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NLS2022016

May 10, 2022

U.S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555-0001

Subject: Annual Radiological Environmental Report  
Cooper Nuclear Station, Docket No. 50-298, DPR-46

Dear Sir or Madam:

The purpose of this letter is to transmit to the Nuclear Regulatory Commission (NRC) the Cooper Nuclear Station (CNS) Annual Radiological Environmental Report for the period January 1, 2021 through December 31, 2021. This report is included as an Enclosure. This document is being submitted for NRC use per the requirements of Technical Specification 5.6.2 and CNS Offsite Dose Assessment Manual Section D 5.2.

This letter contains no regulatory commitments.

Should you have any questions or require additional information, please contact me at (402) 825-5416.

Sincerely,

*Mark E. Unruh for Linda Dewhirst*  
Mark E. Unruh

Linda Dewhirst  
Regulatory Affairs and Compliance Manager

/sj

Enclosure - Radiological Environmental Monitoring Program 2021 Annual Report January 1, 2021 through December 31, 2021

cc: Regional Administrator w/ enclosure  
USNRC - Region IV

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Enclosure

Radiological Environmental Monitoring Program  
2021 Annual Report  
January 1, 2021 through December 31, 2021

***NEBRASKA PUBLIC POWER DISTRICT  
COOPER NUCLEAR STATION  
Radiological Environmental Monitoring Program  
2021 Annual Report  
January 1, 2021 to December 31, 2021***

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## **Preface**

This report covers the period of January 1 through December 31, 2021. Personnel of Nebraska Public Power District made all sample collections. Analyses were performed and reports of analyses were prepared by Teledyne Brown Engineering – Environmental Services and forwarded to Nebraska Public Power District. Environmental Thermoluminescent Dosimeter (TLD) analyses were performed and reports of analyses were prepared by Mirion Technologies.



**SECTION I. INTRODUCTION**

## I. INTRODUCTION

This report contains a complete tabulation of data collected during the period January 1 through December 31 2021, for the operational Radiological Environmental Monitoring Program (REMP) performed for Cooper Nuclear Station (CNS) of Nebraska Public Power District (NPPD) by Teledyne Brown Engineering - Environmental Services.

Cooper Nuclear Station is located in Nemaha County in the southeast corner of Nebraska on the Missouri River. A portion of the site extends into Missouri. The reactor is an 830-megawatt (net electrical) boiling water reactor. Initial criticality was attained on February 21, 1974.

Radiological environmental monitoring began in 1971 before the plant became operational and has continued to the present. The program monitors radiation levels in air, terrestrial and aquatic environments. All samples are collected by NPPD personnel. All samples are shipped for analysis to a contractor's laboratory where there exists special facilities required for measurements of extremely low levels of radioactivity. Teledyne Brown Engineering - Environmental Services has the responsibility for the analyses for Cooper Nuclear Station.

The United States Nuclear Regulatory Commission (USNRC) regulations (10CFR50.34a) require that nuclear power plants be designed, constructed, and operated to keep levels of radioactive material in effluents to unrestricted areas as low as is reasonably achievable (ALARA). Inplant monitoring is used to ensure that release limits are not exceeded. As a precaution against unexpected or undefined environmental processes, which might allow undue accumulation of radioactivity in the environment, a program for monitoring the plant environs is included in NPPD's CNS Offsite Dose Assessment Manual (ODAM).

#### **A. Atmospheric Nuclear Tests and Nuclear Incidents**

Three atmospheric nuclear detonations in the People's Republic of China influenced program results significantly in late 1976 and in 1977. Two of these detonations occurred in late 1976 (September 26 and November 17) and one in late 1977 (September 17). As a consequence of these tests elevated activities of gross beta in air particulate filters and iodine-131 in milk were observed throughout most of the United States. No atmospheric nuclear tests have been conducted since 1980, thus no short-lived fission products were detected in air particulate samples.

On April 26, 1986 the fire and explosion of Chernobyl Reactor No. 4 in the Soviet Union resulted in the release of fission products to the atmosphere and worldwide fallout. Following the explosion, elevated levels of gross beta activities in air particulates and iodine-131 in charcoal filters and milk samples were measured. Additionally, in 1986, cesium-137 and the short-lived radionuclides iodine-131, ruthenium-106, and cesium-134 were detected in broadleaf vegetation. Similar results occurred in other areas of the United States and the entire Northern Hemisphere.

#### **B. Monitoring Program Objectives and Data Interpretation**

The objective of the monitoring program is to detect and assess the impact of possible releases to the environs of radionuclides from the operations of Cooper Nuclear Station. This objective requires measurements of low levels of radioactivity equal to or lower than pre-determined limits of detection. In addition the source of the environmental radiation must be established. Sources of environmental radiation include:

- (1) Natural background radiation from cosmic rays (beryllium-7).
- (2) Terrestrial, primordial radionuclides from the environment (potassium-40, radium-226, thorium-228).
- (3) Fallout from atmospheric nuclear tests such as the September 1977 detonation by the Peoples' Republic of China and the atmospheric weapons test of October 16, 1980 (fission products and fusion products).
- (4) Releases from nuclear power plants such as CNS (fission products and neutron activation products).
- (5) Fallout from the Chernobyl nuclear reactor accident.

Radiation levels measured in the vicinity of an operating power station are compared with preoperational measurements at the same locations to distinguish power plant effects from other sources. Also, results of the monitoring program are related to events known to cause elevated levels of radiation in the environment, e.g., atmospheric nuclear detonations or abnormal plant releases.

**SECTION II. SUMMARY**

## II. SUMMARY

Presented in this report are summaries and discussions of the data generated for the Radiological Environmental Monitoring Program (REMP) for Cooper Nuclear Station (CNS) of Nebraska Public Power District (NPPD) for 2021.

The sampling and analyses program is described in Section III. It contains the sampling schedule and required analyses in Table 1 and Table 2 and the site map.

A discussion of each type of sample analyzed and its impact, if any, on the environment is presented in Section IV. Included are graphs of the radionuclides of interest for the past several years and the statistical results for each quarter of the year.

Section V presents the yearly conclusions of the program.

Section VI is the Radiological Environmental Monitoring Program Summary. It contains the yearly summary of the program with the total number of samples of each type analyzed. It lists the yearly average and range for the control locations versus the indicator locations and the number of detections per total number of samples. It identifies the station with the highest yearly average, the distance and location of that station and provides the range of detection.

Section VII contains the complete data tables for the period.

References are presented in Section VIII.

**SECTION III. SAMPLING AND ANALYSIS PROGRAM**

### **III. SAMPLING AND ANALYSES PROGRAM**

The 2021 sampling and analyses program is described in Table 1 and Table 2. Teledyne Brown Engineering - Environmental Services has a comprehensive quality assurance/quality control program designed to assure the reliability of data obtained. The results for the 2021 Interlaboratory Comparison Program conducted by Analytics, Inc., the Department of Energy's (DOE) Mixed Analyte Performance Evaluation Program (MAPEP) and Environmental Resource Associates (ERA) are contained in Appendix B.

Sampling locations are indicated in the map labeled Figure 1, Figure 2, and Figure 3. Further description of the location and sample types collected at each location are listed in Appendix G.

The annual land use census for 2021 is described in Appendix A. There were no milk animals found within three miles of CNS in 2021 and no evidence of potable water use from the river. The nearest garden to CNS is in sector D, 1.8 miles from CNS. From year to year there is a slight variation in the number of gardens tended. The nearest resident to CNS is in sector Q, 0.9 miles from CNS.

All of the required 2021 environmental monitoring, including sampling and analyses, were conducted as specified in Table D4.1-1 of the CNS Offsite Dose Assessment Manual (ODAM), except as noted in Appendix E, REMP Sampling and Analytical Exceptions table.

**NEBRASKA PUBLIC POWER DISTRICT**

**COOPER NUCLEAR STATION**

*Environmental Radiation Surveillance Program Sampling Schedule and Analyses*

**TABLE 1: Sampling Frequencies and Minimum Numbers**

SAMPLE MEDIUM	ODAM SAMPLE STATIONS	NON-ODAM SAMPLE STATIONS	MINIMUM SAMPLES PER O DAM (PER SAMPLE PERIOD)	SAMPLE COLLECTION FREQUENCY (AT LEAST ONCE PER)	MAXIMUM INTERVAL
Radioiodine	1-10, 111	-	5	7 Days	8.75 Days
Particulates	1-10,111	-	5	7 Days	8.75 Days
Milk (nearest producer)	99	-	1	15 Days in Peak Pasture (June 1 - Sep 30)	18.75 Days
				31 Days in Non-Peak Pasture (Oct 1 - May 31)	38.75 Days
River Water	12 or 35, 28	-	2	31 Days	38.75 Days
Food Products <sup>1</sup> (Broadleaf Vegetation)	35, 96, 101	-	3	Monthly when available <sup>2</sup>	N/A
Direct Radiation	1-10, 20, 44, 56, 58, 59, 66, 67, 71, 79-91, 94, 111, N01-N25	-	32 <sup>3</sup>	92 Days	115 Days
Ground Water	11, 47	-	2	92 Days	115 Days
Sediment from Shoreline	28	35	1	Once in Spring (March 1 - May 31), Once in Fall (Sep 1 - Nov 30)	
Fish	28, 35	-	2	Once in Summer (June 1 - Aug 31), Once in Fall (Sep 1 - Nov 30)	

<sup>1</sup> Broadleaf vegetation required (when available) due to absence of "Milk (other producers)" (LBDCR 2018-001).

<sup>2</sup> Don't need to physically go to Sample Station in attempt to obtain sample if based on season/weather its obvious vegetation is unavailable (e.g., January).

<sup>3</sup> TLD is single phosphore.  $\geq 2$  phosphores in one package are considered  $\geq 2$  dosimeters.



**TABLE 2: Analysis Frequencies**

MEDIUM	ODAM STATIONS	NON-ODAM STATIONS	ANALYSIS TYPE	ANALYSIS FREQUENCY (AT LEAST ONCE PER)	MAXIMUM INTERVAL
Radioiodine	1-10, 111	-	I-131	7 Days	8.75 Days
Particulate	1-10, 111	-	Gross Beta <sup>a</sup>	-	-
			Gamma Isotopic	Only each sample in which gross beta > 10 times yearly mean of control samples	-
			Gamma Isotopic of Composite (by location)	92 Days	115 Days
Milk <sup>1</sup> (nearest producer)	99	-	Gamma Isotopic, I-131	-	-
River Water	12 or 35, 28	-	Gamma Isotopic	-	-
			Tritium on Composite	92 Days	115 Days
Food Products (broadleaf vegetation)	35, 96, 101	-	Gamma Isotopic, I-131	-	-
Direct Radiation	1-10, 20, 44, 56, 58, 59, 66, 67, 71, 79-91, 94, 111, N01-N25	-	Gamma	92 Days	115 Days
Ground Water	11, 47	-	Gamma Isotopic, Tritium	-	-
Sediment from Shoreline	28	35	Gamma Isotopic	-	-
Fish (edible portions)	28, 35	-	Gamma Isotopic	-	-

<sup>a</sup> Analyze for gross beta radioactivity  $\geq$  24 hours following filter change.

Figure 1

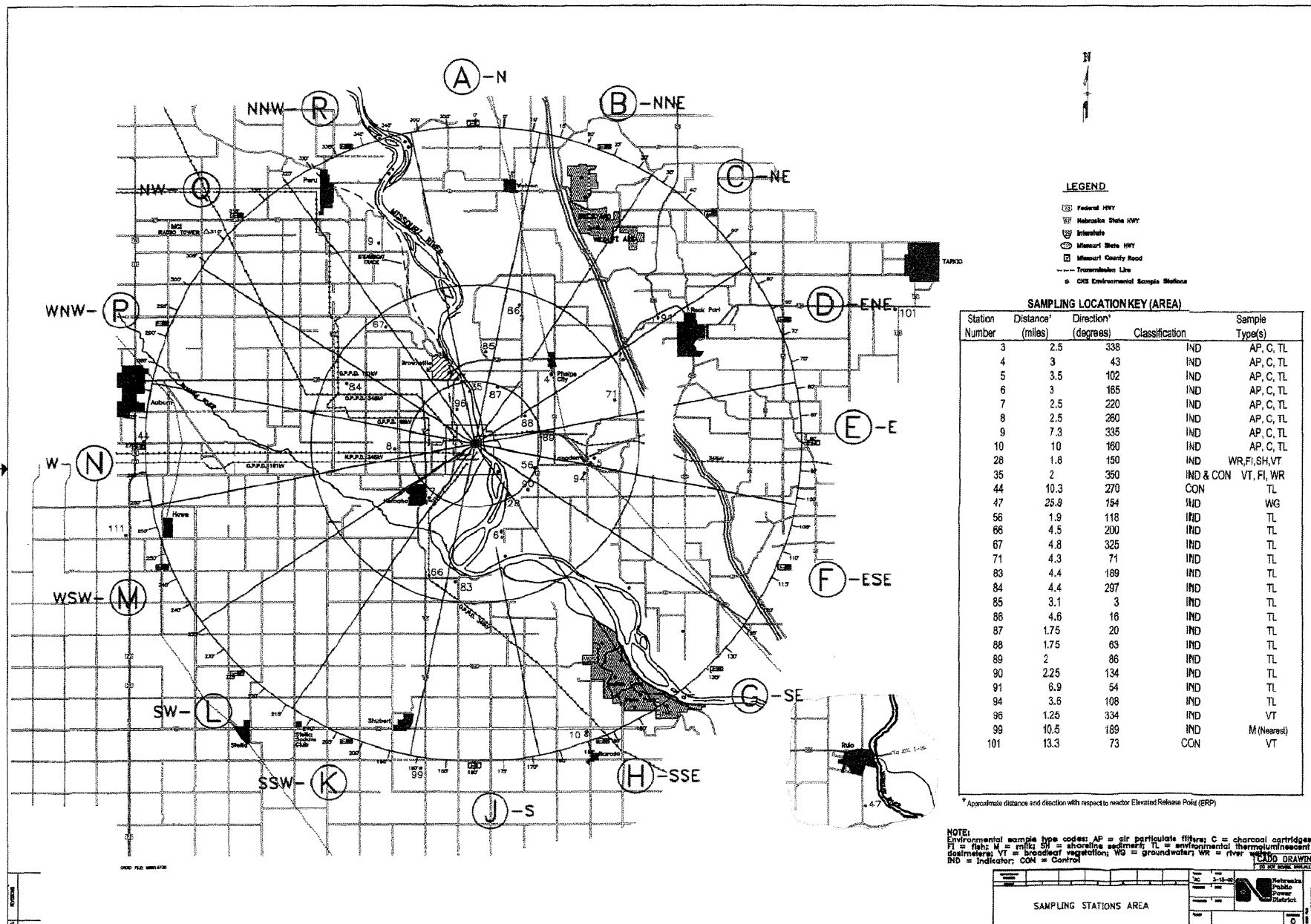


Figure 2

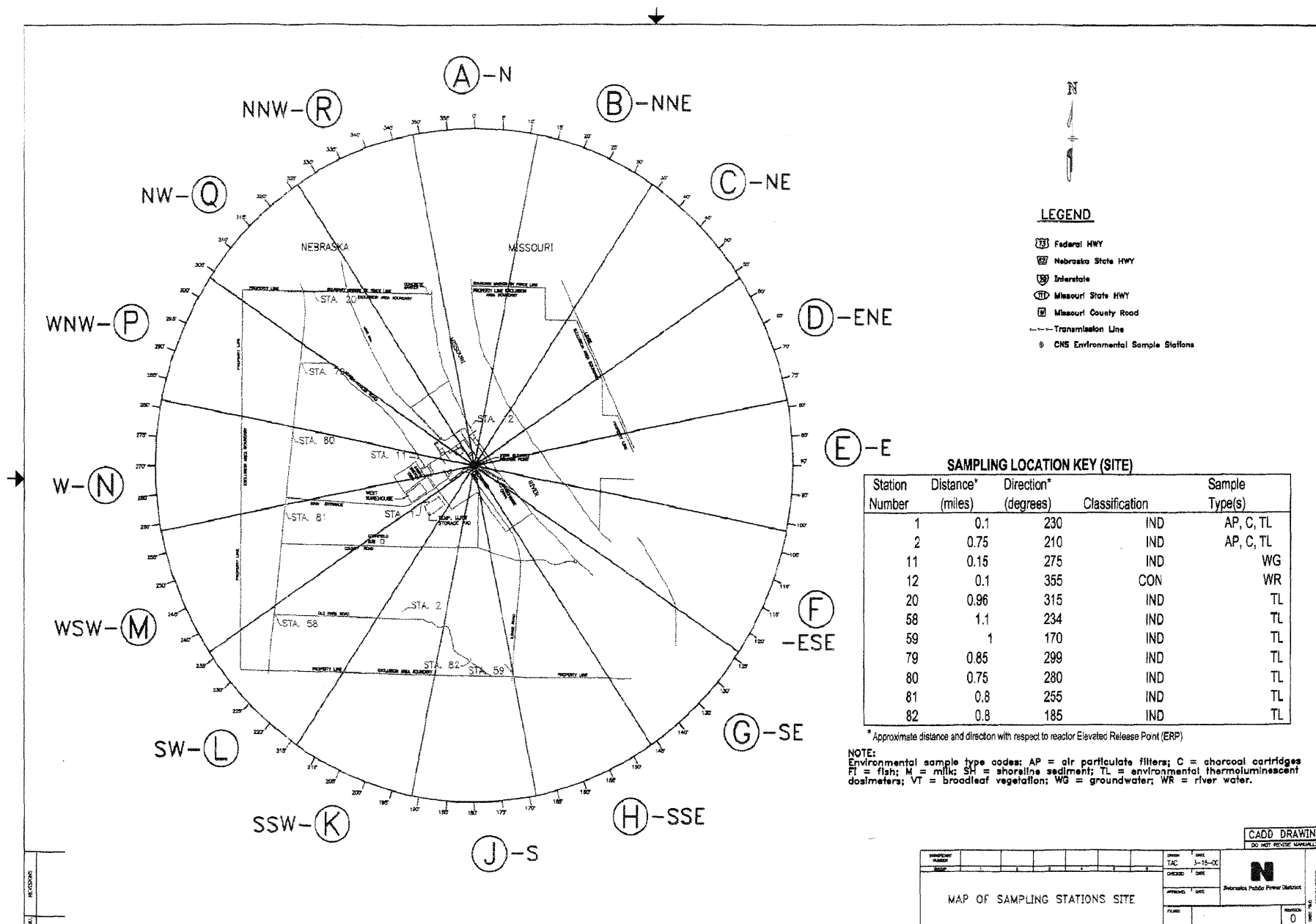
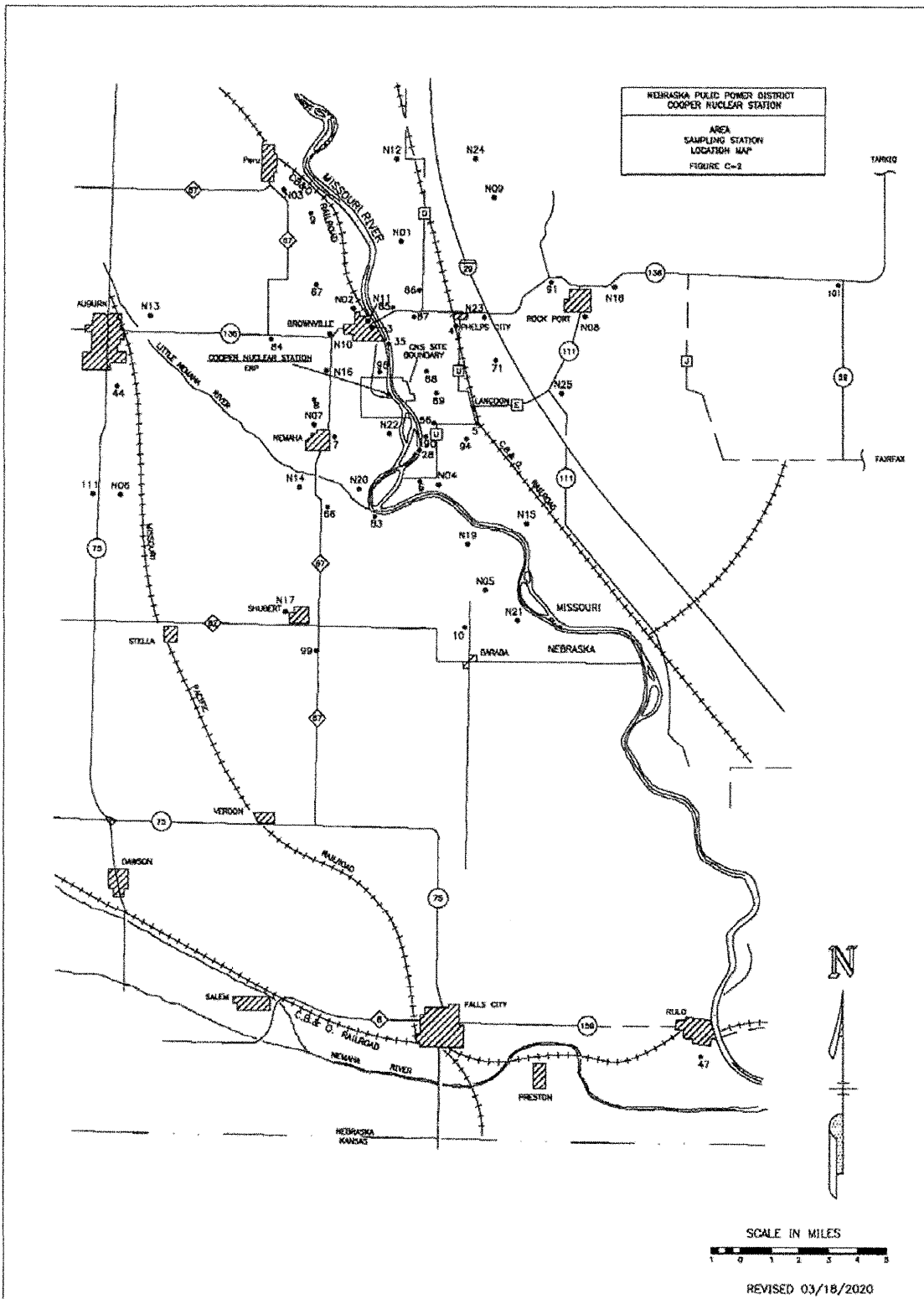


Figure 3



**SECTION IV. SUMMARY AND DISCUSSION OF 2021 ANALYTICAL RESULTS**

#### **IV. SUMMARY AND DISCUSSION OF 2021 ANALYTICAL RESULTS**

Data from the radiological analyses of environmental media collected during 2021 are tabulated and discussed in section A through G. The procedures and specifications followed in the laboratory for these analyses are as required in the Teledyne Brown Engineering Quality Assurance manual and are explained in the Teledyne Brown Engineering Analytical Procedures. A synopsis of analytical procedures used for the environmental samples is provided in Appendix C. In addition to internal quality control measures performed by Teledyne Brown Engineering, the laboratory also participates in an Interlaboratory Comparison Program. Participation in this program ensures that independent checks on the precision and accuracy of the measurements of radioactive material in environmental samples are performed. The results of the Interlaboratory Comparison are provided in Appendix B.

Radiological analyses of environmental media characteristically approach and frequently fall below the detection limits of state-of-the-art measurement methods. The "less than" values in the data tables were calculated from each specific analysis and are dependent on sample size, detector efficiency, length of counting time, chemical yield (when appropriate) and the radioactive decay factor from time of counting to time of collection. Teledyne Brown Engineering's analytical methods meet or are below the Lower Limit of Detection (LLD) requirements given in Table 2 of the USNRC Branch Technical Position, Radiological Monitoring Acceptable Program (November 1979, Revision 1). Appendix C contains a discussion of the LLD formulas.

The following is a discussion and summary of the results of the environmental measurements taken during the 2021 reporting period:

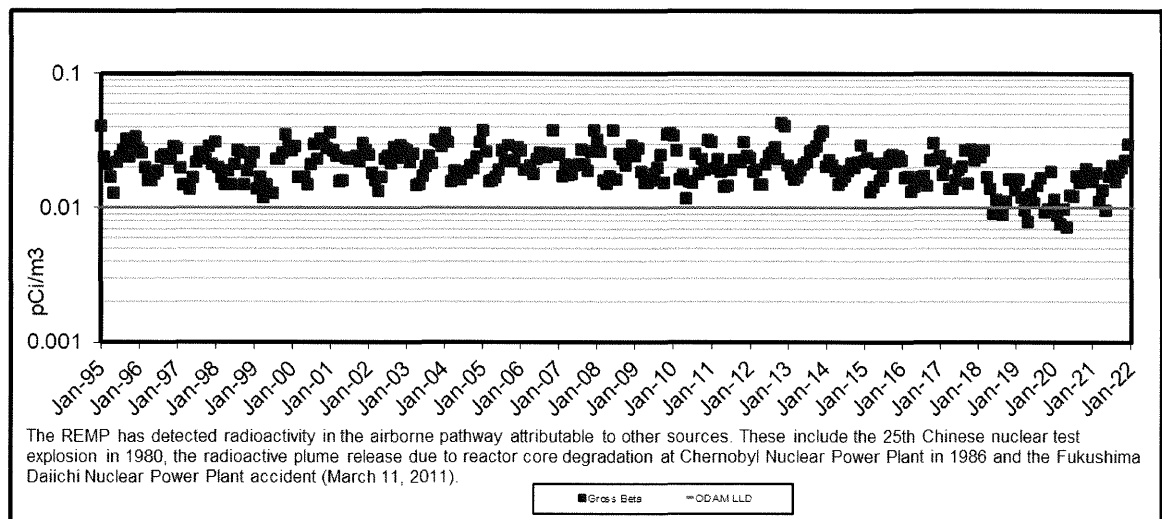
**A. Airborne Particulates**

Gross beta activity was observed in 521 of the 528 indicator samples collected during 2021. The average concentration was 0.018 pCi/m<sup>3</sup> with a range of 0.004 to 0.050 pCi/m<sup>3</sup>. Gross beta activity was observed in all of the 53 control samples with an average concentration of 0.019 pCi/m<sup>3</sup> with a range of 0.008 to 0.033 pCi/m<sup>3</sup>. The results of the gross beta activities are presented in Section VII-1 and Trending Graph 1. The gross beta activities for 2021 were comparable to levels measured in the previous several years. Prior to that period the gross beta activities were higher due to atmospheric nuclear weapons testing performed in other countries. The preoperational period of 1971 through 1974 averaged 0.098 pCi/m<sup>3</sup> gross beta.

Air particulate filters were collected weekly and composited by locations on a quarterly basis, unless otherwise specified in Section VII-2. They were analyzed by gamma ray spectroscopy. The results are presented in Section VII-2. Beryllium-7, which is produced continuously in the upper atmosphere by cosmic radiation, was measured in all of the 44 composite samples. The indicator locations had an average concentration of 0.115 pCi/m<sup>3</sup> with a range of 0.056 to 0.189 pCi/m<sup>3</sup>. The control location had an average concentration of 0.114 pCi/m<sup>3</sup> with a range of 0.062 to 0.168 pCi/m<sup>3</sup>. During the preoperational period, beryllium-7 was measured at comparable levels. All other gamma emitters were below the detection limits. The operation of Cooper Nuclear Station has no discernable impact on Airborne Particulate samples.

TRENDING GRAPH 1

**GROSS BETA IN AIR PARTICULATES  
MONTHLY AVERAGE – ALL LOCATIONS**

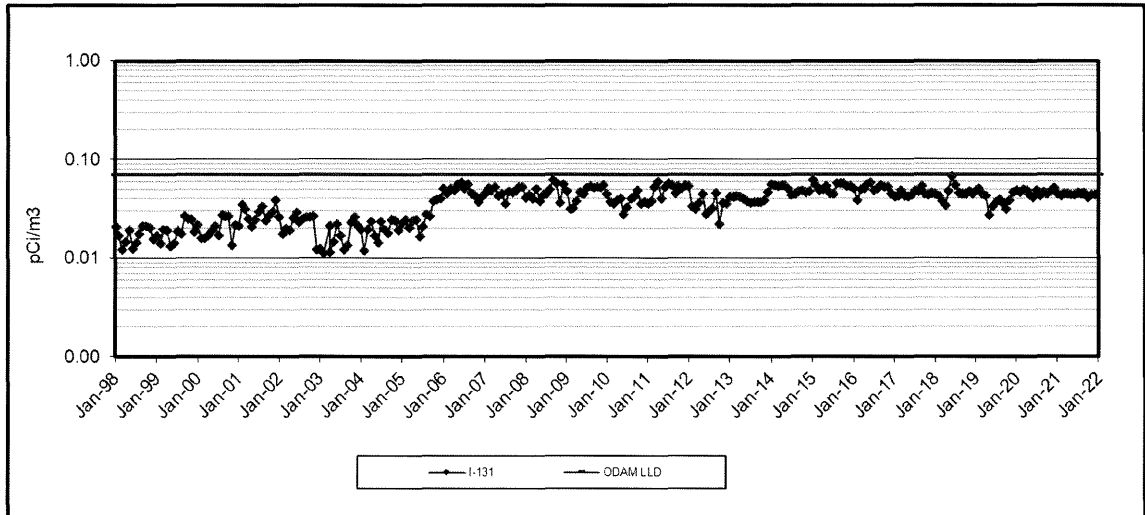


**B. Airborne Iodine**

Charcoal cartridges used to collect airborne iodine were collected weekly and analyzed by gamma spectrometry for iodine-131, unless otherwise specified in Section VII-1. The results are presented in Section VII-1 and Trending Graph 2. Iodine-131 was below the lower limit of detection in all 581 samples. The operation of Cooper Nuclear has no discernable impact on charcoal cartridge samples.

TRENDING GRAPH 2

**IODINE-131 IN CHARCOAL FILTERS**  
MONTHLY AVERAGE – ALL LOCATIONS



Trending Graph 2 represents minimum detectable concentration (MDC) results. This graph has the ODAM LLD trend line, showing the MDC results as below the ODAM required LLDs. The upward trend indicates shortened detector count time in order to maximize the number of samples counted each day and is not an indication that the trend will continue to increase above the LLD limit.

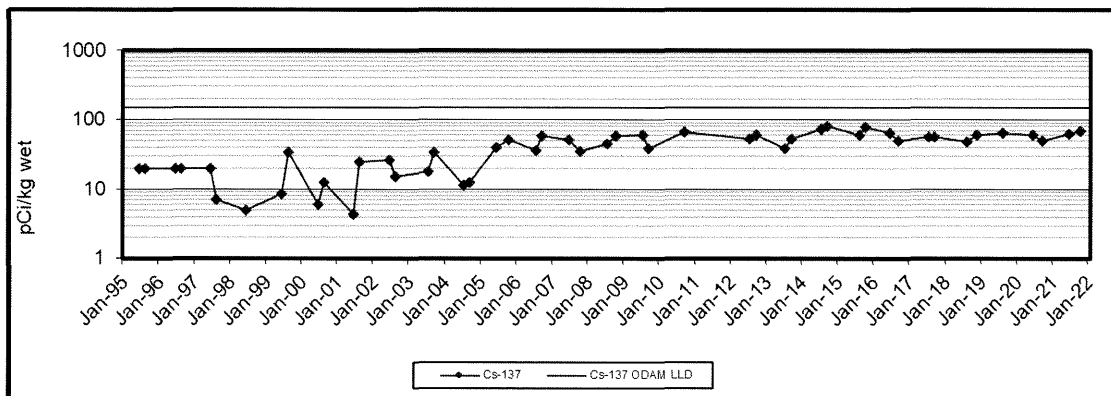


**C. Fish**

Aquatic biota can be sensitive indicators of radionuclide accumulation in the environment because of their ability to concentrate certain chemical elements, which have radioisotopes. The results are presented in Table VII-3 and Trending Graph 3. Eight samples of fish were collected during the summer and fall of 2021. Middle-top feeding fish (carp) and bottom feeding fish (catfish) were collected in June and October. These samples were analyzed by gamma ray spectroscopy. Naturally occurring potassium-40 was detected in all samples. The average concentration at the upstream control location was 2,816 pCi/kg (wet weight) with a range of 2,367 to 3,107 pCi/kg (wet weight). The average concentration for the indicator samples was 2,565 pCi/kg (wet weight) with a range of 2,121 to 2,980 pCi/kg (wet weight). The preoperational period of 1971 through 1974 averaged 2,400 pCi/kg potassium-40. All other gamma emitters were below the lower limit of detection. The operation of Cooper Nuclear Station has had no discernable impact on fish samples.

TRENDING GRAPH 3

**CESIUM-137 IN FISH  
ALL LOCATIONS**



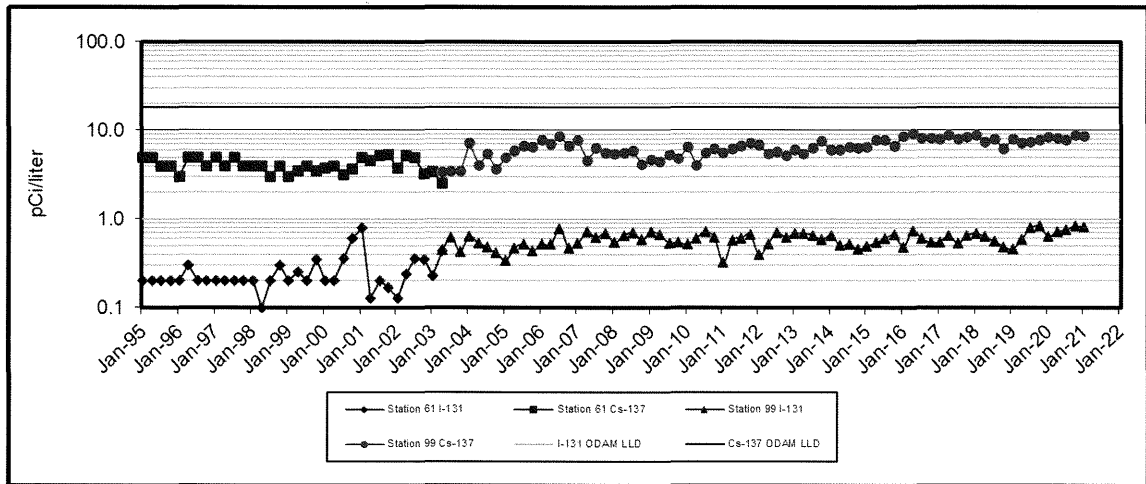
Trending Graph 3 represents minimum detectable concentration (MDC) results. This graph has the ODAM LLD trend line, showing the MDC results as below the ODAM required LLDs. The upward LLD trend indicates that detector count times were gradually shortened to maximize the number of samples counted each day, and is not an indication that the trend will continue to increase above the LLD limit.  
 Samples were not collected in Summer 2010.  
 Flooding of the Missouri River prevented collection of fish in Summer or Fall 2011.  
 Flooding of the Missouri River prevented collection of fish in Fall 2019.

**D. Milk – Nearest Producer**

Milk samples are collected once every 15 days in peak pasture season and once every 31 days the rest of the year from Station 99. The results are presented in Table VII-4 and Trending Graph 4. Station 99 ceased operations in March 2021 and no other milk producers were available. Milk collection could only be obtained January through March 2021. Three samples were analyzed by gamma ray spectroscopy and for low-level iodine-131 by radiochemical separation. All iodine-131 results were below the lower limit of detection. Naturally occurring potassium-40 was measured in all samples with an average concentration of 1,007 pCi/L and a range of 868 to 1,092 pCi/L. All other gamma emitters were below the lower limit of detection. The operation of Cooper Nuclear Station has no discernable impact on milk samples.

TRENDING GRAPH 4

**IODINE-131 AND CESIUM-137 IN MILK – NEAREST PRODUCER  
STATIONS 61 & 99**



Trending Graph 4 represents minimum detectable concentration (MDC) results. This graph has the ODAM LLD trend line, showing the MDC results as below the ODAM required LLDs. The upward trend indicates shortened detector count time in order to maximize the number of samples counted each day, and is not an indication that the trend will continue to increase above the LLD limit.

Station 61 went out of business in May of 2003. Station 99 replaced station 61 in May of 2003.

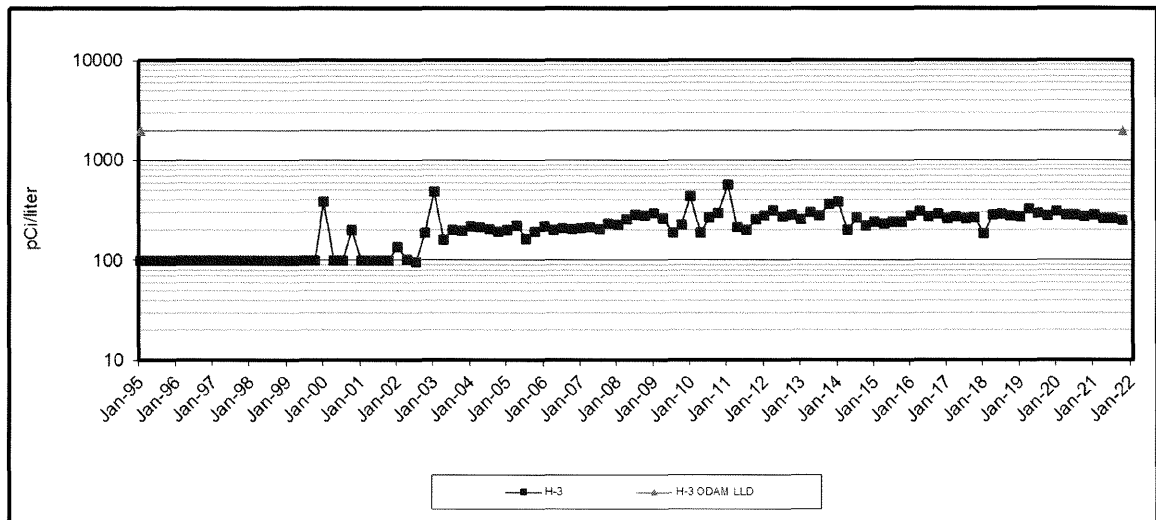
Station 99 milk producer ceased operations in March 2021. No other milk producers available. CNS collects broadleaf vegetation samples in lieu of milk samples.

**E. Ground Water**

Groundwater was collected from two stations quarterly and analyzed for tritium, low level iodine-131 and for gamma emitting radionuclides. Station 11 is located 0.15 miles from the plant and station 47 is 25.8 miles from the plant. The results are presented in Table VII-5 and Trending Graph 5. All tritium and low level iodine results were below the lower limit of detection. All gamma emitters were below the lower limit of detection. The operation of Cooper Nuclear Station has no discernable impact on groundwater samples.

TRENDING GRAPH 5

**TRITIUM IN GROUND WATER**  
QUARTERLY AVERAGE – ALL LOCATIONS



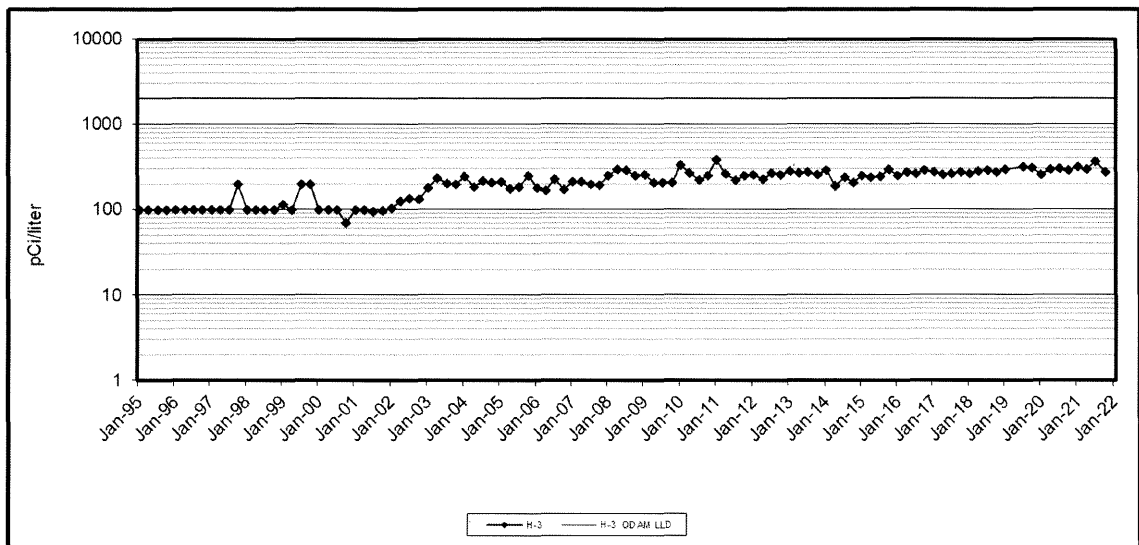
Trending Graph 5 represents minimum detectable concentration (MDC) results. This graph has the ODAM LLD trend line, showing the MDC results as below the ODAM required LLDs. The upward LLD trend indicates that detector count times were gradually shortened to maximize the number of samples counted each day, and is not an indication that the trend will continue to increase above the LLD limit.

**F. River Water**

River water was collected monthly and monitored for gamma emitting radionuclides and tritium. The monthly samples are composited quarterly and analyzed for tritium. The results are presented in Table VII-6 and Trending Graph 6. All tritium results were below the lower limit of detection. All gamma emitters were below the lower limit of detection. The operation of Cooper Nuclear Station has no discernable impact on river water samples.

TRENDING GRAPH 6

**TRITIUM IN RIVER WATER**  
QUARTERLY AVERAGE – ALL LOCATIONS



Trending Graph 6 represents minimum detectable concentration (MDC) results. This graph has the ODAM LLD trend line, showing the MDC results as below the ODAM required LLDs. The upward LLD trend indicates that detector count times were gradually shortened to maximize the number of samples counted each day, and is not an indication that the trend will continue to increase above the LLD limit.

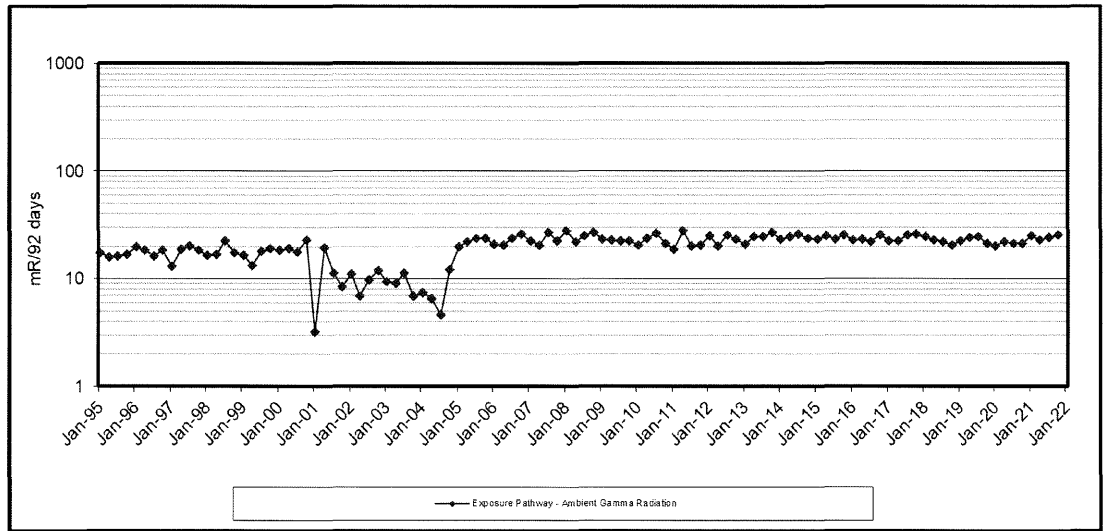
**G. Thermoluminescent Dosimeters**

Thermoluminescent dosimeters (TLDs) determine environmental radiation doses and the results are presented in Table VII-7 and Trending Graph 7. Ambient radiation was monitored at 58 locations within an 11 mile radius of Cooper Nuclear Station and collected quarterly. The average concentration for the indicator locations was 24.4 millirem/quarter and a range from 21.0 to 29.0 millirem/quarter. The highest indicator station 8, which is located 2.5 miles, 260 degrees, had an average of 26.8 millirem/quarter and a range from 25.0 to 29.0 millirem/quarter. The control stations were Station 44 and Station 111 with an average of 24.9 millirem/quarter and a range from 22.0 to 28.0 millirem/quarter. The preoperational period of 1971 through 1974 averaged 37.0 millirem/quarter; which is the preoperational four year average. Current year TLD averages deviate from the preoperational averages due to instrument variations from previous vendors.

The data from year to year is in good agreement and indicates no adverse changes in radiation exposure to the population near Cooper Nuclear Station.

TRENDING GRAPH 7

**THERMOLUMINESCENT DOSIMETRY  
QUARTERLY AVERAGE – ALL LOCATIONS**

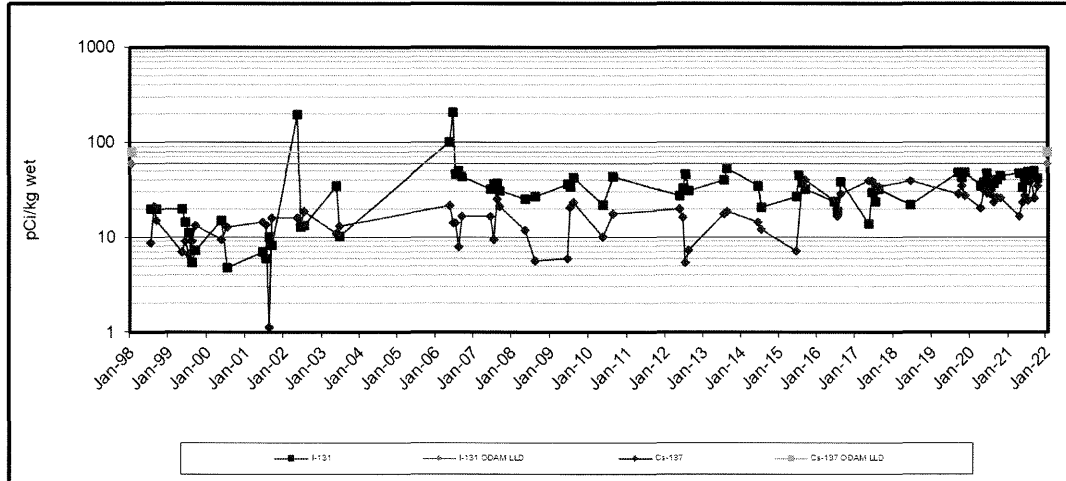


First quarter 2001 TLD data low but still within acceptable limits due to possible dry conditions.

**H. Food – Broadleaf Vegetation**

Broadleaf vegetation samples were collected from two indicator locations and one control location monthly from April to October 2021. The samples were analyzed by gamma ray spectroscopy and for low-level iodine-131 by radiochemical separation. The results are presented in Table VII-8 and Trending Graph 8. Beryllium-7, which is produced continuously in the upper atmosphere by cosmic radiation was measured in 19 of the 21 samples analyzed. The average concentration for the indicator locations was 1,177 pCi/kg (wet) with a range of 391 to 2,507 pCi/kg wet. The control location had an average concentration of 951 pCi/kg (wet) with a range of 269 to 1,509 pCi/kg (wet). Naturally occurring potassium-40 was measured in all 21 samples analyzed. The average concentration for the indicator locations was 5,412 pCi/kg (wet) with a range of 2,778 to 11,930 pCi/kg (wet). The control location had an average concentration of 5,024 pCi/kg (wet) with a range of 3,356 to 6,146 pCi/kg (wet). Naturally occurring thorium-228 was measured in seven samples analyzed. The average concentration for the indicator locations was 93.3 pCi/kg (wet) with a range of 50.3 to 172 pCi/kg (wet). The control location had an average concentration of 65.2 pCi/kg (wet) with a range of 56.3 to 74.1 pCi/kg (wet). All other gamma emitters were below the lower limit of detection. The operation of Cooper Nuclear Station has no discernable impact on broadleaf vegetation samples.

TRENDING GRAPH 8  
**IODINE-131 AND CESIUM-137 IN FOOD – BROADLEAF VEGETATION**  
 ALL LOCATIONS



Trending Graph 8 represents minimum detectable concentration (MDC) results. This graph has the ODAM LLD trend line, showing the MDC results as below the ODAM required LLDs. The upward trend indicates shortened detector count time in order to maximize the number of samples counted each day, and is not an indication that the trend will continue to increase above the LLD limit

The low Cs-137 value reported in July 2001 was due to the wrong aliquot being entered for the gamma analysis resulted in an invalid analysis and is not reported

Due to delay in sample receipt, the I-131 had decayed away, resulting in an invalid analysis for May 2002 and is not reported. Milk samples were collected in lieu of broadleaf vegetation samples in 2004 and 2005.

Due to delay in counting sample, the I-131 had decayed away, resulting in an invalid analysis for June 2006 and is not reported. The I-131 by chemical separation met required I-131 LLD.

Broadleaf vegetation samples were not available for collection in 2011 due to Missouri River flooding.

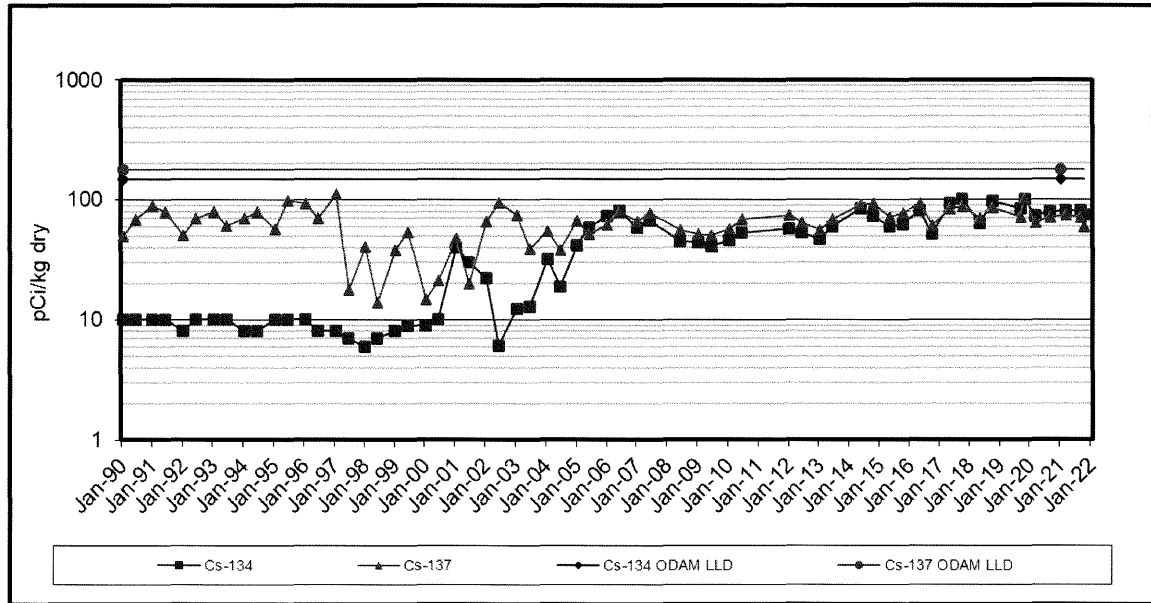
Broadleaf vegetation samples were not available for collection April thru August 2019 due to Missouri River Flooding.

**I. Shoreline Sediment**

Sediment samples were collected in March, September, and October from indicator location 28 and control location 35. The samples collected were analyzed by gamma spectrometry. The results are presented in Table VII-9 and Trending Graph 9. A number of naturally occurring radionuclides were detected in these samples. Naturally occurring potassium-40 was observed in all four samples. The average concentration for the control location was 10,950 pCi/kg (dry weight) and a range of 10,400 to 11,500 pCi/kg (dry weight). The average concentration for the indicator location was 12,130 pCi/kg (dry weight) and a range of 11,140 to 13,120 pCi/kg (dry weight). Naturally occurring Radium-226 was observed in one of the control samples with an average concentration of 1,868 pCi/kg (dry weight). Naturally occurring Thorium-228 was observed in all four samples. The average concentration for the control location was 382 pCi/kg (dry weight) with a range of 304 to 459 pCi/kg (dry weight). The average concentration for the indicator location was 706 pCi/kg (dry weight) and a range of 571 to 841 pCi/kg (dry weight). All other gamma emitters were below the lower limit of detection. The operation of Cooper Nuclear Station has no discernable impact on shoreline sediment samples.

TRENDING GRAPH 9

**CESIUM-134 AND CESIUM-137 IN SHORELINE SEDIMENT  
STATIONS 28 AND 35**



Trending Graph 9 represents minimum detectable concentration (MDC) results. Only one sample was collected in 2008. This graph has the ODAM LLD trend line, showing the MDC results as below the ODAM required LLDs. The upward trend indicates shortened detector count time in order to maximize the number of samples counted each day, and is not an indication that the trend will continue to increase above the LLD limit. Shoreline sediment samples were not available for collection due to flooding of the Missouri River in 2011. Shoreline sediment samples were not available for collection due to flooding of the Missouri River in September 2019.

***J. Errata Data***

There was no errata data for 2021.



**SECTION V. CONCLUSIONS**

## V. CONCLUSIONS

The results of the 2021 Radiological Environmental Monitoring Program (REMP) for Cooper Nuclear Station (CNS) of Nebraska Public Power District (NPPD) have been presented. The report contains data tables, summaries, and discussions of the data and trending graphs.

Naturally occurring radioactivity and residual traces of fallout were observed in sample media in the expected ranges. They have been discussed individually in the text. Observed radioactivity was at very low concentrations.

The results of the analyses have been presented. Based on the evidence of the Radiological Environmental Monitoring Program, Nebraska Public Power District, Cooper Nuclear Station has had no discernable radiological impact on the environment and is operating within regulatory limits.

