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2020 Annual Radiological Environmental Operating Report

Kewaunee Power Station
Part II, Data Tabulations, Graphs and Analyses

Dominion Energy Kewaunee, Inc.

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

REPORT TO

DOMINION NUCLEAR

RADIOLOGICAL MONITORING PROGRAM FOR THE KEWAUNEE POWER STATION KEWAUNEE, WISCONSIN

ANNUAL REPORT - PART II
DATA TABULATIONS AND ANALYSES

January 1 to December 31, 2020

Prepared and submitted by

ATI ENVIRONMENTAL, Inc.
Midwest Laboratory
Project No. 8002

Approved:

Ashok Banavali, Ph.D.
Laboratory Manager

Daniel J. Shannon
Manager - Radiological Protection
and Chemistry, KPS

PREFACE

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

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1.0 INTRODUCTION

The following constitutes Part II of the final report for the 2020 Radiological Monitoring Program conducted at the Kewaunee Power Station (KPS), Kewaunee, Wisconsin.

Included are tabulations of data for all samples collected in 2020 along with graphs of data trends. A summary and interpretation of the data presented here are published in Part I of the 2020 Annual Report on the Radiological Monitoring Program for the Kewaunee Power Station.

FIGURE 1
ENVIRONMENTAL SAMPLING LOCATION

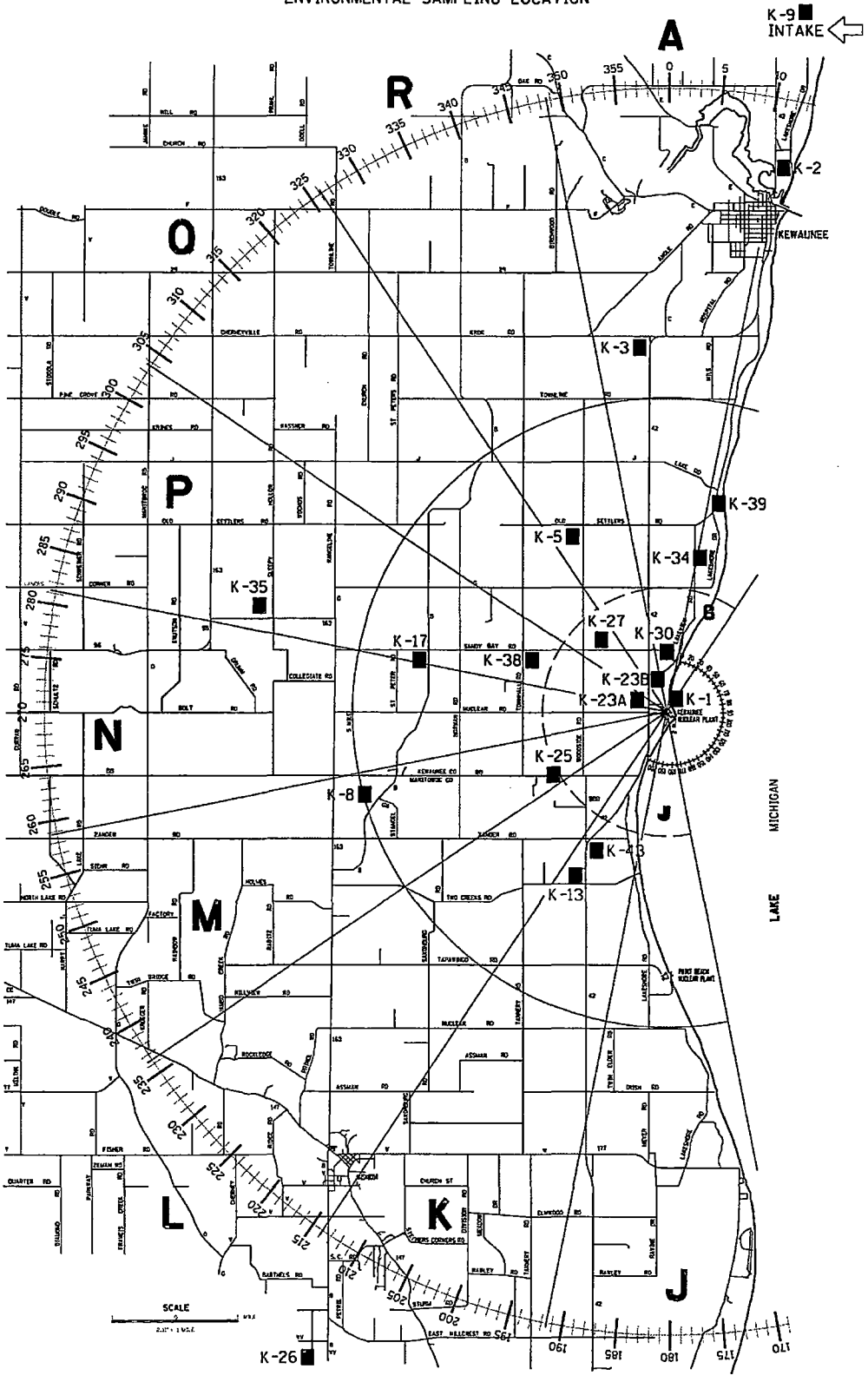

Table 1. Sampling locations, Kewaunee Power Station.

Code	Type[a]	Distance (miles)[b] and Sector	Location
K-1	I		Onsite
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	Maintenance Waste Oil and Material Storage Building
K-1h	I	0.12 NW	North Well
K-1j	I	0.10 S	500' south of condenser discharge
K-1m	I	0.15 N	ISFSI East
K-1o	I	0.16 N	ISFSI North
K-1q	I	0.16 N	ISFSI West
K-1r	I	0.13 N	ISFSI West
K-1t	I	0.10 ESE	Gatehouse
K-1u	I	0.05 SSW	Maintenance Building
K-2	C	8.91 NNE	WPS Operations Building in Kewaunee
K-3[c]	I/C	5.9 N	Lyle and John Siegmund Farm, N2815 Hwy 42, Kewaunee
K-5	I	3.2 NNW	Ed Paplham Farm, E4160 Old Settlers Rd, Kewaunee
K-8	I	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-13	C	3.0 SSW	Rand's General Store, Two Creeks
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-25	I	1.9 SW	Wotachek Farm, 3968 E. Cty Tk BB, Two Rivers
K-26	C	9.1 SSW	Wilfert Farms Vegetable Stand (9.1 miles south of "BB")
K-27	I	1.53 NW	Schleis Farm, E4298 Sandy Bay Rd, Kewaunee
K-30	I	0.8 N	End of site boundary
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-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-43	I	2.71 SSW	Gary Maigatter Property, 17333 Hwy 42, Two Rivers

[a] I = indicator; C = control.

[b] Distances are measured from reactor stack.

[c] Location K-3 is an indicator for ambient radiation and a control for soil, cattle feed and grass.

Table 2. Type and frequency of collection.

Location	Weekly	Quarterly	Semiannually	Annually
K-1b		SW GR [a]		
K-1c			SS [b]	
K-1d		SW		FI [c]
K-1e		SW		
K-1f	AP [g]	GR [a] TLD	SO	
K-1h		WW		
K-1j			SS [b]	
K-1m		TLD		
K-1o		TLD		
K-1q		TLD		
K-1r		TLD		
K-1t		WW [h]		
K-1u		WW [h]		
K-2	AP [g]	TLD		
K-3		GR [a] TLD	SO	CF [d]
K-5		GR [a] TLD		CF [d]
K-8	AP [g]	TLD		
K-9		SW [f]	SS [b]	
K-13		WW		
K-17		TLD		
K-23a				BLV [e]
K-23b				BLV [e]
K-25		TLD		
K-26				BLV [e]
K-27		TLD		
K-30		TLD		
K-34		GR [a]	SO	CF [d]
K-35		GR [a]	SO	CF [d]
K-38		GR [a]	SO	CF [d]
K-39		GR [a] TLD		CF [d]
K-43	AP [g]	TLD		

[a] Three times a year, second third and fourth quarters.
[b] Collected in May and November.
[c] Collected in the third quarter.
[d] First quarter (January, February, March) only.
[e] Alternate since milk sampling is no longer performed.
[f] Two samples, raw and treated.
[g] Frequency may be increased dependent on dust loading.
[h] Well water shall be taken when this source is tapped for drinking or irrigation purposes in areas where the hydraulic gradient or recharge properties are suitable for contamination.

Table 3. Sample Codes:

Code	Description
AP	Airborne particulates
BLV	Broad leaf vegetation
CF	Cattle feed
FI	Fish
GR	Grass
SO	Soil
SW	Surface water
SS	Shoreline Sediment
TLD	Thermoluminescent dosimeter
WW	Well water

2.0 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.

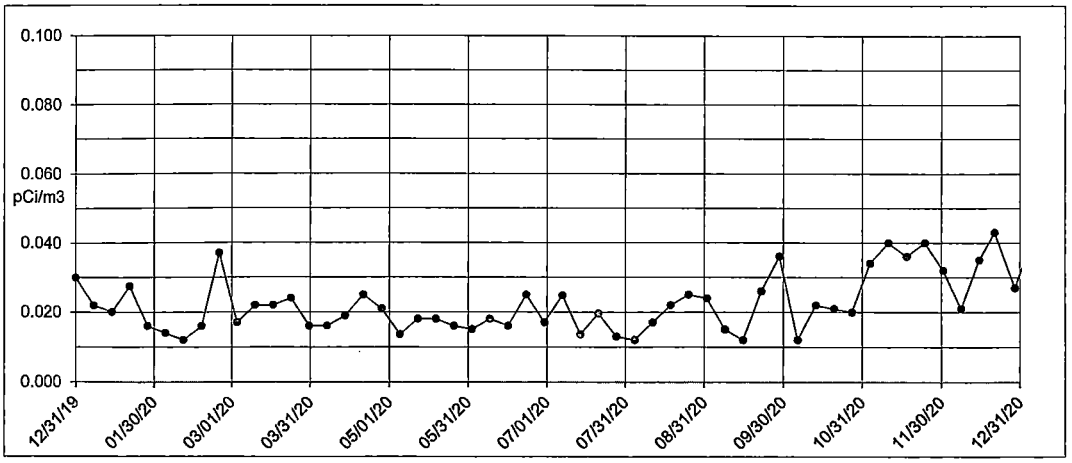

Figure 2. Location K-1f (weekly samples, 2020).

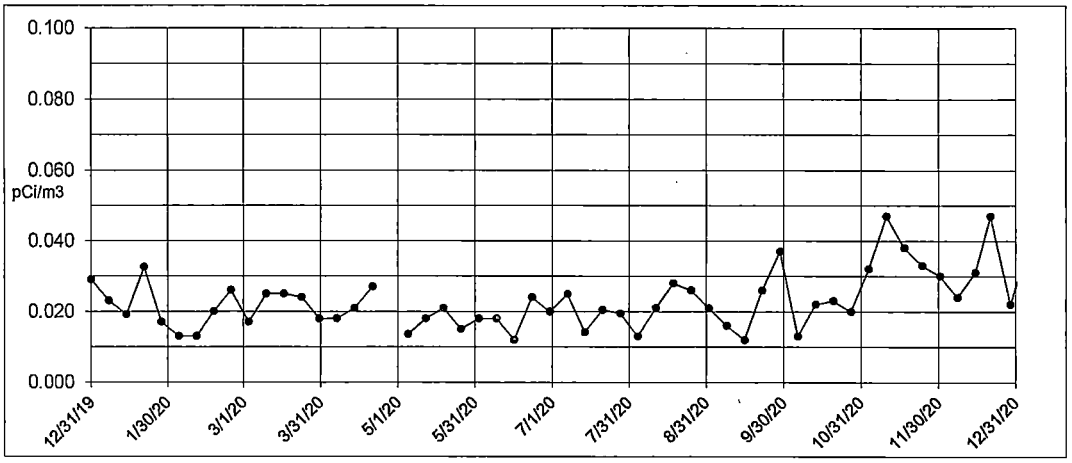

Figure 3. Location K-2 (weekly samples, 2020).

