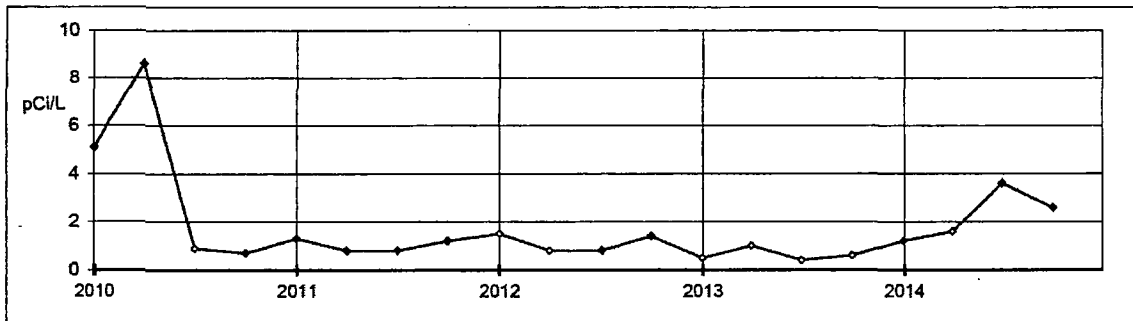


Figure 21. Location K-38. Total Residue. Quarterly collection.

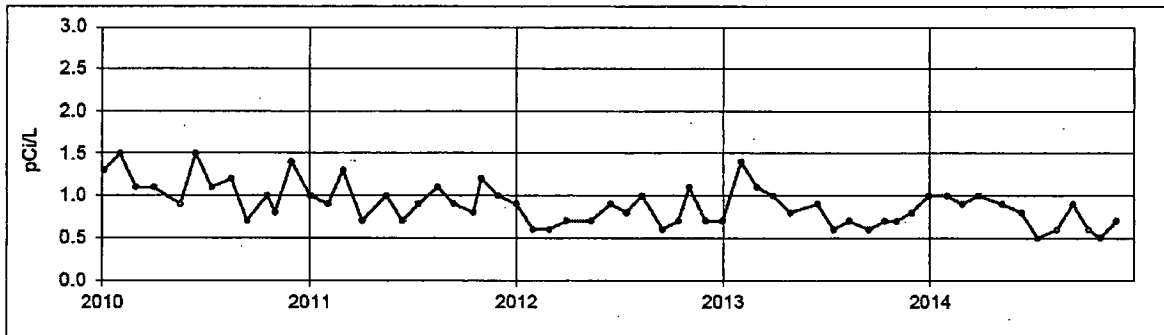


Figure 22. Milk samples. Location K-3.

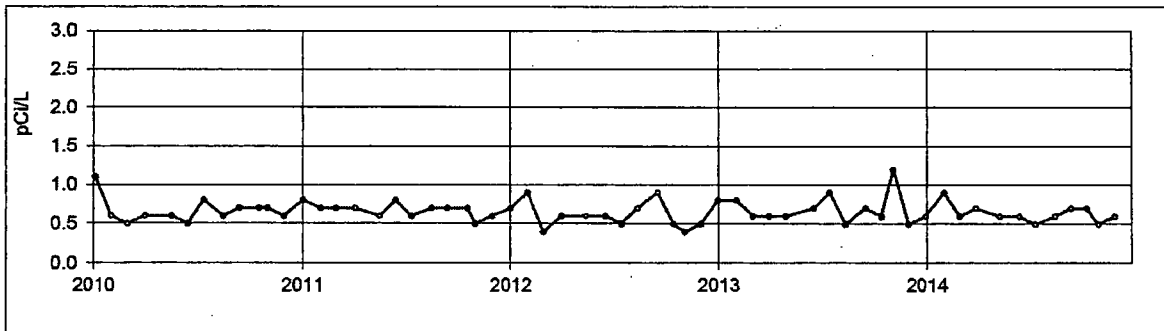


Figure 23. Milk samples. Location K-5.

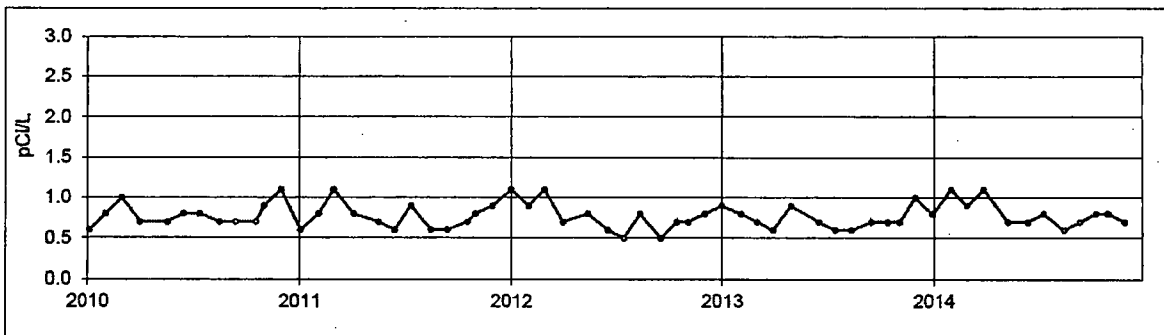


Figure 24. Milk samples. Location K-28 / K-42.

K-42 (Lamer's Dairy Products) replaced K-28 in March, 2010.

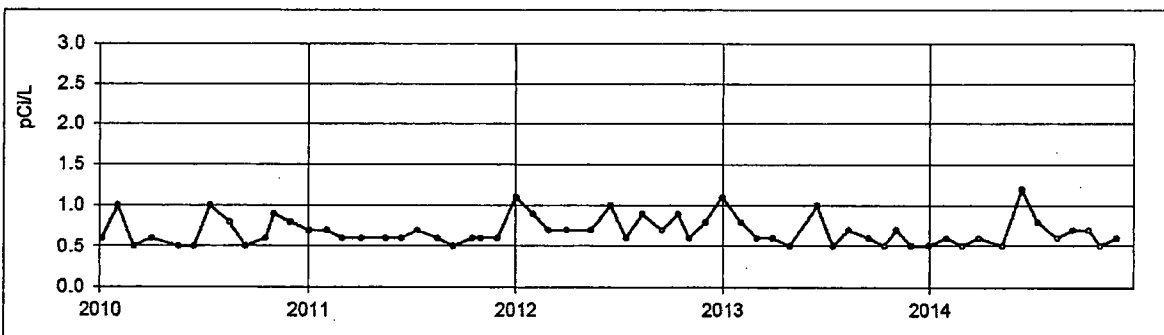


Figure 25. Milk samples. Location K-34.

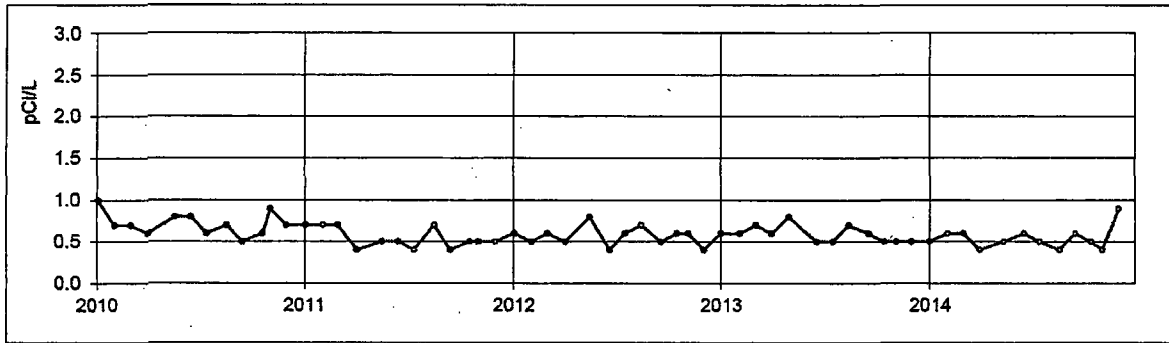


Figure 26. Milk samples. Location K-35.

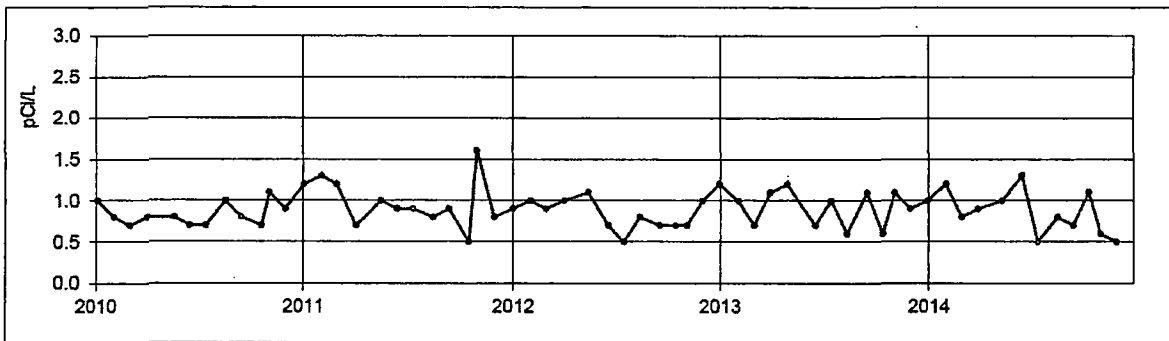


Figure 27. Milk samples. Location K-38.

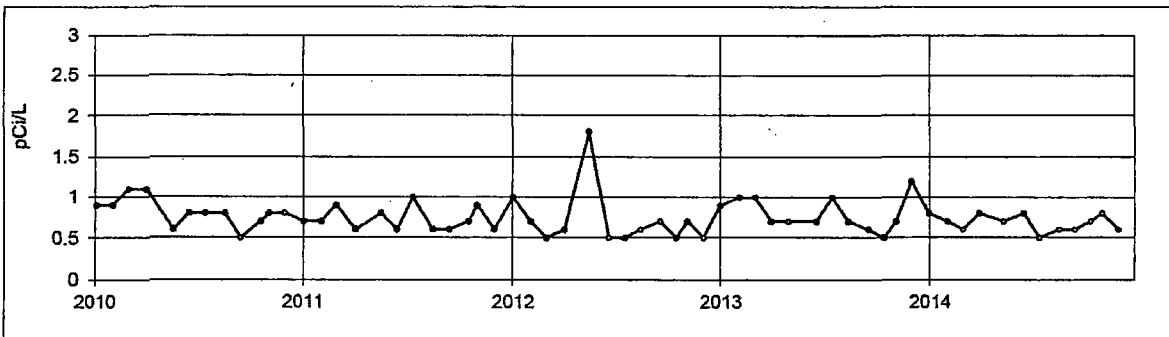
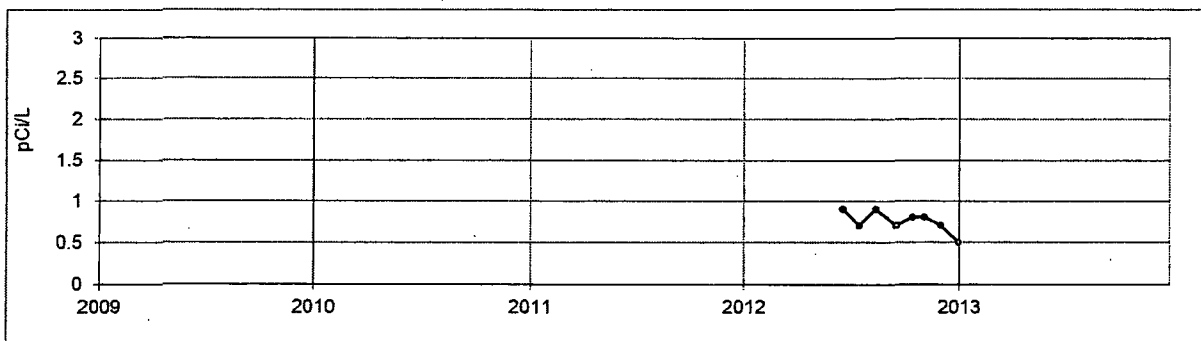
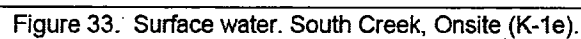
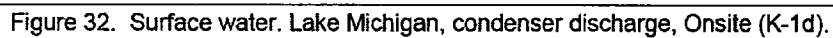
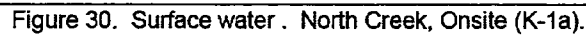
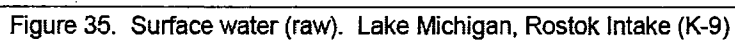
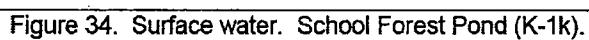


Figure 28. Milk samples. Location K-39.

Figure 29. Milk samples. Location K-44 <sup>a</sup>.

<sup>a</sup> Last collection Jan. 2, 2013, Dairy out of business, cows sold.





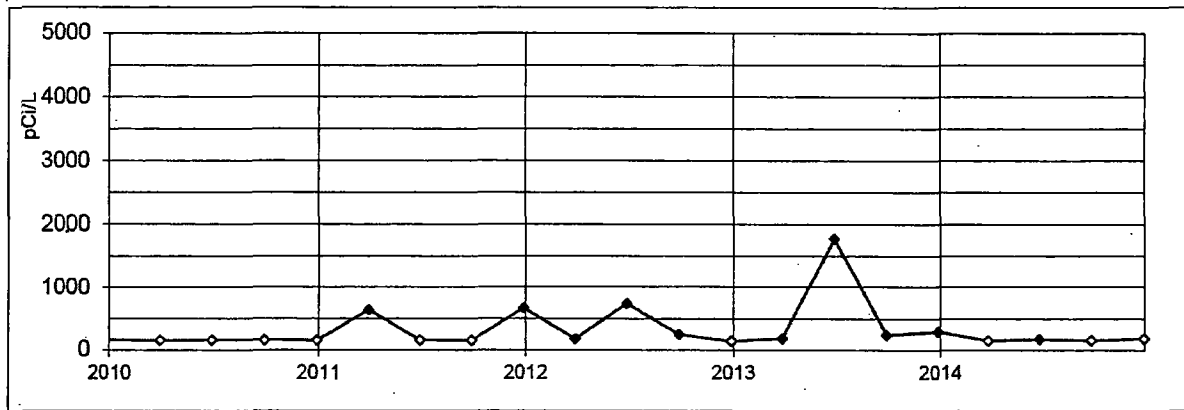


Figure 37. Surface water. Lake Michigan, condenser discharge, K-1d. Quarterly collection.

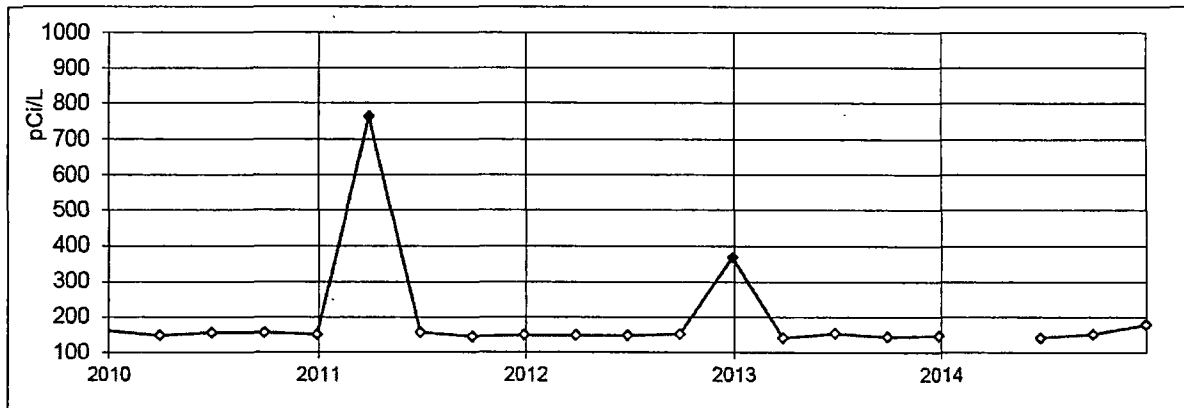


Figure 38. Surface water. Lake Michigan, Two Creeks Park, K-14a. Quarterly collection.

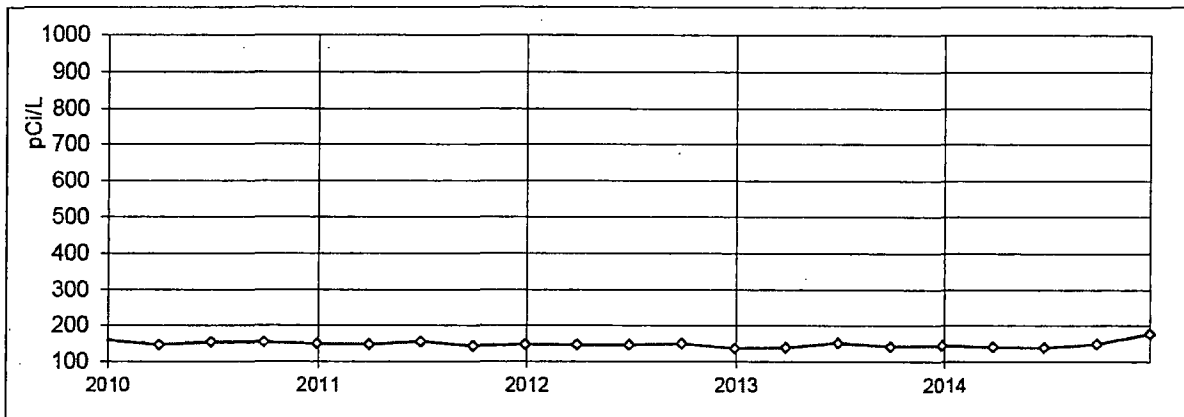


Figure 39. Surface water. Lake Michigan, Rostok Intake, K-9. Quarterly collection.