**SECTION VI. RADIOLOGICAL ENVIRONMENTAL MONITORING**  
**PROGRAM SUMMARY TABLE - 2021**

**ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY**

Name of Facility Cooper Nuclear Station Docket No. 50-298  
 Location of Facility Nemaha Nebraska Reporting Period January 1 2021 to December 31 2021  
 (County/State)

Medium of Pathway Sampled (Unit of Measurement)	Type & Total No. of Analysis Performed	Lower Limit of Detection(1) (LLD)	All Indicator Locations Mean(2) Range(2)	Location with Highest Annual Mean		Control Location Mean(2) Range(2)	No. of Reportable Occurrences
				Name	Mean(2) Range(2)		
<b>Air Particulate</b> (pCi/m <sup>3</sup> )	GR-B	581	0.01 .018(521/528) (.004/.050)	Sta. 10	10.0 mi. .020(52/53) (.007/.047)	.019(53/53) (.008/.033)	0
	BE-7	44	NA .115(40/40) (.056/.189)	Sta. 10	10.0 mi. .140(4/4) (.109/.189)	.114(4/4) (.062/.168)	0
	K-40	44	NA ND(0/40) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
	CO-60	44	NA ND(0/40) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
	TH-228	44	NA ND(0/40) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
<b>Air Iodine</b> (pCi/m <sup>3</sup> )	I-131	581	0.07 ND(0/528) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/53) (ND-ND)	0
<b>Fish</b> (pCi/kg wet)	K-40	8	NA 2565(4/4) (2121/2980)	Sta. 35	2.0 mi. 2816(4/4) (2367/3107)	2816(4/4) (2367/3107)	0
	CO-60	8	130 ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0

(1) Lower Limit of Detection (LLD), as stated in ODAM.

(2) Mean and Range based upon detectable measurements only. Fraction of detectable measurements at specified location indicated in brackets().

ND = Non Detectable.

NA = Not Applicable.

**ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY**

Name of Facility Cooper Nuclear Station  
 Location of Facility Nemaha Nebraska  
 (County/State)

Docket No. 50-298  
 Reporting Period January 1 2021 to December 31 2021

Medium of Pathway Sampled (Unit of Measurement)	Type & Total No. of Analysis Performed	Lower Limit of Detection(1) (LLD)	All Indicator Locations Mean(2) Range(2)	Location with Highest Annual Mean		Control Location Mean(2) Range(2)	No. of Reportable Occurrences	
				Name	Mean(2) Range(2)			
<b>Fish (cont'd)</b> (pCi/kg wet)	CS-137	8	150	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
	TH-228	8	NA	ND(0/4) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/4) (ND-ND)	0
<b>Milk Nearest</b> (pCi/L)	I-131	3	1	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/0) (NA-NA)	0
	K-40	3	NA	1007(3/3) (868/1092)	Sta. 99 10.5 mi.	1007(3/3) (868/1092)	NA(0/0) (NA-NA)	0
	RA-226	3	NA	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/0) (NA-NA)	0
	TH-228	3	NA	ND(0/3) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/0) (NA-NA)	0
<b>Water - Ground</b> (pCi/L)	I-131	8	1	ND(0/8) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/0) (NA-NA)	0
	H-3	8	2000	ND(0/8) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/0) (NA-NA)	0

(1) Lower Limit of Detection (LLD), as stated in ODAM.

(2) Mean and Range based upon detectable measurements only. Fraction of detectable measurements at specified location indicated in brackets().

ND = Non Detectable.

NA = Not Applicable.

**ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY**

Name of Facility Cooper Nuclear Station Docket No. 50-298  
 Location of Facility Nemaha Nebraska Reporting Period January 1 2021 to December 31 2021  
 (County/State)

Medium of Pathway Sampled (Unit of Measurement)	Type & Total No. of Analysis Performed	Lower Limit of Detection(1) (LLD)	All Indicator Locations Mean(2) Range(2)	Location with Highest Annual Mean		Control Location Mean(2) Range(2)	No. of Reportable Occurrences	
				Name	Mean(2) Range(2)			
<b>Water - Ground (cont'd)</b> (pCi/L)	K-40	8	NA	ND(0/8) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/0) (NA-NA)	0
	TH-228	8	NA	ND(0/8) (ND-ND)	NA	NA(0/0) (NA-NA)	NA(0/0) (NA-NA)	0
<b>River Water</b> (pCi/L)	H-3	32	2000	ND(0/16) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/16) (ND-ND)	0
	K-40	24	NA	ND(0/12) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/12) (ND-ND)	0
	TH-228	24	NA	ND(0/12) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/12) (ND-ND)	0
<b>Thermoluminescence Dosimeter</b> (mR/Quarter)	Gamma Dose	228	NA	24.4(221/221) (21.0/29.0)	Sta. 8 2.5 mi.	26.8(4/4) (25.0/29.0)	24.9(7/7) (22/28)	0
<b>Broadleaf Vegetation</b> (pCi/kg wet)	I-131	21	60	ND(0/14) (ND-ND)	NA	NA(0/0) (NA-NA)	ND(0/7) (ND-ND)	0
	BE-7	21	NA	1177(12/14) (391/2507)	Sta. 96 1.3 mi.	1259(7/7) (435/2507)	951(7/7) (269/1509)	0

(1) Lower Limit of Detection (LLD), as stated in ODAM.

(2) Mean and Range based upon detectable measurements only. Fraction of detectable measurements at specified location indicated in brackets().

ND = Non Detectable.

NA = Not Applicable.

**ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY**

Name of Facility <u>Cooper Nuclear Station</u> Location of Facility <u>Nemaha Nebraska</u> (County/State)	Docket No. <u>50-298</u> Reporting Period <u>January 1 2021 to December 31 2021</u>
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Medium of Pathway Sampled (Unit of Measurement)	Type & Total No. of Analysis Performed	Lower Limit of Detection(1) (LLD)	All Indicator Locations Mean(2) Range(2)	<u>Location with Highest Annual Mean</u>			Control Location Mean(2) Range(2)	No. of Reportable Occurrences	
				Name					
<b>Broadleaf Vegetation (cont'd)</b> (pCi/kg wet)	K-40	21	NA	5412(14/14) (2778/11930)	Sta. 101	13.3 mi.	5884(7/7) (2870/11930)	5024(7/7) (3356/6146)	0
	RA-226	21	NA	ND(0/14) (ND-ND)	NA		NA(0/0) (NA-NA)	ND(0/7) (ND-ND)	0
	TH-228	21	NA	93.3(5/14) (50.3/172)	Sta. 101	13.3 mi.	111(2/7) (50.3/172)	65.2(2/7) (56.3/74.1)	0
<b>Shoreline Sediment</b> (pCi/kg dry)	BE-7	4	NA	ND(0/2) (ND-ND)	NA		NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0
	K-40	4	NA	12130(2/2) (11140/13120)	Sta. 28	1.8 mi.	12130(2/2) (11140/13120)	10950(2/2) (10400/11500)	0
	CS-137	4	180	ND(0/2) (ND-ND)	NA		NA(0/0) (NA-NA)	ND(0/2) (ND-ND)	0
	RA-226	4	NA	ND(0/2) (ND-ND)	Sta. 35	2.0 mi.	1868(1/2) (NA-NA)	1868(1/2) (NA-NA)	0
	TH-228	4	NA	706(2/2) (571/841)	Sta. 28	1.8 mi.	706(2/2) (571/841)	382(2/2) (304/459)	0

(1) Lower Limit of Detection (LLD), as stated in ODAM.

(2) Mean and Range based upon detectable measurements only. Fraction of detectable measurements at specified location indicated in brackets().

ND = Non Detectable.

NA = Not Applicable.

**SECTION VII. COMPLETE DATA TABLES**



VII-1  
**NEBRASKA PUBLIC POWER DISTRICT**  
**COOPER NUCLEAR STATION**  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 1

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
12/28/20	01/05/21	1.15E+04	CU.FT.	1.55E-02 ± 3.44E-03	< 2.E-02
01/05/21	01/11/21	8.58E+03	CU.FT.	1.33E-02 ± 4.25E-03	< 3.E-02
01/11/21	01/19/21	1.15E+04	CU.FT.	1.95E-02 ± 3.76E-03	< 4.E-02
01/19/21	01/26/21	1.01E+04	CU.FT.	1.37E-02 ± 3.73E-03	< 2.E-02
01/26/21	02/02/21	1.00E+04	CU.FT.	2.27E-02 ± 4.50E-03	< 3.E-02
02/02/21	02/09/21	1.01E+04	CU.FT.	2.62E-02 ± 4.84E-03	< 6.E-02
02/09/21	02/17/21	1.15E+04	CU.FT.	1.53E-02 ± 3.25E-03	< 4.E-02
02/17/21	02/23/21	8.59E+03	CU.FT.	1.73E-02 ± 4.21E-03	< 3.E-02
02/23/21	03/02/21	1.01E+04	CU.FT.	1.46E-02 ± 3.45E-03	< 2.E-02
03/02/21	03/09/21	1.01E+04	CU.FT.	1.32E-02 ± 3.32E-03	< 5.E-02
03/09/21	03/16/21	9.98E+03	CU.FT.	1.13E-02 ± 3.28E-03	< 5.E-02
03/16/21	03/23/21	1.01E+04	CU.FT.	4.07E-03 ± 2.81E-03	< 4.E-02
03/23/21	03/30/21	1.01E+04	CU.FT.	1.30E-02 ± 3.77E-03	< 6.E-02
03/30/21	04/06/21	1.01E+04	CU.FT.	2.04E-02 ± 4.04E-03	< 3.E-02
04/06/21	04/13/21	1.01E+04	CU.FT.	1.51E-02 ± 3.79E-03	< 3.E-02
04/13/21	04/20/21	1.01E+04	CU.FT.	1.07E-02 ± 3.22E-03	< 4.E-02
04/20/21	04/27/21	9.97E+03	CU.FT.	1.40E-02 ± 3.92E-03	< 5.E-02
04/27/21	05/04/21	1.01E+04	CU.FT.	1.72E-02 ± 3.80E-03	< 4.E-02
05/04/21	05/11/21	1.00E+04	CU.FT.	1.08E-02 ± 3.59E-03	< 5.E-02
05/11/21	05/18/21	1.02E+04	CU.FT.	9.04E-03 ± 3.45E-03	< 3.E-02
05/18/21	05/25/21	9.79E+03	CU.FT.	7.01E-03 ± 3.10E-03	< 3.E-02
05/25/21	06/01/21	1.00E+04	CU.FT.	4.42E-03 ± 2.91E-03	< 2.E-02
06/01/21	06/08/21	1.02E+04	CU.FT.	1.52E-02 ± 3.78E-03	< 2.E-02
06/08/21	06/15/21	1.00E+04	CU.FT.	1.57E-02 ± 3.66E-03	< 2.E-02
06/15/21	06/22/21	1.00E+04	CU.FT.	2.18E-02 ± 4.43E-03	< 5.E-02
06/22/21	06/30/21	1.15E+04	CU.FT.	1.42E-02 ± 3.45E-03	< 6.E-02
06/30/21	07/06/21	8.66E+03	CU.FT.	2.06E-02 ± 4.95E-03	< 4.E-02

VII-1  
**NEBRASKA PUBLIC POWER DISTRICT**  
**COOPER NUCLEAR STATION**  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 1

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
07/06/21	07/13/21	1.01E+04	CU.FT.	1.44E-02 ± 3.73E-03	< 2.E-02
07/13/21	07/20/21	1.00E+04	CU.FT.	1.65E-02 ± 3.70E-03	< 4.E-02
07/20/21	07/27/21	1.02E+04	CU.FT.	2.47E-02 ± 4.95E-03	< 3.E-02
07/27/21	08/03/21	9.93E+03	CU.FT.	2.47E-02 ± 4.64E-03	< 4.E-02
08/03/21	08/10/21	1.01E+04	CU.FT.	1.76E-02 ± 4.29E-03	< 3.E-02
08/10/21	08/17/21	1.02E+04	CU.FT.	2.01E-02 ± 4.26E-03	< 4.E-02
08/17/21	08/23/21	8.49E+03	CU.FT.	1.46E-02 ± 4.90E-03	< 3.E-02
08/23/21	08/31/21	1.16E+04	CU.FT.	2.02E-02 ± 3.81E-03	< 5.E-02
08/31/21	09/07/21	1.00E+04	CU.FT.	1.13E-02 ± 3.25E-03	< 2.E-02
09/07/21	09/14/21	1.01E+04	CU.FT.	2.12E-02 ± 4.29E-03	< 6.E-02
09/14/21	09/21/21	1.01E+04	CU.FT.	2.21E-02 ± 4.50E-03	< 3.E-02
09/21/21	09/28/21	1.00E+04	CU.FT.	1.77E-02 ± 4.18E-03	< 4.E-02
09/28/21	10/05/21	9.92E+03	CU.FT.	2.27E-02 ± 4.32E-03	< 4.E-02
10/05/21	10/12/21	1.02E+04	CU.FT.	1.72E-02 ± 3.86E-03	< 4.E-02
10/12/21	10/19/21	1.01E+04	CU.FT.	2.30E-02 ± 4.19E-03	< 4.E-02
10/19/21	10/26/21	1.04E+04	CU.FT.	1.99E-02 ± 4.09E-03	< 3.E-02
10/26/21	11/02/21	9.74E+03	CU.FT.	5.80E-03 ± 3.24E-03	< 6.E-02
11/02/21	11/08/21	8.64E+03	CU.FT.	3.69E-02 ± 5.73E-03	< 6.E-02
11/08/21	11/16/21	1.16E+04	CU.FT.	2.44E-02 ± 4.04E-03	< 3.E-02
11/16/21	11/23/21	1.00E+04	CU.FT.	1.53E-02 ± 3.77E-03	< 3.E-02
11/23/21	11/30/21	1.00E+04	CU.FT.	2.44E-02 ± 4.55E-03	< 3.E-02
11/30/21	12/07/21	1.01E+04	CU.FT.	2.37E-02 ± 4.68E-03	< 3.E-02
12/07/21	12/14/21	9.97E+03	CU.FT.	2.70E-02 ± 5.00E-03	< 4.E-02
12/14/21	12/21/21	1.01E+04	CU.FT.	2.72E-02 ± 4.80E-03	< 6.E-02
12/21/21	12/28/21	1.01E+04	CU.FT.	4.27E-02 ± 5.69E-03	< 3.E-02
12/28/21	01/04/22	1.01E+04	CU.FT.	4.98E-02 ± 5.95E-03	< 2.E-02

VII-1  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 2

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
12/28/20	01/05/21	1.15E+04	CU.FT.	2.31E-02 ± 3.98E-03	< 5.E-02
01/05/21	01/11/21	8.58E+03	CU.FT.	8.03E-03 ± 3.79E-03	< 7.E-02
01/11/21	01/19/21	1.15E+04	CU.FT.	1.10E-02 ± 3.11E-03	< 4.E-02
01/19/21	01/26/21	1.01E+04	CU.FT.	8.55E-03 ± 3.27E-03	< 5.E-02
01/26/21	02/02/21	1.00E+04	CU.FT.	8.60E-03 ± 3.38E-03	< 4.E-02
02/02/21	02/09/21	1.01E+04	CU.FT.	8.20E-03 ± 3.52E-03	< 4.E-02
02/09/21	02/17/21	1.15E+04	CU.FT.	1.93E-02 ± 3.56E-03	< 4.E-02
02/17/21	02/23/21	8.59E+03	CU.FT.	4.89E-03 ± 3.00E-03	< 5.E-02
02/23/21	03/02/21	1.01E+04	CU.FT.	1.78E-02 ± 3.72E-03	< 5.E-02
03/02/21	03/09/21	1.01E+04	CU.FT.	1.41E-02 ± 3.40E-03	< 5.E-02
03/09/21	03/16/21	9.98E+03	CU.FT.	1.11E-02 ± 3.27E-03	< 5.E-02
03/16/21	03/23/21	1.01E+04	CU.FT.	1.39E-02 ± 3.72E-03	< 5.E-02
03/23/21	03/30/21	1.01E+04	CU.FT.	1.24E-02 ± 3.72E-03	< 6.E-02
03/30/21	04/06/21	1.01E+04	CU.FT.	8.75E-03 ± 3.05E-03	< 5.E-02
04/06/21	04/13/21	1.01E+04	CU.FT.	9.95E-03 ± 3.35E-03	< 4.E-02
04/13/21	04/20/21	1.01E+04	CU.FT.	1.07E-02 ± 3.22E-03	< 5.E-02
04/20/21	04/27/21	1.00E+04	CU.FT.	1.13E-02 ± 3.69E-03	< 5.E-02
04/27/21	05/04/21	1.00E+04	CU.FT.	2.02E-02 ± 4.06E-03	< 3.E-02
05/04/21	05/11/21	9.98E+03	CU.FT.	6.92E-03 ± 3.24E-03	< 5.E-02
05/11/21	05/18/21	1.02E+04	CU.FT.	6.28E-03 ± 3.20E-03	< 6.E-02
05/18/21	05/25/21	1.00E+04	CU.FT.	4.12E-03 ± 2.75E-03	< 6.E-02
05/25/21	06/01/21	1.01E+04	CU.FT.	1.27E-02 ± 3.65E-03	< 4.E-02
06/01/21	06/08/21	1.02E+04	CU.FT.	1.85E-02 ± 4.03E-03	< 5.E-02
06/08/21	06/15/21	1.01E+04	CU.FT.	2.02E-02 ± 4.00E-03	< 4.E-02
06/15/21	06/22/21	9.96E+03	CU.FT.	1.64E-02 ± 4.04E-03	< 2.E-02
06/22/21	06/30/21	1.15E+04	CU.FT.	1.91E-02 ± 3.82E-03	< 6.E-02
06/30/21	07/06/21	8.67E+03	CU.FT.	1.97E-02 ± 4.88E-03	< 4.E-02

VII-1  
**NEBRASKA PUBLIC POWER DISTRICT**  
**COOPER NUCLEAR STATION**  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 2

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
07/06/21	07/13/21	1.04E+04	CU.FT.	1.85E-02 ± 3.98E-03	< 5.E-02
07/13/21	07/20/21	9.91E+03	CU.FT.	2.09E-02 ± 4.06E-03	< 4.E-02
07/20/21	07/27/21	1.00E+04	CU.FT.	2.41E-02 ± 4.98E-03	< 5.E-02
07/27/21	08/03/21	9.86E+03	CU.FT.	2.84E-02 ± 4.90E-03	< 2.E-02
08/03/21	08/10/21	1.01E+04	CU.FT.	2.41E-02 ± 4.73E-03	< 5.E-02
08/10/21	08/17/21	1.02E+04	CU.FT.	1.30E-02 ± 3.72E-03	< 6.E-02
08/17/21	08/23/21	8.49E+03	CU.FT.	1.34E-02 ± 4.81E-03	< 7.E-02
08/23/21	08/31/21	1.16E+04	CU.FT.	9.46E-03 ± 2.97E-03	< 5.E-02
08/31/21	09/07/21	1.01E+04	CU.FT.	7.28E-03 ± 2.83E-03	< 4.E-02
09/07/21	09/14/21	9.99E+03	CU.FT.	2.10E-02 ± 4.31E-03	< 3.E-02
09/14/21	09/21/21	1.01E+04	CU.FT.	8.24E-03 ± 3.42E-03	< 7.E-02
09/21/21	09/28/21	1.00E+04	CU.FT.	2.58E-02 ± 4.74E-03	< 5.E-02
09/28/21	10/05/21	9.92E+03	CU.FT.	2.83E-02 ± 4.72E-03	< 4.E-02
10/05/21	10/12/21	1.01E+04	CU.FT.	2.91E-02 ± 4.72E-03	< 2.E-02
10/12/21	10/19/21	1.01E+04	CU.FT.	1.79E-02 ± 3.79E-03	< 5.E-02
10/19/21	10/26/21	1.04E+04	CU.FT.	1.80E-02 ± 3.95E-03	< 4.E-02
10/26/21	11/02/21	9.74E+03	CU.FT.	1.61E-02 ± 4.12E-03	< 6.E-02
11/02/21	11/08/21	8.65E+03	CU.FT.	3.41E-02 ± 5.55E-03	< 6.E-02
11/08/21	11/16/21	1.16E+04	CU.FT.	2.48E-02 ± 4.06E-03	< 5.E-02
11/16/21	11/23/21	1.00E+04	CU.FT.	9.45E-03 ± 3.27E-03	< 6.E-02
11/23/21	11/30/21	1.00E+04	CU.FT.	2.47E-02 ± 4.57E-03	< 3.E-02
11/30/21	12/07/21	1.01E+04	CU.FT.	2.21E-02 ± 4.58E-03	< 5.E-02
12/07/21	12/14/21	9.97E+03	CU.FT.	2.27E-02 ± 4.72E-03	< 4.E-02
12/14/21	12/21/21	1.00E+04	CU.FT.	2.67E-02 ± 4.80E-03	< 6.E-02
12/21/21	12/28/21	1.01E+04	CU.FT.	4.12E-02 ± 5.61E-03	< 6.E-02
12/28/21	01/04/22	1.01E+04	CU.FT.	4.61E-02 ± 5.76E-03	< 4.E-02

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**COOPER NUCLEAR STATION**  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 3

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
12/28/20	01/05/21	1.15E+04	CU.FT.	1.26E-02 ± 3.21E-03	< 5.E-02
01/05/21	01/11/21	8.60E+03	CU.FT.	1.95E-02 ± 4.73E-03	< 7.E-02
01/11/21	01/19/21	1.13E+04	CU.FT.	1.03E-02 ± 3.08E-03	< 2.E-02
01/19/21	01/26/21	1.03E+04	CU.FT.	1.65E-02 ± 3.90E-03	< 5.E-02
01/26/21	02/02/21	9.84E+03	CU.FT.	2.13E-02 ± 4.45E-03	< 4.E-02
02/02/21	02/09/21	1.03E+04	CU.FT.	3.20E-02 ± 5.14E-03	< 5.E-02
02/09/21	02/17/21	1.13E+04	CU.FT.	1.30E-02 ± 3.10E-03	< 3.E-02
02/17/21	02/23/21	8.64E+03	CU.FT.	2.66E-02 ± 4.90E-03	< 5.E-02
02/23/21	03/02/21	1.01E+04	CU.FT.	6.64E-03 ± 2.66E-03	< 5.E-02
03/02/21	03/09/21	1.00E+04	CU.FT.	1.56E-02 ± 3.55E-03	< 2.E-02
03/09/21	03/16/21	1.01E+04	CU.FT.	8.17E-03 ± 2.96E-03	< 5.E-02
03/16/21	03/23/21	1.02E+04	CU.FT.	1.61E-02 ± 3.87E-03	< 5.E-02
03/23/21	03/30/21	1.01E+04	CU.FT.	4.68E-03 ± 3.04E-03	< 5.E-02
03/30/21	04/06/21	1.01E+04	CU.FT.	2.87E-02 ± 4.62E-03	< 5.E-02
04/06/21	04/13/21	9.98E+03	CU.FT.	3.77E-03 ± 2.74E-03	< 4.E-02
04/13/21	04/20/21	1.01E+04	CU.FT.	1.23E-02 ± 3.36E-03	< 5.E-02
04/20/21	04/27/21	9.73E+03	CU.FT.	1.65E-02 ± 4.18E-03	< 4.E-02
04/27/21	05/04/21	1.03E+04	CU.FT.	1.81E-02 ± 3.83E-03	< 4.E-02
05/04/21	05/11/21	9.92E+03	CU.FT.	1.01E-02 ± 3.55E-03	< 2.E-02
05/11/21	05/18/21	1.02E+04	CU.FT.	1.52E-02 ± 3.96E-03	< 6.E-02
05/18/21	05/25/21	9.97E+03	CU.FT.	8.42E-03 ± 3.19E-03	< 6.E-02
05/25/21	06/01/21	1.01E+04	CU.FT.	9.97E-03 ± 3.42E-03	< 4.E-02
06/01/21	06/08/21	1.02E+04	CU.FT.	9.86E-03 ± 3.33E-03	< 5.E-02
06/08/21	06/15/21	1.02E+04	CU.FT.	1.99E-02 ± 3.95E-03	< 4.E-02
06/15/21	06/22/21	9.98E+03	CU.FT.	1.76E-02 ± 4.13E-03	< 5.E-02
06/22/21	06/30/21	1.13E+04	CU.FT.	1.38E-02 ± 3.46E-03	< 6.E-02
06/30/21	07/06/21	8.84E+03	CU.FT.	1.20E-02 ± 4.21E-03	< 4.E-02

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**COOPER NUCLEAR STATION**  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 3

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
07/06/21	07/13/21	9.79E+03	CU.FT.	2.09E-02 ± 4.32E-03	< 5.E-02
07/13/21	07/20/21	9.99E+03	CU.FT.	1.59E-02 ± 3.65E-03	< 4.E-02
07/20/21	07/27/21	1.03E+04	CU.FT.	2.31E-02 ± 4.82E-03	< 4.E-02
07/27/21	08/03/21	9.86E+03	CU.FT.	2.49E-02 ± 4.67E-03	< 4.E-02
08/03/21	08/10/21	1.02E+04	CU.FT.	2.10E-02 ± 4.49E-03	< 5.E-02
08/10/21	08/17/21	1.02E+04	CU.FT.	8.73E-03 ± 3.34E-03	< 6.E-02
08/17/21	08/23/21	8.53E+03	CU.FT.	< 6.07E-03	< 6.E-02
08/23/21	08/31/21	1.15E+04	CU.FT.	8.88E-03 ± 2.94E-03	< 5.E-02
08/31/21	09/07/21	1.00E+04	CU.FT.	1.62E-02 ± 3.68E-03	< 4.E-02
09/07/21	09/14/21	1.00E+04	CU.FT.	2.28E-02 ± 4.43E-03	< 6.E-02
09/14/21	09/21/21	1.02E+04	CU.FT.	2.02E-02 ± 4.34E-03	< 7.E-02
09/21/21	09/28/21	1.01E+04	CU.FT.	2.01E-02 ± 4.33E-03	< 5.E-02
09/28/21	10/05/21	9.69E+03	CU.FT.	3.03E-02 ± 4.92E-03	< 3.E-02
10/05/21	10/12/21	1.03E+04	CU.FT.	2.88E-02 ± 4.65E-03	< 4.E-02
10/12/21	10/19/21	1.00E+04	CU.FT.	2.29E-02 ± 4.21E-03	< 5.E-02
10/19/21	10/26/21	1.02E+04	CU.FT.	2.02E-02 ± 4.16E-03	< 5.E-02
10/26/21	11/02/21	9.91E+03	CU.FT.	1.55E-02 ± 4.03E-03	< 6.E-02
11/02/21	11/08/21	8.59E+03	CU.FT.	3.58E-02 ± 5.68E-03	< 6.E-02
11/08/21	11/16/21	1.16E+04	CU.FT.	2.90E-02 ± 4.32E-03	< 5.E-02
11/16/21	11/23/21	1.01E+04	CU.FT.	1.10E-02 ± 3.39E-03	< 6.E-02
11/23/21	11/30/21	9.98E+03	CU.FT.	2.74E-02 ± 4.75E-03	< 2.E-02
11/30/21	12/07/21	1.02E+04	CU.FT.	2.56E-02 ± 4.78E-03	< 4.E-02
12/07/21	12/14/21	9.86E+03	CU.FT.	2.55E-02 ± 4.94E-03	< 2.E-02
12/14/21	12/21/21	1.01E+04	CU.FT.	2.67E-02 ± 4.77E-03	< 6.E-02
12/21/21	12/28/21	1.03E+04	CU.FT.	4.08E-02 ± 5.52E-03	< 5.E-02
12/28/21	01/04/22	9.99E+03	CU.FT.	3.01E-02 ± 4.88E-03	< 4.E-02

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**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 4

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
12/28/20	01/05/21	1.15E+04	CU.FT.	3.51E-02 ± 4.72E-03	< 5.E-02
01/05/21	01/11/21	8.59E+03	CU.FT.	6.10E-03 ± 3.61E-03	< 7.E-02
01/11/21	01/19/21	1.13E+04	CU.FT.	1.96E-02 ± 3.81E-03	< 4.E-02
01/19/21	01/26/21	1.03E+04	CU.FT.	8.99E-03 ± 3.27E-03	< 5.E-02
01/26/21	02/02/21	9.85E+03	CU.FT.	2.43E-02 ± 4.65E-03	< 4.E-02
02/02/21	02/09/21	1.02E+04	CU.FT.	1.29E-02 ± 3.88E-03	< 6.E-02
02/09/21	02/17/21	1.14E+04	CU.FT.	1.63E-02 ± 3.35E-03	< 4.E-02
02/17/21	02/23/21	8.65E+03	CU.FT.	9.89E-03 ± 3.52E-03	< 5.E-02
02/23/21	03/02/21	1.01E+04	CU.FT.	5.73E-03 ± 2.56E-03	< 5.E-02
03/02/21	03/09/21	1.01E+04	CU.FT.	1.52E-02 ± 3.49E-03	< 5.E-02
03/09/21	03/16/21	9.80E+03	CU.FT.	1.22E-02 ± 3.41E-03	< 2.E-02
03/16/21	03/23/21	1.02E+04	CU.FT.	9.71E-03 ± 3.34E-03	< 5.E-02
03/23/21	03/30/21	1.00E+04	CU.FT.	4.27E-03 ± 3.02E-03	< 3.E-02
03/30/21	04/06/21	1.02E+04	CU.FT.	1.75E-02 ± 3.79E-03	< 5.E-02
04/06/21	04/13/21	9.97E+03	CU.FT.	1.46E-02 ± 3.79E-03	< 4.E-02
04/13/21	04/20/21	1.02E+04	CU.FT.	1.00E-02 ± 3.14E-03	< 5.E-02
04/20/21	04/27/21	9.98E+03	CU.FT.	7.86E-03 ± 3.39E-03	< 5.E-02
04/27/21	05/04/21	1.01E+04	CU.FT.	1.36E-02 ± 3.50E-03	< 4.E-02
05/04/21	05/11/21	9.96E+03	CU.FT.	1.58E-02 ± 4.01E-03	< 4.E-02
05/11/21	05/18/21	1.02E+04	CU.FT.	5.52E-03 ± 3.13E-03	< 6.E-02
05/18/21	05/25/21	1.00E+04	CU.FT.	1.10E-02 ± 3.42E-03	< 6.E-02
05/25/21	06/01/21	1.00E+04	CU.FT.	1.40E-02 ± 3.79E-03	< 4.E-02
06/01/21	06/08/21	1.02E+04	CU.FT.	8.37E-03 ± 3.19E-03	< 5.E-02
06/08/21	06/15/21	1.02E+04	CU.FT.	1.57E-02 ± 3.62E-03	< 4.E-02
06/15/21	06/22/21	9.99E+03	CU.FT.	1.76E-02 ± 4.12E-03	< 5.E-02
06/22/21	06/30/21	1.13E+04	CU.FT.	1.65E-02 ± 3.67E-03	< 3.E-02
06/30/21	07/06/21	8.84E+03	CU.FT.	1.64E-02 ± 4.57E-03	< 4.E-02

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**COOPER NUCLEAR STATION**  
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**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 4

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
07/06/21	07/13/21	9.55E+03	CU.FT.	1.64E-02 ± 4.04E-03	< 5.E-02
07/13/21	07/20/21	9.93E+03	CU.FT.	2.13E-02 ± 4.09E-03	< 2.E-02
07/20/21	07/27/21	1.04E+04	CU.FT.	2.96E-02 ± 5.18E-03	< 4.E-02
07/27/21	08/03/21	9.86E+03	CU.FT.	2.71E-02 ± 4.82E-03	< 4.E-02
08/03/21	08/10/21	1.02E+04	CU.FT.	2.25E-02 ± 4.60E-03	< 5.E-02
08/10/21	08/17/21	9.74E+03	CU.FT.	1.65E-02 ± 4.12E-03	< 6.E-02
08/17/21	08/23/21	8.54E+03	CU.FT.	8.07E-03 ± 4.38E-03	< 6.E-02
08/23/21	08/31/21	1.15E+04	CU.FT.	2.15E-02 ± 3.91E-03	< 4.E-02
08/31/21	09/07/21	1.01E+04	CU.FT.	2.04E-02 ± 3.97E-03	< 4.E-02
09/07/21	09/14/21	1.00E+04	CU.FT.	1.83E-02 ± 4.12E-03	< 6.E-02
09/14/21	09/21/21	1.01E+04	CU.FT.	7.61E-03 ± 3.36E-03	< 7.E-02
09/21/21	09/28/21	1.01E+04	CU.FT.	2.28E-02 ± 4.51E-03	< 5.E-02
09/28/21	10/05/21	9.73E+03	CU.FT.	2.26E-02 ± 4.69E-03	< 4.E-02
10/05/21	10/12/21	1.02E+04	CU.FT.	1.40E-02 ± 3.61E-03	< 4.E-02
10/12/21	10/19/21	1.01E+04	CU.FT.	2.27E-02 ± 4.17E-03	< 5.E-02
10/19/21	10/26/21	1.02E+04	CU.FT.	1.51E-02 ± 3.77E-03	< 5.E-02
10/26/21	11/02/21	9.22E+03	CU.FT.	1.44E-02 ± 4.15E-03	< 3.E-02
11/02/21	11/08/21	8.54E+03	CU.FT.	3.44E-02 ± 5.61E-03	< 3.E-02
11/08/21	11/16/21	1.17E+04	CU.FT.	1.41E-02 ± 3.27E-03	< 5.E-02
11/16/21	11/23/21	1.00E+04	CU.FT.	1.64E-02 ± 3.85E-03	< 6.E-02
11/23/21	11/30/21	9.99E+03	CU.FT.	2.26E-02 ± 4.43E-03	< 3.E-02
11/30/21	12/07/21	1.02E+04	CU.FT.	1.98E-02 ± 4.39E-03	< 4.E-02
12/07/21	12/14/21	9.86E+03	CU.FT.	1.19E-02 ± 3.97E-03	< 4.E-02
12/14/21	12/21/21	9.98E+03	CU.FT.	2.94E-02 ± 4.98E-03	< 6.E-02
12/21/21	12/28/21	1.04E+04	CU.FT.	4.46E-02 ± 5.70E-03	< 5.E-02
12/28/21	01/04/22	9.99E+03	CU.FT.	4.66E-02 ± 5.82E-03	< 4.E-02



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**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 5

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
12/28/20	01/05/21	1.15E+04	CU.FT.	2.56E-02 ± 4.15E-03	< 5.E-02
01/05/21	01/11/21	8.59E+03	CU.FT.	2.16E-02 ± 4.88E-03	< 7.E-02
01/11/21	01/19/21	1.13E+04	CU.FT.	1.43E-02 ± 3.42E-03	< 4.E-02
01/19/21	01/26/21	1.03E+04	CU.FT.	1.45E-02 ± 3.75E-03	< 5.E-02
01/26/21	02/02/21	9.85E+03	CU.FT.	1.98E-02 ± 4.34E-03	< 4.E-02
02/02/21	02/09/21	1.02E+04	CU.FT.	3.66E-02 ± 5.44E-03	< 6.E-02
02/09/21	02/17/21	1.14E+04	CU.FT.	1.84E-02 ± 3.51E-03	< 4.E-02
02/17/21	02/23/21	8.65E+03	CU.FT.	3.26E-02 ± 5.31E-03	< 5.E-02
02/23/21	03/02/21	1.01E+04	CU.FT.	1.36E-02 ± 3.36E-03	< 5.E-02
03/02/21	03/09/21	1.01E+04	CU.FT.	1.52E-02 ± 3.49E-03	< 5.E-02
03/09/21	03/16/21	9.81E+03	CU.FT.	1.35E-02 ± 3.51E-03	< 5.E-02
03/16/21	03/23/21	1.01E+04	CU.FT.	1.73E-02 ± 3.99E-03	< 5.E-02
03/23/21	03/30/21	1.00E+04	CU.FT.	7.17E-03 ± 3.30E-03	< 6.E-02
03/30/21	04/06/21	1.02E+04	CU.FT.	2.18E-02 ± 4.12E-03	< 5.E-02
04/06/21	04/13/21	9.97E+03	CU.FT.	1.24E-02 ± 3.60E-03	< 4.E-02
04/13/21	04/20/21	1.01E+04	CU.FT.	1.17E-02 ± 3.31E-03	< 5.E-02
04/20/21	04/27/21	1.00E+04	CU.FT.	1.22E-02 ± 3.77E-03	< 5.E-02
04/27/21	05/04/21	9.98E+03	CU.FT.	2.38E-02 ± 4.34E-03	< 4.E-02
05/04/21	05/11/21	9.96E+03	CU.FT.	6.93E-03 ± 3.24E-03	< 4.E-02
05/11/21	05/18/21	1.02E+04	CU.FT.	1.44E-02 ± 3.90E-03	< 6.E-02
05/18/21	05/25/21	1.00E+04	CU.FT.	9.15E-03 ± 3.26E-03	< 6.E-02
05/25/21	06/01/21	1.00E+04	CU.FT.	1.34E-02 ± 3.74E-03	< 4.E-02
06/01/21	06/08/21	1.02E+04	CU.FT.	1.61E-02 ± 3.85E-03	< 5.E-02
06/08/21	06/15/21	1.02E+04	CU.FT.	2.20E-02 ± 4.12E-03	< 4.E-02
06/15/21	06/22/21	9.99E+03	CU.FT.	2.26E-02 ± 4.49E-03	< 5.E-02
06/22/21	06/30/21	1.13E+04	CU.FT.	1.57E-02 ± 3.61E-03	< 6.E-02
06/30/21	07/01/21	1.04E+03	CU.FT.	< 4.26E-02	< 3.E-01

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**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 5

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
07/06/21	07/13/21	8.71E+03	CU.FT.	1.69E-02 ± 4.34E-03	< 6.E-02
07/13/21	07/20/21	9.99E+03	CU.FT.	1.38E-02 ± 3.48E-03	< 4.E-02
07/20/21	07/27/21	1.03E+04	CU.FT.	2.35E-02 ± 4.85E-03	< 4.E-02
07/27/21	08/03/21	9.86E+03	CU.FT.	2.44E-02 ± 4.64E-03	< 4.E-02
08/03/21	08/10/21	1.02E+04	CU.FT.	2.15E-02 ± 4.52E-03	< 5.E-02
08/10/21	08/17/21	9.79E+03	CU.FT.	1.71E-02 ± 4.15E-03	< 6.E-02
08/17/21	08/23/21	8.53E+03	CU.FT.	1.09E-02 ± 4.61E-03	< 6.E-02
08/23/21	08/31/21	1.15E+04	CU.FT.	1.17E-02 ± 3.18E-03	< 5.E-02
08/31/21	09/07/21	1.01E+04	CU.FT.	1.47E-02 ± 3.53E-03	< 4.E-02
09/07/21	09/14/21	1.00E+04	CU.FT.	2.43E-02 ± 4.52E-03	< 6.E-02
09/14/21	09/21/21	1.01E+04	CU.FT.	2.08E-02 ± 4.42E-03	< 7.E-02
09/21/21	09/28/21	1.01E+04	CU.FT.	1.75E-02 ± 4.14E-03	< 5.E-02
09/28/21	10/05/21	9.73E+03	CU.FT.	2.54E-02 ± 4.88E-03	< 4.E-02
10/05/21	10/12/21	1.03E+04	CU.FT.	2.81E-02 ± 4.60E-03	< 4.E-02
10/12/21	10/19/21	1.01E+04	CU.FT.	2.22E-02 ± 4.13E-03	< 5.E-02
10/19/21	10/26/21	1.02E+04	CU.FT.	9.42E-03 ± 3.29E-03	< 5.E-02
10/26/21	11/02/21	9.31E+03	CU.FT.	1.49E-02 ± 4.16E-03	< 6.E-02
11/02/21	11/08/21	8.56E+03	CU.FT.	2.51E-02 ± 4.96E-03	< 6.E-02
11/08/21	11/16/21	1.17E+04	CU.FT.	2.15E-02 ± 3.82E-03	< 5.E-02
11/16/21	11/23/21	1.00E+04	CU.FT.	1.74E-02 ± 3.94E-03	< 6.E-02
11/23/21	11/30/21	9.98E+03	CU.FT.	2.40E-02 ± 4.52E-03	< 3.E-02
11/30/21	12/07/21	1.02E+04	CU.FT.	1.61E-02 ± 4.12E-03	< 4.E-02
12/07/21	12/21/21	1.99E+04	CU.FT.	2.62E-02 ± 3.14E-03	< 2.E-02
12/21/21	12/28/21	1.04E+04	CU.FT.	4.27E-02 ± 5.59E-03	< 5.E-02
12/28/21	01/04/22	9.99E+03	CU.FT.	4.29E-02 ± 5.62E-03	< 4.E-02

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**NEBRASKA PUBLIC POWER DISTRICT**  
**COOPER NUCLEAR STATION**  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 6

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
12/28/20	01/05/21	1.15E+04	CU.FT.	1.84E-02 ± 3.66E-03	< 6.E-02
01/05/21	01/11/21	8.60E+03	CU.FT.	9.06E-03 ± 3.88E-03	< 6.E-02
01/11/21	01/19/21	1.13E+04	CU.FT.	1.47E-02 ± 3.45E-03	< 3.E-02
01/19/21	01/26/21	1.03E+04	CU.FT.	1.51E-02 ± 3.79E-03	< 3.E-02
01/26/21	02/02/21	9.85E+03	CU.FT.	2.84E-02 ± 4.93E-03	< 5.E-02
02/02/21	02/09/21	1.03E+04	CU.FT.	2.06E-02 ± 4.42E-03	< 6.E-02
02/09/21	02/14/21	7.45E+03	CU.FT.	1.15E-02 ± 3.93E-03	< 3.E-02
02/17/21	02/23/21	8.58E+03	CU.FT.	1.26E-02 ± 3.80E-03	< 3.E-02
02/23/21	03/02/21	1.01E+04	CU.FT.	1.09E-02 ± 3.11E-03	< 3.E-02
03/02/21	03/09/21	1.01E+04	CU.FT.	9.06E-03 ± 2.93E-03	< 4.E-02
03/09/21	03/16/21	9.68E+03	CU.FT.	8.21E-03 ± 3.05E-03	< 4.E-02
03/16/21	03/23/21	1.02E+04	CU.FT.	< 3.81E-03	< 5.E-02
03/23/21	03/30/21	1.00E+04	CU.FT.	1.31E-02 ± 3.81E-03	< 3.E-02
03/30/21	04/06/21	1.00E+04	CU.FT.	2.39E-02 ± 4.32E-03	< 5.E-02
04/06/21	04/13/21	9.98E+03	CU.FT.	1.18E-02 ± 3.54E-03	< 5.E-02
04/13/21	04/20/21	1.01E+04	CU.FT.	4.25E-03 ± 2.57E-03	< 5.E-02
04/20/21	04/27/21	1.01E+04	CU.FT.	1.62E-02 ± 4.05E-03	< 5.E-02
04/27/21	05/04/21	9.96E+03	CU.FT.	8.79E-03 ± 3.08E-03	< 5.E-02
05/04/21	05/11/21	9.96E+03	CU.FT.	8.16E-03 ± 3.55E-03	< 5.E-02
05/11/21	05/18/21	1.02E+04	CU.FT.	6.59E-03 ± 3.23E-03	< 4.E-02
05/18/21	05/25/21	1.00E+04	CU.FT.	8.39E-03 ± 3.19E-03	< 6.E-02
05/25/21	06/01/21	1.00E+04	CU.FT.	7.63E-03 ± 3.23E-03	< 5.E-02
06/01/21	06/08/21	1.02E+04	CU.FT.	1.36E-02 ± 3.65E-03	< 5.E-02
06/08/21	06/15/21	1.01E+04	CU.FT.	1.52E-02 ± 3.60E-03	< 5.E-02
06/15/21	06/22/21	9.99E+03	CU.FT.	1.63E-02 ± 4.02E-03	< 4.E-02
06/22/21	06/30/21	8.10E+03	CU.FT.	1.74E-02 ± 4.68E-03	< 5.E-02
06/30/21	07/06/21	8.84E+03	CU.FT.	2.28E-02 ± 5.04E-03	< 5.E-02

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**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 6

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
07/06/21	07/13/21	9.55E+03	CU.FT.	1.51E-02 ± 3.93E-03	< 4.E-02
07/13/21	07/20/21	9.97E+03	CU.FT.	1.67E-02 ± 3.72E-03	< 3.E-02
07/20/21	07/27/21	1.03E+04	CU.FT.	7.89E-03 ± 3.74E-03	< 5.E-02
07/27/21	08/03/21	9.86E+03	CU.FT.	2.01E-02 ± 4.34E-03	< 3.E-02
08/03/21	08/10/21	1.02E+04	CU.FT.	1.81E-02 ± 4.29E-03	< 5.E-02
08/10/21	08/17/21	9.73E+03	CU.FT.	1.14E-02 ± 3.71E-03	< 4.E-02
08/17/21	08/23/21	8.53E+03	CU.FT.	8.61E-03 ± 4.43E-03	< 4.E-02
08/23/21	08/31/21	1.15E+04	CU.FT.	1.66E-02 ± 3.57E-03	< 4.E-02
08/31/21	09/07/21	1.01E+04	CU.FT.	6.24E-03 ± 2.72E-03	< 5.E-02
09/07/21	09/14/21	9.99E+03	CU.FT.	1.48E-02 ± 3.86E-03	< 5.E-02
09/14/21	09/21/21	1.01E+04	CU.FT.	1.35E-02 ± 3.87E-03	< 4.E-02
09/21/21	09/28/21	1.01E+04	CU.FT.	1.90E-02 ± 4.25E-03	< 6.E-02
09/28/21	10/05/21	9.73E+03	CU.FT.	2.46E-02 ± 4.83E-03	< 3.E-02
10/05/21	10/12/21	1.03E+04	CU.FT.	2.93E-02 ± 4.68E-03	< 5.E-02
10/12/21	10/19/21	1.01E+04	CU.FT.	1.83E-02 ± 3.83E-03	< 5.E-02
10/19/21	10/26/21	1.02E+04	CU.FT.	1.88E-02 ± 4.06E-03	< 2.E-02
10/26/21	11/02/21	9.49E+03	CU.FT.	1.19E-02 ± 3.86E-03	< 4.E-02
11/02/21	11/08/21	8.60E+03	CU.FT.	2.83E-02 ± 5.17E-03	< 6.E-02
11/08/21	11/16/21	1.17E+04	CU.FT.	1.98E-02 ± 3.70E-03	< 4.E-02
11/16/21	11/23/21	1.00E+04	CU.FT.	1.68E-02 ± 3.89E-03	< 4.E-02
11/23/21	11/30/21	9.98E+03	CU.FT.	2.63E-02 ± 4.68E-03	< 6.E-02
11/30/21	12/07/21	1.02E+04	CU.FT.	1.92E-02 ± 4.34E-03	< 6.E-02
12/07/21	12/21/21	1.98E+04	CU.FT.	1.84E-02 ± 2.73E-03	< 2.E-02
12/21/21	12/28/21	1.04E+04	CU.FT.	3.98E-02 ± 5.44E-03	< 5.E-02
12/28/21	01/04/22	9.99E+03	CU.FT.	4.76E-02 ± 5.87E-03	< 5.E-02

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**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 7

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
12/28/20	01/05/21	1.15E+04	CU.FT.	1.10E-02 ± 3.08E-03	< 4.E-02
01/05/21	01/11/21	8.58E+03	CU.FT.	1.48E-02 ± 4.38E-03	< 6.E-02
01/11/21	01/19/21	1.15E+04	CU.FT.	1.23E-02 ± 3.22E-03	< 4.E-02
01/19/21	01/26/21	1.01E+04	CU.FT.	1.32E-02 ± 3.69E-03	< 2.E-02
01/26/21	02/02/21	1.00E+04	CU.FT.	9.22E-03 ± 3.44E-03	< 5.E-02
02/02/21	02/09/21	1.01E+04	CU.FT.	2.65E-02 ± 4.86E-03	< 6.E-02
02/09/21	02/17/21	1.15E+04	CU.FT.	7.18E-03 ± 2.52E-03	< 3.E-02
02/17/21	02/23/21	8.59E+03	CU.FT.	2.65E-02 ± 4.92E-03	< 4.E-02
02/23/21	03/02/21	1.02E+04	CU.FT.	1.88E-02 ± 3.78E-03	< 4.E-02
03/02/21	03/09/21	1.01E+04	CU.FT.	1.08E-02 ± 3.10E-03	< 5.E-02
03/09/21	03/16/21	9.98E+03	CU.FT.	8.72E-03 ± 3.04E-03	< 5.E-02
03/16/21	03/23/21	1.01E+04	CU.FT.	1.34E-02 ± 3.68E-03	< 2.E-02
03/23/21	03/30/21	1.01E+04	CU.FT.	9.97E-03 ± 3.52E-03	< 5.E-02
03/30/21	04/06/21	1.01E+04	CU.FT.	2.08E-02 ± 4.07E-03	< 5.E-02
04/06/21	04/13/21	1.01E+04	CU.FT.	1.01E-02 ± 3.36E-03	< 2.E-02
04/13/21	04/20/21	1.01E+04	CU.FT.	8.93E-03 ± 3.06E-03	< 6.E-02
04/20/21	04/27/21	1.00E+04	CU.FT.	1.48E-02 ± 3.97E-03	< 5.E-02
04/27/21	05/04/21	1.00E+04	CU.FT.	2.20E-02 ± 4.21E-03	< 3.E-02
05/04/21	05/11/21	9.98E+03	CU.FT.	4.86E-03 ± 3.24E-03	< 5.E-02
05/11/21	05/18/21	1.02E+04	CU.FT.	1.24E-02 ± 3.74E-03	< 4.E-02
05/18/21	05/25/21	1.01E+04	CU.FT.	9.67E-03 ± 3.28E-03	< 6.E-02
05/25/21	06/01/21	1.00E+04	CU.FT.	1.28E-02 ± 3.69E-03	< 5.E-02
06/01/21	06/08/21	1.02E+04	CU.FT.	1.46E-02 ± 3.73E-03	< 5.E-02
06/08/21	06/15/21	1.01E+04	CU.FT.	2.27E-02 ± 4.19E-03	< 2.E-02
06/15/21	06/22/21	9.95E+03	CU.FT.	2.90E-02 ± 4.93E-03	< 2.E-02
06/22/21	06/30/21	1.15E+04	CU.FT.	1.71E-02 ± 3.67E-03	< 4.E-02
06/30/21	07/06/21	8.67E+03	CU.FT.	1.66E-02 ± 4.65E-03	< 5.E-02

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**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 7

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
07/06/21	07/13/21	1.00E+04	CU.FT.	1.80E-02 ± 4.04E-03	< 4.E-02
07/13/21	07/20/21	1.02E+04	CU.FT.	1.44E-02 ± 3.48E-03	< 6.E-02
07/20/21	07/27/21	1.00E+04	CU.FT.	2.34E-02 ± 4.94E-03	< 5.E-02
07/27/21	08/03/21	9.86E+03	CU.FT.	2.25E-02 ± 4.51E-03	< 2.E-02
08/03/21	08/10/21	1.01E+04	CU.FT.	2.23E-02 ± 4.61E-03	< 5.E-02
08/10/21	08/17/21	1.01E+04	CU.FT.	2.15E-02 ± 4.39E-03	< 4.E-02
08/17/21	08/23/21	8.49E+03	CU.FT.	9.35E-03 ± 4.51E-03	< 5.E-02
08/23/21	08/31/21	1.16E+04	CU.FT.	1.62E-02 ± 3.51E-03	< 4.E-02
08/31/21	09/07/21	1.01E+04	CU.FT.	1.74E-02 ± 3.75E-03	< 2.E-02
09/07/21	09/14/21	9.98E+03	CU.FT.	1.97E-02 ± 4.22E-03	< 5.E-02
09/14/21	09/21/21	1.01E+04	CU.FT.	2.30E-02 ± 4.57E-03	< 2.E-02
09/21/21	09/28/21	1.00E+04	CU.FT.	2.53E-02 ± 4.71E-03	< 6.E-02
09/28/21	10/05/21	9.92E+03	CU.FT.	2.82E-02 ± 4.94E-03	< 5.E-02
10/05/21	10/12/21	1.02E+04	CU.FT.	2.63E-02 ± 4.51E-03	< 2.E-02
10/12/21	10/19/21	1.01E+04	CU.FT.	2.24E-02 ± 4.15E-03	< 5.E-02
10/19/21	10/26/21	1.04E+04	CU.FT.	1.89E-02 ± 4.01E-03	< 5.E-02
10/26/21	11/02/21	9.74E+03	CU.FT.	8.46E-03 ± 3.49E-03	< 4.E-02
11/02/21	11/08/21	8.65E+03	CU.FT.	3.25E-02 ± 5.44E-03	< 6.E-02
11/08/21	11/16/21	1.16E+04	CU.FT.	2.00E-02 ± 3.90E-03	< 4.E-02
11/16/21	11/23/21	1.00E+04	CU.FT.	1.02E-02 ± 3.34E-03	< 4.E-02
11/23/21	11/30/21	1.00E+04	CU.FT.	2.47E-02 ± 4.57E-03	< 6.E-02
11/30/21	12/07/21	1.01E+04	CU.FT.	1.86E-02 ± 4.33E-03	< 3.E-02
12/07/21	12/14/21	9.97E+03	CU.FT.	2.16E-02 ± 4.65E-03	< 4.E-02
12/14/21	12/21/21	1.01E+04	CU.FT.	2.60E-02 ± 4.72E-03	< 6.E-02
12/21/21	12/28/21	1.02E+04	CU.FT.	2.41E-02 ± 4.54E-03	< 5.E-02
12/28/21	01/04/22	1.01E+04	CU.FT.	4.38E-02 ± 5.64E-03	< 5.E-02

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**NEBRASKA PUBLIC POWER DISTRICT**  
**COOPER NUCLEAR STATION**  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 8