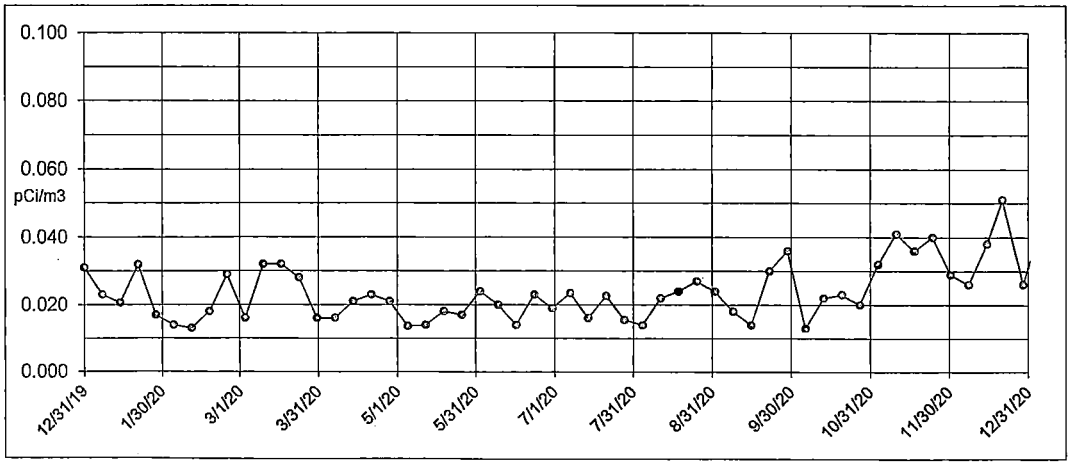

Figure 4. Location K-8 (weekly samples, 2020).

Air Particulates -- Gross Beta

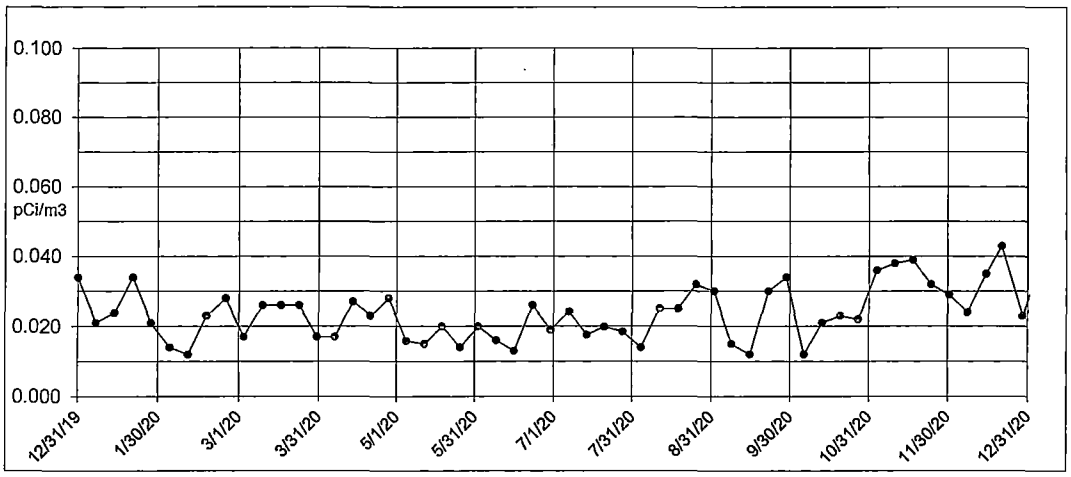

Figure 5. Location K-43 (weekly samples, 2020).

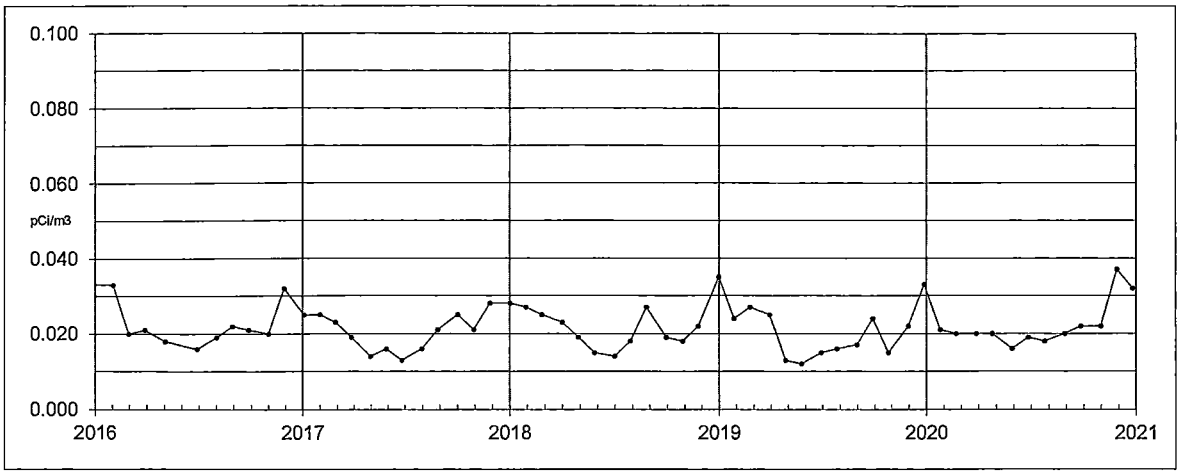

Figure 6. Location K-1f (monthly averages, 2016-2020).

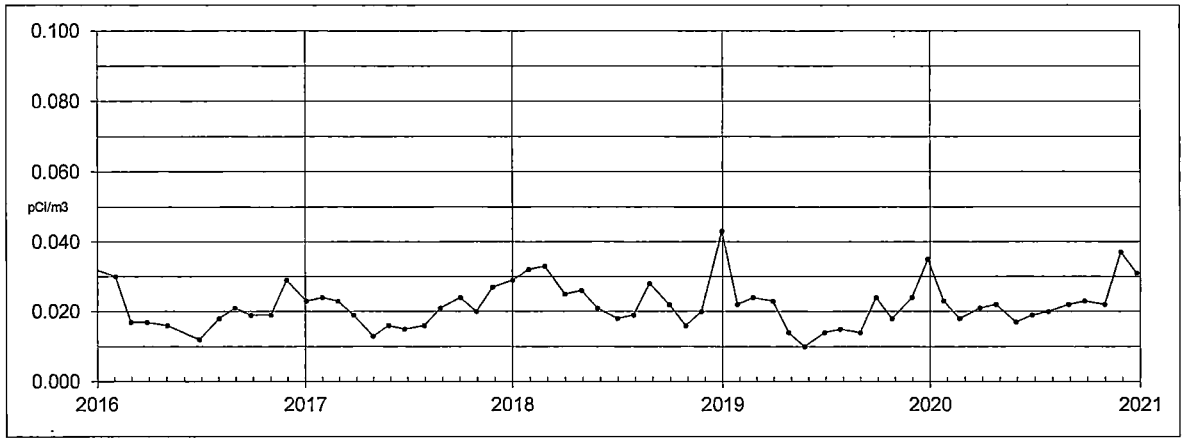

Figure 7. Location K-2 (monthly averages, 2016-2020).

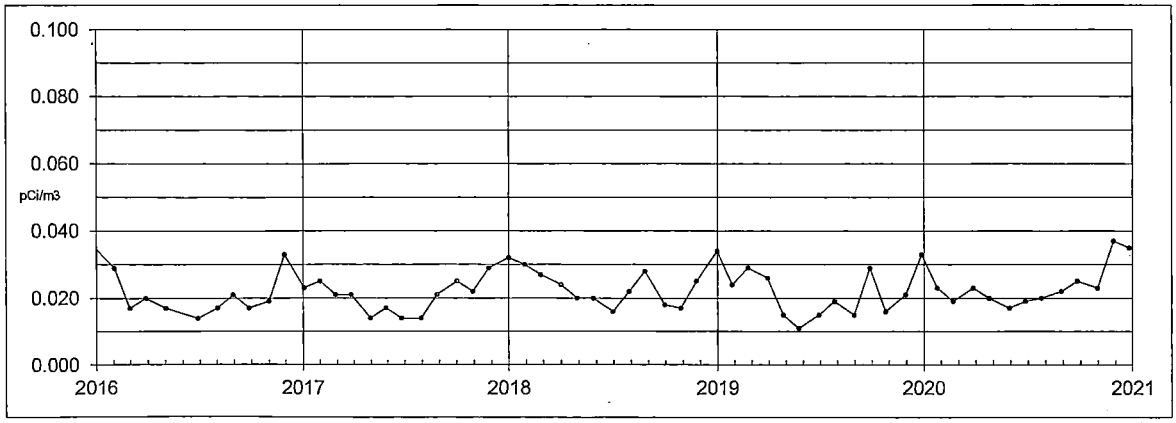

Figure 8. Location K-8 (monthly averages, 2016-2020).

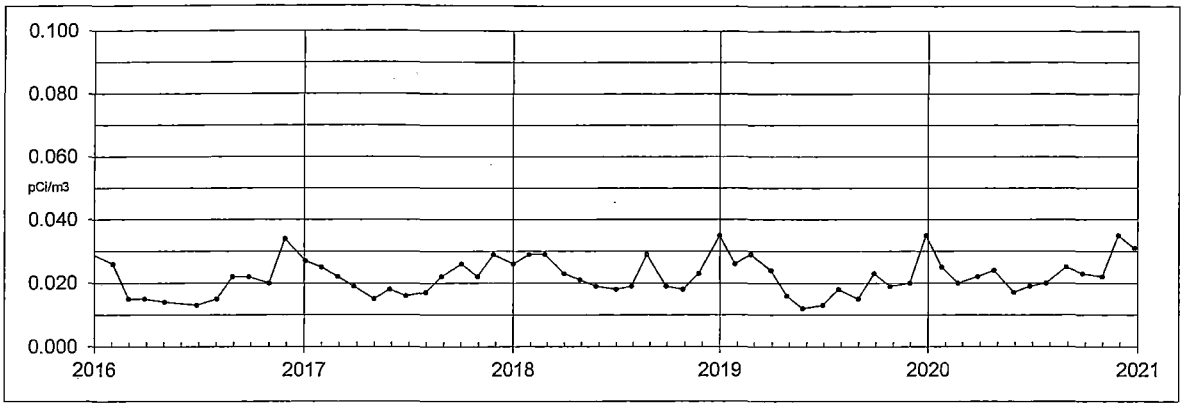

Figure 9. Location K-43 (monthly averages, 2016-2020).

KPS

Well Water – Gross Alpha

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

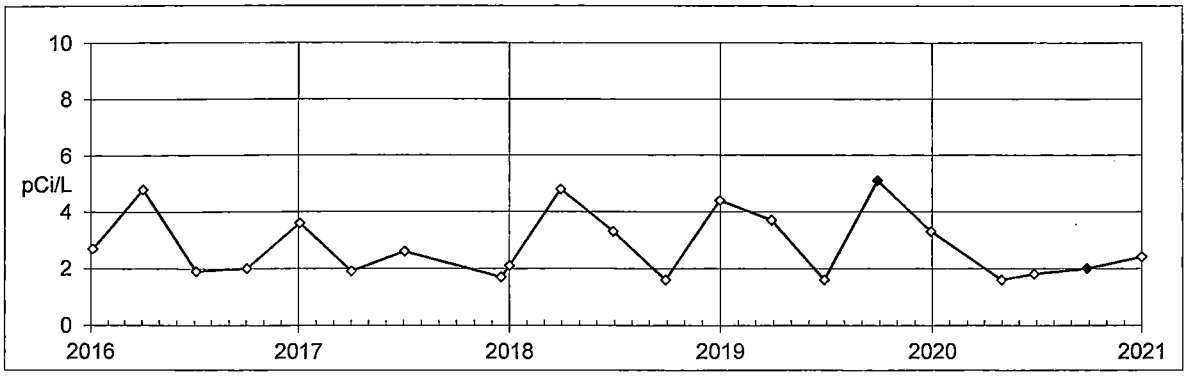

Figure 10. Location K-1h. Total Residue. Quarterly collection.

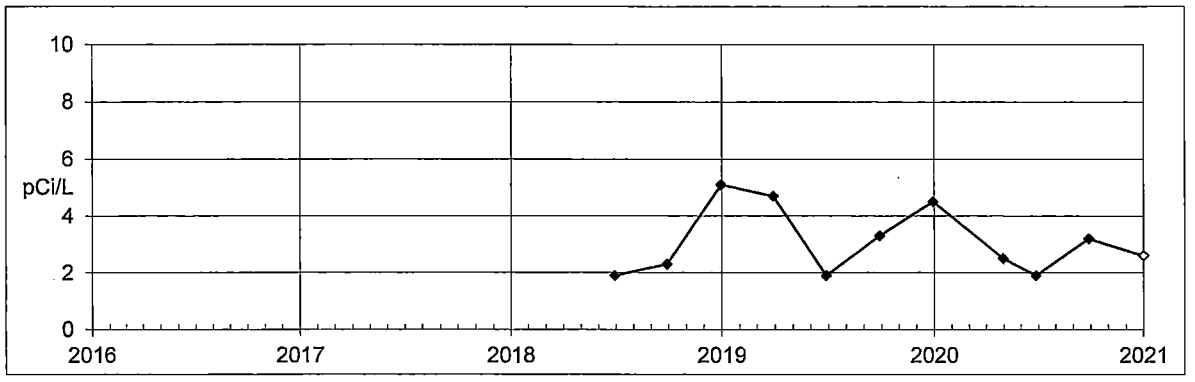

Figure 11. Location K-1t. Total Residue. Quarterly collection.(Initiated 1/1/18; sample taken only when source has been tapped for drinking or irrigation purposes.)