DATA TABULATIONS

Table 4. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: K-1f

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-07-14	302	0.028 ± 0.004	07-08-14	299	0.013 ± 0.004
01-14-14	302	0.030 ± 0.004	07-15-14	304	0.009 ± 0.003
01-21-14	303	0.019 ± 0.004	07-22-14	301	0.025 ± 0.004
01-28-14	305	0.017 ± 0.004	07-29-14	305	0.014 ± 0.004
02-04-14	303	0.019 ± 0.004	08-05-14	300	0.021 ± 0.004
02-11-14	302	0.019 ± 0.004	08-12-14	307	0.014 ± 0.004
02-18-14	301	0.022 ± 0.004	08-19-14	298	0.013 ± 0.004
02-25-14	305	0.026 ± 0.004	08-26-14	305	0.020 ± 0.004
			09-02-14	301	0.017 ± 0.004
03-04-14	300	0.031 ± 0.004			
03-11-14	302	0.021 ± 0.004	09-09-14	305	0.026 ± 0.004
03-18-14	301	0.018 ± 0.004	09-16-14	301	0.015 ± 0.004
03-25-14	303	0.018 ± 0.004	09-23-14	303	0.024 ± 0.004
04-01-14	302	0.021 ± 0.004	09-30-14	301	0.025 ± 0.004
1st Quarter Mean ± s.d.		0.022 ± 0.005	3rd Quarter Mean ± s.d.		0.018 ± 0.006
04-08-14	304	0.019 ± 0.004	10-07-14	304	0.014 ± 0.004
04-15-14	301	0.018 ± 0.004	10-14-14	301	0.017 ± 0.004
04-22-14	303	0.025 ± 0.004	10-21-14	306	0.012 ± 0.003
04-29-14	299	0.011 ± 0.004	10-28-14	300	0.027 ± 0.004
05-06-14	305	0.007 ± 0.003	11-04-14	306	0.011 ± 0.003
05-13-14	301	0.018 ± 0.004	11-11-14	301	0.018 ± 0.004
05-20-14	302	0.015 ± 0.004	11-18-14	303	0.020 ± 0.004
05-27-14	302	0.022 ± 0.004	11-25-14	303	0.031 ± 0.004
06-03-14	303	0.014 ± 0.004			
06-10-14	302	0.011 ± 0.003	12-02-14	304	0.026 ± 0.004
06-17-14	302	0.016 ± 0.004	12-09-14	300	0.041 ± 0.005
06-24-14	307	0.012 ± 0.003	12-16-14	303	0.028 ± 0.004
07-01-14	301	0.013 ± 0.004	12-23-14	304	0.019 ± 0.004
			12-30-14	308	0.024 ± 0.004
2nd Quarter Mean ± s.d.		0.015 ± 0.005	4th Quarter Mean ± s.d.		0.022 ± 0.008
Cumulative Average					0.020

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

Table 5. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: K-2

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-07-14	302	0.027 ± 0.004	07-08-14	305	0.011 ± 0.004
01-14-14	301	0.029 ± 0.004	07-15-14	302	0.011 ± 0.004
01-21-14	303	0.028 ± 0.004	07-22-14	297	0.021 ± 0.004
01-28-14	305	0.012 ± 0.003	07-29-14	306	0.017 ± 0.004
02-04-14	300	0.022 ± 0.004	08-05-14	307	0.019 ± 0.004
02-11-14	303	0.020 ± 0.004	08-12-14	299	0.017 ± 0.004
02-18-14	301	0.020 ± 0.004	08-19-14	307	0.016 ± 0.004
02-25-14	305	0.029 ± 0.004	08-26-14	296	0.023 ± 0.004
			09-02-14	307	0.017 ± 0.004
03-04-14	299	0.034 ± 0.004			
03-11-14	303	0.027 ± 0.004	09-09-14	298	0.021 ± 0.004
03-18-14	301	0.016 ± 0.004	09-16-14	304	0.015 ± 0.004
03-25-14	303	0.020 ± 0.004	09-23-14	301	0.022 ± 0.004
04-01-14	301	0.020 ± 0.004	09-30-14	308	0.026 ± 0.004
1st Quarter Mean ± s.d.		0.023 ± 0.006	3rd Quarter Mean ± s.d.		0.018 ± 0.004
04-08-14	304	0.016 ± 0.004	10-07-14	299	0.016 ± 0.004
04-15-14	302	0.015 ± 0.004	10-14-14	306	0.016 ± 0.003
04-22-14	304	0.023 ± 0.004	10-21-14	299	0.013 ± 0.003
04-29-14	298	0.012 ± 0.004	10-28-14	306	0.017 ± 0.004
05-06-14	305	0.010 ± 0.003	11-04-14	298	0.014 ± 0.004
05-13-14	305	0.017 ± 0.004	11-11-14	308	0.016 ± 0.003
05-20-14	298	0.015 ± 0.004	11-18-14	303	0.019 ± 0.004
05-27-14	304	0.019 ± 0.004	11-25-14	302	0.032 ± 0.004
06-03-14	305	0.013 ± 0.004			
06-10-14	309	0.011 ± 0.003	12-02-14	297	0.026 ± 0.004
06-17-14	295	0.017 ± 0.004	12-09-14	308	0.040 ± 0.004
06-24-14	306	0.012 ± 0.003	12-16-14	301	0.028 ± 0.004
07-01-14	302	0.013 ± 0.004	12-23-14	297	0.015 ± 0.004
			12-30-14	309	0.024 ± 0.004
2nd Quarter Mean ± s.d.		0.015 ± 0.004	4th Quarter Mean ± s.d.		0.021 ± 0.008
Cumulative Average					0.019

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

Table 6. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: K-8

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-07-14	302	0.027 ± 0.004	07-08-14	299	0.012 ± 0.004
01-14-14	302	0.032 ± 0.004	07-15-14	304	0.011 ± 0.004
01-21-14	303	0.022 ± 0.004	07-22-14	301	0.021 ± 0.004
01-28-14	304	0.016 ± 0.004	07-29-14	305	0.016 ± 0.004
02-04-14	301	0.025 ± 0.004	08-05-14	301	0.018 ± 0.004
02-11-14	302	0.019 ± 0.004	08-12-14	305	0.017 ± 0.004
02-18-14	302	0.025 ± 0.004	08-19-14	310	0.013 ± 0.003
02-25-14	304	0.029 ± 0.004	08-26-14	293	0.021 ± 0.004
			09-02-14	301	0.017 ± 0.004
03-04-14	300	0.033 ± 0.004			
03-11-14	302	0.020 ± 0.004	09-09-14	305	0.022 ± 0.004
03-18-14	301	0.013 ± 0.004	09-16-14	301	0.013 ± 0.004
03-25-14	303	0.021 ± 0.004	09-23-14	303	0.022 ± 0.004
04-01-14	302	0.020 ± 0.004	09-30-14	301	0.029 ± 0.004
1st Quarter Mean ± s.d.		0.023 ± 0.006	3rd Quarter Mean ± s.d.		0.018 ± 0.005
04-08-14	303	0.017 ± 0.004	10-07-14	305	0.014 ± 0.004
04-15-14	302	0.016 ± 0.004	10-14-14	309	0.017 ± 0.004
04-22-14	303	0.024 ± 0.004	10-21-14	295	0.013 ± 0.003
04-29-14	299	0.012 ± 0.004	10-28-14	300	0.019 ± 0.004
05-06-14	305	0.010 ± 0.003	11-04-14	306	0.016 ± 0.004
05-13-14	304	0.016 ± 0.004	11-11-14	301	0.019 ± 0.004
05-20-14	298	0.014 ± 0.004	11-18-14	303	< 0.005 <sup>b</sup>
05-27-14	253	0.020 ± 0.005	11-25-14	312	0.027 ± 0.003
06-03-14	303	0.013 ± 0.004			
06-10-14	302	0.012 ± 0.004	12-02-14	295	0.028 ± 0.004
06-17-14	302	0.015 ± 0.004	12-09-14	300	0.036 ± 0.004
06-24-14	307	0.011 ± 0.003	12-16-14	303	0.030 ± 0.004
07-01-14	301	0.013 ± 0.004	12-23-14	304	0.016 ± 0.004
			12-30-14	309	0.021 ± 0.004
2nd Quarter Mean ± s.d.		0.015 ± 0.004	4th Quarter Mean ± s.d.		0.020 ± 0.008
Cumulative Average					0.019

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.<sup>b</sup> Result of reanalysis also < 0.005. Filter was observed to be light.

Table 7. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: K-31

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-07-14	302	0.029 ± 0.004	07-08-14	306	0.014 ± 0.004
01-14-14	301	0.034 ± 0.004	07-15-14	300	0.010 ± 0.003
01-21-14	303	0.021 ± 0.004	07-22-14	297	0.024 ± 0.004
01-28-14	305	0.015 ± 0.004	07-29-14	306	0.016 ± 0.004
02-04-14	300	0.020 ± 0.004	08-05-14	308	0.017 ± 0.004
02-11-14	303	0.025 ± 0.004	08-12-14	298	0.016 ± 0.004
02-18-14	301	0.021 ± 0.004	08-19-14	308	0.015 ± 0.003
02-25-14	305	0.027 ± 0.004	08-26-14	295	0.018 ± 0.004
			09-02-14	308	0.014 ± 0.003
03-04-14	300	0.029 ± 0.004			
03-11-14	301	0.024 ± 0.004	09-09-14	297	0.017 ± 0.004
03-18-14	301	0.019 ± 0.004	09-16-14	304	0.012 ± 0.004
03-25-14	303	0.023 ± 0.004	09-23-14	301	0.020 ± 0.004
04-01-14	301	0.022 ± 0.004	09-30-14	308	0.021 ± 0.004
1st Quarter Mean ± s.d.		0.024 ± 0.005	3rd Quarter Mean ± s.d.		0.016 ± 0.004
04-08-14	304	0.018 ± 0.004	10-07-14	298	0.014 ± 0.004
04-15-14	302	0.019 ± 0.004	10-14-14	307	0.013 ± 0.003
04-22-14	303	0.021 ± 0.004	10-21-14	299	0.012 ± 0.003
04-29-14	299	0.011 ± 0.004	10-28-14	307	0.021 ± 0.004
05-06-14	265	0.007 ± 0.004	11-04-14	297	0.013 ± 0.004
05-13-14	215	0.016 ± 0.005	11-11-14	309	0.015 ± 0.003
05-20-14	298	0.014 ± 0.004	11-18-14	303	0.018 ± 0.004
05-27-14	303	0.018 ± 0.004	11-25-14	303	0.026 ± 0.003
06-03-14	305	0.015 ± 0.004			
06-10-14	310	0.012 ± 0.003	12-02-14	296	0.025 ± 0.004
06-17-14	295	0.014 ± 0.004	12-09-14	309	0.037 ± 0.004
06-24-14	305	0.014 ± 0.003	12-16-14	301	0.021 ± 0.004
07-01-14	302	0.012 ± 0.004	12-23-14	296	0.011 ± 0.004
			12-30-14	309	0.019 ± 0.004
2nd Quarter Mean ± s.d.		0.015 ± 0.004	4th Quarter Mean ± s.d.		0.019 ± 0.007
			Cumulative Average		0.018

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

Table 8. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: K-41

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-07-14	302	0.029 ± 0.004	07-08-14	302	0.012 ± 0.004
01-14-14	301	0.032 ± 0.004	07-15-14	305	0.017 ± 0.004
01-21-14	305	0.019 ± 0.004	07-22-14	303	0.026 ± 0.004
01-28-14	303	0.015 ± 0.004	07-29-14	299	0.014 ± 0.004
02-04-14	303	0.021 ± 0.004	08-05-14	303	0.019 ± 0.004
02-11-14	300	0.017 ± 0.004	08-12-14	302	0.017 ± 0.004
02-18-14	302	0.025 ± 0.004	08-19-14	302	0.014 ± 0.003
02-25-14	305	0.030 ± 0.004	08-26-14	302	0.022 ± 0.004
			09-02-14	304	0.015 ± 0.004
03-04-14	301	0.032 ± 0.004			
03-11-14	301	0.025 ± 0.004	09-09-14	301	0.019 ± 0.004
03-18-14	301	0.016 ± 0.004	09-16-14	304	0.013 ± 0.004
03-25-14	303	0.021 ± 0.004	09-23-14	301	0.024 ± 0.004
04-01-14	302	0.022 ± 0.004	09-30-14	305	0.027 ± 0.004
1st Quarter Mean ± s.d.		0.023 ± 0.006	3rd Quarter Mean ± s.d.		0.018 ± 0.005
04-08-14	303	0.018 ± 0.004	10-07-14	301	0.013 ± 0.004
04-15-14	302	0.014 ± 0.004	10-14-14	303	0.019 ± 0.004
04-22-14	303	0.024 ± 0.004	10-21-14	303	0.013 ± 0.003
04-29-14	303	0.012 ± 0.004	10-28-14	302	0.016 ± 0.004
05-06-14	301	0.010 ± 0.003	11-04-14	302	0.013 ± 0.004
05-13-14	304	0.018 ± 0.004	11-11-14	306	0.019 ± 0.004
05-20-14	301	0.017 ± 0.004	11-18-14	301	0.016 ± 0.004
05-27-14	302	0.019 ± 0.004	11-25-14	305	0.028 ± 0.004
06-03-14	301	0.012 ± 0.004			
06-10-14	305	0.014 ± 0.004	12-02-14	301	0.030 ± 0.004
06-17-14	301	0.015 ± 0.004	12-09-14	299	0.040 ± 0.005
06-24-14	304	0.015 ± 0.004	12-16-14	307	0.026 ± 0.004
07-01-14	302	0.016 ± 0.004	12-23-14	301	0.010 ± 0.004
			12-30-14	309	0.027 ± 0.004
2nd Quarter Mean ± s.d.		0.016 ± 0.004	4th Quarter Mean ± s.d.		0.021 ± 0.009
Cumulative Average					0.020

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

Table 9. Airborne particulates and charcoal canisters, analyses for gross beta and iodine-131<sup>a</sup>.

Location: K-43

Units: pCi/m<sup>3</sup>

Collection: Continuous, weekly exchange.

Date Collected	Volume (m <sup>3</sup> )	Gross Beta	Date Collected	Volume (m <sup>3</sup> )	Gross Beta
<u>Required LLD</u>		<u>0.010</u>	<u>Required LLD</u>		<u>0.010</u>
01-07-14	302	0.025 ± 0.004	07-08-14	299	0.013 ± 0.004
01-14-14	302	0.026 ± 0.003	07-15-14	304	0.012 ± 0.004
01-21-14	303	0.017 ± 0.004	07-22-14	301	0.021 ± 0.004
01-28-14	304	0.012 ± 0.003	07-29-14	305	0.018 ± 0.004
02-04-14	301	0.017 ± 0.004	08-05-14	301	0.024 ± 0.004
02-11-14	302	0.020 ± 0.004	08-12-14	305	0.014 ± 0.004
02-18-14	302	0.020 ± 0.004	08-19-14	309	0.014 ± 0.003
02-25-14	304	0.027 ± 0.004	08-26-14	293	0.019 ± 0.004
			09-02-14	307	0.016 ± 0.004
03-04-14	300	0.027 ± 0.004			
03-11-14	302	0.020 ± 0.004	09-09-14	304	0.020 ± 0.004
03-18-14	301	0.014 ± 0.004	09-16-14	301	0.015 ± 0.004
03-25-14	303	0.019 ± 0.004	09-23-14	303	0.023 ± 0.004
04-01-14	302	0.017 ± 0.004	09-30-14	301	0.028 ± 0.004
1st Quarter Mean ± s.d.		0.020 ± 0.005	3rd Quarter Mean ± s.d.		0.018 ± 0.005
04-08-14	303	0.014 ± 0.004	10-07-14	305	0.012 ± 0.004
04-15-14	302	0.015 ± 0.004	10-14-14	309	0.014 ± 0.003
04-22-14	303	0.024 ± 0.004	10-21-14	295	0.012 ± 0.003
04-29-14	300	0.012 ± 0.004	10-28-14	300	0.021 ± 0.004
05-06-14	305	0.011 ± 0.003	11-04-14	306	0.016 ± 0.004
05-13-14	305	0.018 ± 0.004	11-11-14	301	0.015 ± 0.003
05-20-14	298	0.016 ± 0.004	11-18-14	303	0.015 ± 0.004
05-27-14	303	0.019 ± 0.004	11-25-14	312	0.025 ± 0.003
06-03-14	303	0.013 ± 0.004			
06-10-14	302	0.012 ± 0.004	12-02-14	295	0.030 ± 0.004
06-17-14	302	0.015 ± 0.004	12-09-14	291	0.040 ± 0.005
06-24-14	307	0.011 ± 0.003	12-16-14	303	0.032 ± 0.004
07-01-14	301	0.013 ± 0.004	12-23-14	303	0.015 ± 0.004
			12-30-14	308	0.019 ± 0.004
2nd Quarter Mean ± s.d.		0.015 ± 0.004	4th Quarter Mean ± s.d.		0.020 ± 0.009
Cumulative Average					0.018

<sup>a</sup> Iodine-131 concentrations are < 0.03 pCi/m<sup>3</sup> unless otherwise noted.

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

January			
Location	Average	Minima	Maxima
Indicators	0.022	0.012	0.030
K-1f	0.024	0.017	0.030
K-43	0.020	0.012	0.026
Controls	0.024	0.012	0.034
K-2	0.024	0.012	0.029
K-8	0.024	0.016	0.032
K-31	0.025	0.015	0.034
K-41	0.024	0.015	0.032

April			
Location	Average	Minima	Maxima
Indicators	0.017	0.011	0.025
K-1f	0.018	0.011	0.025
K-43	0.016	0.012	0.024
Controls	0.017	0.011	0.024
K-2	0.017	0.012	0.023
K-8	0.017	0.012	0.024
K-31	0.017	0.011	0.021
K-41	0.017	0.011	0.021

February			
Location	Average	Minima	Maxima
Indicators	0.022	0.017	0.027
K-1f	0.022	0.019	0.026
K-43	0.021	0.017	0.027
Controls	0.024	0.017	0.030
K-2	0.023	0.020	0.029
K-8	0.025	0.019	0.029
K-31	0.023	0.020	0.027
K-41	0.023	0.017	0.030

May			
Location	Average	Minima	Maxima
Indicators	0.014	0.007	0.027
K-1f	0.015	0.007	0.022
K-43	0.015	0.011	0.019
Controls	0.015	0.007	0.020
K-2	0.015	0.010	0.019
K-8	0.015	0.010	0.020
K-31	0.014	0.007	0.018
K-41	0.015	0.010	0.019

March			
Location	Average	Minima	Maxima
Indicators	0.021	0.014	0.031
K-1f	0.022	0.018	0.031
K-43	0.019	0.014	0.027
Controls	0.023	0.013	0.034
K-2	0.023	0.016	0.034
K-8	0.021	0.013	0.033
K-31	0.023	0.019	0.029
K-41	0.023	0.016	0.032

June			
Location	Average	Minima	Maxima
Indicators	0.013	0.011	0.016
K-1f	0.013	0.011	0.016
K-43	0.013	0.011	0.015
Controls	0.015	0.011	0.027
K-2	0.013	0.011	0.017
K-8	0.013	0.011	0.015
K-31	0.013	0.012	0.014
K-41	0.015	0.014	0.016

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	0.016	0.009	0.025
K-1f	0.015	0.009	0.025
K-43	0.016	0.012	0.021
Controls	0.016	0.010	0.026
K-2	0.015	0.011	0.021
K-8	0.015	0.011	0.021
K-31	0.016	0.010	0.024
K-41	0.017	0.012	0.026

October			
Location	Average	Minima	Maxima
Indicators	0.017	0.012	0.027
K-1f	0.018	0.012	0.027
K-43	0.015	0.012	0.021
Controls	0.016	0.012	0.021
K-2	0.016	0.013	0.017
K-8	0.016	0.013	0.019
K-31	0.015	0.012	0.021
K-41	0.015	0.013	0.019

August			
Location	Average	Minima	Maxima
Indicators	0.017	0.013	0.024
K-1f	0.017	0.013	0.021
K-43	0.017	0.014	0.024
Controls	0.017	0.013	0.023
K-2	0.018	0.016	0.023
K-8	0.017	0.013	0.021
K-31	0.016	0.014	0.018
K-41	0.017	0.014	0.022

November			
Location	Average	Minima	Maxima
Indicators	0.019	0.011	0.031
K-1f	0.020	0.011	0.031
K-43	0.018	0.015	0.025
Controls	0.019	0.005	0.032
K-2	0.020	0.014	0.032
K-8	0.017	0.005	0.027
K-31	0.018	0.013	0.026
K-41	0.019	0.013	0.028

September			
Location	Average	Minima	Maxima
Indicators	0.023	0.015	0.028
K-1f	0.023	0.015	0.026
K-43	0.022	0.015	0.028
Controls	0.021	0.012	0.029
K-2	0.021	0.015	0.026
K-8	0.022	0.013	0.029
K-31	0.018	0.012	0.021
K-41	0.021	0.013	0.027

December			
Location	Average	Minima	Maxima
Indicators	0.029	0.015	0.041
K-1f	0.028	0.019	0.041
K-43	0.029	0.015	0.040
Controls	0.026	0.010	0.040
K-2	0.027	0.015	0.040
K-8	0.026	0.016	0.036
K-31	0.024	0.011	0.037
K-41	0.027	0.010	0.040

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 <sup>3</sup> )			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
<u>Indicator</u>				
<u>K-1f</u>				
Lab Code	KAP- 1787	KAP- 3771	KAP- 5970	KAP- 7423
Volume (m <sup>3</sup> )	3931	3932	3930	3943
Be-7	0.048 ± 0.017	0.082 ± 0.016	0.068 ± 0.015	0.047 ± 0.011
Nb-95	< 0.0011	< 0.0010	< 0.0013	< 0.0007
Zr-95	< 0.0013	< 0.0010	< 0.0016	< 0.0013
Ru-103	< 0.0006	< 0.0011	< 0.0008	< 0.0008
Ru-106	< 0.0055	< 0.0032	< 0.0064	< 0.0056
Cs-134	< 0.0010	< 0.0006	< 0.0007	< 0.0007
Cs-137	< 0.0007	< 0.0005	< 0.0004	< 0.0005
Ce-141	< 0.0016	< 0.0011	< 0.0009	< 0.0016
Ce-144	< 0.0045	< 0.0029	< 0.0038	< 0.0050
<u>K-43</u>				
Lab Code	KAP- 1792	KAP- 3776	KAP- 5975	KAP- 7429
Volume (m <sup>3</sup> )	3928	3934	3933	3931
Be-7	0.040 ± 0.013	0.081 ± 0.016	0.058 ± 0.021	0.054 ± 0.015
Nb-95	< 0.0008	< 0.0009	< 0.0015	< 0.0011
Zr-95	< 0.0015	< 0.0008	< 0.0012	< 0.0015
Ru-103	< 0.0010	< 0.0010	< 0.0012	< 0.0012
Ru-106	< 0.0074	< 0.0040	< 0.0071	< 0.0057
Cs-134	< 0.0009	< 0.0009	< 0.0010	< 0.0007
Cs-137	< 0.0005	< 0.0005	< 0.0010	< 0.0010
Ce-141	< 0.0019	< 0.0012	< 0.0016	< 0.0017
Ce-144	< 0.0042	< 0.0050	< 0.0048	< 0.0042