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
12/28/20	01/05/21	1.15E+04	CU.FT.	1.02E-02 ± 3.01E-03	< 6.E-02
01/05/21	01/11/21	8.58E+03	CU.FT.	1.71E-02 ± 4.55E-03	< 6.E-02
01/11/21	01/19/21	1.15E+04	CU.FT.	2.11E-02 ± 3.87E-03	< 4.E-02
01/19/21	01/26/21	1.05E+04	CU.FT.	< 3.69E-03	< 3.E-02
01/26/21	02/02/21	9.66E+03	CU.FT.	2.60E-02 ± 4.83E-03	< 3.E-02
02/02/21	02/09/21	1.01E+04	CU.FT.	2.07E-02 ± 4.49E-03	< 3.E-02
02/09/21	02/17/21	1.15E+04	CU.FT.	1.84E-02 ± 3.49E-03	< 3.E-02
02/17/21	02/23/21	8.59E+03	CU.FT.	2.03E-02 ± 4.45E-03	< 4.E-02
02/23/21	03/02/21	1.02E+04	CU.FT.	1.91E-02 ± 3.80E-03	< 4.E-02
03/02/21	03/09/21	1.01E+04	CU.FT.	5.35E-03 ± 2.52E-03	< 5.E-02
03/09/21	03/16/21	9.98E+03	CU.FT.	1.01E-02 ± 3.17E-03	< 5.E-02
03/16/21	03/23/21	1.01E+04	CU.FT.	1.42E-02 ± 3.74E-03	< 5.E-02
03/23/21	03/30/21	1.01E+04	CU.FT.	< 4.16E-03	< 5.E-02
03/30/21	04/06/21	1.01E+04	CU.FT.	6.64E-03 ± 2.83E-03	< 5.E-02
04/06/21	04/13/21	1.01E+04	CU.FT.	8.39E-03 ± 3.20E-03	< 5.E-02
04/13/21	04/20/21	1.01E+04	CU.FT.	1.05E-02 ± 3.21E-03	< 6.E-02
04/20/21	04/27/21	1.00E+04	CU.FT.	5.34E-03 ± 3.14E-03	< 5.E-02
04/27/21	05/04/21	1.00E+04	CU.FT.	1.55E-02 ± 3.69E-03	< 5.E-02
05/04/21	05/11/21	9.98E+03	CU.FT.	9.71E-03 ± 3.68E-03	< 5.E-02
05/11/21	05/18/21	1.02E+04	CU.FT.	7.05E-03 ± 3.27E-03	< 4.E-02
05/18/21	05/25/21	1.01E+04	CU.FT.	7.40E-03 ± 3.07E-03	< 6.E-02
05/25/21	06/01/21	1.00E+04	CU.FT.	1.34E-02 ± 3.74E-03	< 5.E-02
06/01/21	06/08/21	1.02E+04	CU.FT.	1.21E-02 ± 3.52E-03	< 5.E-02
06/08/21	06/15/21	1.01E+04	CU.FT.	9.48E-03 ± 3.06E-03	< 5.E-02
06/15/21	06/22/21	9.91E+03	CU.FT.	2.61E-02 ± 4.75E-03	< 4.E-02
06/22/21	06/24/21	2.53E+03	CU.FT.	2.11E-02 ± 1.18E-02	< 1.E-01
06/30/21	07/06/21	8.52E+03	CU.FT.	1.85E-02 ± 4.85E-03	< 3.E-02

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**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 8

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
07/06/21	07/10/21	5.24E+03	CU.FT.	1.79E-02 ± 6.31E-03	< 5.E-02
07/13/21	07/20/21	1.00E+04	CU.FT.	1.98E-02 ± 3.96E-03	< 6.E-02
07/20/21	07/27/21	1.00E+04	CU.FT.	2.55E-02 ± 5.07E-03	< 5.E-02
07/27/21	08/03/21	9.86E+03	CU.FT.	2.36E-02 ± 4.58E-03	< 4.E-02
08/03/21	08/07/21	6.61E+03	CU.FT.	2.29E-02 ± 6.26E-03	< 4.E-02
08/10/21	08/17/21	1.01E+04	CU.FT.	1.66E-02 ± 4.02E-03	< 4.E-02
08/17/21	08/23/21	8.48E+03	CU.FT.	9.72E-03 ± 4.54E-03	< 5.E-02
08/23/21	08/31/21	1.12E+04	CU.FT.	7.89E-03 ± 2.91E-03	< 4.E-02
08/31/21	09/07/21	9.86E+03	CU.FT.	1.96E-02 ± 3.98E-03	< 5.E-02
09/07/21	09/14/21	9.96E+03	CU.FT.	1.32E-02 ± 3.74E-03	< 2.E-02
09/14/21	09/21/21	1.01E+04	CU.FT.	1.52E-02 ± 4.00E-03	< 4.E-02
09/21/21	09/28/21	1.00E+04	CU.FT.	1.75E-02 ± 4.17E-03	< 6.E-02
09/28/21	10/05/21	9.92E+03	CU.FT.	3.09E-02 ± 5.11E-03	< 5.E-02
10/05/21	10/12/21	1.02E+04	CU.FT.	3.50E-02 ± 5.05E-03	< 5.E-02
10/12/21	10/19/21	1.01E+04	CU.FT.	2.49E-02 ± 4.33E-03	< 5.E-02
10/19/21	10/26/21	1.04E+04	CU.FT.	8.36E-03 ± 3.15E-03	< 5.E-02
10/26/21	11/02/21	9.74E+03	CU.FT.	8.30E-03 ± 3.47E-03	< 4.E-02
11/02/21	11/08/21	8.65E+03	CU.FT.	1.32E-02 ± 3.96E-03	< 6.E-02
11/08/21	11/16/21	1.16E+04	CU.FT.	2.58E-02 ± 4.29E-03	< 4.E-02
11/16/21	11/23/21	1.00E+04	CU.FT.	1.98E-02 ± 4.11E-03	< 4.E-02
11/23/21	11/30/21	1.00E+04	CU.FT.	2.67E-02 ± 4.70E-03	< 6.E-02
11/30/21	12/07/21	1.01E+04	CU.FT.	1.53E-02 ± 4.09E-03	< 6.E-02
12/07/21	12/14/21	1.00E+04	CU.FT.	2.55E-02 ± 4.89E-03	< 5.E-02
12/14/21	12/21/21	1.01E+04	CU.FT.	1.80E-02 ± 4.17E-03	< 6.E-02
12/21/21	12/28/21	1.00E+04	CU.FT.	4.36E-02 ± 5.77E-03	< 4.E-02
12/28/21	01/04/22	1.01E+04	CU.FT.	4.37E-02 ± 5.63E-03	< 5.E-02



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**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 9

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
12/28/20	01/05/21	1.15E+04	CU.FT.	9.27E-03 ± 2.93E-03	< 6.E-02
01/05/21	01/11/21	8.55E+03	CU.FT.	1.52E-02 ± 4.42E-03	< 6.E-02
01/11/21	01/19/21	1.15E+04	CU.FT.	8.49E-03 ± 2.88E-03	< 4.E-02
01/19/21	01/26/21	1.02E+04	CU.FT.	1.28E-02 ± 3.63E-03	< 3.E-02
01/26/21	02/02/21	9.92E+03	CU.FT.	1.32E-02 ± 3.81E-03	< 5.E-02
02/02/21	02/09/21	1.01E+04	CU.FT.	2.79E-02 ± 4.95E-03	< 6.E-02
02/09/21	02/17/21	1.15E+04	CU.FT.	1.42E-02 ± 3.16E-03	< 3.E-02
02/17/21	02/23/21	8.65E+03	CU.FT.	1.61E-02 ± 4.09E-03	< 4.E-02
02/23/21	03/02/21	1.01E+04	CU.FT.	1.66E-02 ± 3.62E-03	< 4.E-02
03/02/21	03/09/21	1.01E+04	CU.FT.	1.44E-02 ± 3.43E-03	< 5.E-02
03/09/21	03/16/21	9.99E+03	CU.FT.	1.11E-02 ± 3.26E-03	< 5.E-02
03/16/21	03/23/21	1.01E+04	CU.FT.	1.49E-02 ± 3.80E-03	< 5.E-02
03/23/21	03/30/21	1.01E+04	CU.FT.	1.01E-02 ± 3.54E-03	< 5.E-02
03/30/21	04/06/21	1.02E+04	CU.FT.	2.63E-02 ± 4.43E-03	< 5.E-02
04/06/21	04/13/21	9.90E+03	CU.FT.	< 3.77E-03	< 5.E-02
04/13/21	04/20/21	1.02E+04	CU.FT.	4.35E-03 ± 2.56E-03	< 5.E-02
04/20/21	04/27/21	9.82E+03	CU.FT.	5.11E-03 ± 3.16E-03	< 4.E-02
04/27/21	05/04/21	1.02E+04	CU.FT.	1.50E-02 ± 3.60E-03	< 5.E-02
05/04/21	05/11/21	1.00E+04	CU.FT.	5.63E-03 ± 3.31E-03	< 5.E-02
05/11/21	05/18/21	1.01E+04	CU.FT.	6.81E-03 ± 3.28E-03	< 2.E-02
05/18/21	05/25/21	1.01E+04	CU.FT.	6.65E-03 ± 2.99E-03	< 6.E-02
05/25/21	06/01/21	1.01E+04	CU.FT.	9.82E-03 ± 3.40E-03	< 5.E-02
06/01/21	06/08/21	1.03E+04	CU.FT.	9.32E-03 ± 3.25E-03	< 4.E-02
06/08/21	06/15/21	1.00E+04	CU.FT.	1.99E-02 ± 4.01E-03	< 5.E-02
06/15/21	06/22/21	9.87E+03	CU.FT.	2.31E-02 ± 4.55E-03	< 4.E-02
06/22/21	06/30/21	1.13E+04	CU.FT.	1.61E-02 ± 3.64E-03	< 4.E-02
06/30/21	07/06/21	8.65E+03	CU.FT.	1.21E-02 ± 4.29E-03	< 5.E-02

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**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 9

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
07/06/21	07/13/21	1.03E+04	CU.FT.	1.91E-02 ± 4.05E-03	< 4.E-02
07/13/21	07/20/21	1.00E+04	CU.FT.	1.64E-02 ± 3.69E-03	< 6.E-02
07/20/21	07/27/21	9.91E+03	CU.FT.	7.57E-03 ± 3.84E-03	< 4.E-02
07/27/21	08/03/21	1.00E+04	CU.FT.	2.64E-02 ± 4.73E-03	< 3.E-02
08/03/21	08/10/21	1.01E+04	CU.FT.	1.19E-02 ± 3.85E-03	< 5.E-02
08/10/21	08/16/21	8.79E+03	CU.FT.	2.12E-02 ± 4.78E-03	< 3.E-02
08/17/21	08/23/21	8.31E+03	CU.FT.	1.53E-02 ± 5.04E-03	< 3.E-02
08/23/21	08/31/21	1.15E+04	CU.FT.	1.23E-02 ± 3.23E-03	< 4.E-02
08/31/21	09/07/21	9.92E+03	CU.FT.	1.10E-02 ± 3.24E-03	< 5.E-02
09/07/21	09/14/21	1.02E+04	CU.FT.	1.87E-02 ± 4.09E-03	< 5.E-02
09/14/21	09/21/21	1.01E+04	CU.FT.	2.42E-02 ± 4.65E-03	< 4.E-02
09/21/21	09/28/21	9.93E+03	CU.FT.	2.15E-02 ± 4.47E-03	< 3.E-02
09/28/21	10/05/21	1.06E+04	CU.FT.	2.86E-02 ± 4.77E-03	< 5.E-02
10/05/21	10/12/21	9.50E+03	CU.FT.	2.21E-02 ± 4.42E-03	< 5.E-02
10/12/21	10/19/21	1.02E+04	CU.FT.	1.20E-02 ± 3.26E-03	< 5.E-02
10/19/21	10/27/21	1.12E+04	CU.FT.	6.95E-03 ± 2.84E-03	< 4.E-02
10/27/21	11/02/21	8.89E+03	CU.FT.	1.30E-02 ± 4.15E-03	< 4.E-02
11/02/21	11/08/21	8.59E+03	CU.FT.	2.94E-02 ± 5.26E-03	< 5.E-02
11/08/21	11/16/21	1.17E+04	CU.FT.	8.45E-03 ± 2.98E-03	< 4.E-02
11/16/21	11/23/21	9.93E+03	CU.FT.	1.47E-02 ± 3.74E-03	< 3.E-02
11/23/21	11/30/21	1.01E+04	CU.FT.	2.37E-02 ± 4.47E-03	< 6.E-02
11/30/21	12/07/21	1.02E+04	CU.FT.	1.39E-02 ± 3.96E-03	< 6.E-02
12/07/21	12/14/21	9.87E+03	CU.FT.	1.93E-02 ± 4.52E-03	< 3.E-02
12/14/21	12/21/21	1.01E+04	CU.FT.	2.32E-02 ± 4.54E-03	< 6.E-02
12/21/21	12/28/21	1.03E+04	CU.FT.	4.11E-02 ± 5.54E-03	< 5.E-02
12/28/21	01/04/22	9.97E+03	CU.FT.	4.82E-02 ± 5.91E-03	< 5.E-02

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**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 10

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
12/28/20	01/05/21	1.15E+04	CU.FT.	2.86E-02 ± 4.34E-03	< 6.E-02
01/05/21	01/11/21	8.54E+03	CU.FT.	1.88E-02 ± 4.69E-03	< 5.E-02
01/11/21	01/19/21	1.14E+04	CU.FT.	1.03E-02 ± 3.06E-03	< 4.E-02
01/19/21	01/26/21	1.01E+04	CU.FT.	1.35E-02 ± 3.72E-03	< 3.E-02
01/26/21	02/02/21	1.00E+04	CU.FT.	1.25E-02 ± 3.73E-03	< 5.E-02
02/02/21	02/09/21	1.02E+04	CU.FT.	3.26E-02 ± 5.21E-03	< 6.E-02
02/09/21	02/17/21	1.14E+04	CU.FT.	1.76E-02 ± 3.45E-03	< 3.E-02
02/17/21	02/23/21	8.59E+03	CU.FT.	2.90E-02 ± 5.09E-03	< 4.E-02
02/23/21	03/02/21	1.02E+04	CU.FT.	1.21E-02 ± 3.20E-03	< 4.E-02
03/02/21	03/09/21	1.01E+04	CU.FT.	1.56E-02 ± 3.53E-03	< 5.E-02
03/09/21	03/16/21	9.98E+03	CU.FT.	1.11E-02 ± 3.27E-03	< 5.E-02
03/16/21	03/23/21	1.01E+04	CU.FT.	9.81E-03 ± 3.37E-03	< 5.E-02
03/23/21	03/30/21	1.01E+04	CU.FT.	7.70E-03 ± 3.32E-03	< 5.E-02
03/30/21	04/03/21	6.27E+03	CU.FT.	1.77E-02 ± 5.26E-03	< 4.E-02
04/06/21	04/13/21	1.01E+04	CU.FT.	1.74E-02 ± 3.98E-03	< 5.E-02
04/13/21	04/20/21	1.00E+04	CU.FT.	1.14E-02 ± 3.31E-03	< 3.E-02
04/20/21	04/27/21	1.00E+04	CU.FT.	2.04E-02 ± 4.39E-03	< 5.E-02
04/27/21	05/04/21	1.01E+04	CU.FT.	1.73E-02 ± 3.82E-03	< 5.E-02
05/04/21	05/11/21	9.96E+03	CU.FT.	1.60E-02 ± 4.19E-03	< 4.E-02
05/11/21	05/18/21	1.02E+04	CU.FT.	1.58E-02 ± 4.01E-03	< 4.E-02
05/18/21	05/25/21	1.00E+04	CU.FT.	1.33E-02 ± 3.62E-03	< 2.E-02
05/25/21	06/01/21	9.97E+03	CU.FT.	7.04E-03 ± 3.18E-03	< 3.E-02
06/01/21	06/08/21	1.02E+04	CU.FT.	1.66E-02 ± 3.88E-03	< 4.E-02
06/08/21	06/15/21	1.01E+04	CU.FT.	1.62E-02 ± 3.68E-03	< 5.E-02
06/15/21	06/22/21	9.98E+03	CU.FT.	2.36E-02 ± 4.56E-03	< 4.E-02
06/22/21	06/30/21	1.14E+04	CU.FT.	1.67E-02 ± 3.66E-03	< 4.E-02
06/30/21	07/06/21	8.78E+03	CU.FT.	2.26E-02 ± 5.05E-03	< 5.E-02

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**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 10

COLL START DATE	COLL STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
07/06/21	07/13/21	1.01E+04	CU.FT.	1.39E-02 ± 3.69E-03	< 4.E-02
07/13/21	07/20/21	9.92E+03	CU.FT.	1.51E-02 ± 3.60E-03	< 6.E-02
07/20/21	07/27/21	1.00E+04	CU.FT.	2.61E-02 ± 5.11E-03	< 5.E-02
07/27/21	08/03/21	9.86E+03	CU.FT.	2.62E-02 ± 4.76E-03	< 3.E-02
08/03/21	08/10/21	1.01E+04	CU.FT.	2.43E-02 ± 4.74E-03	< 5.E-02
08/10/21	08/17/21	1.02E+04	CU.FT.	1.76E-02 ± 4.08E-03	< 4.E-02
08/17/21	08/23/21	8.46E+03	CU.FT.	< 6.12E-03	< 5.E-02
08/23/21	08/31/21	1.15E+04	CU.FT.	1.88E-02 ± 3.73E-03	< 4.E-02
08/31/21	09/07/21	1.01E+04	CU.FT.	1.80E-02 ± 3.79E-03	< 5.E-02
09/07/21	09/14/21	9.98E+03	CU.FT.	2.30E-02 ± 4.45E-03	< 5.E-02
09/14/21	09/21/21	1.01E+04	CU.FT.	1.74E-02 ± 4.17E-03	< 4.E-02
09/21/21	09/28/21	1.01E+04	CU.FT.	2.84E-02 ± 4.87E-03	< 6.E-02
09/28/21	10/05/21	1.05E+04	CU.FT.	2.62E-02 ± 4.63E-03	< 5.E-02
10/05/21	10/12/21	9.61E+03	CU.FT.	3.17E-02 ± 5.03E-03	< 5.E-02
10/12/21	10/19/21	1.00E+04	CU.FT.	2.28E-02 ± 4.20E-03	< 3.E-02
10/19/21	10/27/21	1.14E+04	CU.FT.	1.79E-02 ± 3.71E-03	< 4.E-02
10/27/21	11/02/21	8.72E+03	CU.FT.	1.40E-02 ± 4.29E-03	< 2.E-02
11/02/21	11/08/21	8.76E+03	CU.FT.	3.37E-02 ± 5.48E-03	< 6.E-02
11/08/21	11/16/21	1.15E+04	CU.FT.	1.92E-02 ± 3.87E-03	< 2.E-02
11/16/21	11/23/21	1.01E+04	CU.FT.	2.32E-02 ± 4.33E-03	< 4.E-02
11/23/21	11/30/21	9.93E+03	CU.FT.	2.49E-02 ± 4.60E-03	< 3.E-02
11/30/21	12/07/21	1.01E+04	CU.FT.	2.41E-02 ± 4.71E-03	< 6.E-02
12/07/21	12/14/21	9.97E+03	CU.FT.	2.29E-02 ± 4.73E-03	< 5.E-02
12/14/21	12/21/21	1.01E+04	CU.FT.	2.66E-02 ± 4.76E-03	< 6.E-02
12/21/21	12/28/21	1.02E+04	CU.FT.	3.62E-02 ± 5.29E-03	< 5.E-02
12/28/21	01/04/22	1.01E+04	CU.FT.	4.70E-02 ± 5.80E-03	< 2.E-02

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**NEBRASKA PUBLIC POWER DISTRICT**  
**COOPER NUCLEAR STATION**  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 111

COLL START DATE	TIME STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
12/28/20	01/05/21	1.16E+04	CU.FT.	2.04E-02 ± 3.78E-03	< 3.E-02
01/05/21	01/11/21	8.52E+03	CU.FT.	1.67E-02 ± 4.54E-03	< 7.E-02
01/11/21	01/19/21	1.14E+04	CU.FT.	1.66E-02 ± 3.57E-03	< 4.E-02
01/19/21	01/26/21	1.01E+04	CU.FT.	1.26E-02 ± 3.64E-03	< 3.E-02
01/26/21	02/02/21	9.99E+03	CU.FT.	2.55E-02 ± 4.69E-03	< 3.E-02
02/02/21	02/09/21	1.02E+04	CU.FT.	2.38E-02 ± 4.66E-03	< 4.E-02
02/09/21	02/17/21	1.14E+04	CU.FT.	1.68E-02 ± 3.39E-03	< 2.E-02
02/17/21	02/23/21	8.60E+03	CU.FT.	1.64E-02 ± 4.13E-03	< 3.E-02
02/23/21	03/02/21	1.02E+04	CU.FT.	1.69E-02 ± 3.62E-03	< 2.E-02
03/02/21	03/09/21	1.01E+04	CU.FT.	9.36E-03 ± 2.96E-03	< 2.E-02
03/09/21	03/16/21	9.99E+03	CU.FT.	1.29E-02 ± 3.42E-03	< 3.E-02
03/16/21	03/23/21	1.01E+04	CU.FT.	1.54E-02 ± 3.84E-03	< 2.E-02
03/23/21	03/30/21	1.00E+04	CU.FT.	1.16E-02 ± 3.69E-03	< 4.E-02
03/30/21	04/06/21	1.01E+04	CU.FT.	1.13E-02 ± 3.29E-03	< 2.E-02
04/06/21	04/13/21	1.00E+04	CU.FT.	1.00E-02 ± 3.38E-03	< 3.E-02
04/13/21	04/20/21	1.01E+04	CU.FT.	8.93E-03 ± 3.06E-03	< 3.E-02
04/20/21	04/27/21	1.00E+04	CU.FT.	1.51E-02 ± 4.00E-03	< 3.E-02
04/27/21	05/04/21	1.01E+04	CU.FT.	1.42E-02 ± 3.56E-03	< 4.E-02
05/04/21	05/11/21	9.92E+03	CU.FT.	9.45E-03 ± 3.67E-03	< 3.E-02
05/11/21	05/18/21	1.02E+04	CU.FT.	1.18E-02 ± 3.69E-03	< 4.E-02
05/18/21	05/25/21	1.00E+04	CU.FT.	1.04E-02 ± 3.37E-03	< 3.E-02
05/25/21	06/01/21	1.00E+04	CU.FT.	7.63E-03 ± 3.23E-03	< 2.E-02
06/01/21	06/08/21	1.02E+04	CU.FT.	1.85E-02 ± 4.03E-03	< 3.E-02
06/08/21	06/15/21	1.01E+04	CU.FT.	1.66E-02 ± 3.72E-03	< 3.E-02
06/15/21	06/22/21	9.84E+03	CU.FT.	1.91E-02 ± 4.28E-03	< 3.E-02
06/22/21	06/30/21	1.13E+04	CU.FT.	1.67E-02 ± 3.69E-03	< 4.E-02
06/30/21	07/06/21	8.84E+03	CU.FT.	2.67E-02 ± 5.30E-03	< 3.E-02

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**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**AIR PARTICULATE AND CHARCOAL FILTERS**

STATION NUMBER 111

COLL START DATE	TIME STOP DATE	SAMPLE VOLUME	UNITS	AP FILTER GROSS BETA (PCI/CU.M.)	CHARCOAL FILTER I-131 (PCI/CU.M.)
07/06/21	07/13/21	1.01E+04	CU.FT.	1.50E-02 ± 3.78E-03	< 2.E-02
07/13/21	07/20/21	1.00E+04	CU.FT.	2.30E-02 ± 4.19E-03	< 3.E-02
07/20/21	07/27/21	1.01E+04	CU.FT.	3.20E-02 ± 5.42E-03	< 5.E-02
07/27/21	08/03/21	9.86E+03	CU.FT.	2.87E-02 ± 4.92E-03	< 3.E-02
08/03/21	08/10/21	1.02E+04	CU.FT.	2.59E-02 ± 4.82E-03	< 2.E-02
08/10/21	08/17/21	1.02E+04	CU.FT.	2.36E-02 ± 4.50E-03	< 2.E-02
08/17/21	08/23/21	8.35E+03	CU.FT.	1.42E-02 ± 4.93E-03	< 3.E-02
08/23/21	08/31/21	1.16E+04	CU.FT.	2.02E-02 ± 3.81E-03	< 3.E-02
08/31/21	09/07/21	1.02E+04	CU.FT.	1.40E-02 ± 3.44E-03	< 3.E-02
09/07/21	09/14/21	9.97E+03	CU.FT.	2.91E-02 ± 4.84E-03	< 3.E-02
09/14/21	09/21/21	1.01E+04	CU.FT.	2.47E-02 ± 4.68E-03	< 3.E-02
09/21/21	09/28/21	1.01E+04	CU.FT.	1.63E-02 ± 4.05E-03	< 3.E-02
09/28/21	10/05/21	1.05E+04	CU.FT.	2.58E-02 ± 4.60E-03	< 2.E-02
10/05/21	10/12/21	9.68E+03	CU.FT.	2.35E-02 ± 4.46E-03	< 3.E-02
10/12/21	10/19/21	9.98E+03	CU.FT.	2.12E-02 ± 4.09E-03	< 2.E-02
10/19/21	10/27/21	1.13E+04	CU.FT.	1.36E-02 ± 3.40E-03	< 2.E-02
10/27/21	11/02/21	8.83E+03	CU.FT.	1.00E-02 ± 3.91E-03	< 4.E-02
11/02/21	11/08/21	8.79E+03	CU.FT.	3.14E-02 ± 5.32E-03	< 5.E-02
11/08/21	11/16/21	1.15E+04	CU.FT.	1.12E-02 ± 3.25E-03	< 3.E-02
11/16/21	11/23/21	1.00E+04	CU.FT.	1.82E-02 ± 3.99E-03	< 3.E-02
11/23/21	11/30/21	9.99E+03	CU.FT.	2.47E-02 ± 4.57E-03	< 3.E-02
11/30/21	12/07/21	1.01E+04	CU.FT.	2.31E-02 ± 4.64E-03	< 3.E-02
12/07/21	12/14/21	9.92E+03	CU.FT.	2.10E-02 ± 4.62E-03	< 5.E-02
12/14/21	12/21/21	1.00E+04	CU.FT.	2.90E-02 ± 4.95E-03	< 3.E-02
12/21/21	12/28/21	1.02E+04	CU.FT.	2.33E-02 ± 4.48E-03	< 2.E-02
12/28/21	01/04/22	1.00E+04	CU.FT.	3.33E-02 ± 5.07E-03	< 5.E-02

VII-2  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**COMPOSITE AIR PARTICULATE FILTERS**  
 (PCI/CU.M.)

STATION NUMBER 1

DATE COLLECTED	12/28-03/30/2021	03/30-06/30/2021	06/30-09/28/2021	09/28-01/04/2022
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GAMMA SPECTRUM ANALYSIS:

BE-7	6.99E-02 ± 2.60E-02	1.36E-01 ± 4.45E-02	1.68E-01 ± 3.55E-02	1.21E-01 ± 3.77E-02
K-40	< 6.E-02	< 6.E-02	< 4.E-02	< 5.E-02
MN-54	< 3.E-03	< 3.E-03	< 3.E-03	< 3.E-03
CO-58	< 4.E-03	< 5.E-03	< 4.E-03	< 6.E-03
FE-59	< 1.E-02	< 2.E-02	< 1.E-02	< 2.E-02
CO-60	< 3.E-03	< 3.E-03	< 2.E-03	< 3.E-03
ZN-65	< 6.E-03	< 6.E-03	< 7.E-03	< 9.E-03
ZR-95	< 1.E-02	< 7.E-03	< 7.E-03	< 1.E-02
RU-103	< 5.E-03	< 7.E-03	< 7.E-03	< 8.E-03
RU-106	< 2.E-02	< 3.E-02	< 2.E-02	< 3.E-02
I-131	< 4.E-01	< 5.E-01	< 5.E-01	< 1.E+00
CS-134	< 3.E-03	< 3.E-03	< 2.E-03	< 3.E-03
CS-137	< 3.E-03	< 3.E-03	< 2.E-03	< 3.E-03
BA-140	< 2.E-01	< 2.E-01	< 2.E-01	< 5.E-01
LA-140	< 9.E-02	< 1.E-01	< 8.E-02	< 2.E-01
CE-141	< 9.E-03	< 1.E-02	< 1.E-02	< 1.E-02
CE-144	< 1.E-02	< 1.E-02	< 1.E-02	< 1.E-02
RA-226	< 4.E-02	< 4.E-02	< 4.E-02	< 4.E-02
TH-228	< 4.E-03	< 4.E-03	< 4.E-03	< 3.E-03

VII-2  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**COMPOSITE AIR PARTICULATE FILTERS**  
 (PCI/CU.M.)

STATION NUMBER 2

DATE COLLECTED	12/28-03/30/2021	03/30-06/30/2021	06/30-09/28/2021	09/28-01/04/2022
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GAMMA SPECTRUM ANALYSIS:

BE-7	7.96E-02 ± 2.96E-02	1.40E-01 ± 3.20E-02	1.16E-01 ± 2.75E-02	9.41E-02 ± 2.63E-02
K-40	< 3.E-02	< 4.E-02	< 2.E-02	< 2.E-02
MN-54	< 2.E-03	< 2.E-03	< 2.E-03	< 2.E-03
CO-58	< 3.E-03	< 3.E-03	< 3.E-03	< 3.E-03
FE-59	< 1.E-02	< 1.E-02	< 8.E-03	< 7.E-03
CO-60	< 2.E-03	< 3.E-03	< 2.E-03	< 2.E-03
ZN-65	< 7.E-03	< 5.E-03	< 3.E-03	< 3.E-03
ZR-95	< 7.E-03	< 6.E-03	< 5.E-03	< 5.E-03
RU-103	< 4.E-03	< 4.E-03	< 4.E-03	< 5.E-03
RU-106	< 1.E-02	< 2.E-02	< 1.E-02	< 2.E-02
I-131	< 3.E-01	< 3.E-01	< 3.E-01	< 6.E-01
CS-134	< 2.E-03	< 3.E-03	< 2.E-03	< 1.E-03
CS-137	< 2.E-03	< 2.E-03	< 2.E-03	< 1.E-03
BA-140	< 2.E-01	< 1.E-01	< 1.E-01	< 3.E-01
LA-140	< 6.E-02	< 8.E-02	< 6.E-02	< 1.E-01
CE-141	< 7.E-03	< 5.E-03	< 6.E-03	< 6.E-03
CE-144	< 8.E-03	< 7.E-03	< 7.E-03	< 7.E-03
RA-226	< 3.E-02	< 2.E-02	< 3.E-02	< 3.E-02
TH-228	< 3.E-03	< 3.E-03	< 3.E-03	< 3.E-03



VII-2  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**COMPOSITE AIR PARTICULATE FILTERS**  
 (PCI/CU.M.)

STATION NUMBER 3

DATE COLLECTED	12/28-03/30/2021	03/30-06/30/2021	06/30-09/28/2021	09/28-01/04/2022
GAMMA SPECTRUM ANALYSIS:				
BE-7	7.19E-02 ± 4.23E-02	1.13E-01 ± 3.87E-02	1.61E-01 ± 3.28E-02	1.06E-01 ± 3.30E-02
K-40	< 3.E-02	< 4.E-02	< 2.E-02	< 3.E-02
MN-54	< 3.E-03	< 3.E-03	< 2.E-03	< 2.E-03
CO-58	< 4.E-03	< 4.E-03	< 3.E-03	< 3.E-03
FE-59	< 1.E-02	< 1.E-02	< 1.E-02	< 9.E-03
CO-60	< 3.E-03	< 3.E-03	< 4.E-03	< 2.E-03
ZN-65	< 1.E-02	< 6.E-03	< 4.E-03	< 5.E-03
ZR-95	< 9.E-03	< 7.E-03	< 5.E-03	< 4.E-03
RU-103	< 7.E-03	< 6.E-03	< 5.E-03	< 5.E-03
RU-106	< 3.E-02	< 2.E-02	< 2.E-02	< 1.E-02
I-131	< 5.E-01	< 3.E-01	< 3.E-01	< 6.E-01
CS-134	< 3.E-03	< 3.E-03	< 2.E-03	< 1.E-03
CS-137	< 4.E-03	< 2.E-03	< 2.E-03	< 2.E-03
BA-140	< 3.E-01	< 1.E-01	< 2.E-01	< 2.E-01
LA-140	< 1.E-01	< 5.E-02	< 6.E-02	< 6.E-02
CE-141	< 1.E-02	< 8.E-03	< 6.E-03	< 6.E-03
CE-144	< 1.E-02	< 1.E-02	< 9.E-03	< 7.E-03
RA-226	< 5.E-02	< 4.E-02	< 3.E-02	< 2.E-02
TH-228	< 4.E-03	< 4.E-03	< 3.E-03	< 2.E-03

VII-2  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**COMPOSITE AIR PARTICULATE FILTERS**  
 (PCI/CU.M.)

STATION NUMBER 4

DATE COLLECTED	12/28-03/30/2021	03/30-06/30/2021	06/30-09/28/2021	09/28-01/04/2022
GAMMA SPECTRUM ANALYSIS:				
BE-7	7.51E-02 ± 2.44E-02	1.12E-01 ± 4.25E-02	1.19E-01 ± 3.70E-02	1.04E-01 ± 4.65E-02
K-40	< 3.E-02	< 6.E-02	< 4.E-02	< 4.E-02
MN-54	< 2.E-03	< 3.E-03	< 3.E-03	< 2.E-03
CO-58	< 3.E-03	< 5.E-03	< 5.E-03	< 4.E-03
FE-59	< 1.E-02	< 1.E-02	< 2.E-02	< 9.E-03
CO-60	< 1.E-03	< 4.E-03	< 3.E-03	< 2.E-03
ZN-65	< 5.E-03	< 9.E-03	< 8.E-03	< 6.E-03
ZR-95	< 5.E-03	< 8.E-03	< 9.E-03	< 7.E-03
RU-103	< 4.E-03	< 7.E-03	< 6.E-03	< 6.E-03
RU-106	< 2.E-02	< 3.E-02	< 2.E-02	< 3.E-02
I-131	< 2.E-01	< 5.E-01	< 4.E-01	< 9.E-01
CS-134	< 3.E-03	< 4.E-03	< 2.E-03	< 2.E-03
CS-137	< 2.E-03	< 3.E-03	< 2.E-03	< 2.E-03
BA-140	< 2.E-01	< 2.E-01	< 2.E-01	< 4.E-01
LA-140	< 6.E-02	< 1.E-01	< 8.E-02	< 1.E-01
CE-141	< 5.E-03	< 1.E-02	< 8.E-03	< 1.E-02
CE-144	< 6.E-03	< 1.E-02	< 1.E-02	< 1.E-02
RA-226	< 2.E-02	< 4.E-02	< 4.E-02	< 3.E-02
TH-228	< 2.E-03	< 4.E-03	< 3.E-03	< 4.E-03

VII-2  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**COMPOSITE AIR PARTICULATE FILTERS**  
 (PCI/CU.M.)

STATION NUMBER 5

DATE COLLECTED	12/28-03/30/2021	03/30-06/30/2021	06/30-09/28/2021	09/28-01/04/2022
GAMMA SPECTRUM ANALYSIS:				
BE-7	8.72E-02 ± 2.83E-02	1.76E-01 ± 4.32E-02	1.42E-01 ± 3.48E-02	1.11E-01 ± 3.05E-02
K-40	< 5.E-02	< 4.E-02	< 3.E-02	< 4.E-02
MN-54	< 3.E-03	< 3.E-03	< 2.E-03	< 3.E-03
CO-58	< 5.E-03	< 4.E-03	< 3.E-03	< 4.E-03
FE-59	< 1.E-02	< 9.E-03	< 1.E-02	< 1.E-02
CO-60	< 3.E-03	< 2.E-03	< 2.E-03	< 2.E-03
ZN-65	< 6.E-03	< 5.E-03	< 4.E-03	< 6.E-03
ZR-95	< 7.E-03	< 6.E-03	< 6.E-03	< 7.E-03
RU-103	< 6.E-03	< 5.E-03	< 5.E-03	< 6.E-03
RU-106	< 2.E-02	< 2.E-02	< 2.E-02	< 2.E-02
I-131	< 4.E-01	< 3.E-01	< 4.E-01	< 1.E+00
CS-134	< 3.E-03	< 2.E-03	< 2.E-03	< 3.E-03
CS-137	< 2.E-03	< 2.E-03	< 2.E-03	< 2.E-03
BA-140	< 2.E-01	< 2.E-01	< 2.E-01	< 3.E-01
LA-140	< 8.E-02	< 6.E-02	< 7.E-02	< 1.E-01
CE-141	< 8.E-03	< 7.E-03	< 8.E-03	< 1.E-02
CE-144	< 1.E-02	< 7.E-03	< 1.E-02	< 1.E-02
RA-226	< 4.E-02	< 3.E-02	< 3.E-02	< 3.E-02
TH-228	< 4.E-03	< 3.E-03	< 3.E-03	< 3.E-03

VII-2  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**COMPOSITE AIR PARTICULATE FILTERS**  
 (PCI/CU.M.)

STATION NUMBER 6

DATE COLLECTED	12/28-03/30/2021	03/30-06/30/2021	06/30-09/28/2021	09/28-01/04/2022
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GAMMA SPECTRUM ANALYSIS:

BE-7	9.40E-02 ± 3.69E-02	1.63E-01 ± 2.78E-02	1.24E-01 ± 3.48E-02	8.97E-02 ± 3.31E-02
K-40	< 5.E-02	< 3.E-02	< 4.E-02	< 3.E-02
MN-54	< 3.E-03	< 2.E-03	< 2.E-03	< 2.E-03
CO-58	< 4.E-03	< 2.E-03	< 2.E-03	< 4.E-03
FE-59	< 2.E-02	< 9.E-03	< 1.E-02	< 1.E-02
CO-60	< 4.E-03	< 2.E-03	< 3.E-03	< 2.E-03
ZN-65	< 9.E-03	< 4.E-03	< 6.E-03	< 5.E-03
ZR-95	< 1.E-02	< 5.E-03	< 5.E-03	< 8.E-03
RU-103	< 9.E-03	< 4.E-03	< 4.E-03	< 7.E-03
RU-106	< 3.E-02	< 2.E-02	< 2.E-02	< 3.E-02
I-131	< 5.E-01	< 2.E-01	< 3.E-01	< 8.E-01
CS-134	< 3.E-03	< 2.E-03	< 3.E-03	< 2.E-03
CS-137	< 3.E-03	< 2.E-03	< 2.E-03	< 2.E-03
BA-140	< 3.E-01	< 1.E-01	< 2.E-01	< 3.E-01
LA-140	< 1.E-01	< 7.E-02	< 8.E-02	< 1.E-01
CE-141	< 1.E-02	< 6.E-03	< 7.E-03	< 1.E-02
CE-144	< 1.E-02	< 7.E-03	< 9.E-03	< 1.E-02
RA-226	< 5.E-02	< 3.E-02	< 3.E-02	< 3.E-02
TH-228	< 5.E-03	< 3.E-03	< 3.E-03	< 3.E-03

VII-2  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**COMPOSITE AIR PARTICULATE FILTERS**  
 (PCI/CU.M.)

STATION NUMBER 7

DATE COLLECTED	12/28-03/30/2021	03/30-06/30/2021	06/30-09/28/2021	09/28-01/04/2022
GAMMA SPECTRUM ANALYSIS:				
BE-7	6.29E-02 ± 2.67E-02	1.57E-01 ± 4.61E-02	1.47E-01 ± 3.58.E-02	1.24E-01 ± 2.69E-02
K-40	< 4.E-02	< 4.E-02	< 4.E-02	< 2.E-02
MN-54	< 2.E-03	< 4.E-03	< 2.E-03	< 2.E-03
CO-58	< 3.E-03	< 5.E-03	< 3.E-03	< 3.E-03
FE-59	< 1.E-02	< 1.E-02	< 1.E-02	< 9.E-03
CO-60	< 1.E-03	< 3.E-03	< 2.E-03	< 1.E-03
ZN-65	< 6.E-03	< 7.E-03	< 4.E-03	< 5.E-03
ZR-95	< 5.E-03	< 1.E-02	< 5.E-03	< 3.E-03
RU-103	< 5.E-03	< 7.E-03	< 4.E-03	< 4.E-03
RU-106	< 2.E-02	< 3.E-02	< 1.E-02	< 2.E-02
I-131	< 3.E-01	< 5.E-01	< 3.E-01	< 1.E+00
CS-134	< 2.E-03	< 4.E-03	< 2.E-03	< 2.E-03
CS-137	< 2.E-03	< 3.E-03	< 2.E-03	< 1.E-03
BA-140	< 2.E-01	< 2.E-01	< 1.E-01	< 3.E-01
LA-140	< 6.E-02	< 1.E-01	< 7.E-02	< 8.E-02
CE-141	< 6.E-03	< 1.E-02	< 5.E-03	< 8.E-03
CE-144	< 9.E-03	< 2.E-02	< 8.E-03	< 8.E-03
RA-226	< 3.E-02	< 5.E-02	< 3.E-02	< 3.E-02
TH-228	< 2.E-03	< 4.E-03	< 3.E-03	< 2.E-03

VII-2  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**COMPOSITE AIR PARTICULATE FILTERS**  
 (PCI/CU.M.)

STATION NUMBER 8

DATE COLLECTED	12/28-03/30/2021	03/30-06/30/2021	06/30-09/28/2021	09/28-01/04/2022
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GAMMA SPECTRUM ANALYSIS:

BE-7	5.62E-02 ± 2.38E-02	1.29E-01 ± 3.58E-02	7.57E-02 ± 5.86E-02	1.08E-01 ± 3.42E-02
K-40	< 3.E-02	< 3.E-02	< 6.E-02	< 4.E-02
MN-54	< 2.E-03	< 3.E-03	< 4.E-03	< 2.E-03
CO-58	< 3.E-03	< 4.E-03	< 6.E-03	< 4.E-03
FE-59	< 9.E-03	< 1.E-02	< 2.E-02	< 1.E-02
CO-60	< 3.E-03	< 2.E-03	< 4.E-03	< 2.E-03
ZN-65	< 5.E-03	< 6.E-03	< 8.E-03	< 7.E-03
ZR-95	< 7.E-03	< 6.E-03	< 1.E-02	< 7.E-03
RU-103	< 4.E-03	< 4.E-03	< 8.E-03	< 7.E-03
RU-106	< 1.E-02	< 2.E-02	< 4.E-02	< 2.E-02
I-131	< 3.E-01	< 4.E-01	< 6.E-01	< 9.E-01
CS-134	< 2.E-03	< 2.E-03	< 4.E-03	< 2.E-03
CS-137	< 2.E-03	< 1.E-03	< 4.E-03	< 2.E-03
BA-140	< 2.E-01	< 2.E-01	< 3.E-01	< 3.E-01
LA-140	< 6.E-02	< 8.E-02	< 1.E-01	< 1.E-01
CE-141	< 7.E-03	< 6.E-03	< 1.E-02	< 8.E-03
CE-144	< 8.E-03	< 7.E-03	< 1.E-02	< 1.E-02
RA-226	< 3.E-02	< 3.E-02	< 5.E-02	< 4.E-02
TH-228	< 3.E-03	< 3.E-03	< 5.E-03	< 3.E-03

VII-2  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**COMPOSITE AIR PARTICULATE FILTERS**  
 (PCI/CU.M.)

STATION NUMBER 9

DATE COLLECTED	12/28-03/30/2021	03/30-06/30/2021	06/30-09/28/2021	09/28-01/04/2022
GAMMA SPECTRUM ANALYSIS:				
BE-7	1.08E-01 ± 3.61E-02	9.26E-02 ± 3.79E-02	1.20E-01 ± 5.01E-02	7.02E-02 ± 3.78E-02
K-40	< 4.E-02	< 4.E-02	< 5.E-02	< 5.E-02
MN-54	< 2.E-03	< 3.E-03	< 3.E-03	< 4.E-03
CO-58	< 3.E-03	< 4.E-03	< 6.E-03	< 6.E-03
FE-59	< 1.E-02	< 1.E-02	< 1.E-02	< 2.E-02
CO-60	< 2.E-03	< 3.E-03	< 2.E-03	< 3.E-03
ZN-65	< 6.E-03	< 7.E-03	< 6.E-03	< 7.E-03
ZR-95	< 7.E-03	< 8.E-03	< 9.E-03	< 1.E-02
RU-103	< 5.E-03	< 7.E-03	< 8.E-03	< 8.E-03
RU-106	< 2.E-02	< 2.E-02	< 2.E-02	< 3.E-02
I-131	< 3.E-01	< 4.E-01	< 5.E-01	< 1.E+00
CS-134	< 2.E-03	< 2.E-03	< 3.E-03	< 3.E-03
CS-137	< 2.E-03	< 3.E-03	< 3.E-03	< 3.E-03
BA-140	< 2.E-01	< 2.E-01	< 2.E-01	< 4.E-01
LA-140	< 8.E-02	< 5.E-02	< 1.E-01	< 2.E-01
CE-141	< 7.E-03	< 8.E-03	< 1.E-02	< 9.E-03
CE-144	< 8.E-03	< 1.E-02	< 1.E-02	< 1.E-02
RA-226	< 4.E-02	< 4.E-02	< 5.E-02	< 4.E-02
TH-228	< 3.E-03	< 4.E-03	< 5.E-03	< 4.E-03

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**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**COMPOSITE AIR PARTICULATE FILTERS**  
 (PCI/CU.M.)

STATION NUMBER 10

DATE COLLECTED	12/28-03/30/2021	03/30-06/30/2021	06/30-09/28/2021	09/28-01/04/2022
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GAMMA SPECTRUM ANALYSIS:

BE-7	1.09E-01 ± 2.65E-02	1.89E-01 ± 4.65E-02	1.32E-01 ± 3.69E-02	1.31E-01 ± 3.38E-02
K-40	< 3.E-02	< 5.E-02	< 4.E-02	< 5.E-02
MN-54	< 2.E-03	< 3.E-03	< 3.E-03	< 3.E-03
CO-58	< 3.E-03	< 6.E-03	< 4.E-03	< 5.E-03
FE-59	< 8.E-03	< 1.E-02	< 1.E-02	< 2.E-02
CO-60	< 3.E-03	< 3.E-03	< 2.E-03	< 3.E-03
ZN-65	< 7.E-03	< 1.E-02	< 8.E-03	< 8.E-03
ZR-95	< 6.E-03	< 1.E-02	< 8.E-03	< 1.E-02
RU-103	< 4.E-03	< 7.E-03	< 7.E-03	< 8.E-03
RU-106	< 2.E-02	< 3.E-02	< 3.E-02	< 3.E-02
I-131	< 3.E-01	< 4.E-01	< 5.E-01	< 8.E-01
CS-134	< 2.E-03	< 3.E-03	< 3.E-03	< 3.E-03
CS-137	< 2.E-03	< 3.E-03	< 3.E-03	< 3.E-03
BA-140	< 1.E-01	< 3.E-01	< 2.E-01	< 4.E-01
LA-140	< 6.E-02	< 1.E-01	< 7.E-02	< 2.E-01
CE-141	< 7.E-03	< 1.E-02	< 1.E-02	< 1.E-02
CE-144	< 1.E-02	< 1.E-02	< 1.E-02	< 2.E-02
RA-226	< 3.E-02	< 5.E-02	< 4.E-02	< 4.E-02
TH-228	< 3.E-03	< 5.E-03	< 4.E-03	< 4.E-03



VII-2  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**COMPOSITE AIR PARTICULATE FILTERS**  
 (PCI/CU.M.)