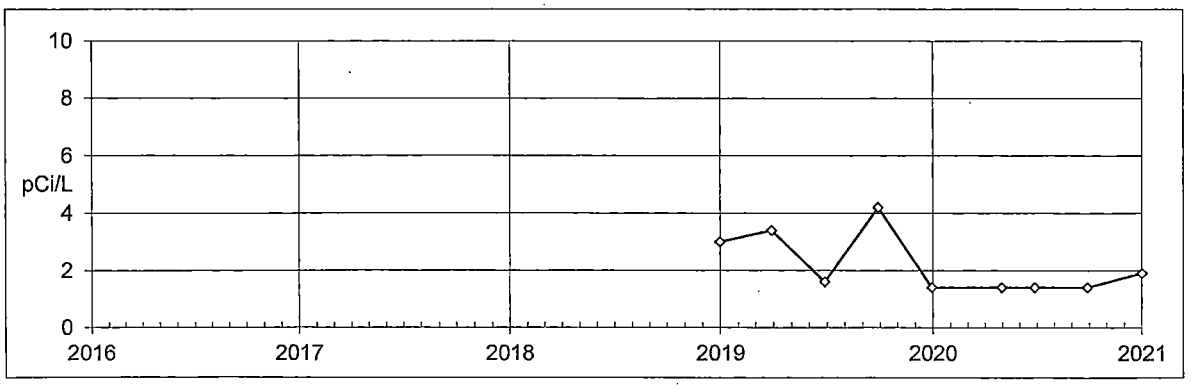

Figure 12. Location K-1u. Total Residue. Quarterly collection.(Initiated 1/2/18; sample taken only when source has been tapped for drinking or irrigation purposes.)

Well Water – Gross Beta

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

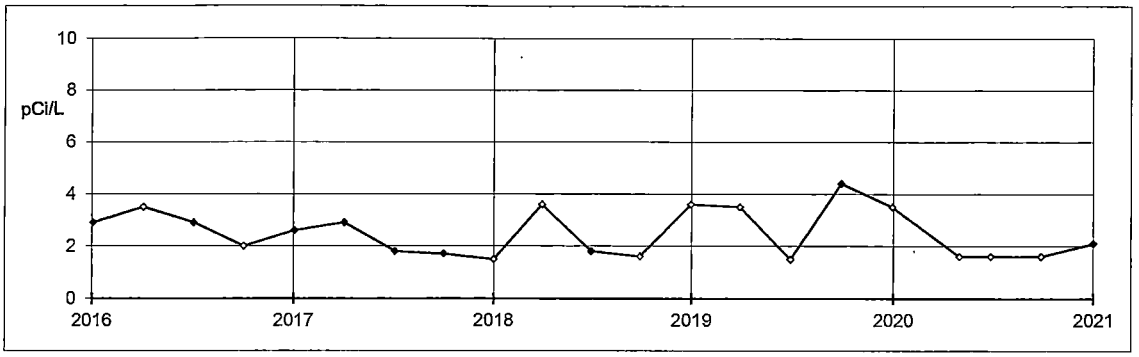

Figure 13. Location K-1h. Total Residue. Quarterly collection.

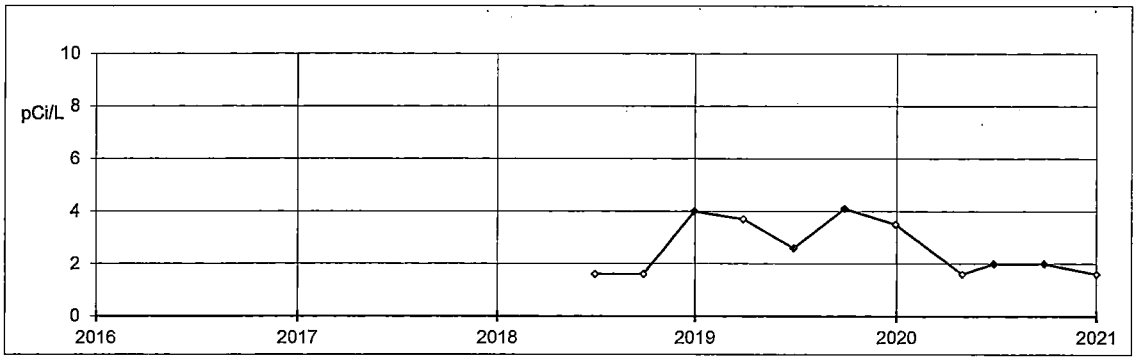

Figure 14. Location K-1t. Total Residue. Quarterly collection.(Initiated 1/1/18; sample taken only when source has been tapped for drinking or irrigation purposes.)

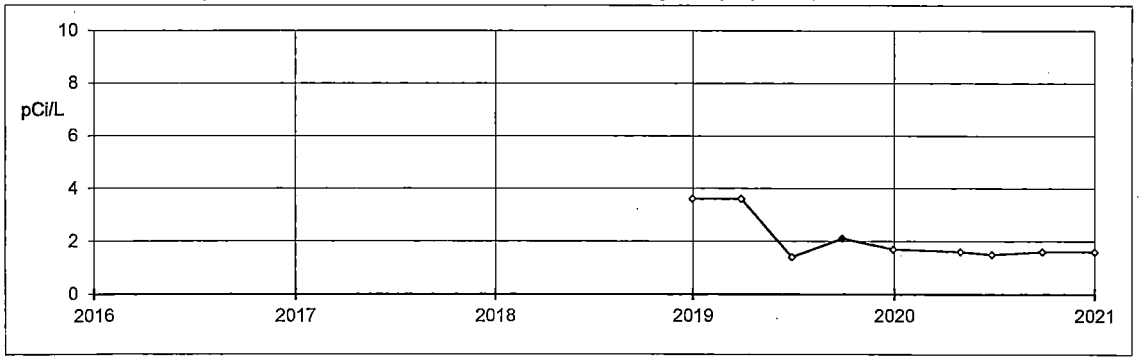

Figure 15. Location K-1u. Total Residue. Quarterly collection.(Initiated 1/2/18; sample taken only when source has been tapped for drinking or irrigation purposes.)

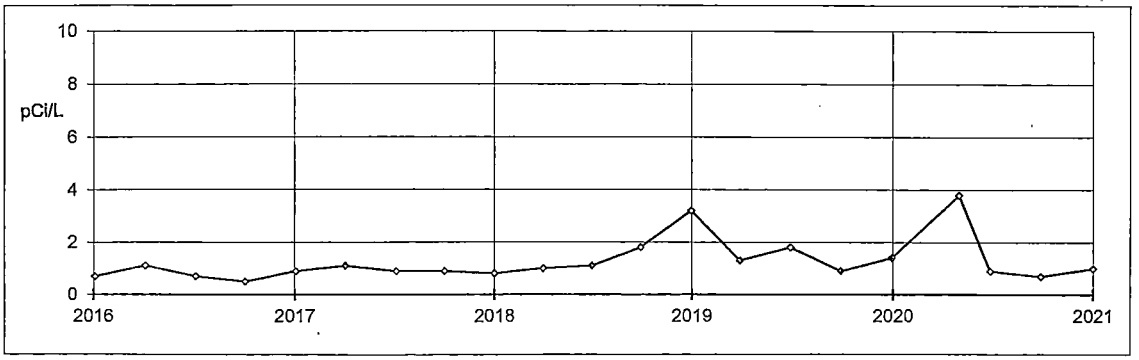

Figure 16. Location K-13. Total Residue. Quarterly collection.

Surface Water – Gross Beta

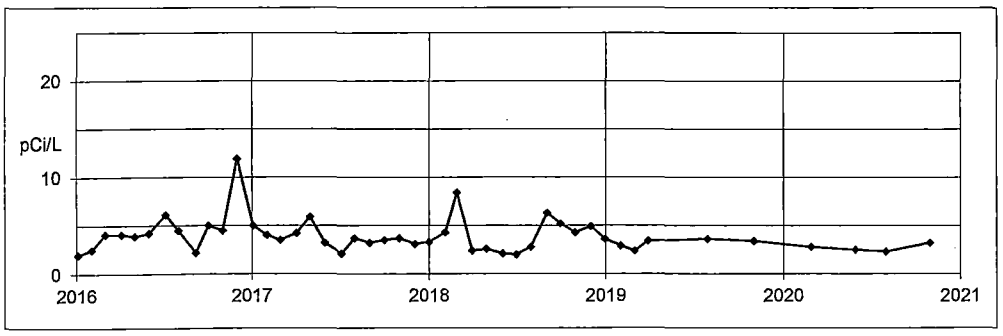

Figure 17. Surface water . Middle Creek, Onsite (K-1b).

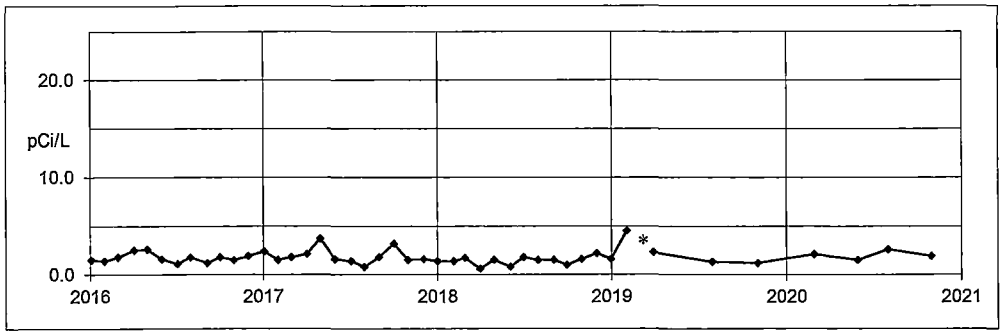

Figure 18. Surface water. Lake Michigan, condenser discharge, Onsite (K-1d).
* Sample not available 3/4/19 due to frozen conditions. (CR#1890)

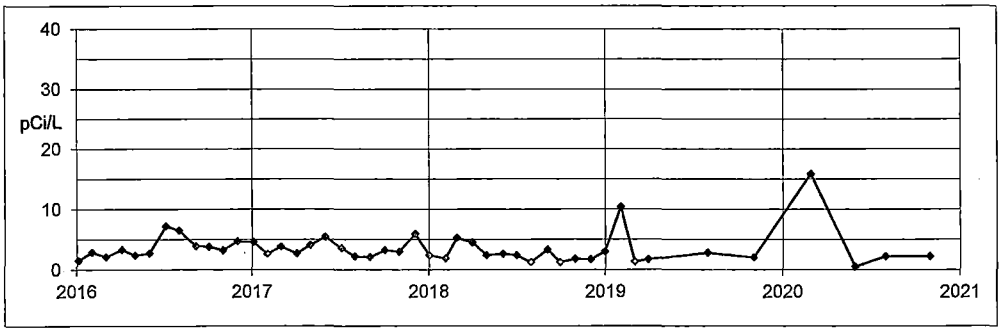

Figure 19. Surface water. South Creek, Onsite (K-1e).