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

	Sample Description and Concentration (pCi/m <sup>3</sup> )			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
<u>Control</u>				
<u>K-2</u>				
Lab Code	KAP- 1788	KAP- 3772	KAP- 5971	KAP- 7424
Volume (m <sup>3</sup> )	3927	3937	3937	3933
Be-7	0.058 ± 0.013	0.069 ± 0.013	0.065 ± 0.016	0.046 ± 0.011
Nb-95	< 0.0012	< 0.0008	< 0.0012	< 0.0008
Zr-95	< 0.0010	< 0.0010	< 0.0019	< 0.0010
Ru-103	< 0.0004	< 0.0007	< 0.0009	< 0.0010
Ru-106	< 0.0057	< 0.0030	< 0.0045	< 0.0047
Cs-134	< 0.0009	< 0.0008	< 0.0008	< 0.0006
Cs-137	< 0.0004	< 0.0004	< 0.0007	< 0.0006
Ce-141	< 0.0016	< 0.0016	< 0.0018	< 0.0017
Ce-144	< 0.0024	< 0.0023	< 0.0035	< 0.0036
<u>K-8</u>				
Lab Code	KAP- 1789	KAP- 3773	KAP- 5972	KAP- 7425
Volume (m <sup>3</sup> )	3928	3882	3929	3942
Be-7	0.055 ± 0.014	0.067 ± 0.015	0.059 ± 0.014	0.053 ± 0.014
Nb-95	< 0.0009	< 0.0008	< 0.0009	< 0.0011
Zr-95	< 0.0011	< 0.0007	< 0.0011	< 0.0012
Ru-103	< 0.0010	< 0.0010	< 0.0010	< 0.0009
Ru-106	< 0.0060	< 0.0020	< 0.0051	< 0.0055
Cs-134	< 0.0008	< 0.0008	< 0.0006	< 0.0010
Cs-137	< 0.0005	< 0.0005	< 0.0004	< 0.0008
Ce-141	< 0.0011	< 0.0013	< 0.0016	< 0.0019
Ce-144	< 0.0042	< 0.0031	< 0.0043	< 0.0052

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

	Sample Description and Concentration (pCi/m <sup>3</sup> )			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
<u>Control</u>				
<u>K-31</u>				
Lab Code	KAP- 1790	KAP- 3774	KAP- 5973	KAP- 7426
Volume (m <sup>3</sup> )	3926	3806	3936	3934
Be-7	0.059 ± 0.014	0.075 ± 0.015	0.077 ± 0.019	0.051 ± 0.017
Nb-95	< 0.0009	< 0.0012	< 0.0007	< 0.0010
Zr-95	< 0.0007	< 0.0008	< 0.0007	< 0.0010
Ru-103	< 0.0011	< 0.0009	< 0.0009	< 0.0007
Ru-106	< 0.0038	< 0.0051	< 0.0044	< 0.0073
Cs-134	< 0.0008	< 0.0008	< 0.0008	< 0.0005
Cs-137	< 0.0008	< 0.0006	< 0.0006	< 0.0009
Ce-141	< 0.0020	< 0.0021	< 0.0012	< 0.0015
Ce-144	< 0.0039	< 0.0040	< 0.0037	< 0.0031
<u>K-41</u>				
Lab Code	KAP- 1791	KAP- 3775	KAP- 5974	KAP- 7427
Volume (m <sup>3</sup> )	3929	3932	3933	3940
Be-7	0.044 ± 0.013	0.066 ± 0.014	0.082 ± 0.022	0.051 ± 0.011
Nb-95	< 0.0010	< 0.0008	< 0.0025	< 0.0008
Zr-95	< 0.0012	< 0.0012	< 0.0025	< 0.0011
Ru-103	< 0.0008	< 0.0008	< 0.0010	< 0.0009
Ru-106	< 0.0086	< 0.0043	< 0.0074	< 0.0049
Cs-134	< 0.0009	< 0.0007	< 0.0013	< 0.0006
Cs-137	< 0.0006	< 0.0005	< 0.0010	< 0.0005
Ce-141	< 0.0012	< 0.0010	< 0.0020	< 0.0013
Ce-144	< 0.0036	< 0.0044	< 0.0058	< 0.0031

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

	<u>1st Qtr.</u>	<u>2nd Qtr.</u>	<u>3rd Qtr.</u>	<u>4th Qtr.</u>	
Date Placed	01-02-14	04-01-14	07-01-14	10-01-14	
Date Removed	03-31-14	07-01-14	10-01-14	01-06-15	
<hr/> mR/91 days <hr/>					
<u>Indicator</u>					<u>Mean±s.d.</u>
K-1f	15.0 ± 1.0	14.9 ± 0.6	14.0 ± 0.8	16.4 ± 0.6	15.1 ± 1.0
K-5	13.4 ± 0.8	13.6 ± 0.6	16.9 ± 0.9	13.6 ± 0.5	14.4 ± 1.7
K-17	12.8 ± 0.5	16.7 ± 0.8	13.8 ± 0.5	16.7 ± 0.6	15.0 ± 2.0
K-25	12.1 ± 0.5	15.8 ± 0.5	14.1 ± 0.6	16.0 ± 0.5	14.5 ± 1.8
K-27	15.2 ± 0.4	18.2 ± 0.7	19.4 ± 0.3	18.8 ± 0.6	17.9 ± 1.9
K-30	12.6 ± 0.6	14.5 ± 0.5	13.3 ± 0.9	16.2 ± 1.0	14.2 ± 1.6
K-39	11.9 ± 0.8	14.2 ± 0.7	12.3 ± 0.5	17.4 ± 0.5	14.0 ± 2.5
K-43	13.1 ± 0.5	15.8 ± 0.5	13.9 ± 0.5	16.7 ± 0.8	14.9 ± 1.7
Mean ± s.d.	13.3 ± 1.2	15.5 ± 1.5	14.7 ± 2.3	16.5 1.461	15.0 ± 1.4
<u>Control</u>					
K-2	16.4 ± 1.4	17.1 ± 1.2	17.3 ± 0.8	16.0 ± 0.8	16.7 ± 0.6
K-3	15.9 ± 1.0	15.7 ± 0.8	16.9 ± 0.9	16.7 ± 0.8	16.3 ± 0.6
K-8	14.5 ± 0.9	12.6 ± 0.7	14.7 ± 0.6	13.0 ± 0.6	13.7 ± 1.1
K-15	11.8 ± 0.5	14.7 ± 0.3	13.2 ± 0.3	15.1 ± 0.3	13.7 ± 1.5
K-31	11.7 ± 0.6	10.9 ± 0.5	13.7 ± 0.7	11.6 ± 0.6	12.0 ± 1.2
K-41	15.6 ± 1.2	16.3 ± 0.8	17.5 ± 1.2	16.5 ± 1.2	16.5 ± 0.8
Mean ± s.d.	14.3 ± 2.1	14.6 ± 2.4	15.6 ± 1.9	14.8 2.074	14.8 ± 0.6
<hr/> Inside the Protected Area <hr/>					
Date Placed	01-02-14	03-31-14	06-30-14	09-30-14	
Date Removed	03-31-14	06-30-14	09-30-14	01-06-15	
K-1L	13.6 ± 0.4	13.1 ± 1.2	15.3 ± 0.5	15.4 ± 1.3	14.4 ± 1.2
K-1M	16.1 ± 0.6	14.9 ± 1.1	17.6 ± 1.2	20.1 ± 1.5	17.2 ± 2.2
K-1N	12.0 ± 1.1	12.6 ± 0.9	11.9 ± 0.6	15.7 ± 1.2	13.1 ± 1.8
K-1O	10.4 ± 0.7	13.2 ± 0.9	9.6 ± 0.3	15.5 ± 0.8	12.2 ± 2.7
K-1P	11.8 ± 0.4	10.9 ± 1.0	11.3 ± 0.2	13.1 ± 1.5	11.8 ± 1.0
K-1Q	9.7 ± 0.9	11.6 ± 0.6	8.7 ± 0.9	14.1 ± 0.7	11.0 ± 2.4
K-1R	15.5 ± 0.7	14.8 ± 0.7	16.6 ± 0.6	18.5 ± 0.7	16.4 ± 1.6
K-1S	14.8 ± 0.6	12.8 ± 0.4	17.2 ± 0.8	19.45 ± 0.5	16.1 ± 2.9
Mean ± s.d.	13.0 ± 2.4	13.0 ± 1.4	13.5 ± 3.6	16.5 ± 2.6	14.0 ± 2.9

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)
01/02/14	KP- 22	< 150	< 47
02/03/14	KP- 379	< 145	< 45
03/03/14	KP- 764	< 142	< 44
04/01/14	KP- 1216	< 143	< 45
05/01/14	KP- 1906	< 145	< 45
06/02/14	KP- 2409	< 143	< 45
07/01/14	KP- 3067	< 142	< 44
08/04/14	KP- 3969	< 131	< 41
09/02/14	KP- 4606	< 177	< 55
10/01/14	KP- 5238	< 149	< 47
11/03/14	KP- 6199	< 175	< 55
12/01/14	KP- 6770	< 170	< 53

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

Collection	Lab	Concentration (pCi/L)				
Date	Code	I-131	Cs-134	Cs-137	Ba-La-140	K-40
<u>Indicators</u>						
<u>K-5</u>						
01-03-14	KMI- 5	< 0.4	< 3.0	< 2.4	< 2.0	1321 ± 96
02-04-14	KMI- 370	< 0.2	< 3.0	< 2.5	< 3.4	1397 ± 111
03-04-14	KMI- 767	< 0.2	< 3.5	< 4.1	< 3.0	1339 ± 111
04-02-14	KMI- 1221	< 0.3	< 3.5	< 2.8	< 3.5	1306 ± 102
05-02-14	KMI- 1891	< 0.4	< 3.9	< 2.8	< 2.8	1432 ± 121
05-13-14	KMI- 2080	< 0.4	< 3.3	< 3.4	< 2.3	1339 ± 112
06-02-14	KMI- 2402	< 0.2	< 3.4	< 3.9	< 1.4	1334 ± 119
06-17-14	KMI- 2779	< 0.4	< 3.4	< 2.7	< 2.0	1350 ± 114
07-02-14	KMI- 3059	< 0.2	< 3.1	< 3.2	< 3.5	1379 ± 114
07-15-14	KMI- 3398	< 0.2	< 4.1	< 4.4	< 2.8	1565 ± 118
08-05-14	KMI- 3959	< 0.2	< 3.0	< 2.9	< 6.6	1410 ± 94
08-19-14	KMI- 4299	< 0.2	< 3.4	< 2.6	< 2.0	1352 ± 98
09-02-14	KMI- 4600	< 0.5	< 3.3	< 3.6	< 2.3	1394 ± 115
09-16-14	KMI- 4863	< 0.4	< 3.6	< 3.6	< 1.2	1241 ± 107
10-02-14	KMI- 5203	< 0.5	< 2.9	< 3.0	< 1.5	1411 ± 97
10-14-14	KMI- 5596	< 0.1	< 2.9	< 2.9	< 2.0	1395 ± 93
11-04-14	KMI- 6193	< 0.4	< 3.1	< 3.4	< 2.1	1312 ± 111
12-02-14	KMI- 6758	< 0.2	< 3.8	< 4.2	< 3.4	1411 ± 108
<u>K-34</u>						
01-02-14	KMI- 6	< 0.2	< 3.1	< 2.8	< 4.5	1521 ± 101
02-03-14	KMI- 371	< 0.4	< 2.9	< 3.4	< 2.8	1317 ± 104
03-03-14	KMI- 768	< 0.2	< 3.4	< 4.0	< 1.5	1438 ± 118
04-01-14	KMI- 1222	< 0.5	< 3.8	< 2.5	< 2.2	1421 ± 114
05-01-14	KMI- 1892	< 0.4	< 3.6	< 2.9	< 3.5	1418 ± 117
05-13-14	KMI- 2081	< 0.4	< 3.4	< 2.1	< 3.5	1274 ± 107
06-02-14	KMI- 2403	< 0.2	< 3.3	< 2.3	< 2.8	1329 ± 108
06-17-14	KMI- 2780	< 0.5	< 3.1	< 4.4	< 2.2	1271 ± 104
07-01-14	KMI- 3060	< 0.4	< 2.9	< 1.9	< 3.8	1405 ± 103
07-15-14	KMI- 3399	< 0.2	< 4.2	< 5.0	< 1.6	1333 ± 106
08-04-14	KMI- 3960	< 0.3	< 3.0	< 3.4	< 4.3	1393 ± 98
08-19-14	KMI- 4300	< 0.3	< 3.0	< 3.6	< 1.8	1336 ± 110
09-02-14	KMI- 4601	< 0.5	< 3.0	< 3.5	< 2.2	1447 ± 110
09-16-14	KMI- 4864	< 0.4	< 4.2	< 4.0	< 2.0	1333 ± 109
10-01-14	KMI- 5204	< 0.5	< 2.9	< 3.5	< 3.0	1432 ± 96
10-14-14	KMI- 5597	< 0.2	< 4.0	< 3.3	< 1.8	1396 ± 117
11-03-14	KMI- 6194	< 0.3	< 5.7	< 5.4	< 3.6	1186 ± 146
12-01-14	KMI- 6759	< 0.2	< 1.2	< 1.6	< 3.2	1426 ± 40

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

Collection	Lab	Concentration (pCi/L)				
Date	Code	I-131	Cs-134	Cs-137	Ba-La-140	K-40
<u>Indicators</u>						
<u>K-38</u>						
01-02-14	KMI- 8	< 0.3	< 3.4	< 2.8	< 3.9	1475 ± 106
02-03-14	KMI- 373	< 0.2	< 3.1	< 2.5	< 3.1	1300 ± 102
03-03-14	KMI- 770	< 0.2	< 2.9	< 3.6	< 3.1	1462 ± 104
04-02-14	KMI- 1224	< 0.3	< 3.3	< 2.8	< 1.6	1471 ± 103
05-01-14	KMI- 1894	< 0.2	< 4.4	< 4.7	< 2.4	1386 ± 121
05-13-14	KMI- 2083	< 0.2	< 4.0	< 3.0	< 3.2	1271 ± 110
06-03-14	KMI- 2405	< 0.2	< 3.8	< 3.7	< 2.0	1347 ± 112
06-17-14	KMI- 2782	< 0.2	< 4.3	< 4.3	< 2.2	1326 ± 116
07-01-14	KMI- 3062	< 0.2	< 3.2	< 3.4	< 2.6	1373 ± 124
07-15-14	KMI- 3401	< 0.5	< 3.2	< 3.1	< 2.0	1420 ± 113
08-04-14	KMI- 3962	< 0.2	< 3.0	< 2.8	< 2.8	1307 ± 99
08-19-14	KMI- 4302	< 0.3	< 3.6	< 3.3	< 2.4	1291 ± 111
09-03-14	KMI- 4603	< 0.4	< 4.3	< 4.6	< 3.1	1293 ± 108
09-16-14	KMI- 4866	< 0.3	< 2.8	< 2.8	< 2.3	1352 ± 105
10-01-14	KMI- 5206	< 0.4	< 3.0	< 2.6	< 1.4	1311 ± 97
10-14-14	KMI- 5599	< 0.2	< 4.0	< 2.8	< 1.3	1280 ± 110
11-04-14	KMI- 6196	< 0.2	< 4.4	< 2.3	< 2.6	1300 ± 112
12-02-14	KMI- 6761	< 0.2	< 1.2	< 1.2	< 2.6	1270 ± 40
<u>K-39</u>						
01-02-14	KMI- 9	< 0.5	< 2.8	< 2.9	< 3.3	1393 ± 102
02-03-14	KMI- 374	< 0.2	< 3.9	< 3.4	< 5.0	1296 ± 97
03-03-14	KMI- 771	< 0.2	< 3.7	< 2.7	< 2.5	1289 ± 104
04-02-14	KMI- 1225	< 0.3	< 4.0	< 3.4	< 2.4	1305 ± 104
05-02-14	KMI- 1895	< 0.2	< 3.3	< 3.4	< 2.3	1349 ± 104
05-13-14	KMI- 2084	< 0.2	< 3.0	< 3.5	< 1.8	1286 ± 103
06-02-14	KMI- 2406	< 0.2	< 4.7	< 4.1	< 2.0	1172 ± 118
06-17-14	KMI- 2783	< 0.5	< 2.9	< 3.1	< 1.7	1365 ± 110
07-01-14	KMI- 3063	< 0.3	< 2.8	< 3.0	< 5.1	1245 ± 93
07-15-14	KMI- 3402	< 0.4	< 2.8	< 3.1	< 2.0	1279 ± 107
08-04-14	KMI- 3963	< 0.2	< 2.9	< 3.3	< 4.7	1306 ± 95
08-19-14	KMI- 4303	< 0.2	< 3.0	< 2.3	< 1.5	1298 ± 98
09-02-14	KMI- 4604	< 0.5	< 4.5	< 3.9	< 3.3	1346 ± 114
09-16-14	KMI- 4867	< 0.3	< 3.8	< 3.1	< 2.0	1300 ± 110
10-01-14	KMI- 5207	< 0.3	< 4.2	< 3.5	< 2.4	1437 ± 119
10-14-14	KMI- 5600	< 0.2	< 4.3	< 2.1	< 1.8	1256 ± 105
11-04-14	KMI- 6197	< 0.4	< 4.4	< 4.0	< 2.4	1350 ± 112
12-02-14	KMI- 6762	< 0.2	< 1.5	< 1.3	< 3.2	1313 ± 41



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

Collection	Lab	Concentration (pCi/L)				
Date	Code	I-131	Cs-134	Cs-137	Ba-La-140	K-40
<u>Controls</u>						
<u>K-3</u>						
01-03-14	KMI- 4	< 0.1	< 4.2	< 2.2	< 1.6	1339 ± 110
02-04-14	KMI- 369	< 0.2	< 4.1	< 3.1	< 2.5	1376 ± 109
03-04-14	KMI- 766	< 0.2	< 4.6	< 4.5	< 2.4	1383 ± 116
04-02-14	KMI- 1220	< 0.3	< 3.6	< 3.1	< 2.2	1287 ± 90
05-02-14	KMI- 1890	< 0.3	< 5.1	< 5.7	< 2.1	1285 ± 128
05-13-14	KMI- 2079	< 0.5	< 3.7	< 3.4	< 2.7	1363 ± 116
06-03-14	KMI- 2401	< 0.3	< 4.2	< 4.2	< 2.1	1300 ± 119
06-17-14	KMI- 2778	< 0.3	< 4.6	< 2.9	< 1.6	1287 ± 111
07-02-14	KMI- 3058	< 0.3	< 3.5	< 3.9	< 3.0	1302 ± 99
07-15-14	KMI- 3397	< 0.4	< 4.0	< 3.7	< 1.5	1412 ± 117
08-04-14	KMI- 3958	< 0.2	< 2.8	< 3.6	< 2.4	1403 ± 103
08-19-14	KMI- 4298	< 0.3	< 3.8	< 2.6	< 1.7	1331 ± 110
09-02-14	KMI- 4599	< 0.4	< 4.4	< 4.1	< 2.0	1400 ± 109
09-16-14	KMI- 4862	< 0.4	< 3.0	< 2.2	< 2.4	1351 ± 116
10-01-14	KMI- 5202	< 0.4	< 3.3	< 2.7	< 4.6	1416 ± 99
10-14-14	KMI- 5595	< 0.1	< 3.7	< 4.3	< 2.4	1392 ± 120
11-03-14	KMI- 6192	< 0.4	< 3.7	< 2.8	< 2.1	1320 ± 107
12-02-14	KMI- 6757	< 0.2	< 3.8	< 2.5	< 3.9	1313 ± 104
<u>K-35</u>						
01-03-14	KMI- 7	< 0.2	< 6.9	< 6.0	< 3.5	1301 ± 158
02-04-14	KMI- 372	< 0.4	< 3.9	< 4.2	< 4.3	1316 ± 106
03-04-14	KMI- 769	< 0.4	< 4.5	< 3.0	< 2.0	1447 ± 115
04-02-14	KMI- 1223	< 0.3	< 2.8	< 3.5	< 1.8	1377 ± 94
05-01-14	KMI- 1893	< 0.4	< 3.9	< 2.6	< 2.6	1309 ± 110
05-13-14	KMI- 2082	< 0.4	< 3.6	< 4.5	< 2.7	1377 ± 111
06-03-14	KMI- 2404	< 0.2	< 3.9	< 3.6	< 2.8	1271 ± 106
06-17-14	KMI- 2781	< 0.3	< 3.4	< 2.9	< 1.8	1348 ± 113
07-02-14	KMI- 3061	< 0.2	< 4.0	< 4.0	< 6.5	1418 ± 117
07-15-14	KMI- 3400	< 0.4	< 2.9	< 2.3	< 1.9	1416 ± 110
08-05-14	KMI- 3961	< 0.2	< 3.9	< 3.5	< 3.0	1367 ± 99
08-19-14	KMI- 4301	< 0.3	< 3.9	< 4.1	< 2.9	1462 ± 118
09-03-14	KMI- 4602	< 0.5	< 3.3	< 4.4	< 2.5	1393 ± 117
09-16-14	KMI- 4865	< 0.3	< 2.8	< 3.6	< 1.4	1478 ± 117
10-01-14	KMI- 5205	< 0.3	< 4.3	< 3.3	< 1.5	1369 ± 114
10-14-14	KMI- 5598	< 0.2	< 3.0	< 2.9	< 1.5	1435 ± 106
11-04-14	KMI- 6195	< 0.2	< 4.4	< 5.1	< 2.0	1306 ± 117
12-02-14	KMI- 6760	< 0.2	< 1.1	< 1.3	< 2.9	1411 ± 41