STATION NUMBER 111

DATE COLLECTED	12/28-03/30/2021	03/30-06/30/2021	06/30-09/28/2021	09/28-01/04/2022
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GAMMA SPECTRUM ANALYSIS:

BE-7	6.25E-02 ± 2.98E-02	1.68E-01 ± 3.49E-02	1.13E-01 ± 4.51E-02	1.13E-01 ± 3.11E-02
K-40	< 3.E-02	< 4.E-02	< 5.E-02	< 3.E-02
MN-54	< 2.E-03	< 2.E-03	< 3.E-03	< 3.E-03
CO-58	< 4.E-03	< 3.E-03	< 5.E-03	< 3.E-03
FE-59	< 6.E-03	< 1.E-02	< 1.E-02	< 9.E-03
CO-60	< 2.E-03	< 2.E-03	< 4.E-03	< 2.E-03
ZN-65	< 6.E-03	< 6.E-03	< 9.E-03	< 6.E-03
ZR-95	< 6.E-03	< 4.E-03	< 1.E-02	< 9.E-03
RU-103	< 4.E-03	< 4.E-03	< 8.E-03	< 7.E-03
RU-106	< 2.E-02	< 2.E-02	< 3.E-02	< 3.E-02
I-131	< 3.E-01	< 3.E-01	< 5.E-01	< 9.E-01
CS-134	< 2.E-03	< 2.E-03	< 3.E-03	< 2.E-03
CS-137	< 1.E-03	< 2.E-03	< 3.E-03	< 2.E-03
BA-140	< 2.E-01	< 2.E-01	< 2.E-01	< 3.E-01
LA-140	< 3.E-02	< 3.E-02	< 9.E-02	< 8.E-02
CE-141	< 7.E-03	< 6.E-03	< 1.E-02	< 1.E-02
CE-144	< 8.E-03	< 9.E-03	< 1.E-02	< 1.E-02
RA-226	< 3.E-02	< 3.E-02	< 5.E-02	< 4.E-02
TH-228	< 3.E-03	< 3.E-03	< 4.E-03	< 3.E-03

VII-3  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - INGESTION**  
**FISH**  
 (PCI/KG WET)

STATION NUMBER 28

DATE COLLECTED	6/15/2021 CATFISH	6/15/2021 CARP	10/5/2021 CATFISH	10/5/2021 CARP
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GAMMA SPECTRUM ANALYSIS:

BE-7	< 5.E+02	< 4.E+02	< 6.E+02	< 6.E+02
K-40	2.60E+03 ± 9.41E+02	2.12E+03 ± 1.01E+03	2.56E+03 ± 9.40E+02	2.98E+03 ± 1.02E+03
MN-54	< 6.E+01	< 6.E+01	< 7.E+01	< 4.E+01
CO-58	< 5.E+01	< 5.E+01	< 7.E+01	< 5.E+01
FE-59	< 1.E+02	< 9.E+01	< 2.E+02	< 2.E+02
CO-60	< 4.E+01	< 6.E+01	< 7.E+01	< 8.E+01
ZN-65	< 1.E+02	< 1.E+02	< 1.E+02	< 1.E+02
ZR-95	< 1.E+02	< 1.E+02	< 1.E+02	< 1.E+02
RU-103	< 6.E+01	< 5.E+01	< 8.E+01	< 6.E+01
RU-106	< 5.E+02	< 5.E+02	< 7.E+02	< 5.E+02
I-131	< 1.E+02	< 9.E+01	< 2.E+02	< 1.E+02
CS-134	< 6.E+01	< 6.E+01	< 7.E+01	< 8.E+01
CS-137	< 6.E+01	< 6.E+01	< 8.E+01	< 7.E+01
BA-140	< 3.E+02	< 3.E+02	< 5.E+02	< 4.E+02
CE-141	< 7.E+01	< 8.E+01	< 1.E+02	< 9.E+01
CE-144	< 3.E+02	< 3.E+02	< 4.E+02	< 3.E+02
RA-226	< 1.E+03	< 1.E+03	< 1.E+03	< 1.E+03
TH-228	< 1.E+02	< 1.E+02	< 1.E+02	< 1.E+02

VII-3  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - INGESTION**  
**FISH**  
 (PCI/KG WET)

STATION NUMBER 35

DATE COLLECTED	6/15/2021 CATFISH	6/15/2021 CARP	10/5/2021 CATFISH	10/5/2021 CARP
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GAMMA SPECTRUM ANALYSIS:

BE-7	< 5.E+02	< 5.E+02	< 5.E+02	< 5.E+02
K-40	2.37E+03 ± 8.25E+02	2.99E+03 ± 9.81E+02	2.79E+03 ± 1.09E+03	3.11E+03 ± 1.04E+03
MN-54	< 6.E+01	< 6.E+01	< 6.E+01	< 7.E+01
CO-58	< 4.E+01	< 6.E+01	< 5.E+01	< 9.E+01
FE-59	< 1.E+02	< 1.E+02	< 2.E+02	< 2.E+02
CO-60	< 5.E+01	< 7.E+01	< 5.E+01	< 7.E+01
ZN-65	< 2.E+02	< 1.E+02	< 1.E+02	< 1.E+02
ZR-95	< 1.E+02	< 1.E+02	< 1.E+02	< 1.E+02
RU-103	< 5.E+01	< 7.E+01	< 6.E+01	< 8.E+01
RU-106	< 4.E+02	< 7.E+02	< 5.E+02	< 7.E+02
I-131	< 9.E+01	< 1.E+02	< 2.E+02	< 2.E+02
CS-134	< 6.E+01	< 6.E+01	< 7.E+01	< 9.E+01
CS-137	< 6.E+01	< 6.E+01	< 6.E+01	< 8.E+01
BA-140	< 3.E+02	< 4.E+02	< 5.E+02	< 6.E+02
CE-141	< 7.E+01	< 1.E+02	< 7.E+01	< 1.E+02
CE-144	< 3.E+02	< 4.E+02	< 2.E+02	< 4.E+02
RA-226	< 1.E+03	< 1.E+03	< 1.E+03	< 2.E+03
TH-228	< 9.E+01	< 1.E+02	< 9.E+01	< 1.E+02

VII-4  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - INGESTION**  
**MILK NEAREST PRODUCER**  
 (PCI/LITER)

STATION NUMBER 99

DATE COLLECTED	1/5/2021	2/2/2021	3/2/2021
RADIOCHEMICAL ANALYSIS:			
I-131	< 8.E-01	< 9.E-01	< 7.E-01
GAMMA SPECTRUM ANALYSIS:			
BE-7	< 7.E+01	< 7.E+01	< 6.E+01
K-40	1.09E+03 ± 1.72E+02	1.06E+03 ± 1.77E+02	8.68E+02 ± 1.77E+02
MN-54	< 7.E+00	< 8.E+00	< 8.E+00
CO-58	< 7.E+00	< 8.E+00	< 8.E+00
FE-59	< 2.E+01	< 2.E+01	< 2.E+01
CO-60	< 9.E+00	< 7.E+00	< 9.E+00
ZN-65	< 2.E+01	< 2.E+01	< 1.E+01
ZR-95	< 1.E+01	< 1.E+01	< 1.E+01
RU-103	< 8.E+00	< 9.E+00	< 7.E+00
RU-106	< 8.E+01	< 8.E+01	< 6.E+01
I-131	< 1.E+01	< 1.E+01	< 8.E+00
CS-134	< 1.E+01	< 1.E+01	< 8.E+00
CS-137	< 8.E+00	< 9.E+00	< 8.E+00
BA-140	< 4.E+01	< 3.E+01	< 3.E+01
LA-140	< 1.E+01	< 1.E+01	< 1.E+01
CE-141	< 1.E+01	< 2.E+01	< 1.E+01
CE-144	< 6.E+01	< 6.E+01	< 5.E+01
RA-226	< 2.E+02	< 2.E+02	< 2.E+02
TH-228	< 2.E+01	< 2.E+01	< 1.E+01

VII-5  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - INGESTION**  
**WATER - GROUND**  
 (PCI/LITER)

STATION NUMBER 11

DATE COLLECTED	1/6/2021	4/12/2021	7/12/2021	10/13/2021
RADIOCHEMICAL ANALYSIS:				
I-131	< 9.E-01	< 8.E-01	< 6.E-01	< 9.E-01
H-3	< 3.E+02	< 3.E+02	< 3.E+02	< 3.E+02
GAMMA SPECTRUM ANALYSIS:				
BE-7	< 4.E+01	< 6.E+01	< 3.E+01	< 6.E+01
K-40	< 8.E+01	< 1.E+02	< 7.E+01	< 1.E+02
MN-54	< 4.E+00	< 7.E+00	< 3.E+00	< 6.E+00
CO-58	< 3.E+00	< 6.E+00	< 3.E+00	< 7.E+00
FE-59	< 8.E+00	< 2.E+01	< 8.E+00	< 1.E+01
CO-60	< 5.E+00	< 8.E+00	< 6.E+00	< 6.E+00
ZN-65	< 8.E+00	< 1.E+01	< 9.E+00	< 1.E+01
ZR-95	< 7.E+00	< 1.E+01	< 7.E+00	< 1.E+01
RU-103	< 4.E+00	< 7.E+00	< 5.E+00	< 8.E+00
RU-106	< 4.E+01	< 5.E+01	< 4.E+01	< 6.E+01
I-131	< 6.E+00	< 8.E+00	< 6.E+00	< 1.E+01
CS-134	< 4.E+00	< 7.E+00	< 5.E+00	< 7.E+00
CS-137	< 4.E+00	< 6.E+00	< 4.E+00	< 6.E+00
BA-140	< 2.E+01	< 3.E+01	< 2.E+01	< 3.E+01
LA-140	< 7.E+00	< 9.E+00	< 8.E+00	< 1.E+01
CE-141	< 6.E+00	< 9.E+00	< 7.E+00	< 1.E+01
CE-144	< 3.E+01	< 4.E+01	< 3.E+01	< 4.E+01
RA-226	< 1.E+02	< 2.E+02	< 1.E+02	< 2.E+02
TH-228	< 8.E+00	< 1.E+01	< 1.E+01	< 1.E+01

VII-5  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - INGESTION**  
**WATER - GROUND**  
 (PCI/LITER)

STATION NUMBER 47

DATE COLLECTED	1/6/2021	4/12/2021	7/12/2021	10/12/2021
RADIOCHEMICAL ANALYSIS:				
I-131	< 9.E-01	< 7.E-01	< 5.E-01	< 8.E-01
H-3	< 3.E+02	< 3.E+02	< 3.E+02	< 2.E+02
GAMMA SPECTRUM ANALYSIS:				
BE-7	< 3.E+01	< 4.E+01	< 5.E+01	< 4.E+01
K-40	< 7.E+01	< 1.E+02	< 9.E+01	< 1.E+02
MN-54	< 4.E+00	< 5.E+00	< 6.E+00	< 7.E+00
CO-58	< 3.E+00	< 6.E+00	< 7.E+00	< 6.E+00
FE-59	< 7.E+00	< 1.E+01	< 1.E+01	< 1.E+01
CO-60	< 4.E+00	< 8.E+00	< 5.E+00	< 3.E+00
ZN-65	< 7.E+00	< 1.E+01	< 1.E+01	< 5.E+00
ZR-95	< 6.E+00	< 1.E+01	< 1.E+01	< 1.E+01
RU-103	< 4.E+00	< 5.E+00	< 7.E+00	< 5.E+00
RU-106	< 3.E+01	< 6.E+01	< 7.E+01	< 5.E+01
I-131	< 6.E+00	< 8.E+00	< 9.E+00	< 1.E+01
CS-134	< 4.E+00	< 6.E+00	< 7.E+00	< 6.E+00
CS-137	< 4.E+00	< 6.E+00	< 7.E+00	< 7.E+00
BA-140	< 2.E+01	< 2.E+01	< 3.E+01	< 3.E+01
LA-140	< 5.E+00	< 9.E+00	< 9.E+00	< 1.E+01
CE-141	< 7.E+00	< 1.E+01	< 1.E+01	< 1.E+01
CE-144	< 3.E+01	< 4.E+01	< 5.E+01	< 4.E+01
RA-226	< 1.E+02	< 1.E+02	< 2.E+02	< 1.E+02
TH-228	< 7.E+00	< 1.E+01	< 1.E+01	< 1.E+01

VII-6  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - INGESTION**  
**WATER - RIVER**  
 (PCI/LITER)

STATION NUMBER 28

DATE COLLECTED	1/4/2021	2/3/2021	3/9/2021	4/13/2021
<b>RADIOCHEMICAL ANALYSIS:</b>				
H-3	< 3.E+02	< 3.E+02	< 4.E+02	< 3.E+02
H-3 Qtrly			< 3.E+02	
<b>GAMMA SPECTRUM ANALYSIS:</b>				
BE-7	< 4.E+01	< 4.E+01	< 5.E+01	< 5.E+01
K-40	< 4.E+01	< 1.E+02	< 1.E+02	< 9.E+01
MN-54	< 4.E+00	< 5.E+00	< 6.E+00	< 6.E+00
CO-58	< 4.E+00	< 6.E+00	< 6.E+00	< 7.E+00
FE-59	< 9.E+00	< 9.E+00	< 1.E+01	< 1.E+01
CO-60	< 5.E+00	< 5.E+00	< 5.E+00	< 8.E+00
ZN-65	< 9.E+00	< 1.E+01	< 1.E+01	< 2.E+01
ZR-95	< 6.E+00	< 1.E+01	< 1.E+01	< 1.E+01
RU-103	< 5.E+00	< 6.E+00	< 8.E+00	< 6.E+00
RU-106	< 5.E+01	< 5.E+01	< 6.E+01	< 5.E+01
I-131	< 6.E+00	< 8.E+00	< 7.E+00	< 8.E+00
CS-134	< 4.E+00	< 6.E+00	< 8.E+00	< 9.E+00
CS-137	< 5.E+00	< 7.E+00	< 7.E+00	< 7.E+00
BA-140	< 2.E+01	< 2.E+01	< 2.E+01	< 2.E+01
LA-140	< 7.E+00	< 8.E+00	< 8.E+00	< 7.E+00
CE-141	< 8.E+00	< 9.E+00	< 1.E+01	< 9.E+00
CE-144	< 3.E+01	< 4.E+01	< 4.E+01	< 4.E+01
RA-226	< 1.E+02	< 2.E+02	< 2.E+02	< 2.E+02
TH-228	< 9.E+00	< 1.E+01	< 1.E+01	< 1.E+01

VII-6  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - INGESTION**  
**WATER - RIVER**  
 (PCI/LITER)

STATION NUMBER 28

DATE COLLECTED	5/12/2021	6/9/2021	7/8/2021	8/5/2021
RADIOCHEMICAL ANALYSIS:				
H-3	< 3.E+02	< 3.E+02	< 6.E+02	< 3.E+02
H-3 Qtrly		< 3.E+02		
GAMMA SPECTRUM ANALYSIS:				
BE-7	< 5.E+01	< 5.E+01	< 3.E+01	< 7.E+01
K-40	< 1.E+02	< 1.E+02	< 6.E+01	< 2.E+02
MN-54	< 7.E+00	< 8.E+00	< 3.E+00	< 6.E+00
CO-58	< 6.E+00	< 8.E+00	< 3.E+00	< 7.E+00
FE-59	< 1.E+01	< 1.E+01	< 7.E+00	< 2.E+01
CO-60	< 8.E+00	< 5.E+00	< 5.E+00	< 4.E+00
ZN-65	< 9.E+00	< 1.E+01	< 7.E+00	< 2.E+01
ZR-95	< 1.E+01	< 7.E+00	< 7.E+00	< 1.E+01
RU-103	< 6.E+00	< 7.E+00	< 4.E+00	< 8.E+00
RU-106	< 6.E+01	< 6.E+01	< 3.E+01	< 7.E+01
I-131	< 8.E+00	< 7.E+00	< 4.E+00	< 1.E+01
CS-134	< 9.E+00	< 7.E+00	< 4.E+00	< 7.E+00
CS-137	< 6.E+00	< 8.E+00	< 4.E+00	< 7.E+00
BA-140	< 2.E+01	< 3.E+01	< 1.E+01	< 3.E+01
LA-140	< 9.E+00	< 9.E+00	< 4.E+00	< 1.E+01
CE-141	< 9.E+00	< 1.E+01	< 6.E+00	< 1.E+01
CE-144	< 4.E+01	< 5.E+01	< 2.E+01	< 6.E+01
RA-226	< 2.E+02	< 2.E+02	< 1.E+02	< 2.E+02
TH-228	< 1.E+01	< 1.E+01	< 7.E+00	< 2.E+01



VII-6  
**NEBRASKA PUBLIC POWER DISTRICT**  
**COOPER NUCLEAR STATION**  
**EXPOSURE PATHWAY - INGESTION**  
**WATER - RIVER**  
(PCi/LITER)

STATION NUMBER 28

DATE COLLECTED	9/2/2021	10/4/2021	11/4/2021	12/7/2021
RADIOCHEMICAL ANALYSIS:				
H-3	< 3.E+02	< 2.E+02	< 3.E+02	< 3.E+02
H-3 Qtrly	< 3.E+02			< 3.E+02
GAMMA SPECTRUM ANALYSIS:				
BE-7	< 7.E+01	< 5.E+01	< 5.E+01	< 7.E+01
K-40	< 2.E+02	< 1.E+02	< 7.E+01	< 2.E+02
MN-54	< 7.E+00	< 7.E+00	< 5.E+00	< 6.E+00
CO-58	< 8.E+00	< 6.E+00	< 5.E+00	< 6.E+00
FE-59	< 2.E+01	< 1.E+01	< 9.E+00	< 2.E+01
CO-60	< 7.E+00	< 9.E+00	< 7.E+00	< 9.E+00
ZN-65	< 1.E+01	< 1.E+01	< 9.E+00	< 1.E+01
ZR-95	< 2.E+01	< 1.E+01	< 1.E+01	< 1.E+01
RU-103	< 8.E+00	< 4.E+00	< 7.E+00	< 8.E+00
RU-106	< 7.E+01	< 4.E+01	< 6.E+01	< 6.E+01
I-131	< 1.E+01	< 7.E+00	< 7.E+00	< 8.E+00
CS-134	< 7.E+00	< 8.E+00	< 6.E+00	< 8.E+00
CS-137	< 8.E+00	< 7.E+00	< 7.E+00	< 8.E+00
BA-140	< 4.E+01	< 2.E+01	< 2.E+01	< 3.E+01
LA-140	< 8.E+00	< 9.E+00	< 7.E+00	< 8.E+00
CE-141	< 1.E+01	< 9.E+00	< 1.E+01	< 1.E+01
CE-144	< 6.E+01	< 4.E+01	< 4.E+01	< 5.E+01
RA-226	< 2.E+02	< 2.E+02	< 2.E+02	< 2.E+02
TH-228	< 2.E+01	< 1.E+01	< 1.E+01	< 1.E+01

VII-6  
**NEBRASKA PUBLIC POWER DISTRICT**  
**COOPER NUCLEAR STATION**  
**EXPOSURE PATHWAY - INGESTION**  
**WATER - RIVER**  
**(PCI/LITER)**

STATION NUMBER 35

DATE COLLECTED	1/5/2021	2/3/2021	3/9/2021	4/13/2021
RADIOCHEMICAL ANALYSIS:				
H-3	< 3.E+02	< 3.E+02	< 3.E+02	< 3.E+02
H-3 Qtrly			< 3.E+02	
GAMMA SPECTRUM ANALYSIS:				
BE-7	< 3.E+01	< 6.E+01	< 5.E+01	< 5.E+01
K-40	< 6.E+01	< 2.E+02	< 1.E+02	< 1.E+02
MN-54	< 4.E+00	< 6.E+00	< 5.E+00	< 7.E+00
CO-58	< 4.E+00	< 7.E+00	< 5.E+00	< 6.E+00
FE-59	< 8.E+00	< 1.E+01	< 1.E+01	< 1.E+01
CO-60	< 4.E+00	< 5.E+00	< 7.E+00	< 6.E+00
ZN-65	< 9.E+00	< 1.E+01	< 1.E+01	< 2.E+01
ZR-95	< 6.E+00	< 1.E+01	< 1.E+01	< 1.E+01
RU-103	< 4.E+00	< 6.E+00	< 5.E+00	< 7.E+00
RU-106	< 3.E+01	< 3.E+01	< 6.E+01	< 7.E+01
I-131	< 5.E+00	< 1.E+01	< 6.E+00	< 9.E+00
CS-134	< 4.E+00	< 7.E+00	< 6.E+00	< 7.E+00
CS-137	< 4.E+00	< 6.E+00	< 6.E+00	< 9.E+00
BA-140	< 2.E+01	< 3.E+01	< 2.E+01	< 3.E+01
LA-140	< 5.E+00	< 1.E+01	< 5.E+00	< 1.E+01
CE-141	< 6.E+00	< 1.E+01	< 9.E+00	< 1.E+01
CE-144	< 2.E+01	< 4.E+01	< 4.E+01	< 4.E+01
RA-226	< 9.E+01	< 2.E+02	< 2.E+02	< 2.E+02
TH-228	< 7.E+00	< 1.E+01	< 1.E+01	< 1.E+01

VII-6  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - INGESTION**  
**WATER - RIVER**  
 (PCI/LITER)

STATION NUMBER 35

DATE COLLECTED	5/12/2021	6/9/2021	7/8/2021	8/5/2021
RADIOCHEMICAL ANALYSIS:				
H-3	< 3.E+02	< 3.E+02	< 6.E+02	< 3.E+02
H-3 Qtrly		< 3.E+02		
GAMMA SPECTRUM ANALYSIS:				
BE-7	< 6.E+01	< 4.E+01	< 4.E+01	< 7.E+01
K-40	< 2.E+02	< 1.E+02	< 7.E+01	< 2.E+02
MN-54	< 7.E+00	< 6.E+00	< 5.E+00	< 8.E+00
CO-58	< 7.E+00	< 6.E+00	< 5.E+00	< 6.E+00
FE-59	< 1.E+01	< 1.E+01	< 1.E+01	< 1.E+01
CO-60	< 8.E+00	< 9.E+00	< 5.E+00	< 8.E+00
ZN-65	< 1.E+01	< 1.E+01	< 9.E+00	< 2.E+01
ZR-95	< 2.E+01	< 9.E+00	< 8.E+00	< 1.E+01
RU-103	< 7.E+00	< 6.E+00	< 5.E+00	< 7.E+00
RU-106	< 7.E+01	< 6.E+01	< 4.E+01	< 7.E+01
I-131	< 8.E+00	< 7.E+00	< 5.E+00	< 1.E+01
CS-134	< 9.E+00	< 7.E+00	< 5.E+00	< 1.E+01
CS-137	< 6.E+00	< 7.E+00	< 5.E+00	< 8.E+00
BA-140	< 2.E+01	< 2.E+01	< 2.E+01	< 3.E+01
LA-140	< 6.E+00	< 1.E+01	< 5.E+00	< 1.E+01
CE-141	< 1.E+01	< 9.E+00	< 8.E+00	< 1.E+01
CE-144	< 5.E+01	< 4.E+01	< 4.E+01	< 6.E+01
RA-226	< 2.E+02	< 2.E+02	< 1.E+02	< 2.E+02
TH-228	< 1.E+01	< 1.E+01	< 1.E+01	< 1.E+01

VII-6  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - INGESTION**  
**WATER - RIVER**  
 (PCI/LITER)

STATION NUMBER 35

DATE COLLECTED	9/2/2021	10/4/2021	11/4/2021	12/7/2021
RADIOCHEMICAL ANALYSIS:				
H-3	< 3.E+02	< 2.E+02	< 3.E+02	< 3.E+02
H-3 Qtrly	< 3.E+02			< 3.E+02
GAMMA SPECTRUM ANALYSIS:				
BE-7	< 7.E+01	< 7.E+01	< 4.E+01	< 7.E+01
K-40	< 1.E+02	< 1.E+02	< 7.E+01	< 1.E+02
MN-54	< 8.E+00	< 8.E+00	< 7.E+00	< 6.E+00
CO-58	< 7.E+00	< 9.E+00	< 8.E+00	< 6.E+00
FE-59	< 1.E+01	< 1.E+01	< 1.E+01	< 1.E+01
CO-60	< 7.E+00	< 6.E+00	< 9.E+00	< 8.E+00
ZN-65	< 1.E+01	< 2.E+01	< 1.E+01	< 1.E+01
ZR-95	< 1.E+01	< 1.E+01	< 1.E+01	< 1.E+01
RU-103	< 9.E+00	< 7.E+00	< 5.E+00	< 5.E+00
RU-106	< 5.E+01	< 7.E+01	< 5.E+01	< 6.E+01
I-131	< 1.E+01	< 9.E+00	< 8.E+00	< 7.E+00
CS-134	< 8.E+00	< 8.E+00	< 7.E+00	< 8.E+00
CS-137	< 8.E+00	< 9.E+00	< 5.E+00	< 7.E+00
BA-140	< 3.E+01	< 2.E+01	< 3.E+01	< 2.E+01
LA-140	< 7.E+00	< 1.E+01	< 1.E+01	< 7.E+00
CE-141	< 1.E+01	< 1.E+01	< 9.E+00	< 9.E+00
CE-144	< 5.E+01	< 6.E+01	< 4.E+01	< 4.E+01
RA-226	< 2.E+02	< 2.E+02	< 1.E+02	< 2.E+02
TH-228	< 1.E+01	< 2.E+01	< 1.E+01	< 1.E+01

VII-7  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - THERMOLUMINESCENT DOSIMETRY - TLD**  
 MILLIREM/QUARTER

Sample Nuclide	Station Number	First Quarter 01/01-03/31	Second Quarter 04/01-06/30	Third Quarter 07/01-09/30	Fourth Quarter 10/01-01/01	Quarter Average - 1 S.D.
TLD	1	26.0 ± 0.9	23.0 ± 1.0	26.0 ± 1.5	27.0 ± 0.4	25.5 ± 1.7
	2	26.0 ± 1.7	25.0 ± 1.0	24.0 ± 0.7	25.0 ± 0.6	25.0 ± 0.8
	3	25.0 ± 1.0	23.0 ± 0.3	23.0 ± 0.7	25.0 ± 0.6	24.0 ± 1.2
	4	25.0 ± 1.2	22.0 ± 1.1	25.0 ± 0.8	25.0 ± 0.0	24.3 ± 1.5
	5	24.0 ± 1.5	21.0 ± 0.6	23.0 ± 0.6	23.0 ± 0.2	22.8 ± 1.3
	6	24.0 ± 0.4	23.0 ± 0.7	25.0 ± 0.4	24.0 ± 0.5	24.0 ± 0.8
	7	25.0 ± 1.3	24.0 ± 0.2	25.0 ± 0.7	27.0 ± 0.7	25.3 ± 1.3
	8	29.0 ± 3.6	25.0 ± 1.1	26.0 ± 0.1	27.0 ± 2.4	26.8 ± 1.7
	9	25.0 ± 0.4	23.0 ± 0.2	25.0 ± 1.0	24.0 ± 0.5	24.3 ± 1.0
	10	26.0 ± 0.4	24.0 ± 0.6	24.0 ± 0.3	26.0 ± 0.5	25.0 ± 1.2
	20	27.0 ± 0.3	24.0 ± 0.8	26.0 ± 0.3	28.0 ± 1.5	26.3 ± 1.7
	44	28.0 ± 1.5	22.0 ± 0.5	(b)	26.0 ± 0.3	25.3 ± 3.1
	56	26.0 ± 0.5	23.0 ± 0.8	25.0 ± 0.6	26.0 ± 0.2	25.0 ± 1.4
	58	25.0 ± 0.9	22.0 ± 1.2	25.0 ± 0.1	26.0 ± 0.1	24.5 ± 1.7
	59	26.0 ± 0.9	24.0 ± 1.4	26.0 ± 0.9	(b)	25.3 ± 1.2
	66	25.0 ± 1.2	22.0 ± 0.4	24.0 ± 0.4	26.0 ± 0.9	24.3 ± 1.7
	67	25.0 ± 0.5	24.0 ± 0.5	26.0 ± 1.0	26.0 ± 0.9	25.3 ± 1.0
	71	27.0 ± 0.6	23.0 ± 0.4	25.0 ± 0.3	26.0 ± 0.8	25.3 ± 1.7
	79	25.0 ± 0.5	23.0 ± 0.1	23.0 ± 0.5	23.0 ± 0.8	23.5 ± 1.0
	80	25.0 ± 0.7	24.0 ± 0.7	26.0 ± 0.1	28.0 ± 0.3	25.8 ± 1.7
81	24.0 ± 0.7	23.0 ± 0.5	25.0 ± 0.4	27.0 ± 0.8	24.8 ± 1.7	
82	(a)	24.0 ± 0.6	25.0 ± 0.2	26.0 ± 0.4	25.0 ± 1.0	
83	27.0 ± 0.6	25.0 ± 0.3	25.0 ± 0.5	28.0 ± 0.2	26.3 ± 1.5	
84	27.0 ± 0.4	24.0 ± 0.8	24.0 ± 0.6	26.0 ± 0.7	25.3 ± 1.5	
85	25.0 ± 0.9	23.0 ± 0.7	23.0 ± 0.7	26.0 ± 1.2	24.3 ± 1.5	

(a) Damaged in a fire and results are invalid.

(b) TLD was lost in the field and unable to be analyzed.

VII-7  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - THERMOLUMINESCENT DOSIMETRY - TLD**  
 MILLIREM/QUARTER

Sample Nuclide	Station Number	First Quarter 01/01-03/31	Second Quarter 04/01-06/30	Third Quarter 07/01-09/30	Fourth Quarter 10/01-01/01	Quarter Average - 1 S.D.
TLD	86	24.0 ± 0.3	24.0 ± 1.3	25.0 ± 0.5	26.0 ± 0.9	24.8 ± 1.0
	87	25.0 ± 0.9	23.0 ± 0.3	24.0 ± 0.4	27.0 ± 0.8	24.8 ± 1.7
	88	26.0 ± 1.7	23.0 ± 0.4	23.0 ± 0.3	26.0 ± 0.4	24.5 ± 1.7
	89	25.0 ± 0.7	21.0 ± 0.6	23.0 ± 0.9	26.0 ± 0.9	23.8 ± 2.2
	90	25.0 ± 1.0	23.0 ± 0.3	23.0 ± 0.3	26.0 ± 0.4	24.3 ± 1.5
	91	25.0 ± 0.4	22.0 ± 0.7	24.0 ± 0.6	24.0 ± 0.4	23.8 ± 1.3
	94	26.0 ± 0.3	24.0 ± 0.7	25.0 ± 0.7	24.0 ± 0.6	24.8 ± 1.0
	111	26.0 ± 0.7	23.0 ± 0.5	24.0 ± 0.6	25.0 ± 0.6	24.5 ± 1.3
	N01	25.0 ± 0.9	24.0 ± 0.9	23.0 ± 0.6	26.0 ± 0.7	24.5 ± 1.3
	N02	25.0 ± 0.4	22.0 ± 0.7	23.0 ± 0.4	25.0 ± 0.6	23.8 ± 1.5
	N03	25.0 ± 0.5	22.0 ± 0.5	24.0 ± 0.4	26.0 ± 0.7	24.3 ± 1.7
	N04	24.0 ± 0.6	22.0 ± 0.4	24.0 ± 0.3	25.0 ± 1.2	23.8 ± 1.3
	N05	24.0 ± 0.2	22.0 ± 0.7	22.0 ± 0.4	26.0 ± 1.2	23.5 ± 1.9
	N06	25.0 ± 0.6	22.0 ± 0.2	24.0 ± 0.3	24.0 ± 0.6	23.8 ± 1.3
	N07	28.0 ± 2.2	25.0 ± 0.6	25.0 ± 0.4	25.0 ± 0.7	25.8 ± 1.5
	N08	23.0 ± 0.6	21.0 ± 0.8	23.0 ± 0.5	24.0 ± 0.3	22.8 ± 1.3
	N09	24.0 ± 1.0	21.0 ± 0.2	23.0 ± 0.4	25.0 ± 0.4	23.3 ± 1.7
	N10	26.0 ± 1.2	24.0 ± 1.6	24.0 ± 1.0	26.0 ± 1.5	25.0 ± 1.2
	N11	24.0 ± 0.7	22.0 ± 0.5	23.0 ± 0.6	25.0 ± 0.7	23.5 ± 1.3
	N12	25.0 ± 1.2	22.0 ± 0.3	24.0 ± 0.3	23.0 ± 1.9	23.5 ± 1.3
	N13	23.0 ± 0.4	24.0 ± 0.8	25.0 ± 0.3	25.0 ± 0.5	24.3 ± 1.0
	N14	24.0 ± 0.5	21.0 ± 0.5	24.0 ± 0.3	25.0 ± 0.6	23.5 ± 1.7
	N15	24.0 ± 0.2	21.0 ± 1.2	25.0 ± 0.3	26.0 ± 0.6	24.0 ± 2.2
	N16	26.0 ± 0.7	24.0 ± 0.3	25.0 ± 0.5	24.0 ± 0.6	24.8 ± 1.0
	N17	25.0 ± 0.4	24.0 ± 0.2	25.0 ± 0.6	24.0 ± 0.5	24.5 ± 0.6

VII-7  
**NEBRASKA PUBLIC POWER DISTRICT**  
**COOPER NUCLEAR STATION**  
**EXPOSURE PATHWAY - THERMOLUMINESCENT DOSIMETRY - TLD**  
**MILLIREM/QUARTER**

Sample Nuclide	Station Number	First Quarter 01/01-03/31	Second Quarter 04/01-06/30	Third Quarter 07/01-09/30	Fourth Quarter 10/01-01/01	Quarter Average - 1 S.D.
TLD	N18	23.0 ± 0.3	23.0 ± 0.8	22.0 ± 0.7	26.0 ± 0.5	23.5 ± 1.7
	N19	24.0 ± 0.5	24.0 ± 1.1	24.0 ± 0.2	26.0 ± 0.2	24.5 ± 1.0
	N20	(a)	25.0 ± 0.9	26.0 ± 0.1	27.0 ± 0.5	26.0 ± 1.0
	N21	23.0 ± 0.3	21.0 ± 0.4	23.0 ± 1.0	24.0 ± 0.9	22.8 ± 1.3
	N22	24.0 ± 0.7	22.0 ± 0.9	24.0 ± 0.7	26.0 ± 0.3	24.0 ± 1.6
	N23	25.0 ± 0.6	22.0 ± 0.5	23.0 ± 0.7	23.0 ± 2.0	23.3 ± 1.3
	N24	26.0 ± 0.7	24.0 ± 0.1	26.0 ± 0.3	26.0 ± 0.2	25.5 ± 1.0
	N25	25.0 ± 1.4	23.0 ± 0.9	23.0 ± 0.5	26.0 ± 0.4	24.3 ± 1.5
Average/Quarter	25.2 ± 1.3	23.0 ± 1.2	24.2 ± 1.1	25.5 ± 1.2		

Range  
Detection/Total

(a) Damaged in a fire and results are invalid.

Sample Nuclide	Station Number	First Quarter 01/01-03/31	Second Quarter 04/01-06/30	Third Quarter 07/01-09/30	Fourth Quarter 10/01-01/01	Quarter Average - 1 S.D.
TLD	Control*	18.0 ± 0.3	16.0 ± 0.3	16.0 ± 0.7	18.0 ± 0.7	17.0 ± 1.2
		18.0 ± 1.1	17.0 ± 0.2	17.0 ± 0.6	19.0 ± 0.1	17.8 ± 1.0
		18.0 ± 0.8	16.0 ± 0.6	18.0 ± 0.7	18.0 ± 0.4	17.5 ± 1.0

\*Transit Control TLDs. Not included in the control calculations.

VII-8  
**NEBRASKA PUBLIC POWER DISTRICT**  
**COOPER NUCLEAR STATION**  
**EXPOSURE PATHWAY - INGESTION**  
**VEGETATION - TERRESTRIAL, BROADLEAF**  
**(PCI/KG WET)**

STATION NUMBER 35

DATE COLLECTED	4/29/2021	5/24/2021	6/21/2021	7/23/2021
RADIOCHEMICAL ANALYSIS:				
I-131	< 5.E+01	< 3.E+01	< 4.E+01	< 5.E+01
GAMMA SPECTRUM ANALYSIS:				
BE-7	2.69E+02 ± 1.18E+02	4.99E+02 ± 2.38E+02	1.09E+03 ± 2.75E+02	1.30E+03 ± 3.38E+02
K-40	4.72E+03 ± 4.25E+02	3.36E+03 ± 4.83E+02	6.15E+03 ± 6.75E+02	6.02E+03 ± 8.03E+02
MN-54	< 1.E+01	< 2.E+01	< 2.E+01	< 3.E+01
CO-58	< 1.E+01	< 2.E+01	< 3.E+01	< 3.E+01
FE-59	< 3.E+01	< 5.E+01	< 7.E+01	< 8.E+01
CO-60	< 1.E+01	< 2.E+01	< 2.E+01	< 4.E+01
ZN-65	< 3.E+01	< 6.E+01	< 6.E+01	< 5.E+01
ZR-95	< 2.E+01	< 4.E+01	< 3.E+01	< 4.E+01
RU-103	< 1.E+01	< 2.E+01	< 3.E+01	< 3.E+01
RU-106	< 1.E+02	< 2.E+02	< 2.E+02	< 2.E+02
I-131	< 2.E+01	< 2.E+01	< 3.E+01	< 4.E+01
CS-134	< 2.E+01	< 3.E+01	< 2.E+01	< 3.E+01
CS-137	< 1.E+01	< 2.E+01	< 2.E+01	< 3.E+01
BA-140	< 5.E+01	< 9.E+01	< 8.E+01	< 1.E+02
CE-141	< 2.E+01	< 3.E+01	< 3.E+01	< 5.E+01
CE-144	< 8.E+01	< 1.E+02	< 1.E+02	< 1.E+02
RA-226	< 3.E+02	< 5.E+02	< 5.E+02	< 6.E+02
TH-228	< 4.E+01	5.63E+01 ± 2.89E+01	< 4.E+01	< 6.E+01



VII-8  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - INGESTION**  
**VEGETATION - TERRESTRIAL, BROADLEAF**  
 (PCI/KG WET)

STATION NUMBER 35

DATE COLLECTED	8/26/2021	9/15/2021	10/4/2021
RADIOCHEMICAL ANALYSIS:			
I-131	< 5.E+01	< 5.E+01	< 4.E+01
GAMMA SPECTRUM ANALYSIS:			
BE-7	1.51E+03 ± 4.14E+02	1.26E+03 ± 3.31E+02	7.23E+02 ± 2.15E+02
K-40	6.02E+03 ± 9.33E+02	4.03E+03 ± 6.75E+02	4.88E+03 ± 6.97E+02
MN-54	< 4.E+01	< 3.E+01	< 2.E+01
CO-58	< 5.E+01	< 3.E+01	< 3.E+01
FE-59	< 8.E+01	< 6.E+01	< 5.E+01
CO-60	< 4.E+01	< 4.E+01	< 3.E+01
ZN-65	< 9.E+01	< 6.E+01	< 7.E+01
ZR-95	< 8.E+01	< 4.E+01	< 4.E+01
RU-103	< 4.E+01	< 3.E+01	< 3.E+01
RU-106	< 4.E+02	< 2.E+02	< 3.E+02
I-131	< 4.E+01	< 3.E+01	< 4.E+01
CS-134	< 5.E+01	< 4.E+01	< 4.E+01
CS-137	< 4.E+01	< 2.E+01	< 3.E+01
BA-140	< 1.E+02	< 1.E+02	< 1.E+02
CE-141	< 6.E+01	< 3.E+01	< 5.E+01
CE-144	< 2.E+02	< 2.E+02	< 2.E+02
RA-226	< 9.E+02	< 7.E+02	< 8.E+02
TH-228	< 9.E+01	7.41E+01 ± 5.87E+01	< 5.E+01

VII-8  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - INGESTION**  
**VEGETATION - TERRESTRIAL, BROADLEAF**  
 (PCI/KG WET)

STATION NUMBER 96

DATE COLLECTED	4/29/2021	5/24/2021	6/21/2021	7/23/2021
<b>RADIOCHEMICAL ANALYSIS:</b>				
I-131	< 5.E+01	< 3.E+01	< 4.E+01	< 5.E+01
<b>GAMMA SPECTRUM ANALYSIS:</b>				
BE-7	4.39E+02 ± 1.54E+02	4.35E+02 ± 1.64E+02	6.61E+02 ± 2.48E+02	5.59E+02 ± 1.64E+02
K-40	7.19E+03 ± 5.13E+02	4.84E+03 ± 6.12E+02	4.89E+03 ± 6.62E+02	5.90E+03 ± 5.75E+02
MN-54	< 2.E+01	< 2.E+01	< 2.E+01	< 2.E+01
CO-58	< 2.E+01	< 2.E+01	< 2.E+01	< 2.E+01
FE-59	< 4.E+01	< 5.E+01	< 5.E+01	< 4.E+01
CO-60	< 2.E+01	< 2.E+01	< 2.E+01	< 2.E+01
ZN-65	< 5.E+01	< 6.E+01	< 5.E+01	< 6.E+01
ZR-95	< 3.E+01	< 3.E+01	< 4.E+01	< 3.E+01
RU-103	< 2.E+01	< 2.E+01	< 2.E+01	< 2.E+01
RU-106	< 2.E+02	< 2.E+02	< 2.E+02	< 2.E+02
I-131	< 2.E+01	< 2.E+01	< 2.E+01	< 3.E+01
CS-134	< 2.E+01	< 2.E+01	< 2.E+01	< 2.E+01
CS-137	< 2.E+01	< 3.E+01	< 2.E+01	< 2.E+01
BA-140	< 7.E+01	< 8.E+01	< 8.E+01	< 8.E+01
CE-141	< 3.E+01	< 3.E+01	< 3.E+01	< 2.E+01
CE-144	< 1.E+02	< 1.E+02	< 1.E+02	< 9.E+01
RA-226	< 4.E+02	< 5.E+02	< 6.E+02	< 4.E+02
TH-228	< 3.E+01	7.72E+01 ± 4.00E+01	< 4.E+01	< 3.E+01

VII-8  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - INGESTION**  
**VEGETATION - TERRESTRIAL, BROADLEAF**  
 (PCI/KG WET)

STATION NUMBER 96

DATE COLLECTED	8/26/2021	9/15/2021	10/4/2021
RADIOCHEMICAL ANALYSIS:			
I-131	< 4.E+01	< 5.E+01	< 4.E+01
GAMMA SPECTRUM ANALYSIS:			
BE-7	2.51E+03 ± 3.99E+02	2.28E+03 ± 3.57E+02	1.94E+03 ± 4.52E+02
K-40	5.43E+03 ± 8.97E+02	2.78E+03 ± 5.29E+02	3.54E+03 ± 7.18E+02
MN-54	< 4.E+01	< 3.E+01	< 3.E+01
CO-58	< 4.E+01	< 2.E+01	< 3.E+01
FE-59	< 6.E+01	< 5.E+01	< 9.E+01
CO-60	< 4.E+01	< 4.E+01	< 3.E+01
ZN-65	< 8.E+01	< 6.E+01	< 7.E+01
ZR-95	< 5.E+01	< 6.E+01	< 5.E+01
RU-103	< 3.E+01	< 3.E+01	< 4.E+01
RU-106	< 3.E+02	< 3.E+02	< 3.E+02
I-131	< 4.E+01	< 3.E+01	< 4.E+01
CS-134	< 4.E+01	< 4.E+01	< 4.E+01
CS-137	< 4.E+01	< 3.E+01	< 4.E+01
BA-140	< 1.E+02	< 1.E+02	< 2.E+02
CE-141	< 5.E+01	< 5.E+01	< 6.E+01
CE-144	< 2.E+02	< 2.E+02	< 3.E+02
RA-226	< 8.E+02	< 7.E+02	< 9.E+02
TH-228	9.82E+01 ± 6.58E+01	6.92E+01 ± 6.31E+01	< 6.E+01

VII-8  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - INGESTION**  
**VEGETATION - TERRESTRIAL, BROADLEAF**  
 (PCI/KG WET)

STATION NUMBER 101

DATE COLLECTED	4/29/2021	5/24/2021	6/21/2021	7/23/2021
RADIOCHEMICAL ANALYSIS:				
I-131	< 4.E+01	< 3.E+01	< 4.E+01	< 5.E+01
GAMMA SPECTRUM ANALYSIS:				
BE-7	3.91E+02 ± 1.69E+02	6.46E+02 ± 2.24E+02	1.27E+03 ± 3.47E+02	< 2.E+02
K-40	5.27E+03 ± 5.63E+02	4.30E+03 ± 5.61E+02	1.19E+04 ± 9.57E+02	5.35E+03 ± 5.07E+02
MN-54	< 2.E+01	< 3.E+01	< 3.E+01	< 2.E+01
CO-58	< 2.E+01	< 2.E+01	< 3.E+01	< 1.E+01
FE-59	< 4.E+01	< 5.E+01	< 7.E+01	< 4.E+01
CO-60	< 2.E+01	< 3.E+01	< 3.E+01	< 1.E+01
ZN-65	< 5.E+01	< 5.E+01	< 8.E+01	< 4.E+01
ZR-95	< 3.E+01	< 4.E+01	< 5.E+01	< 3.E+01
RU-103	< 2.E+01	< 2.E+01	< 3.E+01	< 2.E+01
RU-106	< 1.E+02	< 2.E+02	< 2.E+02	< 1.E+02
I-131	< 2.E+01	< 2.E+01	< 4.E+01	< 2.E+01
CS-134	< 2.E+01	< 3.E+01	< 2.E+01	< 2.E+01
CS-137	< 2.E+01	< 2.E+01	< 4.E+01	< 2.E+01
BA-140	< 6.E+01	< 6.E+01	< 1.E+02	< 6.E+01
CE-141	< 2.E+01	< 3.E+01	< 5.E+01	< 3.E+01
CE-144	< 1.E+02	< 1.E+02	< 2.E+02	< 1.E+02
RA-226	< 4.E+02	< 6.E+02	< 8.E+02	< 4.E+02
TH-228	< 3.E+01	1.72E+02 ± 5.10E+01	< 6.E+01	< 4.E+01

VII-8  
**NEBRASKA PUBLIC POWER DISTRICT**  
**COOPER NUCLEAR STATION**  
**EXPOSURE PATHWAY - INGESTION**  
**VEGETATION - TERRESTRIAL, BROADLEAF**  
(PCII/KG WET)

STATION NUMBER 101

DATE COLLECTED	8/26/2021	9/15/2021	10/4/2021
RADIOCHEMICAL ANALYSIS:			
I-131	< 5.E+01	< 5.E+01	< 4.E+01
GAMMA SPECTRUM ANALYSIS:			
BE-7	1.80E+03 ± 3.94E+02	1.20E+03 ± 3.05E+02	< 3.E+02
K-40	5.00E+03 ± 9.03E+02	2.87E+03 ± 4.71E+02	6.47E+03 ± 6.56E+02
MN-54	< 4.E+01	< 2.E+01	< 2.E+01
CO-58	< 3.E+01	< 2.E+01	< 2.E+01
FE-59	< 7.E+01	< 5.E+01	< 6.E+01
CO-60	< 4.E+01	< 2.E+01	< 3.E+01
ZN-65	< 1.E+02	< 5.E+01	< 6.E+01
ZR-95	< 4.E+01	< 5.E+01	< 4.E+01
RU-103	< 4.E+01	< 2.E+01	< 2.E+01
RU-106	< 3.E+02	< 2.E+02	< 2.E+02
I-131	< 3.E+01	< 3.E+01	< 3.E+01
CS-134	< 3.E+01	< 2.E+01	< 3.E+01
CS-137	< 4.E+01	< 3.E+01	< 3.E+01
BA-140	< 1.E+02	< 9.E+01	< 1.E+02
CE-141	< 4.E+01	< 4.E+01	< 4.E+01
CE-144	< 2.E+02	< 2.E+02	< 2.E+02
RA-226	< 8.E+02	< 6.E+02	< 6.E+02
TH-228	< 7.E+01	5.03E+01 ± 4.21E+01	< 5.E+01

VII-9  
NEBRASKA PUBLIC POWER DISTRICT  
COOPER NUCLEAR STATION  
EXPOSURE PATHWAY - AIRBORNE  
SHORELINE SEDIMENT  
(PCI/KG DRY)

STATION NUMBER 28

DATE COLLECTED

3/9/2021

9/15/2021

GAMMA SPECTRUM ANALYSIS:

BE-7	< 6.E+02	< 6.E+02
K-40	1.11E+04 ± 1.50E+03	1.31E+04 ± 1.44E+03
MN-54	< 8.E+01	< 6.E+01
CO-58	< 7.E+01	< 6.E+01
FE-59	< 2.E+02	< 1.E+02
CO-60	< 6.E+01	< 6.E+01
ZN-65	< 2.E+02	< 1.E+02
ZR-95	< 1.E+02	< 1.E+02
RU-103	< 5.E+01	< 7.E+01
RU-106	< 7.E+02	< 6.E+02
I-131	< 7.E+01	< 8.E+01
CS-134	< 1.E+02	< 8.E+01
CS-137	< 8.E+01	< 7.E+01
BA-140	< 3.E+02	< 2.E+02
CE-141	< 1.E+02	< 1.E+02
CE-144	< 4.E+02	< 5.E+02
RA-226	< 2.E+03	< 2.E+03
TH-228	8.41E+02 ± 1.66E+02	5.71E+02 ± 1.26E+02

VII-9  
**NEBRASKA PUBLIC POWER DISTRICT**  
 COOPER NUCLEAR STATION  
**EXPOSURE PATHWAY - AIRBORNE**  
**SHORELINE SEDIMENT**  
 (PCI/KG DRY)

STATION NUMBER 35

DATE COLLECTED	3/9/2021	10/5/2021
GAMMA SPECTRUM ANALYSIS:		
BE-7	< 4.E+02	< 5.E+02
K-40	1.04E+04 ± 1.31E+03	1.15E+04 ± 1.24E+03
MN-54	< 5.E+01	< 6.E+01
CO-58	< 5.E+01	< 6.E+01
FE-59	< 1.E+02	< 1.E+02
CO-60	< 5.E+01	< 6.E+01
ZN-65	< 2.E+02	< 1.E+02
ZR-95	< 9.E+01	< 1.E+02
RU-103	< 5.E+01	< 5.E+01
RU-106	< 5.E+02	< 5.E+02
I-131	< 6.E+01	< 7.E+01
CS-134	< 7.E+01	< 8.E+01
CS-137	< 7.E+01	< 6.E+01
BA-140	< 2.E+02	< 2.E+02
CE-141	< 8.E+01	< 7.E+01
CE-144	< 3.E+02	< 3.E+02
RA-226	< 1.E+03	1.87E+03 ± 9.72E+02
TH-228	3.04E+02 ± 1.29E+02	4.59E+02 ± 1.09E+02

**SECTION VIII. REFERENCES**



## VIII. REFERENCES

1. Nebraska Public Power District, Cooper Nuclear Station Environmental Radiation Monitoring Program, Annual Report, January 1, 1982-December 31, 1982 (prepared by Teledyne Isotopes).
2. Nebraska Public Power District, Cooper Nuclear Station Environmental Radiation Monitoring Program, Annual Report, January 1, 1983-December 31, 1983 (prepared by Teledyne Isotopes).
3. Nebraska Public Power District Cooper Nuclear Station, Environmental Monitoring Program, Annual Report, January 1, 1984 to December 31, 1984. (Prepared by Teledyne Isotopes.)
4. U.S. Department of Energy; EML 440 March 1985; EML-444 April 1989; Environmental Measurements Laboratory, US Department of Energy, New York, New York 10014.
5. U.S. Environmental Protection Agency; Environmental Radiation Data, Report 35, July -- September 1983, Report 39, July -- September 1985; Report 40, October -- December 1984; Report 41, January -- March 1985. Report 42, April -- June 1985; Report 43, July-September 1985, Report 44-45, October-March 1986; Report 46, April-June 1986; Report 47, July-September 1986; Report 48, October-December 1986; Report 49, January-March 1987. Environmental Radiation Facility, Montgomery, Alabama.
6. U.S. Department of Energy; EML 460, October 1, 1986; Environmental Measurements Laboratory, US Department of Energy, New York, New York 10014.
7. U.S. Nuclear Regulatory Commission, 1975, Regulatory Guide 4.8, Environmental Technical Specifications for Nuclear Power Plants.
8. U.S. Regulatory Commission, Branch Technical Position, Radiological Monitoring Acceptable Program (November, 1979, Revision 1).

**APPENDIX A**  
**2021 LAND USE CENSUS**

## **ANNUAL CNS LAND USE CENSUS / POTABLE** **WATER USE**

Conducted July 19-20, 2021  
0-3 miles

Cooper Nuclear Station (CNS) Offsite Dose Assessment Manual (ODAM) requires an annual land use census. This census identifies the location of the nearest garden that is greater than 500 square feet in area and yields leafy green vegetables, the nearest milk animal, and the location of the nearest resident in each of the 16 meteorological sectors within 3 miles of CNS.

A land use census was performed July 19-20, 2021, in accordance with the CNS ODAM. The nearest residence was found in sector Q, 0.9 miles from CNS, and the nearest garden was found in sector M, 1.8 miles from CNS.

No milk animals were found within 3 miles of CNS and there was no evidence of potable water use from the Missouri River within three miles of CNS.

## ANNUAL CNS LAND USE CENSUS

July 19-20, 2021  
0-3 Miles

SECTOR	NEAREST RESIDENT	Direction in Degrees	NEAREST GARDEN	Direction in Degrees	NEAREST MILK ANIMAL
	Distance		Distance		
A/N	NONE	NA	NONE	NA	NONE
B/NNE	NONE	NA	NONE	NA	NONE
C/NE	1.6 Miles	45.0°	NONE	NA	NONE
D/ENE	NONE	NA	NONE	NA	NONE
E/E	2.0 Miles	100.0°	NONE	NA	NONE
F/ESE	NONE	NA	2.3 Miles	107.0°	NONE
G/SE	NONE	NA	NONE	NA	NONE
H/SSE	NONE	NA	NONE	NA	NONE
J/S	NONE	NA	NONE	NA	NONE
K/SSW	NONE	NA	NONE	NA	NONE
L/SW	1.3 Miles	221.0°	2.2 Miles	230.0°	NONE
M/WSW	1.8 Miles	240.0°	1.8 Miles	240.0°	NONE
N/W	NONE	NA	NONE	NA	NONE
P/WNW	2.4 Miles	295.0°	NONE	NA	NONE
Q/NW	0.9 Miles	307.0°	NONE	NA	NONE
R/NNW	1.9 Miles	337.0°	2.8 Miles	330.0°	NONE

Yellow Highlight = Nearest Resident and Nearest Garden, respectively.

**APPENDIX B**  
**SUMMARY OF INTRALABORATORY COMPARISONS**

## INTERLABORATORY COMPARISION PROGRAM

The purpose of the Interlaboratory Comparison Program (ICP) is to confirm the accuracy of results produced by Teledyne Brown Engineering. Samples of various matrices (i.e. soil, water, vegetation, air filters, and milk) are spiked with known amounts of radioactivity by commercial vendors of this service and by departments within the government. TBE participates in three programs. Two are commercial, Analytics Inc. and Environmental Resource Associates (ERA) and one is a government sponsored program, the Department of Energy's (DOE) Mixed Analyte Performance Evaluation Program (MAPEP). The DOE's MAPEP was created to mimic conditions found at DOE sites which do not resemble typical environmental samples obtained at commercial nuclear power facilities. All three programs are blind performance evaluation studies in which samples with known activities are sent to TBE for analysis. Once analyzed, TBE submits the results to the respective agency for evaluation. The results of these evaluations are published in TBE's quarterly and annual QA reports.

The National Institute of Standards and Technology (NIST) is the approval authority for laboratory providers participating in Intercomparison Study Programs; however, at this time, there are no approved laboratories for environmental and/or radiochemical isotope analyses.