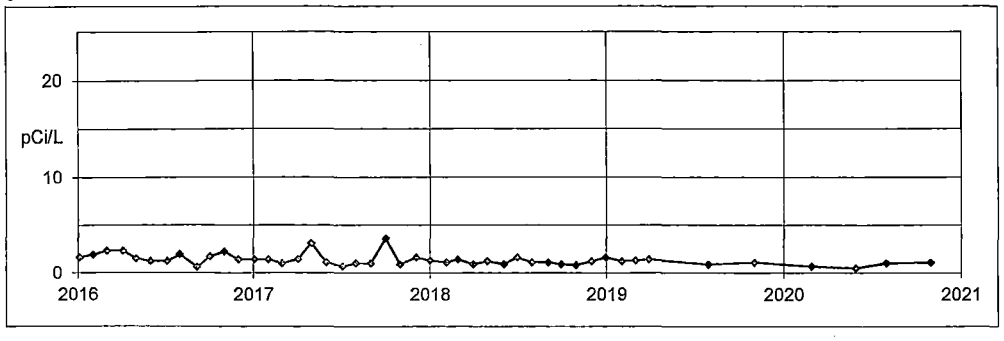

Figure 20. Surface water (raw). Lake Michigan, Rostok Intake (K-9)

Surface Water Tritium

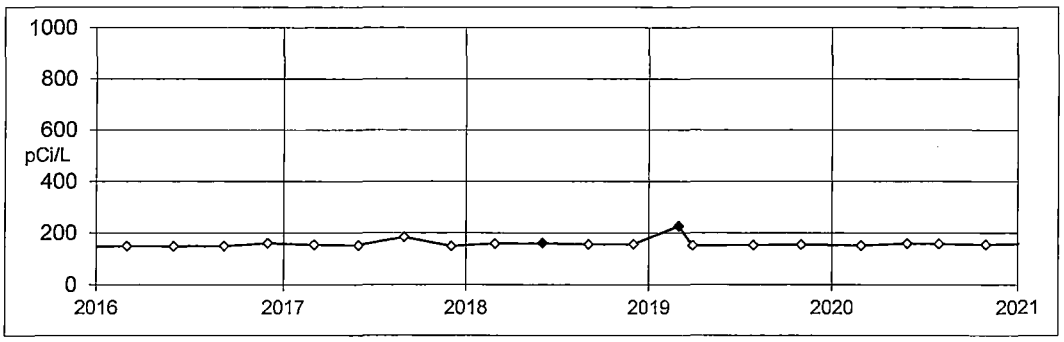

Figure 21. Surface water. Lake Michigan, condenser discharge, K-1d. Quarterly collection.

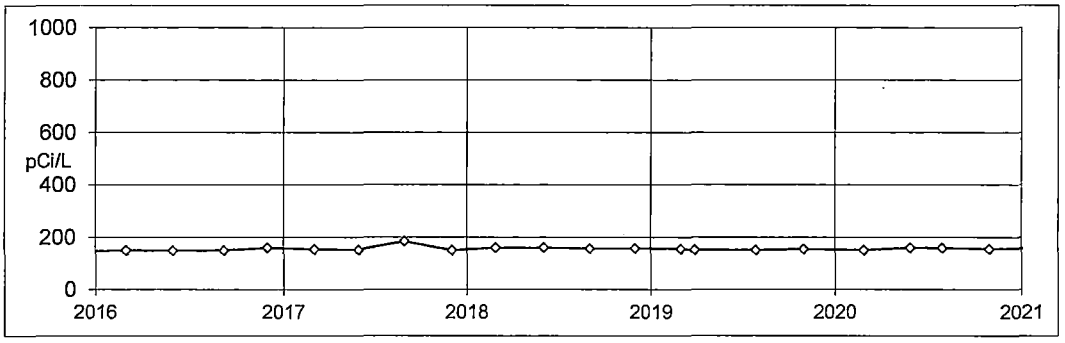

Figure 22. Surface water. Lake Michigan, Rostok Intake, K-9. Quarterly collection.

3.0 DATA TABULATIONS

Table 4. Airborne particulates, analyses for gross beta.
Location: K-1f
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta		Date Collected	Volume (m^3)	Gross Beta	
Required LLD		0.010		Required LLD		0.010	
01-07-20	299	0.022 ± 0.004		07-07-20	300	0.025 ± 0.004	
01-14-20	307	0.020 ± 0.003		07-14-20	243	0.014 ± 0.004	b
01-21-20	303	0.027 ± 0.004		07-21-20	292	0.020 ± 0.003	
01-28-20	302	0.016 ± 0.003		07-28-20	151	0.013 ± 0.006	c
02-04-20	299	0.014 ± 0.003		08-04-20	305	0.012 ± 0.003	
02-11-20	305	0.012 ± 0.003		08-11-20	308	0.017 ± 0.003	
02-18-20	298	0.016 ± 0.003	a	08-18-20	295	0.022 ± 0.004	
02-25-20	300	0.037 ± 0.004		08-25-20	304	0.025 ± 0.003	
03-03-20	299	0.019 ± 0.004		09-01-20	302	0.024 ± 0.004	
03-10-20	304	0.017 ± 0.003		09-08-20	301	0.015 ± 0.003	
03-17-20	299	0.022 ± 0.003		09-15-20	303	0.012 ± 0.003	
03-24-20	300	0.024 ± 0.003		09-22-20	305	0.026 ± 0.004	
03-31-20	305	0.016 ± 0.003		09-29-20	298	0.036 ± 0.004	
1st Quarter Mean ± s.d.		0.020 ± 0.007		3rd Quarter Mean ± s.d.		0.020 ± 0.007	
04-07-20	300	0.016 ± 0.003		10-06-20	307	0.012 ± 0.003	
04-14-20	302	0.019 ± 0.003		10-13-20	303	0.022 ± 0.004	
04-21-20	303	0.025 ± 0.004		10-20-20	301	0.021 ± 0.003	
04-28-20	302	0.021 ± 0.004		10-27-20	300	0.020 ± 0.003	
				11-03-20	305	0.034 ± 0.004	
05-05-20	301	0.014 ± 0.003					
05-12-20	303	0.018 ± 0.003		11-10-20	302	0.040 ± 0.004	
05-19-20	301	0.018 ± 0.003		11-17-20	302	0.036 ± 0.004	
05-26-20	306	0.016 ± 0.003		11-24-20	301	0.040 ± 0.004	
06-02-20	302	0.015 ± 0.003		12-01-20	302	0.032 ± 0.004	
06-09-20	302	0.018 ± 0.003		12-08-20	303	0.021 ± 0.003	
06-16-20	303	0.016 ± 0.003		12-15-20	305	0.035 ± 0.004	
06-23-20	301	0.025 ± 0.004		12-21-20	263	0.043 ± 0.005	
06-30-20	305	0.017 ± 0.003		12-29-20	344	0.027 ± 0.003	
2nd Quarter Mean ± s.d.		0.018 ± 0.003		4th Quarter Mean ± s.d.		0.029 ± 0.010	
				Cumulative Average		0.022	

[a] Found sample pump degraded. No indication of flow during filter changeout. (CR#2016)

[b] Found power to sampler off. (CR#2063)

[c] Found power to sampler off 7/26/20. Blown fuse on pump. (CR#2076).

Table 5. Airborne particulates, analyses for gross beta.

Location: K-2

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-07-20	398	0.023 ± 0.004	07-07-20	301	0.025 ± 0.004
01-14-20	307	0.019 ± 0.003	07-14-20	301	0.014 ± 0.003
01-21-20	303	0.033 ± 0.004	07-21-20	303	0.021 ± 0.003
01-28-20	302	0.017 ± 0.003	07-28-20	300	0.019 ± 0.003
02-04-20	299	0.013 ± 0.003	08-04-20	305	0.013 ± 0.003
02-11-20	305	0.013 ± 0.003	08-11-20	309	0.021 ± 0.003
02-18-20	298	0.020 ± 0.003	08-18-20	294	0.028 ± 0.004
02-25-20	306	0.026 ± 0.004	08-25-20	306	0.026 ± 0.003
03-03-20	298	0.020 ± 0.004	09-01-20	300	0.021 ± 0.004
03-10-20	304	0.017 ± 0.003	09-08-20	301	0.016 ± 0.003
03-17-20	303	0.025 ± 0.003	09-15-20	303	0.012 ± 0.003
03-24-20	301	0.024 ± 0.003	09-22-20	305	0.026 ± 0.004
03-31-20	305	0.018 ± 0.003	09-29-20	298	0.037 ± 0.004
1st Quarter Mean ± s.d.		0.021 ± 0.006	3rd Quarter Mean ± s.d.		0.021 ± 0.007
04-07-20	300	0.018 ± 0.003	10-06-20	306	0.013 ± 0.003
04-14-20	301	0.021 ± 0.003	10-13-20	303	0.022 ± 0.004
04-21-20	303	0.027 ± 0.004	10-20-20	301	0.023 ± 0.003
04-28-20	0	ND[a]	10-27-20	300	0.020 ± 0.003
			11-03-20	305	0.032 ± 0.004
05-05-20	301	0.014 ± 0.003			
05-12-20	303	0.018 ± 0.003	11-10-20	304	0.047 ± 0.004
05-19-20	301	0.021 ± 0.003	11-17-20	302	0.038 ± 0.004
05-26-20	306	0.015 ± 0.003	11-24-20	301	0.033 ± 0.004
06-02-20	302	0.018 ± 0.003	12-01-20	302	0.030 ± 0.004
06-09-20	302	0.018 ± 0.003	12-08-20	303	0.024 ± 0.003
06-16-20	304	0.012 ± 0.003	12-15-20	305	0.031 ± 0.004
06-23-20	300	0.024 ± 0.004	12-21-20	263	0.047 ± 0.005
06-30-20	305	0.020 ± 0.003	12-29-20	343	0.022 ± 0.003
2nd Quarter Mean ± s.d.		0.019 ± 0.004	4th Quarter Mean ± s.d.		0.029 ± 0.010
			Cumulative Average		0.023

[a] ND - No data. Sampler found on ground. No air particulate sample taken. (CR#2034)

Table 6. Airborne particulates, analyses for gross beta.

Location: K-8

Units: pCi/m^3

Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-07-20	299	0.023 ± 0.004	07-07-20	301	0.023 ± 0.004
01-14-20	307	0.021 ± 0.003	07-14-20	301	0.016 ± 0.003
01-21-20	303	0.032 ± 0.004	07-21-20	303	0.023 ± 0.003
01-28-20	302	0.017 ± 0.004	07-28-20	300	0.016 ± 0.003
02-04-20	299	0.014 ± 0.003	08-04-20	305	0.014 ± 0.003
02-11-20	305	0.013 ± 0.003	08-11-20	308	0.022 ± 0.003
02-18-20	298	0.018 ± 0.003	08-18-20	294	0.024 ± 0.004
02-25-20	305	0.029 ± 0.004	08-25-20	306	0.027 ± 0.004
03-03-20	299	0.020 ± 0.004	09-01-20	300	0.024 ± 0.004
03-10-20	61	0.016 ± 0.011 [a]	09-08-20	301	0.018 ± 0.003
03-17-20	299	0.032 ± 0.004	09-15-20	303	0.014 ± 0.003
03-24-20	301	0.028 ± 0.004	09-22-20	305	0.030 ± 0.004
03-31-20	305	0.016 ± 0.003	09-29-20	298	0.036 ± 0.004
1st Quarter Mean ± s.d.		0.021 ± 0.007	3rd Quarter Mean ± s.d.		0.022 ± 0.007
04-07-20	300	0.016 ± 0.003	10-06-20	307	0.012 ± 0.003
04-14-20	302	0.021 ± 0.003	10-13-20	303	0.019 ± 0.003
04-21-20	303	0.023 ± 0.004	10-20-20	301	0.022 ± 0.003
04-28-20	302	0.021 ± 0.004	10-27-20	300	0.023 ± 0.003
			11-03-20	305	0.034 ± 0.004
05-05-20	299	0.014 ± 0.003			
05-12-20	303	0.014 ± 0.003	11-10-20	304	0.041 ± 0.004
05-19-20	301	0.018 ± 0.003	11-17-20	302	0.036 ± 0.004
05-26-20	306	0.017 ± 0.003	11-24-20	301	0.040 ± 0.004
06-02-20	302	0.024 ± 0.004	12-01-20	302	0.029 ± 0.004
06-09-20	302	0.020 ± 0.003	12-08-20	303	0.026 ± 0.004
06-16-20	304	0.014 ± 0.003	12-15-20	305	0.038 ± 0.004
06-23-20	301	0.023 ± 0.004	12-21-20	263	0.051 ± 0.005
06-30-20	305	0.019 ± 0.003	12-29-20	344	0.026 ± 0.003
2nd Quarter Mean ± s.d.		0.019 ± 0.004	4th Quarter Mean ± s.d.		0.031 ± 0.011
			Cumulative Average		0.023

[a] Pump problems, reduced run-time. Reduced volume. Replaced pump. (CR#2025)

Table 7. Airborne particulates, analyses for gross beta.
Location: K-43
Units: pCi/m^3
Collection: Continuous, weekly exchange.

