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# BRAIDWOOD STATION

# UNIT 1 and UNIT 2

Annual Radiological
Environmental Operating Report

1 January through 31 December 2022

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Constellation®

Braidwood Station
Braceville, IL 60407

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Appendices

I. Preface

The following sections of the preface are meant to help define key concepts, provide clarity, and give context to the readers of this report.

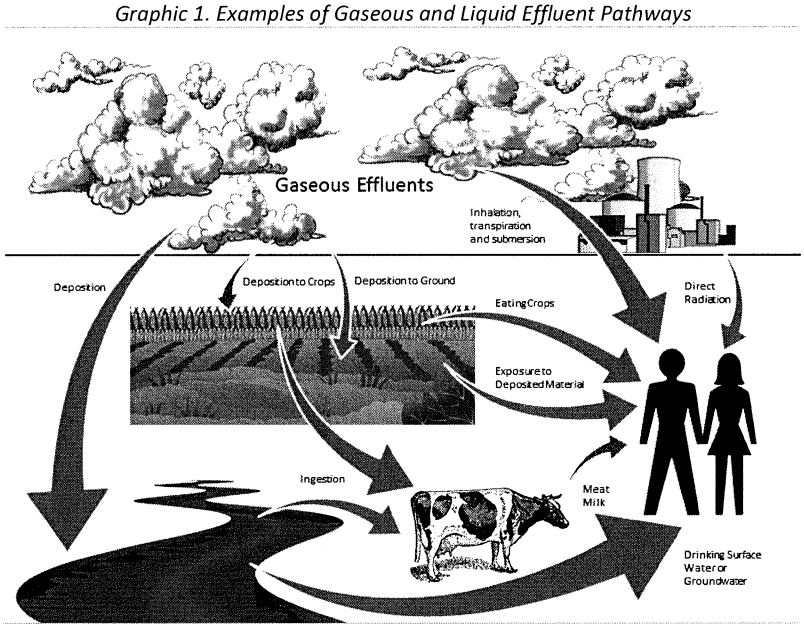
Annual Reports

The Nuclear Regulatory Commission (NRC) is the federal agency who has the role to protect public health and safety through the development of regulations governing nuclear power reactors and ensuring their compliance. As part of the many commitments Nuclear Power Plants have to the NRC to ensure this safety, they provide two reports annually to specifically address how the station's operation impacts the environment of local communities. The NRC then reviews these reports and makes them available to the public. The names of the reports are the Annual Radioactive Effluent Release Report (ARERR) and the Annual Radiological Environmental Operating Report (AREOR).

The ARERR reports the results of the sampling from the effluent release paths at the station analyzed for radioactivity. An effluent is a liquid or gaseous waste containing plant-related radioactive material emitted at the boundary of the facility.

The AREOR reports the results of the samples obtained in the environment surrounding the station. Environmental samples include air, water, vegetation, and other sample types that are identified as potential pathways radioactivity can reach humans.

*Graphic 1. Examples of Gaseous and Liquid Effluent Pathways*

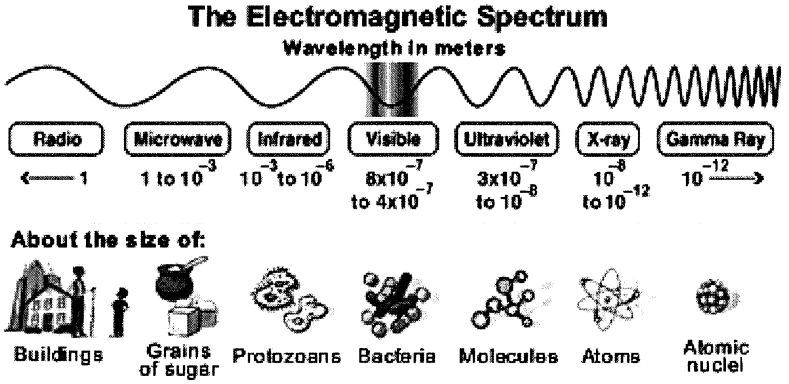



Graphic 1 demonstrates some potential exposure pathways from Braidwood Nuclear Power Station. The ARERR and AREOR together ensure Nuclear Power Plants are operating in a manner that is within established regulatory commitments meant to adequately protect the public.

## Understanding Radiation

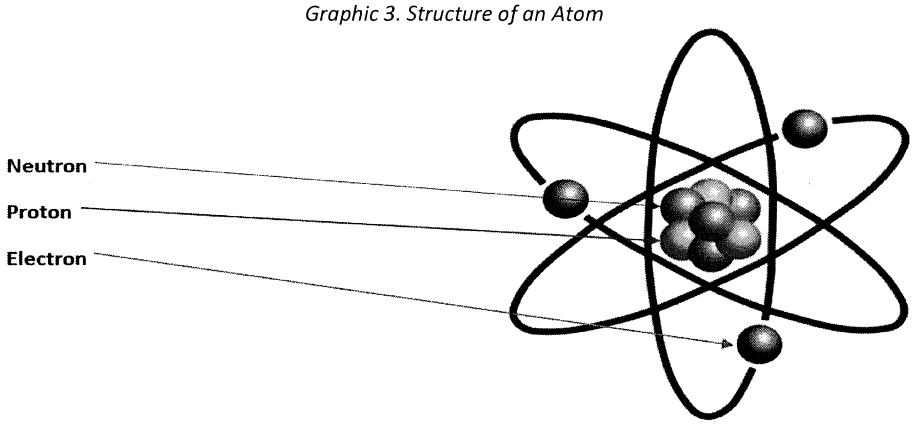
Generally radiation is defined as emitted energy in the form of waves or particles. If radiation has enough energy to displace electrons from an atom it is termed "ionizing", otherwise it is "non-ionizing". Non-Ionizing radiation includes light, heat given off from a stove, radiowaves and microwaves. Ionizing radiation occurs in atoms, particles too small for the eye to see. So, what are atoms and how does radiation come from them?

*Graphic 2. Types of Radiation, from NASA Hubblesite*




An atom is the smallest part of an element that maintains the characteristics of that element. Atoms are made up of three parts: protons, neutrons, and electrons.

*Graphic 3. Structure of an Atom*




The number of protons in an atom determines the element. For example, a hydrogen atom will always have one proton while an oxygen atom will always have eight protons. The protons are clustered with the neutrons forming the nucleus at the center of the atom. Orbiting around the nucleus are the relatively small electrons.

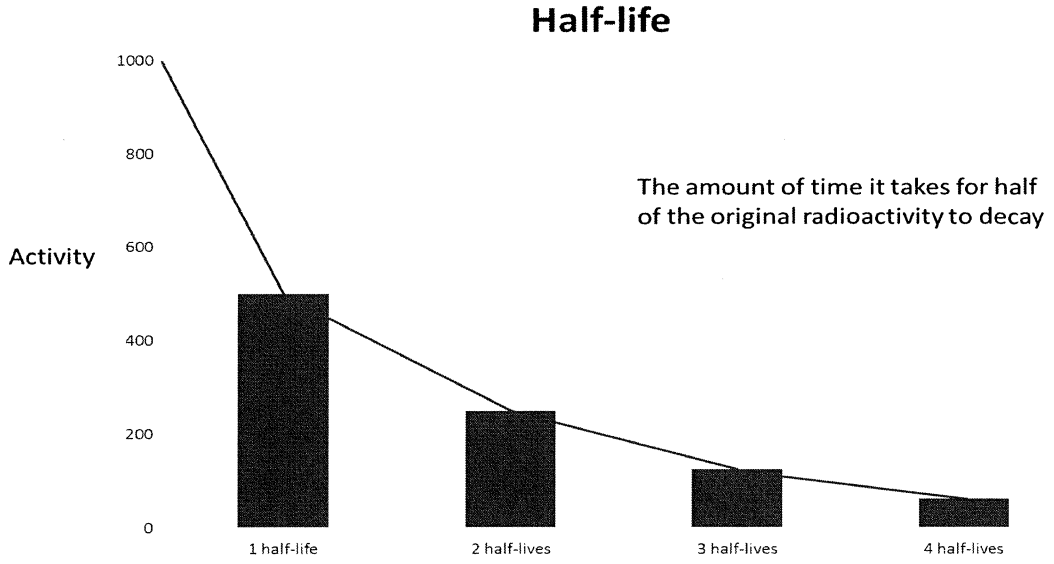
Isotopes are atoms that have the same number of protons but different numbers of neutrons. Different isotopes of an element will all have the same chemical properties and many isotopes are radioactive while other isotopes are not radioactive. A radioactive isotope can emit radiation because it contains excess energy in its nucleus. Radioactive atoms and isotopes are also referred to as radionuclides and radioisotopes.

There are two basic ways that radionuclides are produced at a nuclear power plant. The first is fission, which creates radionuclides that are called *fission products*. Fission occurs when a very large atom, such as uranium-235 (U-235) or plutonium-239 (Pu-239), absorbs a neutron into its nucleus making the atom unstable. The unstable atom can then split into smaller atoms. When fission occurs there is a large amount of energy released, in the form of heat. A nuclear power plant uses the heat generated to boil water that spins turbines to produce electricity.

The second way a radionuclide is produced at a nuclear power plant is through a process called activation. Radionuclides produced in this method are termed *activation products*. Pure water that passes over the fissioning atoms is used to cool the reactor and also produce steam to turn the turbines. Although this water is considered to be very pure, there are always some contaminants within the water from material used in the plant's construction and operation. These contaminants are exposed to the fission process and may become activation products. The atoms in the water itself can also become activated and create radionuclides.

Over time, radioactive atoms will reach a stable state and no longer be radioactive. To do this they must release their excess energy. This release of excess energy is called radioactive decay. The time it takes for a radionuclide to become stable is measured in units called half-lives. A half-life is the amount of time it takes for half of the original radioactivity to decay. Each radionuclide has a specific half-life. Some half-lives can be very long and measured in years while others may be very short and measured in seconds.

*Graphic 4. Radioactive Decay Half-Life*




In the annual reports you will see both man-made and naturally-ocurring radionuclides listed, for example potassium-40 (K-40, natural) and cobalt-60 (Co-60, man-made). We are mostly concerned about man-made radionuclides because they can be produced as by-products when generating electricity at a nuclear power plant. It is important to note that there are also other ways man-made radionuclides are produced, such as detonating nuclear weapons.

Weapons testing has deposited some of the same man-made radionuclides into the environment as those generated by nuclear power, and some are still present today because of long half-lives.

Measuring Radiation

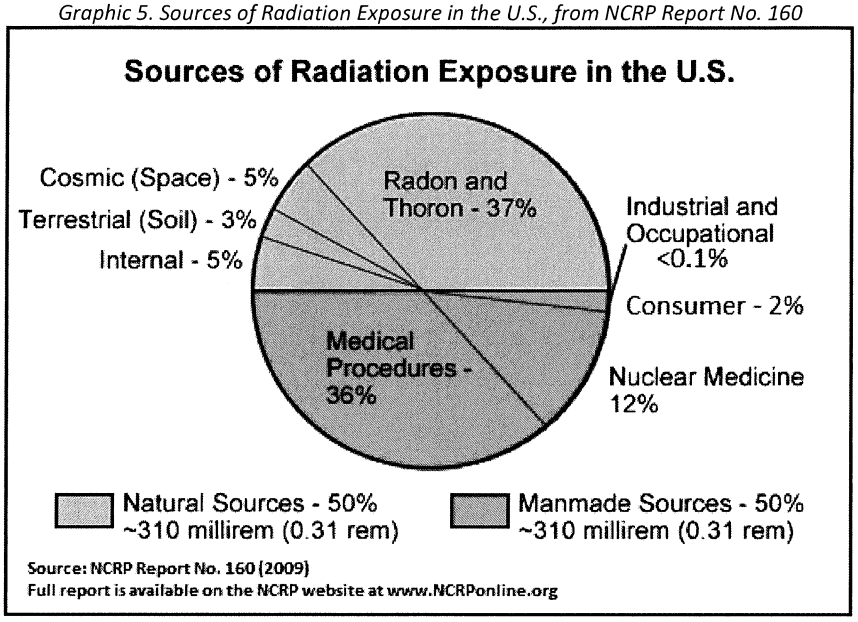
There are four different but interrelated units for measuring radioactivity, exposure, absorbed dose, and dose equivalent. Together, they are used to scientifically report the amount of radiation and its effects on humans.

- Radioactivity refers to the amount of ionizing radiation released by a material. The units of measure for radioactivity used within the AREOR and ARERR are the Curie (Ci). Small fractions of the Ci often have a prefix, such as the microCurie (μCi), which means 1/1,000,000 of a Curie.
- Exposure describes the amount of radiation traveling through the air. The units of measure for exposure used within the AREOR and ARERR are the Roentgen (R). Traditionally direct radiation monitors placed around the site are measured milliRoentgen (mR), 1/1,000 of one R.
- Absorbed dose describes the amount of radiation absorbed by an object or person. The units of measure for absorbed dose used within the AREOR and ARERR are the rad. Noble gas air doses are reported by the site are measured in millirad (mrad), 1/1,000 of one rad.
- Dose equivalent (or effective dose) combines the amount of radiation absorbed and the health effects of that type of radiation. The units used within the AREOR and ARERR are the Roentgen equivalent man (rem). Regulations require doses to the whole body, specific organ, and direct radiation to be reported in millirem (mrem), 1/1,000 of one rem.

Sources of Radiation

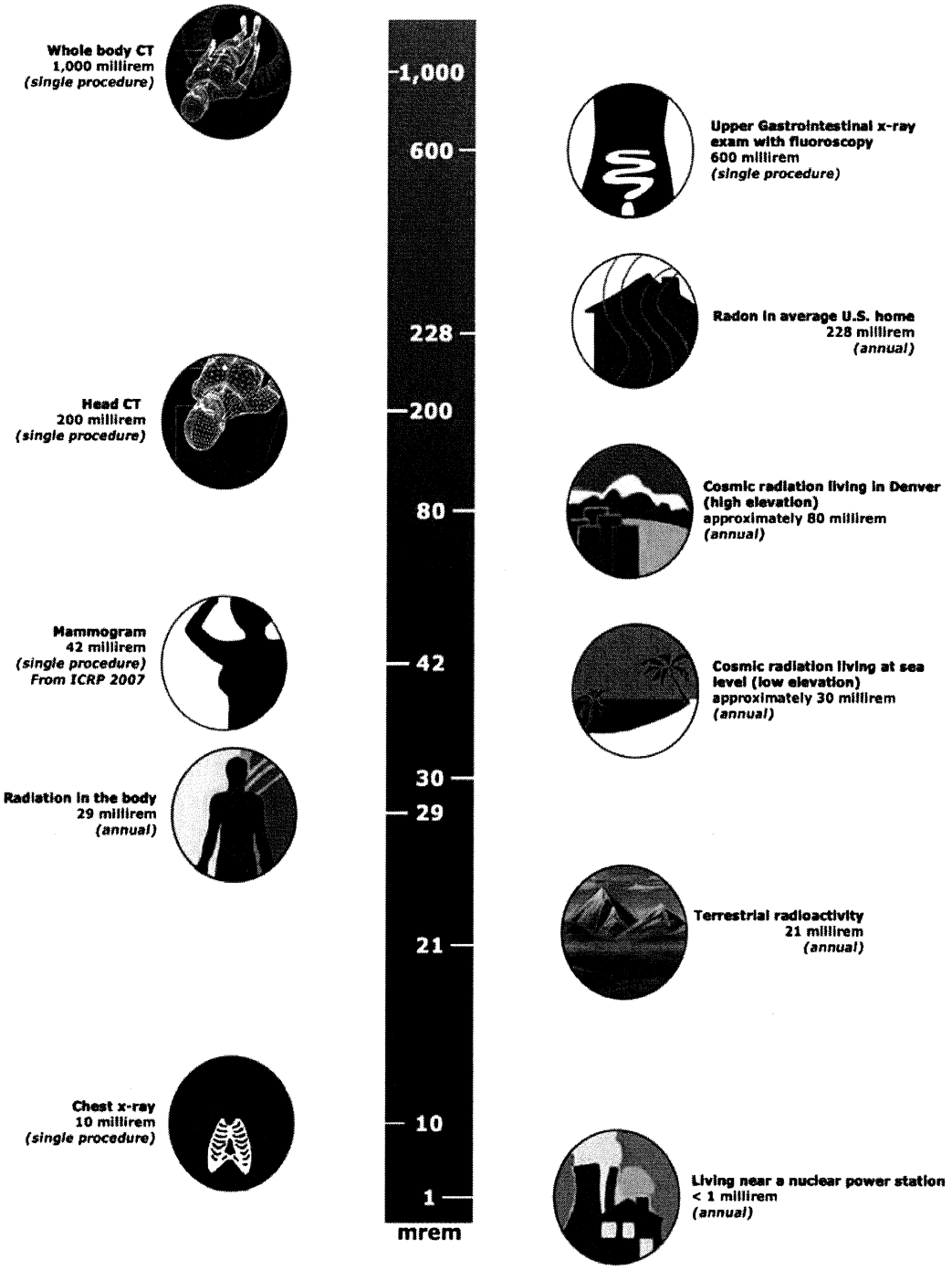
People are exposed to radiation every day of their lives and have been since the dawn of mankind. Some of this radiation is naturally occurring while some is man-made. There are many factors that will determine the amount of radiation individuals will be exposed to such as where they live, medical treatments, etc. The average person in the United States is exposed to approximately 620 mrem each year. Half of this exposure, 310 mrem, comes from natural sources and the other half, 310 mrem, from man-made sources. Graphic 5 shows what the typical sources of radiation are for an individual over a calendar year:

*Graphic 5. Sources of Radiation Exposure in the U.S., from NCRP Report No. 160*




The radiation from a nuclear power plant is included in the chart as part of the "Industrial and Occupational" fraction, <0.1%. The largest natural source of radiation is from radon, because radon gas travels in the air we breathe. Perhaps you know someone who had a CT scan at a hospital to check his or her bones, brain, or heart. CT scans are included in the chart as "Medical Procedures" which make up the next largest fraction. Graphic 6 on the following page shows some of the common doses humans receive from radiation every year.

*Graphic 6 .Relative Doses from Radiation Sources, from EPA Radiation Doses and Sources*

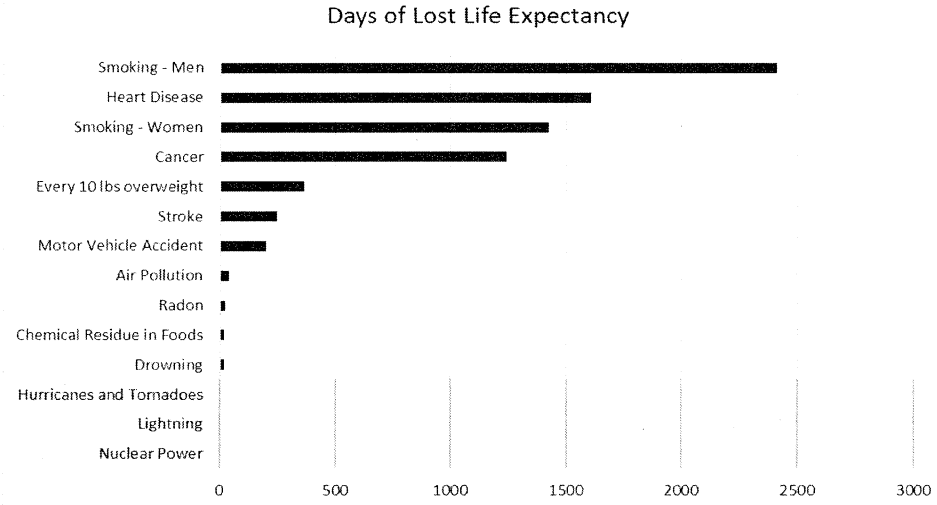


## Radiation Risk

Current science suggests there is some risk from any exposure to radiation. However, it is very hard to tell whether cancers or deaths can be attributed to very low doses of radiation or by something else. U.S. radiation protection standards are based on the premise that any radiation exposure carries some risk.

The following graph is an example of one study that tries to relate risk from many different factors. This graph represents risk as "Days of Lost Life Expectancy". All the categories are averaged over the entire population except Male Smokers, Female Smokers, and individuals that are overweight. Those risks are only for people that fall into those categories. The category for Nuclear Power is a government estimate based on all radioactivity releases from nuclear power, including accidents and wastes.

*Graphic 7. Days of Lost Life Expectancy, Adapted from the Journal of American Physicians and Surgeons Volume 8 Number 2 Summer 2003*




## II. Summary and Conclusions

This report on the Radiological Environmental Monitoring Program (REMP) conducted for Constellation's Braidwood Station covers the period January 1, 2022, through December 31, 2022. During that time period 1,561 analyses were performed on 1,265 samples. In assessing all the data gathered for this report and comparing these results with preoperational data, it was concluded that the operation of Braidwood Station had no adverse radiological impact on the environment.

Surface, public, and ground/well water samples were analyzed for concentrations of tritium and gamma-emitting nuclides. Surface water and public water samples were also analyzed for concentrations of gross beta. Gross beta and tritium activities detected were consistent with those detected in previous years. No fission or activation products were detected. As part of an effort to implement industry best practices, both gaseous and liquid station effluents were evaluated for all 10CFR61 required nuclides. Nuclides exceeding 1% relative abundance in the waste stream were added to the list of nuclides that Teledyne Brown evaluates in potentially impacted REMP matrices. For Braidwood Station, nickel-63 (Ni-63) exceeds 1% relative abundance in the radwaste resins. Occasionally, Ni-63 is observed in liquid release tank quarterly composites, therefore, beginning in the fall of 2013 the station requested that Ni-63 be evaluated in the downstream surface water, sediment, and fish analyses. Nickel-63 has not been observed in downstream surface water.

Fish (commercially and/or recreationally-important species) and sediment samples were analyzed for concentrations of gamma-emitting nuclides. No fission or activation products were detected in fish. Nickel-63 was not detected in any fish or sediment samples analyzed. No plant-produced fission or activation products were found in sediment.

Air particulate samples were analyzed for concentrations of gross beta and gamma-emitting nuclides. No fission or activation products were detected.

High sensitivity iodine-131 (I-131) analyses were performed on weekly air samples. All results were less than the minimum detectable concentration for I-131.

Cow milk samples were analyzed for concentrations of I-131 and gamma-emitting nuclides. Iodine-131 was not detected in any milk samples. Concentrations of naturally-occurring potassium-40 (K-40) were detected. No fission or activation products were found in any samples and all required LLDs (Lower Limit of Detection) were met.

Food Product samples were analyzed for concentrations of gamma-emitting nuclides. No fission or activation products were found in any samples and all required LLDs were met.

Environmental gamma radiation measurements were performed quarterly using Optically Stimulated Luminescence Dosimeters (OSLD). Beginning in 2012, Constellation (formerly Exelon) changed the type of dosimetry used for the Radiological Environmental Monitoring Program (REMP). Optically Stimulated

Luminescent Dosimetry were deployed and Thermo-luminescent Dosimetry (TLD) were discontinued. This change may result in a step change in readings, up or down, depending on site characteristics. The relative comparison to control locations remains valid. OSLD technology is different than that used in a TLD but has the same purpose (to measure direct radiation). A dose evaluation was performed by taking the highest readings at the ISFSI pad and extrapolating dose to the nearest resident. The dose to the nearest resident was estimated to be 0.25 mrem in 2022.

## III. Introduction

The Braidwood Station, consisting of two 3,645 MWt pressurized water reactors owned and operated by Constellation is located in Will County, Illinois. Unit No. 1 went critical on May 29, 1987. Unit No. 2 went critical on March 08, 1988. The site is located in northeastern Illinois, 20 miles south-southwest of Joliet, Illinois, 60 miles southwest of Chicago and southwest of the Kankakee River.

This report covers those analyses performed by Teledyne Brown Engineering (TBE) and Landauer Technologies on samples collected during the period January 1, 2022, through December 31, 2022.

### A. Objectives of the REMP

The objectives of the REMP are to:

1. Provide data on measurable levels of radiation and radioactive materials in the site environs;
2. Evaluate the relationship between quantities of radioactive material released from the plant and resultant radiation doses to individuals from principal pathways of exposure.

### B. Implementation of the Objectives

The implementation of the objectives is accomplished by:

1. Identifying significant exposure pathways;
2. Establishing baseline radiological data of media within those pathways;
3. Continuously monitoring those media before and during Station operation to assess Station radiological effects (if any) on man and the environment.

## IV. Program Description

### A. Sample Collection

Samples for the Braidwood Station REMP were collected for Constellation Energy by Environmental Inc. Midwest Labs (EIML). This section describes the general collection methods used by EIML to obtain environmental samples for the Braidwood Station REMP in 2022. Sample locations and descriptions can be found in Table B–1 and Figures B–1 through B–3, Appendix B. The sampling methods used by EIML are listed in Table B-2.

Aquatic Environment

The aquatic environment was evaluated by performing radiological analyses on samples of surface water, public water, well water, fish, and sediment. Two-gallon water samples were collected weekly from six surface water locations [BD-10, BD-25 (Control (C)), BD-38, BD-40, BD-55 and BD-56], and one weekly composite sample of public drinking water at location (BD-22) and ground/well water samples collected quarterly from eight locations (BD-13, BD-34, BD-35, BD-36, BD-37, BD-50, BD-51 and BD-54). All samples were collected in new plastic bottles, which were rinsed with source water prior to collection per procedure. Fish samples comprised of quillback, golden redhorse, flathead catfish, smallmouth bass, channel catfish, common carp and largemouth bass flesh were collected semiannually at three locations, BD-25 (C), BD-28 and BD-41. Sediment samples composed of recently deposited substrate were collected at three locations semiannually, BD-10, BD-25 (C), BD-57. Two additional samples were taken at location BD-Spoil.

Atmospheric Environment

The atmospheric environment was evaluated by performing radiological analyses on samples of air particulate and airborne iodine. Air particulate samples were collected and analyzed weekly at eight locations [BD-02, BD-03 (C), BD-04, BD-05, BD-06, BD-19, BD-20 and BD-21]. Airborne iodine and particulate samples were obtained at each location, using a vacuum pump with charcoal and glass fiber filters installed. The pumps were run continuously and sampled air at the rate of approximately one cubic foot per minute. The air particulate filters and air iodine cartridges were replaced weekly and sent to the laboratory for analysis.

Terrestrial Environment

The terrestrial environment was evaluated by performing radiological analyses on food product samples. Food products and broadleaf vegetation were collected at six locations (BD-Control, BD-Quad 1, BD-Quad 2, BD-Quad 3, BD-Quad 4, BWD-G1 and BWD-G2). Various types of samples were collected and placed in new unused plastic bags and sent to the laboratory for analysis.

Ambient Gamma Radiation

Beginning in 2012, Constellation (formerly Exelon) changed the type of

dosimetry used for the Radiological Environmental Monitoring Program (REMP). Optically Stimulated Luminescent Dosimeters (OSLD) were deployed and the use of Thermoluminescent Dosimeters (TLD) was discontinued. This change may result in a step change in readings, up or down, depending on site characteristics. The relative comparison to control locations remains valid. OSLD technology is different than that used in a TLD but has the same purpose (to measure direct radiation).

Each location consisted of two OSLDs. The OSLDs were exchanged quarterly and sent to Landauer for analysis. The OSLDs were placed at locations on and around the Braidwood Station site as follows:

An inner ring consisting of sixteen locations (BD-101, BD-102, BD-103, BD-104, BD-105, BD-106, BD-107, BD-108, BD-109, BD-110, BD-111a, BD-112, BD-113a, BD-114, BD-115 and BD-116) at or near the site boundary.

An outer ring consisting of sixteen locations (BD-201, BD-202, BD-203, BD-204, BD-205, BD-206, BD-207, BD-208, BD-209, BD-210, BD-211, BD-212, BD-213, BD-214, BD-215 and BD-216) extending to approximately 5 miles from the site.

An additional set located at the eight fixed air sampling locations (BD-02, BD-3 (C), BD-04, BD-05, BD-06, BD-19, BD-20 and BD-21).

An ISFSI set consisting of six locations (BD-ISFSI-104-3, BD-ISFSI-104-4, BD-ISFSI-105-3, BD-ISFSI-105-4, BD-ISFSI-110-3 and BD-ISFSI-110-4).

The specific OSLD locations were determined by the following criteria:

1. The presence of relatively dense population;
2. Site meteorological data taking into account distance and elevation for each of the sixteen–22 1/2 degree sectors around the site;
3. Where estimated annual dose from Braidwood Station, if any, would be most significant.

B. Sample Analysis

This section describes the general analytical methodologies used by TBE to analyze the environmental samples for radioactivity for the Braidwood Station REMP in 2022. The analytical procedures used by the laboratories are listed in Table B-2.