For the TBE laboratory, 146 out of 154 analyses performed met the specified acceptance criteria. Seven analyses did not meet the specified acceptance criteria and were addressed through the TBE Corrective Action Program. A summary of the NCR dispositions is provided. *NOTE: One analysis (soil for Tc-99) that did not meet acceptance criteria was performed for TBE information and is not on the list of required ICP analyses.*

**A.1 Analytics Environmental Radioactivity Cross Check Program  
Teledyne Brown Engineering Environmental Services**

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value <sup>(a)</sup>	Ratio of TBE to Analytics Result	Evaluation <sup>(b)</sup>			
March 2021	E13466	Milk	Sr-89	pCi/L	84.6	87.1	0.97	A			
			Sr-90	pCi/L	11.5	12.6	0.91	A			
March 2021	E13467	Milk	Ce-141	pCi/L	111	125	0.89	A			
			Co-58	pCi/L	123	128	0.96	A			
			Co-60	pCi/L	140	154	0.91	A			
			Cr-51	pCi/L	252	242	1.04	A			
			Cs-134	pCi/L	130	151	0.86	A			
			Cs-137	pCi/L	110	110	1.00	A			
			Fe-59	pCi/L	105	109	0.96	A			
			I-131	pCi/L	77.6	86.9	0.89	A			
			Mn-54	pCi/L	111	112	0.99	A			
			Zn-65	pCi/L	200	211	0.95	A			
			E13468	Charcoal	I-131	pCi	83.5	88.5	0.94	A	
			March 2021	E13469	AP	Ce-141	pCi	103.0	103	1.00	A
						Co-58	pCi	93.3	105	0.89	A
Co-60	pCi	136				126	1.08	A			
Cr-51	pCi	213				198	1.07	A			
Cs-134	pCi	123.0				124	0.99	A			
Cs-137	pCi	86.3				90.1	0.96	A			
Fe-59	pCi	81.3				89.6	0.91	A			
Mn-54	pCi	93.5				92.0	1.02	A			
March 2021	E13470	Soil	Ce-141	pCi/g	0.232	0.262	0.89	A			
			Co-58	pCi/g	0.251	0.268	0.94	A			
			Co-60	pCi/g	0.306	0.322	0.95	A			
			Cr-51	pCi/g	0.517	0.506	1.02	A			
			Cs-134	pCi/g	0.263	0.317	0.83	A			
			Cs-137	pCi/g	0.278	0.301	0.92	A			
			Fe-59	pCi/g	0.228	0.229	1.00	A			
			Mn-54	pCi/g	0.221	0.235	0.94	A			
March 2021	E13471	AP	Sr-89	pCi	92.2	95.5	0.97	A			
			Sr-90	pCi	11.7	13.9	0.84	A			

(a) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) Analytics evaluation based on TBE internal QC limits:

A = Acceptable - reported result falls within ratio limits of 0.80-1.20

W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30

N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

**A.1 Analytics Environmental Radioactivity Cross Check Program  
Teledyne Brown Engineering Environmental Services**

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value <sup>(a)</sup>	Ratio of TBE to Analytics Result	Evaluation <sup>(b)</sup>			
September 2021	E13472	Milk	Sr-89	pCi/L	66.4	85.4	0.78	W			
			Sr-90	pCi/L	11.9	14.0	0.85	A			
September 2021	E13473	Milk	Ce-141	pCi/L	118	114	1.03	A			
			Co-58	pCi/L	116	118	0.98	A			
			Co-60	pCi/L	142	145	0.98	A			
			Cr-51	pCi/L	244	236	1.03	A			
			Cs-134	pCi/L	81	93.1	0.87	A			
			Cs-137	pCi/L	105	112	0.94	A			
			Fe-59	pCi/L	105	102	1.03	A			
			I-131	pCi/L	65.1	85.6	0.76	W			
			Mn-54	pCi/L	128	128	1.00	A			
			Zn-65	pCi/L	158	153	1.03	A			
			September 2021	E13474	Charcoal	I-131	pCi	85.2	90.9	0.94	A
			September 2021	E13475	AP	Ce-141	pCi	126	135	0.94	A
Co-58	pCi	148				139	1.07	A			
Co-60	pCi	183				171	1.07	A			
Cr-51	pCi	322				278	1.16	A			
Cs-134	pCi	118				110	1.08	A			
Cs-137	pCi	147				132	1.12	A			
Fe-59	pCi	131				120	1.09	A			
Mn-54	pCi	161				151	1.06	A			
September 2021	E13476	Soil	Ce-141	pCi/g	0.215	0.219	0.98	A			
Co-58			pCi/g	0.208	0.226	0.92	A				
Co-60			pCi/g	0.277	0.277	1.00	A				
Cr-51			pCi/g	0.388	0.452	0.86	A				
Cs-134			pCi/g	0.157	0.178	0.88	A				
Cs-137			pCi/g	0.270	0.284	0.95	A				
Fe-59			pCi/g	0.218	0.195	1.12	A				
Mn-54			pCi/g	0.239	0.246	0.97	A				
September 2021	E13477	AP	Sr-89	pCi	85.6	68.3	1.25	W			
Sr-90			pCi	12.6	11.2	1.13	A				

(a) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) Analytics evaluation based on TBE internal QC limits:

A = Acceptable - reported result falls within ratio limits of 0.80-1.20

W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30

N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30



**A-2 DOE's Mixed Analyte Performance Evaluation Program (MAPEP)  
Teledyne Brown Engineering Environmental Services**

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value <sup>(a)</sup>	Acceptance Range	Evaluation <sup>(b)</sup>	
February 2021	21-GrF44	AP	Gross Alpha	Bq/sample	0.371	1.77	0.53 - 3.01	N <sup>(3)</sup>	
			Gross Beta	Bq/sample	0.731	0.65	0.325 - 0.974	A	
	21-MaS44	Soil	Ni-63	Bq/kg	310	689.0	482 - 896	N <sup>(4)</sup>	
			Tc-99	Bq/kg	457	638	447 - 829	W	
	21-MaSU44	Urine	Cs-134	Bq/L	2.34	2.73	1.91 - 3.55	A	
			Cs-137	Bq/L	2.54	2.71	1.90 - 3.52	A	
			Co-57	Bq/L	0.4100		(1)	A	
			Co-60	Bq/L	2.24	2.44	1.71 - 3.17	A	
			Mn-54	Bq/L	2.03	2.03	1.42 - 2.64	A	
			K-40	Bq/L	52.8	54.0	38 - 70	A	
			U-234	Bq/L	0.108	0.0877	0.0614 - 0.114	W	
			U-238	Bq/L	0.101	0.091	0.064 - 0.118	A	
			Zn-65	Bq/L	1.06	1.34	(2)	A	
	21-MaW44	Water	Ni-63	Bq/L	6.7	8.2	5.7 - 10.7	A	
			Tc-99	Bq/L	3.850	4.01	2.81 - 5.21	A	
	21-RdV44	Vegetation	Cs-134	Bq/sample	3.13	3.60	2.5 - 4.7	A	
			Cs-137	Bq/sample	4.64	4.69	3.28 - 6.10	A	
			Co-57	Bq/sample	5.25	5.05	3.54 - 6.57	A	
			Co-60	Bq/sample	2.86	2.99	2.09 - 3.89	A	
			Mn-54	Bq/sample	5.02	5.25	3.68 - 6.83	A	
			Sr-90	Bq/sample	0.631	0.673	0.471 - 0.875	A	
			Zn-65	Bq/sample	-0.233		(1)	A	
	August 2021	21-GrF45	AP	Gross Alpha	Bq/sample	0.368	0.960	0.288 - 1.632	A
				Gross Beta	Bq/sample	0.595	0.553	0.277 - 0.830	A
		21-MaS45	Soil	Ni-63	Bq/kg	546	1280	896 - 1664	N <sup>(5)</sup>
				Tc-99	Bq/kg	453	777	544 - 1010	N <sup>(6)</sup>
		21-MaSU45	Urine	Cs-134	Bq/L	3.10	3.62	2.53 - 4.71	A
Cs-137				Bq/L	0.083		(1)	A	
Co-57				Bq/L	0.844	0.87	0.606 - 1.125	A	
Co-60				Bq/L	0.0535		(1)	A	
Mn-54				Bq/L	0.459	0.417	(2)	A	
K-40				Bq/L	48.8	54.0	38 - 70	A	
U-234				Bq/L	0.133	0.116	0.081 - 0.151	A	
U-238				Bq/L	0.137	0.121	0.085 - 0.157	A	
Zn-65				Bq/L	0.339	0.420	(2)	A	
21-MaW45		Water	Ni-63	Bq/L	33.5	39.5	27.7 - 51.4	A	
			Tc-99	Bq/L	3.5	3.7	2.60 - 4.82	A	
21-RdV45		Vegetation	Cs-134	Bq/sample	3.42	4.34	3.04 - 5.64	W	
			Cs-137	Bq/sample	2.14	2.21	1.55 - 2.87	A	
			Co-57	Bq/sample	4.08	4.66	3.26 - 6.06	A	
			Co-60	Bq/sample	2.81	3.51	2.46 - 4.56	A	
			Mn-54	Bq/sample	0.035		(1)	A	
			Sr-90	Bq/sample	1.15	1.320	0.92 - 1.72	A	
			Zn-65	Bq/sample	2.05	2.43	1.70 - 3.16	A	

(a) The MAPEP known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) DOE/MAPEP evaluation:

A = Acceptable - reported result falls within ratio limits of 0.80-1.20

W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30

N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

(1) False positive test

(2) Sensitivity evaluation

(3) See **NCR 21-02**

(4) See **NCR 21-03**

(5) See **NCR 21-13**

(6) Tc-99 cross-checks done for TBE information only - not required

**A.3 ERA Environmental Radioactivity Cross Check Program  
Teledyne Brown Engineering Environmental Services**

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value <sup>(a)</sup>	Acceptance Limits	Evaluation <sup>(b)</sup>	
March 2021	MRAD-34	Water	Am-241	pCi/L	175	157	108 - 201	A	
			Fe-55	pCi/L	579	275	162 - 400	N <sup>(1)</sup>	
			Pu-238	pCi/L	181	171	103 - 222	A	
			Pu-239	pCi/L	153	142	87.9 - 175	A	
		Soil	Sr-90	pCi/kg	6570	9190	2860 - 14,300	A	
			AP	Fe-55	pCi/filter	107	121	44.2 - 193	A
				U-234	pCi/filter	25.99	25.5	18.9 - 29.9	A
				U-238	pCi/filter	24.7	25.3	19.1 - 30.2	A
April 2021	RAD-125	Water	Ba-133	pCi/L	92.3	90.5	76.2 - 99.6	A	
			Cs-134	pCi/L	62.9	70.5	57.5 - 77.6	A	
			Cs-137	pCi/L	161	168	151 - 187	A	
			Co-60	pCi/L	22.5	20.9	17.7 - 25.8	A	
			Zn-65	pCi/L	183	177.0	159 - 208	A	
			GR-A	pCi/L	30.8	30.2	15.4 - 39.4	A	
			GR-B	pCi/L	60.1	67.5	46.8 - 74.2	A	
			U-Nat	pCi/L	36.45	36.9	30.0 - 40.8	A	
			H-3	pCi/L	13,400	14,600	12,800 - 16,100	A	
			Sr-89	pCi/L	64.5	63.5	51.4 - 71.5	A	
			Sr-90	pCi/L	22.8	23.0	16.5 - 27.0	A	
			I-131	pCi/L	28.2	26.7	22.2 - 31.4	A	
			September 2021	MRAD-35	Water	Am-241	pCi/L	68	63.7
Fe-55	pCi/L	179				246	145 - 358	A	
Pu-238	pCi/L	102				114	68.5 - 148	A	
Pu-239	pCi/L	32				34.3	21.2 - 42.3	A	
Soil	Sr-90	pCi/kg			6160	6090	1,900 - 9,490	A	
	AP	Fe-55			pCi/filter	493	548	200 - 874	A
		Pu-238			pCi/filter	28	28.5	21.5 - 35.0	A
Pu-239		pCi/filter			21	21.6	16.1 - 26.1	A	
U-234	pCi/filter	7.95			7.76	5.75 - 9.09	A		
	U-238	pCi/filter			8.0	7.69	5.81 - 9.17	A	
	October 2021	RAD-127	Water	Ba-133	pCi/L	82.8	87.5	73.6 - 96.2	A
Cs-134				pCi/L	64.0	70.1	57.1 - 77.1	A	
Cs-137				pCi/L	145	156	140 - 174	A	
Co-60				pCi/L	83.2	85.9	77.3 - 96.8	A	
Zn-65				pCi/L	133	145	130 - 171	A	
GR-A				pCi/L	76.0	66.7	35.0 - 82.5	A	
GR-B	pCi/L	63.0	55.7	38.1 - 62.6	N <sup>(2)</sup>				
U-Nat	pCi/L	52.88	55.5	45.3 - 61.1	A				
H-3	pCi/L	13,800	17,200	15,000 - 18,900	N <sup>(3)</sup>				
Sr-89	pCi/L	54.9	61.0	49.1 - 68.9	A				
Sr-90	pCi/L	24.8	29.3	21.3 - 34.0	A				
I-131	pCi/L	27.4	26.4	21.9 - 31.1	A				
December 2021	QR 120121Y	Water	GR-B	pCi/L	47.6	39.8	26.4 - 47.3	N <sup>(4)</sup>	
			H-3	pCi/L	17,500	17,800	15,600 - 19,600	A	

(a) The ERA known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(b) ERA evaluation:

A = Acceptable - Reported value falls within the Acceptance Limits

N = Not Acceptable - Reported value falls outside of the Acceptance Limits

(1) See **NCR 21-01**

(2) See **NCR 21-10**

(3) See **NCR 21-11**

(4) See **NCR 21-14**

- The ERA MRAD March 2021 Water Fe-55 result was evaluated as *Not Acceptable*. The reported value for Fe-55 was 579 pCi/L and the known result was 275 pCi/L (acceptance range 162 - 400). When reviewing the original sample data, it was found that the carrier yield was 52.6% (lower than typical water samples). Looking at the etched plate that was counted, it appeared that some loss of sample could have occurred. The sample was logged for reanalysis and used as the workgroup duplicate. The results were acceptable at 197 and 221 respectively. Yields were 97.4% and 105.7% and the plated samples were centered with no apparent loss of sample. The loss of sample during plating resulted in a low yield which produced an artificially high sample result. (NCR 21-01)
- The MAPEP February 2021 AP Gross Alpha result was evaluated as *Not Acceptable*. The reported value was 0.371 Bq/sample and the known result was 1.77 Bq/sample (acceptance range 0.53 - 3.01). A similar failure had occurred several years prior due to the filter being placed with the wrong side up on the detector. At that time, a small dot was placed on the top of the filter prior to removal from the package to indicate the correct side for counting. The current sample was still in the detector when the result was received (dot side facing the detector). The sample was recounted with a similar result and was flipped and recounted. The flipped result was 0.661 Bq/sample, within the acceptable range. Because TBE cannot rely on receiving correct packaging from the provider, MAPEP AP cross-checks will be counted on both sides going forward. *NOTE: The August sample had the same packaging issue (upside down)*. (NCR 21-02)
- The MAPEP February 2021 soil Ni-63 was evaluated as *Not Acceptable*. The reported value was 310 Bq/kg and the known result was 689 (acceptance range 482 - 896). All workgroup QC was reviewed with no anomalies. The analytical procedure had been revised prior to this analysis to eliminate added interferences. The sample yield was >100%, indicative of incomplete separation from interferences, leading to a lower result. The procedure was again revised after acceptable results were obtained. (NCR 21-03)
- The ERA October 2021 water Gross Beta result was evaluated as *Not Acceptable*. The reported value was 63.0 pCi/L and the known was 55.7 (acceptance range 38.1 - 62.6) or 113% of the known. The 2-sigma error was 6.8, placing the reported result well within the acceptable range. All QA was reviewed with no anomalies. A follow-up Quick Response cross-check was analyzed with a 120% ratio (see item 7). (NCR 21-10)
- The ERA October 2021 water Tritium result was evaluated as *Not Acceptable*. The reported value was 13,800 pCi/L and the known was 17,200 (acceptance range 15,000 - 18,900). The 2-sigma error was 1,430, placing the result within the acceptable range. TBE's internal QC acceptance is 70% - 130%, while ERA's for this sample was 87% - 110%. All QA was reviewed with no anomalies. A Quick

Response follow-up cross-check was analyzed with a result of 17,500 pCi/L (known 17,800 pCi/L). (NCR 21-11)

- The MAPEP August 2021 soil Ni-63 result was evaluated as *Not Acceptable*. The reported value was 546 Bq/kg and the known result was 1,280 Bq/kg (acceptance range 896 - 1,664). All QC was reviewed and no anomalies found. The procedure revision to remove added MAPAP interferences was ineffective for this sample. No client soil matrix samples were analyzed for Ni-63 in 2020 or 2021. The root cause investigation is still ongoing at this time. (NCR 21-13)
- The ERA December 2021 Quick Response water Gross Beta result was evaluated as *Not Acceptable*. The reported value was 47.6 pCi/L and the known was 39.8 pCi/L or 120% of the known (acceptance range of 26.4 - 47.3). The 2-sigma error was 6.1, placing the reported result well within the acceptable range. All QA was reviewed with no anomalies. The original sample was recounted on a different detector with a result of  $40.3 \pm 6.27$  pCi/L. The “failure” of this sample and the RAD-127 was due to the narrow upper acceptance ranges assigned (119% and 112%) (NCR 21-14)

**APPENDIX C**  
**SYNOPSIS OF ANALYTICAL PROCEDURES**

## SYNOPSIS OF ANALYTICAL PROCEDURES

Appendix C is a synopsis of the analytical procedures performed during this reporting period on samples collected for the Nebraska Public Power Nuclear Plant's Radiological Environmental Monitoring Program. All analyses have been mutually agreed upon by Nebraska Public Power District and Teledyne Brown Engineering and include those recommended by the USNRC Branch Technical Position, Rev. 1, November 1979.

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Air Particulates.....	C-3
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## GROSS BETA ANALYSIS OF AIR PARTICULATE SAMPLES

### **Air Particulates**

After a delay of five or more days, allowing for the radon-222 and radon-220 (thoron) daughter products to decay, the filters are counted in a gas-flow proportional counter.

Calculations of the results, the two sigma error and the lower limit of detection (LLD):

$$\text{RESULT (pCi/m}^3\text{)} = ((S/T) - (B/t))/(2.22 V E)$$

$$\text{TWO SIGMA ERROR (pCi/m}^3\text{)} = 2((S/T)^2 + (B/t^2))^{1/2}/(2.22 V E)$$

$$\text{LLD (pCi/m}^3\text{)} = 4.66(B^{1/2})/(2.22 V E t)$$

where:

S	=	Gross counts of sample including blank
B	=	Counts of blank
E	=	Counting efficiency
T	=	Number of minutes sample was counted
t	=	Number of minutes blank was counted
V	=	Sample aliquot size (cubic meters)

## **DETERMINATION OF GROSS BETA ACTIVITY IN WATER SAMPLES**

### **Introduction**

The procedures described in this section are used to measure the overall radioactivity of water samples without identifying the radioactive species present. No chemical separation techniques are involved.

One liter of the sample is evaporated on a hot plate. A smaller volume may be used if the sample has a significant salt content as measured gravimetrically. If requested by the customer, the sample is filtered through No. 54 filter paper before evaporation, removing particles greater than 30 microns in size.

After evaporating to a small volume in a beaker, the sample is rinsed into a 2-inch diameter stainless steel planchette, which is stamped with a concentric ring pattern to distribute residue evenly. Final evaporation to dryness takes place under heat lamps.

Residue mass is determined by weighing the planchette before and after mounting the sample. The planchette is counted for beta activity on an automatic proportional counter. Results are calculated using empirical self-absorption curves which allow for the change in effective counting efficiency caused by the residue mass.

### **Detection Capability**

Detection capability depends upon the sample volume actually represented on the planchette, the background and the efficiency of the counting instrument, and upon self-absorption of beta particles by the mounted sample. Because the radioactive species are not identified, no decay corrections are made and the reported activity refers to the counting time.

The minimum detectable level (MDL) for water samples is nominally 1.6 picoCuries per liter for gross beta at the 4.66 sigma level (1.0 pCi/L at the 2.83 sigma level), assuming that 1 liter of sample is used and that 0.5 gram of sample residue is mounted on the planchette. These figures are based upon a counting time of 50 minutes and upon representative values of counting efficiency and background of 0.2 and 1.2 cpm, respectively

The MDL becomes significantly lower as the mount weight decreases because of reduced self-absorption. At a zero mount weight, the 4.66 sigma MDL for gross beta is 0.9 pCi/L. These values reflect a beta counting efficiency of 0.38.



**ANALYSIS OF SAMPLES FOR TRITIUM**  
(Liquid Scintillation)

**Water**

Ten milliliters of water are mixed with 10 ml of a liquid scintillation "cocktail" and then the mixture is counted in an automatic liquid scintillator.

Calculation of the results, the two sigma error and the lower limit detection (LLD) in pCi/L:

$$\text{RESULT} = (N-B)/(2.22 V E)$$

$$\text{TWO SIGMA ERROR} = 2((N + B)/\Delta t)^{1/2} / (2.22 V E)$$

$$\text{LLD} = 4.66(B/\Delta t)^{1/2} / (2.22 V E)$$

where:

N	=	the gross cpm of the sample
B	=	the background of the detector in cpm
2.22	=	conversion factor changing dpm to pCi
V	=	volume of the sample in ml
E	=	efficiency of the detector
$\Delta t$	=	counting time for the sample

## ANALYSIS OF SAMPLES FOR IODINE-131

### **Milk or Water**

Two or more liters of sample are first equilibrated with stable iodide carrier. A batch treatment with anion exchange resin is used to remove iodine from the sample. The iodine is then stripped from the resin with sodium hypochlorite solution, is reduced with hydroxylamine hydrochloride and is extracted into carbon tetrachloride as free iodine. It is then back-extracted as iodide into sodium bisulfite solution and is precipitated as palladium iodide. The precipitate is weighed for chemical yield and is mounted on a nylon planchette for low-level beta counting.

Calculations of results, two sigma error and the lower limit of detection (LLD) in pCi/L:

$$\text{RESULT} = (N/\Delta t - B)/(2.22 E V Y DF)$$

$$\text{TWO SIGMA ERROR} = 2((N/\Delta t + B)/\Delta t)^{1/2} / (2.22 E V Y DF)$$

$$\text{LLD} = 4.66(B/\Delta t)^{1/2} / (2.22 E V Y DF)$$

where:	N	=	total counts from sample (counts)
	$\Delta t$	=	counting time for sample (min)
	B	=	background rate of counter (cpm)
	2.22	=	dpm/pCi
	V	=	volume or weight of sample analyzed
	Y	=	chemical yield of the mount or sample counted
	DF	=	decay factor from the collection to the counting date
	E	=	efficiency of the counter for I-131, corrected for self absorption effects by the formula
	E	=	$E_s(\exp(-0.0061M))/(\exp(-0.0061M_s))$
	$E_s$	=	efficiency of the counter determined from an I-131 standard mount
	$M_s$	=	mass of PdI <sub>2</sub> on the standard mount, mg
	M	=	mass of PdI <sub>2</sub> on the sample mount, mg

## **GAMMA SPECTROMETRY OF SAMPLES**

### **Milk or Water**

A 1.0 or 4.0 liter Marinelli beaker is filled with a representative aliquot of the sample. The sample is then counted until detection limits are met with a shielded high purity germanium (HPGe) detector coupled to a VAX-based data acquisition system, which performs pulse height analysis.

### **Dried Solids other than Soils and Sediments**

A large quantity of the sample is dried at a low temperature, less than 100°C. As much as possible (up to the total sample) is loaded into a tare, standard 240 cc container and weighed. The sample is then counted until detection limits are met with a shielded HPGe detector coupled to a VAX-based data acquisition system, which performs pulse height analysis.

### **Fish**

As much as possible (up to the total sample) of the edible portion of the sample is loaded into a tared Marinelli and weighed. The sample is then counted until detection limits are met with a shielded HPGe detector coupled to a VAX-based data acquisition system, which performs pulse height analysis.

### **Soils and Sediments**

Soils and sediments are dried at a low temperature, less than 100°C. The soil or sediment is loaded fully into a tared, standard 240 cc container and weighed. The sample is then counted until detection limits are met with a shielded HPGe detector coupled to a VAX-based data acquisition system, which performs pulse height and analysis.

### **Charcoal Cartridges (Air Iodine)**

Charcoal cartridges are counted up to five at a time, with one positioned on the face of an HPGe detector and up to four on the side of the HPGe detector. Each HPGe detector is calibrated for both positions. The detection limit for iodine-131 of each charcoal cartridge can be determined (assuming no positive iodine-131) uniquely from the volume of air, which passed through it. In the event iodine-131 is observed in the initial counting of a set, each charcoal cartridge is then counted separately, positioned on the face of the detector.

## Air Particulates

The thirteen airborne particulate filters for a quarterly composite for each field station are aligned one in front of another and then counted until detection limits are met with a shielded HPGe detector coupled to a VAX-based data acquisition system which performs pulse height analysis.

A VAX software program defines peaks by certain changes in the slope of the spectrum. The program also compares the energy of each peak with a library of peaks for isotope identification and then performs the radioactivity calculation using the appropriate fractional gamma ray abundance, half-life, detector efficiency, and net counts in the peak region.

The calculation of results, two sigma error and the lower limit of detection (LLD) in pCi/volume or pCi/mass:

$$\text{RESULT} = (S-B)/(2.22 t E V F DF)$$

$$\text{TWO SIGMA ERROR} = 2(S+B)^{1/2}/(2.22 t E V F DF)$$

$$\text{LLD} = 4.66(B)^{1/2}/(2.22 t E V F DF)$$

where:	S	=	Area, in counts, of sample peak and background (region of spectrum of interest)
	B	=	Background area, in counts, under sample peak, determined by a linear interpolation of the representative backgrounds on either side of the peak
	t	=	length of time in minutes the sample was counted
	2.22	=	dpm/pCi
	E	=	detector efficiency for energy of interest and geometry of sample
	V	=	sample aliquot size (liters, cubic meters, kilograms, or grams)
	F	=	fractional gamma abundance (specific for each emitted gamma)
	DF	=	decay factor from the mid-collection date to the counting date

## **ADDENDUM TO GAMMA SPECTROMETRY PROCEDURE**

Ba-140 (half-life  $\approx 12.8$ d) decays to La-140 (half-life  $\approx 40$  hrs) and the daughter radionuclide, La-140 approaches  $\sim 90\%$  of the Ba-140 activity within  $\sim 6$  days. The La-140 photon energy at 1596 keV is used to quantify the Ba-140 activity due to its high photon emission probability yield (96%) producing a higher count rate when present and therefore, a smaller associated counting error.

Zr-95 (half-life  $\approx 65$ d) decays to Nb-95 (half-life  $\approx 35$ d). The photon energy of Nb-95 ( $\approx 765$  keV) is used to quantify Zr-95 because of the high photon emission probability yield ( $\sim 100\%$ ) yielding a higher count rate and an associated lower counting error. The daughter radionuclide, Nb-95 approaches the Zr-95 activity after a time period of  $\sim 65$  days, an estimated time interval occurring between sample exposure, collection and shipping, and analysis.

## ENVIRONMENTAL DOSIMETRY

Environmental Dosimetry services are provided by Mirion Technologies. Mirion Technologies uses a thermoluminescent dosimeter (TLD) manufactured by Panasonic, Inc. Panasonic identifies it as an UD-814A1 TLD. The TLD has four elements, numbered 1-4. Elements and their filtration are composed of:

ELEMENT	MATERIAL	FILTRATION
1	${}^n\text{Li}_2{}^n\text{B}_4\text{O}_7\text{-Cu}$	Thin plastic
2	$\text{CaSO}_4\text{-Tm}$	Lead
3	$\text{CaSO}_4\text{-Tm}$	Lead
4	$\text{CaSO}_4\text{-Tm}$	Lead

This material has a high light output, negligible thermally induced signal loss (fading) and negligible self-dosing. The energy response curve (as well as other features) satisfies NRC Regulatory Guide 4.13. Transit doses are accounted for by use of separate TLDs.

Prior to being sent to Cooper Nuclear Station, the Mirion badges are exposed to Cs-137, to a known dose and read in the Panasonic UD-710 reader, with reference badges to establish an element response level for each badge. Badges are then re-annealed for assignment and distribution to Cooper Nuclear Station.

Following the field exposure the badges are returned to Mirion Technologies for processing in a Panasonic UD-710 reader. Each element is heated and the measured light emission is recorded. The transit controls are read in the same manner. Total exposure for each badge is the average of Elements 2, 3, and 4.

Transit Controls are calculated using the following equation:

$$\text{TRANSDOSE} = \frac{(E_{3_1} + E_{4_1} + E_{3_2} + E_{4_2})}{4} - \frac{(E_{3_{\text{trans}}} + E_{4_{\text{trans}}})}{2}$$

### **LOWER LIMIT of DETECTION FORMULAS**

The LLD formulas in Appendix C are consistent with the LLD discussion in the ODAM. The term  $s_b$  in the ODAM equals  $\sqrt{B/t}$  by Poisson statistics, where B = blank counts and t = blank counting intervals. The decay factor term  $e^{-\lambda\Delta t}$  in the ODAM is the same as the DF terms in Appendix C, but does not appear in certain analyses such as gross beta because decay does not apply. In the tritium analysis, decay is not considered because of the relatively long half-life.

Efficiencies and volumes are consistent between the two documents. Chemical yields appear in Appendix C where applicable but do not apply to other analyses such as tritium and gross beta.

**APPENDIX D**  
**DETECTION LIMITS AND REPORTING LEVELS**



NEBRASKA PUBLIC POWER - COOPER NUCLEAR STATION  
DETECTION LIMITS AND REPORTING LEVELS

Isotope	ODAM LLD	NRC Rept. Level
<b><u>Water - pCi/liter</u></b>		
Gross beta	4	N/A
H-3	2000	20000 <sup>(a)</sup> /30000 <sup>(b)</sup>
Mn-54	15	1000
Fe-59	30	400
Co-58	15	1000
Co-60	15	300
Zn-65	30	300
Zr-95	30	400 - [Nb-95]
Nb-95	15	400 - [Zr-95]
I-131	1 <sup>(c)</sup>	2
Cs-134	15	30
Cs-137	18	50
Ba-140	60	200 - [La-140]
La-140	15	200 - [Ba-140]
<b><u>Air Filter - pCi/m<sup>3</sup></u></b>		
Gross Beta	0.01	N/A
I-131	0.07	0.9
Cs-134	0.05	10
Cs-137	0.06	20
<b><u>Fish - pCi/kg-wet</u></b>		
Mn-54	130	30000
Fe-59	260	10000
Co-58	130	30000
Co-60	130	10000
Zn-65	260	20000
Cs-134	130	1000
Cs-137	150	2000
<b><u>Milk - pCi/liter</u></b>		
I-131	1	3
Cs-134	15	60
Cs-137	18	70
Ba-140	60	300 - [La-140]
La-140	15	300 - [Ba-140]

(a) For drinking water samples

(b) For samples of water not used as a source of drinking water

(c) LLD for drinking water

NEBRASKA PUBLIC POWER - COOPER NUCLEAR STATION  
DETECTION LIMITS AND REPORTING LEVELS

<u>Isotope</u>	<u>ODAM LLD</u>	<u>NRC Rept. Level</u>
<b><u>Vegetation - pCi/kg-wet</u></b>		
I-131	60	100
Cs-134	60	1000
Cs-137	80	2000
<b><u>Sediment - pCi/kg-dry</u></b>		
Cs-134	150	N/A
Cs-137	180	N/A

**APPENDIX E**  
**REMP SAMPLING AND ANALYTICAL EXCEPTIONS**

## **EXCEPTIONS**

Appendix E contains the exceptions to the 2021 REMP Program. Where possible, causes of the deviation have been corrected to prevent recurrence.

Any deviations from the sampling schedule are documented on the data tables. Data Tables are in Section VII.

**2021 Exceptions Table**

Condition Report Number (CR-CNS-)	Requirement	Analyses Impacted	Cause of Exception	Location Where Replacement Samples were Obtained
CR-CNS-2021-01059	At least once per 15 days during Peak Pasture Period; at least once per 31 days at other times (+25% grace).	Gamma Isotopic and I-131 analysis of each sample	The Dairy Farm at Station 99 (nearest producer) ceased operations in March 2021. Milk samples were no longer available from this location after March 2021.	Due to zero milk producers currently in production in the area, it is not possible to obtain replacement milk samples to meet this requirement. Broadleaf samples were collected from Stations 35, 96, and 101 in lieu of milk samples.

**APPENDIX F**

**SUMMARY OF DOSES TO A MEMBER OF THE PUBLIC OFFSITE**

## **LIQUID EFFLUENT DOSE CALCULATIONS**

Doses to the maximum individual and 0 to 50 - mile population resulting from the release of radioactive material in liquid effluents from Cooper Nuclear Station were calculated using the latest version of the LADTAP II computer program included as part of NRC Dose 2.3.20 (ORNL 2015). The LADTAP II program implements the radiological dose models of Regulatory Guide 1.109 for determining the radiation exposure to man from three principal exposure pathways in the aquatic environment -- potable water, aquatic foods, and recreational water use. Doses to both the maximum individual and 0 to 50 mile population are calculated as a function of age group and pathway for significant body organs, and are presented in Tables 1 - 6.

Assumptions and data sources used for input to the LADTAP II code are described in a separate section of this appendix (see page F-67).

### **No Liquid Releases in 2021**

TABLE 1. Doses to Maximum Individual at the Site Boundary, Resulting From Exposure to Radioactivity Discharged in Liquid Effluents, January-June 2021 Cooper Nuclear Station

Period and Pathway	Dose to Individual, mrem							
	Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
<u>1st Quarter</u>								
Drinking Water		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Shoreline	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
<b>Totals</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>
<u>2nd Quarter</u>								
Eating Fish		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Drinking Water		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Shoreline	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
<b>Totals</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>
<b>Totals for 1st &amp; 2nd Quarters</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>

Calculated doses are based on the following periods of exposures: Fishing: April - November; Drinking water and shoreline: January - December



**TABLE 2. Doses to Maximum Individual at the Site Boundary, Resulting From Exposure to Radioactivity Discharged in Liquid Effluents, July-December 2021, Cooper Nuclear Station**

Period and Pathway	Dose to Individual, mrem							
	Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
<u>3rd Quarter</u>								
Eating Fish		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Drinking Water		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Shoreline	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
<b>Totals</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>
<u>4th Quarter</u>								
Eating Fish		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Drinking Water		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Shoreline	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
<b>Totals</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>
<b>Totals for 3rd &amp; 4th Quarters</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>

Calculated doses are based on the following periods of exposures: Fishing: April - November; Drinking water and shoreline: January - December

TABLE 3. Summary of Doses to Maximum Individual at the Site Boundary, Resulting from Exposure to Radioactivity Discharged in Liquid Effluents, January-December 2021, Cooper Nuclear Station

Period and Pathway	Dose to Individual, mrem							
	Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
1st Quarter	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
2nd Quarter	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+001	0.00 E+00	0.00 E+00
3rd Quarter	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
4th Quarter	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Totals for 2021	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00

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TABLE 4. Doses to Population Within a 50-Mile Radius, Resulting From Exposure to Radioactivity Discharged in Liquid Effluents, January-June 2021, Cooper Nuclear Station

Period and Pathway	Dose to Population, manrem							
	Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
<u>1st Quarter</u>								
Drinking Water		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Shoreline	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
<b>Totals</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>
<u>2nd Quarter</u>								
Eating Fish		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Drinking Water		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Shoreline	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Swimming	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Boating	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
<b>Totals</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>
<b>Totals for 1st &amp; 2nd Quarters</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>

Calculated doses are based on the following periods of exposures: Fishing and Boating: April - November; Drinking water and shoreline: January - December; Swimming: June - September. Exposure from drinking water is calculated for the city of St. Joseph, Missouri, nearest public water intake from the Missouri River, 84 miles downstream.

TABLE 5. Doses to Population Within a 50-Mile Radius, Resulting From Exposure to Radioactivity Discharged in Liquid Effluents, July-December 2021, Cooper Nuclear Station

Period and Pathway	Dose to Population, manrem							
	Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
<u>3rd Quarter</u>								
Eating Fish		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Drinking Water		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Shoreline	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Swimming	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Boating	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
<b>Totals</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>
<u>4th Quarter</u>								
Eating Fish		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Drinking Water		0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Shoreline	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
Boating	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
<b>Totals</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>
<b>Totals for 3rd &amp; 4th Quarters</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>

Calculated doses are based on the following periods of exposures: Fishing and Boating: April - November; Drinking water and shoreline: January - December; Swimming: June - September. Exposure from drinking water is calculated for the city of St. Joseph, Missouri, nearest public water intake from the Missouri River, 84 miles downstream.

TABLE 6. Summary of Doses to Population Within a 50-Mile Radius, Resulting from Exposure to Radioactivity Discharged in Liquid Effluents, January-December 2021 Cooper Nuclear Station

Period and Pathway	Dose to Population, manrem							
	Skin	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
<u>1st Quarter</u>	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
<u>2nd Quarter</u>	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
<u>3rd Quarter</u>	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
<u>4th Quarter</u>	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00	0.00 E+00
<b>Totals for 2021</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>	<b>0.00 E+00</b>

## **GASEOUS EFFLUENT DOSE CALCULATIONS (EXCEPT CARBON-14)**

Doses to the maximum individual and 0 to 50 mile population resulting from the release of radioactive material in gaseous effluents from the Cooper Nuclear Station were calculated using the latest version of the GASPAR computer code included as part of NRC Dose 2.3.20 (ORNL 2015). Four sites were selected for individual dose calculations: the site boundary, the nearest residence, the nearest garden and the nearest cow. GASPAR implements the radiological dose models of Regulatory Guide 1.109 for determining the radiation exposure to man from four principal atmospheric exposure pathways: plume, ground, inhalation, and ingestion. Doses to the maximum individual and the population are calculated as a function of age group and pathway for significant body organs.

Tables 1 through 7 present maximum individual doses. Population doses are given in Tables 8 through 14.

Assumptions and data used for input to the GASPAR code are described in a separate section of this appendix (see page F-67).

TABLE 1. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-MARCH 2021

SPECIAL LOCATION NO. 1A Site Boundary  
 AT .69 MILES NNW

ANNUAL BETA AIR DOSE = 1.33E-06 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 2.69E-06 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.80E-06	1.82E-06	3.25E-06
GROUND	1.75E-05	1.75E-05	1.75E-05	1.75E-05	1.75E-05	1.75E-05	1.75E-05	2.05E-05
VEGET								
ADULT	3.04E-06	4.86E-06	1.85E-05	3.98E-06	2.80E-06	3.44E-04	3.05E-07	0.00E+00
TEEN	3.44E-06	5.60E-06	3.06E-05	6.23E-06	4.28E-06	4.61E-04	5.72E-07	0.00E+00
CHILD	5.11E-06	4.12E-06	7.44E-05	1.06E-05	6.91E-06	8.82E-04	8.71E-07	0.00E+00
MEAT								
ADULT	2.17E-07	4.83E-07	3.34E-07	2.74E-07	1.23E-07	9.10E-06	2.50E-08	0.00E+00
TEEN	1.19E-07	2.62E-07	2.79E-07	2.21E-07	1.00E-07	6.59E-06	2.36E-08	0.00E+00
CHILD	1.23E-07	1.35E-07	5.21E-07	2.90E-07	1.27E-07	9.95E-06	2.77E-08	0.00E+00
COW MILK								
ADULT	1.73E-06	5.41E-07	2.69E-06	2.74E-06	2.11E-06	2.65E-04	2.11E-07	0.00E+00
TEEN	1.99E-06	7.22E-07	4.91E-06	4.84E-06	3.76E-06	4.20E-04	4.36E-07	0.00E+00
CHILD	2.44E-06	5.74E-07	1.19E-05	8.40E-06	6.25E-06	8.38E-04	6.71E-07	0.00E+00
INFANT	3.80E-06	5.65E-07	2.13E-05	1.77E-05	1.06E-05	2.04E-03	1.21E-06	0.00E+00
GOATMILK								
ADULT	4.28E-06	7.12E-07	6.36E-06	6.65E-06	3.68E-06	3.18E-04	6.34E-07	0.00E+00
TEEN	4.47E-06	9.68E-07	1.16E-05	1.17E-05	6.53E-06	5.04E-04	1.31E-06	0.00E+00
CHILD	4.49E-06	7.85E-07	2.81E-05	2.04E-05	1.09E-05	1.01E-03	2.01E-06	0.00E+00
INFANT	6.08E-06	7.86E-07	4.85E-05	4.13E-05	1.81E-05	2.44E-03	3.64E-06	0.00E+00
INHAL								
ADULT	1.84E-07	3.68E-07	3.79E-07	4.34E-07	6.59E-07	6.96E-05	1.76E-06	0.00E+00
TEEN	2.22E-07	4.00E-07	5.35E-07	5.99E-07	9.13E-07	9.07E-05	2.69E-06	0.00E+00
CHILD	2.36E-07	2.20E-07	7.31E-07	5.89E-07	8.57E-07	1.12E-04	2.25E-06	0.00E+00
INFANT	1.64E-07	9.97E-08	5.37E-07	5.35E-07	5.66E-07	1.03E-04	1.66E-06	0.00E+00

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TABLE 1. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-MARCH 2021 (Continued)

SPECIAL LOCATION NO. 2A Site Boundary  
 AT .60 MILES NNE

ANNUAL BETA AIR DOSE = 4.15E-07 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 8.37E-07 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	5.60E-07	5.60E-07	5.60E-07	5.60E-07	5.60E-07	5.60E-07	5.65E-07	1.01E-06
GROUND	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.89E-05
VEGET								
ADULT	2.79E-06	4.48E-06	1.70E-05	3.64E-06	2.56E-06	3.15E-04	2.79E-07	0.00E+00
TEEN	3.15E-06	5.15E-06	2.81E-05	5.70E-06	3.92E-06	4.21E-04	5.23E-07	0.00E+00
CHILD	4.69E-06	3.80E-06	6.84E-05	9.67E-06	6.32E-06	8.07E-04	7.96E-07	0.00E+00
MEAT								
ADULT	1.99E-07	4.45E-07	3.06E-07	2.51E-07	1.13E-07	8.32E-06	2.28E-08	0.00E+00
TEEN	1.09E-07	2.42E-07	2.56E-07	2.02E-07	9.15E-08	6.03E-06	2.16E-08	0.00E+00
CHILD	1.13E-07	1.24E-07	4.78E-07	2.65E-07	1.16E-07	9.10E-06	2.54E-08	0.00E+00
COW MILK								
ADULT	1.58E-06	4.97E-07	2.47E-06	2.50E-06	1.93E-06	2.42E-04	1.93E-07	0.00E+00
TEEN	1.82E-06	6.63E-07	4.50E-06	4.43E-06	3.44E-06	3.84E-04	3.99E-07	0.00E+00
CHILD	2.23E-06	5.26E-07	1.09E-05	7.69E-06	5.71E-06	7.67E-04	6.13E-07	0.00E+00
INFANT	3.48E-06	5.19E-07	1.96E-05	1.62E-05	9.72E-06	1.86E-03	1.11E-06	0.00E+00
GOATMILK								
ADULT	3.92E-06	6.53E-07	5.82E-06	6.08E-06	3.36E-06	2.90E-04	5.79E-07	0.00E+00
TEEN	4.09E-06	8.88E-07	1.06E-05	1.07E-05	5.97E-06	4.61E-04	1.20E-06	0.00E+00
CHILD	4.11E-06	7.21E-07	2.57E-05	1.86E-05	9.93E-06	9.20E-04	1.84E-06	0.00E+00
INFANT	5.57E-06	7.21E-07	4.45E-05	3.78E-05	1.66E-05	2.24E-03	3.33E-06	0.00E+00
INHAL								
ADULT	1.70E-07	3.40E-07	3.50E-07	4.02E-07	6.10E-07	6.44E-05	1.62E-06	0.00E+00
TEEN	2.05E-07	3.68E-07	4.95E-07	5.54E-07	8.44E-07	8.39E-05	2.48E-06	0.00E+00
CHILD	2.18E-07	1.85E-07	6.75E-07	5.45E-07	7.93E-07	1.04E-04	2.07E-06	0.00E+00
INFANT	1.52E-07	7.54E-08	4.96E-07	4.94E-07	5.23E-07	9.54E-05	1.53E-06	0.00E+00



TABLE 1. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-MARCH 2021 (Continued)

SPECIAL LOCATION NO. 3A Nearest Resident  
 AT .90 MILES NW

ANNUAL BETA AIR DOSE = 1.19E-05 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 2.39E-05 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.60E-05	1.61E-05	2.89E-05
GROUND	7.52E-06	7.52E-06	7.52E-06	7.52E-06	7.52E-06	7.52E-06	7.52E-06	8.83E-06
VEGET								
ADULT	1.39E-06	2.06E-06	7.95E-06	1.84E-06	1.29E-06	1.59E-04	1.42E-07	0.00E+00
TEEN	1.55E-06	2.38E-06	1.31E-05	2.88E-06	1.98E-06	2.13E-04	2.66E-07	0.00E+00
CHILD	2.27E-06	1.75E-06	3.20E-05	4.89E-06	3.20E-06	4.09E-04	4.05E-07	0.00E+00
MEAT								
ADULT	9.85E-08	2.03E-07	1.49E-07	1.26E-07	5.72E-08	4.22E-06	1.16E-08	0.00E+00
TEEN	5.35E-08	1.11E-07	1.25E-07	1.02E-07	4.65E-08	3.06E-06	1.10E-08	0.00E+00
CHILD	5.41E-08	5.68E-08	2.32E-07	1.34E-07	5.90E-08	4.61E-06	1.29E-08	0.00E+00
COW MILK								
ADULT	7.99E-07	2.37E-07	1.22E-06	1.27E-06	9.71E-07	1.22E-04	9.83E-08	0.00E+00
TEEN	9.20E-07	3.16E-07	2.22E-06	2.24E-06	1.73E-06	1.94E-04	2.03E-07	0.00E+00
CHILD	1.12E-06	2.51E-07	5.40E-06	3.89E-06	2.87E-06	3.86E-04	3.12E-07	0.00E+00
INFANT	1.74E-06	2.47E-07	9.63E-06	8.20E-06	4.89E-06	9.38E-04	5.65E-07	0.00E+00
GOATMILK								
ADULT	1.99E-06	3.14E-07	2.89E-06	3.08E-06	1.70E-06	1.46E-04	2.95E-07	0.00E+00
TEEN	2.07E-06	4.27E-07	5.26E-06	5.45E-06	3.01E-06	2.32E-04	6.09E-07	0.00E+00
CHILD	2.07E-06	3.45E-07	1.28E-05	9.45E-06	5.01E-06	4.63E-04	9.36E-07	0.00E+00
INFANT	2.79E-06	3.45E-07	2.20E-05	1.92E-05	8.37E-06	1.13E-03	1.69E-06	0.00E+00
INHAL								
ADULT	4.61E-08	9.38E-08	9.36E-08	1.07E-07	1.62E-07	1.74E-05	4.45E-07	0.00E+00
TEEN	5.52E-08	1.27E-07	1.32E-07	1.48E-07	2.24E-07	2.26E-05	6.85E-07	0.00E+00
CHILD	5.83E-08	3.20E-07	1.80E-07	1.45E-07	2.10E-07	2.78E-05	5.74E-07	0.00E+00
INFANT	4.06E-08	2.60E-07	1.32E-07	1.32E-07	1.39E-07	2.56E-05	4.33E-07	0.00E+00

TABLE 1. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-MARCH 2021 (Continued)

SPECIAL LOCATION NO. 4A Nearest Cow  
AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 8.15E-06 MILLRADS  
ANNUAL GAMMA AIR DOSE = 1.64E-05 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.10E-05	1.10E-05	1.10E-05	1.10E-05	1.10E-05	1.10E-05	1.11E-05	1.99E-05
GROUND	4.07E-07	4.07E-07	4.07E-07	4.07E-07	4.07E-07	4.07E-07	4.07E-07	4.77E-07
VEGET								
ADULT	8.30E-08	1.09E-07	4.29E-07	1.13E-07	8.01E-08	9.91E-06	8.79E-09	0.00E+00
TEEN	9.17E-08	1.25E-07	7.09E-07	1.77E-07	1.23E-07	1.33E-05	1.65E-08	0.00E+00
CHILD	1.30E-07	9.25E-08	1.73E-06	3.01E-07	1.98E-07	2.55E-05	2.50E-08	0.00E+00
MEAT								
ADULT	5.85E-09	1.05E-08	8.62E-09	7.70E-09	3.55E-09	2.63E-07	7.18E-10	0.00E+00
TEEN	3.11E-09	5.72E-09	7.20E-09	6.21E-09	2.88E-09	1.91E-07	6.79E-10	0.00E+00
CHILD	3.04E-09	2.94E-09	1.34E-08	8.17E-09	3.66E-09	2.88E-07	7.98E-10	0.00E+00
COW MILK								
ADULT	4.93E-08	1.37E-08	7.25E-08	7.83E-08	6.01E-08	7.58E-06	6.07E-09	0.00E+00
TEEN	5.67E-08	1.82E-08	1.32E-07	1.38E-07	1.07E-07	1.20E-05	1.26E-08	0.00E+00
CHILD	6.89E-08	1.45E-08	3.20E-07	2.40E-07	1.78E-07	2.39E-05	1.93E-08	0.00E+00
INFANT	1.07E-07	1.43E-08	5.71E-07	5.07E-07	3.02E-07	5.82E-05	3.49E-08	0.00E+00
GOATMILK								
ADULT	1.23E-07	1.83E-08	1.73E-07	1.91E-07	1.05E-07	9.09E-06	1.82E-08	0.00E+00
TEEN	1.28E-07	2.48E-08	3.14E-07	3.37E-07	1.86E-07	1.44E-05	3.77E-08	0.00E+00
CHILD	1.27E-07	2.00E-08	7.61E-07	5.84E-07	3.10E-07	2.87E-05	5.79E-08	0.00E+00
INFANT	1.71E-07	2.00E-08	1.31E-06	1.19E-06	5.18E-07	6.98E-05	1.05E-07	0.00E+00
INHAL								
ADULT	7.50E-09	1.64E-08	1.46E-08	1.73E-08	2.61E-08	2.84E-06	7.04E-08	0.00E+00
TEEN	8.95E-09	3.57E-08	2.06E-08	2.38E-08	3.61E-08	3.69E-06	1.10E-07	0.00E+00
CHILD	9.39E-09	1.96E-07	2.81E-08	2.34E-08	3.39E-08	4.52E-06	9.34E-08	0.00E+00
INFANT	6.55E-09	1.69E-07	2.07E-08	2.12E-08	2.23E-08	4.16E-06	7.48E-08	0.00E+00

TABLE 1. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-MARCH 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
AT 2.80 MILES NNW

ANNUAL BETA AIR DOSE = 8.89E-06 MILLRADS  
ANNUAL GAMMA AIR DOSE = 1.79E-05 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.20E-05	1.20E-05	1.20E-05	1.20E-05	1.20E-05	1.20E-05	1.21E-05	2.17E-05
GROUND	6.60E-07	6.60E-07	6.60E-07	6.60E-07	6.60E-07	6.60E-07	6.60E-07	7.75E-07
VEGET								
ADULT	1.32E-07	1.78E-07	6.97E-07	1.78E-07	1.26E-07	1.56E-05	1.38E-08	0.00E+00
TEEN	1.46E-07	2.05E-07	1.15E-06	2.79E-07	1.93E-07	2.09E-05	2.59E-08	0.00E+00
CHILD	2.09E-07	1.51E-07	2.80E-06	4.74E-07	3.12E-07	4.00E-05	3.95E-08	0.00E+00
MEAT								
ADULT	9.30E-09	1.73E-08	1.38E-08	1.22E-08	5.58E-09	4.13E-07	1.13E-09	0.00E+00
TEEN	4.97E-09	9.39E-09	1.15E-08	9.81E-09	4.53E-09	2.99E-07	1.07E-09	0.00E+00
CHILD	4.89E-09	4.83E-09	2.15E-08	1.29E-08	5.75E-09	4.52E-07	1.26E-09	0.00E+00
COW MILK								
ADULT	7.77E-08	2.18E-08	1.15E-07	1.23E-07	9.45E-08	1.19E-05	9.57E-09	0.00E+00
TEEN	8.93E-08	2.91E-08	2.10E-07	2.18E-07	1.68E-07	1.89E-05	1.98E-08	0.00E+00
CHILD	1.09E-07	2.31E-08	5.09E-07	3.79E-07	2.80E-07	3.76E-05	3.04E-08	0.00E+00
INFANT	1.69E-07	2.28E-08	9.07E-07	7.98E-07	4.75E-07	9.15E-05	5.50E-08	0.00E+00
GOATMILK								
ADULT	1.94E-07	2.91E-08	2.74E-07	3.00E-07	1.65E-07	1.43E-05	2.87E-08	0.00E+00
TEEN	2.01E-07	3.95E-08	4.98E-07	5.30E-07	2.93E-07	2.27E-05	5.93E-08	0.00E+00
CHILD	2.01E-07	3.19E-08	1.21E-06	9.20E-07	4.88E-07	4.52E-05	9.12E-08	0.00E+00
INFANT	2.70E-07	3.19E-08	2.08E-06	1.87E-06	8.15E-07	1.10E-04	1.65E-07	0.00E+00
INHAL								
ADULT	1.07E-08	2.28E-08	2.10E-08	2.46E-08	3.71E-08	4.03E-06	1.00E-07	0.00E+00
TEEN	1.27E-08	4.42E-08	2.96E-08	3.39E-08	5.14E-08	5.24E-06	1.57E-07	0.00E+00
CHILD	1.34E-08	2.16E-07	4.04E-08	3.34E-08	4.83E-08	6.43E-06	1.32E-07	0.00E+00
INFANT	9.33E-09	1.86E-07	2.97E-08	3.02E-08	3.18E-08	5.91E-06	1.04E-07	0.00E+00

TABLE 2. DOSES TO MAXIMUM INDIVIDUAL (MREM), APRIL-JUNE 2021

SPECIAL LOCATION NO. 1A Site Boundary  
AT .67 MILES N

ANNUAL BETA AIR DOSE = 4.95E-05 MILLRADS  
ANNUAL GAMMA AIR DOSE = 8.01E-05 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	5.38E-05	5.38E-05	5.38E-05	5.38E-05	5.38E-05	5.38E-05	5.43E-05	1.06E-04
GROUND	2.61E-04	2.61E-04	2.61E-04	2.61E-04	2.61E-04	2.61E-04	2.61E-04	3.06E-04
VEGET								
ADULT	1.90E-05	4.35E-05	3.52E-04	1.51E-05	1.07E-05	1.44E-03	1.00E-06	0.00E+00
TEEN	2.40E-05	4.82E-05	4.88E-04	2.35E-05	1.64E-05	1.93E-03	1.88E-06	0.00E+00
CHILD	4.18E-05	3.36E-05	1.02E-03	3.96E-05	2.64E-05	3.69E-03	2.86E-06	0.00E+00
MEAT								
ADULT	1.62E-06	8.64E-06	4.66E-06	1.29E-06	4.46E-07	3.81E-05	8.20E-08	0.00E+00
TEEN	1.10E-06	4.66E-06	3.33E-06	1.03E-06	3.63E-07	2.76E-05	7.76E-08	0.00E+00
CHILD	1.50E-06	2.37E-06	5.44E-06	1.32E-06	4.61E-07	4.17E-05	9.12E-08	0.00E+00
COW MILK								
ADULT	6.50E-06	3.60E-06	2.23E-05	9.80E-06	8.18E-06	1.10E-03	6.94E-07	0.00E+00
TEEN	7.88E-06	4.57E-06	3.60E-05	1.73E-05	1.46E-05	1.75E-03	1.43E-06	0.00E+00
CHILD	1.06E-05	3.41E-06	7.95E-05	3.01E-05	2.42E-05	3.48E-03	2.20E-06	0.00E+00
INFANT	1.65E-05	3.24E-06	1.11E-04	6.42E-05	4.14E-05	8.46E-03	3.99E-06	0.00E+00
GOATMILK								
ADULT	1.51E-05	2.97E-06	4.87E-05	2.27E-05	1.36E-05	1.32E-03	2.08E-06	0.00E+00
TEEN	1.63E-05	4.01E-06	7.90E-05	4.01E-05	2.41E-05	2.10E-03	4.30E-06	0.00E+00
CHILD	1.78E-05	3.23E-06	1.75E-04	6.96E-05	4.01E-05	4.18E-03	6.61E-06	0.00E+00
INFANT	2.42E-05	3.21E-06	2.40E-04	1.42E-04	6.73E-05	1.02E-02	1.20E-05	0.00E+00
INHAL								
ADULT	4.33E-07	2.19E-06	2.92E-06	8.61E-07	1.28E-06	1.39E-04	1.72E-05	0.00E+00
TEEN	5.22E-07	8.69E-06	3.51E-06	1.19E-06	1.77E-06	1.80E-04	2.65E-05	0.00E+00
CHILD	5.59E-07	6.78E-05	4.24E-06	1.17E-06	1.67E-06	2.21E-04	2.22E-05	0.00E+00
INFANT	3.67E-07	5.96E-05	2.11E-06	1.05E-06	1.10E-06	2.03E-04	1.71E-05	0.00E+00

TABLE 2. DOSES TO MAXIMUM INDIVIDUAL (MREM), APRIL-JUNE 2021 (Continued)