Date Collected	Volume (m^3)	Gross Beta	Date Collected	Volume (m^3)	Gross Beta
Required LLD		0.010	Required LLD		0.010
01-07-20	299	0.021 ± 0.004	07-07-20	300	0.024 ± 0.004
01-14-20	307	0.024 ± 0.004	07-14-20	301	0.018 ± 0.004
01-21-20	303	0.034 ± 0.004	07-21-20	303	0.020 ± 0.003
01-28-20	302	0.021 ± 0.004	07-28-20	300	0.018 ± 0.003
02-04-20	299	0.014 ± 0.003	08-04-20	305	0.014 ± 0.003
02-11-20	305	0.012 ± 0.003	08-11-20	308	0.025 ± 0.003
02-18-20	298	0.023 ± 0.004	08-18-20	295	0.025 ± 0.004
02-25-20	306	0.028 ± 0.004	08-25-20	305	0.032 ± 0.004
03-03-20	300	0.021 ± 0.004	09-01-20	300	0.030 ± 0.004
03-10-20	304	0.017 ± 0.003	09-08-20	301	0.015 ± 0.003
03-17-20	306	0.026 ± 0.003	09-15-20	303	0.012 ± 0.003
03-24-20	300	0.026 ± 0.004	09-22-20	305	0.030 ± 0.004
03-31-20	305	0.017 ± 0.003	09-29-20	298	0.034 ± 0.004
1st Quarter Mean ± s.d.		0.022 ± 0.006	3rd Quarter Mean ± s.d.		0.023 ± 0.007
04-07-20	299.79	0.017 ± 0.003	10-06-20	306	0.012 ± 0.003
04-14-20	302.01	0.027 ± 0.004	10-13-20	303	0.021 ± 0.003
04-21-20	302.61	0.023 ± 0.004	10-20-20	301	0.023 ± 0.003
04-28-20	302.13	0.028 ± 0.004	10-27-20	300	0.022 ± 0.003
			11-03-20	305	0.036 ± 0.004
05-05-20	300.66	0.016 ± 0.003			
05-12-20	302.64	0.015 ± 0.003	11-10-20	304	0.038 ± 0.004
05-19-20	300.78	0.020 ± 0.003	11-17-20	302	0.039 ± 0.004
05-26-20	305.94	0.014 ± 0.003	11-24-20	301	0.032 ± 0.004
06-02-20	301.86	0.020 ± 0.003	12-01-20	302	0.029 ± 0.004
06-09-20	301.89	0.016 ± 0.003	12-08-20	303	0.024 ± 0.003
06-16-20	303.39	0.013 ± 0.003	12-15-20	305	0.035 ± 0.004
06-23-20	300.96	0.026 ± 0.004	12-21-20	263	0.043 ± 0.005
06-30-20	305.16	0.019 ± 0.003	12-29-20	344	0.023 ± 0.003
2nd Quarter Mean ± s.d.		0.020 ± 0.005	4th Quarter Mean ± s.d.		0.029 ± 0.009
			Cumulative Average		0.023

Table 8. Airborne particulate data, gross beta analyses, monthly averages, minima and maxima.

January

Location	Average	Minima	Maxima
Indicators	0.023	0.016	0.034
K-1f	0.021	0.016	0.027
K-8	0.023	0.017	0.032
K-43	0.025	0.021	0.034
Controls	0.023	0.017	0.033
K-2	0.023	0.017	0.033

February

Location	Average	Minima	Maxima
Indicators	0.020	0.012	0.037
K-1f	0.020	0.012	0.037
K-8	0.019	0.013	0.029
K-43	0.020	0.012	0.028
Controls	0.018	0.013	0.026
K-2	0.018	0.013	0.026

March

Location	Average	Minima	Maxima
Indicators	0.022	0.016	0.032
K-1f	0.020	0.016	0.024
K-8	0.023	0.016	0.032
K-43	0.022	0.017	0.026
Controls	0.021	0.017	0.025
K-2	0.021	0.017	0.025

April

Location	Average	Minima	Maxima
Indicators	0.021	0.016	0.028
K-1f	0.020	0.016	0.025
K-8	0.020	0.016	0.025
K-43	0.024	0.017	0.028
Controls	0.022	0.018	0.027
K-2	0.022	0.018	0.027

May

Location	Average	Minima	Maxima
Indicators	0.017	0.014	0.024
K-1f	0.016	0.014	0.018
K-8	0.017	0.014	0.024
K-43	0.017	0.014	0.020
Controls	0.017	0.014	0.021
K-2	0.017	0.014	0.021

June

Location	Average	Minima	Maxima
Indicators	0.019	0.013	0.026
K-1f	0.019	0.016	0.025
K-8	0.019	0.014	0.023
K-43	0.019	0.013	0.026
Controls	0.019	0.012	0.024
K-2	0.019	0.012	0.024

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

Table 8. Airborne particulate data, gross beta analyses, monthly averages, minima and maxima, (continued)

July

Location	Average	Minima	Maxima
Indicators	0.019	0.013	0.025
K-1f	0.018	0.013	0.025
K-8	0.020	0.016	0.023
K-43	0.020	0.018	0.024
Controls	0.020	0.014	0.025
K-2	0.020	0.014	0.025

October

Location	Average	Minima	Maxima
Indicators	0.022	0.012	0.036
K-1f	0.022	0.012	0.034
K-8	0.022	0.012	0.034
K-43	0.023	0.012	0.036
Controls	0.022	0.013	0.032
K-2	0.022	0.013	0.032

August

Location	Average	Minima	Maxima
Indicators	0.022	0.012	0.032
K-1f	0.020	0.012	0.025
K-8	0.022	0.014	0.027
K-43	0.025	0.014	0.032
Controls	0.022	0.013	0.028
K-2	0.022	0.013	0.028

November

Location	Average	Minima	Maxima
Indicators	0.036	0.029	0.041
K-1f	0.037	0.032	0.040
K-8	0.037	0.029	0.041
K-43	0.035	0.029	0.039
Controls	0.037	0.030	0.047
K-2	0.037	0.030	0.047

September

Location	Average	Minima	Maxima
Indicators	0.023	0.012	0.036
K-1f	0.022	0.012	0.036
K-8	0.025	0.014	0.036
K-43	0.023	0.012	0.034
Controls	0.023	0.012	0.037
K-2	0.023	0.012	0.037

December

Location	Average	Minima	Maxima
Indicators	0.033	0.021	0.051
K-1f	0.032	0.021	0.043
K-8	0.035	0.026	0.051
K-43	0.031	0.023	0.043
Controls	0.031	0.022	0.047
K-2	0.031	0.022	0.047

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

Table 9. Airborne particulate samples, quarterly composites of weekly samples, analysis for gamma-emitting isotopes.

	Sample Description and Concentration (pCi/m^3)			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Indicator				
K-1f				
Lab Code	KAP- 1201	KAP- 2439	KAP- 4044	KAP- 4837
Volume (m^3)	3920	3931	3707	3938
Be-7	0.078 ± 0.014	0.104 ± 0.019	0.103 ± 0.019	0.068 ± 0.014
Nb-95	< 0.0012	< 0.0016	< 0.0013	< 0.0013
Zr-95	< 0.0019	< 0.0014	< 0.0019	< 0.0014
Ru-103	< 0.0011	< 0.0009	< 0.0010	< 0.0009
Ru-106	< 0.0049	< 0.0071	< 0.0084	< 0.0079
Cs-134	< 0.0010	< 0.0010	< 0.0012	< 0.0011
Cs-137	< 0.0010	< 0.0006	< 0.0007	< 0.0010
Ce-141	< 0.0022	< 0.0021	< 0.0021	< 0.0021
Ce-144	< 0.0057	< 0.0047	< 0.0049	< 0.0047
K-8				
Lab Code	KAP- 1203	KAP- 2441	KAP- 4046	KAP- 4839
Volume (m^3)	3683	3930	3925	3940
Be-7	0.072 ± 0.016	0.110 ± 0.016	0.096 ± 0.019	0.069 ± 0.015
Nb-95	< 0.0010	< 0.0010	< 0.0014	< 0.0013
Zr-95	< 0.0016	< 0.0009	< 0.0009	< 0.0014
Ru-103	< 0.0011	< 0.0007	< 0.0014	< 0.0016
Ru-106	< 0.0095	< 0.0075	< 0.0066	< 0.0042
Cs-134	< 0.0012	< 0.0006	< 0.0009	< 0.0010
Cs-137	< 0.0008	< 0.0005	< 0.0005	< 0.0008
Ce-141	< 0.0019	< 0.0015	< 0.0021	< 0.0021
Ce-144	< 0.0063	< 0.0039	< 0.0049	< 0.0036

Table 9. Airborne particulate samples, quarterly composites of weekly samples, analysis for gamma-emitting isotopes, (continued).

	Sample Description and Concentration (pCi/m^3)			
	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Indicator				
K-43				
Lab Code	KAP- 1204	KAP- 2442	KAP- 4047	KAP- 4840
Volume (m^3)	3934	3930	3924	3939
Be-7	0.075 ± 0.016	0.106 ± 0.019	0.103 ± 0.016	0.072 ± 0.019
Nb-95	< 0.0010	< 0.0013	< 0.0017	< 0.0014
Zr-95	< 0.0019	< 0.0023	< 0.0024	< 0.0019
Ru-103	< 0.0006	< 0.0015	< 0.0014	< 0.0012
Ru-106	< 0.0063	< 0.0104	< 0.0058	< 0.0056
Cs-134	< 0.0009	< 0.0012	< 0.0009	< 0.0010
Cs-137	< 0.0008	< 0.0006	< 0.0007	< 0.0007
Ce-141	< 0.0017	< 0.0023	< 0.0019	< 0.0014
Ce-144	< 0.0046	< 0.0043	< 0.0054	< 0.0043
Control				
K-2				
Lab Code	KAP- 1202	KAP- 2440	KAP- 4045	KAP- 4838
Volume (m^3)	4029	3628	3926	3938
Be-7	0.078 ± 0.020	0.103 ± 0.018	0.094 ± 0.019	0.065 ± 0.015
Nb-95	< 0.0017	< 0.0016	< 0.0016	< 0.0008
Zr-95	< 0.0016	< 0.0012	< 0.0010	< 0.0016
Ru-103	< 0.0014	< 0.0008	< 0.0013	< 0.0015
Ru-106	< 0.0075	< 0.0106	< 0.0066	< 0.0077
Cs-134	< 0.0013	< 0.0010	< 0.0009	< 0.0009
Cs-137	< 0.0012	< 0.0007	< 0.0008	< 0.0009
Ce-141	< 0.0025	< 0.0020	< 0.0022	< 0.0019
Ce-144	< 0.0062	< 0.0044	< 0.0030	< 0.0052

Table 10. Ambient gamma radiation (TLD), quarterly exposure.

	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	
Date Placed	01-02-20	04-01-20	07-01-20	10-01-20	
Date Removed	04-01-20	07-01-20	10-01-20	01-04-21	
	mR/91 days				
Indicator					Mean±s.d.
K-1f	13.2 ± 0.5	15.4 ± 0.8	14.0 ± 0.7	15.1 ± 0.7	14.4 ± 1.0
K-3	16.3 ± 0.6	16.4 ± 0.9	16.4 ± 0.7	16.1 ± 0.7	16.3 ± 0.1
K-5	14.9 ± 0.5	16.0 ± 0.6	15.5 ± 0.7	16.6 ± 0.5	15.8 ± 0.7
K-8	15.9 ± 0.8	16.8 ± 0.7	15.6 ± 0.9	17.1 ± 0.9	16.4 ± 0.7
K-17	17.2 ± 0.5	19.0 ± 0.9	17.3 ± 0.5	19.1 ± 0.9	18.2 ± 1.0
K-25	16.9 ± 0.8	19.3 ± 0.8	17.7 ± 0.8	19.1 ± 0.8	18.3 ± 1.1
K-27	16.3 ± 0.3	17.8 ± 0.5	16.8 ± 0.4	17.8 ± 0.7	17.2 ± 0.8
K-30	16.5 ± 0.5	14.7 ± 0.6	16.2 ± 0.6	15.0 ± 0.8	15.6 ± 0.9
K-39	17.3 ± 0.8	17.6 ± 0.6	17.0 ± 0.9	17.6 ± 0.7	17.4 ± 0.3
K-43	14.1 ± 1.2	15.0 ± 1.0	13.7 ± 0.7	14.5 ± 0.6	14.3 ± 0.6
Mean ± s.d.	15.9 ± 1.4	16.8 ± 1.6	16.0 ± 1.3	16.8 ± 1.6	16.4 ± 0.5
Control					
K-2	16.5 ± 0.7	16.6 ± 0.5	17.1 ± 1.1	16.6 ± 0.5	16.7 ± 0.3
Mean ± s.d.	16.5 ± 0.7	16.6 ± 0.5	17.1 ± 1.1	16.6 ± 0.5	16.7 ± 0.3

Inside the Protected Area					
Date Placed	01-02-20	03-31-20	06-30-20	09-29-20	
Date Removed	03-31-20	06-30-20	09-29-20	01-04-21	Mean±s.d.
K-1m	156.8 ± 4.7	159.7 ± 9.3	151.2 ± 5.9	158.0 ± 11.2	156.4 ± 3.7
K-1o	142.1 ± 1.1	144.5 ± 4.6	140.8 ± 0.9	139.1 ± 3.3	141.6 ± 2.3
K-1q	21.6 ± 1.9	21.4 ± 0.3	20.7 ± 1.7	21.7 ± 0.6	21.4 ± 0.5
K-1r	17.0 ± 0.8	17.8 ± 0.8	16.1 ± 0.8	18.6 ± 1.2	17.4 ± 1.1
Mean ± s.d.	84.4 ± 75.4	85.9 ± 76.8	82.2 ± 73.8	84.4 ± 74.5	84.2 ± 1.5

Table 11. Well water, analyses for gross alpha, gross beta, tritium, strontium-90, potassium-40 and gamma-emitting isotopes.
Collection: Quarterly.