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

Collection	Lab	Concentration (pCi/L)				
Date	Code	I-131	Cs-134	Cs-137	Ba-La-140	K-40
<u>Control</u>						
<u>K-42</u>						
01-02-14	KMI- 10	< 0.3	< 3.7	< 3.5	< 2.6	1362 ± 100
02-03-14	KMI- 375	< 0.4	< 3.4	< 3.7	< 2.5	1309 ± 110
03-03-14	KMI- 772	< 0.2	< 3.6	< 4.3	< 2.8	1289 ± 100
04-01-14	KMI- 1226	< 0.3	< 3.1	< 2.7	< 2.0	1403 ± 106
05-01-14	KMI- 1896	< 0.2	< 3.0	< 3.3	< 2.0	1285 ± 95
05-13-14	KMI- 2085	< 0.2	< 3.5	< 2.3	< 1.5	1446 ± 115
06-02-14	KMI- 2407	< 0.2	< 4.5	< 3.0	< 1.8	1251 ± 106
06-17-14	KMI- 2784	< 0.2	< 2.9	< 2.9	< 2.4	1370 ± 101
07-01-14	KMI- 3064	< 0.5	< 3.4	< 3.6	< 3.9	1299 ± 104
07-15-14	KMI- 3403	< 0.2	< 4.7	< 3.8	< 2.1	1235 ± 118
08-04-14	KMI- 3964	< 0.2	< 3.0	< 2.9	< 7.2	1271 ± 101
08-19-14	KMI- 4304	< 0.3	< 3.9	< 4.3	< 2.7	1325 ± 116
09-02-14	KMI- 4605	< 0.5	< 3.9	< 4.4	< 2.3	1390 ± 106
09-16-14	KMI- 4868	< 0.3	< 5.4	< 5.7	< 3.7	1301 ± 124
10-01-14	KMI- 5208	< 0.3	< 3.1	< 3.8	< 2.8	1319 ± 108
10-14-14	KMI- 5601	< 0.2	< 3.0	< 3.7	< 2.1	1269 ± 104
11-04-14	KMI- 6198	< 0.5	< 3.7	< 2.7	< 2.8	1315 ± 113
12-01-14	KMI- 6763	< 0.2	< 1.2	< 1.5	< 3.3	1347 ± 42

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
<u>Indicators</u>							
K-5							
January	KMI - 5	< 1.0	< 0.6	1.61 ± 0.12	1.17	< 0.51	< 6.21
February	- 370	< 0.7	0.9 ± 0.3	1.70 ± 0.14	1.22	0.74	< 5.88
March	- 767	< 0.9	< 0.6	1.63 ± 0.14	1.09	< 0.55	< 6.13
April	- 1221	< 1.2	< 0.7	1.59 ± 0.12	1.03	< 0.68	< 6.29
May	- 2149	< 0.9	< 0.6	1.69 ± 0.14	0.91	< 0.66	< 5.92
June	- 2786	< 0.9	< 0.6	1.64 ± 0.14	0.88	< 0.68	< 6.10
July	- 3432	< 0.8	< 0.5	1.80 ± 0.14	0.90	< 0.56	< 5.56
August	- 4683	< 0.8	< 0.6	1.68 ± 0.12	0.84	< 0.71	< 5.95
September	- 5698	< 0.8	< 0.7	1.61 ± 0.14	0.96	< 0.73	< 6.21
October	- 6136	< 0.9	0.7 ± 0.4	1.71 ± 0.12	1.30	0.54	< 5.85
November	- 6193	< 0.9	< 0.5	1.60 ± 0.14	1.05	< 0.48	< 6.25
December	- 6758	< 0.9	< 0.6	1.72 ± 0.13	0.91	< 0.66	< 5.81
K-34							
January	KMI - 6	< 0.9	0.5 ± 0.3	1.85 ± 0.12	1.13	0.44	< 5.41
February	- 371	< 0.8	0.6 ± 0.3	1.61 ± 0.13	1.02	0.59	< 6.21
March	- 768	< 0.8	< 0.5	1.75 ± 0.14	1.04	< 0.48	< 5.71
April	- 1222	< 1.0	< 0.6	1.73 ± 0.14	0.96	< 0.63	< 5.78
May	- 2150	< 0.7	< 0.5	1.64 ± 0.14	0.92	< 0.54	< 6.10
June	- 2787	< 0.7	1.2 ± 0.4	1.59 ± 0.13	0.93	1.29	< 6.29
July	- 3433	< 0.7	0.8 ± 0.3	1.67 ± 0.13	1.15	0.70	< 5.99
August	- 4684	< 0.7	< 0.6	1.66 ± 0.13	0.91	< 0.66	< 6.02
September	- 5699	< 0.7	0.7 ± 0.4	1.70 ± 0.13	1.09	0.64	< 5.88
October	- 6137	< 0.9	< 0.7	1.72 ± 0.13	1.00	< 0.70	< 5.81
November	- 6194	< 0.8	< 0.5	1.45 ± 0.18	1.07	< 0.47	< 6.90
December	- 6759	< 1.1	0.6 ± 0.4	1.74 ± 0.05	0.96	0.63	< 5.75

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
<u>Indicators</u>							
K-38							
January	KMI - 8	< 0.9	1.0 ± 0.4	1.80 ± 0.13	1.03	0.97	< 5.56
February	- 373	< 0.8	1.2 ± 0.4	1.59 ± 0.12	1.18	1.02	< 6.29
March	- 770	< 0.8	0.8 ± 0.3	1.78 ± 0.13	1.03	0.78	< 5.62
April	- 1224	< 0.9	0.9 ± 0.3	1.79 ± 0.13	1.00	0.90	< 5.59
May	- 2152	< 0.8	1.0 ± 0.4	1.62 ± 0.14	0.93	1.08	< 6.17
June	- 2789	< 0.7	1.3 ± 0.4	1.63 ± 0.14	0.88	1.48	< 6.13
July	- 3435	< 0.7	< 0.5	1.70 ± 0.14	0.90	< 0.56	< 5.88
August	- 4686	< 0.7	0.8 ± 0.4	1.58 ± 0.13	0.88	0.91	< 6.33
September	- 5701	< 0.6	0.7 ± 0.3	1.61 ± 0.13	0.99	0.71	< 6.21
October	- 6139	< 0.7	1.1 ± 0.4	1.58 ± 0.13	1.03	1.07	< 6.33
November	- 6196	< 0.8	0.6 ± 0.3	1.59 ± 0.14	1.15	0.52	< 6.29
December	- 6761	< 0.8	0.5 ± 0.3	1.55 ± 0.05	0.90	0.56	< 6.45
K-39							
January	KMI - 9	< 1.0	0.8 ± 0.4	1.70 ± 0.12	1.11	0.72	< 5.88
February	- 374	< 0.8	0.7 ± 0.3	1.58 ± 0.12	1.01	0.69	< 6.33
March	- 771	< 0.9	< 0.6	1.57 ± 0.13	1.01	< 0.59	< 6.37
April	- 1225	< 0.9	0.8 ± 0.4	1.59 ± 0.13	0.98	0.82	< 6.29
May	- 2153	< 0.9	< 0.7	1.61 ± 0.13	1.02	< 0.69	< 6.21
June	- 2790	< 0.8	0.8 ± 0.4	1.55 ± 0.14	0.98	0.82	< 6.45
July	- 3436	< 0.8	< 0.5	1.54 ± 0.12	1.02	< 0.49	< 6.49
August	- 4687	< 0.8	< 0.6	1.59 ± 0.12	0.96	< 0.63	< 6.29
September	- 5702	< 0.7	< 0.6	1.61 ± 0.14	1.05	< 0.57	< 6.21
October	- 6140	< 0.8	< 0.7	1.64 ± 0.14	0.95	< 0.74	< 6.10
November	- 6197	< 1.4	< 0.8	1.65 ± 0.14	1.25	< 0.64	< 6.06
December	- 6762	< 1.0	0.6 ± 0.3	1.60 ± 0.05	0.98	0.61	< 6.25

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
<u>Control</u>		<u>K-3</u>					
January	KMI - 4	< 0.9	1.0 ± 0.3	1.63 ± 0.13	1.08	0.93	< 6.13
February	- 369	< 0.8	1.0 ± 0.4	1.68 ± 0.13	1.15	0.87	< 5.95
March	- 766	< 0.9	0.9 ± 0.3	1.69 ± 0.14	1.31	0.69	< 5.92
April	- 1220	< 0.8	1.0 ± 0.4	1.57 ± 0.11	1.06	0.94	< 6.37
May	- 2148	< 0.9	0.9 ± 0.4	1.61 ± 0.15	0.91	0.99	< 6.21
June	- 2785	< 0.8	0.8 ± 0.4	1.58 ± 0.14	1.03	0.78	< 6.33
July	- 3431	< 0.8	< 0.5	1.65 ± 0.13	0.88	< 0.57	< 6.06
August	- 4682	< 0.8	< 0.6	1.67 ± 0.13	0.89	< 0.67	< 5.99
September	- 5697	< 0.7	0.9 ± 0.4	1.68 ± 0.14	0.96	0.94	< 5.95
October	- 6135	< 0.8	< 0.6	1.71 ± 0.13	0.94	< 0.64	< 5.85
November	- 6192	< 0.9	0.5 ± 0.3	1.61 ± 0.13	1.11	0.45	< 6.21
December	- 6757	< 0.9	0.7 ± 0.3	1.60 ± 0.13	0.93	0.75	< 6.25
		<u>K-35</u>					
January	KMI - 7	< 0.9	0.5 ± 0.3	1.59 ± 0.19	1.00	0.50	< 6.29
February	- 372	< 0.9	< 0.6	1.60 ± 0.13	1.04	< 0.58	< 6.25
March	- 769	< 0.8	0.6 ± 0.3	1.76 ± 0.14	1.15	0.52	< 5.68
April	- 1223	< 0.7	< 0.4	1.68 ± 0.11	0.95	< 0.42	< 5.95
May	- 2151	< 0.6	< 0.5	1.64 ± 0.13	0.98	< 0.51	< 6.10
June	- 2788	< 1.2	< 0.6	1.60 ± 0.13	0.96	< 0.63	< 6.25
July	- 3434	< 0.7	< 0.5	1.73 ± 0.14	0.85	< 0.59	< 5.78
August	- 4685	< 0.7	< 0.4	1.73 ± 0.13	0.97	< 0.41	< 5.78
September	- 5700	< 0.7	< 0.6	1.75 ± 0.14	0.96	< 0.63	< 5.71
October	- 6138	< 0.8	< 0.5	1.71 ± 0.13	1.02	< 0.49	< 5.85
November	- 6195	< 0.8	< 0.4	1.59 ± 0.14	1.03	< 0.39	< 6.29
December	- 6760	< 0.9	< 0.5	1.72 ± 0.05	1.00	< 0.50	< 5.81
		<u>K-42</u>					
January	KMI - 10	< 1.1	0.8 ± 0.4	1.66 ± 0.12	1.05	0.76	< 6.02
February	- 375	< 1.4	1.1 ± 0.6	1.60 ± 0.13	1.11	0.99	< 6.25
March	- 772	< 1.1	0.9 ± 0.4	1.57 ± 0.12	1.13	0.80	< 6.37
April	- 1226	< 1.3	1.1 ± 0.5	1.71 ± 0.13	0.98	1.12	< 5.85
May	- 2154	< 0.8	0.7 ± 0.4	1.67 ± 0.13	0.91	0.77	< 5.99
June	- 2791	< 0.8	0.7 ± 0.3	1.53 ± 0.13	0.88	0.80	< 6.54
July	- 3437	< 0.9	0.8 ± 0.4	1.55 ± 0.14	0.88	0.91	< 6.45
August	- 4688	< 1.1	< 0.6	1.58 ± 0.13	0.89	< 0.67	< 6.33
September	- 5703	< 0.8	< 0.7	1.64 ± 0.14	0.95	< 0.74	< 6.10
October	- 6141	< 0.9	0.8 ± 0.4	1.58 ± 0.13	0.89	0.90	< 6.33
November	- 6198	< 1.0	0.8 ± 0.3	1.60 ± 0.14	1.06	0.75	< 6.25
December	- 6763	< 1.0	0.7 ± 0.3	1.64 ± 0.05	1.25	0.56	< 6.10

Table 16. Well water, analyses for gross alpha, gross beta, tritium, strontium-89<sup>a</sup>, strontium-90<sup>a</sup>, potassium-40 and gamma-emitting isotopes.

Collection: Quarterly.

Sample Description and Concentration (pCi/L)				
<u>Indicator</u>				
<u>K-1g</u>				
Date Collected	01-02-14	04-01-14	07-01-14.	10-01-14
Lab Code	KWW- 17	KWW- 1247	KWW- 3071	KWW- 5229
Gross alpha	2.9 ± 1.6	< 3.7	< 1.7	< 2.3
Gross beta	2.4 ± 1.3	3.6 ± 2.2	< 1.6	< 3.3
H-3	< 150	< 143	< 142	< 156
Sr-89	< 0.5	< 0.6	< 0.6	< 0.5
Sr-90	< 0.4	< 0.4	< 0.5	< 0.5
K-40 (ICP)	2.00	2.30	2.41	1.94
Mn-54	< 1.8	< 2.4	< 1.5	< 3.4
Fe-59	< 4.4	< 6.2	< 4.9	< 6.6
Co-58	< 2.1	< 1.5	< 3.0	< 2.4
Co-60	< 2.4	< 1.9	< 2.1	< 3.2
Zn-65	< 2.2	< 7.1	< 5.2	< 7.2
Zr-Nb-95	< 3.9	< 4.9	< 2.8	< 4.0
Cs-134	< 4.0	< 3.3	< 3.5	< 3.7
Cs-137	< 2.2	< 2.5	< 3.5	< 2.5
Ba-La-140	< 1.8	< 4.1	< 3.3	< 4.1
<u>K-1h</u>				
Date Collected	03-31-14	05-01-14	07-01-14	10-01-14
Lab Code	KWW- 1246	KWW- 1946	KWW- 3072	KWW- 5230
Gross alpha	< 2.4	3.0 ± 2.3	2.2 ± 1.5	3.1 ± 1.5
Gross beta	< 3.3	4.8 ± 2.4	< 1.6	< 1.5
H-3	< 143	< 146	< 142	< 156
K-40 (ICP)	2.26	2.30	2.39	2.35
Mn-54	< 4.4	< 1.5	< 2.3	< 2.7
Fe-59	< 5.1	< 5.5	< 2.5	< 2.5
Co-58	< 2.8	< 1.7	< 2.3	< 1.9
Co-60	< 3.1	< 2.4	< 2.1	< 2.9
Zn-65	< 10.1	< 3.5	< 4.7	< 3.5
Zr-Nb-95	< 5.5	< 3.3	< 2.3	< 2.5
Cs-134	< 4.1	< 2.0	< 2.7	< 2.9
Cs-137	< 3.7	< 2.4	< 1.8	< 2.9
Ba-La-140	< 2.9	< 6.6	< 3.7	< 2.2

<sup>a</sup> Strontium analyses required on samples from K-1g only.

<sup>b</sup> Sample collection delayed until late March due to frozen conditions.

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

Collection:		Quarterly.		
Sample Description and Concentration (pCi/L)				
<u>Indicator</u>				
<u>K-10</u>				
Date Collected	01-02-14	04-01-14	07-01-14	10-01-14
Lab Code	KWW- 18	KWW- 1249	KWW- 3073	KWW- 5231
Gross beta	3.2 ± 0.8	< 1.9	< 1.0	< 2.1
H-3	< 150	< 143	< 142	< 156
K-40 (ICP)	4.34	0.72	1.68	0.26
Mn-54	< 2.5	< 2.0	< 2.0	< 3.6
Fe-59	< 3.4	< 4.3	< 4.1	< 6.0
Co-58	< 2.4	< 2.4	< 2.1	< 1.6
Co-60	< 1.2	< 1.9	< 2.6	< 3.6
Zn-65	< 2.9	< 6.1	< 1.6	< 5.8
Zr-Nb-95	< 3.1	< 2.8	< 2.5	< 2.1
Cs-134	< 2.7	< 2.7	< 3.2	< 3.5
Cs-137	< 3.3	< 2.2	< 3.3	< 4.3
Ba-La-140	< 1.7	< 2.7	< 3.5	< 4.8
<u>K-11</u>				
Date Collected	01-02-14	04-01-14	07-01-14	10-01-14
Lab Code	KWW- 19	KWW- 1250	KWW- 3074	KWW- 5232
Gross beta	0.7 ± 0.3	1.1 ± 0.5	0.7 ± 0.3	1.3 ± 0.5
H-3	< 150	< 143	< 142	< 156
K-40 (ICP)	0.84	1.11	0.85	0.80
Mn-54	< 2.7	< 2.2	< 2.3	< 2.7
Fe-59	< 3.9	< 3.8	< 3.9	< 3.3
Co-58	< 1.8	< 1.9	< 1.9	< 2.7
Co-60	< 2.2	< 1.7	< 1.8	< 1.9
Zn-65	< 3.9	< 3.2	< 3.7	< 4.6
Zr-Nb-95	< 3.1	< 2.0	< 2.6	< 2.8
Cs-134	< 3.0	< 2.5	< 3.9	< 2.8
Cs-137	< 2.1	< 1.9	< 2.5	< 1.9
Ba-La-140	< 2.5	< 3.0	< 2.9	< 1.5

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

Collection:		Quarterly.			
Sample Description and Concentration (pCi/L)					
<u>Indicator</u>					
<u>K-38</u>					
Date Collected	01-02-14	04-01-14	07-01-14	10-01-14	
Lab Code	KWW- 21	KWW- 1252	KWW- 3076	KWW- 5234	
Gross beta	1.2 ± 0.7	< 1.6	3.6 ± 0.7	2.6 ± 1.2	
H-3	< 150	< 143	< 142	< 156	
K-40 (ICP)	< 0.28	0.78	5.31	2.61	
Mn-54	< 2.7	< 3.4	< 2.5	< 1.8	
Fe-59	< 5.7	< 4.6	< 5.3	< 3.3	
Co-58	< 2.8	< 1.8	< 3.1	< 2.8	
Co-60	< 2.0	< 2.6	< 1.6	< 2.2	
Zn-65	< 3.0	< 6.1	< 3.2	< 5.0	
Zr-Nb-95	< 3.5	< 2.4	< 3.0	< 2.3	
Cs-134	< 3.3	< 3.9	< 2.6	< 2.6	
Cs-137	< 2.7	< 4.1	< 3.1	< 2.8	
Ba-La-140	< 3.8	< 3.5	< 2.3	< 6.9	
<u>Control</u>					
<u>K-13</u>					
Date Collected	01-02-14	04-01-14	07-01-14	10-01-14	
Lab Code	KWW- 20	KWW- 1251	KWW- 3075	KWW- 5233	
Gross beta	0.7 ± 0.3	< 0.9	0.7 ± 0.3	< 0.8	
H-3	< 150	< 143	< 142	< 156	
K-40 (ICP)	0.97	0.95	0.98	1.00	
Mn-54	< 4.7	< 3.6	< 2.1	< 1.3	
Fe-59	< 5.1	< 5.0	< 4.0	< 3.6	
Co-58	< 3.5	< 2.3	< 2.2	< 3.1	
Co-60	< 4.8	< 2.9	< 1.7	< 1.1	
Zn-65	< 7.8	< 3.0	< 3.0	< 3.6	
Zr-Nb-95	< 3.6	< 2.1	< 2.2	< 1.9	
Cs-134	< 5.5	< 3.4	< 2.8	< 2.7	
Cs-137	< 5.4	< 4.8	< 3.2	< 2.8	
Ba-La-140	< 3.4	< 2.8	< 2.2	< 5.8	



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	09-02-14	09-02-14
Lab Code	KME- 4644	KME- 4645
Gross Alpha	0.063 ± 0.028	0.040 ± 0.023
Gross Beta	2.85 ± 0.080	2.19 ± 0.062
Be-7	< 0.13	< 0.23
K-40	2.77 ± 0.38	1.80 ± 0.36
Nb-95	< 0.021	< 0.032
Zr-95	< 0.022	< 0.040
Ru-103	< 0.011	< 0.020
Ru-106	< 0.081	< 0.101
Cs-134	< 0.016	< 0.018
Cs-137	< 0.010	< 0.019
Ce-141	< 0.023	< 0.061
Ce-144	< 0.058	< 0.154