SPECIAL LOCATION NO. 2A Site Boundary  
 AT .54 MILES ESE

ANNUAL BETA AIR DOSE = 1.32E-06 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 2.14E-06 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.43E-06	1.43E-06	1.43E-06	1.43E-06	1.43E-06	1.43E-06	1.45E-06	2.83E-06
GROUND	9.04E-05	9.04E-05	9.04E-05	9.04E-05	9.04E-05	9.04E-05	9.04E-05	1.06E-04
VEGET								
ADULT	6.51E-06	1.50E-05	1.21E-04	5.08E-06	3.45E-06	4.47E-04	3.50E-07	0.00E+00
TEEN	8.18E-06	1.66E-05	1.69E-04	7.94E-06	5.27E-06	6.00E-04	6.56E-07	0.00E+00
CHILD	1.42E-05	1.16E-05	3.50E-04	1.34E-05	8.53E-06	1.15E-03	9.98E-07	0.00E+00
MEAT								
ADULT	5.61E-07	3.00E-06	1.61E-06	4.46E-07	1.48E-07	1.19E-05	2.86E-08	0.00E+00
TEEN	3.81E-07	1.62E-06	1.15E-06	3.56E-07	1.20E-07	8.59E-06	2.71E-08	0.00E+00
CHILD	5.20E-07	8.21E-07	1.88E-06	4.55E-07	1.53E-07	1.30E-05	3.18E-08	0.00E+00
COW MILK								
ADULT	2.19E-06	1.20E-06	7.64E-06	3.28E-06	2.62E-06	3.43E-04	2.42E-07	0.00E+00
TEEN	2.62E-06	1.52E-06	1.23E-05	5.80E-06	4.67E-06	5.44E-04	5.00E-07	0.00E+00
CHILD	3.46E-06	1.13E-06	2.71E-05	1.01E-05	7.76E-06	1.08E-03	7.69E-07	0.00E+00
INFANT	5.32E-06	1.07E-06	3.74E-05	2.14E-05	1.32E-05	2.63E-03	1.39E-06	0.00E+00
GOATMILK								
ADULT	5.18E-06	9.73E-07	1.68E-05	7.76E-06	4.46E-06	4.11E-04	7.26E-07	0.00E+00
TEEN	5.53E-06	1.31E-06	2.72E-05	1.37E-05	7.92E-06	6.52E-04	1.50E-06	0.00E+00
CHILD	5.93E-06	1.05E-06	6.01E-05	2.38E-05	1.32E-05	1.30E-03	2.31E-06	0.00E+00
INFANT	7.91E-06	1.05E-06	8.21E-05	4.85E-05	2.21E-05	3.16E-03	4.17E-06	0.00E+00
INHAL								
ADULT	2.88E-07	1.49E-06	1.99E-06	5.69E-07	8.50E-07	9.27E-05	1.18E-05	0.00E+00
TEEN	3.46E-07	5.94E-06	2.39E-06	7.84E-07	1.18E-06	1.20E-04	1.82E-05	0.00E+00
CHILD	3.69E-07	4.64E-05	2.89E-06	7.71E-07	1.10E-06	1.48E-04	1.53E-05	0.00E+00
INFANT	2.41E-07	4.08E-05	1.43E-06	6.96E-07	7.29E-07	1.36E-04	1.17E-05	0.00E+00

TABLE 2. DOSES TO MAXIMUM INDIVIDUAL (MREM), APRIL-JUNE 2021 (Continued)

SPECIAL LOCATION NO. 3A Nearest Resident  
 AT .90 MILES NW

ANNUAL BETA AIR DOSE = 1.69E-04 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 2.74E-04 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.84E-04	1.84E-04	1.84E-04	1.84E-04	1.84E-04	1.84E-04	1.85E-04	3.62E-04
GROUND	6.15E-05	6.15E-05	6.15E-05	6.15E-05	6.15E-05	6.15E-05	6.15E-05	7.23E-05
VEGET								
ADULT	4.64E-06	1.05E-05	8.39E-05	3.80E-06	2.99E-06	4.28E-04	2.33E-07	0.00E+00
TEEN	5.89E-06	1.16E-05	1.17E-04	5.90E-06	4.55E-06	5.73E-04	4.37E-07	0.00E+00
CHILD	1.03E-05	8.12E-06	2.43E-04	9.95E-06	7.35E-06	1.10E-03	6.65E-07	0.00E+00
MEAT								
ADULT	3.84E-07	2.03E-06	1.11E-06	3.10E-07	1.17E-07	1.13E-05	1.91E-08	0.00E+00
TEEN	2.62E-07	1.10E-06	7.95E-07	2.47E-07	9.51E-08	8.21E-06	1.80E-08	0.00E+00
CHILD	3.58E-07	5.57E-07	1.30E-06	3.16E-07	1.21E-07	1.24E-05	2.12E-08	0.00E+00
COW MILK								
ADULT	1.64E-06	9.28E-07	5.43E-06	2.51E-06	2.30E-06	3.28E-04	1.61E-07	0.00E+00
TEEN	2.05E-06	1.19E-06	8.82E-06	4.44E-06	4.10E-06	5.20E-04	3.34E-07	0.00E+00
CHILD	2.87E-06	8.94E-07	1.95E-05	7.72E-06	6.82E-06	1.04E-03	5.13E-07	0.00E+00
INFANT	4.61E-06	8.61E-07	2.77E-05	1.67E-05	1.17E-05	2.52E-03	9.27E-07	0.00E+00
GOATMILK								
ADULT	3.67E-06	8.01E-07	1.17E-05	5.56E-06	3.64E-06	3.93E-04	4.84E-07	0.00E+00
TEEN	4.05E-06	1.08E-06	1.90E-05	9.83E-06	6.46E-06	6.24E-04	1.00E-06	0.00E+00
CHILD	4.63E-06	8.76E-07	4.22E-05	1.71E-05	1.07E-05	1.24E-03	1.54E-06	0.00E+00
INFANT	6.56E-06	8.74E-07	5.87E-05	3.53E-05	1.81E-05	3.02E-03	2.78E-06	0.00E+00
INHAL								
ADULT	1.25E-07	5.25E-07	6.63E-07	2.56E-07	3.61E-07	3.48E-05	3.73E-06	0.00E+00
TEEN	1.56E-07	2.00E-06	8.07E-07	3.53E-07	4.99E-07	4.53E-05	5.77E-06	0.00E+00
CHILD	1.74E-07	1.54E-05	9.84E-07	3.46E-07	4.68E-07	5.56E-05	4.85E-06	0.00E+00
INFANT	1.17E-07	1.35E-05	5.11E-07	3.15E-07	3.08E-07	5.11E-05	3.76E-06	0.00E+00

TABLE 2. DOSES TO MAXIMUM INDIVIDUAL (MREM), APRIL-JUNE 2021 (Continued)

SPECIAL LOCATION NO. 4A Nearest Cow  
AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 7.42E-05 MILLRADS  
ANNUAL GAMMA AIR DOSE = 1.20E-04 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	8.06E-05	8.06E-05	8.06E-05	8.06E-05	8.06E-05	8.06E-05	8.14E-05	1.59E-04
GROUND	4.08E-06	4.08E-06	4.08E-06	4.08E-06	4.08E-06	4.08E-06	4.08E-06	4.80E-06
VEGET								
ADULT	3.24E-07	7.14E-07	5.67E-06	2.77E-07	2.45E-07	3.73E-05	1.52E-08	0.00E+00
TEEN	4.15E-07	7.94E-07	7.91E-06	4.28E-07	3.72E-07	4.99E-05	2.84E-08	0.00E+00
CHILD	7.32E-07	5.58E-07	1.66E-05	7.22E-07	6.00E-07	9.56E-05	4.32E-08	0.00E+00
MEAT								
ADULT	2.57E-08	1.34E-07	7.48E-08	2.11E-08	8.95E-09	9.88E-07	1.24E-09	0.00E+00
TEEN	1.76E-08	7.26E-08	5.37E-08	1.68E-08	7.28E-09	7.15E-07	1.17E-09	0.00E+00
CHILD	2.41E-08	3.68E-08	8.82E-08	2.15E-08	9.24E-09	1.08E-06	1.38E-09	0.00E+00
COW MILK								
ADULT	1.20E-07	6.93E-08	3.78E-07	1.87E-07	1.90E-07	2.85E-05	1.05E-08	0.00E+00
TEEN	1.55E-07	8.93E-08	6.17E-07	3.31E-07	3.38E-07	4.53E-05	2.17E-08	0.00E+00
CHILD	2.28E-07	6.81E-08	1.37E-06	5.74E-07	5.62E-07	9.03E-05	3.33E-08	0.00E+00
INFANT	3.77E-07	6.65E-08	2.00E-06	1.26E-06	9.67E-07	2.19E-04	6.03E-08	0.00E+00
GOATMILK								
ADULT	2.54E-07	6.30E-08	7.98E-07	3.90E-07	2.84E-07	3.43E-05	3.15E-08	0.00E+00
TEEN	2.90E-07	8.55E-08	1.30E-06	6.88E-07	5.06E-07	5.44E-05	6.50E-08	0.00E+00
CHILD	3.51E-07	6.93E-08	2.90E-06	1.20E-06	8.41E-07	1.08E-04	9.99E-08	0.00E+00
INFANT	5.20E-07	6.92E-08	4.11E-06	2.50E-06	1.43E-06	2.63E-04	1.81E-07	0.00E+00
INHAL								
ADULT	2.05E-08	4.53E-08	5.96E-08	4.40E-08	5.66E-08	4.26E-06	2.30E-07	0.00E+00
TEEN	2.70E-08	1.11E-07	7.53E-08	6.05E-08	7.79E-08	5.56E-06	3.52E-07	0.00E+00
CHILD	3.18E-08	6.56E-07	9.47E-08	5.91E-08	7.28E-08	6.84E-06	2.94E-07	0.00E+00
INFANT	2.22E-08	5.85E-07	5.69E-08	5.43E-08	4.78E-08	6.27E-06	2.19E-07	0.00E+00

TABLE 2. DOSES TO MAXIMUM INDIVIDUAL (MREM), APRIL-JUNE 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
AT 2.30 MILES ESE

ANNUAL BETA AIR DOSE = 8.66E-06 MILLRADS  
ANNUAL GAMMA AIR DOSE = 1.40E-05 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	9.41E-06	9.41E-06	9.41E-06	9.41E-06	9.41E-06	9.41E-06	9.50E-06	1.86E-05
GROUND	3.06E-06	3.06E-06	3.06E-06	3.06E-06	3.06E-06	3.06E-06	3.06E-06	3.59E-06
VEGET								
ADULT	2.28E-07	5.17E-07	4.16E-06	1.85E-07	1.41E-07	1.97E-05	1.17E-08	0.00E+00
TEEN	2.89E-07	5.74E-07	5.78E-06	2.87E-07	2.14E-07	2.65E-05	2.19E-08	0.00E+00
CHILD	5.06E-07	4.01E-07	1.20E-05	4.85E-07	3.46E-07	5.07E-05	3.33E-08	0.00E+00
MEAT								
ADULT	1.91E-08	1.01E-07	5.50E-08	1.53E-08	5.62E-09	5.23E-07	9.53E-10	0.00E+00
TEEN	1.30E-08	5.46E-08	3.94E-08	1.22E-08	4.57E-09	3.79E-07	9.02E-10	0.00E+00
CHILD	1.78E-08	2.77E-08	6.45E-08	1.57E-08	5.80E-09	5.72E-07	1.06E-09	0.00E+00
COW MILK								
ADULT	7.98E-08	4.47E-08	2.67E-07	1.21E-07	1.08E-07	1.51E-05	8.07E-09	0.00E+00
TEEN	9.86E-08	5.71E-08	4.33E-07	2.15E-07	1.92E-07	2.40E-05	1.67E-08	0.00E+00
CHILD	1.36E-07	4.28E-08	9.58E-07	3.73E-07	3.20E-07	4.78E-05	2.56E-08	0.00E+00
INFANT	2.17E-07	4.10E-08	1.35E-06	8.03E-07	5.47E-07	1.16E-04	4.64E-08	0.00E+00
GOATMILK								
ADULT	1.81E-07	3.80E-08	5.78E-07	2.73E-07	1.73E-07	1.81E-05	2.42E-08	0.00E+00
TEEN	1.98E-07	5.14E-08	9.40E-07	4.82E-07	3.08E-07	2.88E-05	5.00E-08	0.00E+00
CHILD	2.23E-07	4.14E-08	2.08E-06	8.37E-07	5.12E-07	5.74E-05	7.69E-08	0.00E+00
INFANT	3.11E-07	4.13E-08	2.89E-06	1.72E-06	8.62E-07	1.39E-04	1.39E-07	0.00E+00
INHAL								
ADULT	1.53E-08	5.69E-08	9.53E-08	3.08E-08	4.50E-08	4.72E-06	4.87E-07	0.00E+00
TEEN	1.87E-08	1.71E-07	1.15E-07	4.24E-08	6.22E-08	6.12E-06	7.40E-07	0.00E+00
CHILD	2.03E-08	1.20E-06	1.39E-07	4.16E-08	5.84E-08	7.51E-06	6.15E-07	0.00E+00
INFANT	1.35E-08	1.05E-06	7.02E-08	3.77E-08	3.85E-08	6.90E-06	4.48E-07	0.00E+00



TABLE 3. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-JUNE 2021

SPECIAL LOCATION NO. 1A Site Boundary  
 AT .69 MILES NNW

ANNUAL BETA AIR DOSE = 4.28E-05 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 7.19E-05 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	4.82E-05	4.82E-05	4.82E-05	4.82E-05	4.82E-05	4.82E-05	4.87E-05	9.37E-05
GROUND	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.81E-04	1.81E-04	2.13E-04
VEGET								
ADULT	1.57E-05	3.28E-05	2.37E-04	1.46E-05	1.02E-05	1.32E-03	1.04E-06	0.00E+00
TEEN	1.92E-05	3.66E-05	3.36E-04	2.28E-05	1.57E-05	1.77E-03	1.95E-06	0.00E+00
CHILD	3.21E-05	2.58E-05	7.13E-04	3.86E-05	2.53E-05	3.39E-03	2.96E-06	0.00E+00
MEAT								
ADULT	1.28E-06	5.86E-06	3.27E-06	1.17E-06	4.39E-07	3.50E-05	8.49E-08	0.00E+00
TEEN	8.29E-07	3.17E-06	2.39E-06	9.32E-07	3.57E-07	2.53E-05	8.03E-08	0.00E+00
CHILD	1.08E-06	1.61E-06	4.00E-06	1.20E-06	4.53E-07	3.82E-05	9.44E-08	0.00E+00
COW MILK								
ADULT	6.32E-06	2.89E-06	1.72E-05	9.70E-06	7.78E-06	1.01E-03	7.18E-07	0.00E+00
TEEN	7.49E-06	3.72E-06	2.85E-05	1.72E-05	1.38E-05	1.61E-03	1.48E-06	0.00E+00
CHILD	9.69E-06	2.81E-06	6.43E-05	2.98E-05	2.30E-05	3.20E-03	2.28E-06	0.00E+00
INFANT	1.50E-05	2.70E-06	9.59E-05	6.32E-05	3.92E-05	7.78E-03	4.13E-06	0.00E+00
GOATMILK								
ADULT	1.51E-05	2.74E-06	3.82E-05	2.30E-05	1.32E-05	1.21E-03	2.16E-06	0.00E+00
TEEN	1.61E-05	3.71E-06	6.37E-05	4.07E-05	2.35E-05	1.93E-03	4.45E-06	0.00E+00
CHILD	1.69E-05	2.99E-06	1.44E-04	7.06E-05	3.90E-05	3.84E-03	6.85E-06	0.00E+00
INFANT	2.29E-05	2.98E-06	2.12E-04	1.44E-04	6.54E-05	9.34E-03	1.24E-05	0.00E+00
INHAL								
ADULT	4.53E-07	1.82E-06	2.32E-06	9.59E-07	1.44E-06	1.54E-04	1.33E-05	0.00E+00
TEEN	5.46E-07	6.33E-06	2.87E-06	1.32E-06	1.99E-06	2.00E-04	2.05E-05	0.00E+00
CHILD	5.83E-07	4.70E-05	3.53E-06	1.30E-06	1.87E-06	2.46E-04	1.72E-05	0.00E+00
INFANT	3.91E-07	4.12E-05	1.90E-06	1.18E-06	1.23E-06	2.26E-04	1.32E-05	0.00E+00

TABLE 3. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-JUNE 2021 (Continued)

SPECIAL LOCATION NO. 2A Site Boundary  
 AT .67 MILES N

ANNUAL BETA AIR DOSE = 3.45E-05 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 5.80E-05 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	3.89E-05	3.89E-05	3.89E-05	3.89E-05	3.89E-05	3.89E-05	3.93E-05	7.56E-05
GROUND	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.16E-04	2.54E-04
VEGET								
ADULT	1.88E-05	3.92E-05	2.83E-04	1.76E-05	1.24E-05	1.61E-03	1.25E-06	0.00E+00
TEEN	2.30E-05	4.38E-05	4.01E-04	2.75E-05	1.90E-05	2.15E-03	2.34E-06	0.00E+00
CHILD	3.85E-05	3.09E-05	8.52E-04	4.65E-05	3.07E-05	4.12E-03	3.56E-06	0.00E+00
MEAT								
ADULT	1.53E-06	7.00E-06	3.91E-06	1.40E-06	5.31E-07	4.25E-05	1.02E-07	0.00E+00
TEEN	9.93E-07	3.78E-06	2.87E-06	1.12E-06	4.31E-07	3.08E-05	9.66E-08	0.00E+00
CHILD	1.29E-06	1.92E-06	4.79E-06	1.45E-06	5.47E-07	4.65E-05	1.14E-07	0.00E+00
COW MILK								
ADULT	7.63E-06	3.48E-06	2.06E-05	1.17E-05	9.43E-06	1.23E-03	8.64E-07	0.00E+00
TEEN	9.05E-06	4.47E-06	3.42E-05	2.07E-05	1.68E-05	1.95E-03	1.79E-06	0.00E+00
CHILD	1.17E-05	3.39E-06	7.72E-05	3.60E-05	2.79E-05	3.90E-03	2.74E-06	0.00E+00
INFANT	1.82E-05	3.26E-06	1.15E-04	7.63E-05	4.76E-05	9.47E-03	4.97E-06	0.00E+00
GOATMILK								
ADULT	1.82E-05	3.31E-06	4.58E-05	2.78E-05	1.60E-05	1.48E-03	2.59E-06	0.00E+00
TEEN	1.94E-05	4.48E-06	7.65E-05	4.90E-05	2.84E-05	2.34E-03	5.36E-06	0.00E+00
CHILD	2.04E-05	3.61E-06	1.73E-04	8.50E-05	4.72E-05	4.68E-03	8.23E-06	0.00E+00
INFANT	2.77E-05	3.60E-06	2.55E-04	1.73E-04	7.92E-05	1.14E-02	1.49E-05	0.00E+00
INHAL								
ADULT	5.30E-07	2.14E-06	2.74E-06	1.12E-06	1.68E-06	1.80E-04	1.57E-05	0.00E+00
TEEN	6.38E-07	7.45E-06	3.38E-06	1.54E-06	2.32E-06	2.34E-04	2.42E-05	0.00E+00
CHILD	6.80E-07	5.54E-05	4.16E-06	1.52E-06	2.18E-06	2.88E-04	2.03E-05	0.00E+00
INFANT	4.56E-07	4.86E-05	2.23E-06	1.37E-06	1.44E-06	2.65E-04	1.55E-05	0.00E+00

TABLE 3. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-JUNE 2021 (Continued)

SPECIAL LOCATION NO. 3A Nearest Resident  
 AT .90 MILES NW

ANNUAL BETA AIR DOSE = 1.41E-04 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 2.37E-04 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.59E-04	1.59E-04	1.59E-04	1.59E-04	1.59E-04	1.59E-04	1.60E-04	3.09E-04
GROUND	6.39E-05	6.39E-05	6.39E-05	6.39E-05	6.39E-05	6.39E-05	6.39E-05	7.52E-05
VEGET								
ADULT	5.86E-06	1.17E-05	8.42E-05	5.67E-06	4.19E-06	5.58E-04	3.93E-07	0.00E+00
TEEN	7.13E-06	1.31E-05	1.20E-04	8.85E-06	6.40E-06	7.48E-04	7.37E-07	0.00E+00
CHILD	1.19E-05	9.26E-06	2.55E-04	1.50E-05	1.03E-05	1.43E-03	1.12E-06	0.00E+00
MEAT								
ADULT	4.67E-07	2.06E-06	1.17E-06	4.37E-07	1.75E-07	1.48E-05	3.21E-08	0.00E+00
TEEN	3.00E-07	1.11E-06	8.63E-07	3.50E-07	1.42E-07	1.07E-05	3.04E-08	0.00E+00
CHILD	3.85E-07	5.64E-07	1.45E-06	4.53E-07	1.80E-07	1.62E-05	3.57E-08	0.00E+00
COW MILK								
ADULT	2.46E-06	1.10E-06	6.34E-06	3.82E-06	3.19E-06	4.28E-04	2.72E-07	0.00E+00
TEEN	2.95E-06	1.42E-06	1.06E-05	6.75E-06	5.68E-06	6.79E-04	5.62E-07	0.00E+00
CHILD	3.89E-06	1.08E-06	2.40E-05	1.17E-05	9.44E-06	1.35E-03	8.64E-07	0.00E+00
INFANT	6.12E-06	1.05E-06	3.64E-05	2.50E-05	1.61E-05	3.29E-03	1.56E-06	0.00E+00
GOATMILK								
ADULT	5.81E-06	1.08E-06	1.40E-05	8.89E-06	5.30E-06	5.13E-04	8.16E-07	0.00E+00
TEEN	6.22E-06	1.46E-06	2.35E-05	1.57E-05	9.41E-06	8.15E-04	1.69E-06	0.00E+00
CHILD	6.66E-06	1.18E-06	5.36E-05	2.72E-05	1.56E-05	1.62E-03	2.59E-06	0.00E+00
INFANT	9.17E-06	1.17E-06	7.95E-05	5.57E-05	2.63E-05	3.95E-03	4.69E-06	0.00E+00
INHAL								
ADULT	1.60E-07	5.83E-07	7.15E-07	3.42E-07	4.99E-07	5.08E-05	3.96E-06	0.00E+00
TEEN	1.96E-07	2.00E-06	8.88E-07	4.71E-07	6.90E-07	6.61E-05	6.12E-06	0.00E+00
CHILD	2.14E-07	1.47E-05	1.10E-06	4.62E-07	6.48E-07	8.13E-05	5.14E-06	0.00E+00
INFANT	1.45E-07	1.29E-05	6.10E-07	4.20E-07	4.27E-07	7.48E-05	3.97E-06	0.00E+00

TABLE 3. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-JUNE 2021 (Continued)

SPECIAL LOCATION NO. 4A Nearest Cow  
AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 7.30E-05 MILLRADS  
ANNUAL GAMMA AIR DOSE = 1.23E-04 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	8.22E-05	8.22E-05	8.22E-05	8.22E-05	8.22E-05	8.22E-05	8.29E-05	1.60E-04
GROUND	3.69E-06	3.69E-06	3.69E-06	3.69E-06	3.69E-06	3.69E-06	3.69E-06	4.34E-06
VEGET								
ADULT	3.72E-07	6.91E-07	4.92E-06	3.83E-07	3.03E-07	4.20E-05	2.56E-08	0.00E+00
TEEN	4.51E-07	7.74E-07	7.01E-06	5.96E-07	4.61E-07	5.63E-05	4.79E-08	0.00E+00
CHILD	7.43E-07	5.50E-07	1.50E-05	1.01E-06	7.45E-07	1.08E-04	7.29E-08	0.00E+00
MEAT								
ADULT	2.85E-08	1.17E-07	6.98E-08	2.80E-08	1.22E-08	1.12E-06	2.09E-09	0.00E+00
TEEN	1.81E-08	6.33E-08	5.16E-08	2.25E-08	9.89E-09	8.08E-07	1.98E-09	0.00E+00
CHILD	2.28E-08	3.22E-08	8.71E-08	2.91E-08	1.25E-08	1.22E-06	2.32E-09	0.00E+00
COW MILK								
ADULT	1.67E-07	7.14E-08	3.96E-07	2.62E-07	2.31E-07	3.22E-05	1.77E-08	0.00E+00
TEEN	2.03E-07	9.29E-08	6.66E-07	4.62E-07	4.11E-07	5.10E-05	3.65E-08	0.00E+00
CHILD	2.73E-07	7.15E-08	1.52E-06	8.03E-07	6.83E-07	1.02E-04	5.61E-08	0.00E+00
INFANT	4.39E-07	6.98E-08	2.36E-06	1.73E-06	1.17E-06	2.47E-04	1.02E-07	0.00E+00
GOATMILK								
ADULT	3.86E-07	7.32E-08	8.71E-07	5.94E-07	3.72E-07	3.86E-05	5.30E-08	0.00E+00
TEEN	4.18E-07	9.93E-08	1.47E-06	1.05E-06	6.62E-07	6.12E-05	1.10E-07	0.00E+00
CHILD	4.58E-07	8.03E-08	3.36E-06	1.82E-06	1.10E-06	1.22E-04	1.68E-07	0.00E+00
INFANT	6.46E-07	8.01E-08	5.09E-06	3.75E-06	1.85E-06	2.96E-04	3.05E-07	0.00E+00
INHAL								
ADULT	2.70E-08	6.63E-08	8.53E-08	5.84E-08	7.99E-08	7.18E-06	3.74E-07	0.00E+00
TEEN	3.44E-08	1.73E-07	1.08E-07	8.04E-08	1.10E-07	9.33E-06	5.74E-07	0.00E+00
CHILD	3.89E-08	1.08E-06	1.37E-07	7.88E-08	1.03E-07	1.15E-05	4.80E-07	0.00E+00
INFANT	2.70E-08	9.54E-07	8.18E-08	7.20E-08	6.79E-08	1.05E-05	3.62E-07	0.00E+00

TABLE 3. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-JUNE 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
AT 2.80 MILES NNW

ANNUAL BETA AIR DOSE = 8.76E-05 MILLRADS  
ANNUAL GAMMA AIR DOSE = 1.47E-04 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	9.87E-05	9.87E-05	9.87E-05	9.87E-05	9.87E-05	9.87E-05	9.95E-05	1.92E-04
GROUND	6.25E-06	6.25E-06	6.25E-06	6.25E-06	6.25E-06	6.25E-06	6.25E-06	7.34E-06
VEGET								
ADULT	6.22E-07	1.17E-06	8.31E-06	6.36E-07	5.00E-07	6.91E-05	4.26E-08	0.00E+00
TEEN	7.55E-07	1.31E-06	1.18E-05	9.91E-07	7.62E-07	9.26E-05	7.99E-08	0.00E+00
CHILD	1.25E-06	9.27E-07	2.53E-05	1.68E-06	1.23E-06	1.77E-04	1.22E-07	0.00E+00
MEAT								
ADULT	4.80E-08	1.98E-07	1.18E-07	4.68E-08	2.01E-08	1.83E-06	3.48E-09	0.00E+00
TEEN	3.04E-08	1.07E-07	8.70E-08	3.75E-08	1.64E-08	1.33E-06	3.30E-09	0.00E+00
CHILD	3.85E-08	5.45E-08	1.47E-07	4.87E-08	2.08E-08	2.00E-06	3.87E-09	0.00E+00
COW MILK								
ADULT	2.77E-07	1.19E-07	6.64E-07	4.34E-07	3.81E-07	5.29E-05	2.95E-08	0.00E+00
TEEN	3.37E-07	1.55E-07	1.12E-06	7.68E-07	6.79E-07	8.39E-05	6.09E-08	0.00E+00
CHILD	4.52E-07	1.19E-07	2.55E-06	1.33E-06	1.13E-06	1.67E-04	9.37E-08	0.00E+00
INFANT	7.25E-07	1.16E-07	3.95E-06	2.86E-06	1.93E-06	4.06E-04	1.69E-07	0.00E+00
GOATMILK								
ADULT	6.42E-07	1.22E-07	1.46E-06	9.88E-07	6.17E-07	6.35E-05	8.85E-08	0.00E+00
TEEN	6.95E-07	1.65E-07	2.46E-06	1.75E-06	1.10E-06	1.01E-04	1.83E-07	0.00E+00
CHILD	7.60E-07	1.34E-07	5.64E-06	3.03E-06	1.82E-06	2.01E-04	2.81E-07	0.00E+00
INFANT	1.07E-06	1.33E-07	8.52E-06	6.23E-06	3.07E-06	4.88E-04	5.08E-07	0.00E+00
INHAL								
ADULT	3.71E-08	9.79E-08	1.25E-07	7.99E-08	1.11E-07	1.02E-05	5.80E-07	0.00E+00
TEEN	4.68E-08	2.71E-07	1.58E-07	1.10E-07	1.53E-07	1.32E-05	8.91E-07	0.00E+00
CHILD	5.27E-08	1.77E-06	1.99E-07	1.08E-07	1.43E-07	1.62E-05	7.47E-07	0.00E+00
INFANT	3.64E-08	1.56E-06	1.17E-07	9.84E-08	9.41E-08	1.49E-05	5.65E-07	0.00E+00

TABLE 4. DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-SEPTEMBER 2021

SPECIAL LOCATION NO. 1A Site Boundary  
 AT .67 MILES N

ANNUAL BETA AIR DOSE = 3.10E-05 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 5.03E-05 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	3.38E-05	3.38E-05	3.38E-05	3.38E-05	3.38E-05	3.38E-05	3.41E-05	6.64E-05
GROUND	3.36E-04	3.36E-04	3.36E-04	3.36E-04	3.36E-04	3.36E-04	3.36E-04	3.95E-04
VEGET								
ADULT	1.25E-05	6.05E-05	8.19E-05	1.30E-05	1.40E-05	2.21E-03	1.43E-08	0.00E+00
TEEN	1.92E-05	6.63E-05	1.35E-04	1.96E-05	2.10E-05	2.97E-03	2.68E-08	0.00E+00
CHILD	3.88E-05	4.55E-05	3.28E-04	3.14E-05	3.32E-05	5.69E-03	4.08E-08	0.00E+00
MEAT								
ADULT	2.17E-06	1.25E-05	1.37E-06	2.36E-06	1.36E-06	5.89E-05	1.17E-09	0.00E+00
TEEN	1.71E-06	6.73E-06	1.08E-06	1.83E-06	1.02E-06	4.27E-05	1.11E-09	0.00E+00
CHILD	2.64E-06	3.40E-06	1.90E-06	2.15E-06	1.19E-06	6.44E-05	1.30E-09	0.00E+00
COW MILK								
ADULT	6.12E-06	8.51E-06	9.19E-06	1.16E-05	1.32E-05	1.68E-03	9.96E-09	0.00E+00
TEEN	1.04E-05	1.02E-05	1.62E-05	1.99E-05	2.29E-05	2.67E-03	2.06E-08	0.00E+00
CHILD	2.01E-05	7.08E-06	3.83E-05	3.23E-05	3.68E-05	5.30E-03	3.17E-08	0.00E+00
INFANT	3.21E-05	2.63E-05	7.26E-05	6.80E-05	6.02E-05	1.29E-02	5.73E-08	0.00E+00
GOATMILK								
ADULT	4.30E-06	3.93E-06	1.23E-05	7.41E-06	1.16E-05	2.02E-03	2.96E-08	0.00E+00
TEEN	7.11E-06	5.20E-06	2.24E-05	1.31E-05	2.06E-05	3.20E-03	6.12E-08	0.00E+00
CHILD	1.34E-05	4.09E-06	5.49E-05	2.25E-05	3.41E-05	6.36E-03	9.41E-08	0.00E+00
INFANT	2.45E-05	6.40E-06	1.07E-04	5.34E-05	5.88E-05	1.55E-02	1.70E-07	0.00E+00
INHAL								
ADULT	5.79E-07	4.89E-06	1.16E-06	1.36E-06	2.20E-06	2.59E-04	3.50E-05	0.00E+00
TEEN	7.74E-07	2.26E-05	1.63E-06	1.87E-06	3.04E-06	3.33E-04	5.47E-05	0.00E+00
CHILD	8.86E-07	1.85E-04	2.23E-06	1.82E-06	2.85E-06	4.03E-04	4.62E-05	0.00E+00
INFANT	6.13E-07	1.63E-04	1.67E-06	1.66E-06	1.87E-06	3.71E-04	3.75E-05	0.00E+00

TABLE 4. DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-SEPTEMBER 2021 (Continued)

SPECIAL LOCATION NO. 2A Site Boundary  
 AT .65 MILES SE

ANNUAL BETA AIR DOSE = 5.60E-06 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 9.09E-06 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	6.10E-06	6.10E-06	6.10E-06	6.10E-06	6.10E-06	6.10E-06	6.15E-06	1.20E-05
GROUND	8.66E-05	8.66E-05	8.66E-05	8.66E-05	8.66E-05	8.66E-05	8.66E-05	1.02E-04
VEGET								
ADULT	3.21E-06	1.56E-05	2.09E-05	3.29E-06	3.53E-06	5.57E-04	2.49E-09	0.00E+00
TEEN	4.92E-06	1.71E-05	3.45E-05	4.97E-06	5.30E-06	7.49E-04	4.67E-09	0.00E+00
CHILD	9.94E-06	1.17E-05	8.39E-05	7.96E-06	8.39E-06	1.43E-03	7.10E-09	0.00E+00
MEAT								
ADULT	5.59E-07	3.24E-06	3.49E-07	6.07E-07	3.47E-07	1.49E-05	2.03E-10	0.00E+00
TEEN	4.42E-07	1.74E-06	2.76E-07	4.69E-07	2.61E-07	1.08E-05	1.92E-10	0.00E+00
CHILD	6.82E-07	8.79E-07	4.86E-07	5.52E-07	3.05E-07	1.63E-05	2.26E-10	0.00E+00
COW MILK								
ADULT	1.55E-06	2.18E-06	2.33E-06	2.93E-06	3.34E-06	4.23E-04	1.73E-09	0.00E+00
TEEN	2.64E-06	2.62E-06	4.12E-06	5.05E-06	5.77E-06	6.70E-04	3.58E-09	0.00E+00
CHILD	5.12E-06	1.80E-06	9.72E-06	8.19E-06	9.29E-06	1.33E-03	5.51E-09	0.00E+00
INFANT	8.14E-06	6.74E-06	1.84E-05	1.72E-05	1.52E-05	3.24E-03	9.97E-09	0.00E+00
GOATMILK								
ADULT	1.07E-06	9.90E-07	3.11E-06	1.84E-06	2.90E-06	5.08E-04	5.15E-09	0.00E+00
TEEN	1.78E-06	1.31E-06	5.68E-06	3.25E-06	5.15E-06	8.05E-04	1.06E-08	0.00E+00
CHILD	3.36E-06	1.02E-06	1.39E-05	5.60E-06	8.52E-06	1.60E-03	1.64E-08	0.00E+00
INFANT	6.16E-06	1.62E-06	2.72E-05	1.33E-05	1.47E-05	3.88E-03	2.96E-08	0.00E+00
INHAL								
ADULT	4.18E-07	1.81E-06	8.35E-07	9.62E-07	1.55E-06	1.86E-04	1.89E-05	0.00E+00
TEEN	5.58E-07	3.78E-06	1.18E-06	1.32E-06	2.14E-06	2.39E-04	2.82E-05	0.00E+00
CHILD	6.36E-07	2.11E-05	1.61E-06	1.29E-06	2.00E-06	2.88E-04	2.32E-05	0.00E+00
INFANT	4.39E-07	1.83E-05	1.20E-06	1.17E-06	1.32E-06	2.65E-04	1.62E-05	0.00E+00

TABLE 4. DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-SEPTEMBER 2021 (Continued)

SPECIAL LOCATION NO. 3A Nearest Resident  
 AT .90 MILES NW

ANNUAL BETA AIR DOSE = 1.72E-04 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 2.80E-04 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.89E-04	3.69E-04
GROUND	8.05E-05	8.05E-05	8.05E-05	8.05E-05	8.05E-05	8.05E-05	8.05E-05	9.47E-05
VEGET								
ADULT	3.46E-06	1.51E-05	2.34E-05	3.75E-06	4.12E-06	6.53E-04	2.52E-08	0.00E+00
TEEN	5.19E-06	1.66E-05	3.81E-05	5.67E-06	6.19E-06	8.77E-04	4.73E-08	0.00E+00
CHILD	1.03E-05	1.15E-05	9.18E-05	9.16E-06	9.82E-06	1.68E-03	7.19E-08	0.00E+00
MEAT								
ADULT	5.55E-07	3.03E-06	3.98E-07	6.35E-07	3.77E-07	1.74E-05	2.06E-09	0.00E+00
TEEN	4.35E-07	1.63E-06	3.14E-07	4.92E-07	2.85E-07	1.26E-05	1.95E-09	0.00E+00
CHILD	6.66E-07	8.22E-07	5.51E-07	5.80E-07	3.34E-07	1.90E-05	2.29E-09	0.00E+00
COW MILK								
ADULT	1.80E-06	2.25E-06	2.71E-06	3.37E-06	3.82E-06	4.96E-04	1.75E-08	0.00E+00
TEEN	2.98E-06	2.72E-06	4.77E-06	5.81E-06	6.63E-06	7.86E-04	3.62E-08	0.00E+00
CHILD	5.67E-06	1.89E-06	1.13E-05	9.48E-06	1.07E-05	1.56E-03	5.58E-08	0.00E+00
INFANT	9.05E-06	7.04E-06	2.11E-05	2.00E-05	1.76E-05	3.79E-03	1.01E-07	0.00E+00
GOATMILK								
ADULT	1.50E-06	1.10E-06	3.80E-06	2.54E-06	3.52E-06	5.95E-04	5.22E-08	0.00E+00
TEEN	2.30E-06	1.45E-06	6.88E-06	4.49E-06	6.25E-06	9.43E-04	1.08E-07	0.00E+00
CHILD	4.05E-06	1.14E-06	1.67E-05	7.75E-06	1.04E-05	1.87E-03	1.66E-07	0.00E+00
INFANT	7.26E-06	1.76E-06	3.19E-05	1.79E-05	1.78E-05	4.55E-03	3.00E-07	0.00E+00
INHAL								
ADULT	8.25E-08	7.38E-07	1.66E-07	1.92E-07	3.09E-07	3.63E-05	4.63E-06	0.00E+00
TEEN	1.10E-07	3.13E-06	2.33E-07	2.64E-07	4.26E-07	4.67E-05	7.24E-06	0.00E+00
CHILD	1.26E-07	2.48E-05	3.17E-07	2.58E-07	4.00E-07	5.65E-05	6.13E-06	0.00E+00
INFANT	8.71E-08	2.18E-05	2.36E-07	2.35E-07	2.63E-07	5.19E-05	5.00E-06	0.00E+00



TABLE 4. DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-SEPTEMBER 2021 (Continued)

SPECIAL LOCATION NO. 4A Nearest Cow  
AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 1.55E-05 MILLRADS  
ANNUAL GAMMA AIR DOSE = 2.47E-05 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.66E-05	1.66E-05	1.66E-05	1.66E-05	1.66E-05	1.66E-05	1.68E-05	3.19E-05
GROUND	5.27E-06	5.27E-06	5.27E-06	5.27E-06	5.27E-06	5.27E-06	5.27E-06	6.20E-06
VEGET								
ADULT	2.38E-07	1.01E-06	1.63E-06	2.60E-07	2.87E-07	4.54E-05	2.18E-09	0.00E+00
TEEN	3.55E-07	1.11E-06	2.64E-06	3.95E-07	4.31E-07	6.11E-05	4.09E-09	0.00E+00
CHILD	7.01E-07	7.69E-07	6.34E-06	6.39E-07	6.85E-07	1.17E-04	6.22E-09	0.00E+00
MEAT								
ADULT	3.73E-08	2.00E-07	2.79E-08	4.34E-08	2.60E-08	1.21E-06	1.78E-10	0.00E+00
TEEN	2.91E-08	1.07E-07	2.19E-08	3.36E-08	1.96E-08	8.79E-07	1.68E-10	0.00E+00
CHILD	4.45E-08	5.43E-08	3.85E-08	3.97E-08	2.30E-08	1.33E-06	1.98E-10	0.00E+00
COW MILK								
ADULT	1.25E-07	1.53E-07	1.89E-07	2.34E-07	2.65E-07	3.45E-05	1.51E-09	0.00E+00
TEEN	2.07E-07	1.84E-07	3.33E-07	4.04E-07	4.59E-07	5.46E-05	3.13E-09	0.00E+00
CHILD	3.91E-07	1.28E-07	7.85E-07	6.61E-07	7.42E-07	1.08E-04	4.81E-09	0.00E+00
INFANT	6.24E-07	4.80E-07	1.47E-06	1.40E-06	1.22E-06	2.64E-04	8.71E-09	0.00E+00
GOATMILK								
ADULT	1.09E-07	7.49E-08	2.69E-07	1.84E-07	2.47E-07	4.13E-05	4.51E-09	0.00E+00
TEEN	1.64E-07	9.93E-08	4.86E-07	3.25E-07	4.38E-07	6.55E-05	9.31E-09	0.00E+00
CHILD	2.84E-07	7.80E-08	1.18E-06	5.61E-07	7.26E-07	1.30E-04	1.43E-08	0.00E+00
INFANT	5.06E-07	1.20E-07	2.24E-06	1.29E-06	1.25E-06	3.16E-04	2.59E-08	0.00E+00
INHAL								
ADULT	1.40E-08	1.00E-07	2.90E-08	3.20E-08	5.18E-08	6.30E-06	5.39E-07	0.00E+00
TEEN	1.84E-08	2.50E-07	4.04E-08	4.40E-08	7.15E-08	8.08E-06	8.23E-07	0.00E+00
CHILD	2.08E-08	1.49E-06	5.47E-08	4.30E-08	6.71E-08	9.72E-06	6.87E-07	0.00E+00
INFANT	1.45E-08	1.29E-06	4.02E-08	3.93E-08	4.42E-08	8.93E-06	5.19E-07	0.00E+00

TABLE 4. DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-SEPTEMBER 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
 AT 2.30 MILES ESE

ANNUAL BETA AIR DOSE = 4.31E-07 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 6.56E-07 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	4.40E-07	4.40E-07	4.40E-07	4.40E-07	4.40E-07	4.40E-07	4.44E-07	8.43E-07
GROUND	2.37E-06	2.37E-06	2.37E-06	2.37E-06	2.37E-06	2.37E-06	2.37E-06	2.79E-06
VEGET								
ADULT	9.25E-08	4.33E-07	6.12E-07	9.67E-08	1.05E-07	1.65E-05	2.96E-10	0.00E+00
TEEN	1.41E-07	4.75E-07	1.00E-06	1.46E-07	1.57E-07	2.22E-05	5.54E-10	0.00E+00
CHILD	2.83E-07	3.27E-07	2.43E-06	2.35E-07	2.49E-07	4.26E-05	8.43E-10	0.00E+00
MEAT								
ADULT	1.56E-08	8.89E-08	1.03E-08	1.73E-08	1.00E-08	4.42E-07	2.41E-11	0.00E+00
TEEN	1.23E-08	4.78E-08	8.11E-09	1.34E-08	7.56E-09	3.20E-07	2.28E-11	0.00E+00
CHILD	1.90E-08	2.41E-08	1.43E-08	1.58E-08	8.84E-09	4.83E-07	2.68E-11	0.00E+00
COW MILK								
ADULT	4.59E-08	6.18E-08	6.90E-08	8.65E-08	9.82E-08	1.26E-05	2.05E-10	0.00E+00
TEEN	7.73E-08	7.43E-08	1.22E-07	1.49E-07	1.70E-07	1.99E-05	4.24E-10	0.00E+00
CHILD	1.49E-07	5.14E-08	2.88E-07	2.42E-07	2.74E-07	3.95E-05	6.53E-10	0.00E+00
INFANT	2.37E-07	1.92E-07	5.42E-07	5.09E-07	4.48E-07	9.61E-05	1.18E-09	0.00E+00
GOATMILK								
ADULT	3.42E-08	2.87E-08	9.40E-08	5.85E-08	8.72E-08	1.51E-05	6.12E-10	0.00E+00
TEEN	5.50E-08	3.80E-08	1.71E-07	1.03E-07	1.55E-07	2.39E-05	1.26E-09	0.00E+00
CHILD	1.01E-07	2.98E-08	4.18E-07	1.78E-07	2.57E-07	4.74E-05	1.94E-09	0.00E+00
INFANT	1.83E-07	4.67E-08	8.08E-07	4.18E-07	4.42E-07	1.15E-04	3.52E-09	0.00E+00
INHAL								
ADULT	1.93E-08	9.59E-08	3.85E-08	4.49E-08	7.25E-08	8.67E-06	8.84E-07	0.00E+00
TEEN	2.58E-08	2.67E-07	5.42E-08	6.17E-08	1.00E-07	1.11E-05	1.33E-06	0.00E+00
CHILD	2.95E-08	1.80E-06	7.39E-08	6.02E-08	9.39E-08	1.35E-05	1.11E-06	0.00E+00
INFANT	2.04E-08	1.57E-06	5.53E-08	5.49E-08	6.18E-08	1.24E-05	8.01E-07	0.00E+00

TABLE 5. DOSES TO MAXIMUM INDIVIDUAL (MREM), OCTOBER-DECEMBER 2021

SPECIAL LOCATION NO. 1A Site Boundary  
 AT .69 MILES NNW

ANNUAL BETA AIR DOSE = 4.46E-03 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 2.90E-03 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.95E-03	5.44E-03
GROUND	3.22E-04	3.22E-04	3.22E-04	3.22E-04	3.22E-04	3.22E-04	3.22E-04	3.78E-04
VEGET								
ADULT	8.29E-06	5.01E-05	2.41E-05	8.57E-06	7.65E-06	1.20E-03	4.09E-17	0.00E+00
TEEN	1.27E-05	5.36E-05	3.95E-05	1.30E-05	1.15E-05	1.61E-03	4.62E-17	0.00E+00
CHILD	2.53E-05	3.55E-05	9.57E-05	2.05E-05	1.81E-05	3.09E-03	5.51E-17	0.00E+00
MEAT								
ADULT	1.64E-06	1.14E-05	4.81E-07	1.36E-06	6.12E-07	3.20E-05	0.00E+00	0.00E+00
TEEN	1.30E-06	6.15E-06	3.75E-07	1.05E-06	4.64E-07	2.32E-05	0.00E+00	0.00E+00
CHILD	2.01E-06	3.10E-06	6.49E-07	1.24E-06	5.44E-07	3.50E-05	0.00E+00	0.00E+00
COW MILK								
ADULT	3.06E-06	5.09E-06	3.78E-06	5.58E-06	6.68E-06	9.13E-04	6.15E-23	0.00E+00
TEEN	5.20E-06	6.10E-06	6.67E-06	9.64E-06	1.16E-05	1.45E-03	1.36E-22	0.00E+00
CHILD	1.01E-05	4.19E-06	1.57E-05	1.58E-05	1.88E-05	2.88E-03	2.17E-22	0.00E+00
INFANT	1.64E-05	1.21E-05	3.01E-05	3.38E-05	3.11E-05	7.00E-03	5.91E-22	0.00E+00
GOATMILK								
ADULT	2.16E-06	1.89E-06	4.57E-06	3.80E-06	6.18E-06	1.10E-03	7.38E-24	0.00E+00
TEEN	3.62E-06	2.48E-06	8.32E-06	6.73E-06	1.10E-05	1.74E-03	1.64E-23	0.00E+00
CHILD	6.85E-06	1.93E-06	2.03E-05	1.16E-05	1.82E-05	3.45E-03	2.60E-23	0.00E+00
INFANT	1.26E-05	2.88E-06	4.03E-05	2.78E-05	3.15E-05	8.40E-03	7.09E-23	0.00E+00
INHAL								
ADULT	4.84E-07	4.63E-06	7.66E-07	1.13E-06	1.73E-06	2.03E-04	4.18E-05	0.00E+00
TEEN	6.47E-07	2.02E-05	1.08E-06	1.54E-06	2.39E-06	2.62E-04	6.39E-05	0.00E+00
CHILD	7.39E-07	1.64E-04	1.47E-06	1.50E-06	2.24E-06	3.17E-04	5.34E-05	0.00E+00
INFANT	5.04E-07	1.44E-04	1.13E-06	1.34E-06	1.47E-06	2.91E-04	4.07E-05	0.00E+00

TABLE 5. DOSES TO MAXIMUM INDIVIDUAL (MREM), OCTOBER-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 2A Site Boundary  
 AT .67 MILES N

ANNUAL BETA AIR DOSE = 6.17E-03 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 3.95E-03 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	2.59E-03	2.59E-03	2.59E-03	2.59E-03	2.59E-03	2.59E-03	2.65E-03	7.45E-03
GROUND	4.39E-04	4.39E-04	4.39E-04	4.39E-04	4.39E-04	4.39E-04	4.39E-04	5.17E-04
VEGET								
ADULT	1.13E-05	6.84E-05	3.30E-05	1.17E-05	1.05E-05	1.64E-03	5.59E-17	0.00E+00
TEEN	1.74E-05	7.32E-05	5.40E-05	1.77E-05	1.57E-05	2.20E-03	6.30E-17	0.00E+00
CHILD	3.46E-05	4.85E-05	1.31E-04	2.81E-05	2.47E-05	4.22E-03	7.53E-17	0.00E+00
MEAT								
ADULT	2.24E-06	1.56E-05	6.56E-07	1.85E-06	8.36E-07	4.37E-05	0.00E+00	0.00E+00
TEEN	1.77E-06	8.39E-06	5.12E-07	1.43E-06	6.33E-07	3.17E-05	0.00E+00	0.00E+00
CHILD	2.74E-06	4.23E-06	8.87E-07	1.69E-06	7.43E-07	4.78E-05	0.00E+00	0.00E+00
COW MILK								
ADULT	4.18E-06	6.95E-06	5.17E-06	7.62E-06	9.12E-06	1.25E-03	8.39E-23	0.00E+00
TEEN	7.10E-06	8.33E-06	9.11E-06	1.32E-05	1.59E-05	1.98E-03	1.86E-22	0.00E+00
CHILD	1.38E-05	5.72E-06	2.14E-05	2.15E-05	2.57E-05	3.93E-03	2.96E-22	0.00E+00
INFANT	2.24E-05	1.66E-05	4.11E-05	4.62E-05	4.25E-05	9.56E-03	8.07E-22	0.00E+00
GOATMILK								
ADULT	2.95E-06	2.58E-06	6.25E-06	5.20E-06	8.44E-06	1.50E-03	1.01E-23	0.00E+00
TEEN	4.95E-06	3.39E-06	1.14E-05	9.19E-06	1.50E-05	2.37E-03	2.23E-23	0.00E+00
CHILD	9.35E-06	2.64E-06	2.77E-05	1.59E-05	2.49E-05	4.72E-03	3.56E-23	0.00E+00
INFANT	1.73E-05	3.94E-06	5.50E-05	3.80E-05	4.31E-05	1.15E-02	9.68E-23	0.00E+00
INHAL								
ADULT	6.75E-07	6.43E-06	1.07E-06	1.57E-06	2.41E-06	2.83E-04	5.81E-05	0.00E+00
TEEN	9.01E-07	2.81E-05	1.50E-06	2.15E-06	3.33E-06	3.65E-04	8.88E-05	0.00E+00
CHILD	1.03E-06	2.27E-04	2.04E-06	2.09E-06	3.12E-06	4.42E-04	7.41E-05	0.00E+00
INFANT	7.01E-07	2.00E-04	1.57E-06	1.87E-06	2.05E-06	4.06E-04	5.66E-05	0.00E+00

TABLE 5. DOSES TO MAXIMUM INDIVIDUAL (MREM), OCTOBER-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 3A Nearest Resident  
 AT .90 MILES NW

ANNUAL BETA AIR DOSE = 2.50E-03 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 2.45E-03 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.63E-03	1.63E-03	1.63E-03	1.63E-03	1.63E-03	1.63E-03	1.66E-03	3.81E-03
GROUND	1.38E-04	1.38E-04	1.38E-04	1.38E-04	1.38E-04	1.38E-04	1.38E-04	1.62E-04
VEGET								
ADULT	3.79E-06	2.18E-05	1.32E-05	3.97E-06	3.78E-06	6.07E-04	1.82E-17	0.00E+00
TEEN	5.80E-06	2.34E-05	2.13E-05	6.00E-06	5.67E-06	8.16E-04	2.05E-17	0.00E+00
CHILD	1.15E-05	1.56E-05	5.09E-05	9.55E-06	8.97E-06	1.56E-03	2.45E-17	0.00E+00
MEAT								
ADULT	7.12E-07	4.92E-06	2.42E-07	5.96E-07	2.80E-07	1.62E-05	0.00E+00	0.00E+00
TEEN	5.64E-07	2.64E-06	1.88E-07	4.61E-07	2.13E-07	1.17E-05	0.00E+00	0.00E+00
CHILD	8.72E-07	1.33E-06	3.27E-07	5.45E-07	2.50E-07	1.77E-05	0.00E+00	0.00E+00
COW MILK								
ADULT	1.45E-06	2.28E-06	1.91E-06	2.64E-06	3.27E-06	4.62E-04	2.73E-23	0.00E+00
TEEN	2.46E-06	2.75E-06	3.36E-06	4.58E-06	5.70E-06	7.33E-04	6.07E-23	0.00E+00
CHILD	4.76E-06	1.90E-06	7.91E-06	7.52E-06	9.26E-06	1.46E-03	9.65E-23	0.00E+00
INFANT	7.83E-06	5.40E-06	1.51E-05	1.63E-05	1.54E-05	3.54E-03	2.63E-22	0.00E+00
GOATMILK								
ADULT	1.08E-06	9.23E-07	2.40E-06	1.90E-06	3.12E-06	5.55E-04	3.28E-24	0.00E+00
TEEN	1.82E-06	1.22E-06	4.34E-06	3.37E-06	5.55E-06	8.79E-04	7.28E-24	0.00E+00
CHILD	3.43E-06	9.54E-07	1.05E-05	5.82E-06	9.20E-06	1.75E-03	1.16E-23	0.00E+00
INFANT	6.35E-06	1.37E-06	2.06E-05	1.40E-05	1.59E-05	4.25E-03	3.15E-23	0.00E+00
INHAL								
ADULT	1.55E-07	1.43E-06	2.47E-07	3.61E-07	5.56E-07	6.44E-05	1.26E-05	0.00E+00
TEEN	2.07E-07	6.16E-06	3.47E-07	4.95E-07	7.67E-07	8.30E-05	1.93E-05	0.00E+00
CHILD	2.37E-07	4.96E-05	4.72E-07	4.80E-07	7.18E-07	1.01E-04	1.61E-05	0.00E+00
INFANT	1.62E-07	4.37E-05	3.61E-07	4.32E-07	4.73E-07	9.24E-05	1.23E-05	0.00E+00