Sample Description and Concentration (pCi/L)				
Indicator				
K-1h				
Date Collected	01-02-20	05-04-20	07-01-20	10-01-20
Lab Code	KWW- 2	KWW- 1381	KWW- 2195	KWW- 3500
Gross alpha	< 3.3	< 1.6	< 1.8	2.0 ± 1.3[a]
Gross beta	< 3.5	< 1.6	< 1.6	< 1.6
H-3	< 158	< 152	< 159	< 156
Sr-90	< 0.5	< 0.6	< 0.4	< 0.5
K-40 (ICP)	1.56	2.05	1.97	2.21
Mn-54	< 2.4	< 4.3	< 2.0	< 3.5
Fe-59	< 7.4	< 4.2	< 3.5	< 8.4
Co-58	< 3.8	< 1.4	< 1.2	< 5.8
Co-60	< 2.8	< 1.7	< 1.4	< 6.6
Zn-65	< 7.2	< 5.7	< 2.3	< 16.9
Zr-Nb-95	< 3.6	< 2.2	< 1.9	< 10.7
Cs-134	< 4.0	< 3.5	< 2.3	< 7.0
Cs-137	< 3.4	< 1.9	< 1.5	< 6.0
Ba-La-140	< 2.9	< 3.0	< 1.9	< 7.5
K-1t				
Date Collected	01-02-20	05-04-20	07-01-20	10-01-20
Lab Code	KWW- 3	KWW- 1382	KWW- 2196	KWW- 3501
Gross alpha	< 4.5	2.5 ± 1.5[a]	< 1.9	3.2 ± 1.8[a]
Gross beta	< 3.5	< 1.6	2.0 ± 1.2[b]	2.0 ± 1.2[b]
H-3	< 158	< 152	< 159	< 156
K-40 (ICP)	2.79	2.95	3.12	3.28
Mn-54	< 4.2	< 3.7	< 3.5	< 4.5
Fe-59	< 5.7	< 3.7	< 6.3	< 9.7
Co-58	< 4.4	< 2.5	< 2.4	< 4.4
Co-60	< 1.8	< 2.7	< 3.1	< 2.9
Zn-65	< 5.2	< 2.7	< 4.3	< 7.6
Zr-Nb-95	< 2.8	< 2.3	< 2.1	< 3.6
Cs-134	< 4.0	< 3.7	< 3.9	< 5.0
Cs-137	< 3.0	< 2.9	< 3.1	< 3.1
Ba-La-140	< 7.1	< 2.7	< 5.1	< 2.3

[a] A positive gross alpha result in well water is likely due to naturally occuring sources such as radon daughters.

[b] A positive gross beta result in well water is likely due to naturally occuring sources such as potassium-40.

Table 11. Well water, analyses for gross alpha, gross beta, tritium, strontium-90, potassium-40 and gamma-emitting isotopes (continued).
Collection: Quarterly.

Sample Description and Concentration (pCi/L)				
Indicator				
K-1u				
Date Collected	01-02-20	05-04-20	07-01-20	10-01-20
Lab Code	KWW- 4	KWW- 1383	KWW- 2197	KWW- 3502
Gross alpha	< 1.4	< 1.4	< 1.4	< 1.4
Gross beta	< 1.7	< 1.6	< 1.5	< 1.6
H-3	< 158	< 152	< 159	< 156
K-40 (ICP)	1.31	1.56	1.64	1.56
Mn-54	< 2.1	< 3.0	< 2.7	< 3.7
Fe-59	< 3.3	< 4.1	< 4.2	< 6.6
Co-58	< 2.7	< 2.9	< 2.9	< 4.9
Co-60	< 2.2	< 2.3	< 2.5	< 3.3
Zn-65	< 2.2	< 3.7	< 3.3	< 3.6
Zr-Nb-95	< 3.4	< 2.1	< 3.2	< 4.5
Cs-134	< 2.9	< 3.3	< 4.6	< 4.5
Cs-137	< 2.8	< 3.3	< 3.6	< 3.4
Ba-La-140	< 4.8	< 2.6	< 7.5	< 1.9
Control				
K-13				
Date Collected	01-02-20	05-04-20	07-01-20	10-01-20
Lab Code	KWW- 5	KWW- 1384	KWW- 2198	KWW- 3503
Gross beta	1.4 ± 0.6[a]	< 3.8	< 0.9	< 0.7
H-3	< 158	< 152	< 159	< 156
K-40 (ICP)	1.15	1.56	1.48	1.31
Mn-54	< 3.7	< 2.2	< 2.2	< 4.2
Fe-59	< 4.4	< 3.7	< 5.7	< 7.7
Co-58	< 4.7	< 2.1	< 1.9	< 3.2
Co-60	< 2.3	< 2.9	< 2.4	< 2.3
Zn-65	< 6.3	< 4.8	< 5.5	< 8.7
Zr-Nb-95	< 5.8	< 2.2	< 2.1	< 5.2
Cs-134	< 4.8	< 2.5	< 3.5	< 3.8
Cs-137	< 4.2	< 1.7	< 3.3	< 3.3
Ba-La-140	< 4.4	< 1.3	< 4.4	< 2.8

[a] A positive gross beta result in well water is likely due to naturally occuring sources such as potassium-40.

Table 12. Broadleaf vegetation samples, analyses for gamma-emitting isotopes. Annual collection.

Sample Description and Concentration (pCi/g wet)		
	Indicator	
Location	K-23a	K-23b
Date Collected	08-03-20	08-03-20
Lab Code	KVE- 2732	KVE- 2734
Type	Broad leaf veg.	Broad leaf veg.
Be-7	1.79 ± 0.24	1.37 ± 0.30
K-40	5.17 ± 0.44	5.72 ± 0.53
Nb-95	< 0.015	< 0.019
Zr-95	< 0.024	< 0.034
Ru-103	< 0.011	< 0.023
Ru-106	< 0.093	< 0.130
Cs-134	< 0.014	< 0.020
Cs-137	< 0.016	< 0.012
Ce-141	< 0.021	< 0.045
Ce-144	< 0.097	< 0.142

	Control
Location	K-26
Date Collected	09-03-20
Lab Code	KVE- 3118
Type	Broad leaf veg.
Be-7	< 0.06
K-40	1.95 ± 0.20
Nb-95	< 0.011
Zr-95	< 0.014
Ru-103	< 0.010
Ru-106	< 0.068
Cs-134	< 0.007
Cs-137	< 0.008
Ce-141	< 0.018
Ce-144	< 0.053

Table 13. Cattlefeed, analyses for gross beta, strontium-90, and gamma-emitting isotopes.
Collection: First Quarter

	Sample Description and Concentration (pCi/g wet)			
	Control			
Location	K-3	K-35	K-3	K-35
Date Collected	01-02-20	01-02-20	01-02-20	01-02-20
Lab Code	KCF- 6	KCF- 9	KCF- 12	KCF- 15
Type	Hay	Hay	Silage	Silage
Gross beta	25.15 ± 0.71	10.85 ± 0.37	8.84 ± 0.29	7.36 ± 0.26
Sr-90	0.017 ± 0.008	< 0.009	0.010 ± 0.004	< 0.003
Be-7	< 0.174	< 0.133	2.80 ± 0.274	< 0.109
K-40	24.23 ± 0.80	7.26 ± 0.46	7.48 ± 0.54	4.80 ± 0.30
Nb-95	< 0.024	< 0.017	< 0.016	< 0.006
Zr-95	< 0.036	< 0.019	< 0.030	< 0.010
Ru-103	< 0.024	< 0.012	< 0.017	< 0.009
Ru-106	< 0.201	< 0.094	< 0.178	< 0.047
Cs-134	< 0.021	< 0.013	< 0.018	< 0.010
Cs-137	< 0.023	< 0.016	< 0.023	< 0.009
Ce-141	< 0.039	< 0.027	< 0.024	< 0.022
Ce-144	< 0.150	< 0.088	< 0.130	< 0.062
	Indicator			
Location	K-5	K-34	K-38	K-39
Date Collected	01-02-20	01-02-20	01-02-20	01-02-20
Lab Code	KCF- 7	KCF- 8	KCF- 10	KCF- 11
Type	Hay	Hay	Hay	Hay
Gross beta	7.85 ± 0.26	26.44 ± 0.79	20.49 ± 0.65	23.11 ± 0.67
Sr-90	< 0.005	< 0.026	0.020 ± 0.011	0.022 ± 0.010
Be-7	0.58 ± 0.178	< 0.234	< 0.269	0.64 ± 0.359
K-40	6.37 ± 0.51	21.65 ± 0.82	15.59 ± 0.96	17.84 ± 1.03
Nb-95	< 0.012	< 0.032	< 0.020	< 0.028
Zr-95	< 0.016	< 0.040	< 0.046	< 0.056
Ru-103	< 0.015	< 0.024	< 0.025	< 0.032
Ru-106	< 0.104	< 0.189	< 0.200	< 0.183
Cs-134	< 0.017	< 0.026	< 0.029	< 0.035
Cs-137	< 0.021	< 0.027	0.056 ± 0.028	< 0.036
Ce-141	< 0.026	< 0.038	< 0.049	< 0.036
Ce-144	< 0.100	< 0.149	< 0.128	< 0.216

Table 13. Cattlefeed, analyses for gross beta, strontium-90, and gamma-emitting isotopes (continued). Collection: First Quarter

	Sample Description and Concentration (pCi/g wet)			
	Indicator			
Location	K-5	K-34	K-38	K-39
Date Collected	01-02-20	01-02-20	01-02-20	01-02-20
Lab Code	KCF- 13	KCF- 14	KCF- 16	KCF- 17
Type	Silage	Silage	Silage	Silage
Gross beta	8.85 ± 0.40	5.30 ± 0.16	2.02 ± 0.07	10.09 ± 0.32
Sr-90	< 0.009	< 0.002	< 0.002	< 0.006
Be-7	0.97 ± 0.186	1.36 ± 0.226	1.14 ± 0.169	0.39 ± 0.156
K-40	6.15 ± 0.44	3.51 ± 0.37	3.65 ± 0.35	6.16 ± 0.38
Nb-95	< 0.010	< 0.020	< 0.012	< 0.013
Zr-95	< 0.031	< 0.023	< 0.015	< 0.025
Ru-103	< 0.009	< 0.011	< 0.016	< 0.012
Ru-106	< 0.078	< 0.136	< 0.120	< 0.071
Cs-134	< 0.014	< 0.015	< 0.013	< 0.012
Cs-137	< 0.015	< 0.013	< 0.013	< 0.009
Ce-141	< 0.019	< 0.031	< 0.017	< 0.021
Ce-144	< 0.093	< 0.108	< 0.066	< 0.093

Table 14. Grass, analyses for gross beta, strontium-90, and gamma-emitting isotopes.
Collection: Quarterly, April through December
Units: pCi/g wet

Sample Description and Concentration (pCi/g wet)