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

Sample Description and Concentration (pCi/g wet)				
K-24				
Location				
Date Collected	01-02-14	04-01-14	07-01-14	10-01-14
Lab Code	KE- 12	KE- 1217	KE- 3065	KE- 5239
Gross beta	1.40 ± 0.04	1.57 ± 0.04	0.97 ± 0.03	1.48 ± 0.05
Sr-89	< 0.007	< 0.005	< 0.004	< 0.011
Sr-90	< 0.003	< 0.004	< 0.002	< 0.004
Be-7	< 0.069	< 0.041	< 0.068	< 0.052
K-40	1.35 ± 0.12	1.34 ± 0.14	1.26 ± 0.11	1.21 ± 0.10
Nb-95	< 0.007	< 0.005	< 0.013	< 0.009
Zr-95	< 0.006	< 0.007	< 0.006	< 0.012
Ru-103	< 0.008	< 0.004	< 0.008	< 0.008
Ru-106	< 0.044	< 0.044	< 0.033	< 0.032
Cs-134	< 0.005	< 0.004	< 0.004	< 0.003
Cs-137	< 0.005	< 0.006	< 0.003	< 0.004
Ce-141	< 0.014	< 0.008	< 0.014	< 0.023
Ce-144	< 0.045	< 0.032	< 0.030	< 0.026
K-32				
Location				
Date Collected	01-02-14	04-01-14	07-01-14	10-01-14
Lab Code	KE- 13	KE- 1218	KE- 3066	KE- 5240
Gross beta	1.70 ± 0.05	1.57 ± 0.04	1.89 ± 0.05	1.43 ± 0.04
Sr-89	< 0.003	< 0.003	< 0.008	< 0.009
Sr-90	< 0.002	< 0.002	< 0.003	< 0.003
Be-7	< 0.052	< 0.067	< 0.087	< 0.060
K-40	1.21 ± 0.12	1.31 ± 0.18	1.35 ± 0.12	1.54 ± 0.13
Nb-95	< 0.006	< 0.008	< 0.014	< 0.012
Zr-95	< 0.006	< 0.015	< 0.014	< 0.016
Ru-103	< 0.008	< 0.007	< 0.012	< 0.010
Ru-106	< 0.046	< 0.072	< 0.039	< 0.040
Cs-134	< 0.004	< 0.008	< 0.005	< 0.004
Cs-137	< 0.003	< 0.009	< 0.005	< 0.004
Ce-141	< 0.015	< 0.012	< 0.025	< 0.025
Ce-144	< 0.040	< 0.058	< 0.031	< 0.037

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)				
Location	Indicator			
	K-23		K-1A	K-24
Date Collected	08-04-14	08-04-14	09-02-14	09-02-14
Lab Code	KVE- 3970	KVE- 3971	KVE- 4623	KVE- 4624
Type	Clover	Wheat	Corn	Beet Leaves
Gross beta	3.97 ± 0.16	5.58 ± 0.14	1.98 ± 0.05	7.44 ± 0.26
Sr-89	< 0.018	< 0.056	< 0.003	< 0.021
Sr-90	< 0.006	0.023 ± 0.011	< 0.001	< 0.007
Be-7	0.32 ± 0.17	0.87 ± 0.15	< 0.060	0.24 ± 0.08
K-40	4.09 ± 0.46	3.50 ± 0.34	1.40 ± 0.16	5.83 ± 0.28
Nb-95	< 0.018	< 0.011	< 0.008	< 0.007
Zr-95	< 0.024	< 0.025	< 0.012	< 0.015
Ru-103	< 0.014	< 0.011	< 0.010	< 0.007
Ru-106	< 0.116	< 0.104	< 0.061	< 0.042
Cs-134	< 0.016	< 0.012	< 0.006	< 0.007
Cs-137	< 0.019	< 0.007	< 0.008	< 0.008
Ce-141	< 0.030	< 0.022	< 0.014	< 0.018
Ce-144	< 0.104	< 0.059	< 0.05	< 0.040

Location	K-24	K-38	K-38	K-38
Date Collected	09-02-14	09-03-14	09-03-14	09-03-14
Lab Code	KVE- 4625	KVE- 4631	KVE- 4632	KVE- 4633
Type	Cabbage Leaves	Tomatoes	Beet Leaves	Cucumber
Gross beta	3.11 ± 0.18	2.79 ± 0.07	5.71 ± 0.18	2.27 ± 0.06
Sr-89	< 0.014	< 0.003	< 0.010	< 0.002
Sr-90	0.009 ± 0.003	< 0.001	< 0.003	< 0.001
Be-7	0.31 ± 0.06	< 0.057	0.56 ± 0.11	< 0.056
K-40	3.45 ± 0.14	2.18 ± 0.17	4.72 ± 0.26	2.01 ± 0.17
Nb-95	< 0.006	< 0.006	< 0.009	< 0.007
Zr-95	< 0.010	< 0.012	< 0.013	< 0.008
Ru-103	< 0.005	< 0.006	< 0.011	< 0.006
Ru-106	< 0.058	< 0.037	< 0.068	< 0.053
Cs-134	< 0.006	< 0.006	< 0.009	< 0.006
Cs-137	< 0.007	< 0.007	< 0.009	< 0.006
Ce-141	< 0.015	< 0.012	< 0.013	< 0.010
Ce-144	< 0.053	< 0.055	< 0.071	< 0.036

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)			
	09-03-14	09-03-14	09-03-14	09-03-14
Date Collected	09-03-14	09-03-14	09-03-14	09-03-14
Lab Code	KVE- 4626	KVE- 4627	KVE- 4629	KVE- 4630
Type	Kohlrabi	Corn	Beans	Carrots
Gross beta	3.16 ± 0.01	3.23 ± 0.09	2.29 ± 0.07	3.96 ± 0.10
Sr-89	< 0.005	< 0.017	< 0.005	< 0.003
Sr-90	< 0.002	< 0.006	0.004 ± 0.001	< 0.001
Be-7	< 0.038	< 0.049	< 0.061	< 0.054
K-40	2.47 ± 0.15	2.18 ± 0.16	1.86 ± 0.17	3.49 ± 0.22
Nb-95	< 0.007	< 0.006	< 0.008	< 0.008
Zr-95	< 0.009	< 0.008	< 0.012	< 0.006
Ru-103	< 0.006	< 0.005	< 0.007	< 0.005
Ru-106	< 0.033	< 0.031	< 0.054	< 0.062
Cs-134	< 0.005	< 0.004	< 0.005	< 0.006
Cs-137	< 0.005	< 0.004	< 0.005	< 0.005
Ce-141	< 0.012	< 0.012	< 0.010	< 0.011
Ce-144	< 0.042	< 0.047	< 0.052	< 0.041

Location	K-13 (control)	K-26 (control)
	10-01-14	10-02-14
Date Collected	10-01-14	10-02-14
Lab Code	KVE- 5235	KVE- 5236
Type	Pumpkins	Pumpkins
Gross beta	1.84 ± 0.03	2.99 ± 0.05
Sr-89	< 0.003	< 0.007
Sr-90	< 0.002	< 0.004
Be-7	< 0.049	< 0.041
K-40	1.63 ± 0.14	2.68 ± 0.16
Nb-95	< 0.005	< 0.004
Zr-95	< 0.007	< 0.007
Ru-103	< 0.005	< 0.003
Ru-106	< 0.043	< 0.052
Cs-134	< 0.004	< 0.005
Cs-137	< 0.004	< 0.005
Ce-141	< 0.008	< 0.010
Ce-144	< 0.036	< 0.040

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-3	K-35	K-35
Date Collected	01-03-14	01-03-14	01-02-14	01-02-14
Lab Code	KCF- 25	KCF- 31	KCF- 28	KCF- 34
Type	Silage	Hay	Silage	Hay
Gross beta	4.49 ± 0.10	12.01 ± 0.25	3.04 ± 0.07	7.03 ± 0.16
Sr-89	< 0.009	< 0.015	< 0.004	< 0.010
Sr-90	< 0.005	0.012 ± 0.005	0.003 ± 0.001	< 0.006
Be-7	0.33 ± 0.10	0.22 ± 0.09	0.14 ± 0.06	< 0.10
K-40	3.47 ± 0.24	9.47 ± 0.33	2.36 ± 0.17	5.85 ± 0.28
Nb-95	< 0.008	< 0.010	< 0.007	< 0.010
Zr-95	< 0.010	< 0.013	< 0.007	< 0.013
Ru-103	< 0.006	< 0.009	< 0.006	< 0.007
Ru-106	< 0.037	< 0.076	< 0.050	< 0.061
Cs-134	< 0.008	< 0.008	< 0.006	< 0.008
Cs-137	< 0.007	< 0.010	< 0.006	< 0.009
Ce-141	< 0.017	< 0.019	< 0.011	< 0.012
Ce-144	< 0.064	< 0.060	< 0.052	< 0.062
Indicator				
Location	K-5	K-5	K-34	K-34
Date Collected	01-02-14	01-02-14	01-02-14	01-02-14
Lab Code	KCF- 26	KCF- 32	KCF- 27	KCF- 33
Type	Silage	Hay	Silage	Hay
Gross beta	12.20 ± 0.30	26.89 ± 0.53	4.07 ± 0.09	6.29 ± 0.14
Sr-89	< 0.021	< 0.028	< 0.007	< 0.009
Sr-90	< 0.012	< 0.016	< 0.004	0.010 ± 0.003
Be-7	0.22 ± 0.09	< 0.09	0.68 ± 0.10	0.13 ± 0.06
K-40	8.55 ± 0.36	23.50 ± 0.39	3.36 ± 0.24	5.49 ± 0.26
Nb-95	< 0.010	< 0.009	< 0.007	< 0.007
Zr-95	< 0.013	< 0.018	< 0.013	< 0.006
Ru-103	< 0.009	< 0.006	< 0.006	< 0.006
Ru-106	< 0.046	< 0.061	< 0.052	< 0.054
Cs-134	< 0.009	< 0.008	< 0.007	< 0.006
Cs-137	< 0.012	< 0.010	< 0.008	< 0.006
Ce-141	< 0.015	< 0.016	< 0.014	< 0.012
Ce-144	< 0.058	< 0.046	< 0.041	< 0.031

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

Sample Description and Concentration (pCi/g wet)				
Location	Indicator			
	K-38	K-38	K-39	K-39
Date Collected	01-02-14	01-02-14	01-02-14	01-02-14
Lab Code	KCF- 29	KCF- 35	KCF- 30	KCF- 36
Type	Silage	Hay	Silage	Hay
Gross beta	10.02 ± 0.22	15.49 ± 0.35	8.76 ± 0.19	22.84 ± 0.45
Sr-89	< 0.013	< 0.023	< 0.013	< 0.021
Sr-90	< 0.008	< 0.013	< 0.007	0.013 ± 0.007
Be-7	0.23 ± 0.08	0.44 ± 0.12	0.13 ± 0.10	< 0.12
K-40	8.20 ± 0.34	16.30 ± 0.40	7.33 ± 0.34	17.04 ± 0.40
Nb-95	< 0.009	< 0.013	< 0.009	< 0.012
Zr-95	< 0.012	< 0.019	< 0.011	< 0.024
Ru-103	< 0.008	< 0.010	< 0.007	< 0.008
Ru-106	< 0.055	< 0.122	< 0.073	< 0.102
Cs-134	< 0.008	< 0.011	< 0.007	< 0.010
Cs-137	< 0.009	< 0.013	< 0.009	< 0.012
Ce-141	< 0.011	< 0.020	< 0.011	< 0.021
Ce-144	< 0.059	< 0.078	< 0.058	< 0.076

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				
Location	Indicator			
	K-1b	K-1f	K-5	K-34
Date Collected	06-02-14	06-02-14	06-02-14	06-02-14
Lab Code	KG- 2415	KG- 2417	KG- 2419	KG- 2420
Gross beta	5.89 ± 0.09	5.59 ± 0.15	6.18 ± 0.16	5.03 ± 0.07
Sr-89	< 0.019	< 0.007	< 0.008	< 0.010
Sr-90	< 0.008	< 0.002	< 0.002	0.008 ± 0.003
Be-7	0.73 ± 0.16	0.27 ± 0.10	0.52 ± 0.11	0.51 ± 0.12
K-40	5.30 ± 0.49	4.87 ± 0.34	5.30 ± 0.32	5.01 ± 0.39
Mn-54	< 0.013	< 0.008	< 0.008	< 0.010
Co-58	< 0.009	< 0.009	< 0.008	< 0.008
Co-60	< 0.011	< 0.010	< 0.006	< 0.011
Nb-95	< 0.010	< 0.013	< 0.009	< 0.012
Zr-95	< 0.028	< 0.015	< 0.016	< 0.021
Ru-103	< 0.015	< 0.008	< 0.007	< 0.011
Ru-106	< 0.070	< 0.070	< 0.061	< 0.099
Cs-134	< 0.013	< 0.011	< 0.010	< 0.011
Cs-137	< 0.013	< 0.009	< 0.012	< 0.012
Ce-141	< 0.031	< 0.020	< 0.015	< 0.023
Ce-144	< 0.131	< 0.080	< 0.070	< 0.080

Location	Indicator		Control	
	K-38	K-39	K-3	K-35
Date Collected	06-02-14	06-02-14	06-02-14	06-02-14
Lab Code	KG- 2422	KG- 2423	KG- 2418	KG- 2421
Gross beta	6.13 ± 0.08	4.65 ± 0.07	5.59 ± 0.15	4.94 ± 0.13
Sr-89	< 0.012	< 0.012	< 0.007	< 0.008
Sr-90	< 0.005	< 0.006	< 0.002	< 0.003
Be-7	0.42 ± 0.11	0.39 ± 0.10	0.42 ± 0.13	0.52 ± 0.14
K-40	5.32 ± 0.37	3.37 ± 0.26	4.81 ± 0.37	3.76 ± 0.30
Mn-54	< 0.014	< 0.007	< 0.011	< 0.007
Co-58	< 0.011	< 0.006	< 0.010	< 0.010
Co-60	< 0.007	< 0.006	< 0.013	< 0.004
Nb-95	< 0.016	< 0.010	< 0.011	< 0.011
Zr-95	< 0.015	< 0.014	< 0.023	< 0.020
Ru-103	< 0.008	< 0.005	< 0.013	< 0.006
Ru-106	< 0.083	< 0.072	< 0.065	< 0.093
Cs-134	< 0.011	< 0.008	< 0.013	< 0.011
Cs-137	< 0.012	< 0.007	< 0.010	< 0.011
Ce-141	< 0.018	< 0.017	< 0.024	< 0.021
Ce-144	< 0.076	< 0.046	< 0.085	< 0.086

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	08-04-14	08-04-14	08-04-14	08-04-14
Lab Code	KG- 3949	KG- 3950	KG- 3952	KG- 3954
Gross beta	8.31 ± 0.19	3.98 ± 0.10	8.53 ± 0.20	7.16 ± 0.18
Sr-89	< 0.017	< 0.011	< 0.016	< 0.020
Sr-90	< 0.007	< 0.004	< 0.007	< 0.008
Be-7	1.10 ± 0.21	0.65 ± 0.19	1.29 ± 0.19	1.04 ± 0.16
K-40	5.77 ± 0.52	4.13 ± 0.40	5.42 ± 0.42	4.67 ± 0.34
Mn-54	< 0.014	< 0.013	< 0.012	< 0.009
Co-58	< 0.010	< 0.008	< 0.012	< 0.009
Co-60	< 0.013	< 0.010	< 0.011	< 0.007
Nb-95	< 0.017	< 0.013	< 0.016	< 0.010
Zr-95	< 0.028	< 0.026	< 0.014	< 0.016
Ru-103	< 0.018	< 0.013	< 0.014	< 0.008
Ru-106	< 0.079	< 0.119	< 0.110	< 0.090
Cs-134	< 0.018	< 0.010	< 0.016	< 0.011
Cs-137	< 0.016	< 0.015	< 0.012	< 0.013
Ce-141	< 0.027	< 0.018	< 0.029	< 0.015
Ce-144	< 0.109	< 0.071	< 0.143	< 0.076

	Indicator		Control	
Location	K-38	K-39	K-3	K-35
Date Collected	08-04-14	08-04-14	08-04-14	08-04-14
Lab Code	KG- 3956	KG- 3957	KG- 3951	KG- 3955
Gross beta	7.34 ± 0.17	7.34 ± 0.17	9.58 ± 0.19	9.57 ± 0.19
Sr-89	< 0.021	< 0.021	< 0.018	< 0.014
Sr-90	< 0.008	< 0.009	< 0.007	< 0.006
Be-7	0.97 ± 0.15	1.08 ± 0.16	0.73 ± 0.16	0.50 ± 0.20
K-40	5.37 ± 0.44	5.66 ± 0.30	6.55 ± 0.37	7.07 ± 0.49
Mn-54	< 0.014	< 0.012	< 0.011	< 0.012
Co-58	< 0.014	< 0.007	< 0.011	< 0.015
Co-60	< 0.012	< 0.012	< 0.008	< 0.020
Nb-95	< 0.014	< 0.010	< 0.012	< 0.016
Zr-95	< 0.020	< 0.015	< 0.015	< 0.021
Ru-103	< 0.019	< 0.010	< 0.013	< 0.016
Ru-106	< 0.111	< 0.068	< 0.092	< 0.077
Cs-134	< 0.017	< 0.009	< 0.013	< 0.015
Cs-137	< 0.019	< 0.010	< 0.011	< 0.013
Ce-141	< 0.037	< 0.013	< 0.025	< 0.018
Ce-144	< 0.101	< 0.064	< 0.085	< 0.105



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

Sample Description and Concentration (pCi/g wet)				
Location	Indicator			
	K-1b	K-1f	K-5	K-34
Date Collected	10-01-14	10-01-14	10-01-14	10-01-14
Lab Code	KG- 5211	KG- 5212	KG- 5214	KG- 5215
Gross beta	5.73 ± 0.16	6.30 ± 0.17	6.32 ± 0.13	8.52 ± 0.19
Sr-89	< 0.022	< 0.026	< 0.011	< 0.045
Sr-90	< 0.015	< 0.014	< 0.004	< 0.015
Be-7	2.83 ± 0.25	5.18 ± 0.28	2.20 ± 0.19	2.59 ± 0.25
K-40	4.28 ± 0.36	4.18 ± 0.35	5.48 ± 0.36	6.01 ± 0.43
Mn-54	< 0.009	< 0.014	< 0.008	< 0.013
Co-58	< 0.008	< 0.011	< 0.008	< 0.012
Co-60	< 0.014	< 0.012	< 0.008	< 0.010
Nb-95	< 0.017	< 0.012	< 0.012	< 0.012
Zr-95	< 0.022	< 0.022	< 0.016	< 0.022
Ru-103	< 0.017	< 0.011	< 0.011	< 0.011
Ru-106	< 0.108	< 0.128	< 0.086	< 0.076
Cs-134	< 0.015	< 0.013	< 0.010	< 0.012
Cs-137	< 0.009	< 0.008	< 0.009	< 0.014
Ce-141	< 0.040	< 0.031	< 0.016	< 0.027
Ce-144	< 0.112	< 0.083	< 0.079	< 0.093

Location	Indicator		Control	
	K-38	K-39	K-3	K-35
Date Collected	10-01-14	10-01-14	10-01-14	10-01-14
Lab Code	KG- 5218	KG- 5219	KG- 5213	KG- 5217
Gross beta	6.30 ± 0.14	6.73 ± 0.17	10.60 ± 0.23	5.53 ± 0.13
Sr-89	< 0.018	< 0.031	< 0.016	< 0.013
Sr-90	< 0.007	< 0.011	< 0.009	< 0.004
Be-7	2.00 ± 0.17	3.08 ± 0.25	5.30 ± 0.22	1.62 ± 0.16
K-40	4.52 ± 0.31	5.64 ± 0.45	7.88 ± 0.35	5.13 ± 0.36
Mn-54	< 0.006	< 0.010	< 0.006	< 0.009
Co-58	< 0.007	< 0.010	< 0.009	< 0.010
Co-60	< 0.007	< 0.011	< 0.007	< 0.007
Nb-95	< 0.010	< 0.014	< 0.007	< 0.008
Zr-95	< 0.010	< 0.028	< 0.007	< 0.013
Ru-103	< 0.009	< 0.016	< 0.009	< 0.011
Ru-106	< 0.069	< 0.134	< 0.064	< 0.106
Cs-134	< 0.010	< 0.015	< 0.007	< 0.011
Cs-137	< 0.010	< 0.015	< 0.008	< 0.008
Ce-141	< 0.025	< 0.025	< 0.015	< 0.023
Ce-144	< 0.083	< 0.090	< 0.066	< 0.072