In order to achieve the stated objectives, the current program includes the following analyses:

1. Concentrations of beta emitters in public and surface water and air particulates.
2. Concentrations of gamma emitters in public, ground/well and surface water, air particulates, milk, grass, fish, sediment and food products.
3. Concentrations of tritium in public, ground/well and surface water.
4. Concentrations of I-131 in air, milk and public water.

5. Concentrations of Ni-63 in surface water, fish and sediment.

6. Ambient gamma radiation levels at various site environs.

C. Data Interpretation

The radiological and direct radiation data collected prior to Braidwood Station becoming operational were used as a baseline with which these operational data were compared. For the purpose of this report, Braidwood Station was considered operational at initial criticality. In addition, data was compared to previous years' operational data for consistency and trending. Several factors were important in the interpretation of the data:

1. Lower Limit of Detection and Minimum Detectable Concentration

The lower limit of detection (LLD) was defined as the smallest concentration of radioactive material in a sample that would yield a net count (above background) that would be detected with only a 5% probability of falsely concluding that a blank observation represents a "real" signal. The LLD was intended as a before the fact estimate of a system (including instrumentation, procedure and sample type) and not as an after the fact criteria for the presence of activity. All analyses were designed to achieve the required Braidwood Station detection capabilities for environmental sample analysis.

The MDC is the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal. The MDC is an *a posteriori* determination.

2. Net Activity Calculation and Reporting of Results

Net activity for a sample was calculated by subtracting background activity from the sample activity. Since the REMP measures extremely small changes in radioactivity in the environment, background variations may result in sample activity being lower than the background activity resulting in a negative number. An MDC was reported in all cases where positive activity was not detected.

Gamma spectroscopy results for each type of sample were grouped as follows:

For surface water, public water, ground/well water, air particulate/ radioiodine, milk, vegetation and fish, twelve nuclides, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, I-131, Cs-134, Cs-137, Ba-140 and La-140 were reported.

For sediment, eleven nuclides, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, Cs-134, Cs-137, Ba-140 and La-140 were reported.

Means and standard deviations of the results were calculated. The standard deviations represent the variability of measured results for different samples rather than the single analysis uncertainty.

D. Program Exceptions

For 2022, the Braidwood Station REMP had a sample recovery rate in excess of 98%. Sample anomalies and missed samples are listed in the tables below:

Table D-1 LISTING OF SAMPLE ANOMALIES

| Sample Type | Location Code | Collection Date | Reason |
|---|---|---|---|
| APAI | BD-21 | 02/10/22 | Sample collected after 2 weeks run. Collector was unable to reach the sampler due to a heavy snow accumulation. |
| AP/AI | BD-20 | 07/21/22 | Timer broke after 13.6 hours. Filter appears to be similar to other samples. Run time calculated, timer exchanged. |
| AP/AI | BD-03 | 10/20/22 | Pump stopped working after 20.3 hours; pump exchanged. |
| AP/AI | BD-03 | 11/17/22 | Timer indicates low value of 74.5 hours due to recent power failure. |
| AP/AI | BD-02 | 12/08/22 | Timer broke down. Filter appears similar in color to other samples. Run time calculated. |
| AP/AI | BD-19 | 12/29/22 | Timer indicates lower value of 118 hours. Possible power outage. NOTE: problem identified as a timer failure. Timer exchanged on 01/12/23. |

Table D-2 LISTING OF MISSED SAMPLES

| Sample Type | Location Code | Collection Date(s) | Reason |
|---|---|---|---|
| SW | BD-10 | 01/06/22 - 02/10/22 | No sample; river frozen |
| SW | BD-25 | 01/06/22 - 01/13/22<br>01/27/22 - 02/24/22 | No sample; river frozen |
| SW | BD-38 | 01/06/22<br>01/20/22 - 02/10/22 | No sample; lake frozen |
| SW | BD-55 | 01/06/22 - 02/24/22 | No sample; lake frozen |
| SW | BD-56 | 01/06/22 - 02/10/22<br>02/24/22 | No sample; lake frozen |
| SW | BD-25 | 04/07/22 | No sample, area flooded, access closed |
| AP/AI | BD-03 | 10/06/22 | Pump stopped working after 20.3 hrs; pump exchanged |
| AP/AI | BD-03 | 10/27/22 - 11/10/22 | No power at the sampler; station informed |
| SW | BD-25<br>BD-38<br>BD-55<br>BD-56 | 12/22/22 - 12/29/22 | No sample; river/lake/pond frozen |
| SW | BD-10 | 12/29/22 | No sample; river frozen |

Each program exception was reviewed to understand the causes of the program exception. Sampling and maintenance issues were reviewed with the personnel involved to prevent recurrence. Occasional equipment breakdowns, power outages and weather related issues were unavoidable.

The overall sample recovery rate indicates that the appropriate procedures and equipment are in place to assure reliable program implementation.

E. Program Changes

There were no program changes in 2022.

V. Results and Discussion

A. Aquatic Environment

1. Surface Water (SW)

Samples were taken weekly and composited monthly at six locations (BD-10, BD-25 (C), BD-38, BD-40, BD-55 and BD-56). Of these locations, only BD-10 could be affected by Braidwood Station's effluent releases as it is downstream of the NPDES-permitted outfall. The following analyses were performed:

Gross Beta

Samples from all locations were analyzed for concentrations of gross beta (Table C–I.1, Appendix C). Gross beta was detected in 58 of 67 samples. The values ranged from 2.2 to 13.8 pCi/L. Concentrations detected were consistent with those detected in previous years. (Figures C–1 through C-3, Appendix C)

Tritium

Quarterly composites of weekly collections were analyzed for tritium activity (Table C–I.2, Appendix C). Tritium activity was detected in 5 of 24 samples. Concentrations ranged from 184 ± 875, which were consistent with those detected in previous years. (Figures C–4 through C-6, Appendix C)

Nickel-63

Monthly samples were analyzed for Ni-63 activity. Ni-63 was not detected and the required LLD was met. (Table C–I.3, Appendix C)

Iron-55

Monthly samples were analyzed for Fe-55 activity. Fe-55 was not detected and the required LLD was met. (Table C–I.4, Appendix C)

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides. No nuclides were detected and all required LLDs were met. (Table C–I.4, Appendix C)

2. Public Water (PW)

Monthly composites of weekly samples were made at one location (BD-22). This location could be affected by Braidwood Station's effluent releases. The following analyses were performed:

Gross Beta

Samples from the location were analyzed for concentrations of gross beta (Tables C–II.1, Appendix C). Gross beta was detected in 9 of 12 samples. The values ranged from 2.9 to 5.5 pCi/L. Concentrations

detected were consistent with those detected in previous years. (Figure C–7, Appendix C)

Tritium

Monthly composites of weekly samples from BD-22 were analyzed for tritium activity (Table C–II.2, Appendix C). Tritium was detected in 9 of 12 samples. Concentrations ranged from 337 to 3,050 pCi/L. Concentrations detected were consistent with those detected in previous years (Figure C–8, Appendix C).

Iodine

Monthly composites of weekly samples from the location were analyzed for I-131. Iodine was not detected in any samples and the required LLD was met. (Table C-II.3, Appendix C)

Nickel-63

Monthly samples were analyzed for Ni-63 activity. Ni-63 was detected in 1 of 12 samples with a concentration of 64 pCi/L. The required LLD was met on all samples. (Table C–II.4, Appendix C)

Iron-55

Monthly samples were analyzed for Fe-55 activity. Fe-55 was not detected and the required LLD was met. (Table C–II.5, Appendix C)

Gamma Spectrometry

Samples from the location were analyzed for gamma emitting nuclides. No nuclides were detected and all required LLDs were met. (Table C–II.6, Appendix C)

3. Ground/Well Water (WW)

Quarterly samples were collected at eight locations (BD-13, BD-34, BD-35, BD-36, BD-37, BD-50, BD-51 and BD-54). The following analyses were performed:

Tritium

Quarterly grab samples from the locations were analyzed for tritium activity (Table C–III.1, Appendix C). Tritium was detected in one sample at the detection limit with a concentration of 198 pCi/L. Concentrations were consistent with those in previous years. (Figures C–9 through C–13, Appendix C)

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides. No nuclides were detected and all required LLDs were met. (Table C-II.3, Appendix C)

4. Fish

Fish samples comprising the flesh of smallmouth bass, golden redhorse, shorthead redhorse, common carp, and largemouth bass were collected at three locations (BD-25, BD-28, and BD-41) semiannually. Location BD-28 could be affected by Braidwood Station's effluent releases. The following analyses were performed:

Iron-55

The edible portion of fish samples from all three locations was analyzed for Fe-55 activity. Fe-55 was not detected and the required LLD was met. (Table C-II.3, Appendix C)

Nickel-63

The edible portion of fish samples from all three locations was analyzed for Ni-63 activity. Ni-63 was not detected and the required LLD was met. (Table C–IV.1, Appendix C)

Gamma Spectrometry

The edible portion of fish samples from all three locations was analyzed for gamma emitting nuclides. No fission or activation products were found. No nuclides were detected and all required LLDs were met. (Table C–IV.1, Appendix C)

5. Sediment (BS)

Aquatic sediment samples were collected at three locations (BD-10, BD-25 (C), and BD-57) semiannually. The locations at the Braidwood Station outfall to the Kankakee River (BD-57) and downstream of the outfall (BD-10), could be affected by Braidwood Station's effluent releases. Sediment samples were also obtained from spoil piles resulting from river dredging in the vicinity of the station's outfall. The following analyses were performed:

Iron-55

Sediment samples from all three locations was analyzed for Fe-55 activity. Fe-55 was not detected and the required LLD was met. (Table C–V.1, Appendix C)

Nickel-63

Sediment samples from all three locations was analyzed for Ni-63 activity. Ni-63 was not detected and the required LLD was met. (Table C–V.1, Appendix C)

Gamma Spectrometry

Sediment samples from the location were analyzed for gamma emitting nuclides. Cesium-137 (Cs-137) was detected in one sample at a concentration of 157 pCi/kg dry. No other fission or activation products were found and all required LLDs were met. (Table C–V.1, Appendix C)

B. Atmospheric Environment

1. Airborne (AP/AI)

a. Air Particulates

Continuous air particulate samples were collected from eight locations on a weekly basis. The eight locations were separated into three groups: Near field samplers (BD-06, BD-19, BD-20 and BD-21), far field samplers within 10 km of the site (BD-02, BD-04 and BD-05) and the Control sampler between 10 and 30 km from the site (BD-03). The following analyses were performed:

Gross Beta

Weekly samples were analyzed for concentrations of beta emitters (Table C–VI.1 and C-VI.2, Appendix C). Detectable gross beta activity was observed at all locations. Comparison of results among the three groups aid in determining the effects, if any, resulting from the operation of Braidwood Station. The results from the near field (Group I) ranged from 8E-03 to 41E-03 $pCi/m^3$ with a mean of 20E-03 $pCi/m^3$. The results from the far field (Group II) ranged from 7E-03 to 40E-03 $pCi/m^3$ with a mean of 20E-03 $pCi/m^3$. The results from the Control location (Group III) ranged from 9E-03 to 33E-03 $pCi/m^3$ with a mean of 20E-03 $pCi/m^3$. Comparison of the 2022 air particulate data with previous years' data indicate no effects from the operation of Braidwood Station. Additionally, a comparison of the weekly values for 2022 indicate no notable differences among the three groups. (Figures C-14 through C-18, Appendix C)

Gamma Spectrometry

Weekly samples were composited quarterly and analyzed for gamma emitting nuclides. No nuclides were detected and all required LLDs were met. (Table C–VI.3, Appendix C)

b. Airborne Iodine

Continuous air samples were collected from eight locations (BD-02, BD-03, BD-04, BD-05, BD-06, BD-19, BD-20 and BD-21) and analyzed weekly. The following analysis was performed:

I-131

Continuous air samples were collected from eight locations for I-131. All results were less than the minimum detectable concentration for I-131. The required LLD was met for all analyses. (Table C–VII.1, Appendix C)

C. Terrestrial Environment

1. Milk (MI)

One sample was collected from one location (control location BD-18) in April. The following analyses were performed:

Iodine-131

The milk sample was analyzed for concentrations of I-131. Iodine-131 was not detected in any samples. All required LLDs were met. (Table C–VIII.1, Appendix C)

Gamma Spectrometry

The milk sample was analyzed for concentrations of gamma emitting nuclides. No nuclides were detected and all required LLDs were met. (Table C–VIII.2 & Table C-VIII.3, Appendix C)

2. Food Products (VE)

Food product samples were collected at eight locations: BD-Control, BD-Quad 1, BD-Quad 2, BD-Quad 3, BD-Quad 4, BWD-G1 and BWD-G2 when available. The following analysis was performed:

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides. No nuclides were detected and all required LLDs were met. (Table C–IX.1, Appendix C)

D. Ambient Gamma Radiation

Ambient gamma radiation levels were measured utilizing Optically Stimulated Luminescence Dosimeter (OSLD). Forty-eight OSLD locations were established around the site, each with two OSLD's installed for measurement. The data was analyzed using methods acceptable for demonstrating compliance with the Environmental Protection Agency (EPA) 40 CFR 190, "Environmental Radiation Protection Standards for Nuclear Power Operations". It incorporates the concepts of ANSI/HPS N13.37, "Environmental Dosimetry". Results of OSLD measurements are listed in Tables C–X.1 to C–X.3, Appendix C.

All OSLD measurements had a range of 9.6 to 59.4 mrem/std. quarter. A comparison of the Inner Ring, Outer Ring and Other data to the Control Location data, indicate that the ambient gamma radiation levels from all locations were similar.

Annual Facility Dose was reported for station BD-ISFSI-105-4. The direct dose to the nearest resident was estimated to be 0.25 mrem for the year.

E. Land Use Survey

A Land Use Survey conducted during September 7, 2022, around the Braidwood Station was performed by EIML for Constellation to comply with section 12.5.2 of the Braidwood Station's Offsite Dose Calculation Manual ODCM). The purpose of the survey was to document the nearest resident, milk-producing animal and garden of greater than 500 $ft^2$ in each of the sixteen 22 ½ degree sectors around the site. For dose calculation, a garden is assumed at the nearest residence. There were no notable changes to the 2022 land use census. The results of this survey are summarized below:

| Distance in Miles from the Braidwood Station Reactor Buildings | | | | |
|---|---|---|---|---|
| Sector | | Residence Miles | Livestock Miles | Milk Farm Miles |
| A | N | 0.50 | 2.6 | - |
| B | NNE | 0.88 | - | - |
| C | NE | 0.65 | - | - |
| D | ENE | 0.60 | - | - |
| E | E | 1.50 | 2.3 | - |
| F | ESE | 2.20 | 2.3 | - |
| G | SE | 2.70 | 2.7 | - |
| H | SSE | 4.50 | - | - |
| J | S | 4.20 | - | - |
| K | SSW | 4.00 | 5.3 | - |
| L | SW | 0.40 | - | - |
| M | WSW | 0.45 | - | - |
| N | W | 0.35 | 1.6 | 8.7 |
| P | WNW | 0.40 | - | - |
| Q | NW | 0.40 | - | - |
| R | NNW | 0.40 | - | - |

F. Errata Data

There was no errata data for 2022 REMP.

G. Summary of Results – Inter-Laboratory Comparison Program

The TBE Laboratory analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation, and water matrices for various analytes. The PE samples supplied by Analytics Inc., Environmental Resource Associates (ERA) and Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP), were evaluated against the following pre-set acceptance criteria:

1. Analytics Evaluation Criteria

   Analytics' evaluation report provides a ratio of TBE's result and Analytics' known value. Since flag values are not assigned by Analytics, TBE evaluates the reported ratios based on internal QC requirements based on the DOE MAPEP criteria.

2. ERA Evaluation Criteria

   ERA's evaluation report provides an acceptance range for control and warning limits with associated flag values. ERA's acceptance limits are established per the USEPA, National Environmental Laboratory Accreditation Conference (NELAC), state-specific Performance Testing (PT) program requirements or ERA's SOP for the Generation of Performance Acceptance Limits, as applicable. The acceptance limits are either determined by a regression equation specific to each analyte or a fixed percentage limit promulgated under the appropriate regulatory document.

3. DOE Evaluation Criteria

   MAPEP's evaluation report provides an acceptance range with associated flag values. MAPEP defines three levels of performance:

   - Acceptable (flag = "A") - result within ± 20% of the reference value
   - Acceptable with Warning (flag = "W") - result falls in the ± 20% to ± 30% of the reference value
   - Not Acceptable (flag = "N") – bias is greater than 30% of the reference value

   *Note: The Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP) samples are created to mimic conditions found at DOE sites which do not resemble typical environmental samples obtained at commercial nuclear power facilities.*

For the TBE laboratory, 142 out of 150 analyses performed met the specified acceptance criteria. Eight analyses did not meet the specified acceptance criteria and were addressed through the TBE Corrective Action Program. *NOTE: Two analyses (soil for Tc-99 and U-238) that did not meet acceptance criteria was performed for TBE information and is not on the list of required ICP analyses.* A summary is found below:

1. The Analytics March 2022 AP Ce-141 result was evaluated as *Not Acceptable*. The reported value for Ce-141 was 60.9 pCi and the known result was 42.0 pCi/L (1.45 ratio of reported result vs. known; TBE's internal acceptance range is 0.70 - 1.30). This sample was used as the workgroup duplicate with a result of 45.7 (109% of known) and was also counted on a different detector with a result of 50.9 (121% of known). This was TBE's first failure for AP Ce-141. (NCR 22-04)

2. The MAPEP February 2022 Urine U-234 & U-238 results were evaluated as *Not Acceptable*. TBE's reported values of 0.142 and 0.0254 were above the known upper ranges of 0.0096 and 0.0134 respectively for U-234 and U-238. These spiked values were below TBE's typical MDC for urine client samples. The samples were re-prepped using a larger sample aliquot and counted for 60 hours as opposed to 48 hours. The recount results were 0.00732 for U-234 and 0.0119 for U-238 (both within acceptable range). MAPEP urine samples will be flagged to use a larger sample aliquot and counting time than typical client samples. MAPEP did not include any urine cross-check samples in August. (NCR 22-05)

3. The ERA MRAD September 2022 AP Pu-238 was evaluated as *Not Acceptable*. The reported value was 38.8 pCi and the known result was 29.9 (acceptance range 22.6 – 36.7). The AP filter was cut in half prior to digestion (shared with Fe-55) but should have been complete digested together and aliquotted afterwards like typical client samples. This is the first failure for AP Pu-238. (NCR 22-19)

4. The ERA October 2022 water Uranium result was evaluated as *Not Acceptable*. The reported value was 10.54 pCi/L and the known was 8.53 (acceptance range 6.60 – 9.88) or 124% of the known (acceptable for TBE QC). The 2-sigma error was 3.2, placing the reported result well within the acceptable range. This sample was used as the workgroup duplicate with a result of 8.2 +/- 2.9 pCi/L (also within the acceptable range). All other QA was reviewed with no anomalies. (NCR 22-20)

5. The Analytics AP Co-60 result was evaluated as *Not Acceptable*. The reported value was 207 pCi and the known was 147 (141% of the known). TBE's internal QC acceptance is 70 - 130%. All QA was reviewed with no anomalies. This sample was used as the workgroup duplicate and counted on a different detector with a result of 167 pCi (114% of the known). This is the first failure for AP Co-60 - average result ratio compared to the known is 109%. (NCR 22-21)

6. The MAPEP August 2022 water Tc-99 result was evaluated as *Not Acceptable*. The reported value was 1.86 +/- 0.414 Bq/L for this "false positive" test. The evaluation of the submitted result to the 3 times the uncertainty indicated a slight positive. This sample was used as the workgroup duplicate with a result of 0.88 +/- 0.374 Bq/L. All QC was reviewed, and no anomalies found. This is the first unacceptable since the resumption of reporting water Tc-99 for the 3$^{rd}$ quarter of 2020. TBE to known ratios have ranged from 94-109% during this time. (NCR 22-22)

The Inter-Laboratory Comparison Program provides evidence of "in control" counting systems and methods, and that the laboratories are producing accurate and reliable data.

# APPENDIX A

# RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT ANNUAL SUMMARY

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## TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR BRAIDWOOD STATION, 2022

**NAME OF FACILITY: BRAIDWOOD** **DOCKET NUMBERS: 50-456 & 50-457**
**LOCATION OF FACILITY: BRACEVILLE, IL** **REPORTING PERIOD: 2022**

| MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)* | TYPES OF ANALYSIS PERFORMED | NUMBER OF ANALYSIS PERFORMED | REQUIRED LOWER LIMIT OF DETECTION (LLD) | **INDICATOR LOCATIONS** MEAN (M) (F) *RANGE* | **CONTROL LOCATION** MEAN (M) (F) *RANGE* | **LOCATION WITH HIGHEST ANNUAL MEAN (M)** MEAN (M) (F) *RANGE* | STATION # NAME DISTANCE AND DIRECTION | NUMBER OF NONROUTINE REPORTED MEASUREMENTS |
|---|---|---|---|---|---|---|---|---|
| **SURFACE WATER** *(PCI/LITER)* | **GR-B** | 67 | 4 | 6.6 (47/56) *2.2 - 13.8* | 4.6 (11/11) *2.7 - 6.8* | 10.4 (12/12) *5.1 - 13.8* | BD-40 INDICATOR BRAIDWOOD STATION COOLING LAKE ONSITE | 0 |
| | **H-3** | 24 | 200 | 437 (5/20) *184 - 875* | <LLD | 765 (2/4) *654 - 875* | BD-10 INDICATOR KANKAKEE RIVER DOWNSTREAM 5.4 MILES NE OF SITE | 0 |
| | **NI-63** | 22 | 30 | <LLD | <LLD | - | | 0 |
| | **FE-55** | 22 | 200 | <LLD | <LLD | - | | 0 |
| | **GAMMA** | 67 | | | | | | |
| | *MN-54* | | 15 | <LLD | <LLD | - | | 0 |
| | *CO-58* | | 15 | <LLD | <LLD | - | | 0 |
| | *FE-59* | | 30 | <LLD | <LLD | - | | 0 |
| | *CO-60* | | 15 | <LLD | <LLD | - | | 0 |
| | *ZN-65* | | 30 | <LLD | <LLD | - | | 0 |
| | *NB-95* | | 15 | <LLD | <LLD | - | | 0 |
| | *ZR-95* | | 30 | <LLD | <LLD | - | | 0 |
| | *I-131* | | 15 | <LLD | <LLD | - | | 0 |
| | *CS-134* | | 15 | <LLD | <LLD | - | | 0 |
| | *CS-137* | | 18 | <LLD | <LLD | - | | 0 |
| | *BA-140* | | 60 | <LLD | <LLD | - | | 0 |
| | *LA-140* | | 15 | <LLD | <LLD | - | | 0 |
| **PUBLIC WATER** *(PCI/LITER)* | **GR-B** | 12 | 4 | 3.7 (9/12) *2.9 - 5.5* | NA | 3.7 (9/12) *2.9 - 5.5* | BD-22 INDICATOR WILMINGTON 6.0 MILES NE OF SITE | 0 |
| | **H-3** | 12 | 200 | 1173 (9/12) *337 - 3050* | NA | 1173 (9/12) *337 - 3050* | BD-22 INDICATOR WILMINGTON 6.0 MILES NE OF SITE | 0 |
| | **I-131** | 12 | 1 | <LLD | NA | - | | 0 |
| | **NI-63** | 12 | 30 | 64 (1/12) | <LLD | 64 (1/12) | BD-22 INDICATOR WILMINGTON 6.0 MILES NE OF SITE | 0 |

*(M) The Mean Values are calculated using the positive values. (F) Fraction of detectable measurement are indicated in parentheses.*

**TABLE A-1** **RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR BRAIDWOOD STATION, 2022**

**NAME OF FACILITY: BRAIDWOOD** **DOCKET NUMBERS: 50-456 & 50-457**

**LOCATION OF FACILITY: BRACEVILLE, IL** **REPORTING PERIOD: 2022**

| MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)* | TYPES OF ANALYSIS PERFORMED | NUMBER OF ANALYSIS PERFORMED | REQUIRED LOWER LIMIT OF DETECTION (LLD) | **INDICATOR LOCATIONS** MEAN (M) (F) *RANGE* | **CONTROL LOCATION** MEAN (M) (F) *RANGE* | **LOCATION WITH HIGHEST ANNUAL MEAN (M)** MEAN (M) (F) *RANGE* | STATION # NAME DISTANCE AND DIRECTION | NUMBER OF NONROUTINE REPORTED MEASUREMENTS |
|---|---|---|---|---|---|---|---|---|
| **PUBLIC WATER** | **FE-55** | 12 | 200 | <LLD | <LLD | - | | 0 |
| *(PCI/LITER)* | **GAMMA** | 12 | | | | | | |
| | *MN-54* | | 15 | <LLD | NA | - | | 0 |
| | *CO-58* | | 15 | <LLD | NA | - | | 0 |
| | *FE-59* | | 30 | <LLD | NA | - | | 0 |
| | *CO-60* | | 15 | <LLD | NA | - | | 0 |
| | *ZN-65* | | 30 | <LLD | NA | - | | 0 |
| | *NB-95* | | 15 | <LLD | NA | - | | 0 |
| | *ZR-95* | | 30 | <LLD | NA | - | | 0 |
| | *CS-134* | | 15 | <LLD | NA | - | | 0 |
| | *CS-137* | | 18 | <LLD | NA | - | | 0 |
| | *BA-140* | | 60 | <LLD | NA | - | | 0 |
| | *LA-140* | | 15 | <LLD | NA | - | | 0 |
| **GROUND WATER** *(PCI/LITER)* | **H-3** | 32 | 200 | 198 (1/32) | NA | 198 (1/4) | BD-34 INDICATOR GIBSON WELL 4.7 MILES E OF SITE | 0 |
| | **GAMMA** | 32 | | | | | | |
| | *MN-54* | | 15 | <LLD | NA | - | | 0 |
| | *CO-58* | | 15 | <LLD | NA | - | | 0 |
| | *FE-59* | | 30 | <LLD | NA | - | | 0 |
| | *CO-60* | | 15 | <LLD | NA | - | | 0 |
| | *ZN-65* | | 30 | <LLD | NA | - | | 0 |
| | *NB-95* | | 15 | <LLD | NA | - | | 0 |
| | *ZR-95* | | 30 | <LLD | NA | - | | 0 |
| | *I-131* | | 15 | <LLD | NA | - | | 0 |
| | *CS-134* | | 15 | <LLD | NA | - | | 0 |
| | *CS-137* | | 18 | <LLD | NA | - | | 0 |
| | *BA-140* | | 60 | <LLD | NA | - | | 0 |
| | *LA-140* | | 15 | <LLD | NA | - | | 0 |
| **FISH** *(PCI/KG WET)* | **FE-55** | 12 | 260 | <LLD | <LLD | - | | 0 |

*(M) The Mean Values are calculated using the positive values. (F) Fraction of detectable measurement are indicated in parentheses.*

**TABLE A-1** **RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR BRAIDWOOD STATION, 2022**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **NAME OF FACILITY: BRAIDWOOD** | | | | | **DOCKET NUMBERS:** | **50-456 & 50-457** | | |
| **LOCATION OF FACILITY: BRACEVILLE, IL** | | | | | **REPORTING PERIOD:** | **2022** | | |
| MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)* | TYPES OF ANALYSIS PERFORMED | NUMBER OF ANALYSIS PERFORMED | REQUIRED LOWER LIMIT OF DETECTION (LLD) | **INDICATOR LOCATIONS** MEAN (M) (F) *RANGE* | **CONTROL LOCATION** MEAN (M) (F) *RANGE* | **LOCATION WITH HIGHEST ANNUAL MEAN (M)** MEAN (M) (F) *RANGE* | STATION # NAME DISTANCE AND DIRECTION | NUMBER OF NONROUTINE REPORTED MEASUREMENTS |
| **FISH** | **NI-63** | 12 | 260 | <LLD | <LLD | - | | 0 |
| *(PCI/KG WET)* | **GAMMA** | 12 | | | | | | |
| | *MN-54* | | 130 | <LLD | <LLD | - | | 0 |
| | *CO-58* | | 130 | <LLD | <LLD | - | | 0 |
| | *FE-59* | | 260 | <LLD | <LLD | - | | 0 |
| | *CO-60* | | 130 | <LLD | <LLD | - | | 0 |
| | *ZN-65* | | 260 | <LLD | <LLD | - | | 0 |
| | *NB-95* | | NA | <LLD | <LLD | - | | 0 |
| | *ZR-95* | | NA | <LLD | <LLD | - | | 0 |
| | *I-131* | | NA | <LLD | <LLD | - | | 0 |
| | *CS-134* | | 130 | <LLD | <LLD | - | | 0 |
| | *CS-137* | | 150 | <LLD | <LLD | - | | 0 |
| | *BA-140* | | NA | <LLD | <LLD | - | | 0 |
| | *LA-140* | | NA | <LLD | <LLD | - | | 0 |
| **SEDIMENT** | **FE-55** | 8 | 2000 | <LLD | <LLD | - | | 0 |
| *(PCI/KG DRY)* | | | | | | | | |
| | **NI-63** | 8 | 260 | <LLD | <LLD | - | | 0 |
| | **GAMMA** | 8 | | | | | | |
| | *MN-54* | | NA | <LLD | <LLD | - | | 0 |
| | *CO-58* | | NA | <LLD | <LLD | - | | 0 |
| | *FE-59* | | NA | <LLD | <LLD | - | | 0 |
| | *CO-60* | | NA | <LLD | <LLD | - | | 0 |
| | *ZN-65* | | NA | <LLD | <LLD | - | | 0 |
| | *NB-95* | | NA | <LLD | <LLD | - | | 0 |
| | *ZR-95* | | NA | <LLD | <LLD | - | | 0 |
| | *CS-134* | | 150 | <LLD | <LLD | - | | 0 |
| | *CS-137* | | 180 | 157 (1/4) | <LLD | 157 (1/2) | BD-10 INDICATOR KANKAKEE RIVER DOWNSTREAM 5.4 MILES NE OF SITE | 0 |
| | *BA-140* | | NA | <LLD | <LLD | - | | 0 |
| | *LA-140* | | NA | <LLD | <LLD | - | | 0 |