	Indicator			
Location	K-1b	K-1f	K-5	K-34
Date Collected	06-01-20	06-01-20	06-01-20	06-01-20
Lab Code	KG- 1810	KG- 1811	KG- 1813	KG- 1814
Gross beta	7.81 ± 0.20	8.14 ± 0.23	6.75 ± 0.20	22.81 ± 0.66
Sr-90	< 0.003	< 0.003	< 0.003	< 0.006
Be-7	0.74 ± 0.19	0.28 ± 0.13	1.00 ± 0.21	2.01 ± 0.33
K-40	6.53 ± 0.60	4.67 ± 0.37	5.57 ± 0.51	14.36 ± 0.94
Mn-54	< 0.015	< 0.008	< 0.013	< 0.019
Co-58	< 0.013	< 0.011	< 0.014	< 0.024
Co-60	< 0.018	< 0.014	< 0.017	< 0.020
Nb-95	< 0.024	< 0.011	< 0.016	< 0.020
Zr-95	< 0.037	< 0.013	< 0.022	< 0.029
Ru-103	< 0.017	< 0.007	< 0.019	< 0.024
Ru-106	< 0.129	< 0.118	< 0.170	< 0.217
Cs-134	< 0.021	< 0.011	< 0.015	< 0.022
Cs-137	< 0.013	< 0.011	< 0.008	< 0.022
Ce-141	< 0.034	< 0.011	< 0.036	< 0.030
Ce-144	< 0.172	< 0.073	< 0.103	< 0.107

	Indicator		Control	
Location	K-38	K-39	K-3	K-35
Date Collected	06-01-20	06-01-20	06-01-20	06-01-20
Lab Code	KG- 1816	KG- 1817	KG- 1812	KG- 1815
Gross beta	7.65 ± 0.20	6.74 ± 0.18	7.97 ± 0.19	8.54 ± 0.22
Sr-90	< 0.003	< 0.003	< 0.004	< 0.004
Be-7	0.61 ± 0.26	0.55 ± 0.18	0.21 ± 0.13	0.26 ± 0.15
K-40	5.97 ± 0.62	5.16 ± 0.50	6.34 ± 0.49	6.31 ± 0.49
Mn-54	< 0.022	< 0.019	< 0.014	< 0.019
Co-58	< 0.016	< 0.017	< 0.014	< 0.018
Co-60	< 0.018	< 0.014	< 0.009	< 0.014
Nb-95	< 0.016	< 0.018	< 0.007	< 0.016
Zr-95	< 0.029	< 0.035	< 0.016	< 0.026
Ru-103	< 0.015	< 0.014	< 0.013	< 0.014
Ru-106	< 0.219	< 0.085	< 0.110	< 0.130
Cs-134	< 0.024	< 0.020	< 0.012	< 0.017
Cs-137	< 0.013	< 0.013	< 0.015	< 0.020
Ce-141	< 0.031	< 0.033	< 0.019	< 0.027
Ce-144	< 0.170	< 0.107	< 0.094	< 0.133

Table 14. Grass, analyses for gross beta, strontium-90, and gamma-emitting isotopes (continued).
Collection: Quarterly, April through December
Units: pCi/g wet

Sample Description and Concentration (pCi/g wet)

	Indicator			
Location	K-1b	K-1f	K-5	K-34
Date Collected	08-03-20	08-03-20	08-03-20	08-03-20
Lab Code	KG- 2724	KG- 2725	KG- 2727	KG- 2728
Gross beta	7.16 ± 0.22	6.70 ± 0.25	7.75 ± 0.26	7.99 ± 0.29
Sr-90	< 0.004	< 0.005	< 0.004	< 0.003
Be-7	1.38 ± 0.22	2.19 ± 0.30	2.38 ± 0.30	3.86 ± 0.45
K-40	5.88 ± 0.54	5.35 ± 0.54	5.65 ± 0.57	7.04 ± 0.66
Mn-54	< 0.016	< 0.016	< 0.017	< 0.020
Co-58	< 0.018	< 0.021	< 0.012	< 0.022
Co-60	< 0.013	< 0.011	< 0.012	< 0.018
Nb-95	< 0.022	< 0.031	< 0.021	< 0.020
Zr-95	< 0.036	< 0.027	< 0.036	< 0.032
Ru-103	< 0.016	< 0.022	< 0.023	< 0.023
Ru-106	< 0.154	< 0.165	< 0.189	< 0.162
Cs-134	< 0.019	< 0.022	< 0.021	< 0.023
Cs-137	< 0.019	< 0.013	< 0.019	< 0.014
Ce-141	< 0.037	< 0.031	< 0.039	< 0.056
Ce-144	< 0.141	< 0.204	< 0.135	< 0.197

	Indicator		Control	
Location	K-38	K-39	K-3	K-35
Date Collected	08-03-20	08-03-20	08-03-20	08-03-20
Lab Code	KG- 2730	KG- 2731	KG- 2726	KG- 2729
Gross beta	8.84 ± 0.28	6.62 ± 0.21	8.50 ± 0.26	7.17 ± 0.23
Sr-90	< 0.005	< 0.002	< 0.007	< 0.003
Be-7	2.59 ± 0.25	2.35 ± 0.28	1.42 ± 0.23	2.53 ± 0.39
K-40	7.68 ± 0.53	5.78 ± 0.50	6.33 ± 0.53	6.65 ± 0.63
Mn-54	< 0.014	< 0.019	< 0.014	< 0.018
Co-58	< 0.013	< 0.022	< 0.011	< 0.017
Co-60	< 0.013	< 0.015	< 0.011	< 0.011
Nb-95	< 0.017	< 0.013	< 0.009	< 0.028
Zr-95	< 0.029	< 0.020	< 0.030	< 0.035
Ru-103	< 0.015	< 0.019	< 0.018	< 0.021
Ru-106	< 0.161	< 0.149	< 0.132	< 0.152
Cs-134	< 0.018	< 0.019	< 0.016	< 0.024
Cs-137	< 0.021	< 0.018	< 0.017	< 0.021
Ce-141	< 0.036	< 0.040	< 0.020	< 0.048
Ce-144	< 0.099	< 0.126	< 0.110	< 0.169

Table 14. Grass, analyses for gross beta, strontium-90, and gamma-emitting isotopes (continued).
Collection: Quarterly, April through December
Units: pCi/g wet

Sample Description and Concentration (pCi/g wet)				
	Indicator			
Location	K-1b	K-1f	K-5	K-34
Date Collected	10-01-20	10-01-20	10-01-20	10-01-20
Lab Code	KG- 3491	KG- 3492	KG- 3494	KG- 3496
Gross beta	8.79 ± 0.31	10.32 ± 0.41	11.33 ± 0.41	6.03 ± 0.27
Sr-90	< 0.004	< 0.005	< 0.004	< 0.003
Be-7	4.68 ± 0.44	5.52 ± 0.54	6.21 ± 0.38	5.76 ± 0.49
K-40	6.15 ± 0.68	7.47 ± 0.72	7.79 ± 0.55	3.95 ± 0.54
Mn-54	< 0.029	< 0.020	< 0.016	< 0.021
Co-58	< 0.019	< 0.026	< 0.009	< 0.015
Co-60	< 0.021	< 0.024	< 0.010	< 0.019
Nb-95	< 0.027	< 0.019	< 0.021	< 0.023
Zr-95	< 0.046	< 0.035	< 0.026	< 0.044
Ru-103	< 0.025	< 0.024	< 0.015	< 0.019
Ru-106	< 0.187	< 0.203	< 0.122	< 0.165
Cs-134	< 0.029	< 0.030	< 0.015	< 0.027
Cs-137	< 0.024	< 0.027	< 0.016	< 0.018
Ce-141	< 0.063	< 0.039	< 0.037	< 0.056
Ce-144	< 0.188	< 0.230	< 0.086	< 0.197
	Indicator		Control	
Location	K-38	K-39	K-3	K-35
Date Collected	10-01-20	10-01-20	10-01-20	10-01-20
Lab Code	KG- 3498	KG- 3499	KG- 3493	KG- 3497
Gross beta	9.46 ± 0.35	11.21 ± 0.39	7.43 ± 0.29	8.54 ± 0.24
Sr-90	< 0.003	< 0.004	< 0.004	< 0.003
Be-7	7.72 ± 0.62	7.55 ± 0.54	3.54 ± 0.34	1.80 ± 0.30
K-40	6.11 ± 0.72	4.45 ± 0.75	5.25 ± 0.47	6.94 ± 0.62
Mn-54	< 0.023	< 0.016	< 0.009	< 0.019
Co-58	< 0.022	< 0.025	< 0.012	< 0.016
Co-60	< 0.022	< 0.017	< 0.014	< 0.019
Nb-95	< 0.027	< 0.023	< 0.015	< 0.017
Zr-95	< 0.041	< 0.040	< 0.025	< 0.033
Ru-103	< 0.021	< 0.015	< 0.022	< 0.018
Ru-106	< 0.205	< 0.167	< 0.105	< 0.130
Cs-134	< 0.034	< 0.025	< 0.019	< 0.025
Cs-137	< 0.026	< 0.013	< 0.022	< 0.011
Ce-141	< 0.065	< 0.041	< 0.036	< 0.034
Ce-144	< 0.246	< 0.185	< 0.100	< 0.106

Table 15. Soil samples, analyses for gross alpha, gross beta, strontium-90, and gamma-emitting isotopes.
Collection: Semiannually

Sample Description and Concentration (pCi/g dry)

	Indicator		
Location	K-1f	K-34	K-38
Date Collected	05-04-20	05-04-20	05-04-20
Lab Code	KSO- 1388	KSO- 1390	KSO- 1392
Gross alpha	5.38 ± 1.99	5.67 ± 1.73	9.46 ± 2.45
Gross beta	26.12 ± 1.85	22.40 ± 1.74	30.38 ± 1.93
Sr-90	< 0.046	< 0.042	< 0.041
Be-7	< 0.12	0.26 ± 0.15	0.28 ± 0.15
K-40	19.19 ± 0.77	16.71 ± 0.76	20.56 ± 0.85
Nb-95	< 0.019	< 0.018	< 0.020
Zr-95	< 0.030	< 0.028	< 0.034
Ru-103	< 0.015	< 0.017	< 0.020
Ru-106	< 0.118	< 0.121	< 0.141
Cs-134	< 0.019	< 0.018	< 0.021
Cs-137	< 0.02	0.07 ± 0.02	0.08 ± 0.02
Ce-141	< 0.040	< 0.040	< 0.040
Ce-144	< 0.082	< 0.081	< 0.091
Date Collected	10-01-20	10-01-20	10-01-20
Lab Code	KSO- 3504	KSO- 3506	KSO- 3508
Gross alpha	6.02 ± 1.90	4.49 ± 1.42	6.16 ± 2.18
Gross beta	22.76 ± 1.64	22.27 ± 1.64	29.83 ± 1.72
Sr-90	< 0.035	< 0.040	< 0.038
Be-7	< 0.42	< 0.46	< 0.53
K-40	16.34 ± 0.82	16.80 ± 0.84	21.36 ± 0.83
Nb-95	< 0.097	< 0.048	< 0.098
Zr-95	< 0.086	< 0.063	< 0.105
Ru-103	< 0.065	< 0.060	< 0.068
Ru-106	< 0.119	< 0.139	< 0.164
Cs-134	< 0.021	< 0.024	< 0.020
Cs-137	0.06 ± 0.03	0.07 ± 0.03	0.10 ± 0.03
Ce-141	< 0.157	< 0.137	< 0.125
Ce-144	< 0.130	< 0.155	< 0.114

Table 15. Soil samples, analyses for gross alpha, gross beta, strontium-90, and gamma-emitting isotopes (continued).
Collection: Semiannually

Sample Description and Concentration (pCi/g dry)

	Control	
Location	K-3	K-35
Date Collected	05-04-20	05-04-20
Lab Code	KSO- 1389	KSO- 1391
Gross alpha	5.98 ± 1.85	4.54 ± 1.82
Gross beta	28.35 ± 1.94	19.92 ± 1.86
Sr-90	< 0.043	< 0.044
Be-7	< 0.13	< 0.12
K-40	18.63 ± 0.80	11.70 ± 0.66
Nb-95	< 0.018	< 0.021
Zr-95	< 0.034	< 0.024
Ru-103	< 0.017	< 0.016
Ru-106	< 0.147	< 0.120
Cs-134	< 0.016	< 0.017
Cs-137	0.08 ± 0.03	0.07 ± 0.02
Ce-141	< 0.037	< 0.042
Ce-144	< 0.089	< 0.084
Date Collected	10-01-20	10-01-20
Lab Code	KSO- 3505	KSO- 3507
Gross alpha	3.41 ± 1.67	4.05 ± 1.80
Gross beta	17.25 ± 1.58	16.65 ± 1.64
Sr-90	< 0.036	< 0.037
Be-7	1.30 ± 0.63	< 0.66
K-40	12.14 ± 0.99	10.34 ± 0.66
Nb-95	< 0.182	< 0.058
Zr-95	< 0.105	< 0.076
Ru-103	< 0.089	< 0.035
Ru-106	< 0.256	< 0.148
Cs-134	< 0.035	< 0.020
Cs-137	0.05 ± 0.03	< 0.024
Ce-141	< 0.203	< 0.123
Ce-144	< 0.196	< 0.121