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)		
Location	Indicator	
	K-1f	K-5
Date Collected	05-01-14	05-01-14
Lab Code	KSO- 1967	KSO- 1969
Gross alpha	5.98 ± 2.70	9.10 ± 3.32
Gross beta	26.86 ± 3.01	29.14 ± 3.24
Sr-89	< 0.063	< 0.064
Sr-90	0.040 ± 0.019	0.097 ± 0.027
Be-7	< 0.26	< 0.28
K-40	17.75 ± 0.90	20.04 ± 0.90
Nb-95	< 0.043	< 0.043
Zr-95	< 0.048	< 0.033
Ru-103	< 0.038	< 0.031
Ru-106	< 0.147	< 0.129
Cs-134	< 0.017	< 0.019
Cs-137	0.08 ± 0.02	0.14 ± 0.03
Ce-141	< 0.077	< 0.064
Ce-144	< 0.146	< 0.107
Date Collected	10-01-14	10-01-14
Lab Code	KSO- 5280	KSO- 5282
Gross alpha	7.29 ± 2.17	6.41 ± 2.15
Gross beta	31.05 ± 2.38	24.80 ± 2.26
Sr-89	< 0.097	< 0.112
Sr-90	< 0.029	0.038 ± 0.020
Be-7	< 0.36	< 0.36
K-40	21.54 ± 0.86	18.42 ± 0.75
Nb-95	< 0.090	< 0.069
Zr-95	< 0.035	< 0.065
Ru-103	< 0.033	< 0.027
Ru-106	< 0.187	< 0.134
Cs-134	< 0.018	< 0.019
Cs-137	0.13 ± 0.03	0.12 ± 0.03
Ce-141	< 0.139	< 0.118
Ce-144	< 0.153	< 0.125

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)			
Location	Indicator		
	K-34	K-38	K-39
Date Collected	05-01-14	05-01-14	05-01-14
Lab Code	KSO- 1970	KSO- 1972	KSO- 1974
Gross alpha	8.60 ± 3.62	7.51 ± 3.24	7.80 ± 3.24
Gross beta	26.58 ± 2.92	29.89 ± 3.25	27.38 ± 3.09
Sr-89	< 0.064	< 0.085	< 0.064
Sr-90	0.040 ± 0.021	< 0.045	0.057 ± 0.024
Be-7	< 0.33	0.44 ± 0.26	< 0.25
K-40	20.78 ± 0.95	20.45 ± 0.85	18.97 ± 0.83
Nb-95	< 0.025	< 0.038	< 0.027
Zr-95	< 0.023	< 0.022	< 0.020
Ru-103	< 0.026	< 0.029	< 0.022
Ru-106	< 0.097	< 0.091	< 0.090
Cs-134	< 0.017	< 0.018	< 0.022
Cs-137	0.10 ± 0.03	0.12 ± 0.03	0.14 ± 0.03
Ce-141	< 0.056	< 0.072	< 0.065
Ce-144	< 0.130	< 0.157	< 0.152
Date Collected	10-01-14	10-01-14	10-01-14
Lab Code	KSO- 5283	KSO- 5285	KSO- 5286
Gross alpha	8.53 ± 2.73	9.17 ± 2.56	7.49 ± 2.43
Gross beta	27.38 ± 2.13	29.52 ± 2.36	29.85 ± 2.38
Sr-89	< 0.119	< 0.112	< 0.125
Sr-90	< 0.036	0.046 ± 0.021	< 0.039
Be-7	< 0.31	< 0.28	< 0.36
K-40	18.96 ± 0.73	19.56 ± 0.80	21.81 ± 0.86
Nb-95	< 0.059	< 0.075	< 0.084
Zr-95	< 0.058	< 0.069	< 0.073
Ru-103	< 0.035	< 0.045	< 0.045
Ru-106	< 0.132	< 0.177	< 0.112
Cs-134	< 0.015	< 0.016	< 0.018
Cs-137	0.10 ± 0.02	0.06 ± 0.03	0.05 ± 0.02
Ce-141	< 0.086	< 0.120	< 0.115
Ce-144	< 0.110	< 0.163	< 0.145

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)		
Location	Control	
	K-3	K-35
Date Collected	05-01-14	05-01-14
Lab Code	KSO- 1968	KSO- 1971
Gross alpha	3.76 ± 2.34	8.75 ± 3.17
Gross beta	22.72 ± 2.80	23.35 ± 2.81
Sr-89	< 0.088	< 0.065
Sr-90	0.187 ± 0.039	0.049 ± 0.022
Be-7	< 0.27	< 0.25
K-40	18.34 ± 0.94	16.58 ± 0.83
Nb-95	< 0.038	< 0.025
Zr-95	< 0.037	< 0.059
Ru-103	< 0.025	< 0.017
Ru-106	< 0.176	< 0.123
Cs-134	< 0.023	< 0.018
Cs-137	0.15 ± 0.04	0.10 ± 0.03
Ce-141	< 0.071	< 0.064
Ce-144	< 0.109	< 0.159
Date Collected	10-01-14	10-01-14
Lab Code	KSO- 5281	KSO- 5284
Gross alpha	9.90 ± 2.32	8.79 ± 2.32
Gross beta	29.27 ± 2.30	23.80 ± 2.11
Sr-89	< 0.134	< 0.089
Sr-90	< 0.046	< 0.028
Be-7	< 0.25	< 0.42
K-40	19.30 ± 0.82	15.82 ± 0.76
Nb-95	< 0.048	< 0.086
Zr-95	< 0.087	< 0.041
Ru-103	< 0.044	< 0.037
Ru-106	< 0.167	< 0.186
Cs-134	< 0.016	< 0.021
Cs-137	0.13 ± 0.03	0.10 ± 0.04
Ce-141	< 0.104	< 0.127
Ce-144	< 0.139	< 0.165

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

Collection: Monthly

Sample Description and Concentration (pCi/L)			
<u>Indicator</u>			
<u>K-1a</u>			
Date Collected	01-02-14	02-03-14	03-03-14
Lab Code	NS <sup>a</sup>	NS <sup>a</sup>	NS <sup>a</sup>
Gross beta			
Suspended Solids	-	-	-
Dissolved Solids	-	-	-
Total Residue	-	-	-
K-40 (ICP)	-	-	-
Mn-54	-	-	-
Fe-59	-	-	-
Co-58	-	-	-
Co-60	-	-	-
Zn-65	-	-	-
Zr-Nb-95	-	-	-
Cs-134	-	-	-
Cs-137	-	-	-
Ba-La-140	-	-	-
<u>K-1b</u>			
Date Collected	01-02-14	02-03-14	03-03-14
Lab Code	NS <sup>a</sup>	NS <sup>a</sup>	NS <sup>a</sup>
Gross beta			
Suspended Solids	-	-	-
Dissolved Solids	-	-	-
Total Residue	-	-	-
K-40 (ICP)	-	-	-
Mn-54	-	-	-
Fe-59	-	-	-
Co-58	-	-	-
Co-60	-	-	-
Zn-65	-	-	-
Zr-Nb-95	-	-	-
Cs-134	-	-	-
Cs-137	-	-	-
Ba-La-140	-	-	-

<sup>a</sup> NS= No sample; water frozen.

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

Sample Description and Concentration (pCi/L)			
<u>Indicator</u>			
<u>K-1a</u>			
Date Collected	04-01-14	05-01-14	06-02-14
Lab Code	KSW- 1227	KSW- 1897	KSW- 2424
Gross beta			
Suspended Solids	< 1.0	< 0.7	< 0.7
Dissolved Solids	7.2 ± 1.1	6.1 ± 1.6	11.6 ± 1.4
Total Residue	7.2 ± 1.1	6.1 ± 1.6	11.6 ± 1.4
K-40 (ICP)	5.04	4.83	7.57
Mn-54	< 2.5	< 2.7	< 3.2
Fe-59	< 6.0	< 5.7	< 5.4
Co-58	< 2.5	< 1.7	< 2.3
Co-60	< 1.5	< 2.6	< 2.5
Zn-65	< 4.8	< 4.9	< 5.2
Zr-Nb-95	< 1.9	< 2.7	< 2.6
Cs-134	< 3.3	< 3.0	< 4.4
Cs-137	< 2.7	< 3.2	< 4.2
Ba-La-140	< 2.5	< 4.0	< 5.9
<u>K-1b</u>			
Date Collected	04-01-14	05-01-14	06-02-14
Lab Code	KSW- 1228	KSW- 1898	KSW- 2425
Gross beta			
Suspended Solids	< 0.9	< 0.7	0.9 ± 0.4
Dissolved Solids	6.6 ± 0.9	4.9 ± 1.2	11.4 ± 1.1
Total Residue	6.6 ± 0.9	4.9 ± 1.2	12.3 ± 1.2
K-40 (ICP)	3.72	2.74	6.17
Mn-54	< 2.1	< 2.4	< 3.7
Fe-59	< 3.2	< 5.8	< 9.2
Co-58	< 2.5	< 2.4	< 5.8
Co-60	< 1.7	< 1.7	< 4.0
Zn-65	< 2.5	< 3.2	< 5.3
Zr-Nb-95	< 2.3	< 3.6	< 4.2
Cs-134	< 2.9	< 2.8	< 6.1
Cs-137	< 2.9	< 2.5	< 6.8
Ba-La-140	< 3.7	< 5.0	< 4.7

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

Sample Description and Concentration (pCi/L)				
<u>Indicator</u>				
<u>K-1a</u>				
Date Collected	07-01-14	08-04-14	09-02-14	
Lab Code	KSW- 3077	KSW- 3976	KSW- 4608	
Gross beta				
Suspended Solids	< 0.7	< 0.7	< 0.7	
Dissolved Solids	3.4 ± 0.6	4.2 ± 1.0	14.1 ± 1.5	
Total Residue	3.4 ± 0.6	4.2 ± 1.0	14.1 ± 1.5	
K-40 (ICP)	2.89	4.28	12.55	
Mn-54	< 1.8	< 2.6	< 2.5	
Fe-59	< 4.9	< 6.3	< 7.7	
Co-58	< 2.6	< 2.5	< 2.3	
Co-60	< 1.5	< 3.1	< 1.6	
Zn-65	< 4.1	< 3.8	< 4.3	
Zr-Nb-95	< 2.6	< 3.7	< 3.6	
Cs-134	< 3.9	< 3.2	< 3.7	
Cs-137	< 3.7	< 2.8	< 2.8	
Ba-La-140	< 2.1	< 11.3	< 4.8	
<u>K-1b</u>				
Date Collected	07-01-14	08-04-14	09-02-14	
Lab Code	KSW- 3078	KSW- 3977	KSW- 4609	
Gross beta				
Suspended Solids	1.1 ± 0.4	< 0.7	< 0.7	
Dissolved Solids	2.4 ± 0.7	1.7 ± 0.6	3.2 ± 0.7	
Total Residue	3.5 ± 0.8	1.7 ± 0.6	3.2 ± 0.7	
K-40 (ICP)	2.44	2.21	2.00	
Mn-54	< 2.6	< 1.7	< 2.3	
Fe-59	< 4.1	< 5.3	< 5.2	
Co-58	< 3.9	< 2.5	< 3.3	
Co-60	< 2.0	< 1.7	< 2.2	
Zn-65	< 2.4	< 2.5	< 2.5	
Zr-Nb-95	< 3.7	< 3.2	< 4.1	
Cs-134	< 3.7	< 1.8	< 2.9	
Cs-137	< 3.5	< 1.6	< 2.3	
Ba-La-140	< 3.0	< 4.8	< 4.1	

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

Sample Description and Concentration (pCi/L)				
<u>Indicator</u>				
<u>K-1a</u>				
Date Collected	10-01-14	11-03-14	12-01-14	
Lab Code	KSW- 5220	KSW- 6208	KSW- 6776	
Gross beta				
Suspended Solids	1.1 ± 0.4	< 0.7	< 0.8	
Dissolved Solids	20.2 ± 2.1	4.3 ± 1.0	7.7 ± 4.0	
Total Residue	21.3 ± 2.1	4.3 ± 1.0	7.7 ± 4.0	
K-40 (ICP)	14.76	4.85	5.60	
Mn-54	< 4.0	< 3.1	< 2.8	
Fe-59	< 1.8	< 2.7	< 5.6	
Co-58	< 2.9	< 2.3	< 2.7	
Co-60	< 2.5	< 1.9	< 2.5	
Zn-65	< 3.6	< 3.1	< 3.4	
Zr-Nb-95	< 3.2	< 2.5	< 2.7	
Cs-134	< 3.9	< 3.8	< 3.2	
Cs-137	< 4.3	< 3.7	< 3.0	
Ba-La-140	< 2.2	< 2.8	< 1.8	
<u>K-1b</u>				
Date Collected	10-01-14	11-03-14	12-01-14	
Lab Code	KSW- 5221	KSW- 6209	KSW- 6777	
Gross beta				
Suspended Solids	< 0.7	1.0 ± 0.4	< 0.7	
Dissolved Solids	4.2 ± 1.2	3.3 ± 0.7	3.4 ± 0.8	
Total Residue	4.2 ± 1.2	4.3 ± 0.8	3.4 ± 0.8	
K-40 (ICP)	2.50	2.36	3.05	
Mn-54	< 2.5	< 2.4	< 1.8	
Fe-59	< 2.9	< 4.5	< 3.8	
Co-58	< 2.9	< 2.8	< 2.6	
Co-60	< 2.1	< 1.1	< 0.8	
Zn-65	< 3.8	< 5.6	< 3.0	
Zr-Nb-95	< 1.6	< 2.4	< 2.9	
Cs-134	< 2.9	< 3.1	< 2.5	
Cs-137	< 2.0	< 2.0	< 3.3	
Ba-La-140	< 2.6	< 4.2	< 1.3	



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

Sample Description and Concentration (pCi/L)			
<u>Indicator</u>			
<u>K-1d</u>			
Date Collected	01-02-14	02-03-14	03-03-14
Lab Code	KSW- 14	KSW- 376	KSW- 756
Gross beta			
Suspended Solids	< 0.8	< 0.7	< 0.7
Dissolved Solids	2.8 ± 0.6	2.3 ± 0.6	2.1 ± 0.7
Total Residue	2.8 ± 0.6	2.3 ± 0.6	2.1 ± 0.7
K-40 (ICP)	1.19	1.36	1.28
Mn-54	< 2.1	< 1.9	< 1.3
Fe-59	< 5.5	< 2.2	< 3.8
Co-58	< 1.9	< 1.1	< 2.1
Co-60	< 1.9	< 1.5	< 2.2
Zn-65	< 6.2	< 1.8	< 2.1
Zr-Nb-95	< 1.5	< 3.1	< 2.1
Cs-134	< 2.7	< 2.4	< 2.3
Cs-137	< 3.6	< 2.5	< 2.2
Ba-La-140	< 2.3	< 2.2	< 1.7
<u>K-1e</u>			
Date Collected	01-02-14	02-03-14	03-03-14
Lab Code	NS <sup>a</sup>	NS <sup>a</sup>	NS <sup>a</sup>
Gross beta			
Suspended Solids	-	-	-
Dissolved Solids	-	-	-
Total Residue	-	-	-
K-40 (ICP)	-	-	-
Mn-54	-	-	-
Fe-59	-	-	-
Co-58	-	-	-
Co-60	-	-	-
Zn-65	-	-	-
Zr-Nb-95	-	-	-
Cs-134	-	-	-
Cs-137	-	-	-
Ba-La-140	-	-	-

<sup>a</sup> NS= No sample; water frozen.

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

Sample Description and Concentration (pCi/L)				
<u>Indicator</u>				
<u>K-1d</u>				
Date Collected	04-01-14	05-01-14	06-02-14	
Lab Code	KSW- 1229	KSW- 1899	KSW- 2426	
Gross beta				
Suspended Solids	< 0.7	< 0.7	< 0.7	
Dissolved Solids	2.1 ± 0.5	2.2 ± 0.7	1.3 ± 0.4	
Total Residue	2.1 ± 0.5	2.2 ± 0.7	1.3 ± 0.4	
K-40 (ICP)	1.47	1.45	1.25	
Mn-54	< 2.7	< 2.3	< 3.0	
Fe-59	< 4.1	< 4.4	< 3.2	
Co-58	< 2.9	< 3.2	< 3.1	
Co-60	< 1.9	< 1.2	< 1.9	
Zn-65	< 2.1	< 3.7	< 2.8	
Zr-Nb-95	< 1.7	< 3.1	< 3.6	
Cs-134	< 3.1	< 1.6	< 2.1	
Cs-137	< 2.9	< 1.6	< 3.2	
Ba-La-140	< 1.2	< 3.6	< 2.7	
<u>K-1e</u>				
Date Collected	04-01-14	05-01-14	06-02-14	
Lab Code	KSW- 1230	KSW- 1900	KSW- 2427	
Gross beta				
Suspended Solids	< 0.7	< 0.7	< 0.7	
Dissolved Solids	3.4 ± 1.0	3.0 ± 1.3	6.5 ± 1.1	
Total Residue	3.4 ± 1.0	3.0 ± 1.3	6.5 ± 1.1	
K-40 (ICP)	2.35	1.86	4.02	
Mn-54	< 2.1	< 2.3	< 1.9	
Fe-59	< 3.9	< 4.3	< 5.9	
Co-58	< 1.8	< 2.1	< 2.4	
Co-60	< 2.5	< 2.1	< 2.1	
Zn-65	< 6.1	< 4.7	< 5.9	
Zr-Nb-95	< 3.0	< 3.7	< 2.6	
Cs-134	< 3.9	< 2.6	< 3.0	
Cs-137	< 1.9	< 2.7	< 3.1	
Ba-La-140	< 3.2	< 6.4	< 2.2	

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

Sample Description and Concentration (pCi/L)			
<u>Indicator</u>			
<u>K-1d</u>			
Date Collected	07-01-14	08-04-14	09-02-14
Lab Code	KSW- 3079	KSW- 3978	KSW- 4610
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	1.6 ± 0.4	1.6 ± 0.4	1.2 ± 0.4
Total Residue	1.6 ± 0.4	1.6 ± 0.4	1.2 ± 0.4
K-40 (ICP)	1.20	1.14	1.07
Mn-54	< 2.7	< 2.0	< 2.7
Fe-59	< 2.6	< 3.5	< 2.5
Co-58	< 2.3	< 1.7	< 2.8
Co-60	< 2.7	< 2.0	< 2.9
Zn-65	< 4.0	< 4.6	< 4.7
Zr-Nb-95	< 3.3	< 3.5	< 3.0
Cs-134	< 2.8	< 2.2	< 3.3
Cs-137	< 1.8	< 2.5	< 2.3
Ba-La-140	< 3.2	< 11.3	< 4.1
<u>K-1e</u>			
Date Collected	07-01-14	08-04-14	09-02-14
Lab Code	KSW- 3080	KSW- 3979	KSW- 4611
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	2.1 ± 0.5	6.2 ± 1.2	3.7 ± 0.9
Total Residue	2.1 ± 0.5	6.2 ± 1.2	3.7 ± 0.9
K-40 (ICP)	2.98	6.94	4.17
Mn-54	< 2.8	< 2.2	< 4.2
Fe-59	< 2.7	< 4.7	< 5.0
Co-58	< 1.6	< 1.7	< 5.0
Co-60	< 2.4	< 1.7	< 2.5
Zn-65	< 3.0	< 4.0	< 4.3
Zr-Nb-95	< 2.8	< 3.0	< 4.9
Cs-134	< 2.6	< 1.8	< 4.8
Cs-137	< 2.7	< 2.1	< 4.7
Ba-La-140	< 2.3	< 5.4	< 4.0

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

Sample Description and Concentration (pCi/L)			
<u>Indicator</u>			
<u>K-1d</u>			
Date Collected	10-01-14	11-03-14	12-01-14
Lab Code	KSW- 5222	KSW- 6210	KSW- 6778
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	1.9 ± 0.7	1.4 ± 0.4	1.3 ± 0.4
Total Residue	1.9 ± 0.7	1.4 ± 0.4	1.3 ± 0.4
K-40 (ICP)	1.14	1.25	1.26
Mn-54	< 3.9	< 4.6	< 2.1
Fe-59	< 7.5	< 8.1	< 4.0
Co-58	< 3.8	< 7.0	< 1.6
Co-60	< 6.2	< 6.6	< 2.5
Zn-65	< 4.1	< 5.9	< 2.4
Zr-Nb-95	< 4.6	< 5.2	< 2.7
Cs-134	< 5.1	< 5.6	< 2.7
Cs-137	< 5.4	< 3.8	< 3.1
Ba-La-140	< 3.3	< 3.1	< 2.4
<u>K-1e</u>			
Date Collected	10-01-14	11-03-14	12-01-14
Lab Code	KSW- 5223	KSW- 6211	KSW- 6779
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	5.0 ± 1.2	4.0 ± 0.8	4.6 ± 1.1
Total Residue	5.0 ± 1.2	4.0 ± 0.8	4.6 ± 1.1
K-40 (ICP)	3.90	2.73	2.37
Mn-54	< 2.8	< 3.0	< 2.2
Fe-59	< 5.0	< 2.9	< 3.4
Co-58	< 2.5	< 1.4	< 3.0
Co-60	< 4.1	< 2.8	< 2.5
Zn-65	< 4.0	< 4.3	< 6.2
Zr-Nb-95	< 4.5	< 2.8	< 3.1
Cs-134	< 4.8	< 3.2	< 3.3
Cs-137	< 3.0	< 2.6	< 3.6
Ba-La-140	< 2.5	< 2.3	< 2.7

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

Sample Description and Concentration (pCi/L)			
<u>Indicator</u>			
<u>K-1k</u>			
Date Collected	01-02-14	02-03-14	03-03-14
Lab Code	NS <sup>a</sup>	NS <sup>a</sup>	NS <sup>a</sup>
Gross beta			
Suspended Solids	-	-	-
Dissolved Solids	-	-	-
Total Residue	-	-	-
K-40 (ICP)	-	-	-
Mn-54	-	-	-
Fe-59	-	-	-
Co-58	-	-	-
Co-60	-	-	-
Zn-65	-	-	-
Zr-Nb-95	-	-	-
Cs-134	-	-	-
Cs-137	-	-	-
Ba-La-140	-	-	-
Date Collected	04-01-14	05-01-14	06-02-14
Lab Code	KSW- 1231	KSW- 1901	KSW- 2428
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	4.0 ± 0.6	6.3 ± 0.9	5.9 ± 0.7
Total Residue	4.0 ± 0.6	6.3 ± 0.9	5.9 ± 0.7
K-40 (ICP)	1.94	5.49	5.77
Mn-54	< 3.3	< 2.7	< 2.7
Fe-59	< 4.7	< 2.2	< 3.6
Co-58	< 2.5	< 2.5	< 2.5
Co-60	< 2.6	< 2.2	< 2.5
Zn-65	< 3.0	< 3.0	< 1.6
Zr-Nb-95	< 4.0	< 4.0	< 1.9
Cs-134	< 3.1	< 3.4	< 2.9
Cs-137	< 3.8	< 3.0	< 2.3
Ba-La-140	< 3.2	< 3.8	< 4.2

<sup>a</sup> NS= No sample; water frozen.