*(M) The Mean Values are calculated using the positive values. (F) Fraction of detectable measurement are indicated in parentheses.*

**TABLE A-1** **RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR BRAIDWOOD STATION, 2022**

**NAME OF FACILITY: BRAIDWOOD** **DOCKET NUMBERS: 50-456 & 50-457**
**LOCATION OF FACILITY: BRACEVILLE, IL** **REPORTING PERIOD: 2022**

| MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)* | TYPES OF ANALYSIS PERFORMED | NUMBER OF ANALYSIS PERFORMED | REQUIRED LOWER LIMIT OF DETECTION (LLD) | **INDICATOR LOCATIONS** MEAN (M) (F) *RANGE* | **CONTROL LOCATION** MEAN (M) (F) *RANGE* | **LOCATION WITH HIGHEST ANNUAL MEAN (M)** MEAN (M) (F) *RANGE* | STATION # NAME DISTANCE AND DIRECTION | NUMBER OF NONROUTINE REPORTED MEASUREMENTS |
|---|---|---|---|---|---|---|---|---|
| **AIR PARTICULATE** | **GR-B** | 411 | 10 | 20 | 20 | 21 | BD-20 INDICATOR | 0 |
| *(E-3 PCI/CU.METER)* | | | | (363/363) | (47/48) | (52/52) | NEARSITE N | |
| | | | | *7 - 41* | *9 - 33* | *9 - 37* | 0.6 MILES N OF SITE | |
| | **GAMMA** | 32 | | | | | | |
| | *MN-54* | | NA | <LLD | <LLD | - | | 0 |
| | *CO-58* | | NA | <LLD | <LLD | - | | 0 |
| | *FE-59* | | NA | <LLD | <LLD | - | | 0 |
| | *CO-60* | | NA | <LLD | <LLD | - | | 0 |
| | *ZN-65* | | NA | <LLD | <LLD | - | | 0 |
| | *NB-95* | | NA | <LLD | <LLD | - | | 0 |
| | *ZR-95* | | NA | <LLD | <LLD | - | | 0 |
| | *CS-134* | | 50 | <LLD | <LLD | - | | 0 |
| | *CS-137* | | 60 | <LLD | <LLD | - | | 0 |
| | *BA-140* | | NA | <LLD | <LLD | - | | 0 |
| | *LA-140* | | NA | <LLD | <LLD | - | | 0 |
| **AIR IODINE** | **GAMMA** | 411 | | | | | | |
| *(E-3 PCI/CU.METER)* | *I-131* | | 70 | <LLD | <LLD | - | | 0 |
| **MILK** | **I-131** | 1 | 1 | <LLD | <LLD | - | | 0 |
| *(PCI/LITER)* | | | | | | | | |
| | **GAMMA** | 1 | | | | | | |
| | *MN-54* | | NA | <LLD | <LLD | - | | 0 |
| | *CO-58* | | NA | <LLD | <LLD | - | | 0 |
| | *FE-59* | | NA | <LLD | <LLD | - | | 0 |
| | *CO-60* | | NA | <LLD | <LLD | - | | 0 |
| | *ZN-65* | | NA | <LLD | <LLD | - | | 0 |
| | *NB-95* | | NA | <LLD | <LLD | - | | 0 |
| | *ZR-95* | | NA | <LLD | <LLD | - | | 0 |
| | *CS-134* | | 15 | <LLD | <LLD | - | | 0 |
| | *CS-137* | | 18 | <LLD | <LLD | - | | 0 |
| | *BA-140* | | 60 | <LLD | <LLD | - | | 0 |
| | *LA-140* | | 15 | <LLD | <LLD | - | | 0 |

*(M) The Mean Values are calculated using the positive values. (F) Fraction of detectable measurement are indicated in parentheses.*

**TABLE A-1** **RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR BRAIDWOOD STATION, 2022**

**NAME OF FACILITY: BRAIDWOOD** **DOCKET NUMBERS: 50-456 & 50-457**

**LOCATION OF FACILITY: BRACEVILLE, IL** **REPORTING PERIOD: 2022**

| MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)* | TYPES OF ANALYSIS PERFORMED | NUMBER OF ANALYSIS PERFORMED | REQUIRED LOWER LIMIT OF DETECTION (LLD) | **INDICATOR LOCATIONS** MEAN (M) (F) *RANGE* | **CONTROL LOCATION** MEAN (M) (F) *RANGE* | **LOCATION WITH HIGHEST ANNUAL MEAN (M)** MEAN (M) (F) *RANGE* | STATION # NAME DISTANCE AND DIRECTION | NUMBER OF NONROUTINE REPORTED MEASUREMENTS |
|---|---|---|---|---|---|---|---|---|
| **GRASS** | **GAMMA** | 0 | | | | | | |
| *(PCI/KG WET)* | *MN-54* | | NA | | | | | 0 |
| | *CO-58* | | NA | | | | | 0 |
| | *FE-59* | | NA | | | | | 0 |
| | *CO-60* | | NA | | | | | 0 |
| | *ZN-65* | | NA | | | | | 0 |
| | *NB-95* | | NA | | | | | 0 |
| | *ZR-95* | | NA | | | | | 0 |
| | *CS-134* | | 60 | | | | | 0 |
| | *CS-137* | | 60 | | | | | 0 |
| | *BA-140* | | 80 | | | | | 0 |
| | *LA-140* | | NA | | | | | 0 |
| | | | | | | | | 0 |
| **VEGETATION** | **GAMMA** | 130 | | | | | | |
| *(PCI/KG WET)* | *MN-54* | | NA | <LLD | <LLD | - | | 0 |
| | *CO-58* | | NA | <LLD | <LLD | - | | 0 |
| | *FE-59* | | NA | <LLD | <LLD | - | | 0 |
| | *CO-60* | | NA | <LLD | <LLD | - | | 0 |
| | *ZN-65* | | NA | <LLD | <LLD | - | | 0 |
| | *NB-95* | | NA | <LLD | <LLD | - | | 0 |
| | *ZR-95* | | NA | <LLD | <LLD | - | | 0 |
| | *I-131* | | 60 | <LLD | <LLD | - | | 0 |
| | *CS-134* | | 60 | <LLD | <LLD | - | | 0 |
| | *CS-137* | | 80 | <LLD | <LLD | | | 0 |
| | *BA-140* | | NA | <LLD | <LLD | - | | 0 |
| | *LA-140* | | NA | <LLD | <LLD | - | | 0 |
| **DIRECT RADIATION** | **OSLD-QUARTERLY** | 184 | NA | 6.5 | 15.8 | 46.9 | BD-ISFSI-105-4 INDICATOR | 0 |
| *(MILLIREM/QTR.)* | | | | (180/180) | (4/4) | (4/4) | | |
| | | | | *9.6 - 59.4* | *14.0 - 17.8* | *32.07 - 59.4* | 0.20 MILES SE | |

*(M) The Mean Values are calculated using the positive values. (F) Fraction of detectable measurement are indicated in parentheses.*

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# APPENDIX B

# LOCATION DESIGNATION, DISTANCE & DIRECTION, AND SAMPLE COLLECTION & ANALYTICAL METHODS

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TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Braidwood Station, 2022

| Location | Location Description | Distance & Direction from Site |
|---|---|---|
| A. Surface Water | | |
| BD-10 | Kankakee River Downstream (indicator) | 5.4 miles NE |
| BD-25 | Kankakee River Upstream (control) | 9.6 miles E |
| BD-38 | Main Drainage Ditch (indicator) | 1.5 miles SE |
| BD-40 | Braidwood Station Cooling Lake (indicator) | Onsite (1.0 mile E) |
| BD-55 | North Pond Fatlan Site (indicator) | 0.6 miles NE |
| BD-56 | South Pond Fatlan Site (indicator) | 0.6 miles NE |
| B. Drinking (Potable) Water | | |
| BD-22 | Wilmington (indicator) | 6.0 miles NE |
| C. Ground/Well Water | | |
| BD-13 | Braidwood City Hall Well (indicator) | 1.7 miles NNE |
| BD-34 | Gibson Well (indicator) | 4.7 miles E |
| BD-35 | Joly Well (indicator) | 4.7 miles E |
| BD-36 | Hutton Well (indicator) | 4.7 miles E |
| BD-37 | Nurczyk Well (indicator) | 4.7 miles E |
| BD-50 | Skole Well (indicator) | 4.7 miles E |
| BD-51 | Fatlan Well (indicator) | 0.6 miles NE |
| BD-54 | Cash Well (indicator) | 0.9 miles NE |
| D. Milk - Bi-Weekly / Monthly | | |
| BD-18 | Biros' Farm (control) | 8.7 miles W |
| E. Air Particulates / Air Iodine | | |
| BD-02 | Custer Park (indicator) | 5.0 miles E |
| BD-03 | County Line Road (control) | 6.2 miles ESE |
| BD-04 | Essex (indicator) | 4.8 miles SSE |
| BD-05 | Gardner (indicator) | 5.5 miles SW |
| BD-06 | Godley (indicator) | 0.5 miles WSW |
| BD-19 | Nearsite NW (indicator) | 0.3 miles NW |
| BD-20 | Nearsite N (indicator) | 0.6 miles N |
| BD-21 | Nearsite NE (indicator) | 0.5 miles NE |
| F. Fish | | |
| BD-25 | Kankakee River, Upstream (control) | 9.6 miles E |
| BD-28 | Kankakee River, Discharge (indicator) | 5.4 miles E |
| BD-41 | Cooling Lake (indicator) | Onsite (1.0 mile E) |
| G. Sediment | | |
| BD-10 | Kankakee River, Downstream (indicator) | 5.4 miles NE |
| BD-25 | Kankakee River Upstream (control) | 9.6 miles E |
| BD-57 | Circulating Water Blowdown Discharge (indicator) | 5.4 miles E |
| BD-Spoil-1 | Circulating Water Blowdown Discharge (indicator) | 5.4 miles E |
| BD-Spoil-2 | Circulating Water Blowdown Discharge (indicator) | 5.4 miles E |
| H. Food Products | | |
| BWD-G1 | Nearsite NE | 0.54 miles NE |
| BWD-G2 | Nearsite W | 0.21 miles W |
| Quadrant 1 | Clark Farm | 3.8 miles ENE |
| Quadrant 2 | W.F. Soltwisch | 4.5 miles SSE |
| Quadrant 3 | Terri Schultz | 4.8 miles SSW |
| Quadrant 4 | Bruce Sinkular | 1.9 miles NNW |
| Control | Gorman Farm | 9.0 miles NE |

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Braidwood Station, 2022

| Location | Location Description | Distance & Direction from Site |
|---|---|---|
| I. Environmental Dosimetry - OSLD | | |
| Inner Ring | | |
| BD-101 | | 0.5 miles N |
| BD-102 | | 1.1 miles NNE |
| BD-103 | | 1.0 mile NE |
| BD-104 | | 0.7 miles ENE |
| BD-105 | | 2.2 miles E |
| BD-106 | | 2.5 miles ESE |
| BD-107 | | 3.2 miles SE |
| BD-108 | | 3.2 miles SSE |
| BD-109 | | 3.8 miles S |
| BD-110 | | 2.8 miles SSW |
| BD-111a | | 1.4 miles SW |
| BD-112 | | 0.7 miles WSW |
| BD-113a | | 0.5 miles W |
| BD-114 | | 0.4 miles WNW |
| BD-115 | | 0.3 miles NW |
| BD-116 | | 0.4 miles NNW |
| Outer Ring | | |
| BD-201 | | 4.2 miles N |
| BD-202 | | 4.8 miles NNE |
| BD-203 | | 4.9 miles NE |
| BD-204 | | 4.3 miles ENE |
| BD-205 | | 4.0 miles E |
| BD-206 | | 4.5 miles ESE |
| BD-207 | | 4.5 miles SE |
| BD-208 | | 4.5 miles SSE |
| BD-209 | | 4.8 miles S |
| BD-210 | | 5.3 miles SSW |
| BD-211 | | 4.8 miles SW |
| BD-212 | | 5.0 miles WSW |
| BD-213 | | 4.8 miles W |
| BD-214 | | 4.3 miles WNW |
| BD-215 | | 4.5 miles NW |
| BD-216 | | 4.0 miles NNW |
| Other | | |
| BD-02 | Custer Park (indicator) | 5.0 miles E |
| BD-03 | 13000 W. Road (control) | 6.2 miles ESE |
| BD-04 | Essex (indicator) | 4.8 miles SSE |
| BD-05 | Gardner (indicator) | 5.5 miles SW |
| BD-06 | Godley (indicator) | 0.5 miles WSW |
| BD-19 | Nearsite NW (indicator) | 0.3 miles NW |
| BD-20 | Nearsite N (indicator) | 0.6 miles N |
| BD-21 | Nearsite NE (indicator) | 0.5 miles NE |
| ISFSI | | |
| BD-ISFSI-104-3 | | 0.11 miles E |
| BD-ISFSI-104-4 | | 0.13 miles E |
| BD-ISFSI-105-3 | | 0.23 miles SE |
| BD-ISFSI-105-4 | | 0.20 miles SE |
| BD-ISFSI-110-3 | | 0.18 miles SE |
| BD-ISFSI-110-4 | | 0.15 miles SE |

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Braidwood Station, 2022

| Distance in Miles from the Braidwood Station ISFSI Pad, 2022 | | |
|---|---|---|
| Sector | | Residence Miles |
| N | WNW | 0.7 |
| P | WNW | 0.7 |
| Q | NW | 0.7 |
| R | NNW | 0.7 |

| Distance in Miles from the Braidwood Station Reactor Buildings, 2022 | | | | |
|---|---|---|---|---|
| Sector | | Residence Miles | Livestock Miles | Milk Farm Miles |
| A | N | 0.5 | 2.6 | - |
| B | NNE | 0.9 | - | - |
| C | NE | 0.7 | - | - |
| D | ENE | 0.8 | 3.3 | - |
| E | E | 1.5 | 2.3 | - |
| F | ESE | 2.2 | 2.3 | - |
| G | SE | 2.7 | 2.7 | - |
| H | SSE | 4.5 | - | - |
| J | S | 4.2 | 4.8 | - |
| K | SSW | 1.3 | 5.3 | - |
| L | SW | 0.4 | 1.2 | - |
| M | WSW | 0.5 | - | - |
| N | W | 0.4 | 1.6 | 8.7 |
| P | WNW | 0.4 | - | - |
| Q | NW | 0.4 | - | - |
| R | NNW | 0.4 | - | - |

TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Braidwood Station, 2022

| Sample Medium | Analysis | Sampling Method | Analytical Procedure Number |
|---|---|---|---|
| Surface Water | Gamma Spectroscopy | Monthly composite from weekly grab samples | TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis |
| Surface Water | Gross Beta | Monthly composite from weekly grab samples | TBE, TBE-2008 Gross Alpha and/or Gross Beta Activity in Various Matrices |
| Surface Water | Iron-55 | Monthly composite from weekly grab samples | TBE, TBE-2006 Iron-55 Activity in Various Matrices |
| Surface Water | Nickel-63 | Monthly composite from weekly grab samples | TBE, TBE-2013 Radionickel Activity in Various Matrices |
| Surface Water | Tritium | Quarterly composite from weekly grab samples | TBE, TBE-2011 Tritium Analysis in Drinking Water by Liquid Scintillation |
| Drinking Water | Gamma Spectroscopy | Monthly composite from weekly composite samples | TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis<br>TBE. TBE-2023 Compositing of Samples |
| Drinking Water | Gross Beta | Monthly composite from weekly composite samples | TBE, TBE-2008 Gross Alpha and/or Gross Beta Activity in Various Matrices<br>TBE. TBE-2023 Compositing of Samples |
| Drinking Water | Iodine | Monthly composite from weekly composite samples | TBE, TBE-2012 Radioiodine in Various Matrices<br>TBE. TBE-2023 Compositing of Samples |
| Drinking Water | Iron-55 | Monthly composite from weekly grab samples | TBE, TBE-2006 Iron-55 Activity in Various Matrices |
| Drinking Water | Nickel-63 | Monthly composite from weekly grab samples | TBE, TBE-2013 Radionickel Activity in Various Matrices |
| Drinking Water | Tritium | Monthly composite from weekly composite samples | TBE, TBE-2011 Tritium Analysis in Drinking Water by Liquid Scintillation<br>TBE. TBE-2023 Compositing of Samples |
| Ground/ Well Water | Gamma Spectroscopy | Quarterly grab sample | TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis |
| Ground/ Well Water | Tritium | Quarterly grab sample | TBE, TBE-2011 Tritium analysis in Drinking Water by Liquid Scintillation |
| Fish | Gamma Spectroscopy | Semi-annual samples collected via electro-shocking or other techniques | TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis |
| Fish | Iron-55 | Semi-annual samples collected via electro-shocking or other techniques | TBE, TBE-2006 Iron-55 Activity in Various Matrices |
| Fish | Nickel-63 | Semi-annual samples collected via electroshocking or other techniques | TBE, TBE-2013 Radionickel Activity in Various Matrices |
| Sediment | Gamma Spectroscopy | Semi-annual grab samples | TBE-2007 Gamma-Emitting Radioisotope Analysis |
| Sediment | Iron-55 | Semi-annual grab samples | TBE, TBE-2006 Iron-55 Activity in Various Matrices |
| Sediment | Nickel-63 | Semi-annual grab samples | TBE, TBE-2013 Radionickel Activity in Various Matrices |
| Air Particulates | Gross Beta | One-week composite of continuous air sampling through glass fiber filter paper | TBE, TBE-2008 Gross Alpha and/or Gross Beta Activity in Various Matrices |
| Air Particulates | Gamma Spectroscopy | Quarterly composite of each station | TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis<br>TBE. TBE-2023 Compositing of Samples |
| Air Iodine | I-131 | Weekly composite of continuous air sampling through charcoal filter | TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis |
| Milk | Gamma Spectroscopy | Bi-weekly grab sample May through October. Monthly all other times | TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis |
| Milk | I-131 | Bi-weekly grab sample May through October. Monthly all other times | TBE, TBE-2012 Radioiodine in Various Matrices |
| Food Products | Gamma Spectroscopy | Grab samples during the growing season | TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis |
| OSLD | Optically Stimulated Luminescence Dosimetry | Quarterly OSLDs comprised of two $Al_2O_3$:C Landauer Incorporated elements. | Landauer Incorporated |

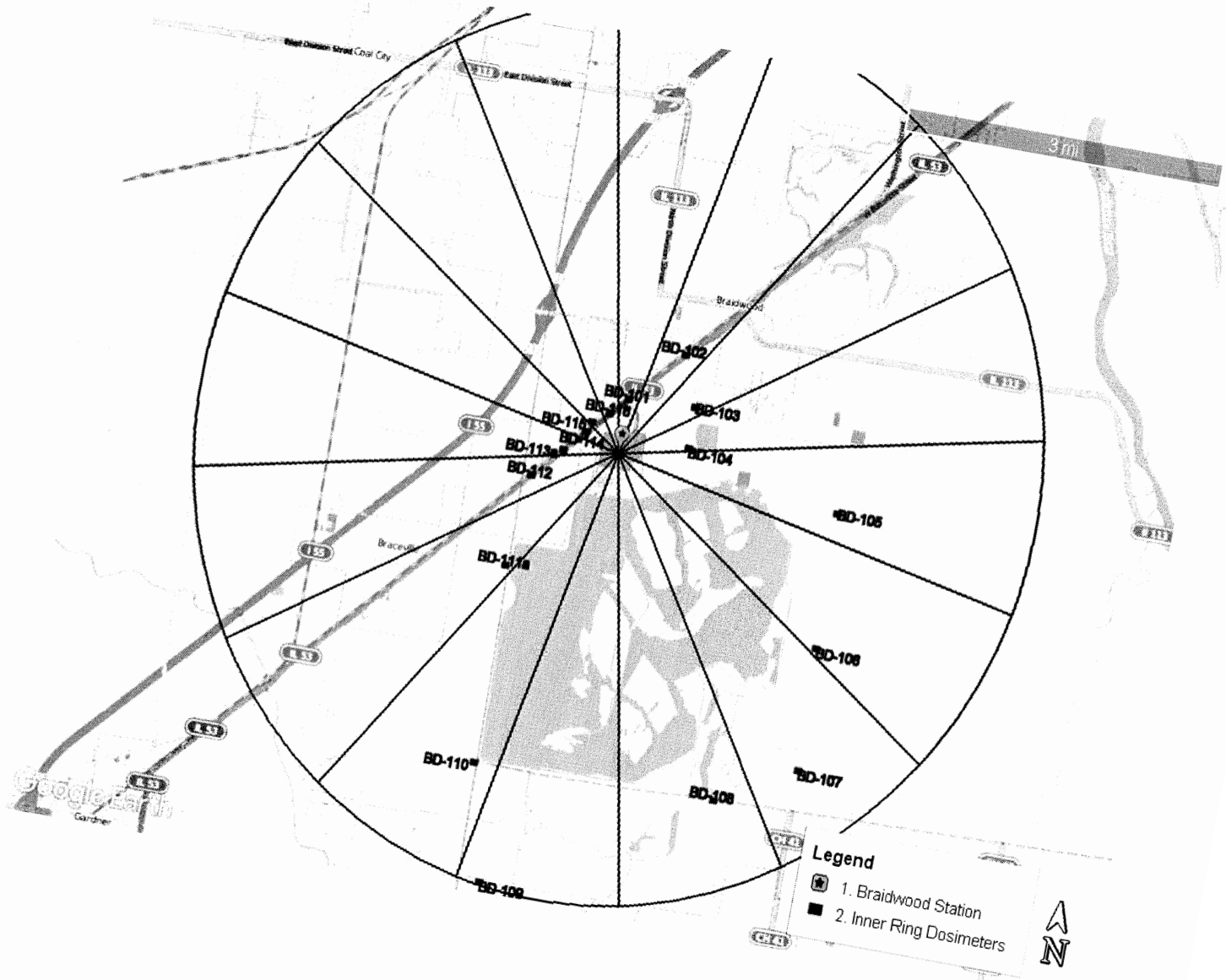


Figure B-1
Inner Ring and Other OSLD Locations
of Braidwood Station, 2022

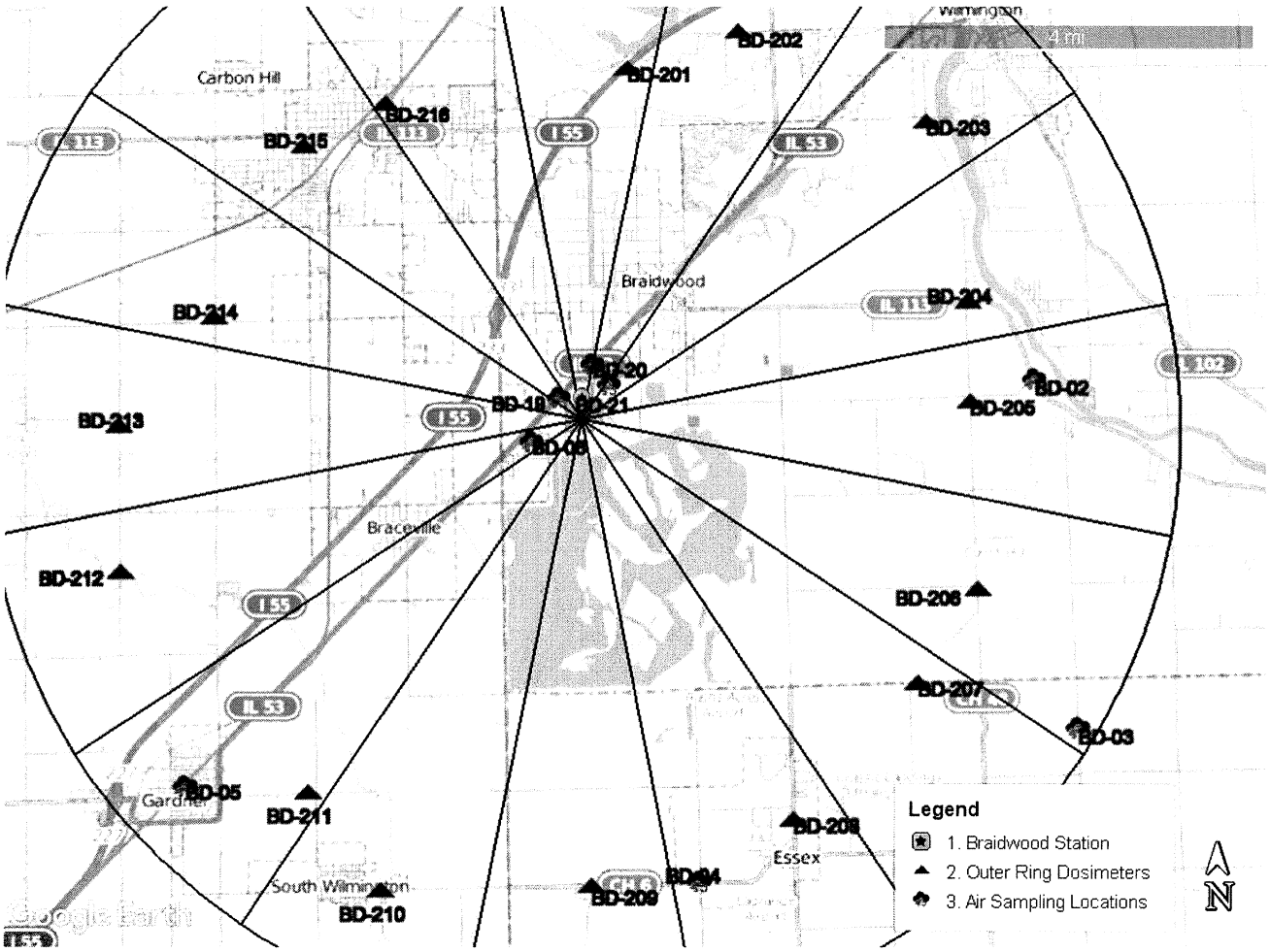


Figure B-2
Fixed Air Sampling and Outer Ring
OSLD Locations of Braidwood Station, 2022