Table 16. Surface water samples, analyses for gross beta, potassium-40 and gamma-emitting isotopes.
Collection: Quarterly

Sample Description and Concentration (pCi/L)			
Indicator			
K-1b			
Date Collected	03-02-20	06-01-20	08-03-20
Lab Code	KSW- 577	KSW- 1818	KSW- 2719
Gross beta			
Suspended Solids	< 0.7	1.5 ± 0.4	< 0.7
Dissolved Solids	2.8 ± 0.7	1.0 ± 0.2	2.3 ± 0.7
Total Residue	2.8 ± 0.7	2.5 ± 0.4	2.3 ± 0.7
K-40 (ICP)	4.10	< 2.46	2.54
Mn-54	< 2.6	< 2.4	< 5.4
Fe-59	< 5.5	< 7.1	< 5.0
Co-58	< 1.8	< 3.5	< 4.1
Co-60	< 2.1	< 3.3	< 6.4
Zn-65	< 2.9	< 10.1	< 16.2
Zr-Nb-95	< 2.5	< 3.3	< 9.5
Cs-134	< 3.1	< 4.6	< 5.3
Cs-137	< 1.8	< 3.8	< 6.2
Ba-La-140	< 1.1	< 5.4	< 6.2
K-1d			
Date Collected	03-02-20	06-01-20	08-03-20
Lab Code	KSW- 578	KSW- 1819	KSW- 2720
Gross beta			
Suspended Solids	1.0 ± 0.4	0.9 ± 0.4	< 0.8
Dissolved Solids	1.1 ± 0.4	0.6 ± 0.2	2.6 ± 0.5
Total Residue	2.1 ± 0.6	1.5 ± 0.4	2.6 ± 0.5
K-40 (ICP)	1.64	1.39	1.97
Mn-54	< 2.0	< 2.1	< 4.4
Fe-59	< 4.0	< 3.0	< 4.5
Co-58	< 1.3	< 1.7	< 4.8
Co-60	< 1.3	< 1.5	< 4.7
Zn-65	< 3.2	< 4.1	< 10.4
Zr-Nb-95	< 1.1	< 1.9	< 7.4
Cs-134	< 2.2	< 1.9	< 5.0
Cs-137	< 2.6	< 1.5	< 4.9
Ba-La-140	< 2.0	< 1.7	< 6.4

Table 16. Surface water samples, analyses for gross beta, potassium-40, and gamma-emitting isotopes (continued).
Collection: Quarterly

Sample Description and Concentration (pCi/L)	
Indicator	
K-1b	
Date Collected	11-02-20
Lab Code	KSW- 4165
Gross beta	
Suspended Solids	< 0.7
Dissolved Solids	3.2 ± 0.7
Total Residue	3.2 ± 0.7
K-40 (ICP)	3.28
Mn-54	< 2.7
Fe-59	< 9.6
Co-58	< 2.3
Co-60	< 1.7
Zn-65	< 6.0
Zr-Nb-95	< 2.6
Cs-134	< 3.7
Cs-137	< 2.2
Ba-La-140	< 3.1
K-1d	
Date Collected	11-02-20
Lab Code	KSW- 4166
Gross beta	
Suspended Solids	< 0.8
Dissolved Solids	1.9 ± 0.6
Total Residue	1.9 ± 0.6
K-40 (ICP)	1.72
Mn-54	< 1.9
Fe-59	< 5.6
Co-58	< 2.4
Co-60	< 3.1
Zn-65	< 2.9
Zr-Nb-95	< 2.9
Cs-134	< 4.2
Cs-137	< 2.7
Ba-La-140	< 8.4

Table 16. Surface water samples, analyses for gross beta, potassium-40 and gamma-emitting isotopes (continued).
Collection: Quarterly

Sample Description and Concentration (pCi/L)			
Indicator			
K-1e			
Date Collected	03-02-20	06-01-20	08-03-20
Lab Code	KSW- 579	KSW- 1820	KSW- 2721
Gross beta			
Suspended Solids	< 1.8	< 0.7	< 0.7
Dissolved Solids	15.9 ± 1.5	0.5 ± 0.2	2.2 ± 0.8
Total Residue	15.9 ± 1.5	0.5 ± 0.2	2.2 ± 0.8
K-40 (ICP)	24.60	1.64	2.87
Mn-54	< 3.3	< 3.7	< 2.3
Fe-59	< 6.3	< 6.0	< 5.6
Co-58	< 2.5	< 2.4	< 3.6
Co-60	< 2.9	< 2.3	< 2.6
Zn-65	< 4.7	< 5.2	< 8.1
Zr-Nb-95	< 5.3	< 3.5	< 3.6
Cs-134	< 4.0	< 4.2	< 3.6
Cs-137	< 4.0	< 5.3	< 4.1
Ba-La-140	< 3.5	< 5.9	< 5.3

Date Collected	11-02-20
Lab Code	KSW- 4167
Gross beta	
Suspended Solids	< 0.7
Dissolved Solids	2.2 ± 0.8
Total Residue	2.2 ± 0.8
K-40 (ICP)	2.87
Mn-54	< 2.1
Fe-59	< 2.8
Co-58	< 3.1
Co-60	< 1.5
Zn-65	< 4.5
Zr-Nb-95	< 3.0
Cs-134	< 4.1
Cs-137	< 3.1
Ba-La-140	< 4.7

Table 16. Surface water samples, analyses for gross beta, potassium-40 and gamma-emitting isotopes (continued).
Collection: Quarterly

Sample Description and Concentration (pCi/L)			
Control			
K-9 (Raw)			
Date Collected	03-02-20	06-01-20	08-03-20
Lab Code	KSW- 580	KSW- 1821	KSW- 2722
Gross beta			
Suspended Solids	< 0.8	< 0.8	< 0.8
Dissolved Solids	0.7 ± 0.4	0.5 ± 0.2	1.0 ± 0.4
Total Residue	0.7 ± 0.4	0.5 ± 0.2	1.0 ± 0.4
K-40 (ICP)	1.48	< 1.23	1.39
Mn-54	< 1.9	< 1.7	< 4.1
Fe-59	< 1.8	< 3.7	< 6.6
Co-58	< 2.0	< 1.8	< 4.4
Co-60	< 2.0	< 2.0	< 3.7
Zn-65	< 4.4	< 3.9	< 10.7
Zr-Nb-95	< 2.4	< 2.3	< 6.2
Cs-134	< 3.0	< 2.1	< 4.7
Cs-137	< 2.9	< 1.9	< 4.5
Ba-La-140	< 2.3	< 1.8	< 5.3
K-9 (Tap)			
Date Collected	03-02-20	06-01-20	08-03-20
Lab Code	KSW- 581	KSW- 1822	KSW- 2723
Gross beta			
Suspended Solids	< 0.7	< 0.7	< 0.7
Dissolved Solids	1.0 ± 0.4	0.8 ± 0.2	1.1 ± 0.4
Total Residue	1.0 ± 0.4	0.8 ± 0.2	1.1 ± 0.4
K-40 (ICP)	1.48	< 1.15	1.39
Mn-54	< 1.9	< 3.0	< 4.0
Fe-59	< 2.9	< 5.6	< 8.9
Co-58	< 0.9	< 4.0	< 3.9
Co-60	< 1.0	< 2.7	< 3.5
Zn-65	< 2.7	< 6.3	< 10.7
Zr-Nb-95	< 2.7	< 2.9	< 3.6
Cs-134	< 2.4	< 4.8	< 4.6
Cs-137	< 1.5	< 4.2	< 4.6
Ba-La-140	< 2.9	< 5.3	< 8.8

Table 16. Surface water samples, analyses for gross beta, potassium-40, and gamma-emitting isotopes (continued).
Collection: Quarterly

Sample Description and Concentration (pCi/L)	
Control	
K-9 (Raw)	
Date Collected	11-02-20
Lab Code	KSW- 4168
Gross beta	
Suspended Solids	< 0.8
Dissolved Solids	1.1 ± 0.4
Total Residue	1.1 ± 0.4
K-40 (ICP)	1.39
Mn-54	< 3.8
Fe-59	< 4.7
Co-58	< 3.8
Co-60	< 3.1
Zn-65	< 5.6
Zr-Nb-95	< 2.5
Cs-134	< 3.9
Cs-137	< 2.2
Ba-La-140	< 5.7
K-9 (Tap)	
Date Collected	11-02-20
Lab Code	KSW- 4169
Gross beta	
Suspended Solids	< 0.7
Dissolved Solids	0.7 ± 0.4
Total Residue	0.7 ± 0.4
K-40 (ICP)	1.39
Mn-54	< 2.5
Fe-59	< 4.1
Co-58	< 3.5
Co-60	< 2.3
Zn-65	< 3.2
Zr-Nb-95	< 2.3
Cs-134	< 2.8
Cs-137	< 2.8
Ba-La-140	< 4.5

Table 17. Surface water, analyses for tritium and strontium-90.

Location and Collection Period		Concentration pCi/L H-3	Concentration pCi/L Sr-90
Indicator			
K-1b			
1st Quarter	KSW -577	< 151	< 0.5
2nd Quarter	KSW -1818	< 159	< 0.5
3rd Quarter	KSW -2719	< 158	< 0.6
4th Quarter	KSW -4169	< 155	< 0.5
K-1d			
1st Quarter	KSW -578	< 151	< 0.5
2nd Quarter	KSW -1819	< 159	< 0.5
3rd Quarter	KSW -2720	< 158	< 0.5
4th Quarter	KSW -4166	< 155	< 0.6
K-1e			
1st Quarter	KSW -579	< 151	< 0.5
2nd Quarter	KSW -1820	< 159	< 0.5
3rd Quarter	KSW -2721	< 158	< 0.6
4th Quarter	KSW -4167	< 155	< 0.5
Control			
K-9			
1st Quarter	KSW -580 (Raw)	< 151	< 0.4
	KSW -581 (Tap)	< 151	< 0.4
2nd Quarter	KSW -1821 (Raw)	< 159	< 0.5
	KSW -1822 (Tap)	< 159	< 0.5
3rd Quarter	KSW -2722 (Raw)	< 158	< 0.6
	KSW -2723 (Tap)	< 158	< 0.5
4th Quarter	KSW -4168 (Raw)	< 155	< 0.5
	KSW -4169 (Tap)	< 155	< 0.5

Table 18. Fish, collected at K-1d, analyses for gross beta, and strontium-90 and gamma-emitting isotopes.
Collection: Annually

Sample Description and Concentration (pCi/g wet)		
Collected	09-14-20	
Lab Code	KF- 3489	
Type	Rainbow Trout	
Portion	Flesh	Bones
Gross beta	4.48 ± 0.16	4.56 ± 1.21
Sr-90	NA[a]	0.15 ± 0.08
K-40	3.87 ± 0.49	NA[a]
Mn-54	< 0.028	NA[a]
Fe-59	< 0.058	NA[a]
Co-58	< 0.019	NA[a]
Co-60	< 0.016	NA[a]
Cs-134	< 0.022	NA[a]
Cs-137	< 0.025	NA[a]

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

Table 19. Shoreline sediment samples, analyses for gross beta and strontium-90, and gamma-emitting isotopes.
Collection: May and November

	Sample Description and Concentration (pCi/g dry)		
	Indicator		Control
Location	K-1c	K-1j	K-9
Collection Date	05-04-20	05-04-20	05-04-20
Lab Code	KSS- 1385	KSS- 1386	KSS- 1387
Gross beta	4.55 ± 0.88	6.33 ± 0.96	11.49 ± 1.03
Sr-90	< 0.046	< 0.042	< 0.047
K-40	3.10 ± 0.28	3.38 ± 0.29	7.92 ± 0.43
Co-58	< 0.009	< 0.016	< 0.009
Co-60	< 0.007	< 0.010	< 0.010
Cs-134	< 0.008	< 0.010	< 0.007
Cs-137	0.019 ± 0.009	< 0.014	0.018 ± 0.010
Location	K-1c	K-1j	K-9
Collection Date	11-02-20	11-02-20	11-02-20
Lab Code	KSS- 4170	KSS- 4171	KSS- 4172
Gross beta	7.78 ± 0.89	8.81 ± 0.96	7.76 ± 0.88
Sr-90	< 0.046	< 0.049	< 0.048
K-40	5.58 ± 0.42	5.26 ± 0.42	5.41 ± 0.48
Co-58	< 0.021	< 0.021	< 0.037
Co-60	< 0.011	< 0.015	< 0.026
Cs-134	< 0.014	< 0.011	< 0.022
Cs-137	< 0.018	< 0.017	< 0.024

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