TABLE 5. DOSES TO MAXIMUM INDIVIDUAL (MREM), OCTOBER-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 4A Nearest Cow  
AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 1.22E-03 MILLRADS  
ANNUAL GAMMA AIR DOSE = 1.60E-03 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.07E-03	1.09E-03	2.23E-03
GROUND	6.36E-06	6.36E-06	6.36E-06	6.36E-06	6.36E-06	6.36E-06	6.36E-06	7.48E-06
VEGET								
ADULT	1.85E-07	1.02E-06	7.34E-07	1.96E-07	1.95E-07	3.19E-05	3.33E-19	0.00E+00
TEEN	2.82E-07	1.10E-06	1.17E-06	2.95E-07	2.93E-07	4.29E-05	3.75E-19	0.00E+00
CHILD	5.60E-07	7.31E-07	2.79E-06	4.72E-07	4.65E-07	8.21E-05	4.48E-19	0.00E+00
MEAT								
ADULT	3.32E-08	2.27E-07	1.27E-08	2.81E-08	1.36E-08	8.51E-07	0.00E+00	0.00E+00
TEEN	2.62E-08	1.22E-07	9.90E-09	2.18E-08	1.04E-08	6.16E-07	0.00E+00	0.00E+00
CHILD	4.06E-08	6.16E-08	1.72E-08	2.57E-08	1.23E-08	9.30E-07	0.00E+00	0.00E+00
COW MILK								
ADULT	7.28E-08	1.09E-07	1.00E-07	1.32E-07	1.68E-07	2.43E-05	5.00E-25	0.00E+00
TEEN	1.23E-07	1.32E-07	1.76E-07	2.30E-07	2.93E-07	3.85E-05	1.11E-24	0.00E+00
CHILD	2.38E-07	9.19E-08	4.15E-07	3.79E-07	4.76E-07	7.65E-05	1.76E-24	0.00E+00
INFANT	3.95E-07	2.57E-07	7.93E-07	8.29E-07	7.95E-07	1.86E-04	4.80E-24	0.00E+00
GOATMILK								
ADULT	5.65E-08	4.72E-08	1.30E-07	9.92E-08	1.63E-07	2.91E-05	6.00E-26	0.00E+00
TEEN	9.48E-08	6.24E-08	2.33E-07	1.76E-07	2.90E-07	4.62E-05	1.33E-25	0.00E+00
CHILD	1.79E-07	4.91E-08	5.63E-07	3.04E-07	4.82E-07	9.18E-05	2.12E-25	0.00E+00
INFANT	3.32E-07	6.89E-08	1.09E-06	7.32E-07	8.34E-07	2.23E-04	5.76E-25	0.00E+00
INHAL								
ADULT	2.33E-08	1.23E-07	3.87E-08	5.49E-08	8.46E-08	9.17E-06	1.12E-06	0.00E+00
TEEN	3.12E-08	3.27E-07	5.38E-08	7.53E-08	1.17E-07	1.18E-05	1.67E-06	0.00E+00
CHILD	3.60E-08	2.12E-06	7.27E-08	7.31E-08	1.09E-07	1.43E-05	1.38E-06	0.00E+00
INFANT	2.49E-08	1.85E-06	5.48E-08	6.63E-08	7.16E-08	1.32E-05	9.74E-07	0.00E+00

TABLE 5. DOSES TO MAXIMUM INDIVIDUAL (MREM), OCTOBER-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
 AT 2.80 MILES NNW

ANNUAL BETA AIR DOSE = 1.33E-03 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 1.67E-03 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.12E-03	1.12E-03	1.12E-03	1.12E-03	1.12E-03	1.12E-03	1.13E-03	2.37E-03
GROUND	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.08E-05	1.27E-05
VEGET								
ADULT	3.04E-07	1.71E-06	1.14E-06	3.21E-07	3.15E-07	5.10E-05	1.44E-18	0.00E+00
TEEN	4.65E-07	1.84E-06	1.83E-06	4.85E-07	4.72E-07	6.85E-05	1.63E-18	0.00E+00
CHILD	9.24E-07	1.22E-06	4.37E-06	7.74E-07	7.47E-07	1.31E-04	1.95E-18	0.00E+00
MEAT								
ADULT	5.58E-08	3.83E-07	2.03E-08	4.69E-08	2.25E-08	1.36E-06	0.00E+00	0.00E+00
TEEN	4.41E-08	2.06E-07	1.58E-08	3.64E-08	1.71E-08	9.85E-07	0.00E+00	0.00E+00
CHILD	6.82E-08	1.04E-07	2.74E-08	4.30E-08	2.02E-08	1.49E-06	0.00E+00	0.00E+00
COW MILK								
ADULT	1.19E-07	1.82E-07	1.60E-07	2.16E-07	2.71E-07	3.88E-05	2.17E-24	0.00E+00
TEEN	2.01E-07	2.20E-07	2.82E-07	3.74E-07	4.73E-07	6.16E-05	4.81E-24	0.00E+00
CHILD	3.88E-07	1.52E-07	6.64E-07	6.16E-07	7.69E-07	1.22E-04	7.66E-24	0.00E+00
INFANT	6.43E-07	4.28E-07	1.27E-06	1.35E-06	1.28E-06	2.98E-04	2.08E-23	0.00E+00
GOATMILK								
ADULT	9.06E-08	7.65E-08	2.05E-07	1.59E-07	2.62E-07	4.66E-05	2.60E-25	0.00E+00
TEEN	1.52E-07	1.01E-07	3.69E-07	2.82E-07	4.66E-07	7.39E-05	5.77E-25	0.00E+00
CHILD	2.87E-07	7.95E-08	8.92E-07	4.88E-07	7.72E-07	1.47E-04	9.19E-25	0.00E+00
INFANT	5.32E-07	1.13E-07	1.74E-06	1.17E-06	1.34E-06	3.57E-04	2.50E-24	0.00E+00
INHAL								
ADULT	3.14E-08	2.50E-07	5.17E-08	7.42E-08	1.14E-07	1.26E-05	2.00E-06	0.00E+00
TEEN	4.21E-08	1.03E-06	7.22E-08	1.02E-07	1.58E-07	1.63E-05	3.06E-06	0.00E+00
CHILD	4.85E-08	8.09E-06	9.77E-08	9.88E-08	1.48E-07	1.97E-05	2.56E-06	0.00E+00
INFANT	3.34E-08	7.12E-06	7.40E-08	8.94E-08	9.71E-08	1.81E-05	1.97E-06	0.00E+00

TABLE 6. DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-DECEMBER 2021

SPECIAL LOCATION NO. 1A Site Boundary  
 AT .69 MILES NNW

ANNUAL BETA AIR DOSE = 2.69E-03 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 1.97E-03 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.29E-03	1.29E-03	1.29E-03	1.29E-03	1.29E-03	1.29E-03	1.31E-03	3.23E-03
GROUND	5.72E-04	5.72E-04	5.72E-04	5.72E-04	5.72E-04	5.72E-04	5.72E-04	6.73E-04
VEGET								
ADULT	1.72E-05	9.44E-05	7.87E-05	1.77E-05	1.73E-05	2.73E-03	9.97E-09	0.00E+00
TEEN	2.64E-05	1.02E-04	1.29E-04	2.68E-05	2.59E-05	3.66E-03	1.87E-08	0.00E+00
CHILD	5.28E-05	6.86E-05	3.13E-04	4.27E-05	4.11E-05	7.02E-03	2.84E-08	0.00E+00
MEAT								
ADULT	3.21E-06	2.08E-05	1.40E-06	3.00E-06	1.53E-06	7.28E-05	8.13E-10	0.00E+00
TEEN	2.54E-06	1.12E-05	1.10E-06	2.32E-06	1.16E-06	5.27E-05	7.69E-10	0.00E+00
CHILD	3.92E-06	5.63E-06	1.92E-06	2.73E-06	1.35E-06	7.96E-05	9.04E-10	0.00E+00
COW MILK								
ADULT	7.24E-06	1.10E-05	9.98E-06	1.34E-05	1.56E-05	2.07E-03	6.93E-09	0.00E+00
TEEN	1.23E-05	1.32E-05	1.76E-05	2.32E-05	2.71E-05	3.28E-03	1.43E-08	0.00E+00
CHILD	2.38E-05	9.07E-06	4.15E-05	3.77E-05	4.38E-05	6.52E-03	2.20E-08	0.00E+00
INFANT	3.83E-05	2.99E-05	7.88E-05	8.00E-05	7.20E-05	1.58E-02	3.99E-08	0.00E+00
GOATMILK								
ADULT	5.10E-06	4.51E-06	1.28E-05	8.85E-06	1.41E-05	2.48E-03	2.06E-08	0.00E+00
TEEN	8.49E-06	5.94E-06	2.34E-05	1.56E-05	2.50E-05	3.94E-03	4.26E-08	0.00E+00
CHILD	1.60E-05	4.63E-06	5.70E-05	2.70E-05	4.14E-05	7.82E-03	6.55E-08	0.00E+00
INFANT	2.93E-05	7.14E-06	1.12E-04	6.43E-05	7.16E-05	1.90E-02	1.18E-07	0.00E+00
INHAL								
ADULT	7.74E-07	3.64E-06	1.37E-06	1.77E-06	2.75E-06	3.32E-04	4.57E-05	0.00E+00
TEEN	1.03E-06	6.36E-06	1.93E-06	2.42E-06	3.80E-06	4.26E-04	6.76E-05	0.00E+00
CHILD	1.18E-06	3.02E-05	2.63E-06	2.35E-06	3.56E-06	5.12E-04	5.53E-05	0.00E+00
INFANT	8.03E-07	2.60E-05	1.99E-06	2.12E-06	2.34E-06	4.71E-04	3.72E-05	0.00E+00



TABLE 6. DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 2A Site Boundary  
 AT .67 MILES N

ANNUAL BETA AIR DOSE = 4.35E-03 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 2.92E-03 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.90E-03	1.95E-03	5.05E-03
GROUND	8.19E-04	8.19E-04	8.19E-04	8.19E-04	8.19E-04	8.19E-04	8.19E-04	9.63E-04
VEGET								
ADULT	2.44E-05	1.35E-04	1.11E-04	2.52E-05	2.45E-05	3.86E-03	9.97E-09	0.00E+00
TEEN	3.75E-05	1.46E-04	1.82E-04	3.81E-05	3.67E-05	5.18E-03	1.87E-08	0.00E+00
CHILD	7.51E-05	9.78E-05	4.41E-04	6.06E-05	5.81E-05	9.93E-03	2.84E-08	0.00E+00
MEAT								
ADULT	4.57E-06	2.97E-05	1.97E-06	4.27E-06	2.17E-06	1.03E-04	8.13E-10	0.00E+00
TEEN	3.62E-06	1.60E-05	1.55E-06	3.30E-06	1.64E-06	7.46E-05	7.69E-10	0.00E+00
CHILD	5.59E-06	8.05E-06	2.71E-06	3.89E-06	1.92E-06	1.13E-04	9.04E-10	0.00E+00
COW MILK								
ADULT	1.03E-05	1.57E-05	1.41E-05	1.90E-05	2.22E-05	2.93E-03	6.93E-09	0.00E+00
TEEN	1.74E-05	1.88E-05	2.49E-05	3.28E-05	3.85E-05	4.64E-03	1.43E-08	0.00E+00
CHILD	3.38E-05	1.29E-05	5.86E-05	5.34E-05	6.22E-05	9.23E-03	2.20E-08	0.00E+00
INFANT	5.43E-05	4.26E-05	1.12E-04	1.13E-04	1.02E-04	2.24E-02	3.99E-08	0.00E+00
GOATMILK								
ADULT	7.18E-06	6.42E-06	1.81E-05	1.25E-05	1.99E-05	3.52E-03	2.06E-08	0.00E+00
TEEN	1.20E-05	8.46E-06	3.29E-05	2.21E-05	3.54E-05	5.57E-03	4.26E-08	0.00E+00
CHILD	2.26E-05	6.60E-06	8.03E-05	3.80E-05	5.87E-05	1.11E-02	6.55E-08	0.00E+00
INFANT	4.16E-05	1.02E-05	1.58E-04	9.07E-05	1.01E-04	2.69E-02	1.18E-07	0.00E+00
INHAL								
ADULT	1.23E-06	6.55E-06	2.18E-06	2.83E-06	4.42E-06	5.28E-04	7.47E-05	0.00E+00
TEEN	1.64E-06	1.61E-05	3.07E-06	3.87E-06	6.10E-06	6.79E-04	1.11E-04	0.00E+00
CHILD	1.87E-06	1.03E-04	4.18E-06	3.77E-06	5.72E-06	8.19E-04	9.14E-05	0.00E+00
INFANT	1.28E-06	8.97E-05	3.16E-06	3.40E-06	3.76E-06	7.52E-04	6.35E-05	0.00E+00

TABLE 6. DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 3A Nearest Resident  
 AT .90 MILES NW

ANNUAL BETA AIR DOSE = 2.82E-03 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 3.31E-03 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	2.21E-03	2.21E-03	2.21E-03	2.21E-03	2.21E-03	2.21E-03	2.24E-03	4.77E-03
GROUND	2.18E-04	2.18E-04	2.18E-04	2.18E-04	2.18E-04	2.18E-04	2.18E-04	2.56E-04
VEGET								
ADULT	7.21E-06	3.68E-05	3.69E-05	7.65E-06	7.90E-06	1.27E-03	1.87E-08	0.00E+00
TEEN	1.09E-05	3.99E-05	5.97E-05	1.16E-05	1.18E-05	1.70E-03	3.50E-08	0.00E+00
CHILD	2.18E-05	2.69E-05	1.43E-04	1.85E-05	1.88E-05	3.26E-03	5.33E-08	0.00E+00
MEAT								
ADULT	1.26E-06	7.92E-06	6.35E-07	1.21E-06	6.46E-07	3.38E-05	1.52E-09	0.00E+00
TEEN	9.90E-07	4.25E-06	4.98E-07	9.37E-07	4.89E-07	2.45E-05	1.44E-09	0.00E+00
CHILD	1.53E-06	2.15E-06	8.71E-07	1.11E-06	5.75E-07	3.69E-05	1.69E-09	0.00E+00
COW MILK								
ADULT	3.20E-06	4.50E-06	4.59E-06	5.92E-06	7.06E-06	9.63E-04	1.30E-08	0.00E+00
TEEN	5.38E-06	5.42E-06	8.09E-06	1.02E-05	1.23E-05	1.53E-03	2.68E-08	0.00E+00
CHILD	1.03E-05	3.76E-06	1.91E-05	1.68E-05	1.99E-05	3.03E-03	4.13E-08	0.00E+00
INFANT	1.68E-05	1.22E-05	3.61E-05	3.60E-05	3.29E-05	7.37E-03	7.48E-08	0.00E+00
GOATMILK								
ADULT	2.51E-06	2.01E-06	6.15E-06	4.34E-06	6.62E-06	1.16E-03	3.86E-08	0.00E+00
TEEN	4.06E-06	2.67E-06	1.11E-05	7.67E-06	1.18E-05	1.83E-03	7.98E-08	0.00E+00
CHILD	7.44E-06	2.09E-06	2.70E-05	1.32E-05	1.95E-05	3.64E-03	1.23E-07	0.00E+00
INFANT	1.36E-05	3.11E-06	5.21E-05	3.13E-05	3.37E-05	8.84E-03	2.22E-07	0.00E+00
INHAL								
ADULT	2.32E-07	1.47E-06	4.15E-07	5.40E-07	8.45E-07	9.88E-05	1.37E-05	0.00E+00
TEEN	3.10E-07	4.65E-06	5.84E-07	7.40E-07	1.17E-06	1.27E-04	2.07E-05	0.00E+00
CHILD	3.55E-07	3.33E-05	7.94E-07	7.20E-07	1.09E-06	1.54E-04	1.71E-05	0.00E+00
INFANT	2.44E-07	2.92E-05	5.98E-07	6.51E-07	7.19E-07	1.41E-04	1.24E-05	0.00E+00

TABLE 6. DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 4A Nearest Cow  
AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 1.41E-03 MILLRADS  
ANNUAL GAMMA AIR DOSE = 1.90E-03 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.27E-03	1.27E-03	1.27E-03	1.27E-03	1.27E-03	1.27E-03	1.29E-03	2.63E-03
GROUND	1.21E-05	1.21E-05	1.21E-05	1.21E-05	1.21E-05	1.21E-05	1.21E-05	1.43E-05
VEGET								
ADULT	4.26E-07	2.09E-06	2.31E-06	4.58E-07	4.86E-07	7.86E-05	1.59E-09	0.00E+00
TEEN	6.44E-07	2.27E-06	3.72E-06	6.93E-07	7.29E-07	1.06E-04	2.98E-09	0.00E+00
CHILD	1.28E-06	1.54E-06	8.90E-06	1.11E-06	1.16E-06	2.02E-04	4.53E-09	0.00E+00
MEAT								
ADULT	7.14E-08	4.43E-07	3.92E-08	7.02E-08	3.84E-08	2.10E-06	1.29E-10	0.00E+00
TEEN	5.62E-08	2.38E-07	3.07E-08	5.44E-08	2.91E-08	1.52E-06	1.23E-10	0.00E+00
CHILD	8.66E-08	1.20E-07	5.37E-08	6.43E-08	3.43E-08	2.29E-06	1.44E-10	0.00E+00
COW MILK								
ADULT	1.95E-07	2.62E-07	2.84E-07	3.59E-07	4.32E-07	5.97E-05	1.10E-09	0.00E+00
TEEN	3.25E-07	3.16E-07	5.00E-07	6.21E-07	7.51E-07	9.46E-05	2.28E-09	0.00E+00
CHILD	6.22E-07	2.20E-07	1.18E-06	1.02E-06	1.22E-06	1.88E-04	3.51E-09	0.00E+00
INFANT	1.01E-06	7.12E-07	2.23E-06	2.20E-06	2.02E-06	4.57E-04	6.35E-09	0.00E+00
GOATMILK								
ADULT	1.60E-07	1.22E-07	3.89E-07	2.75E-07	4.12E-07	7.16E-05	3.28E-09	0.00E+00
TEEN	2.55E-07	1.62E-07	7.00E-07	4.87E-07	7.33E-07	1.14E-04	6.79E-09	0.00E+00
CHILD	4.62E-07	1.27E-07	1.70E-06	8.41E-07	1.21E-06	2.26E-04	1.04E-08	0.00E+00
INFANT	8.43E-07	1.87E-07	3.25E-06	1.98E-06	2.10E-06	5.48E-04	1.89E-08	0.00E+00
INHAL								
ADULT	3.81E-08	2.25E-07	6.94E-08	8.88E-08	1.39E-07	1.55E-05	1.59E-06	0.00E+00
TEEN	5.09E-08	5.68E-07	9.66E-08	1.22E-07	1.91E-07	1.99E-05	2.39E-06	0.00E+00
CHILD	5.84E-08	3.46E-06	1.31E-07	1.19E-07	1.79E-07	2.41E-05	1.98E-06	0.00E+00
INFANT	4.05E-08	3.01E-06	9.74E-08	1.08E-07	1.18E-07	2.21E-05	1.43E-06	0.00E+00

TABLE 6. DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
AT 2.80 MILES NNW

ANNUAL BETA AIR DOSE = 1.61E-03 MILLRADS  
ANNUAL GAMMA AIR DOSE = 2.13E-03 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.43E-03	1.44E-03	2.97E-03
GROUND	2.01E-05	2.01E-05	2.01E-05	2.01E-05	2.01E-05	2.01E-05	2.01E-05	2.36E-05
VEGET								
ADULT	6.91E-07	3.43E-06	3.67E-06	7.40E-07	7.78E-07	1.25E-04	2.31E-09	0.00E+00
TEEN	1.05E-06	3.73E-06	5.93E-06	1.12E-06	1.17E-06	1.68E-04	4.32E-09	0.00E+00
CHILD	2.08E-06	2.52E-06	1.42E-05	1.80E-06	1.85E-06	3.23E-04	6.57E-09	0.00E+00
MEAT								
ADULT	1.17E-07	7.32E-07	6.26E-08	1.14E-07	6.21E-08	3.35E-06	1.88E-10	0.00E+00
TEEN	9.24E-08	3.93E-07	4.91E-08	8.87E-08	4.71E-08	2.42E-06	1.78E-10	0.00E+00
CHILD	1.42E-07	1.98E-07	8.58E-08	1.05E-07	5.54E-08	3.66E-06	2.09E-10	0.00E+00
COW MILK								
ADULT	3.13E-07	4.27E-07	4.54E-07	5.77E-07	6.92E-07	9.53E-05	1.60E-09	0.00E+00
TEEN	5.24E-07	5.15E-07	7.99E-07	9.99E-07	1.20E-06	1.51E-04	3.31E-09	0.00E+00
CHILD	1.00E-06	3.59E-07	1.88E-06	1.64E-06	1.95E-06	3.00E-04	5.10E-09	0.00E+00
INFANT	1.63E-06	1.16E-06	3.56E-06	3.52E-06	3.24E-06	7.30E-04	9.22E-09	0.00E+00
GOATMILK								
ADULT	2.54E-07	1.97E-07	6.17E-07	4.36E-07	6.57E-07	1.14E-04	4.77E-09	0.00E+00
TEEN	4.05E-07	2.61E-07	1.11E-06	7.71E-07	1.17E-06	1.81E-04	9.85E-09	0.00E+00
CHILD	7.38E-07	2.05E-07	2.69E-06	1.33E-06	1.94E-06	3.60E-04	1.51E-08	0.00E+00
INFANT	1.35E-06	3.01E-07	5.17E-06	3.14E-06	3.35E-06	8.76E-04	2.74E-08	0.00E+00
INHAL								
ADULT	5.29E-08	3.32E-07	9.58E-08	1.24E-07	1.93E-07	2.18E-05	2.47E-06	0.00E+00
TEEN	7.06E-08	9.71E-07	1.34E-07	1.69E-07	2.67E-07	2.81E-05	3.74E-06	0.00E+00
CHILD	8.10E-08	6.56E-06	1.81E-07	1.65E-07	2.50E-07	3.40E-05	3.10E-06	0.00E+00
INFANT	5.61E-08	5.73E-06	1.36E-07	1.50E-07	1.64E-07	3.12E-05	2.29E-06	0.00E+00

TABLE 7. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-DECEMBER 2021

SPECIAL LOCATION NO. 1A Site Boundary  
 AT .69 MILES NNW

ANNUAL BETA AIR DOSE = 3.80E-03 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 2.82E-03 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.86E-03	1.86E-03	1.86E-03	1.86E-03	1.86E-03	1.86E-03	1.90E-03	4.96E-03
GROUND	7.31E-04	7.31E-04	7.31E-04	7.31E-04	7.31E-04	7.31E-04	7.31E-04	8.60E-04
VEGET								
ADULT	3.30E-05	1.24E-04	3.30E-04	3.24E-05	2.75E-05	4.02E-03	1.12E-06	0.00E+00
TEEN	4.54E-05	1.35E-04	4.83E-04	4.98E-05	4.15E-05	5.39E-03	2.10E-06	0.00E+00
CHILD	8.42E-05	9.20E-05	1.06E-03	8.18E-05	6.62E-05	1.03E-02	3.20E-06	0.00E+00
MEAT								
ADULT	4.38E-06	2.57E-05	4.84E-06	4.06E-06	1.91E-06	1.07E-04	9.17E-08	0.00E+00
TEEN	3.27E-06	1.38E-05	3.61E-06	3.18E-06	1.47E-06	7.74E-05	8.68E-08	0.00E+00
CHILD	4.83E-06	6.99E-06	6.11E-06	3.85E-06	1.76E-06	1.17E-04	1.02E-07	0.00E+00
COW MILK								
ADULT	1.36E-05	1.35E-05	2.79E-05	2.31E-05	2.33E-05	3.07E-03	7.76E-07	0.00E+00
TEEN	1.97E-05	1.65E-05	4.73E-05	4.04E-05	4.08E-05	4.86E-03	1.60E-06	0.00E+00
CHILD	3.30E-05	1.16E-05	1.09E-04	6.78E-05	6.66E-05	9.68E-03	2.47E-06	0.00E+00
INFANT	5.25E-05	3.11E-05	1.78E-04	1.44E-04	1.11E-04	2.35E-02	4.46E-06	0.00E+00
GOATMILK								
ADULT	2.11E-05	7.27E-06	5.33E-05	3.32E-05	2.77E-05	3.68E-03	2.33E-06	0.00E+00
TEEN	2.53E-05	9.70E-06	9.07E-05	5.86E-05	4.92E-05	5.83E-03	4.81E-06	0.00E+00
CHILD	3.34E-05	7.68E-06	2.09E-04	1.01E-04	8.16E-05	1.16E-02	7.40E-06	0.00E+00
INFANT	5.26E-05	1.00E-05	3.34E-04	2.16E-04	1.39E-04	2.82E-02	1.34E-05	0.00E+00
INHAL								
ADULT	1.22E-06	8.18E-06	3.96E-06	2.73E-06	4.23E-06	4.79E-04	6.49E-05	0.00E+00
TEEN	1.56E-06	3.44E-05	5.10E-06	3.76E-06	5.84E-06	6.19E-04	1.00E-04	0.00E+00
CHILD	1.73E-06	2.74E-04	6.51E-06	3.67E-06	5.48E-06	7.55E-04	8.39E-05	0.00E+00
INFANT	1.18E-06	2.41E-04	4.01E-06	3.33E-06	3.61E-06	6.94E-04	6.53E-05	0.00E+00

TABLE 7. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 2A Site Boundary  
 AT .67 MILES N

ANNUAL BETA AIR DOSE = 4.97E-03 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 3.45E-03 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	2.27E-03	2.27E-03	2.27E-03	2.27E-03	2.27E-03	2.27E-03	2.32E-03	6.26E-03
GROUND	9.65E-04	9.65E-04	9.65E-04	9.65E-04	9.65E-04	9.65E-04	9.65E-04	1.14E-03
VEGET								
ADULT	4.36E-05	1.63E-04	4.35E-04	4.27E-05	3.62E-05	5.29E-03	1.48E-06	0.00E+00
TEEN	5.99E-05	1.78E-04	6.38E-04	6.57E-05	5.46E-05	7.10E-03	2.77E-06	0.00E+00
CHILD	1.11E-04	1.21E-04	1.40E-03	1.08E-04	8.72E-05	1.36E-02	4.22E-06	0.00E+00
MEAT								
ADULT	5.78E-06	3.40E-05	6.38E-06	5.36E-06	2.52E-06	1.41E-04	1.21E-07	0.00E+00
TEEN	4.31E-06	1.83E-05	4.76E-06	4.19E-06	1.94E-06	1.02E-04	1.14E-07	0.00E+00
CHILD	6.37E-06	9.23E-06	8.07E-06	5.09E-06	2.32E-06	1.54E-04	1.34E-07	0.00E+00
COW MILK								
ADULT	1.80E-05	1.78E-05	3.68E-05	3.05E-05	3.07E-05	4.03E-03	1.02E-06	0.00E+00
TEEN	2.59E-05	2.17E-05	6.24E-05	5.32E-05	5.37E-05	6.40E-03	2.12E-06	0.00E+00
CHILD	4.34E-05	1.53E-05	1.43E-04	8.93E-05	8.77E-05	1.27E-02	3.25E-06	0.00E+00
INFANT	6.92E-05	4.10E-05	2.35E-04	1.90E-04	1.46E-04	3.09E-02	5.88E-06	0.00E+00
GOATMILK								
ADULT	2.78E-05	9.58E-06	7.02E-05	4.37E-05	3.65E-05	4.84E-03	3.07E-06	0.00E+00
TEEN	3.34E-05	1.28E-05	1.20E-04	7.72E-05	6.48E-05	7.68E-03	6.35E-06	0.00E+00
CHILD	4.40E-05	1.01E-05	2.76E-04	1.34E-04	1.07E-04	1.53E-02	9.75E-06	0.00E+00
INFANT	6.92E-05	1.32E-05	4.40E-04	2.84E-04	1.83E-04	3.71E-02	1.76E-05	0.00E+00
INHAL								
ADULT	1.74E-06	1.19E-05	5.73E-06	3.90E-06	6.02E-06	6.82E-04	9.48E-05	0.00E+00
TEEN	2.23E-06	5.01E-05	7.36E-06	5.36E-06	8.32E-06	8.82E-04	1.46E-04	0.00E+00
CHILD	2.47E-06	3.99E-04	9.39E-06	5.24E-06	7.80E-06	1.07E-03	1.23E-04	0.00E+00
INFANT	1.68E-06	3.51E-04	5.77E-06	4.74E-06	5.14E-06	9.88E-04	9.54E-05	0.00E+00

TABLE 7. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 3A Nearest Resident  
 AT .90 MILES NW

ANNUAL BETA AIR DOSE = 3.00E-04 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 4.72E-04 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	3.16E-04	3.16E-04	3.16E-04	3.16E-04	3.16E-04	3.16E-04	3.19E-04	6.29E-04
GROUND	1.56E-03	1.56E-03	1.56E-03	1.56E-03	1.56E-03	1.56E-03	1.56E-03	1.83E-03
VEGET								
ADULT	3.84E-05	2.23E-04	1.66E-04	3.30E-05	1.47E-05	1.27E-03	1.44E-06	0.00E+00
TEEN	5.50E-05	2.39E-04	2.42E-04	5.11E-05	2.22E-05	1.71E-03	2.66E-06	0.00E+00
CHILD	1.04E-04	1.58E-04	5.30E-04	8.16E-05	3.49E-05	3.28E-03	4.02E-06	0.00E+00
MEAT								
ADULT	8.49E-06	5.71E-05	3.71E-06	7.64E-06	2.63E-06	3.40E-05	2.83E-07	0.00E+00
TEEN	6.54E-06	3.07E-05	2.77E-06	5.94E-06	1.96E-06	2.47E-05	2.58E-07	0.00E+00
CHILD	9.93E-06	1.55E-05	4.62E-06	7.08E-06	2.27E-06	3.72E-05	2.95E-07	0.00E+00
COW MILK								
ADULT	1.33E-05	2.16E-05	1.79E-05	2.30E-05	1.59E-05	9.65E-04	7.83E-07	0.00E+00
TEEN	1.94E-05	2.53E-05	3.00E-05	3.94E-05	2.68E-05	1.53E-03	1.61E-06	0.00E+00
CHILD	3.33E-05	1.67E-05	6.73E-05	6.34E-05	4.21E-05	3.03E-03	2.48E-06	0.00E+00
INFANT	4.67E-05	5.61E-05	1.04E-04	1.21E-04	6.42E-05	7.38E-03	4.50E-06	0.00E+00
GOATMILK								
ADULT	1.64E-05	4.84E-06	3.23E-05	2.54E-05	1.41E-05	1.16E-03	2.27E-06	0.00E+00
TEEN	1.77E-05	6.08E-06	5.54E-05	4.46E-05	2.49E-05	1.83E-03	4.70E-06	0.00E+00
CHILD	1.95E-05	4.46E-06	1.28E-04	7.68E-05	4.10E-05	3.64E-03	7.22E-06	0.00E+00
INFANT	2.62E-05	9.18E-06	2.00E-04	1.55E-04	6.77E-05	8.85E-03	1.31E-05	0.00E+00
INHAL								
ADULT	1.54E-06	4.70E-06	2.28E-06	2.81E-06	2.36E-06	8.69E-05	7.77E-05	0.00E+00
TEEN	2.05E-06	6.63E-06	3.01E-06	3.85E-06	3.25E-06	1.11E-04	1.14E-04	0.00E+00
CHILD	2.44E-06	2.48E-05	3.91E-06	3.73E-06	3.04E-06	1.33E-04	9.28E-05	0.00E+00
INFANT	1.66E-06	2.31E-05	2.65E-06	3.34E-06	1.99E-06	1.22E-04	6.06E-05	0.00E+00

TABLE 7. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 4A Nearest Cow  
AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 1.34E-03 MILLRADS  
ANNUAL GAMMA AIR DOSE = 1.84E-03 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	1.23E-03	1.23E-03	1.23E-03	1.23E-03	1.23E-03	1.23E-03	1.25E-03	2.53E-03
GROUND	1.53E-05	1.53E-05	1.53E-05	1.53E-05	1.53E-05	1.53E-05	1.53E-05	1.80E-05
VEGET								
ADULT	8.02E-07	2.70E-06	7.60E-06	8.40E-07	7.84E-07	1.19E-04	2.87E-08	0.00E+00
TEEN	1.09E-06	2.96E-06	1.12E-05	1.29E-06	1.18E-06	1.60E-04	5.38E-08	0.00E+00
CHILD	2.01E-06	2.04E-06	2.49E-05	2.13E-06	1.89E-06	3.07E-04	8.18E-08	0.00E+00
MEAT								
ADULT	9.75E-08	5.39E-07	1.14E-07	9.61E-08	4.93E-08	3.18E-06	2.34E-09	0.00E+00
TEEN	7.21E-08	2.90E-07	8.56E-08	7.52E-08	3.81E-08	2.30E-06	2.22E-09	0.00E+00
CHILD	1.06E-07	1.47E-07	1.46E-07	9.17E-08	4.59E-08	3.48E-06	2.61E-09	0.00E+00
COW MILK								
ADULT	3.62E-07	3.23E-07	6.99E-07	6.19E-07	6.55E-07	9.09E-05	1.99E-08	0.00E+00
TEEN	5.25E-07	3.98E-07	1.20E-06	1.08E-06	1.15E-06	1.44E-04	4.10E-08	0.00E+00
CHILD	8.81E-07	2.84E-07	2.77E-06	1.82E-06	1.88E-06	2.87E-04	6.31E-08	0.00E+00
INFANT	1.43E-06	7.49E-07	4.66E-06	3.92E-06	3.16E-06	6.97E-04	1.14E-07	0.00E+00
GOATMILK								
ADULT	5.63E-07	1.94E-07	1.31E-06	8.93E-07	7.87E-07	1.09E-04	5.95E-08	0.00E+00
TEEN	6.87E-07	2.60E-07	2.25E-06	1.58E-06	1.40E-06	1.73E-04	1.23E-07	0.00E+00
CHILD	9.27E-07	2.07E-07	5.24E-06	2.74E-06	2.32E-06	3.44E-04	1.89E-07	0.00E+00
INFANT	1.49E-06	2.62E-07	8.57E-06	5.86E-06	3.96E-06	8.36E-04	3.42E-07	0.00E+00
INHAL								
ADULT	6.58E-08	2.67E-07	1.66E-07	1.47E-07	2.15E-07	2.20E-05	1.78E-06	0.00E+00
TEEN	8.56E-08	6.33E-07	2.17E-07	2.02E-07	2.97E-07	2.84E-05	2.69E-06	0.00E+00
CHILD	9.74E-08	3.69E-06	2.82E-07	1.97E-07	2.78E-07	3.45E-05	2.23E-06	0.00E+00
INFANT	6.75E-08	3.22E-06	1.84E-07	1.80E-07	1.83E-07	3.17E-05	1.62E-06	0.00E+00



TABLE 7. DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
 AT 2.80 MILES NNW

ANNUAL BETA AIR DOSE = 6.85E-04 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 7.06E-04 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	4.72E-04	4.72E-04	4.72E-04	4.72E-04	4.72E-04	4.72E-04	4.79E-04	1.05E-03
GROUND	2.61E-05	2.61E-05	2.61E-05	2.61E-05	2.61E-05	2.61E-05	2.61E-05	3.07E-05
VEGET								
ADULT	1.35E-06	4.60E-06	1.29E-05	1.40E-06	1.29E-06	1.96E-04	4.80E-08	0.00E+00
TEEN	1.84E-06	5.04E-06	1.90E-05	2.15E-06	1.95E-06	2.63E-04	8.99E-08	0.00E+00
CHILD	3.38E-06	3.46E-06	4.21E-05	3.54E-06	3.12E-06	5.03E-04	1.37E-07	0.00E+00
MEAT								
ADULT	1.66E-07	9.23E-07	1.92E-07	1.62E-07	8.23E-08	5.22E-06	3.92E-09	0.00E+00
TEEN	1.23E-07	4.97E-07	1.44E-07	1.27E-07	6.36E-08	3.78E-06	3.71E-09	0.00E+00
CHILD	1.80E-07	2.51E-07	2.46E-07	1.54E-07	7.64E-08	5.70E-06	4.36E-09	0.00E+00
COW MILK								
ADULT	6.02E-07	5.43E-07	1.17E-06	1.03E-06	1.08E-06	1.49E-04	3.32E-08	0.00E+00
TEEN	8.72E-07	6.67E-07	2.00E-06	1.79E-06	1.89E-06	2.36E-04	6.86E-08	0.00E+00
CHILD	1.46E-06	4.76E-07	4.62E-06	3.02E-06	3.10E-06	4.70E-04	1.05E-07	0.00E+00
INFANT	2.37E-06	1.26E-06	7.75E-06	6.49E-06	5.20E-06	1.14E-03	1.91E-07	0.00E+00
GOATMILK								
ADULT	9.35E-07	3.21E-07	2.20E-06	1.48E-06	1.30E-06	1.79E-04	9.95E-08	0.00E+00
TEEN	1.14E-06	4.29E-07	3.78E-06	2.62E-06	2.30E-06	2.83E-04	2.06E-07	0.00E+00
CHILD	1.53E-06	3.41E-07	8.78E-06	4.54E-06	3.82E-06	5.64E-04	3.16E-07	0.00E+00
INFANT	2.45E-06	4.35E-07	1.43E-05	9.71E-06	6.52E-06	1.37E-03	5.72E-07	0.00E+00
INHAL								
ADULT	7.49E-08	3.41E-07	2.21E-07	1.70E-07	2.68E-07	3.03E-05	2.63E-06	0.00E+00
TEEN	9.61E-08	8.13E-07	2.87E-07	2.34E-07	3.69E-07	3.91E-05	3.96E-06	0.00E+00
CHILD	1.07E-07	4.83E-06	3.69E-07	2.29E-07	3.46E-07	4.75E-05	3.27E-06	0.00E+00
INFANT	7.33E-08	4.20E-06	2.35E-07	2.08E-07	2.28E-07	4.37E-05	2.34E-06	0.00E+00

TABLE 8. DOSES TO POPULATION WITHIN 50 MILES, JANUARY-MARCH 2021

ALARA ANNUAL INTEGRATED POPULATION DOSE SUMMARY (PERSON-REM)

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	: 2.97E-06	: 2.97E-06	: 2.97E-06	: 2.97E-06	: 2.97E-06	: 2.97E-06	: 3.00E-06	: 6.22E-06
	: 52.23%	: 55.08%	: 35.81%	: 44.06%	: 49.96%	: 2.38%	: 56.77%	: 74.98%
GROUND	: 1.77E-06	: 1.77E-06	: 1.77E-06	: 1.77E-06	: 1.77E-06	: 1.77E-06	: 1.77E-06	: 2.08E-06
	: 31.16%	: 32.87%	: 21.37%	: 26.29%	: 29.81%	: 1.42%	: 33.53%	: 25.02%
INHAL	: 3.91E-08	: 1.25E-07	: 8.42E-08	: 9.01E-08	: 1.33E-07	: 1.59E-05	: 3.29E-07	: 0.00E+00
	: .69%	: 2.33%	: 1.02%	: 1.34%	: 2.24%	: 12.72%	: 6.24%	: .00%
VEGET	: 3.38E-07	: 3.46E-07	: 2.06E-06	: 6.42E-07	: 2.15E-07	: 1.25E-06	: 7.19E-08	: 0.00E+00
	: 5.95%	: 6.42%	: 24.82%	: 9.53%	: 3.63%	: 1.00%	: 1.36%	: .00%
COW MILK	: 5.27E-07	: 1.16E-07	: 1.33E-06	: 1.20E-06	: 8.26E-07	: 1.01E-04	: 1.05E-07	: 0.00E+00
	: 9.27%	: 2.15%	: 16.11%	: 17.88%	: 13.90%	: 80.80%	: 1.98%	: .00%
MEAT	: 3.95E-08	: 6.23E-08	: 7.28E-08	: 6.11E-08	: 2.81E-08	: 2.08E-06	: 5.89E-09	: 0.00E+00
	: .70%	: 1.16%	: .88%	: .91%	: .47%	: 1.67%	: .11%	: .00%
*TOTAL*	: 5.68E-06	: 5.39E-06	: 8.29E-06	: 6.73E-06	: 5.94E-06	: 1.25E-04	: 5.28E-06	: 8.30E-06

TABLE 9. DOSES TO POPULATION WITHIN 50 MILES, APRIL-JUNE 2021

ALARA ANNUAL INTEGRATED POPULATION DOSE SUMMARY (PERSON-REM)

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	: 6.73E-05	: 6.73E-05	: 6.73E-05	: 6.73E-05	: 6.73E-05	: 6.73E-05	: 6.81E-05	: 1.50E-04
	: 85.62%	: 84.38%	: 66.14%	: 85.08%	: 85.72%	: 23.86%	: 85.80%	: 93.05%
GROUND	: 9.56E-06	: 9.56E-06	: 9.56E-06	: 9.56E-06	: 9.56E-06	: 9.56E-06	: 9.56E-06	: 1.12E-05
	: 12.17%	: 11.99%	: 9.40%	: 12.09%	: 12.18%	: 3.39%	: 12.04%	: 6.95%
INHAL	: 7.78E-08	: 4.15E-07	: 3.80E-07	: 1.67E-07	: 2.54E-07	: 2.76E-05	: 1.55E-06	: 0.00E+00
	: .10%	: .52%	: .37%	: .21%	: .32%	: 9.78%	: 1.96%	: .00%
VEGET	: 8.75E-07	: 1.71E-06	: 2.09E-05	: 6.25E-07	: 1.87E-07	: 2.12E-06	: 6.14E-08	: 0.00E+00
	: 1.11%	: 2.15%	: 20.57%	: .79%	: .24%	: .75%	: .08%	: .00%
COW MILK	: 6.84E-07	: 3.11E-07	: 3.26E-06	: 1.36E-06	: 1.18E-06	: 1.72E-04	: 9.53E-08	: 0.00E+00
	: .87%	: .39%	: 3.21%	: 1.72%	: 1.50%	: 60.96%	: .12%	: .00%
MEAT	: 1.01E-07	: 4.54E-07	: 3.08E-07	: 8.47E-08	: 3.40E-08	: 3.54E-06	: 5.28E-09	: 0.00E+00
	: .13%	: .57%	: .30%	: .11%	: .04%	: 1.25%	: .01%	: .00%
*TOTAL*	: 7.85E-05	: 7.97E-05	: 1.02E-04	: 7.90E-05	: 7.85E-05	: 2.82E-04	: 7.94E-05	: 1.62E-04

TABLE 10. DOSES TO POPULATION WITHIN 50 MILES, JANUARY-JUNE 2021

ALARA ANNUAL INTEGRATED POPULATION DOSE SUMMARY (PERSON-REM)

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	: 6.92E-05 : : 83.60% :	: 6.92E-05 : : 82.74% :	: 6.92E-05 : : 63.77% :	: 6.92E-05 : : 82.05% :	: 6.92E-05 : : 83.43% :	: 6.92E-05 : : 17.12% :	: 7.01E-05 : : 84.15% :	: 1.54E-04 : : 92.32% :
GROUND	: 1.09E-05 : : 13.16% :	: 1.09E-05 : : 13.02% :	: 1.09E-05 : : 10.04% :	: 1.09E-05 : : 12.91% :	: 1.09E-05 : : 13.13% :	: 1.09E-05 : : 2.69% :	: 1.09E-05 : : 13.08% :	: 1.28E-05 : : 7.68% :
INHAL	: 1.17E-07 : : .14% :	: 5.47E-07 : : .65% :	: 4.80E-07 : : .44% :	: 2.57E-07 : : .31% :	: 3.86E-07 : : .47% :	: 4.36E-05 : : 10.77% :	: 1.96E-06 : : 2.36% :	: 0.00E+00 : : .00% :
VEGET	: 1.21E-06 : : 1.47% :	: 2.06E-06 : : 2.46% :	: 2.30E-05 : : 21.16% :	: 1.27E-06 : : 1.51% :	: 4.04E-07 : : .49% :	: 3.37E-06 : : .83% :	: 1.34E-07 : : .16% :	: 0.00E+00 : : .00% :
COW MILK	: 1.21E-06 : : 1.46% :	: 4.26E-07 : : .51% :	: 4.60E-06 : : 4.24% :	: 2.57E-06 : : 3.05% :	: 2.00E-06 : : 2.41% :	: 2.72E-04 : : 67.20% :	: 2.01E-07 : : .24% :	: 0.00E+00 : : .00% :
MEAT	: 1.41E-07 : : .17% :	: 5.16E-07 : : .62% :	: 3.81E-07 : : .35% :	: 1.46E-07 : : .17% :	: 6.22E-08 : : .07% :	: 5.60E-06 : : 1.38% :	: 1.12E-08 : : .01% :	: 0.00E+00 : : .00% :
*TOTAL*	: 8.28E-05	: 8.37E-05	: 1.09E-04	: 8.44E-05	: 8.30E-05	: 4.04E-04	: 8.33E-05	: 1.67E-04

TABLE 11. DOSES TO POPULATION WITHIN 50 MILES, JULY-SEPTEMBER 2021

ALARA ANNUAL INTEGRATED POPULATION DOSE SUMMARY (PERSON-REM)

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	: 7.20E-05	: 7.20E-05	: 7.20E-05	: 7.20E-05	: 7.20E-05	: 7.20E-05	: 7.30E-05	: 1.67E-04
	: 82.91%	: 80.43%	: 79.12%	: 82.23%	: 82.31%	: 19.93%	: 81.66%	: 91.52%
GROUND	: 1.32E-05	: 1.32E-05	: 1.32E-05	: 1.32E-05	: 1.32E-05	: 1.32E-05	: 1.32E-05	: 1.55E-05
	: 15.14%	: 14.69%	: 14.45%	: 15.02%	: 15.03%	: 3.64%	: 14.71%	: 8.48%
INHAL	: 9.18E-08	: 9.13E-07	: 1.99E-07	: 1.98E-07	: 3.15E-07	: 4.18E-05	: 3.23E-06	: 0.00E+00
	: .11%	: 1.02%	: .22%	: .23%	: .36%	: 11.56%	: 3.61%	: .00%
VEGET	: 5.32E-07	: 2.10E-06	: 3.93E-06	: 4.12E-07	: 1.60E-07	: 2.81E-06	: 9.58E-09	: 0.00E+00
	: .61%	: 2.34%	: 4.31%	: .47%	: .18%	: .78%	: .01%	: .00%
COW MILK	: 9.18E-07	: 7.16E-07	: 1.61E-06	: 1.64E-06	: 1.75E-06	: 2.27E-04	: 1.27E-08	: 0.00E+00
	: 1.06%	: .80%	: 1.77%	: 1.87%	: 2.00%	: 62.79%	: .01%	: .00%
MEAT	: 1.49E-07	: 6.39E-07	: 1.16E-07	: 1.65E-07	: 9.81E-08	: 4.72E-06	: 7.58E-10	: 0.00E+00
	: .17%	: .71%	: .13%	: .19%	: .11%	: 1.31%	: .00%	: .00%
*TOTAL*	: 8.69E-05	: 8.95E-05	: 9.10E-05	: 8.76E-05	: 8.75E-05	: 3.61E-04	: 8.94E-05	: 1.82E-04

TABLE 12. DOSES TO POPULATION WITHIN 50 MILES, OCTOBER-DECEMBER 2021

ALARA ANNUAL INTEGRATED POPULATION DOSE SUMMARY (PERSON-REM)

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	: 1.93E-03 : : 98.92% :	: 1.93E-03 : : 98.71% :	: 1.93E-03 : : 98.78% :	: 1.93E-03 : : 98.90% :	: 1.93E-03 : : 98.90% :	: 1.93E-03 : : 85.25% :	: 1.97E-03 : : 98.74% :	: 5.08E-03 : : 99.56% :
GROUND	: 1.92E-05 : : .98% :	: 1.92E-05 : : .98% :	: 1.92E-05 : : .98% :	: 1.92E-05 : : .98% :	: 1.92E-05 : : .98% :	: 1.92E-05 : : .85% :	: 1.92E-05 : : .96% :	: 2.25E-05 : : .44% :
INHAL	: 1.27E-07 : : .01% :	: 9.19E-07 : : .05% :	: 2.28E-07 : : .01% :	: 2.82E-07 : : .01% :	: 4.40E-07 : : .02% :	: 5.47E-05 : : 2.42% :	: 5.96E-06 : : .30% :	: 0.00E+00 : : .00% :
VEGET	: 6.72E-07 : : .03% :	: 3.29E-06 : : .17% :	: 3.11E-06 : : .16% :	: 4.46E-07 : : .02% :	: 1.24E-07 : : .01% :	: 3.14E-06 : : .14% :	: 0.00E+00 : : .00% :	: 0.00E+00 : : .00% :
COW MILK	: 8.11E-07 : : .04% :	: 7.48E-07 : : .04% :	: 1.31E-06 : : .07% :	: 1.37E-06 : : .07% :	: 1.68E-06 : : .09% :	: 2.52E-04 : : 11.12% :	: 1.99E-34 : : .00% :	: 0.00E+00 : : .00% :
MEAT	: 1.89E-07 : : .01% :	: 1.02E-06 : : .05% :	: 8.36E-08 : : .00% :	: 1.53E-07 : : .01% :	: 7.64E-08 : : .00% :	: 5.24E-06 : : .23% :	: 0.00E+00 : : .00% :	: 0.00E+00 : : .00% :
*TOTAL*	: 1.95E-03	: 1.95E-03	: 1.95E-03	: 1.95E-03	: 1.95E-03	: 2.26E-03	: 1.99E-03	: 5.11E-03

TABLE 13. DOSES TO POPULATION WITHIN 50 MILES, JULY-DECEMBER 2021

ALARA ANNUAL INTEGRATED POPULATION DOSE SUMMARY (PERSON-REM)

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	: 1.88E-03	: 1.88E-03	: 1.88E-03	: 1.88E-03	: 1.88E-03	: 1.88E-03	: 1.92E-03	: 5.06E-03
	: 98.12%	: 97.77%	: 97.76%	: 98.06%	: 98.06%	: 75.13%	: 97.88%	: 99.25%
GROUND	: 3.27E-05	: 3.27E-05	: 3.27E-05	: 3.27E-05	: 3.27E-05	: 3.27E-05	: 3.27E-05	: 3.84E-05
	: 1.70%	: 1.70%	: 1.69%	: 1.70%	: 1.70%	: 1.30%	: 1.66%	: .75%
INHAL	: 2.18E-07	: 1.78E-06	: 4.28E-07	: 4.78E-07	: 7.53E-07	: 9.63E-05	: 8.97E-06	: 0.00E+00
	: .01%	: .09%	: .02%	: .02%	: .04%	: 3.84%	: .46%	: .00%
VEGET	: 1.20E-06	: 5.38E-06	: 7.05E-06	: 8.56E-07	: 2.83E-07	: 5.94E-06	: 9.38E-09	: 0.00E+00
	: .06%	: .28%	: .37%	: .04%	: .01%	: .24%	: .00%	: .00%
COW MILK	: 1.73E-06	: 1.46E-06	: 2.92E-06	: 3.00E-06	: 3.43E-06	: 4.79E-04	: 1.24E-08	: 0.00E+00
	: .09%	: .08%	: .15%	: .16%	: .18%	: 19.09%	: .00%	: .00%
MEAT	: 3.38E-07	: 1.66E-06	: 2.00E-07	: 3.17E-07	: 1.74E-07	: 9.97E-06	: 7.38E-10	: 0.00E+00
	: .02%	: .09%	: .01%	: .02%	: .01%	: .40%	: .00%	: .00%
*TOTAL*	: 1.92E-03	: 1.93E-03	: 1.93E-03	: 1.92E-03	: 1.92E-03	: 2.51E-03	: 1.96E-03	: 5.09E-03

TABLE 14. DOSES TO POPULATION WITHIN 50 MILES, JANUARY-DECEMBER 2021

ALARA ANNUAL INTEGRATED POPULATION DOSE SUMMARY (PERSON-REM)

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	: 1.84E-03	: 1.84E-03	: 1.84E-03	: 1.84E-03	: 1.84E-03	: 1.84E-03	: 1.87E-03	: 4.82E-03
	: 97.38%	: 96.99%	: 95.71%	: 97.24%	: 97.32%	: 65.76%	: 97.22%	: 98.96%
GROUND	: 4.32E-05	: 4.32E-05	: 4.32E-05	: 4.32E-05	: 4.32E-05	: 4.32E-05	: 4.32E-05	: 5.08E-05
	: 2.29%	: 2.28%	: 2.25%	: 2.29%	: 2.29%	: 1.55%	: 2.24%	: 1.04%
INHAL	: 3.27E-07	: 2.21E-06	: 9.68E-07	: 7.17E-07	: 1.11E-06	: 1.35E-04	: 9.94E-06	: 0.00E+00
	: .02%	: .12%	: .05%	: .04%	: .06%	: 4.83%	: .52%	: .00%
VEGET	: 2.42E-06	: 7.45E-06	: 3.00E-05	: 2.12E-06	: 6.86E-07	: 9.33E-06	: 1.43E-07	: 0.00E+00
	: .13%	: .39%	: 1.57%	: .11%	: .04%	: .33%	: .01%	: .00%
COW MILK	: 2.94E-06	: 1.89E-06	: 7.53E-06	: 5.58E-06	: 5.44E-06	: 7.53E-04	: 2.12E-07	: 0.00E+00
	: .16%	: .10%	: .39%	: .30%	: .29%	: 26.97%	: .01%	: .00%
MEAT	: 4.79E-07	: 2.18E-06	: 5.81E-07	: 4.64E-07	: 2.37E-07	: 1.56E-05	: 1.19E-08	: 0.00E+00
	: .03%	: .12%	: .03%	: .02%	: .01%	: .56%	: .00%	: .00%
*TOTAL*	: 1.88E-03	: 1.89E-03	: 1.92E-03	: 1.89E-03	: 1.89E-03	: 2.79E-03	: 1.93E-03	: 4.87E-03



## CARBON-14 GASEOUS EFFLUENT DOSE CALCULATIONS

Doses to the maximum individual resulting from the release of Carbon-14 in gaseous effluents from the Cooper Nuclear Station (CNS) were calculated using the latest version of the GASPAR computer code included as part of NRC Dose 2.3.20 (ORNL 2015). Four pathways were selected for individual dose calculations: the nearest site boundary for inhalation, nearest garden for vegetation ingestion, nearest animal for meat ingestion, and the nearest milk animal (cow). Based on the 2020 Land Use Census, there are no meat or milk animals identified within 5 miles of CNS. However, CNS maintains a virtual cow receptor at 3.5 miles north-northwest of the plant and conservatively includes this receptor in dose calculations.