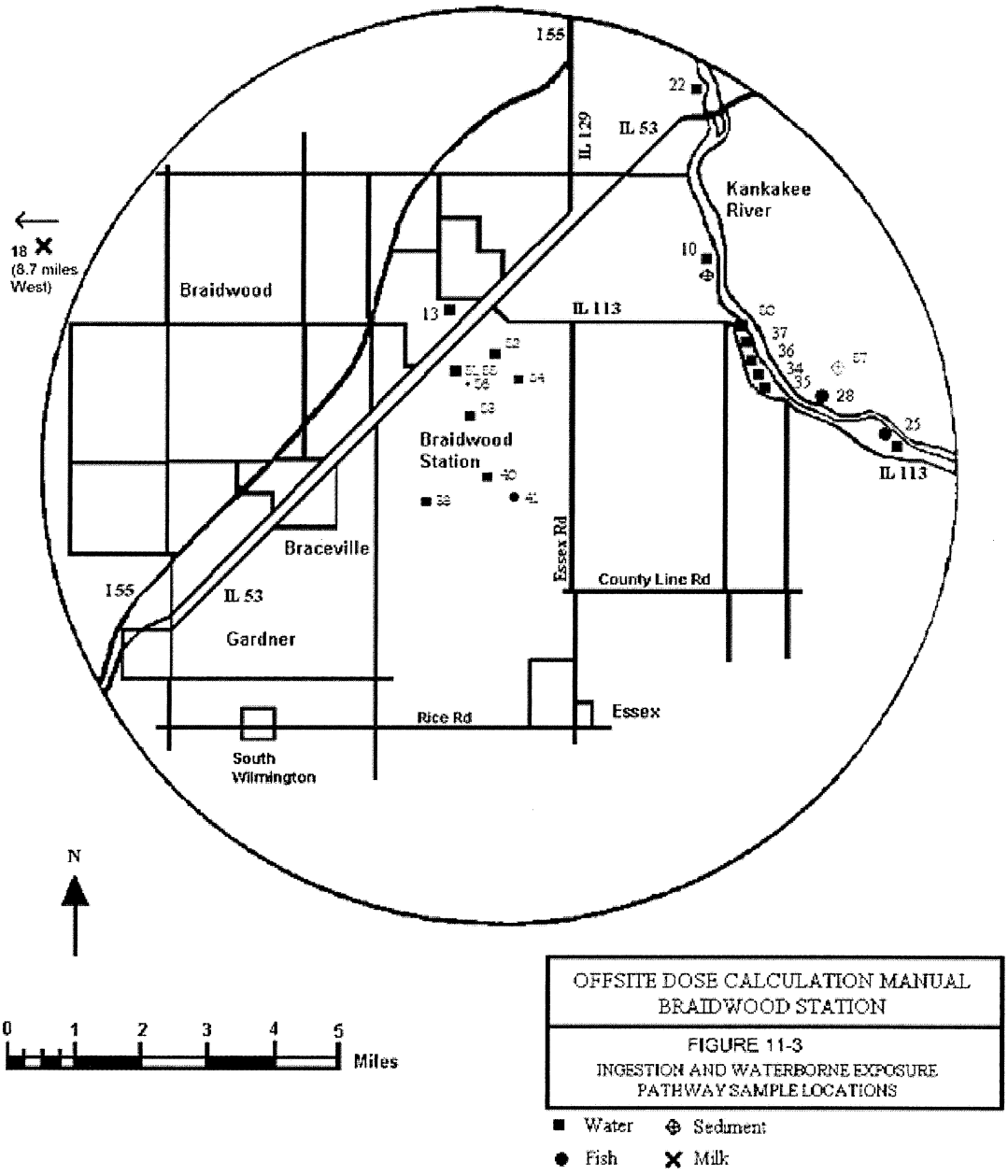


Figure B-3
Ingestion and Waterborne Exposure Pathway
Sample Locations of Braidwood Station, 2022

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# APPENDIX C

# DATA TABLES AND FIGURES

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**Table C-I.1 CONCENTRATIONS OF GROSS BETA IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| COLLECTION PERIOD | BD-10 | BD-25 | BD-38 | BD-40 | BD-55 | BD-56 |
|---|---|---|---|---|---|---|
| 01/06/22 - 01/27/22 | *(1)* | 3.2 ± 1.9 | 8.9 ± 2.7 | 7.1 ± 2.7 | *(1)* | *(1)* |
| 02/17/22 - 02/17/22 | < 3.3 | *(1)* | < 3.9 | 12.8 ± 3.0 | *(1)* | < 3.7 |
| 03/03/22 - 04/01/22 | 4.5 ± 2.0 | 2.7 ± 1.9 | 6.1 ± 2.5 | 10.9 ± 3.4 | 3.4 ± 1.7 | < 2.8 |
| 04/07/22 - 04/28/22 | 3.3 ± 2.2 | 4.8 ± 2.3 | 9.9 ± 3.1 | 6.8 ± 2.8 | 5.2 ± 2.1 | < 3.3 |
| 05/05/22 - 05/26/22 | 5.4 ± 2.5 | 5.5 ± 2.5 | 8.2 ± 2.9 | 11.6 ± 3.4 | 4.0 ± 2.0 | 5.8 ± 2.7 |
| 06/02/22 - 06/30/22 | 2.9 ± 2.0 | 3.3 ± 2.0 | 3.8 ± 2.6 | 10.8 ± 3.0 | 2.9 ± 1.7 | < 3.1 |
| 07/07/22 - 07/28/22 | 5.8 ± 2.0 | 6.8 ± 2.1 | 8.6 ± 2.6 | 10.3 ± 2.6 | 5.0 ± 1.8 | 3.3 ± 1.9 |
| 08/04/22 - 08/24/22 | 4.4 ± 2.1 | 4.7 ± 2.1 | 6.4 ± 2.6 | 12.6 ± 2.9 | 3.2 ± 1.7 | < 2.7 |
| 09/01/22 - 09/29/22 | 2.2 ± 1.5 | 3.4 ± 1.6 | 3.6 ± 1.9 | 5.1 ± 2.0 | < 1.5 | < 1.7 |
| 10/06/22 - 10/27/22 | 4.5 ± 2.1 | 4.6 ± 2.1 | 8.4 ± 2.7 | 13.8 ± 3.1 | 4.7 ± 1.9 | 4.2 ± 2.0 |
| 11/03/22 - 11/23/22 | 6.9 ± 2.4 | 5.5 ± 2.2 | 7.9 ± 2.8 | 10.4 ± 2.9 | 3.1 ± 1.7 | 5.5 ± 2.2 |
| 12/01/22 - 12/15/22 | 6.8 ± 2.1 | 5.8 ± 2.0 | 7.6 ± 2.3 | 12.3 ± 2.7 | 4.5 ± 1.6 | 4.5 ± 1.9 |
| *MEAN ± 2 STD DEV* | 4.7 ± 3.2 | 4.6 ± 2.6 | 7.2 ± 4.1 | 10.4 ± 5.4 | 4.0 ± 1.7 | 4.6 ± 2.0 |

**Table C-I.2 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| COLLECTION PERIOD | BD-10 | BD-25 | BD-38 | BD-40 | BD-55 | BD-56 |
|---|---|---|---|---|---|---|
| 01/06/22 - 04/01/22 | | < 188 | < 186 | < 196 | | |
| 03/03/22 - 04/01/22 | < 195 | | | | < 178 | < 182 |
| 04/07/22 - 06/30/22 | < 163 | < 180 | < 171 | < 161 | < 170 | < 199 |
| 07/07/22 - 09/29/22 | 875 ± 163 | < 182 | < 189 | < 188 | < 197 | < 173 |
| 10/06/22 - 12/15/22 | 654 ± 143 | < 185 | 184 ± 118 | 202 ± 127 | 270 ± 128 | < 187 |
| *MEAN ± 2 STD DEV* | 765 ± 313 | - | 184 ± 0 | 202 ± 0 | 270 ± 0 | - |

*THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES*

*(1) SEE PROGRAM EXCEPTIONS FOR EXPLANATION*

**Table C-I.3 CONCENTRATIONS OF NICKEL-63 IN SURFACE WATER SAMPLES COLLECTED IN THE VACINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| COLLECTION PERIOD | BD-10 | BD-25 |
|---|---|---|
| 01/20/22 - 01/20/22 | *(1)* | < 26 |
| 02/17/22 - 02/24/22 | < 22 | *(1)* |
| 03/03/22 - 03/31/22 | < 30 | < 25 |
| 04/13/22 - 04/28/22 | < 18 | < 20 |
| 05/05/22 - 05/26/22 | < 4 | < 5 |
| 06/02/22 - 06/30/22 | < 21 | < 21 |
| 07/07/22 - 07/28/22 | < 25 | < 24 |
| 08/04/22 - 08/24/22 | < 26 | < 16 |
| 09/01/22 - 09/29/22 | < 19 | < 23 |
| 10/06/22 - 10/27/22 | < 17 | < 18 |
| 11/03/22 - 11/23/22 | < 17 | < 19 |
| 12/01/22 - 12/15/22 | < 21 | < 22 |
| *MEAN* | - | - |

**Table C-I.4 CONCENTRATIONS OF IRON-55 IN SURFACE WATER SAMPLES COLLECTED IN THE VACINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| COLLECTION PERIOD | BD-10 | BD-25 |
|---|---|---|
| 01/20/22 - 01/20/22 | *(1)* | < 48 |
| 02/17/22 - 02/24/22 | < 63 | *(1)* |
| 03/03/22 - 03/31/22 | < 119 | < 172 |
| 04/13/22 - 04/28/22 | < 147 | < 63 |
| 05/05/22 - 05/26/22 | < 132 | < 59 |
| 06/02/22 - 06/30/22 | < 108 | < 83 |
| 07/07/22 - 07/28/22 | < 112 | < 75 |
| 08/04/22 - 08/24/22 | < 142 | < 194 |
| 09/01/22 - 09/29/22 | < 143 | < 103 |
| 10/06/22 - 10/27/22 | < 91 | < 141 |
| 11/03/22 - 11/23/22 | < 77 | < 113 |
| 12/01/22 - 12/15/22 | < 91 | < 160 |
| *MEAN* | - | - |

*(1) SEE PROGRAM EXCEPTIONS FOR EXPLANATION*

**Table C-I.5** **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| SITE | COLLECTION PERIOD | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | I-131 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BD-10 | 01/01/22 - 01/31/22 *(1)* | | | | | | | | | | | | |
| | 02/17/22 - 02/24/22 | < 4 | < 4 | < 7 | < 4 | < 7 | < 4 | < 7 | < 7 | < 4 | < 4 | < 19 | < 5 |
| | 03/03/22 - 03/31/22 | < 4 | < 5 | < 9 | < 5 | < 8 | < 5 | < 8 | < 14 | < 5 | < 4 | < 32 | < 10 |
| | 04/07/22 - 04/28/22 | < 3 | < 2 | < 6 | < 3 | < 4 | < 3 | < 5 | < 7 | < 3 | < 3 | < 19 | < 5 |
| | 05/05/22 - 05/26/22 | < 3 | < 4 | < 8 | < 5 | < 11 | < 4 | < 8 | < 12 | < 5 | < 5 | < 28 | < 10 |
| | 06/02/22 - 06/30/22 | < 6 | < 6 | < 15 | < 6 | < 8 | < 6 | < 12 | < 11 | < 8 | < 8 | < 23 | < 10 |
| | 07/07/22 - 07/28/22 | < 2 | < 2 | < 4 | < 2 | < 4 | < 2 | < 4 | < 8 | < 2 | < 2 | < 15 | < 5 |
| | 08/04/22 - 08/24/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 2 | < 4 | < 12 | < 2 | < 2 | < 20 | < 6 |
| | 09/01/22 - 09/29/22 | < 5 | < 6 | < 14 | < 4 | < 12 | < 6 | < 10 | < 14 | < 6 | < 6 | < 33 | < 12 |
| | 10/06/22 - 10/27/22 | < 2 | < 3 | < 6 | < 3 | < 5 | < 3 | < 5 | < 8 | < 3 | < 2 | < 16 | < 5 |
| | 11/03/22 - 11/23/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 2 | < 4 | < 8 | < 2 | < 2 | < 16 | < 6 |
| | 12/01/22 - 12/22/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 2 | < 4 | < 9 | < 2 | < 2 | < 17 | < 6 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-25 | 01/01/22 - 01/31/22 | < 6 | < 5 | < 10 | < 6 | < 11 | < 6 | < 8 | < 14 | < 5 | < 5 | < 34 | < 12 |
| | 02/01/22 - 02/28/22 *(1)* | | | | | | | | | | | | |
| | 03/03/22 - 03/31/22 | < 4 | < 5 | < 8 | < 5 | < 10 | < 5 | < 7 | < 14 | < 5 | < 5 | < 24 | < 9 |
| | 04/13/22 - 04/28/22 | < 3 | < 3 | < 7 | < 3 | < 7 | < 3 | < 5 | < 10 | < 3 | < 3 | < 23 | < 7 |
| | 05/05/22 - 05/26/22 | < 4 | < 4 | < 10 | < 4 | < 9 | < 5 | < 7 | < 15 | < 5 | < 4 | < 31 | < 11 |
| | 06/02/22 - 06/30/22 | < 6 | < 6 | < 10 | < 7 | < 12 | < 6 | < 8 | < 11 | < 8 | < 7 | < 33 | < 13 |
| | 07/07/22 - 07/28/22 | < 2 | < 2 | < 4 | < 2 | < 4 | < 2 | < 4 | < 9 | < 2 | < 2 | < 17 | < 5 |
| | 08/04/22 - 08/24/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 2 | < 3 | < 9 | < 2 | < 2 | < 17 | < 6 |
| | 09/01/22 - 09/29/22 | < 6 | < 5 | < 14 | < 6 | < 14 | < 7 | < 11 | < 14 | < 6 | < 6 | < 31 | < 14 |
| | 10/06/22 - 10/27/22 | < 3 | < 3 | < 6 | < 3 | < 6 | < 3 | < 5 | < 10 | < 3 | < 3 | < 21 | < 7 |
| | 11/03/22 - 11/23/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 2 | < 4 | < 7 | < 2 | < 2 | < 15 | < 5 |
| | 12/01/22 - 12/15/22 | < 1 | < 2 | < 5 | < 2 | < 3 | < 2 | < 3 | < 14 | < 2 | < 2 | < 21 | < 7 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-38 | 01/13/22 - 01/13/22 | < 2 | < 2 | < 5 | < 3 | < 5 | < 2 | < 5 | < 13 | < 2 | < 2 | < 24 | < 9 |
| | 02/17/22 - 02/24/22 | < 5 | < 5 | < 14 | < 6 | < 11 | < 5 | < 10 | < 12 | < 5 | < 6 | < 33 | < 12 |
| | 03/03/22 - 04/01/22 | < 5 | < 5 | < 10 | < 6 | < 10 | < 5 | < 8 | < 12 | < 5 | < 4 | < 28 | < 8 |
| | 04/07/22 - 04/28/22 | < 4 | < 5 | < 10 | < 4 | < 9 | < 5 | < 7 | < 13 | < 5 | < 4 | < 29 | < 8 |
| | 05/05/22 - 05/26/22 | < 5 | < 5 | < 11 | < 5 | < 11 | < 6 | < 8 | < 14 | < 5 | < 4 | < 31 | < 11 |
| | 06/02/22 - 06/30/22 | < 6 | < 7 | < 13 | < 7 | < 11 | < 7 | < 13 | < 9 | < 7 | < 6 | < 29 | < 9 |
| | 07/07/22 - 07/28/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 2 | < 4 | < 9 | < 2 | < 2 | < 17 | < 6 |
| | 08/04/22 - 08/24/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 2 | < 4 | < 12 | < 2 | < 2 | < 21 | < 8 |
| | 09/01/22 - 09/29/22 | < 2 | < 2 | < 4 | < 2 | < 3 | < 2 | < 3 | < 4 | < 2 | < 2 | < 9 | < 3 |
| | 10/06/22 - 10/27/22 | < 3 | < 3 | < 7 | < 3 | < 5 | < 3 | < 5 | < 8 | < 3 | < 3 | < 17 | < 6 |
| | 11/03/22 - 11/23/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 3 | < 4 | < 8 | < 2 | < 2 | < 18 | < 6 |
| | 12/01/22 - 12/15/22 | < 1 | < 2 | < 4 | < 2 | < 3 | < 2 | < 3 | < 15 | < 2 | < 2 | < 21 | < 7 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |

*(1) SEE PROGRAM EXCEPTIONS FOR EXPLANATION*

**Table C-I.5** **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| SITE | COLLECTION PERIOD | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | I-131 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BD-40 | 01/06/22 - 01/27/22 | < 6 | < 5 | < 14 | < 9 | < 11 | < 7 | < 8 | < 10 | < 6 | < 7 | < 29 | < 11 |
| | 02/03/22 - 02/24/22 | < 5 | < 6 | < 9 | < 6 | < 10 | < 6 | < 9 | < 11 | < 5 | < 5 | < 30 | < 9 |
| | 03/03/22 - 04/01/22 | < 5 | < 4 | < 11 | < 5 | < 11 | < 6 | < 9 | < 13 | < 5 | < 5 | < 26 | < 9 |
| | 04/07/22 - 04/28/22 | < 5 | < 5 | < 11 | < 5 | < 8 | < 5 | < 8 | < 14 | < 5 | < 5 | < 33 | < 10 |
| | 05/05/22 - 05/26/22 | < 5 | < 6 | < 15 | < 6 | < 10 | < 6 | < 10 | < 14 | < 7 | < 6 | < 29 | < 13 |
| | 06/02/22 - 06/30/22 | < 6 | < 7 | < 13 | < 7 | < 16 | < 6 | < 12 | < 10 | < 6 | < 6 | < 25 | < 10 |
| | 07/07/22 - 07/28/22 | < 2 | < 2 | < 4 | < 2 | < 3 | < 2 | < 3 | < 8 | < 2 | < 2 | < 15 | < 5 |
| | 08/04/22 - 08/24/22 | < 2 | < 3 | < 5 | < 2 | < 5 | < 3 | < 4 | < 11 | < 2 | < 2 | < 20 | < 7 |
| | 09/01/22 - 09/29/22 | < 2 | < 2 | < 4 | < 2 | < 3 | < 2 | < 3 | < 4 | < 2 | < 2 | < 10 | < 3 |
| | 10/06/22 - 10/27/22 | < 3 | < 2 | < 6 | < 3 | < 5 | < 3 | < 5 | < 9 | < 3 | < 3 | < 21 | < 6 |
| | 11/03/22 - 11/23/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 2 | < 4 | < 8 | < 2 | < 2 | < 17 | < 5 |
| | 12/01/22 - 12/29/22 | < 6 | < 6 | < 15 | < 7 | < 14 | < 7 | < 9 | < 14 | < 6 | < 5 | < 33 | < 10 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-55 | 01/01/22 - 01/31/22 *(1)* | | | | | | | | | | | | |
| | 02/01/22 - 02/28/22 *(1)* | | | | | | | | | | | | |
| | 03/03/22 - 04/01/22 | < 5 | < 5 | < 12 | < 5 | < 10 | < 6 | < 9 | < 13 | < 5 | < 4 | < 31 | < 12 |
| | 04/07/22 - 04/28/22 | < 5 | < 4 | < 10 | < 5 | < 9 | < 5 | < 7 | < 12 | < 5 | < 5 | < 25 | < 12 |
| | 05/05/22 - 05/26/22 | < 5 | < 5 | < 10 | < 5 | < 14 | < 6 | < 9 | < 14 | < 5 | < 5 | < 31 | < 9 |
| | 06/02/22 - 06/30/22 | < 6 | < 7 | < 11 | < 8 | < 11 | < 6 | < 12 | < 12 | < 8 | < 8 | < 32 | < 9 |
| | 07/07/22 - 07/28/22 | < 2 | < 2 | < 4 | < 2 | < 3 | < 2 | < 3 | < 7 | < 2 | < 2 | < 14 | < 5 |
| | 08/04/22 - 08/24/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 2 | < 4 | < 12 | < 2 | < 2 | < 22 | < 7 |
| | 09/01/22 - 09/29/22 | < 2 | < 2 | < 4 | < 2 | < 3 | < 2 | < 3 | < 5 | < 2 | < 2 | < 11 | < 3 |
| | 10/06/22 - 10/27/22 | < 3 | < 3 | < 6 | < 3 | < 5 | < 3 | < 5 | < 7 | < 3 | < 3 | < 19 | < 6 |
| | 11/03/22 - 11/23/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 2 | < 4 | < 8 | < 3 | < 2 | < 18 | < 5 |
| | 12/01/22 - 12/15/22 | < 2 | < 2 | < 4 | < 2 | < 4 | < 2 | < 4 | < 15 | < 2 | < 2 | < 24 | < 7 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-56 | 01/01/22 - 01/31/22 *(1)* | | | | | | | | | | | | |
| | 02/17/22 - 02/17/22 | < 4 | < 4 | < 8 | < 5 | < 9 | < 5 | < 9 | < 13 | < 5 | < 4 | < 34 | < 8 |
| | 03/03/22 - 04/01/22 | < 6 | < 5 | < 11 | < 5 | < 11 | < 6 | < 10 | < 14 | < 5 | < 4 | < 29 | < 11 |
| | 04/07/22 - 04/28/22 | < 4 | < 5 | < 10 | < 5 | < 8 | < 3 | < 7 | < 12 | < 4 | < 5 | < 28 | < 11 |
| | 05/05/22 - 05/26/22 | < 5 | < 4 | < 10 | < 5 | < 7 | < 4 | < 8 | < 15 | < 5 | < 5 | < 30 | < 10 |
| | 06/02/22 - 06/30/22 | < 6 | < 7 | < 15 | < 7 | < 10 | < 6 | < 11 | < 12 | < 6 | < 7 | < 27 | < 9 |
| | 07/07/22 - 07/28/22 | < 2 | < 2 | < 4 | < 2 | < 3 | < 2 | < 3 | < 7 | < 2 | < 2 | < 14 | < 5 |
| | 08/04/22 - 08/24/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 2 | < 4 | < 9 | < 2 | < 2 | < 16 | < 6 |
| | 09/01/22 - 09/29/22 | < 2 | < 2 | < 4 | < 2 | < 4 | < 2 | < 3 | < 4 | < 2 | < 2 | < 11 | < 4 |
| | 10/06/22 - 10/27/22 | < 3 | < 3 | < 7 | < 3 | < 5 | < 3 | < 6 | < 9 | < 3 | < 3 | < 19 | < 7 |
| | 11/03/22 - 11/23/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 2 | < 4 | < 7 | < 2 | < 2 | < 15 | < 5 |
| | 12/01/22 - 12/15/22 | < 2 | < 2 | < 4 | < 2 | < 3 | < 2 | < 3 | < 14 | < 2 | < 2 | < 21 | < 6 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |

*(1) SEE PROGRAM EXCEPTIONS FOR EXPLANATION*

**Table C-II.1** **CONCENTRATIONS OF GROSS BETA IN PUBLIC WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| COLLECTION PERIOD | BD-22 |
|---|---|
| 12/30/21 - 01/27/22 | < 2.9 |
| 01/27/22 - 02/24/22 | 3.5 ± 1.7 |
| 02/24/22 - 03/31/22 | 3.2 ± 1.4 |
| 03/31/22 - 04/28/22 | < 2.5 |
| 04/28/22 - 05/26/22 | 3.9 ± 1.6 |
| 05/26/22 - 06/30/22 | 2.9 ± 1.6 |
| 06/30/22 - 07/28/22 | < 2.4 |
| 07/28/22 - 08/24/22 | 3.7 ± 1.9 |
| 08/24/22 - 09/29/22 | 3.1 ± 1.9 |
| 09/29/22 - 10/27/22 | 3.2 ± 1.7 |
| 10/27/22 - 11/23/22 | 5.5 ± 2.0 |
| 11/23/22 - 12/29/22 | 4.4 ± 1.7 |
| *MEAN ± 2 STD DEV* | 3.7 ± 1.6 |

**Table C-II.2** **CONCENTRATIONS OF TRITIUM IN PUBLIC WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| COLLECTION PERIOD | BD-22 |
|---|---|
| 12/30/21 - 01/27/22 | < 186 |
| 01/27/22 - 02/24/22 | < 190 |
| 02/24/22 - 03/31/22 | 551 ± 141 |
| 03/31/22 - 04/28/22 | 545 ± 141 |
| 04/28/22 - 05/26/22 | 624 ± 143 |
| 05/26/22 - 06/30/22 | < 177 |
| 06/30/22 - 07/28/22 | 337 ± 127 |
| 07/28/22 - 08/24/22 | 794 ± 160 |
| 08/24/22 - 09/29/22 | 1240 ± 192 |
| 09/29/22 - 10/27/22 | 1540 ± 234 |
| 10/27/22 - 11/23/22 | 3050 ± 390 |
| 11/23/22 - 12/29/22 | 1880 ± 178 |
| *MEAN ± 2 STD DEV* | 1173 ± 1745 |

**Table C-II.3** **CONCENTRATIONS OF I-131 IN PUBLIC WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| COLLECTION PERIOD | BD-22 |
|---|---|
| 12/30/21 - 01/27/22 | < 0.9 |
| 01/27/22 - 02/24/22 | < 0.6 |
| 02/24/22 - 03/31/22 | < 0.9 |
| 03/31/22 - 04/28/22 | < 0.7 |
| 04/28/22 - 05/26/22 | < 0.9 |
| 05/26/22 - 06/30/22 | < 0.9 |
| 06/30/22 - 07/28/22 | < 0.9 |
| 07/28/22 - 08/24/22 | < 0.9 |
| 08/24/22 - 09/29/22 | < 0.9 |
| 09/29/22 - 10/27/22 | < 0.9 |
| 10/27/22 - 11/23/22 | < 0.9 |
| 11/23/22 - 12/29/22 | < 0.9 |
| *MEAN* | - |

*THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES*

*(1) SEE PROGRAM EXCEPTIONS FOR EXPLANATION*

**Table C-II.4** **CONCENTRATIONS OF NICKEL-63 IN PUBLIC WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| COLLECTION PERIOD | BD-22 |
|---|---|
| 12/30/21 - 01/27/22 | < 29 |
| 01/27/22 - 02/24/22 | < 24 |
| 02/24/22 - 03/31/22 | < 26 |
| 03/31/22 - 04/28/22 | 64 ± 24 |
| 04/28/22 - 05/26/22 | < 24 |
| 05/26/22 - 06/30/22 | < 26 |
| 06/30/22 - 07/28/22 | < 17 |
| 07/28/22 - 08/24/22 | < 22 |
| 08/24/22 - 09/29/22 | < 19 |
| 09/29/22 - 10/27/22 | < 20 |
| 10/27/22 - 11/23/22 | < 22 |
| 11/23/22 - 12/29/22 | < 26 |
| *MEAN ± 2 STD DEV* | 64 ± 0 |

**Table C-II.5** **CONCENTRATIONS OF IRON-55 IN PUBLIC WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| COLLECTION PERIOD | BD-22 |
|---|---|
| 12/30/21 - 01/27/22 | < 81 |
| 01/27/22 - 02/24/22 | < 121 |
| 02/24/22 - 03/31/22 | < 166 |
| 03/31/22 - 04/28/22 | < 86 |
| 04/28/22 - 05/26/22 | < 133 |
| 05/26/22 - 06/30/22 | < 51 |
| 06/30/22 - 07/28/22 | < 76 |
| 07/28/22 - 08/24/22 | < 191 |
| 08/24/22 - 09/29/22 | < 96 |
| 09/29/22 - 10/27/22 | < 187 |
| 10/27/22 - 11/23/22 | < 68 |
| 11/23/22 - 12/29/22 | < 184 |
| *MEAN* | - |

*THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES*

**Table C-II.6**

## CONCENTRATIONS OF GAMMA EMITTERS IN PUBLIC WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| SITE | COLLECTION PERIOD | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BD-22 | 12/30/21 - 01/27/22 | < 1 | < 1 | < 3 | < 1 | < 2 | < 1 | < 3 | < 1 | < 1 | < 12 | < 4 |
| | 01/27/22 - 02/24/22 | < 4 | < 6 | < 7 | < 4 | < 10 | < 5 | < 10 | < 4 | < 5 | < 29 | < 12 |
| | 02/24/22 - 03/31/22 | < 1 | < 1 | < 3 | < 1 | < 2 | < 1 | < 2 | < 1 | < 1 | < 11 | < 3 |
| | 03/31/22 - 04/28/22 | < 2 | < 2 | < 4 | < 2 | < 3 | < 2 | < 3 | < 2 | < 2 | < 15 | < 5 |
| | 04/28/22 - 05/26/22 | < 1 | < 2 | < 4 | < 2 | < 3 | < 2 | < 3 | < 2 | < 2 | < 14 | < 4 |
| | 05/26/22 - 06/30/22 | < 4 | < 4 | < 9 | < 4 | < 8 | < 4 | < 6 | < 4 | < 4 | < 26 | < 7 |
| | 06/30/22 - 07/28/22 | < 1 | < 2 | < 4 | < 2 | < 3 | < 2 | < 3 | < 2 | < 2 | < 16 | < 5 |
| | 07/28/22 - 08/24/22 | < 2 | < 2 | < 5 | < 2 | < 4 | < 2 | < 4 | < 2 | < 2 | < 18 | < 6 |
| | 08/24/22 - 09/29/22 | < 2 | < 2 | < 4 | < 2 | < 3 | < 2 | < 3 | < 2 | < 2 | < 11 | < 4 |
| | 09/29/22 - 10/27/22 | < 2 | < 2 | < 4 | < 2 | < 3 | < 2 | < 3 | < 2 | < 2 | < 15 | < 5 |
| | 10/27/22 - 11/23/22 | < 2 | < 2 | < 4 | < 1 | < 3 | < 2 | < 3 | < 2 | < 2 | < 18 | < 6 |
| | 11/23/22 - 12/29/22 | < 5 | < 5 | < 10 | < 5 | < 10 | < 5 | < 10 | < 5 | < 5 | < 31 | < 9 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - |

**Table C-III.1** **CONCENTRATIONS OF TRITIUM IN GROUND/WELL WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| COLLECTION PERIOD | BD-13 | BD-34 | BD-35 | BD-36 | BD-37 | BD-50 | BD-51 | BD-54 |
|---|---|---|---|---|---|---|---|---|
| 01/13/22 - 01/13/22 | < 185 | < 173 | < 186 | < 163 | < 151 | < 168 | < 186 | < 176 |
| 04/13/22 - 04/13/22 | < 174 | 198 ± 130 | < 175 | < 184 | < 198 | < 185 | < 196 | < 196 |
| 07/14/22 - 07/14/22 | < 170 | < 176 | < 185 | < 193 | < 184 | < 174 | < 190 | < 193 |
| 10/13/22 - 10/13/22 | < 182 | < 180 | < 199 | < 191 | < 192 | < 185 | < 186 | < 189 |
| *MEAN* | - | 198 ± 0 | - | - | - | - | - | - |

**Table C-III.2**

## CONCENTRATIONS OF GAMMA EMITTERS IN GROUND/WELL WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| SITE | COLLECTION PERIOD | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | I-131 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BD-13 | 01/13/22 - 01/13/22 | < 6 | < 6 | < 11 | < 7 | < 12 | < 8 | < 12 | < 9 | < 6 | < 7 | < 27 | < 9 |
| | 04/13/22 - 04/13/22 | < 5 | < 5 | < 10 | < 5 | < 10 | < 6 | < 11 | < 10 | < 6 | < 5 | < 24 | < 8 |
| | 07/14/22 - 07/14/22 | < 6 | < 7 | < 13 | < 6 | < 10 | < 7 | < 10 | < 10 | < 8 | < 6 | < 25 | < 10 |
| | 10/13/22 - 10/13/22 | < 8 | < 8 | < 17 | < 8 | < 16 | < 8 | < 12 | < 12 | < 7 | < 7 | < 35 | < 9 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-34 | 01/13/22 - 01/13/22 | < 5 | < 6 | < 11 | < 9 | < 12 | < 7 | < 10 | < 9 | < 6 | < 5 | < 29 | < 10 |
| | 04/13/22 - 04/13/22 | < 6 | < 6 | < 13 | < 6 | < 13 | < 6 | < 12 | < 10 | < 7 | < 6 | < 33 | < 10 |
| | 07/14/22 - 07/14/22 | < 5 | < 6 | < 14 | < 6 | < 14 | < 7 | < 9 | < 8 | < 7 | < 6 | < 29 | < 11 |
| | 10/13/22 - 10/13/22 | < 6 | < 8 | < 14 | < 6 | < 17 | < 7 | < 13 | < 9 | < 7 | < 7 | < 36 | < 8 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-35 | 01/13/22 - 01/13/22 | < 6 | < 8 | < 11 | < 5 | < 12 | < 5 | < 11 | < 12 | < 6 | < 7 | < 31 | < 11 |
| | 04/13/22 - 04/13/22 | < 5 | < 5 | < 11 | < 4 | < 10 | < 4 | < 6 | < 9 | < 5 | < 5 | < 21 | < 7 |
| | 07/14/22 - 07/14/22 | < 8 | < 7 | < 19 | < 7 | < 17 | < 7 | < 14 | < 9 | < 7 | < 8 | < 33 | < 8 |
| | 10/13/22 - 10/13/22 | < 4 | < 6 | < 9 | < 5 | < 9 | < 5 | < 8 | < 7 | < 5 | < 5 | < 21 | < 7 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-36 | 01/13/22 - 01/13/22 | < 7 | < 6 | < 14 | < 7 | < 15 | < 9 | < 12 | < 12 | < 7 | < 7 | < 32 | < 8 |
| | 04/13/22 - 04/13/22 | < 7 | < 6 | < 17 | < 6 | < 15 | < 8 | < 12 | < 11 | < 6 | < 7 | < 30 | < 12 |
| | 07/14/22 - 07/14/22 | < 5 | < 6 | < 7 | < 5 | < 8 | < 5 | < 8 | < 9 | < 6 | < 6 | < 28 | < 10 |
| | 10/13/22 - 10/13/22 | < 9 | < 8 | < 18 | < 11 | < 15 | < 8 | < 14 | < 14 | < 9 | < 8 | < 37 | < 9 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-37 | 01/13/22 - 01/13/22 | < 4 | < 4 | < 9 | < 4 | < 9 | < 5 | < 7 | < 7 | < 5 | < 4 | < 23 | < 8 |
| | 04/13/22 - 04/13/22 | < 4 | < 5 | < 9 | < 4 | < 7 | < 6 | < 10 | < 7 | < 6 | < 5 | < 25 | < 8 |
| | 07/14/22 - 07/14/22 | < 7 | < 7 | < 17 | < 8 | < 11 | < 7 | < 10 | < 11 | < 8 | < 6 | < 28 | < 11 |
| | 10/13/22 - 10/13/22 | < 6 | < 6 | < 11 | < 6 | < 10 | < 7 | < 12 | < 9 | < 6 | < 5 | < 32 | < 5 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |

**Table C-III.2**

## CONCENTRATIONS OF GAMMA EMITTERS IN GROUND/WELL WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| SITE | COLLECTION PERIOD | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | I-131 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BD-50 | 01/13/22 - 01/13/22 | < 5 | < 5 | < 11 | < 4 | < 9 | < 6 | < 8 | < 8 | < 7 | < 6 | < 23 | < 5 |
| | 04/13/22 - 04/13/22 | < 5 | < 5 | < 12 | < 5 | < 11 | < 7 | < 9 | < 9 | < 5 | < 6 | < 28 | < 8 |
| | 07/14/22 - 07/14/22 | < 6 | < 6 | < 10 | < 7 | < 8 | < 6 | < 11 | < 9 | < 7 | < 6 | < 28 | < 7 |
| | 10/13/22 - 10/13/22 | < 7 | < 5 | < 12 | < 6 | < 14 | < 7 | < 11 | < 8 | < 8 | < 7 | < 25 | < 10 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-51 | 01/13/22 - 01/13/22 | < 6 | < 5 | < 11 | < 5 | < 11 | < 6 | < 9 | < 9 | < 5 | < 5 | < 25 | < 10 |
| | 04/13/22 - 04/13/22 | < 6 | < 6 | < 16 | < 9 | < 12 | < 7 | < 16 | < 12 | < 8 | < 6 | < 34 | < 11 |
| | 07/14/22 - 07/14/22 | < 6 | < 7 | < 8 | < 7 | < 14 | < 5 | < 13 | < 8 | < 7 | < 7 | < 27 | < 10 |
| | 10/13/22 - 10/13/22 | < 4 | < 4 | < 9 | < 5 | < 9 | < 4 | < 6 | < 6 | < 5 | < 4 | < 16 | < 7 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-54 | 01/13/22 - 01/13/22 | < 7 | < 7 | < 14 | < 5 | < 15 | < 8 | < 11 | < 11 | < 7 | < 7 | < 37 | < 9 |
| | 04/13/22 - 04/13/22 | < 4 | < 4 | < 10 | < 5 | < 7 | < 6 | < 9 | < 9 | < 6 | < 5 | < 24 | < 8 |
| | 07/14/22 - 07/14/22 | < 8 | < 6 | < 15 | < 5 | < 16 | < 7 | < 15 | < 12 | < 6 | < 7 | < 38 | < 10 |
| | 10/13/22 - 10/13/22 | < 4 | < 4 | < 7 | < 4 | < 8 | < 4 | < 8 | < 7 | < 4 | < 5 | < 19 | < 5 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |

**Table C-IV.1** **CONCENTRATIONS OF IRON-55, NICKEL-63 AND GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

| SITE | COLLECTION PERIOD | Fe-55 | Ni-63 | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | I-131 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BD-25 | | | | | | | | | | | | | | | |
| *Smallmouth Bass* | 05/04/22 | < 255 | < 220 | < 48 | < 51 | < 104 | < 50 | < 112 | < 47 | < 70 | < 92 | < 61 | < 49 | < 248 | < 64 |
| *Golden Redhorse* | 05/04/22 | < 147 | < 238 | < 58 | < 47 | < 97 | < 20 | < 130 | < 50 | < 109 | < 96 | < 42 | < 41 | < 262 | < 100 |
| *Smallmouth Bass* | 10/12/22 | < 254 | < 243 | < 40 | < 48 | < 121 | < 46 | < 106 | < 60 | < 112 | < 118 | < 66 | < 46 | < 263 | < 111 |
| *Shorthead Redhorse* | 10/12/22 | < 190 | < 182 | < 52 | < 47 | < 113 | < 57 | < 122 | < 73 | < 91 | < 126 | < 71 | < 58 | < 306 | < 93 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-28 | | | | | | | | | | | | | | | |
| *Golden Redhorse* | 05/04/22 | < 156 | < 244 | < 72 | < 39 | < 133 | < 44 | < 158 | < 57 | < 110 | < 101 | < 54 | < 46 | < 276 | < 68 |
| *Smallmouth Bass* | 05/04/22 | < 73 | < 260 | < 58 | < 43 | < 111 | < 59 | < 126 | < 48 | < 68 | < 90 | < 53 | < 54 | < 278 | < 79 |
| *Golden Redhorse* | 10/12/22 | < 156 | < 238 | < 33 | < 29 | < 72 | < 31 | < 71 | < 36 | < 50 | < 60 | < 37 | < 28 | < 175 | < 71 |
| *Smallmouth Bass* | 10/12/22 | < 236 | < 126 | < 50 | < 52 | < 105 | < 52 | < 133 | < 82 | < 114 | < 104 | < 50 | < 56 | < 313 | < 109 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-41 | | | | | | | | | | | | | | | |
| *Common Carp* | 05/04/22 | < 148 | < 200 | < 49 | < 51 | < 131 | < 65 | < 99 | < 53 | < 85 | < 82 | < 59 | < 41 | < 257 | < 57 |
| *Largemouth Bass* | 05/04/22 | < 90 | < 209 | < 56 | < 62 | < 125 | < 56 | < 136 | < 58 | < 114 | < 116 | < 66 | < 61 | < 310 | < 79 |
| *Common Carp* | 10/12/22 | < 220 | < 183 | < 32 | < 31 | < 77 | < 38 | < 74 | < 34 | < 60 | < 63 | < 35 | < 36 | < 183 | < 62 |
| *Largemouth Bass* | 10/12/22 | < 252 | < 117 | < 35 | < 42 | < 98 | < 43 | < 91 | < 40 | < 69 | < 87 | < 44 | < 41 | < 244 | < 67 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Table C-V.1** **CONCENTRATIONS OF IRON-55, NICKEL-63 AND GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/KG DRY ± 2 SIGMA

| SITE | COLLECTION PERIOD | Fe-55 | Ni-63 | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BD-10 | 05/17/22 | < 1949 | < 185 | < 62 | < 64 | < 132 | < 70 | < 136 | < 76 | < 129 | < 97 | 157 ± 57 | < 328 | < 130 |
| | 10/29/22 | < 1103 | < 259 | < 78 | < 81 | < 182 | < 105 | < 217 | < 118 | < 155 | < 104 | < 104 | < 344 | < 130 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | 157 ± 0 | - | - |
| BD-25 | 05/17/22 | < 1986 | < 192 | < 82 | < 78 | < 189 | < 103 | < 154 | < 103 | < 112 | < 107 | < 102 | < 407 | < 99 |
| | 10/29/22 | < 792 | < 249 | < 80 | < 64 | < 166 | < 81 | < 149 | < 77 | < 120 | < 81 | < 96 | < 311 | < 97 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-57 | 05/17/22 | < 1949 | < 176 | < 95 | < 89 | < 238 | < 113 | < 181 | < 98 | < 166 | < 112 | < 108 | < 451 | < 165 |
| | 10/29/22 | < 1376 | < 211 | < 71 | < 56 | < 136 | < 71 | < 125 | < 67 | < 117 | < 76 | < 89 | < 274 | < 99 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-SPOIL-1 | 09/22/22 | < 1243 | < 218 | < 75 | < 88 | < 201 | < 80 | < 205 | < 104 | < 171 | < 106 | < 96 | < 407 | < 118 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-SPOIL-2 | 10/06/22 | < 965 | < 169 | < 86 | < 81 | < 163 | < 83 | < 153 | < 89 | < 158 | < 104 | < 90 | < 454 | < 92 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - | - |

**Table C-VI.1**

## CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

| COLLECTION PERIOD | GROUP I - NEAR FIELD | | | | GROUP II - FAR FIELD | | | GROUP III - CONTROL |
|---|---|---|---|---|---|---|---|---|
| | BD-06 | BD-19 | BD-20 | BD-21 | BD-02 | BD-04 | BD-05 | BD-03 |
| 12/30/21 - 01/06/22 | 32 ± 5 | 30 ± 5 | 33 ± 5 | 34 ± 5 | 29 ± 5 | 26 ± 5 | 27 ± 5 | 28 ± 5 |
| 01/06/22 - 01/13/22 | 29 ± 5 | 27 ± 5 | 30 ± 5 | 30 ± 5 | 26 ± 5 | 29 ± 5 | 29 ± 5 | 30 ± 5 |
| 01/13/22 - 01/20/22 | 22 ± 5 | 25 ± 5 | 28 ± 5 | 27 ± 5 | 20 ± 4 | 25 ± 5 | 20 ± 5 | 24 ± 5 |
| 01/20/22 - 01/27/22 | 21 ± 5 | 27 ± 5 | 24 ± 5 | 26 ± 5 | 24 ± 5 | 23 ± 5 | 19 ± 4 | 24 ± 5 |
| 01/27/22 - 02/03/22 | 26 ± 5 | 25 ± 5 | 23 ± 5 | 24 ± 3 | 24 ± 5 | 20 ± 5 | 20 ± 5 | 20 ± 5 |
| 02/03/22 - 02/10/22 | 25 ± 5 | 26 ± 5 | 30 ± 5 | *(1)* | 31 ± 5 | 31 ± 5 | 28 ± 5 | 31 ± 5 |
| 02/10/22 - 02/17/22 | 16 ± 4 | 17 ± 4 | 23 ± 5 | 17 ± 5 | 21 ± 5 | 17 ± 4 | 16 ± 4 | 20 ± 5 |
| 02/17/22 - 02/24/22 | 21 ± 4 | 18 ± 4 | 22 ± 5 | 20 ± 4 | 20 ± 4 | 21 ± 4 | 22 ± 5 | 19 ± 4 |
| 02/24/22 - 03/03/22 | 24 ± 5 | 22 ± 5 | 20 ± 5 | 22 ± 5 | 25 ± 5 | 24 ± 5 | 22 ± 5 | 23 ± 5 |
| 03/03/22 - 03/09/22 | 15 ± 5 | 12 ± 5 | 11 ± 5 | 12 ± 5 | 13 ± 5 | 14 ± 5 | 11 ± 5 | 11 ± 5 |
| 03/09/22 - 03/17/22 | 19 ± 4 | 25 ± 4 | 22 ± 4 | 23 ± 4 | 20 ± 4 | 19 ± 4 | 18 ± 4 | 19 ± 4 |
| 03/17/22 - 03/24/22 | 15 ± 4 | 17 ± 4 | 18 ± 4 | 17 ± 4 | 17 ± 4 | 14 ± 4 | 13 ± 4 | 16 ± 4 |
| 03/24/22 - 03/31/22 | 10 ± 4 | 8 ± 3 | 12 ± 4 | 11 ± 4 | 9 ± 4 | 9 ± 3 | 11 ± 4 | 14 ± 4 |
| 03/31/22 - 04/07/22 | 10 ± 4 | 10 ± 4 | 14 ± 4 | 12 ± 4 | 11 ± 4 | 12 ± 4 | 9 ± 4 | 9 ± 4 |
| 04/07/22 - 04/13/22 | 9 ± 4 | 10 ± 5 | 14 ± 5 | 9 ± 4 | 12 ± 5 | 10 ± 5 | 8 ± 5 | 13 ± 5 |
| 04/13/22 - 04/21/22 | 12 ± 3 | 14 ± 4 | 9 ± 3 | 14 ± 3 | 10 ± 3 | 13 ± 4 | 12 ± 3 | 11 ± 3 |
| 04/21/22 - 04/28/22 | 14 ± 4 | 15 ± 4 | 16 ± 4 | 14 ± 4 | 15 ± 4 | 14 ± 4 | 13 ± 4 | 18 ± 4 |
| 04/28/22 - 05/05/22 | 12 ± 4 | 12 ± 4 | 12 ± 4 | 11 ± 4 | 11 ± 4 | 11 ± 4 | 9 ± 4 | 13 ± 4 |
| 05/05/22 - 05/12/22 | 15 ± 4 | 14 ± 4 | 19 ± 5 | 18 ± 5 | 12 ± 4 | 18 ± 5 | 16 ± 4 | 18 ± 5 |
| 05/12/22 - 05/19/22 | 17 ± 4 | 18 ± 4 | 18 ± 4 | 21 ± 5 | 18 ± 4 | 19 ± 4 | 16 ± 4 | 21 ± 5 |
| 05/19/22 - 05/26/22 | 11 ± 4 | 15 ± 4 | 13 ± 4 | 10 ± 4 | 13 ± 4 | 16 ± 4 | 7 ± 4 | 13 ± 4 |
| 05/26/22 - 06/02/22 | 12 ± 4 | 12 ± 4 | 18 ± 5 | 16 ± 4 | 14 ± 5 | 19 ± 5 | 11 ± 4 | 20 ± 5 |
| 06/02/22 - 06/09/22 | 20 ± 4 | 20 ± 4 | 23 ± 5 | 22 ± 5 | 20 ± 4 | 23 ± 5 | 18 ± 4 | 18 ± 4 |
| 06/09/22 - 06/16/22 | 24 ± 5 | 22 ± 5 | 25 ± 5 | 21 ± 4 | 23 ± 5 | 24 ± 5 | 20 ± 5 | 25 ± 5 |
| 06/16/22 - 06/23/22 | 12 ± 4 | 13 ± 4 | 10 ± 4 | 12 ± 4 | 11 ± 4 | 15 ± 4 | 10 ± 4 | 11 ± 4 |
| 06/23/22 - 06/30/22 | 14 ± 4 | 10 ± 4 | 10 ± 4 | 11 ± 4 | 12 ± 5 | 9 ± 4 | 8 ± 4 | 11 ± 4 |
| 06/30/22 - 07/07/22 | 18 ± 5 | 22 ± 5 | 23 ± 5 | 18 ± 5 | 20 ± 5 | 22 ± 5 | 18 ± 5 | 22 ± 5 |
| 07/07/22 - 07/14/22 | 17 ± 4 | 18 ± 5 | 19 ± 5 | 17 ± 4 | 16 ± 4 | 14 ± 4 | 12 ± 4 | 16 ± 4 |
| 07/14/22 - 07/21/22 | 21 ± 5 | 21 ± 5 | 24 ± 5 | 22 ± 5 | 25 ± 5 | 25 ± 5 | 19 ± 5 | 27 ± 5 |
| 07/21/22 - 07/28/22 | 18 ± 4 | 13 ± 4 | 20 ± 5 | 17 ± 4 | 17 ± 4 | 19 ± 5 | 14 ± 4 | 17 ± 4 |
| 07/28/22 - 08/04/22 | 16 ± 4 | 14 ± 4 | 16 ± 5 | 15 ± 4 | 17 ± 5 | 15 ± 5 | 12 ± 5 | 15 ± 5 |
| 08/04/22 - 08/11/22 | 15 ± 4 | 18 ± 4 | 15 ± 4 | 18 ± 4 | 16 ± 4 | 18 ± 4 | 13 ± 3 | 17 ± 4 |
| 08/11/22 - 08/18/22 | 17 ± 4 | 24 ± 5 | 17 ± 4 | 22 ± 5 | 19 ± 5 | 22 ± 5 | 17 ± 4 | 20 ± 5 |
| 08/18/22 - 08/24/22 | 21 ± 5 | 20 ± 5 | 21 ± 5 | 21 ± 5 | 19 ± 5 | 23 ± 6 | 16 ± 5 | 25 ± 6 |
| 08/24/22 - 09/01/22 | 24 ± 4 | 21 ± 4 | 25 ± 4 | 21 ± 4 | 21 ± 4 | 22 ± 4 | 20 ± 4 | 23 ± 4 |
| 09/01/22 - 09/08/22 | 17 ± 4 | 23 ± 5 | 19 ± 4 | 18 ± 4 | 18 ± 4 | 20 ± 4 | 18 ± 4 | 19 ± 4 |
| 09/08/22 - 09/15/22 | 21 ± 5 | 25 ± 5 | 25 ± 5 | 21 ± 4 | 23 ± 5 | 21 ± 4 | 21 ± 4 | 26 ± 5 |
| 09/15/22 - 09/22/22 | 27 ± 5 | 24 ± 5 | 26 ± 5 | 27 ± 5 | 27 ± 5 | 33 ± 5 | 22 ± 5 | 25 ± 5 |
| 09/22/22 - 09/29/22 | 12 ± 4 | 11 ± 4 | 17 ± 5 | 11 ± 4 | 12 ± 4 | 10 ± 4 | 10 ± 4 | 14 ± 4 |
| 09/29/22 - 10/06/22 | 19 ± 4 | 17 ± 4 | 17 ± 4 | 19 ± 4 | 18 ± 4 | 22 ± 4 | 14 ± 4 | *(1)* |
| 10/06/22 - 10/13/22 | 27 ± 5 | 25 ± 5 | 34 ± 6 | 25 ± 5 | 29 ± 5 | 29 ± 5 | 21 ± 5 | 26 ± 5 |
| 10/13/22 - 10/20/22 | 11 ± 4 | 13 ± 4 | 12 ± 4 | 14 ± 4 | 11 ± 4 | 12 ± 4 | 8 ± 4 | 17 ± 8 |
| 10/20/22 - 10/27/22 | 30 ± 5 | 31 ± 5 | 33 ± 5 | 31 ± 5 | 28 ± 5 | 33 ± 5 | 32 ± 5 | *(1)* |
| 10/27/22 - 11/03/22 | 39 ± 6 | 39 ± 6 | 36 ± 6 | 41 ± 6 | 36 ± 6 | 38 ± 6 | 40 ± 6 | *(1)* |
| 11/03/22 - 11/10/22 | 28 ± 5 | 23 ± 4 | 25 ± 5 | 30 ± 5 | 26 ± 5 | 27 ± 5 | 26 ± 4 | *(1)* |
| 11/10/22 - 11/17/22 | 11 ± 4 | 12 ± 4 | 9 ± 4 | 8 ± 4 | 7 ± 4 | 12 ± 4 | 11 ± 4 | < 11 |
| 11/17/22 - 11/23/22 | 36 ± 6 | 33 ± 6 | 30 ± 6 | 30 ± 6 | 33 ± 6 | 32 ± 6 | 30 ± 5 | 31 ± 5 |
| 11/23/22 - 12/01/22 | 37 ± 5 | 30 ± 5 | 32 ± 5 | 31 ± 5 | 29 ± 5 | 38 ± 5 | 28 ± 5 | 33 ± 5 |
| 12/01/22 - 12/08/22 | 38 ± 6 | 35 ± 6 | 37 ± 6 | 37 ± 6 | 28 ± 5 | 37 ± 6 | 34 ± 5 | 29 ± 5 |
| 12/08/22 - 12/15/22 | 21 ± 4 | 25 ± 5 | 18 ± 4 | 21 ± 4 | 21 ± 4 | 21 ± 4 | 19 ± 4 | 25 ± 5 |
| 12/15/22 - 12/22/22 | 27 ± 5 | 22 ± 4 | 30 ± 5 | 28 ± 5 | 28 ± 5 | 25 ± 5 | 30 ± 5 | 30 ± 5 |
| 12/22/22 - 12/29/22 | 25 ± 5 | 36 ± 7 | 21 ± 5 | 21 ± 4 | 23 ± 5 | 21 ± 5 | 24 ± 5 | 19 ± 4 |
| *MEAN ± 2 STD DEV* | 20 ± 16 | 20 ± 15 | 21 ± 15 | 20 ± 15 | 20 ± 14 | 21 ± 15 | 18 ± 15 | 20 ± 13 |

*THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES*

*(1) SEE PROGRAM EXCEPTIONS FOR EXPLANATION*

**Table C-VI.2** **MONTHLY AND YEARLY VALUES OF GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

| GROUP I - NEAR FIELD LOCATIONS | | | | GROUP II - FAR FIELD LOCATIONS | | | | GROUP III - CONTROL LOCATIONS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| COLLECTION PERIOD | MIN | MAX | MEAN ± 2SD | COLLECTION PERIOD | MIN | MAX | MEAN ± 2SD | COLLECTION PERIOD | MIN | MAX | MEAN ± 2SD |
| 12/30/21 - 01/27/22 | 21 | 34 | 28 ± 7 | 12/30/21 - 01/27/22 | 19 | 29 | 25 ± 7 | 12/30/21 - 01/27/22 | 24 | 30 | 27 ± 6 |
| 01/27/22 - 03/03/22 | 16 | 30 | 22 ± 7 | 01/27/22 - 03/03/22 | 16 | 31 | 23 ± 9 | 01/27/22 - 03/03/22 | 19 | 31 | 23 ± 10 |
| 03/03/22 - 03/24/22 | 11 | 25 | 17 ± 9 | 03/03/22 - 03/24/22 | 11 | 20 | 15 ± 6 | 03/03/22 - 03/24/22 | 11 | 19 | 15 ± 8 |
| 03/24/22 - 04/28/22 | 8 | 16 | 12 ± 5 | 03/24/22 - 04/28/22 | 8 | 15 | 11 ± 4 | 03/24/22 - 04/28/22 | 9 | 18 | 13 ± 7 |
| 04/28/22 - 06/02/22 | 10 | 21 | 15 ± 7 | 04/28/22 - 06/02/22 | 7 | 19 | 14 ± 7 | 04/28/22 - 06/02/22 | 13 | 21 | 17 ± 8 |
| 06/02/22 - 06/30/22 | 10 | 25 | 17 ± 11 | 06/02/22 - 06/30/22 | 8 | 24 | 16 ± 12 | 06/02/22 - 06/30/22 | 11 | 25 | 16 ± 14 |
| 06/30/22 - 08/04/22 | 13 | 24 | 18 ± 6 | 06/30/22 - 08/04/22 | 12 | 25 | 18 ± 8 | 06/30/22 - 08/04/22 | 15 | 27 | 19 ± 10 |
| 08/04/22 - 09/01/22 | 15 | 25 | 20 ± 6 | 08/04/22 - 09/01/22 | 13 | 23 | 19 ± 6 | 08/04/22 - 09/01/22 | 17 | 25 | 21 ± 6 |
| 09/01/22 - 09/29/22 | 11 | 27 | 20 ± 11 | 09/01/22 - 09/29/22 | 10 | 33 | 20 ± 13 | 09/01/22 - 09/29/22 | 14 | 26 | 21 ± 11 |
| 09/29/22 - 11/03/22 | 11 | 41 | 26 ± 20 | 09/29/22 - 11/03/22 | 8 | 40 | 25 ± 21 | 10/06/22 - 10/20/22 | 17 | 26 | 21 ± 13 |
| 11/03/22 - 12/01/22 | 8 | 37 | 25 ± 19 | 11/03/22 - 12/01/22 | 7 | 38 | 25 ± 19 | 11/17/22 - 12/01/22 | 31 | 33 | 32 ± 3 |
| 12/01/22 - 12/29/22 | 18 | 38 | 28 ± 14 | 12/01/22 - 12/29/22 | 19 | 37 | 26 ± 11 | 12/01/22 - 12/29/22 | 19 | 30 | 26 ± 10 |
| 12/30/21 - 12/29/22 | 8 | 41 | 20 ± 15 | 12/30/21 - 12/29/22 | 7 | 40 | 20 ± 15 | 12/30/21 - 12/29/22 | 9 | 33 | 20 ± 13 |

*THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES*

**Table C-VI.3**

## CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

| SITE | COLLECTION PERIOD | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BD-02 | 12/30/21 - 03/24/22 | < 3 | < 3 | < 3 | < 3 | < 5 | < 3 | < 4 | < 2 | < 2 | < 36 | < 16 |
| | 03/24/22 - 06/30/22 | < 3 | < 3 | < 6 | < 4 | < 6 | < 3 | < 7 | < 3 | < 3 | < 19 | < 5 |
| | 06/30/22 - 09/29/22 | < 3 | < 4 | < 6 | < 4 | < 11 | < 5 | < 6 | < 3 | < 4 | < 39 | < 22 |
| | 09/29/22 - 12/29/22 | < 3 | < 3 | < 6 | < 2 | < 7 | < 3 | < 7 | < 3 | < 3 | < 26 | < 7 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - |
| BD-03 | 12/30/21 - 03/24/22 | < 2 | < 4 | < 9 | < 2 | < 7 | < 4 | < 7 | < 3 | < 3 | < 62 | < 16 |
| | 03/24/22 - 06/30/22 | < 3 | < 4 | < 8 | < 4 | < 7 | < 3 | < 6 | < 2 | < 3 | < 21 | < 9 |
| | 06/30/22 - 09/29/22 | < 2 | < 2 | < 6 | < 3 | < 6 | < 2 | < 4 | < 2 | < 2 | < 28 | < 10 |
| | 10/06/22 - 12/29/22 | < 2 | < 3 | < 8 | < 3 | < 7 | < 3 | < 5 | < 2 | < 2 | < 32 | < 11 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - |
| BD-04 | 12/30/21 - 03/24/22 | < 4 | < 5 | < 13 | < 5 | < 10 | < 5 | < 8 | < 4 | < 4 | < 97 | < 33 |
| | 03/24/22 - 06/30/22 | < 2 | < 2 | < 4 | < 2 | < 5 | < 2 | < 4 | < 2 | < 2 | < 11 | < 3 |
| | 06/30/22 - 09/29/22 | < 2 | < 2 | < 5 | < 2 | < 3 | < 3 | < 4 | < 2 | < 2 | < 16 | < 7 |
| | 09/29/22 - 12/29/22 | < 2 | < 3 | < 4 | < 2 | < 7 | < 3 | < 4 | < 2 | < 3 | < 15 | < 10 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - |
| BD-05 | 12/30/21 - 03/24/22 | < 2 | < 3 | < 7 | < 2 | < 6 | < 4 | < 6 | < 2 | < 2 | < 57 | < 18 |
| | 03/24/22 - 06/30/22 | < 3 | < 3 | < 5 | < 3 | < 6 | < 3 | < 5 | < 3 | < 2 | < 17 | < 7 |
| | 06/30/22 - 09/29/22 | < 2 | < 2 | < 5 | < 1 | < 4 | < 2 | < 3 | < 2 | < 1 | < 18 | < 9 |
| | 09/29/22 - 12/29/22 | < 2 | < 2 | < 5 | < 2 | < 6 | < 2 | < 4 | < 2 | < 2 | < 16 | < 8 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - |
| BD-06 | 12/30/21 - 03/24/22 | < 2 | < 3 | < 8 | < 2 | < 5 | < 3 | < 6 | < 2 | < 2 | < 51 | < 9 |
| | 03/24/22 - 06/30/22 | < 1 | < 1 | < 2 | < 2 | < 3 | < 1 | < 2 | < 1 | < 1 | < 7 | < 2 |
| | 06/30/22 - 09/29/22 | < 3 | < 2 | < 6 | < 2 | < 5 | < 2 | < 4 | < 2 | < 2 | < 24 | < 10 |
| | 09/29/22 - 12/29/22 | < 2 | < 2 | < 6 | < 2 | < 5 | < 3 | < 4 | < 2 | < 2 | < 19 | < 8 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - |

**Table C-VI.3**

## CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

| SITE | COLLECTION PERIOD | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BD-19 | 12/30/21 - 03/24/22 | < 2 | < 4 | < 8 | < 2 | < 6 | < 2 | < 6 | < 3 | < 2 | < 54 | < 15 |
| | 03/24/22 - 06/30/22 | < 2 | < 2 | < 5 | < 2 | < 5 | < 2 | < 5 | < 3 | < 2 | < 14 | < 7 |
| | 06/30/22 - 09/29/22 | < 2 | < 2 | < 5 | < 1 | < 5 | < 3 | < 2 | < 2 | < 2 | < 19 | < 12 |
| | 09/29/22 - 12/29/22 | < 2 | < 2 | < 7 | < 3 | < 5 | < 2 | < 4 | < 2 | < 2 | < 21 | < 9 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - |
| BD-20 | 12/30/21 - 03/24/22 | < 2 | < 3 | < 7 | < 3 | < 6 | < 3 | < 5 | < 3 | < 2 | < 42 | < 16 |
| | 03/24/22 - 06/30/22 | < 2 | < 1 | < 4 | < 1 | < 6 | < 2 | < 4 | < 2 | < 1 | < 9 | < 5 |
| | 06/30/22 - 09/29/22 | < 1 | < 2 | < 4 | < 2 | < 5 | < 2 | < 4 | < 2 | < 2 | < 20 | < 11 |
| | 09/29/22 - 12/29/22 | < 2 | < 4 | < 8 | < 4 | < 6 | < 3 | < 5 | < 3 | < 3 | < 23 | < 4 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - |
| BD-21 | 12/30/21 - 03/24/22 | < 2 | < 2 | < 6 | < 2 | < 6 | < 3 | < 5 | < 3 | < 2 | < 60 | < 26 |
| | 03/24/22 - 06/30/22 | < 3 | < 3 | < 6 | < 3 | < 5 | < 3 | < 5 | < 3 | < 2 | < 18 | < 8 |
| | 06/30/22 - 09/29/22 | < 2 | < 3 | < 5 | < 1 | < 4 | < 1 | < 3 | < 2 | < 2 | < 20 | < 10 |
| | 09/29/22 - 12/29/22 | < 1 | < 2 | < 5 | < 3 | < 5 | < 3 | < 4 | < 2 | < 2 | < 13 | < 6 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - |

**Table C-VII.1** **CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

| COLLECTION PERIOD | GROUP I - NEAR FIELD | | | | GROUP II - FAR FIELD | | | GROUP III - CONTROL |
|---|---|---|---|---|---|---|---|---|
| | BD-06 | BD-19 | BD-20 | BD-21 | BD-02 | BD-04 | BD-05 | BD-03 |
| 12/30/21 - 01/06/22 | < 34 | < 35 | < 35 | < 33 | < 34 | < 33 | < 15 | < 36 |
| 01/06/22 - 01/13/22 | < 58 | < 58 | < 57 | < 58 | < 61 | < 62 | < 64 | < 64 |
| 01/13/22 - 01/20/22 | < 30 | < 29 | < 31 | < 29 | < 34 | < 33 | < 34 | < 35 |
| 01/20/22 - 01/27/22 | < 32 | < 34 | < 34 | < 32 | < 36 | < 36 | < 35 | < 37 |
| 01/27/22 - 02/03/22 | < 25 | < 26 | < 23 | < 24 | < 30 | < 25 | < 25 | < 30 |
| 02/03/22 - 02/10/22 | < 48 | < 52 | < 51 | *(1)* | < 37 | < 35 | < 37 | < 39 |
| 02/10/22 - 02/17/22 | < 35 | < 36 | < 36 | < 36 | < 35 | < 35 | < 35 | < 36 |
| 02/17/22 - 02/24/22 | < 32 | < 34 | < 34 | < 32 | < 45 | < 44 | < 45 | < 45 |
| 02/24/22 - 03/03/22 | < 44 | < 47 | < 46 | < 44 | < 36 | < 34 | < 36 | < 37 |
| 03/03/22 - 03/09/22 | < 41 | < 42 | < 43 | < 41 | < 40 | < 40 | < 40 | < 41 |
| 03/09/22 - 03/17/22 | < 31 | < 31 | < 31 | < 30 | < 28 | < 29 | < 30 | < 28 |
| 03/17/22 - 03/24/22 | < 28 | < 29 | < 29 | < 29 | < 24 | < 26 | < 16 | < 26 |
| 03/24/22 - 03/31/22 | < 20 | < 21 | < 21 | < 20 | < 24 | < 20 | < 25 | < 24 |
| 03/31/22 - 04/07/22 | < 61 | < 62 | < 63 | < 62 | < 34 | < 39 | < 35 | < 29 |
| 04/07/22 - 04/13/22 | < 39 | < 41 | < 40 | < 33 | < 56 | < 59 | < 59 | < 56 |
| 04/13/22 - 04/21/22 | < 29 | < 29 | < 29 | < 28 | < 29 | < 29 | < 29 | < 28 |
| 04/21/22 - 04/28/22 | < 36 | < 38 | < 37 | < 36 | < 31 | < 30 | < 31 | < 30 |
| 04/28/22 - 05/05/22 | < 46 | < 46 | < 46 | < 45 | < 29 | < 28 | < 30 | < 29 |
| 05/05/22 - 05/12/22 | < 32 | < 33 | < 33 | < 32 | < 28 | < 29 | < 28 | < 28 |
| 05/12/22 - 05/19/22 | < 30 | < 31 | < 31 | < 26 | < 31 | < 31 | < 31 | < 31 |
| 05/19/22 - 05/26/22 | < 46 | < 46 | < 47 | < 44 | < 48 | < 50 | < 50 | < 48 |
| 05/26/22 - 06/02/22 | < 44 | < 47 | < 47 | < 44 | < 47 | < 42 | < 45 | < 45 |
| 06/02/22 - 06/09/22 | < 52 | < 57 | < 57 | < 57 | < 51 | < 46 | < 51 | < 52 |
| 06/09/22 - 06/16/22 | < 53 | < 55 | < 58 | < 53 | < 53 | < 52 | < 52 | < 52 |
| 06/16/22 - 06/23/22 | < 37 | < 38 | < 38 | < 36 | < 46 | < 47 | < 46 | < 46 |
| 06/23/22 - 06/30/22 | < 22 | < 54 | < 54 | < 54 | < 53 | < 50 | < 53 | < 53 |
| 06/30/22 - 07/07/22 | < 40 | < 41 | < 41 | < 40 | < 24 | < 24 | < 24 | < 24 |
| 07/07/22 - 07/14/22 | < 36 | < 37 | < 37 | < 36 | < 33 | < 32 | < 33 | < 33 |
| 07/14/22 - 07/21/22 | < 43 | < 45 | < 44 | < 43 | < 43 | < 44 | < 43 | < 43 |
| 07/21/22 - 07/28/22 | < 47 | < 47 | < 49 | < 19 | < 27 | < 27 | < 27 | < 27 |
| 07/28/22 - 08/04/22 | < 16 | < 39 | < 39 | < 38 | < 60 | < 58 | < 62 | < 62 |
| 08/04/22 - 08/11/22 | < 33 | < 34 | < 34 | < 32 | < 31 | < 31 | < 30 | < 30 |
| 08/11/22 - 08/18/22 | < 49 | < 50 | < 51 | < 50 | < 53 | < 52 | < 53 | < 52 |
| 08/18/22 - 08/24/22 | < 39 | < 41 | < 40 | < 39 | < 43 | < 43 | < 43 | < 44 |
| 08/24/22 - 09/01/22 | < 58 | < 55 | < 55 | < 54 | < 60 | < 58 | < 60 | < 27 |
| 09/01/22 - 09/08/22 | < 52 | < 53 | < 53 | < 22 | < 38 | < 40 | < 38 | < 39 |
| 09/08/22 - 09/15/22 | < 52 | < 51 | < 51 | < 49 | < 38 | < 38 | < 38 | < 38 |
| 09/15/22 - 09/22/22 | < 58 | < 57 | < 58 | < 56 | < 62 | < 61 | < 62 | < 62 |
| 09/22/22 - 09/29/22 | < 48 | < 50 | < 50 | < 48 | < 50 | < 49 | < 50 | < 52 |
| 09/29/22 - 10/06/22 | < 48 | < 18 | < 18 | < 17 | < 48 | < 47 | < 20 | *(1)* |
| 10/06/22 - 10/13/22 | < 35 | < 34 | < 34 | < 33 | < 29 | < 32 | < 30 | < 30 |
| 10/13/22 - 10/20/22 | < 25 | < 47 | < 47 | < 46 | < 25 | < 25 | < 26 | < 25 |
| 10/20/22 - 10/27/22 | < 20 | < 46 | < 33 | < 32 | < 44 | < 47 | < 45 | *(1)* |
| 10/27/22 - 11/03/22 | < 42 | < 43 | < 37 | < 35 | < 21 | < 42 | < 43 | *(1)* |
| 11/03/22 - 11/10/22 | < 22 | < 51 | < 22 | < 22 | < 50 | < 50 | < 46 | *(1)* |
| 11/10/22 - 11/17/22 | < 33 | < 32 | < 33 | < 32 | < 36 | < 37 | < 37 | < 40 |
| 11/17/22 - 11/23/22 | < 46 | < 47 | < 47 | < 46 | < 48 | < 48 | < 45 | < 45 |
| 11/23/22 - 12/01/22 | < 27 | < 20 | < 20 | < 20 | < 27 | < 26 | < 12 | < 26 |
| 12/01/22 - 12/08/22 | < 36 | < 36 | < 36 | < 35 | < 38 | < 40 | < 37 | < 18 |
| 12/08/22 - 12/15/22 | < 53 | < 52 | < 53 | < 50 | < 35 | < 35 | < 35 | < 34 |
| 12/15/22 - 12/22/22 | < 54 | < 56 | < 56 | < 52 | < 34 | < 33 | < 32 | < 32 |
| 12/22/22 - 12/29/22 | < 53 | < 32 | < 53 | < 52 | < 51 | < 52 | < 53 | < 49 |
| *MEAN* | - | - | - | - | - | - | - | - |

*(1) SEE PROGRAM EXCEPTIONS FOR EXPLANATION*

**Table C-VIII.1** **CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| COLLECTION PERIOD | CONTROL FARM BD-18 |
|---|---|
| 04/07/22 | < 0.9 |
| *MEAN* | - |

**Table C-VIII.2** **CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| SITE | COLLECTION PERIOD | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BD-18 | 04/07/22 | < 8 | < 7 | < 21 | < 8 | < 21 | < 7 | < 13 | < 7 | < 9 | < 53 | < 10 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - |

**Table C-VIII.3** **CONCENTRATIONS OF GAMMA EMITTERS IN GRASS SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

| SITE | COLLECTION PERIOD | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | I-131 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

No Substitute Grass Samples Taken in 2022

**Table C-IX.1**

## CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

| SITE | COLLECTION PERIOD | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | I-131 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BD-CONTROL | | | | | | | | | | | | | |
| *Radish* | 06/16/22 | < 32 | < 31 | < 50 | < 38 | < 68 | < 33 | < 56 | < 38 | < 32 | < 32 | < 118 | < 47 |
| *Lettuce* | 06/16/22 | < 29 | < 26 | < 76 | < 41 | < 76 | < 28 | < 36 | < 37 | < 29 | < 37 | < 119 | < 42 |
| *Turnip* | 07/13/22 | < 34 | < 30 | < 57 | < 46 | < 75 | < 35 | < 55 | < 55 | < 39 | < 33 | < 143 | < 40 |
| *Mustard Greens* | 07/13/22 | < 37 | < 28 | < 97 | < 42 | < 120 | < 45 | < 68 | < 53 | < 44 | < 40 | < 163 | < 39 |
| *Turnip* | 07/13/22 | < 34 | < 30 | < 57 | < 46 | < 75 | < 35 | < 55 | < 55 | < 39 | < 33 | < 143 | < 40 |
| *Mustard Greens* | 07/13/22 | < 37 | < 28 | < 97 | < 42 | < 120 | < 45 | < 68 | < 53 | < 44 | < 40 | < 163 | < 39 |
| *Lettuce* | 07/28/22 | < 30 | < 31 | < 52 | < 33 | < 60 | < 32 | < 51 | < 46 | < 32 | < 30 | < 142 | < 46 |
| *Radish* | 07/28/22 | < 34 | < 31 | < 61 | < 34 | < 57 | < 23 | < 42 | < 43 | < 26 | < 30 | < 115 | < 35 |
| *Radish* | 07/28/22 | < 34 | < 31 | < 61 | < 34 | < 57 | < 23 | < 42 | < 43 | < 26 | < 30 | < 115 | < 35 |
| *Lettuce* | 07/28/22 | < 30 | < 31 | < 52 | < 33 | < 60 | < 32 | < 51 | < 46 | < 32 | < 30 | < 142 | < 46 |
| *Lettuce* | 08/11/22 | < 41 | < 38 | < 70 | < 42 | < 80 | < 33 | < 76 | < 56 | < 39 | < 36 | < 176 | < 44 |
| *Radish* | 08/11/22 | < 19 | < 22 | < 46 | < 23 | < 47 | < 23 | < 41 | < 36 | < 19 | < 22 | < 98 | < 20 |
| *Radish* | 08/11/22 | < 19 | < 22 | < 46 | < 23 | < 47 | < 23 | < 41 | < 36 | < 19 | < 22 | < 98 | < 20 |
| *Lettuce* | 08/11/22 | < 41 | < 38 | < 70 | < 42 | < 80 | < 33 | < 76 | < 56 | < 39 | < 36 | < 176 | < 44 |
| *Lettuce* | 08/31/22 | < 36 | < 32 | < 67 | < 39 | < 72 | < 36 | < 59 | < 59 | < 34 | < 32 | < 173 | < 48 |
| *Turnip* | 08/31/22 | < 20 | < 22 | < 42 | < 21 | < 44 | < 21 | < 34 | < 31 | < 25 | < 19 | < 92 | < 38 |
| *Turnip* | 08/31/22 | < 20 | < 22 | < 42 | < 21 | < 44 | < 21 | < 34 | < 31 | < 25 | < 19 | < 92 | < 38 |
| *Lettuce* | 08/31/22 | < 36 | < 32 | < 67 | < 39 | < 72 | < 36 | < 59 | < 59 | < 34 | < 33 | < 173 | < 48 |
| *Lettuce* | 09/08/22 | < 25 | < 25 | < 57 | < 28 | < 57 | < 27 | < 44 | < 43 | < 28 | < 27 | < 125 | < 41 |
| *Radish* | 09/08/22 | < 30 | < 32 | < 57 | < 26 | < 66 | < 21 | < 44 | < 40 | < 27 | < 26 | < 113 | < 27 |
| *Radish* | 09/08/22 | < 30 | < 32 | < 57 | < 26 | < 66 | < 21 | < 44 | < 40 | < 27 | < 26 | < 113 | < 27 |
| *Lettuce* | 09/08/22 | < 25 | < 25 | < 57 | < 28 | < 57 | < 27 | < 44 | < 43 | < 28 | < 27 | < 125 | < 41 |
| *Lettuce* | 09/22/22 | < 34 | < 33 | < 68 | < 32 | < 63 | < 37 | < 56 | < 53 | < 34 | < 34 | < 158 | < 42 |
| *Radish* | 09/22/22 | < 22 | < 19 | < 40 | < 20 | < 50 | < 19 | < 27 | < 28 | < 24 | < 20 | < 80 | < 24 |
| *Lettuce* | 10/06/22 | < 42 | < 44 | < 80 | < 44 | < 72 | < 45 | < 62 | < 58 | < 50 | < 47 | < 189 | < 51 |
| *Turnip* | 10/06/22 | < 20 | < 27 | < 45 | < 29 | < 49 | < 31 | < 44 | < 41 | < 29 | < 25 | < 115 | < 28 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-QUAD 1 | | | | | | | | | | | | | |
| *Collard Greens* | 07/14/22 | < 30 | < 32 | < 74 | < 33 | < 75 | < 30 | < 65 | < 58 | < 44 | < 35 | < 176 | < 47 |
| *Mustard Greens* | 07/14/22 | < 33 | < 33 | < 84 | < 37 | < 76 | < 35 | < 71 | < 47 | < 46 | < 35 | < 151 | < 43 |
| *Radish* | 07/14/22 | < 29 | < 32 | < 74 | < 35 | < 66 | < 33 | < 61 | < 51 | < 38 | < 38 | < 145 | < 52 |
| *Collard Greens* | 08/04/22 | < 28 | < 25 | < 59 | < 39 | < 67 | < 21 | < 34 | < 32 | < 29 | < 31 | < 97 | < 42 |
| *Turnip* | 08/04/22 | < 37 | < 34 | < 92 | < 46 | < 80 | < 33 | < 59 | < 50 | < 41 | < 41 | < 137 | < 49 |
| *Radish* | 08/04/22 | < 31 | < 50 | < 72 | < 40 | < 79 | < 30 | < 58 | < 47 | < 43 | < 31 | < 169 | < 56 |
| *Collard Greens* | 09/01/22 | < 23 | < 25 | < 58 | < 36 | < 61 | < 21 | < 39 | < 33 | < 22 | < 29 | < 112 | < 30 |
| *Turnip* | 09/01/22 | < 20 | < 18 | < 50 | < 14 | < 43 | < 23 | < 40 | < 34 | < 22 | < 23 | < 92 | < 26 |
| *Red Beets* | 09/01/22 | < 31 | < 29 | < 68 | < 36 | < 67 | < 34 | < 49 | < 44 | < 30 | < 28 | < 134 | < 22 |
| *Swiss Chard* | 10/13/22 | < 31 | < 30 | < 63 | < 38 | < 85 | < 39 | < 65 | < 51 | < 34 | < 38 | < 142 | < 40 |
| *Radish* | 10/13/22 | < 40 | < 43 | < 101 | < 36 | < 92 | < 42 | < 76 | < 53 | < 42 | < 41 | < 194 | < 54 |
| *Red Beets* | 10/13/22 | < 39 | < 33 | < 70 | < 45 | < 91 | < 45 | < 47 | < 53 | < 39 | < 39 | < 173 | < 47 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |

**Table C-IX.1**

## CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

| SITE | COLLECTION PERIOD | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | I-131 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BD-QUAD 2 | | | | | | | | | | | | | |
| *Collard Greens* | 07/21/22 | < 33 | < 32 | < 77 | < 33 | < 78 | < 28 | < 48 | < 37 | < 38 | < 32 | < 144 | < 41 |
| *Kale* | 07/21/22 | < 43 | < 45 | < 86 | < 45 | < 100 | < 38 | < 73 | < 52 | < 49 | < 45 | < 189 | < 44 |
| *Red Beets* | 07/21/22 | < 20 | < 19 | < 40 | < 26 | < 47 | < 23 | < 35 | < 26 | < 20 | < 24 | < 91 | < 25 |
| *Collard Greens* | 08/04/22 | < 30 | < 33 | < 70 | < 21 | < 64 | < 24 | < 44 | < 45 | < 36 | < 24 | < 146 | < 49 |
| *Swiss Chard* | 08/04/22 | < 40 | < 36 | < 84 | < 37 | < 63 | < 26 | < 64 | < 53 | < 42 | < 41 | < 144 | < 66 |
| *Kale* | 08/04/22 | < 31 | < 35 | < 77 | < 49 | < 79 | < 34 | < 57 | < 51 | < 39 | < 37 | < 138 | < 40 |
| *Red Beets* | 08/18/22 | < 37 | < 39 | < 96 | < 54 | < 82 | < 37 | < 71 | < 49 | < 40 | < 37 | < 128 | < 30 |
| *Kale* | 09/01/22 | < 31 | < 26 | < 59 | < 26 | < 78 | < 31 | < 45 | < 42 | < 33 | < 29 | < 128 | < 39 |
| *Swiss Chard* | 09/01/22 | < 21 | < 23 | < 45 | < 25 | < 44 | < 22 | < 36 | < 38 | < 24 | < 24 | < 89 | < 21 |
| *Red Beets* | 09/01/22 | < 15 | < 15 | < 31 | < 16 | < 31 | < 15 | < 23 | < 19 | < 16 | < 15 | < 50 | < 13 |
| *Collard Greens* | 10/13/22 | < 37 | < 30 | < 70 | < 24 | < 97 | < 33 | < 62 | < 52 | < 37 | < 34 | < 130 | < 35 |
| *Swiss Chard* | 10/13/22 | < 36 | < 45 | < 88 | < 60 | < 107 | < 43 | < 70 | < 47 | < 39 | < 35 | < 183 | < 61 |
| *Red Beets* | 10/13/22 | < 25 | < 26 | < 50 | < 31 | < 65 | < 23 | < 32 | < 44 | < 26 | < 29 | < 118 | < 31 |
| *Sweet Potato* | 10/13/22 | < 24 | < 24 | < 58 | < 25 | < 68 | < 29 | < 45 | < 35 | < 20 | < 28 | < 118 | < 41 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-QUAD 3 | | | | | | | | | | | | | |
| *Mustard Greens* | 07/14/22 | < 31 | < 34 | < 86 | < 30 | < 80 | < 30 | < 53 | < 47 | < 38 | < 42 | < 129 | < 40 |
| *Cabbage* | 07/14/22 | < 28 | < 25 | < 64 | < 28 | < 67 | < 29 | < 57 | < 45 | < 39 | < 28 | < 143 | < 40 |
| *Radish* | 07/14/22 | < 38 | < 41 | < 64 | < 45 | < 72 | < 38 | < 76 | < 53 | < 42 | < 33 | < 133 | < 42 |
| *Mustard Greens* | 08/04/22 | < 40 | < 44 | < 89 | < 51 | < 102 | < 49 | < 69 | < 54 | < 54 | < 44 | < 163 | < 60 |
| *Cabbage* | 08/04/22 | < 24 | < 31 | < 58 | < 38 | < 60 | < 31 | < 51 | < 35 | < 33 | < 28 | < 121 | < 35 |
| *Turnip* | 08/04/22 | < 22 | < 22 | < 50 | < 23 | < 50 | < 19 | < 41 | < 34 | < 32 | < 29 | < 116 | < 28 |
| *Collard Greens* | 09/01/22 | < 25 | < 23 | < 55 | < 26 | < 59 | < 28 | < 42 | < 34 | < 26 | < 18 | < 106 | < 38 |
| *Cabbage* | 09/01/22 | < 23 | < 28 | < 58 | < 28 | < 42 | < 24 | < 37 | < 37 | < 27 | < 24 | < 99 | < 26 |
| *Turnip* | 09/01/22 | < 14 | < 15 | < 33 | < 17 | < 28 | < 14 | < 18 | < 20 | < 18 | < 14 | < 62 | < 20 |
| *Carrots* | 10/13/22 | < 32 | < 29 | < 81 | < 30 | < 93 | < 37 | < 65 | < 44 | < 47 | < 44 | < 158 | < 33 |
| *Turnip* | 10/13/22 | < 28 | < 26 | < 66 | < 20 | < 66 | < 22 | < 52 | < 33 | < 30 | < 27 | < 113 | < 29 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |
| BD-QUAD 4 | | | | | | | | | | | | | |
| *Red Beets* | 07/14/22 | < 18 | < 18 | < 36 | < 19 | < 39 | < 18 | < 36 | < 31 | < 21 | < 18 | < 92 | < 21 |
| *Mustard Greens* | 07/14/22 | < 20 | < 23 | < 43 | < 21 | < 45 | < 22 | < 38 | < 37 | < 23 | < 21 | < 101 | < 36 |
| *Red Beets* | 08/04/22 | < 40 | < 38 | < 92 | < 36 | < 81 | < 39 | < 63 | < 52 | < 45 | < 42 | < 185 | < 42 |
| *Radish* | 08/04/22 | < 44 | < 44 | < 82 | < 46 | < 89 | < 48 | < 74 | **< 69** | < 48 | < 47 | < 203 | < 57 |
| *Swiss Chard* | 08/04/22 | < 35 | < 29 | < 59 | < 40 | < 76 | < 34 | < 63 | < 51 | < 34 | < 35 | < 137 | < 30 |
| *Mustard Greens* | 08/04/22 | < 25 | < 23 | < 53 | < 24 | < 48 | < 24 | < 42 | < 34 | < 25 | < 24 | < 108 | < 33 |
| *Red Beets* | 09/01/22 | < 27 | < 28 | < 58 | < 25 | < 60 | < 25 | < 48 | < 32 | < 37 | < 27 | < 119 | < 29 |
| *Swiss Chard* | 09/01/22 | < 45 | < 38 | < 73 | < 31 | < 78 | < 39 | < 65 | < 56 | < 45 | < 47 | < 185 | < 65 |
| *Radish* | 09/01/22 | < 30 | < 30 | < 47 | < 32 | < 59 | < 31 | < 44 | < 43 | < 31 | < 27 | < 124 | < 35 |
| *Red Beets* | 10/13/22 | < 35 | < 36 | < 87 | < 25 | < 66 | < 35 | < 55 | < 50 | < 30 | < 43 | < 146 | < 37 |
| *Swiss Chard* | 10/13/22 | < 34 | < 34 | < 70 | < 37 | < 76 | < 41 | < 70 | < 52 | < 43 | < 40 | < 168 | < 43 |
| *Kohlrabi* | 10/13/22 | < 31 | < 30 | < 46 | < 38 | < 85 | < 36 | < 54 | < 53 | < 31 | < 36 | < 147 | < 40 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |

**BOLD** = Detection Limt not met due to limited sample volume

**Table C-IX.1**

## CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

| SITE | COLLECTION PERIOD | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | I-131 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BWD-G1 | | | | | | | | | | | | | |
| *Kale* | 06/30/22 | < 29 | < 30 | < 64 | < 31 | < 73 | < 30 | < 56 | < 55 | < 34 | < 34 | < 140 | < 49 |
| *Cabbage* | 06/30/22 | < 40 | < 40 | < 62 | < 41 | < 69 | < 30 | < 47 | < 49 | < 45 | < 37 | < 137 | < 42 |
| *Kohlrabi* | 06/30/22 | < 28 | < 27 | < 73 | < 24 | < 43 | < 28 | < 37 | < 33 | < 30 | < 35 | < 140 | < 32 |
| *Kale* | 07/14/22 | < 36 | < 31 | < 76 | < 38 | < 87 | < 33 | < 78 | < 45 | < 43 | < 35 | < 134 | < 44 |
| *Swiss Chard* | 07/14/22 | < 28 | < 31 | < 57 | < 36 | < 63 | < 26 | < 54 | < 48 | < 30 | < 42 | < 139 | < 43 |
| *Kohlrabi* | 07/14/22 | < 18 | < 22 | < 49 | < 19 | < 49 | < 20 | < 42 | < 37 | < 24 | < 25 | < 99 | < 24 |
| *Kale* | 07/28/22 | < 39 | < 31 | < 56 | < 39 | < 83 | < 40 | < 54 | < 49 | < 41 | < 37 | < 163 | < 40 |
| *Turnip* | 07/28/22 | < 27 | < 20 | < 55 | < 28 | < 42 | < 24 | < 37 | < 34 | < 23 | < 26 | < 106 | < 40 |
| *Kohlrabi* | 07/28/22 | < 27 | < 24 | < 65 | < 22 | < 41 | < 26 | < 35 | < 42 | < 23 | < 24 | < 129 | < 38 |
| *Turnip* | 08/11/22 | < 29 | < 31 | < 67 | < 40 | < 64 | < 30 | < 55 | < 46 | < 30 | < 41 | < 125 | < 44 |
| *Swiss Chard* | 08/11/22 | < 28 | < 20 | < 51 | < 31 | < 51 | < 28 | < 44 | < 41 | < 25 | < 29 | < 111 | < 40 |
| *Cabbage* | 08/11/22 | < 22 | < 25 | < 46 | < 21 | < 48 | < 26 | < 41 | < 38 | < 26 | < 25 | < 95 | < 32 |
| *Turnip* | 08/31/22 | < 24 | < 26 | < 46 | < 34 | < 58 | < 28 | < 52 | < 53 | < 24 | < 35 | < 168 | < 38 |
| *Swiss Chard* | 08/31/22 | < 37 | < 35 | < 67 | < 23 | < 80 | < 39 | < 62 | < 50 | < 29 | < 41 | < 147 | < 36 |
| *Kale* | 08/31/22 | < 23 | < 27 | < 47 | < 27 | < 57 | < 30 | < 46 | < 45 | < 25 | < 30 | < 118 | < 32 |
| *Turnip* | 09/08/22 | < 27 | < 32 | < 50 | < 24 | < 51 | < 31 | < 53 | < 41 | < 28 | < 20 | < 138 | < 36 |
| *Swiss Chard* | 09/08/22 | < 38 | < 30 | < 77 | < 42 | < 77 | < 32 | < 62 | < 57 | < 38 | < 37 | < 148 | < 45 |
| *Kale* | 09/08/22 | < 30 | < 34 | < 68 | < 38 | < 59 | < 30 | < 66 | < 54 | < 20 | < 43 | < 122 | < 37 |
| *Cabbage* | 09/22/22 | < 24 | < 27 | < 50 | < 26 | < 61 | < 26 | < 44 | < 39 | < 20 | < 27 | < 142 | < 36 |
| *Swiss Chard* | 09/22/22 | < 28 | < 37 | < 73 | < 34 | < 59 | < 33 | < 52 | < 49 | < 32 | < 36 | < 140 | < 38 |
| *Kale* | 09/22/22 | < 22 | < 22 | < 51 | < 28 | < 44 | < 26 | < 35 | < 38 | < 27 | < 24 | < 111 | < 39 |
| *Kohlrabi* | 10/06/22 | < 31 | < 33 | < 60 | < 37 | < 66 | < 31 | < 54 | < 38 | < 38 | < 39 | < 116 | < 41 |
| *Cabbage* | 10/06/22 | < 23 | < 23 | < 52 | < 24 | < 58 | < 24 | < 36 | < 34 | < 31 | < 33 | < 113 | < 32 |
| *Kale* | 10/06/22 | < 21 | < 23 | < 57 | < 25 | < 54 | < 25 | < 39 | < 29 | < 26 | < 30 | < 104 | < 22 |
| *Kohlrabi* | 10/20/22 | < 26 | < 31 | < 65 | < 29 | < 60 | < 36 | < 46 | < 49 | < 34 | < 35 | < 124 | < 40 |
| *Cabbage* | 10/20/22 | < 22 | < 26 | < 43 | < 25 | < 53 | < 26 | < 41 | < 31 | < 25 | < 23 | < 90 | < 13 |
| *Kale* | 10/20/22 | < 29 | < 31 | < 50 | < 28 | < 51 | < 30 | < 42 | < 36 | < 28 | < 30 | < 122 | < 45 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |

**Table C-IX.1**

## CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

| SITE | COLLECTION PERIOD | Mn-54 | Co-58 | Fe-59 | Co-60 | Zn-65 | Nb-95 | Zr-95 | I-131 | Cs-134 | Cs-137 | Ba-140 | La-140 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BWD-G2 | | | | | | | | | | | | | |
| *Cabbage* | 06/30/22 | < 19 | < 19 | < 49 | < 20 | < 49 | < 19 | < 27 | < 27 | < 20 | < 21 | < 90 | < 32 |
| *Kohlrabi* | 06/30/22 | < 27 | < 23 | < 62 | < 22 | < 71 | < 27 | < 52 | < 51 | < 24 | < 28 | < 108 | < 39 |
| *Swiss Chard* | 06/30/22 | < 33 | < 36 | < 66 | < 36 | < 70 | < 33 | < 57 | < 59 | < 36 | < 37 | < 157 | < 51 |
| *Cabbage* | 07/14/22 | < 18 | < 32 | < 35 | < 16 | < 39 | < 33 | < 39 | < 30 | < 26 | < 35 | < 152 | < 26 |
| *Kale* | 07/14/22 | < 42 | < 36 | < 79 | < 26 | < 67 | < 41 | < 42 | < 42 | < 31 | < 40 | < 119 | < 44 |
| *Turnip* | 07/14/22 | < 27 | < 27 | < 69 | < 32 | < 70 | < 30 | < 60 | < 44 | < 34 | < 41 | < 133 | < 45 |
| *Cabbage* | 07/28/22 | < 20 | < 13 | < 37 | < 19 | < 39 | < 19 | < 33 | < 30 | < 19 | < 23 | < 82 | < 19 |
| *Kale* | 07/28/22 | < 26 | < 24 | < 62 | < 30 | < 87 | < 25 | < 49 | < 51 | < 31 | < 33 | < 105 | < 45 |
| *Turnip* | 07/28/22 | < 22 | < 23 | < 46 | < 24 | < 51 | < 27 | < 41 | < 40 | < 26 | < 30 | < 100 | < 36 |
| *Turnip* | 08/11/22 | < 20 | < 18 | < 38 | < 18 | < 43 | < 18 | < 35 | < 26 | < 21 | < 27 | < 98 | < 19 |
| *Kale* | 08/11/22 | < 19 | < 19 | < 43 | < 24 | < 43 | < 21 | < 34 | < 29 | < 27 | < 25 | < 96 | < 27 |
| *Kohlrabi* | 08/11/22 | < 26 | < 23 | < 49 | < 26 | < 36 | < 29 | < 44 | < 38 | < 27 | < 28 | < 111 | < 38 |
| *Turnip* | 08/31/22 | < 23 | < 22 | < 61 | < 29 | < 57 | < 32 | < 46 | < 54 | < 30 | < 27 | < 142 | < 44 |
| *Kale* | 08/31/22 | < 29 | < 25 | < 62 | < 32 | < 48 | < 32 | < 64 | < 36 | < 31 | < 37 | < 144 | < 37 |
| *Cabbage* | 08/31/22 | < 19 | < 25 | < 42 | < 23 | < 40 | < 24 | < 41 | < 36 | < 22 | < 29 | < 104 | < 34 |
| *Turnip* | 09/08/22 | < 22 | < 22 | < 46 | < 23 | < 53 | < 22 | < 44 | < 35 | < 29 | < 31 | < 114 | < 35 |
| *Kale* | 09/08/22 | < 26 | < 24 | < 49 | < 36 | < 59 | < 27 | < 47 | < 42 | < 29 | < 32 | < 127 | < 45 |
| *Cabbage* | 09/08/22 | < 33 | < 38 | < 66 | < 37 | < 78 | < 33 | < 57 | < 50 | < 35 | < 31 | < 165 | < 36 |
| *Kohlrabi* | 09/08/22 | < 19 | < 16 | < 51 | < 29 | < 43 | < 17 | < 30 | < 29 | < 26 | < 21 | < 85 | < 28 |
| *Turnip* | 09/22/22 | < 22 | < 23 | < 43 | < 31 | < 53 | < 25 | < 35 | < 37 | < 32 | < 26 | < 102 | < 24 |
| *Kale* | 09/22/22 | < 30 | < 32 | < 60 | < 36 | < 63 | < 28 | < 56 | < 47 | < 34 | < 30 | < 128 | < 42 |
| *Kohlrabi* | 09/22/22 | < 20 | < 18 | < 48 | < 36 | < 42 | < 22 | < 33 | < 30 | < 31 | < 26 | < 78 | < 28 |
| *Turnip* | 10/06/22 | < 22 | < 23 | < 48 | < 27 | < 44 | < 27 | < 37 | < 33 | < 28 | < 27 | < 109 | < 29 |
| *Kale* | 10/06/22 | < 29 | < 25 | < 54 | < 24 | < 67 | < 34 | < 44 | < 39 | < 34 | < 29 | < 112 | < 39 |
| *Swiss Chard* | 10/06/22 | < 29 | < 25 | < 55 | < 26 | < 55 | < 29 | < 41 | < 39 | < 29 | < 24 | < 113 | < 33 |
| *Turnip* | 10/20/22 | < 28 | < 26 | < 50 | < 27 | < 39 | < 29 | < 36 | < 44 | < 32 | < 38 | < 116 | < 26 |
| *Kale* | 10/20/22 | < 38 | < 27 | < 65 | < 34 | < 81 | < 48 | < 50 | < 52 | < 35 | < 41 | < 161 | < 53 |
| *Cabbage* | 10/20/22 | < 27 | < 35 | < 49 | < 23 | < 45 | < 29 | < 39 | < 35 | < 30 | < 28 | < 104 | < 28 |
| | *MEAN* | - | - | - | - | - | - | - | - | - | - | - | - |

**Table C-X.1**

## QUARTERLY OSLD RESULTS FOR BRAIDWOOD STATION, 2022

RESULTS IN UNITS OF MREM/QUARTER ± 2 STANDARD DEVIATIONS

| 2022 | Monitoring Location | Location Quarterly Baseline, BQ (mrem) | $B_Q$ + $MDD_Q$ (mrem) | 2022 Normalized Net Dose, MQx (mrem/std. Qtr.) | | | | Quarterly Facility Dose, $F_Q$ (mrem) | | | | Annual Baseline, $B_A$ (mrem) | $B_A$ + $MDD_A$ (mrem) | Normalized Annual Dose, $M_A$ (mrem/yr) | Annual Facility Dose, $F_A$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | | | | |
| Control | BD-03 | 15.50 | 25.34 | 14.0 | 15.1 | 16.3 | 17.8 | ND | ND | ND | ND | 62.10 | 85.74 | 63.23 | ND |
| Ind - Far | BD-02 | 15.00 | 24.84 | 12.5 | 16.4 | 16.5 | 18.2 | ND | ND | ND | ND | 59.90 | 83.54 | 63.59 | ND |
| | BD-04 | 14.10 | 23.94 | 12.2 | 13.7 | 16.1 | 16.3 | ND | ND | ND | ND | 50.90 | 74.54 | 58.29 | ND |
| | BD-05 | 15.60 | 25.44 | 13.0 | 16.3 | 16.1 | 15.2 | ND | ND | ND | ND | 62.50 | 86.14 | 60.61 | ND |
| Ind - Inner | BD-101 | 14.80 | 24.64 | 13.1 | 14.9 | 14.1 | 17.3 | ND | ND | ND | ND | 59.10 | 82.74 | 59.41 | ND |
| | BD-102 | 13.40 | 23.24 | 11.3 | 14.7 | 16.4 | 14.0 | ND | ND | ND | ND | 53.70 | 77.34 | 56.37 | ND |
| | BD-103 | 14.50 | 24.34 | 12.5 | 14.4 | 16.0 | 15.9 | ND | ND | ND | ND | 57.90 | 81.54 | 58.79 | ND |
| | BD-104 | 13.30 | 23.14 | 9.8 | 14.7 | 13.8 | 16.0 | ND | ND | ND | ND | 50.60 | 74.24 | 54.34 | ND |
| | BD-105 | 13.60 | 23.44 | 9.6 | 12.4 | 15.1 | 14.3 | ND | ND | ND | ND | 54.40 | 78.04 | 51.43 | ND |
| | BD-106 | 13.70 | 23.54 | 11.5 | 15.0 | 15.1 | 13.7 | ND | ND | ND | ND | 54.70 | 78.34 | 55.27 | ND |
| | BD-107 | 14.40 | 24.24 | 11.2 | 14.1 | 14.5 | 16.7 | ND | ND | ND | ND | 57.50 | 81.14 | 56.47 | ND |
| | BD-108 | 13.80 | 23.64 | 11.9 | 13.5 | 14.6 | 14.8 | ND | ND | ND | ND | 55.00 | 78.64 | 54.78 | ND |
| | BD-109 | 17.20 | 27.04 | 13.6 | 17.5 | 18.4 | 17.7 | ND | ND | ND | ND | 68.90 | 92.54 | 67.22 | ND |
| | BD-110 | 13.80 | 23.64 | 12.5 | 14.1 | 14.6 | 15.1 | ND | ND | ND | ND | 55.20 | 78.84 | 56.29 | ND |
| | BD-111a | 13.50 | 23.34 | 11.5 | 12.3 | 15.1 | 15.3 | ND | ND | ND | ND | 54.20 | 77.84 | 54.17 | ND |
| | BD-112 | 13.70 | 23.54 | 12.2 | 13.9 | 15.2 | 15.8 | ND | ND | ND | ND | 54.80 | 78.44 | 57.09 | ND |
| | BD-113a | 14.30 | 24.14 | 12.6 | 14.5 | 14.7 | 13.8 | ND | ND | ND | ND | 57.00 | 80.64 | 55.60 | ND |
| | BD-114 | 14.80 | 24.64 | 11.5 | 15.5 | 16.4 | 18.0 | ND | ND | ND | ND | 59.20 | 82.84 | 61.37 | ND |
| | BD-115 | 14.40 | 24.24 | 12.3 | 15.8 | 14.3 | 15.3 | ND | ND | ND | ND | 57.60 | 81.24 | 57.69 | ND |
| | BD-116 | 15.40 | 25.24 | 14.3 | 16.1 | 15.9 | 18.0 | ND | ND | ND | ND | 61.60 | 85.24 | 64.34 | ND |
| Ind - Outer | BD-201 | 18.70 | 28.54 | 16.7 | 18.5 | 20.1 | 22.8 | ND | ND | ND | ND | 74.80 | 98.44 | 78.09 | ND |
| | BD-202 | 14.40 | 24.24 | 12.4 | 14.5 | 15.4 | 16.8 | ND | ND | ND | ND | 57.60 | 81.24 | 59.09 | ND |
| | BD-203 | 14.80 | 24.64 | 11.9 | 15.0 | 14.9 | 15.8 | ND | ND | ND | ND | 59.30 | 82.94 | 57.58 | ND |
| | BD-204 | 13.40 | 23.24 | 11.4 | 13.2 | 13.6 | 16.6 | ND | ND | ND | ND | 53.50 | 77.14 | 54.77 | ND |
| | BD-205 | 13.70 | 23.54 | 11.7 | 13.3 | 12.8 | 16.4 | ND | ND | ND | ND | 54.90 | 78.54 | 54.18 | ND |
| | BD-206 | 14.50 | 24.34 | 14.5 | 14.2 | 15.6 | 15.2 | ND | ND | ND | ND | 58.20 | 81.84 | 59.54 | ND |
| | BD-207 | 13.40 | 23.24 | 11.6 | 14.1 | 15.5 | 13.9 | ND | ND | ND | ND | 53.60 | 77.24 | 55.07 | ND |
| | BD-208 | 14.20 | 24.04 | 12.0 | 14.7 | 15.5 | 14.5 | ND | ND | ND | ND | 57.00 | 80.64 | 56.68 | ND |
| | BD-209 | 17.50 | 27.34 | 14.9 | 16.4 | 18.2 | 17.9 | ND | ND | ND | ND | 69.90 | 93.54 | 67.45 | ND |
| | BD-210 | 16.90 | 26.74 | 14.7 | 17.2 | 18.9 | 17.7 | ND | ND | ND | ND | 67.80 | 91.44 | 68.54 | ND |
| | BD-211 | 18.70 | 28.54 | 15.9 | 20.9 | 19.5 | 18.7 | ND | ND | ND | ND | 74.70 | 98.34 | 74.97 | ND |
| | BD-212 | 14.50 | 24.34 | 11.8 | 14.5 | 17.3 | 17.1 | ND | ND | ND | ND | 58.00 | 81.64 | 60.68 | ND |
| | BD-213 | 13.70 | 23.54 | 12.3 | 13.2 | 15.9 | 16.2 | ND | ND | ND | ND | 55.00 | 78.64 | 57.59 | ND |
| | BD-214 | 16.90 | 26.74 | 16.4 | 17.4 | 20.0 | 17.6 | ND | ND | ND | ND | 67.70 | 91.34 | 71.38 | ND |
| | BD-215 | 14.30 | 24.14 | 12.4 | 13.5 | 15.4 | 15.9 | ND | ND | ND | ND | 57.00 | 80.64 | 57.19 | ND |
| | BD-216 | 16.10 | 25.94 | 13.0 | 17.2 | 17.7 | 19.4 | ND | ND | ND | ND | 64.20 | 87.84 | 67.31 | ND |
| Ind- Near | BD-06 | 14.20 | 24.04 | 13.1 | 14.6 | 15.0 | 15.5 | ND | ND | ND | ND | 56.70 | 80.34 | 58.21 | ND |
| | BD-19 | 16.00 | 25.84 | 12.5 | 15.3 | 17.5 | 20.9 | ND | ND | ND | ND | 63.90 | 87.54 | 66.19 | ND |
| | BD-20 | 15.00 | 24.84 | 13.1 | 15.9 | 16.0 | 17.8 | ND | ND | ND | ND | 60.00 | 83.64 | 62.81 | ND |
| | BD-21 | 14.70 | 24.54 | 11.3 | 13.8 | 14.6 | 18.6 | ND | ND | ND | ND | 58.80 | 82.44 | 58.27 | ND |
| Other (ISFSI) | BD-ISFSI-104-3 | 18.50 | 28.34 | 15.4 | 18.7 | 20.4 | 22.7 | ND | ND | ND | ND | 74.10 | 97.74 | 77.16 | ND |
| | BD-ISFSI-104-4 | 19.60 | 29.44 | 17.6 | 20.5 | 20.7 | 22.0 | ND | ND | ND | ND | 78.4 | 102.0 | 80.8 | ND |
| | BD-ISFSI-105-3 | 22.50 | 32.34 | 21.2 | 23.6 | 28.3 | 30.2 | ND | ND | ND | ND | 90.1 | 113.7 | 103.3 | ND |
| | BD-ISFSI-105-4 | 35.40 | 45.24 | 32.7 | 38.2 | 57.2 | 59.4 | ND | ND | 21.8 | 24.0 | 141.5 | 165.1 | 187.5 | 46.04 |
| | BD-ISFSI-110-3 | 18.70 | 28.54 | 14.3 | 17.8 | 21.9 | 26.7 | ND | ND | ND | ND | 74.8 | 98.4 | 80.7 | ND |
| | BD-ISFSI-110-4 | 22.90 | 32.74 | 19.7 | 24.0 | 22.4 | 26.8 | ND | ND | ND | ND | 91.6 | 115.2 | 92.9 | ND |

***ND= Non-Detect***

**TABLE C-X.2 MEAN QUARTLY OSLD RESULTS FOR THE INNER RING, OUTER RING, OTHER, CONTROL, AND INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) LOCATIONS FOR BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF MREM/QUARTER ± 2 STANDARD DEVIATION OF THE STATION DATA

| COLLECTION PERIOD | SITE BOUNDARY ± 2 S.D. | INTERMEDIATE DIST ± 2 S.D. | OTHER ± 2 S.D. | CONTROL ± 2 S.D. | ISFSI ± 2 S.D. |
|---|---|---|---|---|---|
| JAN-MAR | 12.0 ± 2.5 | 13.3 ± 3.7 | 12.5 ± 1.3 | 14.0 ± 0.0 | 20.1 ± 13.4 |
| APR-JUN | 14.6 ± 2.6 | 15.5 ± 4.5 | 15.1 ± 2.3 | 15.1 ± 0.0 | 23.8 ± 15.0 |
| JUL-SEP | 15.3 ± 2.3 | 16.6 ± 4.5 | 16.0 ± 1.9 | 16.3 ± 0.0 | 28.5 ± 28.7 |
| OCT-DEC | 15.7 ± 2.9 | 17.0 ± 4.2 | 17.5 ± 4.0 | 17.8 ± 0.0 | 31.3 ± 28.2 |

**TABLE C-X.3 SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF MREM/QUARTER ± 2 STANDARD DEVIATION

| LOCATION | SAMPLES ANALYZED | PERIOD MINIMUM | PERIOD MAXIMUM | PERIOD MEAN ± 2 S.D. |
|---|---|---|---|---|
| SITE BOUNDARY | 64 | 9.6 | 18.4 | 14.4 ± 3.9 |
| INTERMEDIATE DISTANCE | 64 | 11.4 | 22.8 | 15.6 ± 5.0 |
| OTHER | 28 | 11.3 | 20.9 | 15.3 ± 4.4 |
| CONTROL | 4 | 14.0 | 17.8 | 15.8 ± 3.2 |
| ISFSI | 24 | 14.3 | 59.4 | 25.9 ± 22.7 |

SITE BOUNDARY STATIONS - BD-101, BD-102, BD-103, BD-104, BD-105, BD-106, BD-107, BD-108, BD-109, BD-110, BD-111A, BD-112 BD-113A, BD-114, BD-115, BD-116

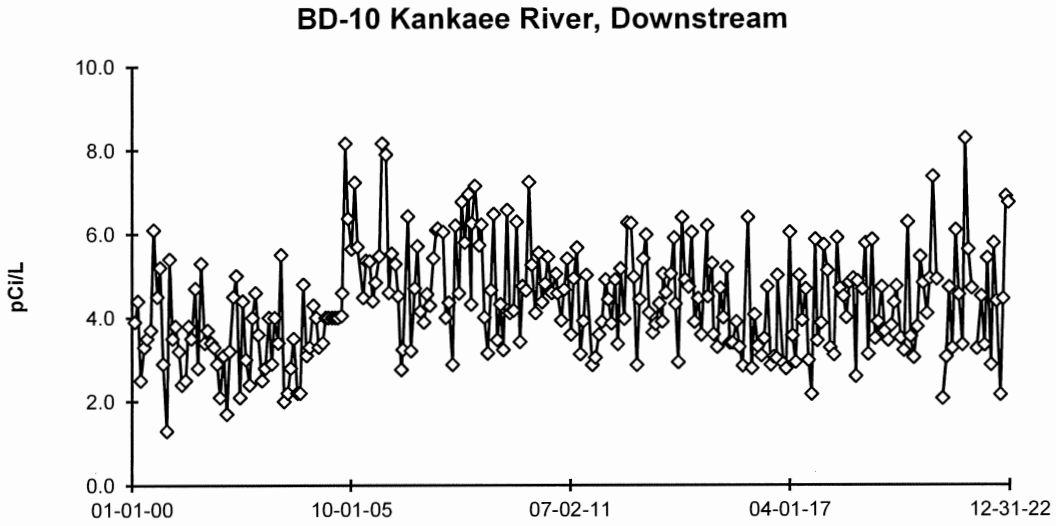
INTERMEDIATE DISTANCE STATIONS - BD-201, BD-202, BD-203, BD-204, BD-205, BD-206, BD-207, BD-208, BD-209, BD-210, BD-211, BD-212, BD-213, BD-214, BD-215, BD-216

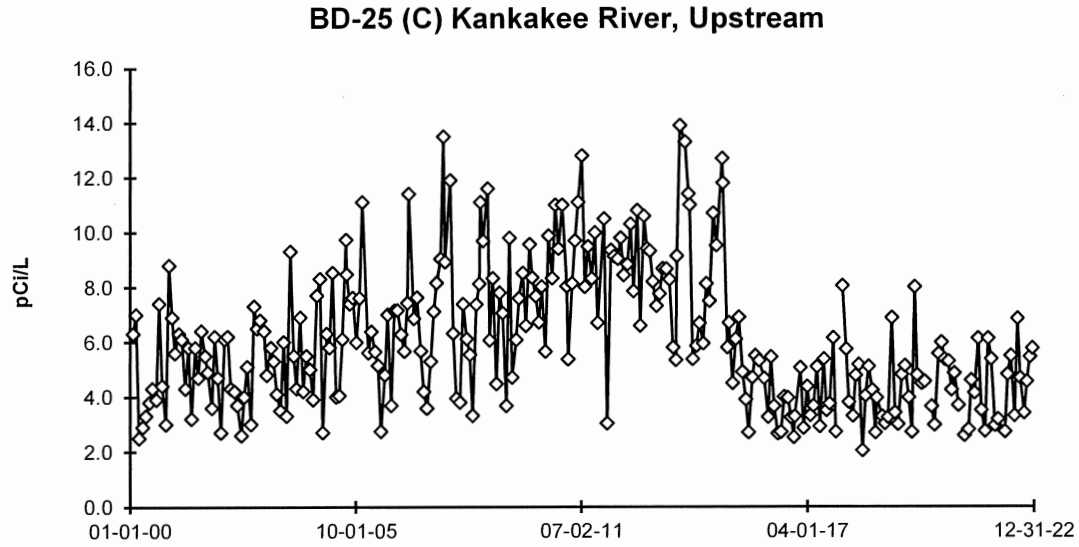
OTHER STATIONS - BD-02, BD-04, BD-05, BD-06, BD-19, BD-20, BD-21

CONTROL STATION - BD-03

ISFSI STATIONS - BD-ISFSI-104-3, BD-ISFSI-104-4, BD-ISFSI-105-3, BD-ISFSI-105-4, BD-ISFSI-110-3, BS-ISFSI-110-4

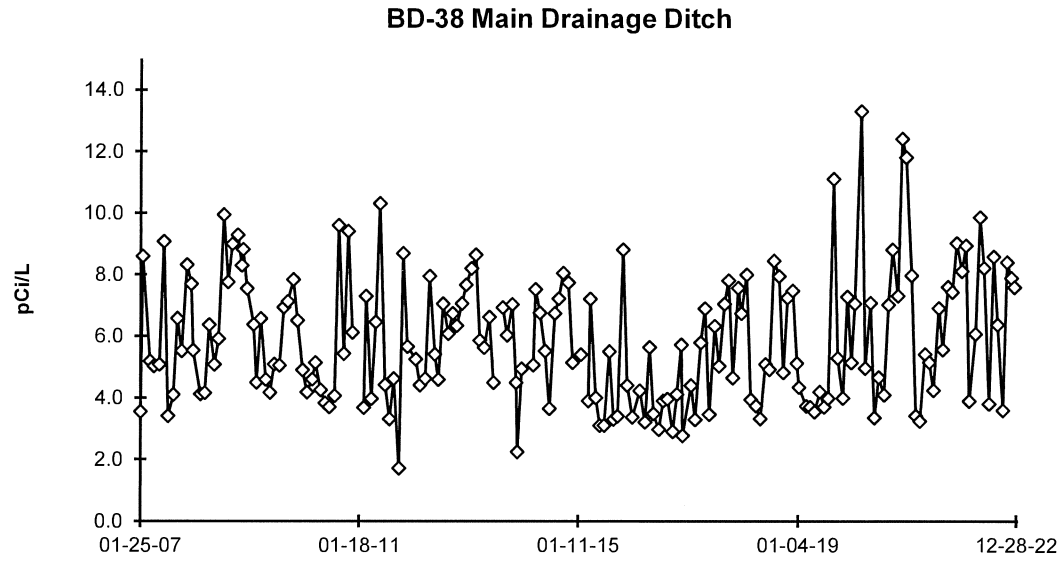
# FIGURE C-1
# Surface Water - Gross Beta - Stations BD-10 and BD-25 (C) Collected in the Vicinity of Braidwood Station, 2000 - 2022