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

Sample Description and Concentration (pCi/L)				
<u>Indicator</u>				
<u>K-1k</u>				
Date Collected	07-01-14	08-04-14	09-02-14	
Lab Code	KSW- 3081	KSW- 3980	KSW- 4612	
Gross beta				
Suspended Solids	< 0.7	< 1.1	2.3 ± 0.8	
Dissolved Solids	6.1 ± 0.7	3.4 ± 0.6	6.2 ± 0.8	
Total Residue	6.1 ± 0.7	3.4 ± 0.6	8.5 ± 1.1	
K-40 (ICP)	6.17	3.80	3.74	
Mn-54	< 2.3	< 2.2	< 3.1	
Fe-59	< 5.8	< 4.8	< 3.8	
Co-58	< 2.9	< 2.9	< 2.1	
Co-60	< 1.2	< 2.4	< 2.4	
Zn-65	< 2.4	< 2.6	< 2.7	
Zr-Nb-95	< 2.7	< 3.5	< 3.5	
Cs-134	< 3.9	< 2.3	< 2.3	
Cs-137	< 2.8	< 2.4	< 3.1	
Ba-La-140	< 2.6	< 9.2	< 3.9	
Date Collected	10-01-14	11-03-14	12-01-14	
Lab Code	KSW- 5224	KSW- 6212	KSW- 6780	
Gross beta				
Suspended Solids	< 1.0	1.1 ± 0.4	< 0.7	
Dissolved Solids	4.9 ± 1.2	8.3 ± 1.0	10.4 ± 1.0	
Total Residue	4.9 ± 1.2	9.4 ± 1.1	10.4 ± 1.0	
K-40 (ICP)	4.04	13.45	8.45	
Mn-54	< 2.0	< 2.9	< 3.5	
Fe-59	< 4.1	< 1.9	< 5.7	
Co-58	< 3.1	< 3.9	< 2.7	
Co-60	< 2.0	< 2.9	< 3.0	
Zn-65	< 5.5	< 2.8	< 4.5	
Zr-Nb-95	< 3.3	< 2.7	< 2.0	
Cs-134	< 3.7	< 4.4	< 4.2	
Cs-137	< 2.5	< 3.9	< 3.7	
Ba-La-140	< 2.0	< 2.8	< 1.8	

<sup>a</sup> NS= No sample; inaccessible.

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

Collection: Monthly

Sample Description and Concentration (pCi/L)			
<u>Control</u>			
<u>K-9 (Raw)</u>			
Date Collected	01-02-14	02-03-14	03-03-14
Lab Code	KSW- 15	KSW- 377	KSW- 757
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	1.6 ± 0.5	1.7 ± 0.5	2.1 ± 0.7
Total Residue	1.6 ± 0.5	1.7 ± 0.5	2.1 ± 0.7
K-40 (ICP)	1.09	1.13	1.12
Mn-54	< 4.1	< 2.3	< 1.7
Fe-59	< 3.3	< 4.4	< 2.6
Co-58	< 3.5	< 2.2	< 1.1
Co-60	< 3.7	< 1.8	< 1.6
Zn-65	< 6.0	< 4.7	< 3.8
Zr-Nb-95	< 2.0	< 2.6	< 1.4
Cs-134	< 3.7	< 2.5	< 2.3
Cs-137	< 3.6	< 2.1	< 2.9
Ba-La-140	< 2.6	< 1.9	< 1.3
<u>K-9 (Tap)</u>			
Date Collected	01-02-14	02-03-14	03-03-14
Lab Code	KSW- 16	KSW- 378	KSW- 758
Gross beta			
Suspended Solids	< 0.8	< 0.7	< 0.7
Dissolved Solids	2.4 ± 0.6	1.5 ± 0.5	< 1.3
Total Residue	2.4 ± 0.6	1.5 ± 0.5	< 1.3
K-40 (ICP)	1.10	1.16	1.14
Mn-54	< 1.9	< 2.3	< 3.2
Fe-59	< 2.9	< 1.9	< 6.5
Co-58	< 1.6	< 2.0	< 2.9
Co-60	< 1.1	< 2.2	< 2.8
Zn-65	< 3.5	< 3.2	< 4.5
Zr-Nb-95	< 2.8	< 2.5	< 2.8
Cs-134	< 2.8	< 2.6	< 3.3
Cs-137	< 2.7	< 2.9	< 2.1
Ba-La-140	< 1.8	< 1.6	< 2.6

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

Sample Description and Concentration (pCi/L)			
<u>Control</u>			
<u>K-9 (Raw)</u>			
Date Collected	04-01-14	05-01-14	06-02-14
Lab Code	KSW- 1232	KSW- 1902	KSW- 2429
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	2.5 ± 0.8	1.6 ± 0.4	0.8 ± 0.4
Total Residue	2.5 ± 0.8	1.6 ± 0.4	0.8 ± 0.4
K-40 (ICP)	1.30	1.07	1.13
Mn-54	< 3.2	< 2.2	< 1.7
Fe-59	< 4.1	< 6.5	< 4.7
Co-58	< 2.7	< 1.6	< 2.5
Co-60	< 2.1	< 1.5	< 2.4
Zn-65	< 5.9	< 3.8	< 3.2
Zr-Nb-95	< 2.3	< 2.4	< 2.2
Cs-134	< 3.2	< 2.4	< 3.6
Cs-137	< 3.3	< 2.5	< 3.5
Ba-La-140	< 1.9	< 3.4	< 3.2
<u>K-9 (Tap)</u>			
Date Collected	04-01-14	05-01-14	06-02-14
Lab Code	KSW- 1233	KSW- 1903	KSW- 2430
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	2.5 ± 0.7	1.4 ± 0.4	2.3 ± 0.7
Total Residue	2.5 ± 0.7	1.4 ± 0.4	2.3 ± 0.7
K-40 (ICP)	1.27	1.10	1.17
Mn-54	< 3.9	< 1.9	< 2.8
Fe-59	< 6.3	< 4.9	< 2.0
Co-58	< 2.9	< 1.9	< 2.1
Co-60	< 3.4	< 2.4	< 2.0
Zn-65	< 5.6	< 3.3	< 3.6
Zr-Nb-95	< 2.9	< 4.2	< 2.8
Cs-134	< 4.5	< 2.5	< 2.7
Cs-137	< 4.1	< 2.9	< 2.7
Ba-La-140	< 2.0	< 5.1	< 2.2



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

Sample Description and Concentration (pCi/L)			
<u>Control</u>			
<u>K-9 (Raw)</u>			
Date Collected	07-01-14	08-04-14	09-02-14
Lab Code	KSW- 3082	KSW- 3981	KSW- 4613
Gross beta			
Suspended Solids	< 0.6	< 0.8	< 0.8
Dissolved Solids	1.2 ± 0.4	1.2 ± 0.4	1.6 ± 0.5
Total Residue	1.2 ± 0.4	1.2 ± 0.4	1.6 ± 0.5
K-40 (ICP)	1.14	1.16	1.07
Mn-54	< 2.8	< 1.0	< 4.5
Fe-59	< 3.6	< 2.5	< 7.9
Co-58	< 1.5	< 1.7	< 3.5
Co-60	< 1.3	< 1.0	< 2.7
Zn-65	< 7.2	< 2.4	< 5.7
Zr-Nb-95	< 2.2	< 1.2	< 4.5
Cs-134	< 3.2	< 1.2	< 4.0
Cs-137	< 3.3	< 1.1	< 3.8
Ba-La-140	< 1.8	< 3.7	< 8.8
<u>K-9 (Tap)</u>			
Date Collected	07-01-14	08-04-14	09-02-14
Lab Code	KSW- 3083	KSW- 3982	KSW- 4614
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	1.3 ± 0.4	1.9 ± 0.7	1.0 ± 0.4
Total Residue	1.3 ± 0.4	1.9 ± 0.7	1.0 ± 0.4
K-40 (ICP)	1.16	1.16	1.07
Mn-54	< 3.0	< 3.1	< 3.4
Fe-59	< 3.1	< 5.7	< 3.1
Co-58	< 2.7	< 2.4	< 2.1
Co-60	< 2.0	< 2.2	< 2.4
Zn-65	< 3.2	< 2.6	< 2.4
Zr-Nb-95	< 1.9	< 3.1	< 2.9
Cs-134	< 1.9	< 3.0	< 2.6
Cs-137	< 3.0	< 2.7	< 3.1
Ba-La-140	< 2.1	< 6.0	< 5.9

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

Sample Description and Concentration (pCi/L)				
<u>Control</u>				
<u>K-9 (Raw)</u>				
Date Collected	07-01-14	08-04-14	09-02-14	
Lab Code	KSW- 3082	KSW- 3981	KSW- 4613	
Gross beta				
Suspended Solids	< 0.6	< 0.8	< 0.8	
Dissolved Solids	1.2 ± 0.4	1.2 ± 0.4	1.6 ± 0.5	
Total Residue	1.2 ± 0.4	1.2 ± 0.4	1.6 ± 0.5	
K-40 (ICP)	1.14	1.16	1.07	
Mn-54	< 2.8	< 1.0	< 4.5	
Fe-59	< 3.6	< 2.5	< 7.9	
Co-58	< 1.5	< 1.7	< 3.5	
Co-60	< 1.3	< 1.0	< 2.7	
Zn-65	< 7.2	< 2.4	< 5.7	
Zr-Nb-95	< 2.2	< 1.2	< 4.5	
Cs-134	< 3.2	< 1.2	< 4.0	
Cs-137	< 3.3	< 1.1	< 3.8	
Ba-La-140	< 1.8	< 3.7	< 8.8	
<u>K-9 (Tap)</u>				
Date Collected	07-01-14	08-04-14	09-02-14	
Lab Code	KSW- 3083	KSW- 3982	KSW- 4614	
Gross beta				
Suspended Solids	< 0.7	< 0.7	< 0.7	
Dissolved Solids	1.3 ± 0.4	1.9 ± 0.7	1.0 ± 0.4	
Total Residue	1.3 ± 0.4	1.9 ± 0.7	1.0 ± 0.4	
K-40 (ICP)	1.16	1.16	1.07	
Mn-54	< 3.0	< 3.1	< 3.4	
Fe-59	< 3.1	< 5.7	< 3.1	
Co-58	< 2.7	< 2.4	< 2.1	
Co-60	< 2.0	< 2.2	< 2.4	
Zn-65	< 3.2	< 2.6	< 2.4	
Zr-Nb-95	< 1.9	< 3.1	< 2.9	
Cs-134	< 1.9	< 3.0	< 2.6	
Cs-137	< 3.0	< 2.7	< 3.1	
Ba-La-140	< 2.1	< 6.0	< 5.9	

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

Sample Description and Concentration (pCi/L)				
<u>Indicator</u>				
<u>K-14a</u>				
Date Collected	01-02-14	02-03-14	03-03-14	
Lab Code	NS <sup>a</sup>	NS <sup>a</sup>	NS <sup>a</sup>	
Gross beta				
Suspended Solids	-	-	-	
Dissolved Solids	-	-	-	
Total Residue	-	-	-	
K-40 (ICP)	-	-	-	
Mn-54	-	-	-	
Fe-59	-	-	-	
Co-58	-	-	-	
Co-60	-	-	-	
Zn-65	-	-	-	
Zr-Nb-95	-	-	-	
Cs-134	-	-	-	
Cs-137	-	-	-	
Ba-La-140	-	-	-	
<u>K-14b</u>				
Date Collected	01-02-14	02-03-14	03-03-14	
Lab Code	NS <sup>a</sup>	NS <sup>a</sup>	NS <sup>a</sup>	
Gross beta				
Suspended Solids	-	-	-	
Dissolved Solids	-	-	-	
Total Residue	-	-	-	
K-40 (ICP)	-	-	-	
Mn-54	-	-	-	
Fe-59	-	-	-	
Co-58	-	-	-	
Co-60	-	-	-	
Zn-65	-	-	-	
Zr-Nb-95	-	-	-	
Cs-134	-	-	-	
Cs-137	-	-	-	
Ba-La-140	-	-	-	

<sup>a</sup> NS= No sample; water frozen.

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

## Description and Concentration (pCi/L)

IndicatorK-14a

Date Collected	04-01-14	05-01-14	06-02-14
Lab Code	KSW- 1234	KSW- 1904	KSW- 2431
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	5.2 ± 0.9	3.6 ± 0.6	6.8 ± 1.0
Total Residue	5.2 ± 0.9	3.6 ± 0.6	6.8 ± 1.0
K-40 (ICP)	2.90	2.91	4.68
Mn-54	< 2.7	< 2.4	< 1.6
Fe-59	< 5.7	< 2.8	< 5.6
Co-58	< 1.4	< 2.0	< 2.0
Co-60	< 1.2	< 2.2	< 2.3
Zn-65	< 2.4	< 3.8	< 1.7
Zr-Nb-95	< 3.0	< 4.1	< 2.9
Cs-134	< 2.8	< 2.7	< 2.8
Cs-137	< 2.7	< 1.5	< 2.5
Ba-La-140	< 3.0	< 5.3	< 2.6

K-14b

Date Collected	04-01-14	05-01-14	06-02-14
Lab Code	KSW- 1235	KSW- 1905	KSW- 2432
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.5
Dissolved Solids	4.7 ± 0.9	3.9 ± 0.6	7.8 ± 0.7
Total Residue	4.7 ± 0.9	3.9 ± 0.6	7.8 ± 0.7
K-40 (ICP)	2.74	2.80	4.59
Mn-54	< 2.0	< 1.3	< 1.9
Fe-59	< 6.0	< 4.0	< 4.4
Co-58	< 2.1	< 2.6	< 2.0
Co-60	< 1.7	< 2.4	< 2.7
Zn-65	< 2.9	< 2.9	< 2.4
Zr-Nb-95	< 3.0	< 4.1	< 3.1
Cs-134	< 3.7	< 3.2	< 2.9
Cs-137	< 3.5	< 3.3	< 3.0
Ba-La-140	< 2.3	< 2.6	< 3.8

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

Sample Description and Concentration (pCi/L)			
<u>Indicator</u>			
<u>K-14a</u>			
Date Collected	07-01-14	08-04-14	09-02-14
Lab Code	KSW- 3084	KSW- 3983	KSW- 4615
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	1.6 ± 0.5	1.8 ± 0.7	0.6 ± 0.3
Total Residue	1.6 ± 0.5	1.8 ± 0.7	0.6 ± 0.3
K-40 (ICP)	1.28	1.19	1.10
Mn-54	< 2.7	< 1.8	< 2.3
Fe-59	< 3.0	< 3.8	< 3.3
Co-58	< 2.3	< 1.9	< 2.6
Co-60	< 2.2	< 1.1	< 1.5
Zn-65	< 4.4	< 2.9	< 4.5
Zr-Nb-95	< 4.0	< 2.4	< 3.6
Cs-134	< 3.6	< 1.6	< 3.9
Cs-137	< 3.5	< 2.0	< 2.9
Ba-La-140	< 2.0	< 3.3	< 2.8
<u>K-14b</u>			
Date Collected	07-01-14	08-04-14	09-02-14
Lab Code	KSW- 3085	KSW- 3984	KSW- 4616
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	1.5 ± 0.4	1.7 ± 0.7	1.8 ± 0.4
Total Residue	1.5 ± 0.4	1.7 ± 0.7	1.8 ± 0.4
K-40 (ICP)	1.29	1.20	1.08
Mn-54	< 2.3	< 1.7	< 2.1
Fe-59	< 5.1	< 4.7	< 3.4
Co-58	< 3.4	< 1.8	< 2.5
Co-60	< 1.7	< 1.1	< 1.5
Zn-65	< 2.0	< 2.6	< 2.5
Zr-Nb-95	< 2.2	< 1.9	< 3.4
Cs-134	< 3.4	< 1.6	< 2.5
Cs-137	< 1.7	< 2.0	< 2.6
Ba-La-140	< 2.5	< 6.1	< 5.9

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

Sample Description and Concentration (pCi/L)				
<u>Indicator</u>				
<u>K-14a</u>				
Date Collected	10-01-14	11-03-14	12-01-14	
Lab Code	KSW- 5227	KSW- 6215	KSW- 6783	
Gross beta				
Suspended Solids	< 0.7	< 0.7	< 0.7	
Dissolved Solids	2.3 ± 0.7	3.9 ± 0.6	2.2 ± 0.4	
Total Residue	2.3 ± 0.7	3.9 ± 0.6	2.2 ± 0.4	
K-40 (ICP)	1.19	1.27	1.73	
Mn-54	< 2.2	< 2.9	< 2.4	
Fe-59	< 4.6	< 2.3	< 4.3	
Co-58	< 1.9	< 1.7	< 2.5	
Co-60	< 2.0	< 1.9	< 2.0	
Zn-65	< 4.0	< 3.4	< 7.0	
Zr-Nb-95	< 4.0	< 2.6	< 3.3	
Cs-134	< 2.7	< 3.6	< 3.8	
Cs-137	< 3.3	< 2.4	< 2.1	
Ba-La-140	< 2.8	< 3.4	< 1.4	
<u>K-14b</u>				
Date Collected	10-01-14	11-03-14	12-01-14	
Lab Code	KSW- 5228	KSW- 6216	KSW- 6784	
Gross beta				
Suspended Solids	< 0.7	< 0.7	< 0.7	
Dissolved Solids	2.2 ± 0.8	3.6 ± 0.6	2.2 ± 0.4	
Total Residue	2.2 ± 0.8	3.6 ± 0.6	2.2 ± 0.4	
K-40 (ICP)	1.16	1.32	1.63	
Mn-54	< 3.8	< 1.2	< 3.4	
Fe-59	< 6.5	< 3.6	< 5.0	
Co-58	< 3.3	< 2.0	< 3.6	
Co-60	< 3.5	< 1.4	< 2.3	
Zn-65	< 3.7	< 4.2	< 6.7	
Zr-Nb-95	< 5.0	< 2.0	< 2.5	
Cs-134	< 4.7	< 2.7	< 3.8	
Cs-137	< 4.4	< 2.4	< 4.4	
Ba-La-140	< 2.8	< 2.4	< 2.0	

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

Collection: Quarterly composites of monthly samples.

Location and		Concentration pCi/L		
Collection Period	Lab Code	H-3	Sr-89	Sr-90
<u>Indicator</u>				
<u>K-1a</u>				
1st Quarter	NS <sup>a</sup>	-	-	-
2nd Quarter	KSW -2625	< 140	< 0.9	< 0.5
3rd Quarter	KSW -5019	< 150	< 1.3	< 0.5
4th Quarter	KSW -7008	< 178	< 1.1	< 0.6
<u>K-1b</u>				
1st Quarter	NS <sup>a</sup>	-	-	-
2nd Quarter	KSW -2627	< 140	< 1.0	< 0.5
3rd Quarter	KSW -5020	< 150	< 1.4	< 0.5
4th Quarter	KSW -7009	< 178	< 1.3	< 0.6
<u>K-1d</u>				
1st Quarter	KSW -817	< 146	< 0.9	< 0.4
2nd Quarter	KSW -2628	170 ± 79	< 1.1	< 0.6
3rd Quarter	KSW -5021	< 150	< 1.3	< 0.5
4th Quarter	KSW -7010	< 178	< 1.1	< 0.6
<u>K-1e</u>				
1st Quarter	NS <sup>a</sup>	-	-	-
2nd Quarter	KSW -2629	< 140	< 1.0	< 0.5
3rd Quarter	KSW -5022	192 ± 89	< 1.2	< 0.4
4th Quarter	KSW -7011	< 178	< 1.1	< 0.5

<sup>a</sup> No samples; water frozen.