Use of a normalized Carbon-14 source term and scaling factors based on the annual thermal gigawatts ( $GW_T$ ) power generation were utilized to determine the quantity of Carbon-14 in the CNS gaseous effluent discharge for 2021. Specifically, the Boiling Water Reactor proxy production rate of 5.1 curies Carbon-14 per  $GW_T$  generation using the methodology described in EPRI, 2010 was the basis for the CNS total calculated emissions of 12.1 curies of Carbon-14 in 2021.

GASPAR implements the radiological dose models of Regulatory Guide 1.109 for determining the radiation exposure to man from four principal atmospheric exposure pathways: plume, ground, inhalation, and ingestion. Doses to the maximum individual are calculated as a function of age group and pathway for significant body organs.

Tables 15 through 21 present maximum individual doses. Note that the inhalation pathway was calculated at the closest site boundary receptor and was negligible for Carbon-14 and is not included in the tables. In addition, the doses presented were conservatively calculated based on the annual site X/Qs. These X/Qs result in doses approximately 20% higher than those calculated with the X/Qs based on growing season meteorology.

Additional assumptions and data used for input to the GASPAR code are described in a separate section of this appendix (see page F67).

TABLE 15. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-MARCH 2021

SPECIAL LOCATION NO. 4A Nearest Cow  
AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	8.14E-03	8.14E-03	4.07E-02	8.14E-03	8.14E-03	8.14E-03	8.14E-03	8.14E-03
TEEN	1.36E-02	1.36E-02	6.81E-02	1.36E-02	1.36E-02	1.36E-02	1.36E-02	1.36E-02
CHILD	3.31E-02	3.31E-02	1.66E-01	3.31E-02	3.31E-02	3.31E-02	3.31E-02	3.31E-02
MEAT								
ADULT	3.25E-03	3.25E-03	1.62E-02	3.25E-03	3.25E-03	3.25E-03	3.25E-03	3.25E-03
TEEN	2.74E-03	2.74E-03	1.37E-02	2.74E-03	2.74E-03	2.74E-03	2.74E-03	2.74E-03
CHILD	5.16E-03	5.16E-03	2.58E-02	5.16E-03	5.16E-03	5.16E-03	5.16E-03	5.16E-03
COW MILK								
ADULT	3.54E-03	3.54E-03	1.77E-02	3.54E-03	3.54E-03	3.54E-03	3.54E-03	3.54E-03
TEEN	6.54E-03	6.54E-03	3.27E-02	6.54E-03	6.54E-03	6.54E-03	6.54E-03	6.54E-03
CHILD	1.61E-02	1.61E-02	8.04E-02	1.61E-02	1.61E-02	1.61E-02	1.61E-02	1.61E-02
INFANT	3.36E-02	3.36E-02	1.57E-01	3.36E-02	3.36E-02	3.36E-02	3.36E-02	3.36E-02
GOATMILK								
ADULT	3.54E-03	3.54E-03	1.77E-02	3.54E-03	3.54E-03	3.54E-03	3.54E-03	3.54E-03
TEEN	6.54E-03	6.54E-03	3.27E-02	6.54E-03	6.54E-03	6.54E-03	6.54E-03	6.54E-03
CHILD	1.61E-02	1.61E-02	8.04E-02	1.61E-02	1.61E-02	1.61E-02	1.61E-02	1.61E-02
INFANT	3.36E-02	3.36E-02	1.57E-01	3.36E-02	3.36E-02	3.36E-02	3.36E-02	3.36E-02

TABLE 15. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-MARCH 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
 AT 2.80 MILES NNW

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	1.23E-02	1.23E-02	6.15E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02	1.23E-02
TEEN	2.06E-02	2.06E-02	1.03E-01	2.06E-02	2.06E-02	2.06E-02	2.06E-02	2.06E-02
CHILD	5.00E-02	5.00E-02	2.50E-01	5.00E-02	5.00E-02	5.00E-02	5.00E-02	5.00E-02
MEAT								
ADULT	4.91E-03	4.91E-03	2.45E-02	4.91E-03	4.91E-03	4.91E-03	4.91E-03	4.91E-03
TEEN	4.14E-03	4.14E-03	2.07E-02	4.14E-03	4.14E-03	4.14E-03	4.14E-03	4.14E-03
CHILD	7.79E-03	7.79E-03	3.89E-02	7.79E-03	7.79E-03	7.79E-03	7.79E-03	7.79E-03
COW MILK								
ADULT	5.35E-03	5.35E-03	2.68E-02	5.35E-03	5.35E-03	5.35E-03	5.35E-03	5.35E-03
TEEN	9.87E-03	9.87E-03	4.94E-02	9.87E-03	9.87E-03	9.87E-03	9.87E-03	9.87E-03
CHILD	2.43E-02	2.43E-02	1.21E-01	2.43E-02	2.43E-02	2.43E-02	2.43E-02	2.43E-02
INFANT	5.07E-02	5.07E-02	2.38E-01	5.07E-02	5.07E-02	5.07E-02	5.07E-02	5.07E-02
GOATMILK								
ADULT	5.35E-03	5.35E-03	2.68E-02	5.35E-03	5.35E-03	5.35E-03	5.35E-03	5.35E-03
TEEN	9.87E-03	9.87E-03	4.94E-02	9.87E-03	9.87E-03	9.87E-03	9.87E-03	9.87E-03
CHILD	2.43E-02	2.43E-02	1.21E-01	2.43E-02	2.43E-02	2.43E-02	2.43E-02	2.43E-02
INFANT	5.07E-02	5.07E-02	2.38E-01	5.07E-02	5.07E-02	5.07E-02	5.07E-02	5.07E-02

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TABLE 16. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), APRIL-JUNE 2021

SPECIAL LOCATION NO. 4A Nearest Cow  
AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	4.68E-03	4.68E-03	2.34E-02	4.68E-03	4.68E-03	4.68E-03	4.68E-03	4.68E-03
TEEN	7.82E-03	7.82E-03	3.91E-02	7.82E-03	7.82E-03	7.82E-03	7.82E-03	7.82E-03
CHILD	1.90E-02	1.90E-02	9.52E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02
MEAT								
ADULT	1.87E-03	1.87E-03	9.33E-03	1.87E-03	1.87E-03	1.87E-03	1.87E-03	1.87E-03
TEEN	1.58E-03	1.58E-03	7.88E-03	1.58E-03	1.58E-03	1.58E-03	1.58E-03	1.58E-03
CHILD	2.96E-03	2.96E-03	1.48E-02	2.96E-03	2.96E-03	2.96E-03	2.96E-03	2.96E-03
COW MILK								
ADULT	2.04E-03	2.04E-03	1.02E-02	2.04E-03	2.04E-03	2.04E-03	2.04E-03	2.04E-03
TEEN	3.75E-03	3.75E-03	1.88E-02	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03
CHILD	9.23E-03	9.23E-03	4.62E-02	9.23E-03	9.23E-03	9.23E-03	9.23E-03	9.23E-03
INFANT	1.93E-02	1.93E-02	9.04E-02	1.93E-02	1.93E-02	1.93E-02	1.93E-02	1.93E-02
GOATMILK								
ADULT	2.04E-03	2.04E-03	1.02E-02	2.04E-03	2.04E-03	2.04E-03	2.04E-03	2.04E-03
TEEN	3.75E-03	3.75E-03	1.88E-02	3.75E-03	3.75E-03	3.75E-03	3.75E-03	3.75E-03
CHILD	9.23E-03	9.23E-03	4.62E-02	9.23E-03	9.23E-03	9.23E-03	9.23E-03	9.23E-03
INFANT	1.93E-02	1.93E-02	9.04E-02	1.93E-02	1.93E-02	1.93E-02	1.93E-02	1.93E-02

TABLE 16. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), APRIL-JUNE 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
AT 2.30 MILES ESE

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	1.00E-02	1.00E-02	5.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
TEEN	1.67E-02	1.67E-02	8.36E-02	1.67E-02	1.67E-02	1.67E-02	1.67E-02	1.67E-02
CHILD	4.07E-02	4.07E-02	2.03E-01	4.07E-02	4.07E-02	4.07E-02	4.07E-02	4.07E-02
MEAT								
ADULT	3.99E-03	3.99E-03	1.99E-02	3.99E-03	3.99E-03	3.99E-03	3.99E-03	3.99E-03
TEEN	3.37E-03	3.37E-03	1.68E-02	3.37E-03	3.37E-03	3.37E-03	3.37E-03	3.37E-03
CHILD	6.34E-03	6.34E-03	3.17E-02	6.34E-03	6.34E-03	6.34E-03	6.34E-03	6.34E-03
COW MILK								
ADULT	4.35E-03	4.35E-03	2.18E-02	4.35E-03	4.35E-03	4.35E-03	4.35E-03	4.35E-03
TEEN	8.03E-03	8.03E-03	4.01E-02	8.03E-03	8.03E-03	8.03E-03	8.03E-03	8.03E-03
CHILD	1.97E-02	1.97E-02	9.87E-02	1.97E-02	1.97E-02	1.97E-02	1.97E-02	1.97E-02
INFANT	4.13E-02	4.13E-02	1.93E-01	4.13E-02	4.13E-02	4.13E-02	4.13E-02	4.13E-02
GOATMILK								
ADULT	4.35E-03	4.35E-03	2.18E-02	4.35E-03	4.35E-03	4.35E-03	4.35E-03	4.35E-03
TEEN	8.03E-03	8.03E-03	4.01E-02	8.03E-03	8.03E-03	8.03E-03	8.03E-03	8.03E-03
CHILD	1.97E-02	1.97E-02	9.87E-02	1.97E-02	1.97E-02	1.97E-02	1.97E-02	1.97E-02
INFANT	4.13E-02	4.13E-02	1.93E-01	4.13E-02	4.13E-02	4.13E-02	4.13E-02	4.13E-02

TABLE 17. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-JUNE 2021

SPECIAL LOCATION NO. 4A Nearest Cow  
 AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
 ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	1.28E-02	1.28E-02	6.42E-02	1.28E-02	1.28E-02	1.28E-02	1.28E-02	1.28E-02
TEEN	2.15E-02	2.15E-02	1.07E-01	2.15E-02	2.15E-02	2.15E-02	2.15E-02	2.15E-02
CHILD	5.22E-02	5.22E-02	2.61E-01	5.22E-02	5.22E-02	5.22E-02	5.22E-02	5.22E-02
MEAT								
ADULT	5.12E-03	5.12E-03	2.56E-02	5.12E-03	5.12E-03	5.12E-03	5.12E-03	5.12E-03
TEEN	4.33E-03	4.33E-03	2.16E-02	4.33E-03	4.33E-03	4.33E-03	4.33E-03	4.33E-03
CHILD	8.13E-03	8.13E-03	4.07E-02	8.13E-03	8.13E-03	8.13E-03	8.13E-03	8.13E-03
COW MILK								
ADULT	5.59E-03	5.59E-03	2.79E-02	5.59E-03	5.59E-03	5.59E-03	5.59E-03	5.59E-03
TEEN	1.03E-02	1.03E-02	5.15E-02	1.03E-02	1.03E-02	1.03E-02	1.03E-02	1.03E-02
CHILD	2.53E-02	2.53E-02	1.27E-01	2.53E-02	2.53E-02	2.53E-02	2.53E-02	2.53E-02
INFANT	5.30E-02	5.30E-02	2.48E-01	5.30E-02	5.30E-02	5.30E-02	5.30E-02	5.30E-02
GOATMILK								
ADULT	5.59E-03	5.59E-03	2.79E-02	5.59E-03	5.59E-03	5.59E-03	5.59E-03	5.59E-03
TEEN	1.03E-02	1.03E-02	5.15E-02	1.03E-02	1.03E-02	1.03E-02	1.03E-02	1.03E-02
CHILD	2.53E-02	2.53E-02	1.27E-01	2.53E-02	2.53E-02	2.53E-02	2.53E-02	2.53E-02
INFANT	5.30E-02	5.30E-02	2.48E-01	5.30E-02	5.30E-02	5.30E-02	5.30E-02	5.30E-02

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TABLE 17. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-JUNE 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
AT 2.80 MILES NNW

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	1.92E-02	1.92E-02	9.62E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02
TEEN	3.22E-02	3.22E-02	1.61E-01	3.22E-02	3.22E-02	3.22E-02	3.22E-02	3.22E-02
CHILD	7.84E-02	7.84E-02	3.92E-01	7.84E-02	7.84E-02	7.84E-02	7.84E-02	7.84E-02
MEAT								
ADULT	7.68E-03	7.68E-03	3.84E-02	7.68E-03	7.68E-03	7.68E-03	7.68E-03	7.68E-03
TEEN	6.49E-03	6.49E-03	3.25E-02	6.49E-03	6.49E-03	6.49E-03	6.49E-03	6.49E-03
CHILD	1.22E-02	1.22E-02	6.10E-02	1.22E-02	1.22E-02	1.22E-02	1.22E-02	1.22E-02
COW MILK								
ADULT	8.38E-03	8.38E-03	4.19E-02	8.38E-03	8.38E-03	8.38E-03	8.38E-03	8.38E-03
TEEN	1.55E-02	1.55E-02	7.73E-02	1.55E-02	1.55E-02	1.55E-02	1.55E-02	1.55E-02
CHILD	3.80E-02	3.80E-02	1.90E-01	3.80E-02	3.80E-02	3.80E-02	3.80E-02	3.80E-02
INFANT	7.95E-02	7.95E-02	3.72E-01	7.95E-02	7.95E-02	7.95E-02	7.95E-02	7.95E-02
GOATMILK								
ADULT	8.38E-03	8.38E-03	4.19E-02	8.38E-03	8.38E-03	8.38E-03	8.38E-03	8.38E-03
TEEN	1.55E-02	1.55E-02	7.73E-02	1.55E-02	1.55E-02	1.55E-02	1.55E-02	1.55E-02
CHILD	3.80E-02	3.80E-02	1.90E-01	3.80E-02	3.80E-02	3.80E-02	3.80E-02	3.80E-02
INFANT	7.95E-02	7.95E-02	3.72E-01	7.95E-02	7.95E-02	7.95E-02	7.95E-02	7.95E-02

TABLE 18. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-SEPTEMBER 2021

SPECIAL LOCATION NO. 4A Nearest Cow  
AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	7.98E-03	7.98E-03	3.99E-02	7.98E-03	7.98E-03	7.98E-03	7.98E-03	7.98E-03
TEEN	1.33E-02	1.33E-02	6.67E-02	1.33E-02	1.33E-02	1.33E-02	1.33E-02	1.33E-02
CHILD	3.25E-02	3.25E-02	1.62E-01	3.25E-02	3.25E-02	3.25E-02	3.25E-02	3.25E-02
MEAT								
ADULT	3.18E-03	3.18E-03	1.59E-02	3.18E-03	3.18E-03	3.18E-03	3.18E-03	3.18E-03
TEEN	2.69E-03	2.69E-03	1.34E-02	2.69E-03	2.69E-03	2.69E-03	2.69E-03	2.69E-03
CHILD	5.06E-03	5.06E-03	2.53E-02	5.06E-03	5.06E-03	5.06E-03	5.06E-03	5.06E-03
COW MILK								
ADULT	3.47E-03	3.47E-03	1.74E-02	3.47E-03	3.47E-03	3.47E-03	3.47E-03	3.47E-03
TEEN	6.41E-03	6.41E-03	3.20E-02	6.41E-03	6.41E-03	6.41E-03	6.41E-03	6.41E-03
CHILD	1.58E-02	1.58E-02	7.88E-02	1.58E-02	1.58E-02	1.58E-02	1.58E-02	1.58E-02
INFANT	3.29E-02	3.29E-02	1.54E-01	3.29E-02	3.29E-02	3.29E-02	3.29E-02	3.29E-02
GOATMILK								
ADULT	3.47E-03	3.47E-03	1.74E-02	3.47E-03	3.47E-03	3.47E-03	3.47E-03	3.47E-03
TEEN	6.41E-03	6.41E-03	3.20E-02	6.41E-03	6.41E-03	6.41E-03	6.41E-03	6.41E-03
CHILD	1.58E-02	1.58E-02	7.88E-02	1.58E-02	1.58E-02	1.58E-02	1.58E-02	1.58E-02
INFANT	3.29E-02	3.29E-02	1.54E-01	3.29E-02	3.29E-02	3.29E-02	3.29E-02	3.29E-02



TABLE 18. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-SEPTEMBER 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
AT 2.30 MILES ESE

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	1.58E-02	1.58E-02	7.90E-02	1.58E-02	1.58E-02	1.58E-02	1.58E-02	1.58E-02
TEEN	2.64E-02	2.64E-02	1.32E-01	2.64E-02	2.64E-02	2.64E-02	2.64E-02	2.64E-02
CHILD	6.43E-02	6.43E-02	3.21E-01	6.43E-02	6.43E-02	6.43E-02	6.43E-02	6.43E-02
MEAT								
ADULT	6.30E-03	6.30E-03	3.15E-02	6.30E-03	6.30E-03	6.30E-03	6.30E-03	6.30E-03
TEEN	5.32E-03	5.32E-03	2.66E-02	5.32E-03	5.32E-03	5.32E-03	5.32E-03	5.32E-03
CHILD	1.00E-02	1.00E-02	5.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
COW MILK								
ADULT	6.88E-03	6.88E-03	3.44E-02	6.88E-03	6.88E-03	6.88E-03	6.88E-03	6.88E-03
TEEN	1.27E-02	1.27E-02	6.34E-02	1.27E-02	1.27E-02	1.27E-02	1.27E-02	1.27E-02
CHILD	3.12E-02	3.12E-02	1.56E-01	3.12E-02	3.12E-02	3.12E-02	3.12E-02	3.12E-02
INFANT	6.52E-02	6.52E-02	3.05E-01	6.52E-02	6.52E-02	6.52E-02	6.52E-02	6.52E-02
GOATMILK								
ADULT	6.88E-03	6.88E-03	3.44E-02	6.88E-03	6.88E-03	6.88E-03	6.88E-03	6.88E-03
TEEN	1.27E-02	1.27E-02	6.34E-02	1.27E-02	1.27E-02	1.27E-02	1.27E-02	1.27E-02
CHILD	3.12E-02	3.12E-02	1.56E-01	3.12E-02	3.12E-02	3.12E-02	3.12E-02	3.12E-02
INFANT	6.52E-02	6.52E-02	3.05E-01	6.52E-02	6.52E-02	6.52E-02	6.52E-02	6.52E-02

TABLE 19. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), OCTOBER-DECEMBER 2021

SPECIAL LOCATION NO. 4A Nearest Cow  
AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	1.12E-02	1.12E-02	5.62E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02
TEEN	1.88E-02	1.88E-02	9.39E-02	1.88E-02	1.88E-02	1.88E-02	1.88E-02	1.88E-02
CHILD	4.57E-02	4.57E-02	2.29E-01	4.57E-02	4.57E-02	4.57E-02	4.57E-02	4.57E-02
MEAT								
ADULT	4.48E-03	4.48E-03	2.24E-02	4.48E-03	4.48E-03	4.48E-03	4.48E-03	4.48E-03
TEEN	3.79E-03	3.79E-03	1.89E-02	3.79E-03	3.79E-03	3.79E-03	3.79E-03	3.79E-03
CHILD	7.12E-03	7.12E-03	3.56E-02	7.12E-03	7.12E-03	7.12E-03	7.12E-03	7.12E-03
COW MILK								
ADULT	4.89E-03	4.89E-03	2.45E-02	4.89E-03	4.89E-03	4.89E-03	4.89E-03	4.89E-03
TEEN	9.02E-03	9.02E-03	4.51E-02	9.02E-03	9.02E-03	9.02E-03	9.02E-03	9.02E-03
CHILD	2.22E-02	2.22E-02	1.11E-01	2.22E-02	2.22E-02	2.22E-02	2.22E-02	2.22E-02
INFANT	4.64E-02	4.64E-02	2.17E-01	4.64E-02	4.64E-02	4.64E-02	4.64E-02	4.64E-02
GOATMILK								
ADULT	4.89E-03	4.89E-03	2.45E-02	4.89E-03	4.89E-03	4.89E-03	4.89E-03	4.89E-03
TEEN	9.02E-03	9.02E-03	4.51E-02	9.02E-03	9.02E-03	9.02E-03	9.02E-03	9.02E-03
CHILD	2.22E-02	2.22E-02	1.11E-01	2.22E-02	2.22E-02	2.22E-02	2.22E-02	2.22E-02
INFANT	4.64E-02	4.64E-02	2.17E-01	4.64E-02	4.64E-02	4.64E-02	4.64E-02	4.64E-02

TABLE 19. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), OCTOBER-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
AT 2.80 MILES NNW

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	1.63E-02	1.63E-02	8.14E-02	1.63E-02	1.63E-02	1.63E-02	1.63E-02	1.63E-02
TEEN	2.72E-02	2.72E-02	1.36E-01	2.72E-02	2.72E-02	2.72E-02	2.72E-02	2.72E-02
CHILD	6.63E-02	6.63E-02	3.31E-01	6.63E-02	6.63E-02	6.63E-02	6.63E-02	6.63E-02
MEAT								
ADULT	6.50E-03	6.50E-03	3.25E-02	6.50E-03	6.50E-03	6.50E-03	6.50E-03	6.50E-03
TEEN	5.49E-03	5.49E-03	2.74E-02	5.49E-03	5.49E-03	5.49E-03	5.49E-03	5.49E-03
CHILD	1.03E-02	1.03E-02	5.16E-02	1.03E-02	1.03E-02	1.03E-02	1.03E-02	1.03E-02
COW MILK								
ADULT	7.09E-03	7.09E-03	3.54E-02	7.09E-03	7.09E-03	7.09E-03	7.09E-03	7.09E-03
TEEN	1.31E-02	1.31E-02	6.54E-02	1.31E-02	1.31E-02	1.31E-02	1.31E-02	1.31E-02
CHILD	3.22E-02	3.22E-02	1.61E-01	3.22E-02	3.22E-02	3.22E-02	3.22E-02	3.22E-02
INFANT	6.72E-02	6.72E-02	3.15E-01	6.72E-02	6.72E-02	6.72E-02	6.72E-02	6.72E-02
GOATMILK								
ADULT	7.09E-03	7.09E-03	3.54E-02	7.09E-03	7.09E-03	7.09E-03	7.09E-03	7.09E-03
TEEN	1.31E-02	1.31E-02	6.54E-02	1.31E-02	1.31E-02	1.31E-02	1.31E-02	1.31E-02
CHILD	3.22E-02	3.22E-02	1.61E-01	3.22E-02	3.22E-02	3.22E-02	3.22E-02	3.22E-02
INFANT	6.72E-02	6.72E-02	3.15E-01	6.72E-02	6.72E-02	6.72E-02	6.72E-02	6.72E-02

TABLE 20. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-DECEMBER 2021

SPECIAL LOCATION NO. 4A Nearest Cow  
AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	1.92E-02	1.92E-02	9.62E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02	1.92E-02
TEEN	3.22E-02	3.22E-02	1.61E-01	3.22E-02	3.22E-02	3.22E-02	3.22E-02	3.22E-02
CHILD	7.83E-02	7.83E-02	3.92E-01	7.83E-02	7.83E-02	7.83E-02	7.83E-02	7.83E-02
MEAT								
ADULT	7.68E-03	7.68E-03	3.84E-02	7.68E-03	7.68E-03	7.68E-03	7.68E-03	7.68E-03
TEEN	6.49E-03	6.49E-03	3.24E-02	6.49E-03	6.49E-03	6.49E-03	6.49E-03	6.49E-03
CHILD	1.22E-02	1.22E-02	6.10E-02	1.22E-02	1.22E-02	1.22E-02	1.22E-02	1.22E-02
COW MILK								
ADULT	8.38E-03	8.38E-03	4.19E-02	8.38E-03	8.38E-03	8.38E-03	8.38E-03	8.38E-03
TEEN	1.55E-02	1.55E-02	7.73E-02	1.55E-02	1.55E-02	1.55E-02	1.55E-02	1.55E-02
CHILD	3.80E-02	3.80E-02	1.90E-01	3.80E-02	3.80E-02	3.80E-02	3.80E-02	3.80E-02
INFANT	7.95E-02	7.95E-02	3.72E-01	7.95E-02	7.95E-02	7.95E-02	7.95E-02	7.95E-02
GOATMILK								
ADULT	8.38E-03	8.38E-03	4.19E-02	8.38E-03	8.38E-03	8.38E-03	8.38E-03	8.38E-03
TEEN	1.55E-02	1.55E-02	7.73E-02	1.55E-02	1.55E-02	1.55E-02	1.55E-02	1.55E-02
CHILD	3.80E-02	3.80E-02	1.90E-01	3.80E-02	3.80E-02	3.80E-02	3.80E-02	3.80E-02
INFANT	7.95E-02	7.95E-02	3.72E-01	7.95E-02	7.95E-02	7.95E-02	7.95E-02	7.95E-02

TABLE 20. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), JULY-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
AT 2.80 MILES NNW

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	2.94E-02	2.94E-02	1.47E-01	2.94E-02	2.94E-02	2.94E-02	2.94E-02	2.94E-02
TEEN	4.91E-02	4.91E-02	2.45E-01	4.91E-02	4.91E-02	4.91E-02	4.91E-02	4.91E-02
CHILD	1.20E-01	1.20E-01	5.98E-01	1.20E-01	1.20E-01	1.20E-01	1.20E-01	1.20E-01
MEAT								
ADULT	1.17E-02	1.17E-02	5.86E-02	1.17E-02	1.17E-02	1.17E-02	1.17E-02	1.17E-02
TEEN	9.90E-03	9.90E-03	4.95E-02	9.90E-03	9.90E-03	9.90E-03	9.90E-03	9.90E-03
CHILD	1.86E-02	1.86E-02	9.30E-02	1.86E-02	1.86E-02	1.86E-02	1.86E-02	1.86E-02
COW MILK								
ADULT	1.28E-02	1.28E-02	6.39E-02	1.28E-02	1.28E-02	1.28E-02	1.28E-02	1.28E-02
TEEN	2.36E-02	2.36E-02	1.18E-01	2.36E-02	2.36E-02	2.36E-02	2.36E-02	2.36E-02
CHILD	5.80E-02	5.80E-02	2.90E-01	5.80E-02	5.80E-02	5.80E-02	5.80E-02	5.80E-02
INFANT	1.21E-01	1.21E-01	5.68E-01	1.21E-01	1.21E-01	1.21E-01	1.21E-01	1.21E-01
GOATMILK								
ADULT	1.28E-02	1.28E-02	6.39E-02	1.28E-02	1.28E-02	1.28E-02	1.28E-02	1.28E-02
TEEN	2.36E-02	2.36E-02	1.18E-01	2.36E-02	2.36E-02	2.36E-02	2.36E-02	2.36E-02
CHILD	5.80E-02	5.80E-02	2.90E-01	5.80E-02	5.80E-02	5.80E-02	5.80E-02	5.80E-02
INFANT	1.21E-01	1.21E-01	5.68E-01	1.21E-01	1.21E-01	1.21E-01	1.21E-01	1.21E-01

TABLE 21. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-DECEMBER 2021

SPECIAL LOCATION NO. 4A Nearest Cow  
AT 3.50 MILES NNW

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	3.23E-02	3.23E-02	1.61E-01	3.23E-02	3.23E-02	3.23E-02	3.23E-02	3.23E-02
TEEN	5.40E-02	5.40E-02	2.70E-01	5.40E-02	5.40E-02	5.40E-02	5.40E-02	5.40E-02
CHILD	1.31E-01	1.31E-01	6.57E-01	1.31E-01	1.31E-01	1.31E-01	1.31E-01	1.31E-01
MEAT								
ADULT	1.29E-02	1.29E-02	6.44E-02	1.29E-02	1.29E-02	1.29E-02	1.29E-02	1.29E-02
TEEN	1.09E-02	1.09E-02	5.44E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02
CHILD	2.05E-02	2.05E-02	1.02E-01	2.05E-02	2.05E-02	2.05E-02	2.05E-02	2.05E-02
COW MILK								
ADULT	1.41E-02	1.41E-02	7.03E-02	1.41E-02	1.41E-02	1.41E-02	1.41E-02	1.41E-02
TEEN	2.59E-02	2.59E-02	1.30E-01	2.59E-02	2.59E-02	2.59E-02	2.59E-02	2.59E-02
CHILD	6.38E-02	6.38E-02	3.19E-01	6.38E-02	6.38E-02	6.38E-02	6.38E-02	6.38E-02
INFANT	1.33E-01	1.33E-01	6.25E-01	1.33E-01	1.33E-01	1.33E-01	1.33E-01	1.33E-01
GOATMILK								
ADULT	1.41E-02	1.41E-02	7.03E-02	1.41E-02	1.41E-02	1.41E-02	1.41E-02	1.41E-02
TEEN	2.59E-02	2.59E-02	1.30E-01	2.59E-02	2.59E-02	2.59E-02	2.59E-02	2.59E-02
CHILD	6.38E-02	6.38E-02	3.19E-01	6.38E-02	6.38E-02	6.38E-02	6.38E-02	6.38E-02
INFANT	1.33E-01	1.33E-01	6.25E-01	1.33E-01	1.33E-01	1.33E-01	1.33E-01	1.33E-01

TABLE 21. CARBON-14 DOSES TO MAXIMUM INDIVIDUAL (MREM), JANUARY-DECEMBER 2021 (Continued)

SPECIAL LOCATION NO. 5A Nearest Garden  
AT 2.80 MILES NNW

ANNUAL BETA AIR DOSE = 0.00E+00 MILLRADS  
ANNUAL GAMMA AIR DOSE = 0.00E+00 MILLRADS

PATHWAY	T.BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
PLUME	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
GROUND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
VEGET								
ADULT	4.91E-02	4.91E-02	2.45E-01	4.91E-02	4.91E-02	4.91E-02	4.91E-02	4.91E-02
TEEN	8.21E-02	8.21E-02	4.11E-01	8.21E-02	8.21E-02	8.21E-02	8.21E-02	8.21E-02
CHILD	2.00E-01	2.00E-01	9.99E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01	2.00E-01
MEAT								
ADULT	1.96E-02	1.96E-02	9.80E-02	1.96E-02	1.96E-02	1.96E-02	1.96E-02	1.96E-02
TEEN	1.66E-02	1.66E-02	8.28E-02	1.66E-02	1.66E-02	1.66E-02	1.66E-02	1.66E-02
CHILD	3.11E-02	3.11E-02	1.56E-01	3.11E-02	3.11E-02	3.11E-02	3.11E-02	3.11E-02
COW MILK								
ADULT	2.14E-02	2.14E-02	1.07E-01	2.14E-02	2.14E-02	2.14E-02	2.14E-02	2.14E-02
TEEN	3.94E-02	3.94E-02	1.97E-01	3.94E-02	3.94E-02	3.94E-02	3.94E-02	3.94E-02
CHILD	9.69E-02	9.69E-02	4.85E-01	9.69E-02	9.69E-02	9.69E-02	9.69E-02	9.69E-02
INFANT	2.03E-01	2.03E-01	9.49E-01	2.03E-01	2.03E-01	2.03E-01	2.03E-01	2.03E-01
GOATMILK								
ADULT	2.14E-02	2.14E-02	1.07E-01	2.14E-02	2.14E-02	2.14E-02	2.14E-02	2.14E-02
TEEN	3.94E-02	3.94E-02	1.97E-01	3.94E-02	3.94E-02	3.94E-02	3.94E-02	3.94E-02
CHILD	9.69E-02	9.69E-02	4.85E-01	9.69E-02	9.69E-02	9.69E-02	9.69E-02	9.69E-02
INFANT	2.03E-01	2.03E-01	9.49E-01	2.03E-01	2.03E-01	2.03E-01	2.03E-01	2.03E-01

## DOSE CALCULATION MODELS

To evaluate the radiological consequences of the routine release of liquid and gaseous effluents from the Cooper Nuclear Station, the latest versions of two computer codes were used: LADTAP II for liquid doses and GASPAR for gaseous doses included as part of NRCDose 2.3.20 (ORNL 2015). Both of these computer codes implement the dose calculational methodologies of U.S. NRC Regulatory Guide 1.109, Revision 1.

Source terms for each quarter are combined with station-specific demographic data and either hydrological dilution factors, for liquid dose calculations, or atmospheric diffusion estimates, for gaseous dose calculations.

For liquid dose calculations, the hydrological dilution factors used for input to LADTAP II, as well as other input parameters, are listed in Table 22. Other inputs not specifically listed in this table are taken from Regulatory Guide 1.109, Revision 1. Semiannual doses are obtained by summing the contributions from the appropriate quarters.

For gaseous dose calculations, atmospheric diffusion estimates are obtained from the reduction and processing of onsite meteorological data, as described in Appendix B. Source terms for the semiannual period are obtained by summing source terms for the appropriate quarters. Additional input to GASPAR includes the following station-supplied data:

- 0 to 50 mile population distribution
- 0 to 50 mile meat, milk, and vegetable distributions
- Absolute humidity at Cooper Nuclear Station ( $14.61 \text{ g/m}^3$ )
- The fraction of the year that the vegetables are grown (0.5)
- The fraction of the daily feed intake derived from pasture for milk and meat animals (0.5)

Other values used for input to GASPAR are default values from Regulatory Guide 1.109, Rev. 1.



TABLE 22. Values of Parameters Used to Make Dose Estimates Resulting From Liquid Discharges at Cooper Nuclear Station January-December 2021

Parameter	Values Assigned	
	Individual	Population
Cooling flow rate (cfs) * (Average daily value)	Q1 NR	NR
	Q2 NR	NR
	Q3 NR	NR
	Q4 NR	NR
Dilution factor*	Q1 NR	NR
	Q2 NR	NR
	Q3 NR	NR
	Q4 NR	NR
Holding time:		
Fish	24 hr ***	168 hr ***
Drinking water	12 hr ***	22.4 hr **
Shoreline exposure	0 hr ***	22.4 hr **
Swimming	0 hr ***	22.4 hr **
Boating	0 hr ***	22.4 hr **

\* Q1, Q2, Q3, and Q4 represent first, second, third and fourth quarter station data for 2021, respectively.

\*\* Based on an average Missouri River water flow of 5.5 ft/sec, 84 miles down the river.

\*\*\* Values from Regulatory Guide 1.109, Revision 1.

NR- No release

## REFERENCES

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U.S. Nuclear Regulatory Commission, Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants", Revision 1, 1974.

U.S. Nuclear Regulatory Commission, Regulatory Guide 1.23 (Safety Guide 23), "Onsite Meteorological Programs", Revision 0, 1972.

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U.S. Nuclear Regulatory Commission, NUREG/CR-1276, "User's Manual for LADTAP II: A Computer Code for Calculating Radiation Exposure to Man From Routine Release of Nuclear Reactor Liquid Effluents", 1980.

U.S. Nuclear Regulatory Commission, Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50, Appendix I", Revision 1, 1977.

**APPENDIX G**  
**REMP SAMPLE STATION DESCRIPTIONS**

## **REMP SAMPLE STATION DESCRIPTIONS**

The following pages contain descriptions of the CNS REMP Sample Stations that were active or were used for part or all of 2021.

**REMP SAMPLE STATION DESCRIPTIONS**  
**SAMPLE TYPES AND SAMPLE LOCATIONS**

<u>Sample Station (a)</u>	<u>Sample Description – Type and Location</u>
No. 1	Type: (1) Air Particulate and Charcoal Filters (2) Environmental Thermoluminescent Dosimetry  Location: Outside the northwest edge of fence, east of the gate to the LLRW storage pad on the CNS site, NW ¼, S32, T5N, R16E, Nemaha County, Nebraska. Lon. 095.38.634 W – Lat. 40.21.523 N
No. 2	Type: (1) Air Particulate and Charcoal Filters (2) Environmental Thermoluminescent Dosimetry  Location: North side of county road to the south portion of CNS site, SW ¼, S32, T5N, R16E, Nemaha County, Nebraska. Lon. 095.38.954 W – Lat. 40.21.126 N
No. 3	Type: (1) Air Particulate and Charcoal Filters (2) Environmental Thermoluminescent Dosimetry  Location: Located in Brownville, Nebraska, south of Hwy 136 but north Main Street, near Brownville State Recreation Park, SE¼, S18, T5N, R16E, Nemaha County, Nebraska. Lon. 095.39.13.4 W – Lat. 40.23.50.5 N
No. 4	Type: (1) Air Particulate and Charcoal Filters (2) Environmental Thermoluminescent Dosimetry  Location: Located ½ mile south of Phelps City, Missouri, on west side of highway “U”, NE ¼, S2, T64N, R42W, Atchison County, Missouri. Lon. 095.35.792 W – Lat. 40.23.797 N
No. 5	Type: (1) Air Particulate and Charcoal Filters (2) Environmental Thermoluminescent Dosimetry  Location: Located ¼ mile south and ¼ mile east of Langdon, Missouri, on north side of road, west of railroad tracks, SW ¼, T64N, R41W, Atchison County, Missouri. Lon. 095.34.434 W – Lat. 40.21.151 N

<u>Sample Station (a)</u>	<u>Sample Description – Type and Location</u>
No. 6	<p>Type: (1) Air Particulate and Charcoal Filters (2) Environmental Thermoluminescent Dosimetry</p> <p>Location: One mile west of the end of Missouri State Highway “U”, SW corner of the intersection, NW ¼, S34, T64N, R42W, Atchison County, Missouri. Lon. 095.37.620 W – Lat. 40.19.459 N</p>
No 7	<p>Type: (1) Air Particulate and Charcoal Filters (2) Environmental Thermoluminescent Dosimetry</p> <p>Location: 300 yards east of Highway 67 on north side of road, SW ¼, S6, T4N, R16E, Nemaha, Nebraska. Lon. 095.40.207 W – Lat. 40.20.287 N</p>
No. 8	<p>Type: (1) Air Particulate and Charcoal Filters (2) Environmental Thermoluminescent Dosimetry</p> <p>Location: ½ mile north, ¾ mile west and ¾ mile north of Nemaha, on west side of road adjacent to transmission line, NE ¼, S35, T5N, R15E, Nemaha County, Nebraska. Lon. 095.41.220 W – Lat. 40.21.570 N</p>
No. 9	<p>Type: (1) Air Particulate and Charcoal Filters (2) Environmental Thermoluminescent Dosimetry</p> <p>Location: Four miles north of Highway 136, on Highway 67. Then 1 mile east of Highway 67 and ½ mile north on west side of road, SW ¼, S26, T6N, R15E, Nemaha County, Nebraska. Lon. 095.41.810 W – Lat. 40.27.259 N</p>
No. 10	<p>Type: (1) Air Particulate and Charcoal Filters (2) Environmental Thermoluminescent Dosimetry</p> <p>Location: One mile north of Barada, Nebraska, in SW corner of intersection, NE ¼, S14, T3N, R16E, Richardson County, Nebraska. Lon. 095.34.723 W – Lat. 40.13.970 N</p>

<u>Sample Station (a)</u>	<u>Sample Description – Type and Location</u>
No. 11	<p>Type: (1) Water – Ground</p> <p>Location: Plant well water supply header at well pits, NW ¼, S32, T5N, R16E, Nemaha County, Nebraska. Lon. 095.53.866 W – Lat. 40.18.970 N</p>
No.20	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: On NNW boundary of NPPD property, east side of county road, SE, S30, T5N, R16E, Nemaha County, Nebraska. Lon. 095.39.226 W – Lat. 40.22.260 N</p>
No.28	<p>Type: (1) Water – River (2) Fish (3) Sediment from Shoreline</p> <p>Location: Samples (1) and (3) are taken from the Missouri River or its shore, downstream, near River Mile 530, Sample (2) is taken from the Missouri River ½ to 3 miles downstream of the plant site. Lon. 095.37.301 W – Lat. 40.20.336 N</p>
No. 35	<p>Type: (1) Fish (2) Water – River (Alternate Site) (3) Food Products – Broadleaf Vegetation</p> <p>Location: Sample (1) will be taken from the Missouri River about 1 to 3 miles above the CNS intake structure. During periods when unsafe conditions warrant, Station 35 may be used as an alternate to Station 12 (upstream collection site) for sample type (2). Sample (3) is taken about ¼ mile south of the Brownville State Recreation Area in Sector A. Lon. 095.39.046 W – Lat. 40.23.737 N</p>

<u>Sample Station (a)</u>	<u>Sample Description – Type and Location</u>
No. 44	Type: (1) Environmental Thermoluminescent Dosimetry  Location: ¼ mile south of Auburn Country Club on Highway 75, then ½ mile east of Highway 75 at fence line north of county road, SE1/4, S27, T5N, R14E, Nemaha County, Nebraska. Lon. 095.49.759 W – Lat. 40.21.840 N
No. 47	Type: (1) Water – Ground  Location: At Falls City Municipal water supply well. Lon. 095.25.537 W – Lat. 40.01.939 N
No. 56	Type: (1) Environmental Thermoluminescent Dosimetry  Location: 1 ¼ miles SW of Langdon, Missouri, on Highway “U”, on the right side of the highway, NW ¼, S23, T64N, R42W, Atchison County, Missouri. Lon. 095.36.383 W – Lat. 40.21.157 N
No. 58	Type: (1) Environmental Thermoluminescent Dosimetry  Location: Three miles south of Brownville, Nebraska, on county road, at the SE corner of the intersection with the farm road leading to Sample Station No. 2, SE1/4, S31, T5N, R16E, Nemaha County, Nebraska. Lon. 095.39.338 W – Lat. 40.21.126 N



<u>Sample Station (a)</u>	<u>Sample Description – Type and Location</u>
No. 59	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: One mile SSE of the CNS Elevated Release Point, in the vicinity of the levee at the south boundary of NPPD property, SE ¼, S32, T5N, R16E, Nemaha County, Nebraska. Lon. 095.38.223 W – Lat. 40.20.986 N</p>
No. 66	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: Two miles south of Nemaha, Nebraska, on Highway 67 east side of road, NW1/4, S19, T4N, R16E, Nemaha County, Nebraska. Lon. 095.40.307 W – Lat. 40.18.277 N</p>
No. 67	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: 2 miles west of Brownville, Nebraska, on Highway 136, then north 1 ½ miles on county road and east ½ mile, on north side of road, NE1/4, S11, T5N, R15E, Nemaha County, Nebraska. Lon. 095.41.520 W – Lat. 40.24.898 N</p>
No. 71	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: Two miles east of Phelps City, Missouri, on Highway 36, then south 1 ½ miles on county road and west ¼ mile, SE1/4, S6, T64N, R41W, Atchison County, Missouri. Lon. 095.34.727 W – Lat. 40.21.664 N</p>
No. 79	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: 1 7/8 miles south of Brownville, NE, on east side of paved road, NPPD property, SE1/4, S30, T5N, R16E, Nemaha County, Nebraska. Lon. 095.39.238 W – Lat. 40.22.006 N</p>

<u>Sample Station (a)</u>	<u>Sample Description – Type and Location</u>
No. 80	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: 2 1/8 miles south of Brownville, on east side of paved road, NPPD property, NE1/4, S31, T5N, R16E, Nemaha County, Nebraska. Lon. 095.39.259 W – Lat. 40.21.834 N</p>
No. 81	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: 2 3/8 miles south of Brownville, Nebraska, in the NE corner of the intersection of the paved county road and CNS access road, NPPD property, NE1/4, S31, T5N, R16E, Nemaha County, Nebraska. Lon. 095.39.291 W – Lat. 40.21.582 N</p>
No. 82	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: 7/8 mile south of CNS in a field, on NPPD property, SW1/4, S32, T5N, R16E, Nemaha County, Nebraska. Lon. 095.38.395 W – Lat. 40.20.961 N</p>
No. 83	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: 2 ¼ miles south of Nemaha, Nebraska, on Highway 67, then east 1 mile to the junction of the driveway and county road (east side of drive), NE1/4, S19, T4N, R16E, Nemaha County, Nebraska. Lon. 095.39.411 W – Lat. 40.18.119 N</p>
No. 84	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: 2 ½ miles west of Brownville, NE, south side of Highway 136 west of Locust Grove School, NW1/4, S22, T5N, R15E, Nemaha County, Nebraska. Lon. 095.42.993 W – Lat. 40.23.564 N</p>

<u>Sample Station (a)</u>	<u>Sample Description – Type and Location</u>
No. 85	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: One mile east of Brownville, Nebraska, on Highway 136, then north ¼ mile on the east side of the county road, NE1/4, S33, T65N, R42W, Atchison County, Missouri. Lon. 095.38.309 W – Lat. 40.24.508 N</p>
No. 86	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: One mile west of Phelps City, Missouri, on Highway 136, then north 1 ½ miles on Highway “D” on west side, SE1/4, S22, T65N, R42W, Atchison County, Missouri. Lon. 095.36.938 W – Lat. 40.25.563 N</p>
No. 87	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: One mile west of Phelps City, Missouri, on Highway 136, then south ½ mile on county road and ¾ mile west on county road to the end of the road, NW1/4, S3, T64N, R42W, Atchison County, Missouri. Lon. 095.37.806 W – Lat. 40.23.818 N</p>
No. 88	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: One mile west of Phelps City, Missouri, on Highway 136, then south 2 miles at the end of the county road, NW1/4, S11, T64N, R42W, Atchison County, Missouri. Lon. 095.37.771 W – Lat. 40.24.762 N</p>
No. 89	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: 2 ½ miles south of Phelps City, Missouri, on Highway “U”, then ½ mile west in the SE corner of the county road intersection, NE1/4, S14, T64N, R42W, Atchison County, Missouri. Lon. 095.36.361 W – Lat. 40.21.962 N</p>

<u>Sample Station (a)</u>	<u>Sample Description – Type and Location</u>
No. 90	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: 1 ½ miles west and ¾ mile south of Langdon, Missouri, on Highway “U”, then ¼ mile west, SW1/4, S23, T64N, R42W, Atchison County, Missouri. Lon. 095.35.808 W – Lat. 40.19.472 N</p>
No. 91	<p>Type: (1) Environmental Thermoluminescent Dosimetry Location:</p> <p>½ mile west of Rockport, Missouri, on the south side of the intersection of U.S. Highway 136 and U.S. Highway 275, at the south side of the water tower, NW1/4, S28, T65N, R41W, Atchison County, Missouri. Lon. 095.32.217 W – Lat. 40.25.181 N</p>
No. 94	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: ¼ mile of Langdon, Missouri, on the west side of the road, NE1/4, S24, T64N, R42W, Atchison County, Missouri. Lon. 095.34.673 W – Lat. 40.20.931 N</p>
No. 96	<p>Type: (1) Food products – Broadleaf Vegetation</p> <p>Location: Approximately 1 mile south of Brownville, Nebraska, along the paved road, in the road ditch in Sector R, SW1/4, S19, T5N, R16E, Nemaha County, Nebraska. Lon. 095.39.318 W – Lat. 40.23.144 N</p>
No. 99	<p>Type: (1) Milk (Nearest and Other Producer)</p> <p>Location: 1 ¼ mile south of Shubert, Nebraska, on the west side of Highway 67, NE1/4, S24, T3N, R15E, Richardson County, Nebraska. Lon. 095.40.368 W – Lat. 40.12.850 N</p>

<u>Sample Station (a)</u>	<u>Sample Description – Type and Location</u>
No. 101	<p>Type: (1) Food Products – Broadleaf Vegetation</p> <p>Location: 5 ½ miles east and ½ mile north of Rock Port, Missouri, near the junction of Highway 136 and Highway 59, in Sector D, encompasses portions of several sections, Athison County, Missouri. Lon. 095.23.822 W – Lat. 40.25.222 N</p>
No. 111	<p>Type: (1) Air Particulate and Charcoal Filters (2) Environmental Thermoluminescent Dosimetry</p> <p>Location: Five miles south of Auburn, Nebraska at junction of Hwy 75 and Howe Rd. In northwest corner of intersection. (40.3196, -95.84167)</p>
N01	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: One mile west of Phelps City, Missouri, on Highway 136, then 2.5 miles north on Highway D, then 0.7 miles west on 200th St. (40.4406, -95.62873)</p>
N02	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: From junction of Main St. and N 4th St. in Brownville, Nebraska, then north 0.25 miles. In parking lot on east side. (40.40062, -95.65980)</p>
N03	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: 1.25 miles southeast of Peru, Nebraska, On Hwy 67, then north on county road 645A Avenue 0.75 miles. On west side of road. (40.47236, -95.71675)</p>
N04	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: Five and 1/2 miles South of Phelps City, Missouri on Hwy U, then 0.5 miles west on 280th St., then 0.4 miles south on D Ave. (40.31793, -95.61650)</p>

<u>Sample Station (a)</u>	<u>Sample Description – Type and Location</u>
N05	Type: (1) Environmental Thermoluminescent Dosimetry  Location: At the entrance to Indian Cave State Park, located approximately 50 yards west of Main Office. (40.26555, -95.57936)
N06	Type: (1) Environmental Thermoluminescent Dosimetry  Location: Five miles south of Auburn, Nebraska, then 1.25 miles east on Howe Rd. Site is on west side of resident's driveway, north side of road. (40.31975, -95.81673)
N07	Type: (1) Environmental Thermoluminescent Dosimetry  Location: Approximately 0.75 miles north of Nemaha, Nebraska on Hwy 67, then 0.75 miles west on 726 Rd. On north side of road. (40.34936, -95.68569)
N08	Type: (1) Environmental Thermoluminescent Dosimetry  Location: From junction of Hwy 136 and Hwy 111 in Rock Port, Missouri then south 1.0 mile on Hwy 111. On east side of Hwy 111. (40.40224, -95.51313)
N09	Type: (1) Environmental Thermoluminescent Dosimetry  Location: Two miles west of Rock Port, Missouri on Hwy 136, then 3.6 miles north on Outer Rd. On west side of road. (40.45553, -95.58272)
N10	Type: (1) Environmental Thermoluminescent Dosimetry  Location: One mile west of Brownville, Nebraska, at junction of Hwy 136 and Main Street. In northwest corner of junction. (40.39283, -95.67590)
N11	Type: (1) Environmental Thermoluminescent Dosimetry  Location: Located in Brownville, Nebraska, at the junction of Nebraska St. and N 1st St. In the southwest corner of junction. (40.40055, -95.65518)

<u>Sample Station (a)</u>	<u>Sample Description – Type and Location</u>
N12	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: Approximately 0.3 miles west of Watson, Missouri, near the junction of Highway A and C Ave. Located west of junction. (40.47706, -95.62920)</p>
N13	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: Two miles east of Auburn, Nebraska, on Hwy 136, then 0.6 miles north on 641 Ave. On east side of road. (40.40208, -95.80033)</p>
N14	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: Approximately 1.25 miles south of Nemaha, Nebraska on Hwy 67, then 0.6 miles west on 724 Rd, then 0.1 miles west on 647 Ave. Located on Jarvis Creek levee. (40.31998, -95.68995)</p>
N15	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: Approximately 4.1 miles northwest of Corning, Missouri on Hwy 111, then 2 miles west on Route Z, then 0.3 miles north on Golden Ave., then 0.5 miles west on 297th street to levee. (40.29750, -95.55442)</p>
N16	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: One mile west of Brownville, Nebraska on Hwy 136, then 1.25 miles south on Hwy 67. Located on west side of highway. (40.37526, -95.67331)</p>
N17	<p>Type: (1) Environmental Thermoluminescent Dosimetry</p> <p>Location: Approximately 0.4 miles west of Shubert, Nebraska on Hwy 62, then north 0.5 miles on 647 Ave. (40.24026, -95.69086)</p>

<u>Sample Station (a)</u>	<u>Sample Description – Type and Location</u>
N18	Type: (1) Environmental Thermoluminescent Dosimetry  Location: Approximately 0.75 miles west of Rock Port, Missouri, on Hwy 136, then 350 feet on Burke Rd. On southwest side of Burke Rd. (40.41705, -95.50112)
N19	Type: (1) Environmental Thermoluminescent Dosimetry  Location: One mile west of entrance to Indian Cave State Park on Hwy 64E, then 1.5 miles north on 652 Ave., then 0.1 miles west on 721A Rd. Located east of residence. (40.28341, -95.60014)
N20	Type: (1) Environmental Thermoluminescent Dosimetry  Location: One mile south of Nemaha, Nebraska on Hwy 67, then 0.9 miles east on the levee. On north side of levee. (40.32331, -95.66007)
N21	Type: (1) Environmental Thermoluminescent Dosimetry  Location: From entrance to Indian Cave State Park, follow Indian Cave Recreation Road for 2.5 miles. Located on east side of road on siren pole. (40.25270, -95.55357)
N22	Type: (1) Environmental Thermoluminescent Dosimetry  Location: 1.5 miles southwest of CNS on 648A Ave., follow access road into Langdon Bend Wildlife Management Area 1.5 miles to levee. In southeast corner of parking lot. (40.34198, -95.63790)
N23	Type: (1) Environmental Thermoluminescent Dosimetry  Location: 2.1 miles east of Phelps City, Missouri, on Hwy 136 at the former City of Rock Port Water Treatment Plant. South side of Hwy 136. (40.40330, -95.55858)
N24	Type: (1) Environmental Thermoluminescent Dosimetry  Location: Two miles east of Watson, Missouri at Charity Lake. Located on the southwest corner of the lake near the boat ramp. (40.47547, -95.58370)



Sample  
Station (a)

Sample Description – Type and Location

N25

Type: (1) Environmental Thermoluminescent Dosimetry

Location: Three miles south of Rock Port, Missouri on Hwy 111,  
then 0.6 miles south on Outer Rd. Located on west side  
of road, across from Hunter Cemetery.  
(40.36291, -95.52197)