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
<u>Indicator</u>				
<u>K-14a</u>				
1st Quarter	NS <sup>a</sup>	-	-	-
2nd Quarter	KSW -2633	< 140	< 1.2	< 0.6
3rd Quarter	KSW -5026	< 150	< 1.3	< 0.5
4th Quarter	KSW -7015	< 178	< 1.1	< 0.6
<u>K-14b</u>				
1st Quarter	NS <sup>a</sup>	-	-	-
2nd Quarter	KSW -2634	< 140	< 1.0	< 0.5
3rd Quarter	KSW -5028	< 150	< 1.2	< 0.4
4th Quarter	KSW -7016	< 178	< 1.1	< 0.5
<u>K-1k</u>				
1st Quarter	NS <sup>a</sup>	-	-	-
2nd Quarter	KSW -2630	< 140	< 1.0	< 0.5
3rd Quarter	KSW -5023	< 150	< 1.2	0.7 ± 0.4
4th Quarter	KSW -7012	< 178	< 1.0	0.6 ± 0.3
<u>Control</u>				
<u>K-9</u>				
1st Quarter	KSW -818 (Raw)	< 142	< 1.1	< 0.5
	KSW -819 (Tap)	< 142	< 1.0	< 0.5
2nd Quarter	KSW -2631 (Raw)	< 140	< 1.0	< 0.5
	KSW -2632 (Tap)	< 140	< 1.1	< 0.6
3rd Quarter	KSW -5024 (Raw)	< 150	< 1.3	< 0.5
	KSW -5025 (Tap)	< 150	< 1.6	< 0.5
4th Quarter	KSW -7013 (Raw)	< 178	< 1.2	< 0.6
	KSW -7014 (Tap)	< 178	< 1.3	< 0.6

<sup>a</sup> No samples; water frozen.



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	05-07-14		09-12-14	
Lab Code	KF- 2408		KF- 5210	
Type	Sucker		Lake Herring	
Portion	<u>Flesh</u>	<u>Bones</u>	<u>Flesh</u>	<u>Bones</u>
Gross beta	3.58 ± 0.07	3.62 ± 0.59	3.37 ± 0.07	3.10 ± 1.03
Sr-89	NA <sup>a</sup>	< 0.34	NA <sup>a</sup>	< 0.33
Sr-90	NA	0.26 ± 0.07	NA	0.40 ± 0.10
K-40	3.31 ± 0.44	NA <sup>a</sup>	2.69 ± 0.37	NA <sup>a</sup>
Mn-54	< 0.014	NA	< 0.018	NA
Fe-59	< 0.060	NA	< 0.062	NA
Co-58	< 0.015	NA	< 0.013	NA
Co-60	< 0.012	NA	< 0.011	NA
Cs-134	< 0.018	NA	< 0.016	NA
Cs-137	< 0.015	NA	< 0.020	NA

Collected	12-31-14	
Lab Code	KF- 7509	
Type	Brown Trout	
Portion	<u>Flesh</u>	<u>Bones</u>
Gross beta	4.31 ± 0.09	2.86 ± 0.69
Sr-89	NA <sup>a</sup>	< 0.17
Sr-90	NA	0.22 ± 0.07
K-40	3.41 ± 0.44	NA <sup>a</sup>
Mn-54	< 0.011	NA
Fe-59	< 0.030	NA
Co-58	< 0.013	NA
Co-60	< 0.012	NA
Cs-134	< 0.015	NA
Cs-137	< 0.014	NA

<sup>a</sup> 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	06-02-14	06-02-14	05-01-14	06-02-14
Lab Code	KSL- 2410	KSL- 2411	KSL- 1887	KSL- 2414
Gross beta	4.07 ± 0.08	7.12 ± 0.18	1.84 ± 0.11	4.20 ± 0.06
Sr-89	< 0.006	< 0.017	< 0.023	< 0.009
Sr-90	< 0.002	0.006 ± 0.003	< 0.006	< 0.004
Be-7	0.43 ± 0.13	0.52 ± 0.13	0.49 ± 0.03	0.72 ± 0.13
K-40	4.12 ± 0.37	5.76 ± 0.42	0.83 ± 0.04	4.72 ± 0.37
Mn-54	< 0.008	< 0.011	< 0.002	< 0.012
Co-58	< 0.012	< 0.007	< 0.002	< 0.008
Co-60	< 0.012	< 0.017	< 0.002	< 0.007
Nb-95	< 0.009	< 0.013	< 0.003	< 0.010
Zr-95	< 0.020	< 0.026	< 0.004	< 0.017
Ru-103	< 0.012	< 0.011	< 0.002	< 0.009
Ru-106	< 0.057	< 0.103	< 0.019	< 0.102
Cs-134	< 0.013	< 0.012	< 0.002	< 0.010
Cs-137	< 0.013	< 0.012	0.004 ± 0.002	< 0.006
Ce-141	< 0.013	< 0.016	< 0.007	< 0.020
Ce-144	< 0.048	< 0.101	< 0.021	< 0.078

Location	K-1e	K-1k	K-14
Date Collected	06-02-14	06-02-14	05-01-14
Lab Code	KSL- 2412	KSL- 2413	KSL- 1888
Gross beta	3.24 ± 0.06	4.19 ± 0.05	11.57 ± 0.72
Sr-89	< 0.007	< 0.004	< 0.197
Sr-90	< 0.003	< 0.002	0.071 ± 0.033
Be-7	0.23 ± 0.12	< 0.08	0.80 ± 0.04
K-40	3.65 ± 0.31	3.41 ± 0.26	1.04 ± 0.05
Mn-54	< 0.010	< 0.007	< 0.002
Co-58	< 0.009	< 0.007	< 0.002
Co-60	< 0.010	< 0.006	< 0.002
Nb-95	< 0.010	< 0.008	< 0.004
Zr-95	< 0.013	< 0.017	< 0.005
Ru-103	< 0.012	< 0.008	< 0.002
Ru-106	< 0.099	< 0.076	< 0.015
Cs-134	< 0.010	< 0.009	< 0.002
Cs-137	< 0.013	< 0.007	0.007 ± 0.002
Ce-141	< 0.022	< 0.015	< 0.007
Ce-144	< 0.088	< 0.064	< 0.017

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	09-02-14	09-02-14	08-04-14	09-02-14
Lab Code	KSL- 4634	KSL- 4635	KSL- 3965	KSL- 4636
Gross beta	4.36 ± 0.13	6.84 ± 0.21	2.72 ± 0.20	7.72 ± 0.28
Sr-89	< 0.008	< 0.016	< 0.08	< 0.041
Sr-90	< 0.003	< 0.005	0.035 ± 0.015	< 0.015
Be-7	0.41 ± 0.16	1.27 ± 0.17	0.77 ± 0.04	0.43 ± 0.18
K-40	4.65 ± 0.47	5.15 ± 0.40	1.64 ± 0.05	5.29 ± 0.42
Mn-54	< 0.013	< 0.009	< 0.002	< 0.015
Co-58	< 0.014	< 0.011	< 0.002	< 0.016
Co-60	< 0.016	< 0.013	< 0.002	< 0.014
Nb-95	< 0.016	< 0.017	< 0.004	< 0.015
Zr-95	< 0.022	< 0.028	< 0.004	< 0.020
Ru-103	< 0.013	< 0.013	< 0.003	< 0.011
Ru-106	< 0.162	< 0.107	< 0.017	< 0.125
Cs-134	< 0.017	< 0.012	< 0.002	< 0.014
Cs-137	< 0.016	< 0.008	0.018 ± 0.002	< 0.010
Ce-141	< 0.033	< 0.025	< 0.008	< 0.016
Ce-144	< 0.113	< 0.075	< 0.012	< 0.098

Location	K-1e	K-1k	K-14
Date Collected	08-04-14	08-04-14	08-04-14
Lab Code	KSL- 3966	KSL- 3967	KSL- 3968
Gross beta	4.54 ± 0.10	6.64 ± 0.12	2.50 ± 0.15
Sr-89	< 0.009	< 0.009	< 0.024
Sr-90	< 0.003	0.003 ± 0.002	0.009 ± 0.005
Be-7	< 0.12	< 0.10	0.51 ± 0.03
K-40	3.77 ± 0.33	5.63 ± 0.41	1.51 ± 0.04
Mn-54	< 0.012	< 0.013	< 0.001
Co-58	< 0.012	< 0.017	< 0.002
Co-60	< 0.012	< 0.013	< 0.002
Nb-95	< 0.012	< 0.017	< 0.003
Zr-95	< 0.012	< 0.024	< 0.004
Ru-103	< 0.012	< 0.013	< 0.002
Ru-106	< 0.097	< 0.084	< 0.014
Cs-134	< 0.011	< 0.013	< 0.001
Cs-137	< 0.010	< 0.013	0.010 ± 0.002
Ce-141	< 0.019	< 0.018	< 0.006
Ce-144	< 0.059	< 0.098	< 0.011

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)					
Location	Indicator				Control
	K-1c	K-1d	K-1j	K-14	K-9
Collection Date	05-01-14	05-01-14	05-01-14	05-01-14	05-01-14
Lab Code	KBS- 1962	KBS- 1963	KBS- 1964	KBS- 1966	KBS- 1965
Gross beta	10.47 ± 1.66	8.28 ± 1.51	10.89 ± 1.72	9.11 ± 1.65	15.49 ± 1.79
Sr-89	< 0.053	< 0.070	< 0.045	< 0.050	< 0.036
Sr-90	< 0.030	< 0.040	< 0.027	< 0.030	0.026 ± 0.012
K-40	5.58 ± 0.43	5.53 ± 0.39	5.84 ± 0.41	6.79 ± 0.44	10.50 ± 0.87
Co-58	< 0.013	< 0.006	< 0.010	< 0.012	< 0.034
Co-60	< 0.012	< 0.007	< 0.009	< 0.009	< 0.031
Cs-134	< 0.013	< 0.012	< 0.012	< 0.011	< 0.028
Cs-137	< 0.015	< 0.012	< 0.011	< 0.012	0.08 ± 0.03
Location	K-1c	K-1d	K-1j	K-14	K-9
Collection Date	11-03-14	11-03-14	11-03-14	11-03-14	11-03-14
Lab Code	KBS- 6217	KBS- 6218	KBS- 6219	KBS- 6221	KBS- 6220
Gross beta	10.96 ± 1.68	12.16 ± 1.67	12.87 ± 1.78	10.44 ± 1.69	15.22 ± 1.76
Sr-89	< 0.043	< 0.042	< 0.059	< 0.040	< 0.038
Sr-90	< 0.020	0.028 ± 0.013	< 0.020	0.020 ± 0.011	0.041 ± 0.013
K-40	6.45 ± 0.43	6.52 ± 0.41	8.14 ± 0.46	8.20 ± 0.46	8.99 ± 0.65
Co-58	< 0.014	< 0.014	< 0.016	< 0.012	< 0.026
Co-60	< 0.010	0.08 ± 0.02	0.08 ± 0.01	< 0.008	< 0.015
Cs-134	< 0.012	< 0.013	< 0.008	< 0.009	< 0.015
Cs-137	0.03 ± 0.02	< 0.013	0.03 ± 0.01	< 0.012	< 0.024

**This Page Intentionally Left Blank**



**Dominion<sup>®</sup>**

**2014  
Annual  
Radiological  
Environmental  
Operating  
Report**

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

**Dominion Energy Kewaunee, Inc.**

## State Change History

Submit by HAWLEY, ROBIN C	Draft 5/6/2014 12:40:34 Owner : HAWLEY, ROBIN C	Submit by HAWLEY, ROBIN C	Supervisor Review 5/6/2014 12:43:02 Owner : HOLSCHBACH, DARRYL M	Complete by HOLSCHBACH, DARRYL M	O/R Review 5/6/2014 13:31:36 Owner : OLSOWY, TIMOTHY F	Complete by BACKUS, DANIEL C.	CRT Review 5/6/2014 16:36:32 Owner : OLSOWY, TIMOTHY F
CA by PRIBEK, BARBARA A	CRT Assignment Creation 5/8/2014 9:52:00 Owner : OLSOWY, TIMOTHY F	Update CR by PRIBEK, BARBARA A	CRT Review 5/8/2014 9:57:51 Owner : OLSOWY, TIMOTHY F	Complete by OLSOWY, TIMOTHY F	Assignments Pending 5/13/2014 10:59:26 Owner : OLSOWY, TIMOTHY F		

## Section 1

**Applicable to site:** KEWA  
**Record #:** CR547860  
**Revision Number:** 0  
**Submitter:** HAWLEY, ROBIN C  
**Submitter Dept.:** KEWA - Chemistry  
**Submitter Phone Number:** 8215/7665  
**Submitter Pager Number:** n/a  
**One-Line Description:** K-31 Environmental Air Sampler lost power.  
**Description:** East Krok substation (K-31) air sampler has no power supplied to it due to Public Service performing maintenance inside the substation. Power will be restored to the sampler when work is completed.  
  
 Run time on environmental air sample is less than expected.  
  
 Power was lost 5/5/14 @ 0953 per remote monitoring alert. Sampler status was checked at that time.  
  
 Sampler status to be verified when power to sampler is restored.

**Discovery Date:** 5/6/2014  
**Discovery Time:** 8:26:00  
**Method of Discovery:** SEFI (Self Identified)  
**Literal 1:** If this CR is associated with the BACC Program, please ensure that the CR Description contains sufficient information to ensure the ability to quickly locate the component, which will ensure ALARA.

**Associated with Boric Acid?:** No  
**Applicable to unit:** Unit 1  
**Associated w/ Equipment Location?:** No  
**System(s):** 63-MET-METEOROLOGICAL/ENV  
**Equipment Location Display:** Equipment Location - Critical Component - PRA Flag - Quality Classification - Component Description

**Equipment Location Links:**  
**Initial Actions:** Initiated this Condition Report.  
**Additional C/A processes req'd?:** Other  
**Text Question 1:** Provide details for any Additional C/A processes needed:  
**Text Answer 1:** When power is restored, operational check will be performed by Chemistry dept.

Request CA to CY/RP to report and document in the 2014 Annual Radiological Environmental Operating Report due 5/15/2015.  
 Document loss of power and reduced run time IAW REMM 2.4.1.c, all deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Report.

**C/As Initiated (REA, WR, ETC):**

Tag Hung: (None)  
 Tag Number:  
 Additional Contacts:  
 Supervisor - CR Review: HOLSCHBACH, DARRYL M  
 Question G: Is this CR an Operability/Reportability Issue Requiring O/R Review?  
 Yes/No G: Yes  
 Question H: Does this CR affect personnel safety?  
 Yes/No H: Yes  
 Question I: Does this CR affect plant safety?  
 Yes/No I: Yes  
 Question J: Does this CR involve plant equipment?  
 Yes/No J: Yes  
 Question K: Is this CR an environmental concern?  
 Yes/No K: Yes  
 Literal 2: Unit Conditions:  
 Unit 1% Pwr: 0  
 Unit 2% Pwr: NA  
 Unit 3% Pwr: NA  
 Unit 1 Mode: 7  
 Unit 2 Mode: NA  
 Unit 3 Mode: NA  
 OP-AA-102 Review Req'd?: Yes  
 Is a TS SSC Affected?: No  
 TS SSC Operability Assessment: N/A  
 Text Question 2: Basis for operability:  
 Text Answer 2: NON-FUNCTIONAL. K-31 Environmental Air Sampler is NON-FUNCTIONAL due to loss of power. The K-31 Environmental Air Sampler is required per Table 2.2.1-A, Radiological Environmental Monitoring Manual. Per Table 2.2.1-A, samples should be obtained from available sampling locations. Several locations remain functional to obtain the minimum required samples per REMM. If specimens are unobtainable due to sampling equipment malfunction, reasonable efforts shall be made to correct the problem prior to the end-of the next sampling period.  
 Question L: Is an Operability Assessment req'd for an SSC, which is Functional for its TRM function, to demonstrate operability for its TS function?  
 Yes / No L: No  
 Literal 4: The basis for establishing IOD can be documented in the "Basis for Operability" field. An IOD assignment does not necessarily need to be created.  
 Is an IOD Assignment Required?: No  
 LCO entered: No  
 Applicable LCO:  
 Non-TS SSC Functionality Assessment.: Non-Functional  
 Literal 5: NOTE: If a RAS is to be assigned to determine the answer to the next question, select "TBD" (to be determined) for the answer to the next question.  
 Does it impact a TS SSC?: No  
 Literal 6: The basis for establishing Non-TS SSC Functionality may be documented in the "Basis for Operability" field. A RAS assignment does not necessarily need to be created in these instances.  
 Is a RAS Assignment Needed?: No  
 Literal 7: If this Condition Report is addressing an SSC, document the qualification status of the SSC in the following field. Otherwise select N/A. NOTE: An SSC can be Operable or Functional and still not be Fully Qualified.  
 SSC Qualification Status: N/A  
 Reportable condition?: No  
 Text Question 3: Reportability Comments:  
 Text Answer 3:  
 Can IOD be established?: (None)  
 Literal 3: If this CR is associated with any system leakage, provide answers to the



**State Change History**

<b>Submit</b> by HAWLEY, ROBIN C	<b>Draft</b> 5/6/2014 12:40:34 Owner : HAWLEY, ROBIN C	<b>Submit</b> by HAWLEY, ROBIN C	<b>Supervisor Review</b> 5/6/2014 12:43:02 Owner : HOLSCHBACH, DARRYL M	<b>Complete</b> by HOLSCHBACH, DARRYL M	<b>O/R Review</b> 5/6/2014 13:31:36 Owner : OLSOWY, TIMOTHY F	<b>Complete</b> by BACKUS, DANIEL C.	<b>CRT Review</b> 5/6/2014 16:36:32 Owner : OLSOWY, TIMOTHY F
<b>CA</b> by PRIBEK, BARBARA A	<b>CRT Assignment Creation</b> 5/8/2014 9:52:00 Owner : OLSOWY, TIMOTHY F	<b>Update CR</b> by PRIBEK, BARBARA A	<b>CRT Review</b> 5/8/2014 9:57:51 Owner : OLSOWY, TIMOTHY F	<b>Complete</b> by OLSOWY, TIMOTHY F	<b>Assignments Pending</b> 5/13/2014 10:59:26 Owner : OLSOWY, TIMOTHY F		

**Section 1**

**Applicable to site:** KEWA  
**Record #:** CR547860  
**Revision Number:** 0  
**Submitter:** HAWLEY, ROBIN C  
**Submitter Dept.:** KEWA - Chemistry  
**Submitter Phone Number:** 8215/7665  
**Submitter Pager Number:** n/a  
**One-Line Description:** K-31 Environmental Air Sampler lost power.  
**Description:** East Krok substation (K-31) air sampler has no power supplied to it due to Public Service performing maintenance inside the substation. Power will be restored to the sampler when work is completed.  
  
 Run time on environmental air sample is less than expected.  
  
 Power was lost 5/5/14 @ 0953 per remote monitoring alert. Sampler status was checked at that time.  
  
 Sampler status to be verified when power to sampler is restored.  
**Discovery Date:** 5/6/2014  
**Discovery Time:** 8:26:00  
**Method of Discovery:** SEFI (Self Identified)  
**Literal 1:** If this CR is associated with the BACC Program, please ensure that the CR Description contains sufficient information to ensure the ability to quickly locate the component, which will ensure ALARA.  
  
**Associated with Boric Acid?:** No  
**Applicable to unit:** Unit 1  
**Associated w/ Equipment Location?:** No  
**System(s):** 63-MET--METEOROLOGICAL/ENV  
**Equipment Location Display:** Equipment Location - Critical Component - PRA Flag - Quality Classification - Component Description  
**Equipment Location Links:**  
**Initial Actions:** Initiated this Condition Report.  
**Additional C/A processes req'd?:** Other  
**Text Question 1:** Provide details for any Additional C/A processes needed:  
**Text Answer 1:** When power is restored, operational check will be performed by Chemistry dept.  
  
 Request CA to CY/RP to report and document in the 2014 Annual Radiological Environmental Operating Report due 5/15/2015.  
 Document loss of power and reduced run time IAW REMM 2.4.1.c, all deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Report.  
  
**C/As Initiated (REA, WR, ETC):**

**This Page Intentionally Left Blank**