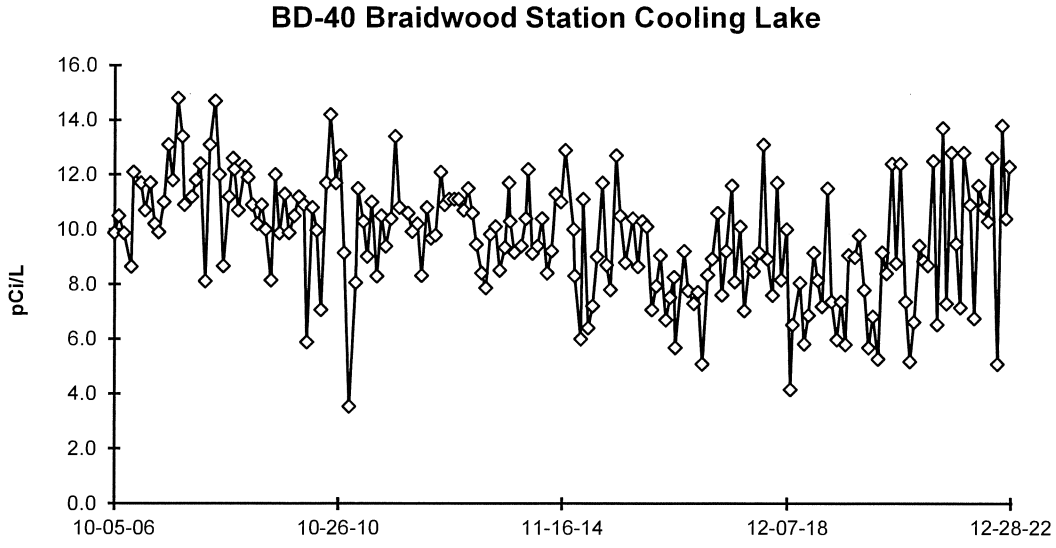


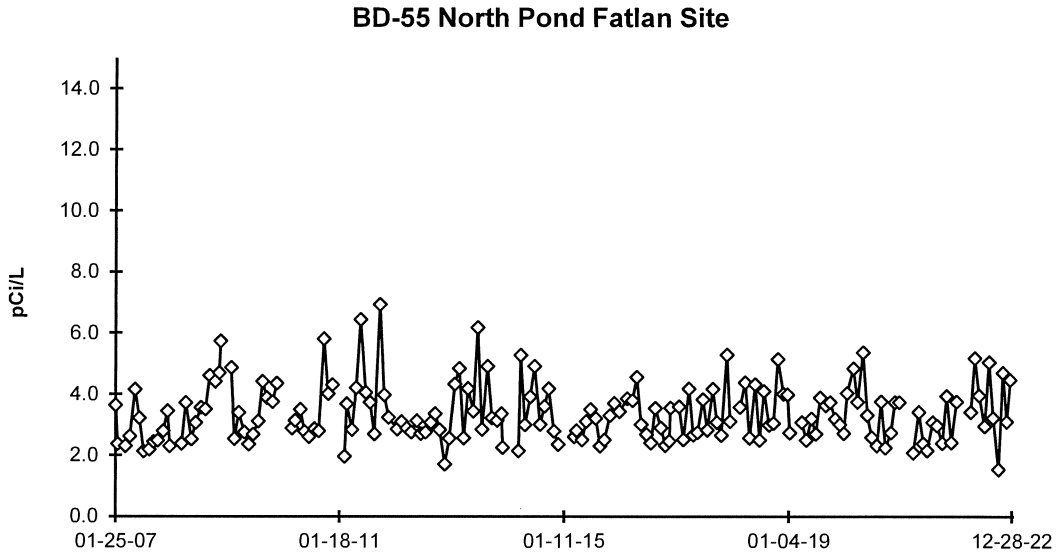

*DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JUNE 2005*

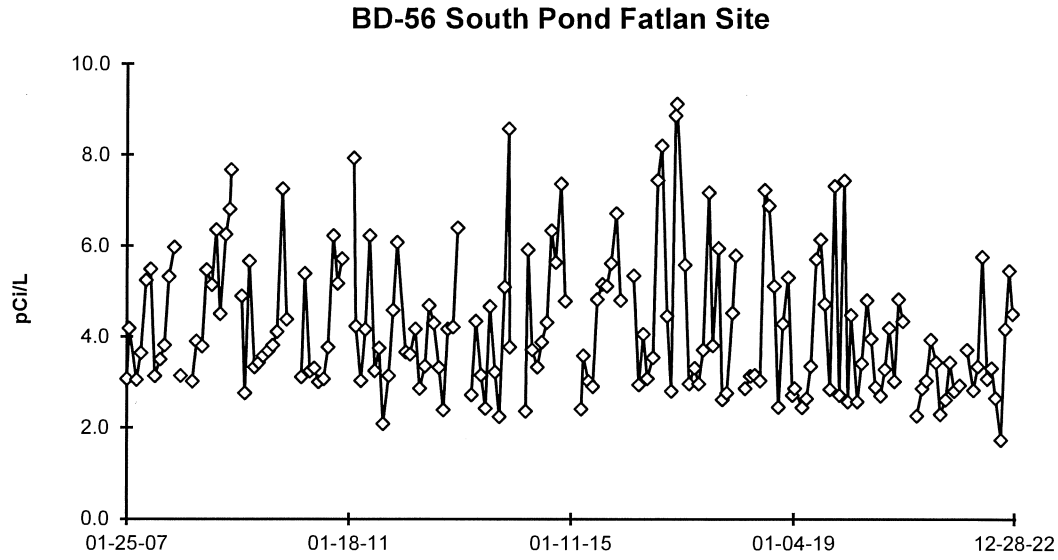
# FIGURE C-2
# Surface Water - Gross Beta - Stations BD-38 and BD-40 Collected in the Vicinity of Braidwood Station, 2006 - 2022



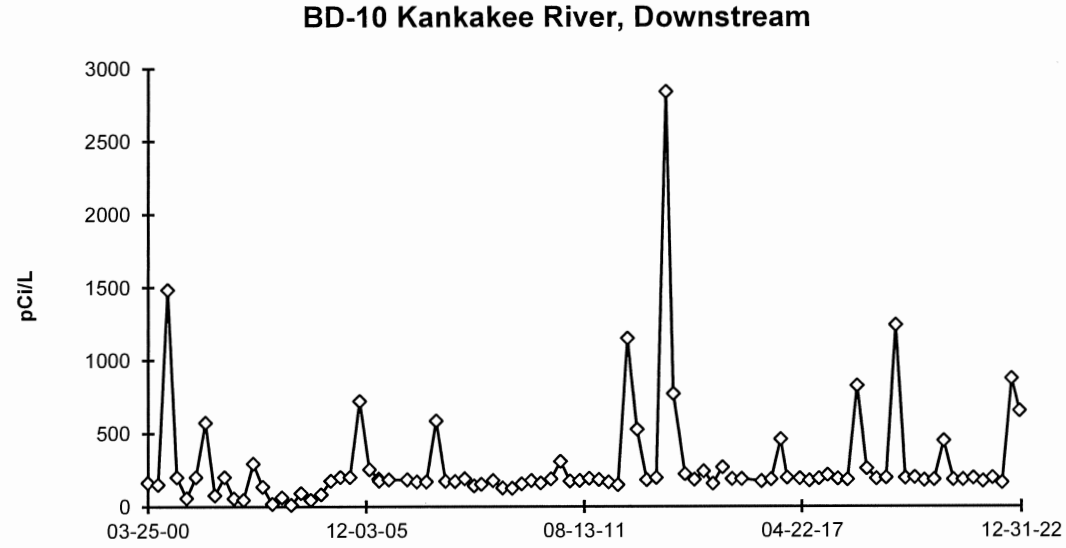
# FIGURE C-3
# Surface Water - Gross Beta - Stations BD-55 and BD-56 Collected in the Vicinity of Braidwood Station, 2007 - 2022

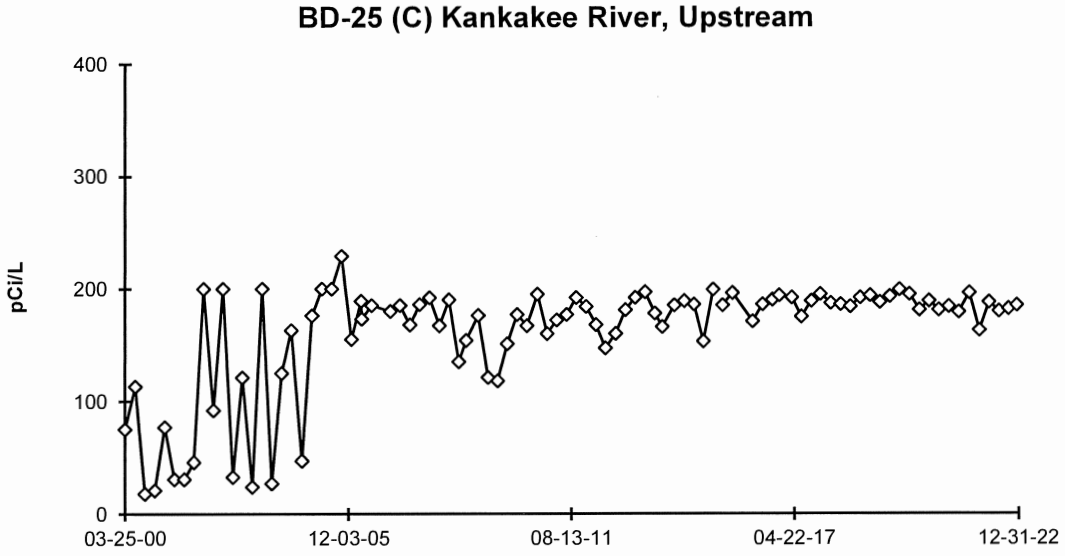



*GAPS IN DATA ARE DUE TO SAMPLING POINTS BEING FROZEN AT TIME OF COLLECTION*

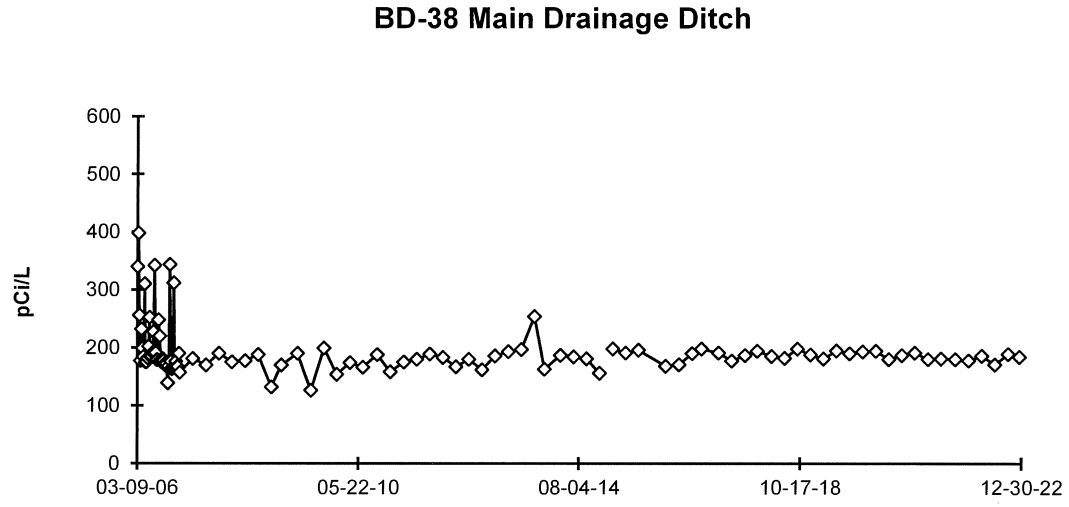
# FIGURE C-4
# Surface Water - Tritium - Stations BD-10 and BD-25 (C) Collected in the Vicinity of Braidwood Station, 2000 - 2022

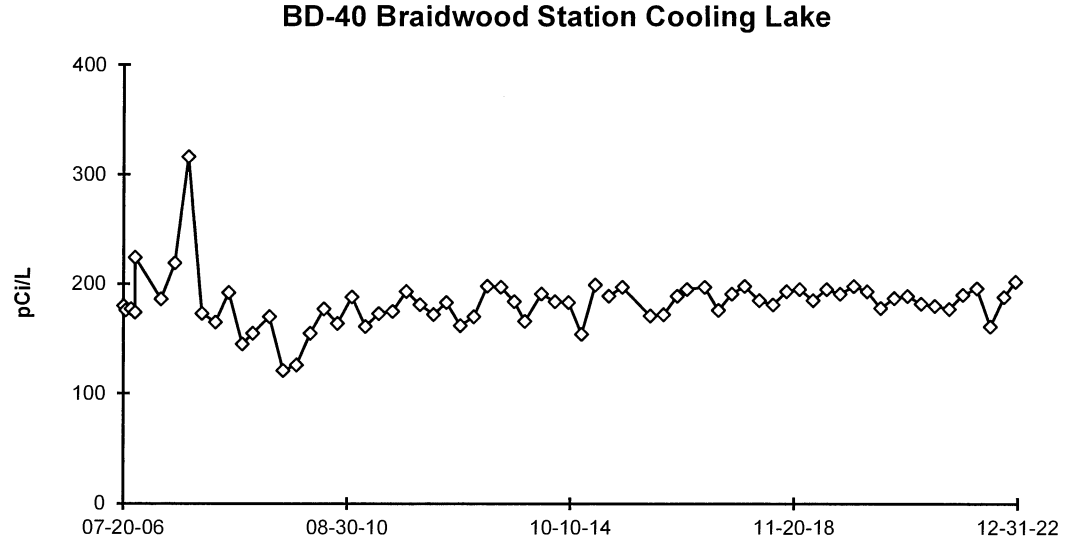


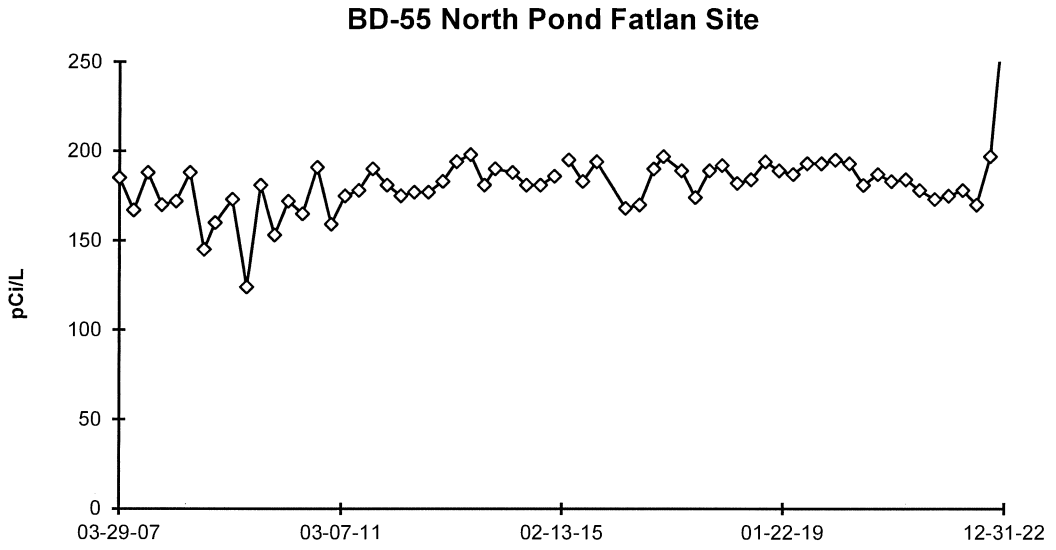

*DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JUNE 2005*

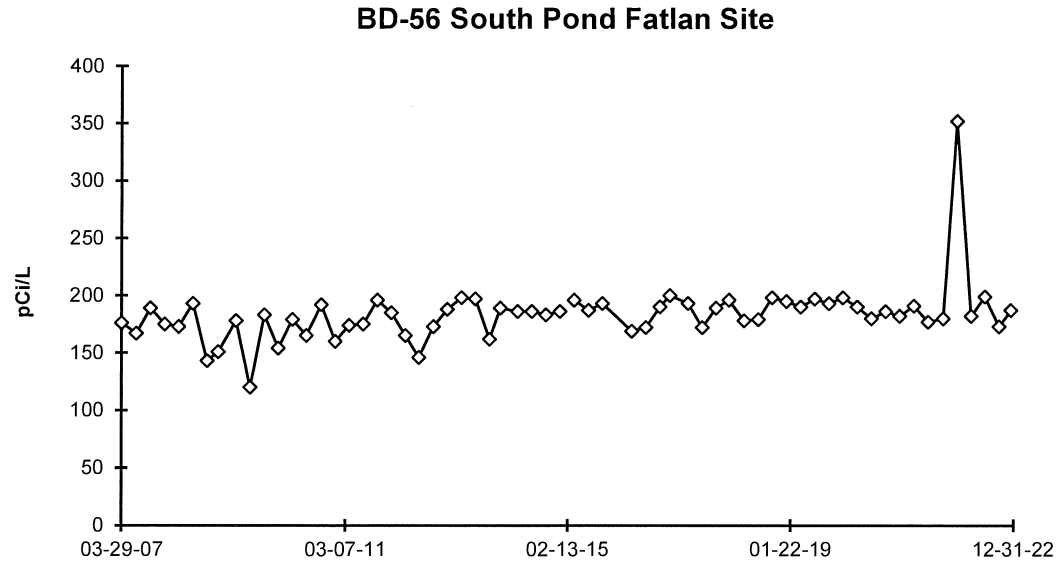
# FIGURE C-5
# Surface Water - Tritium - Stations BD-38 and BD-40 Collected in the Vicinity of Braidwood Station, 2006 - 2022



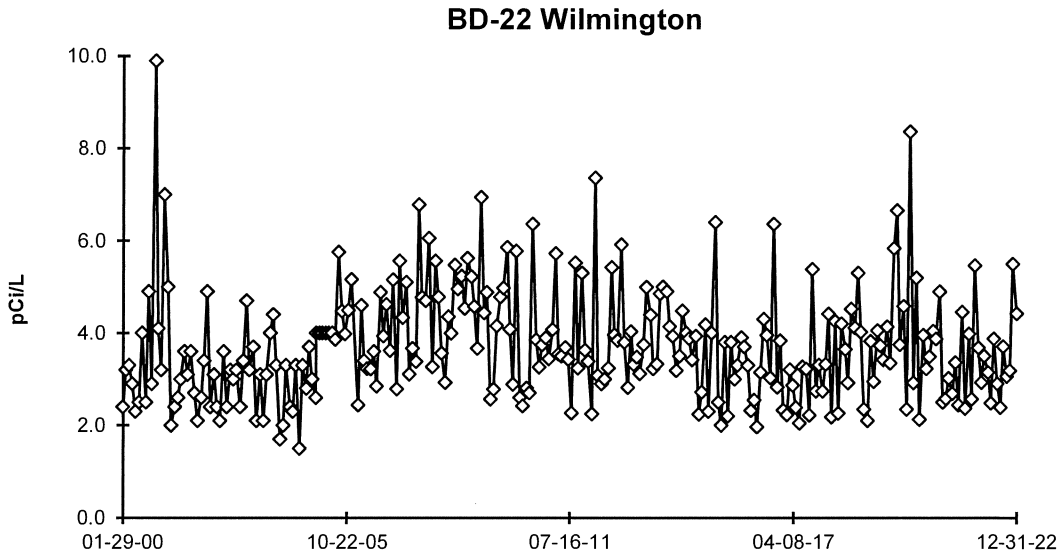



# FIGURE C-6
# Surface Water - Tritium - Stations BD-55 and BD-56 Collected in the Vicinity of Braidwood Station, 2007 - 2022



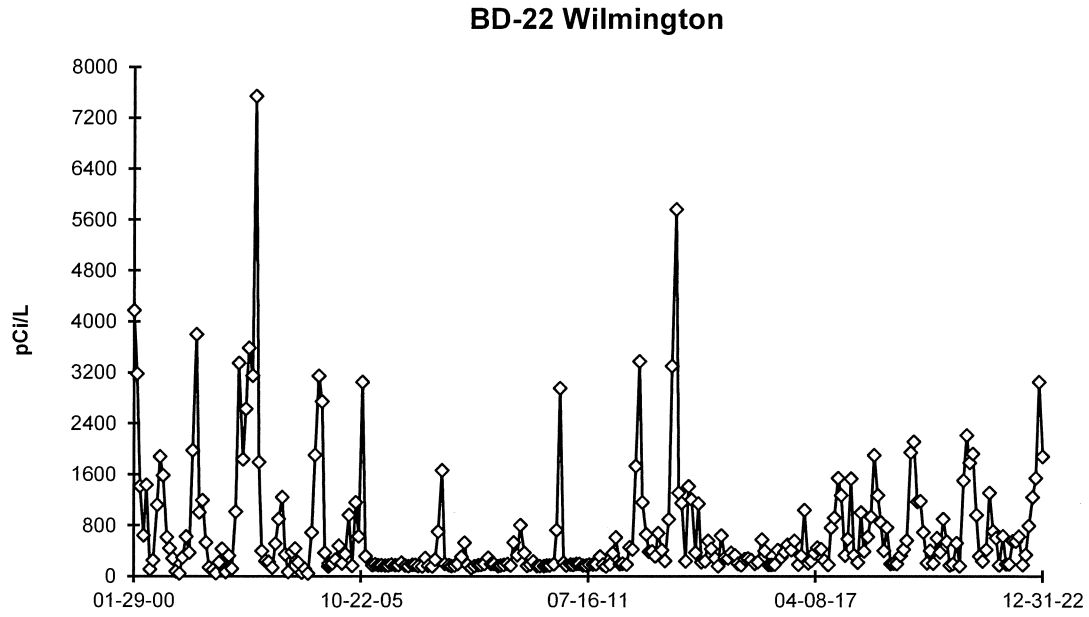



# FIGURE C-7
# Public Water - Gross Beta - Station BD-22
# Collected in the Vicinity of Braidwood Station, 2000 - 2022



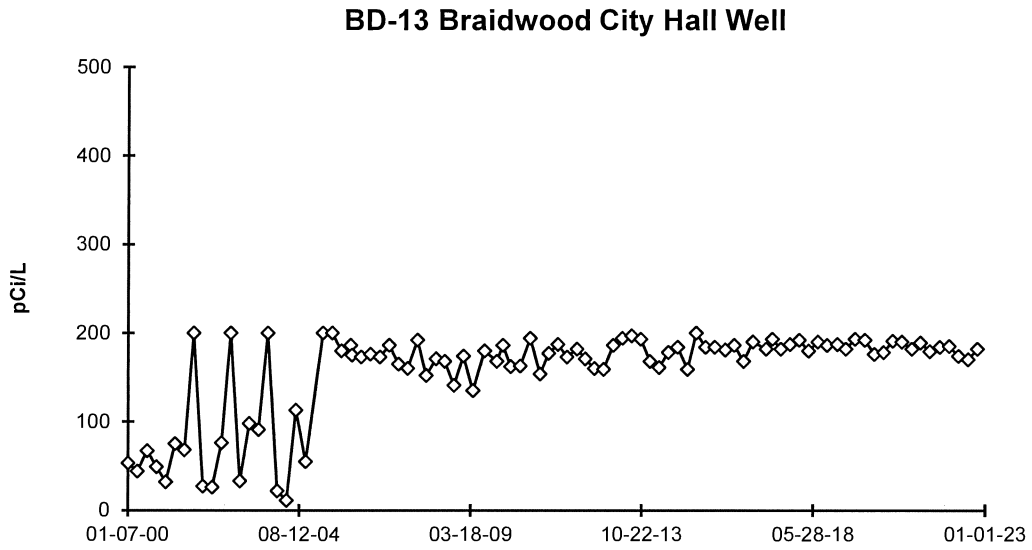

*DUE TO VENDOR CHANGE, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JUNE 2005*

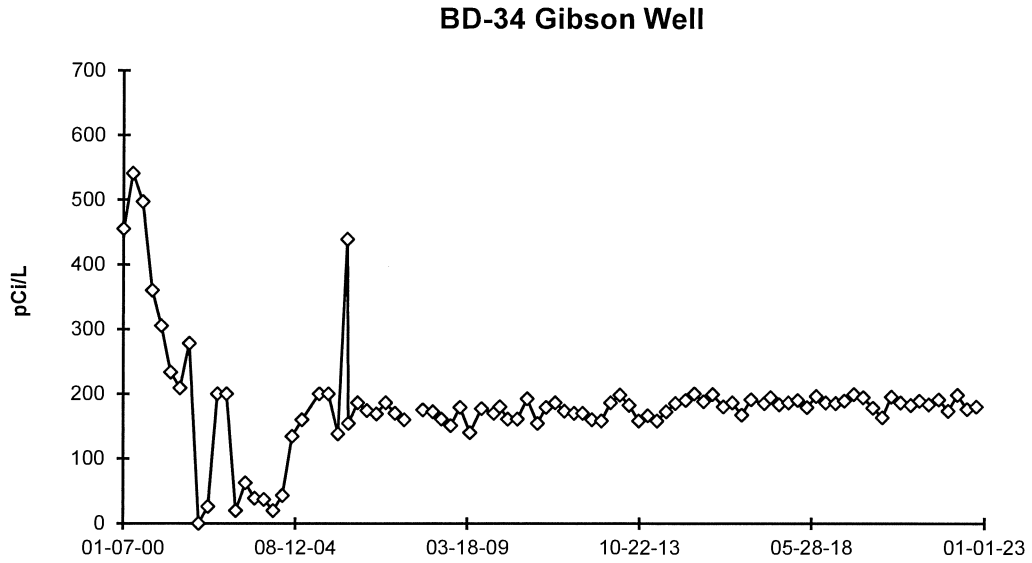
# FIGURE C-8
# Public Water - Tritium - Station BD-22
# Collected in the Vicinity of Braidwood Station, 2000 - 2022




*DUE TO VENDOR CHANGE, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JUNE 2005*

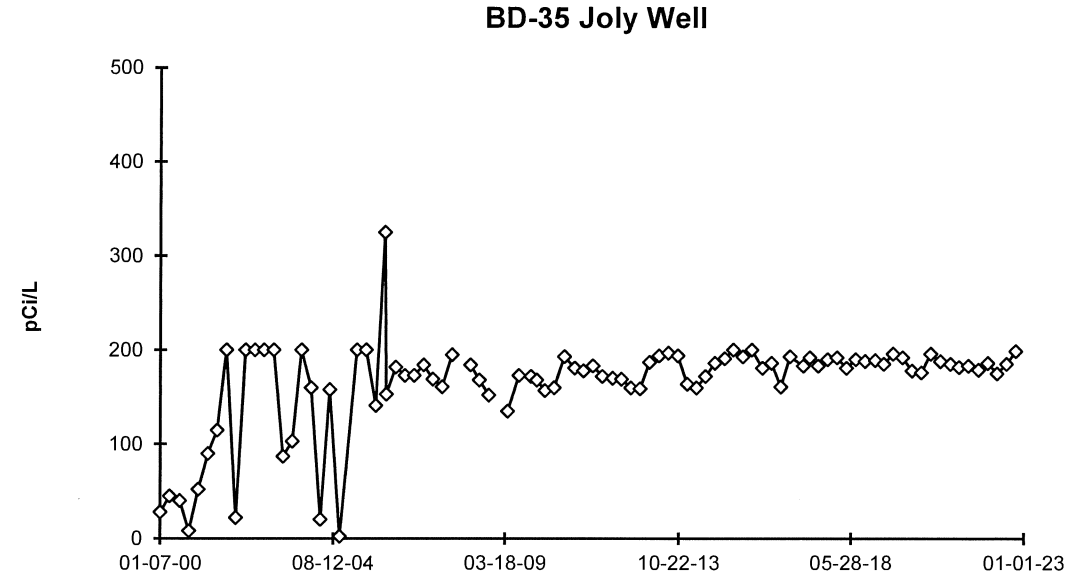
# FIGURE C-9
# Ground/Well Water - Tritium - Stations BD-13 and BD-34 Collected in the Vicinity of Braidwood Station, 2000 - 2022

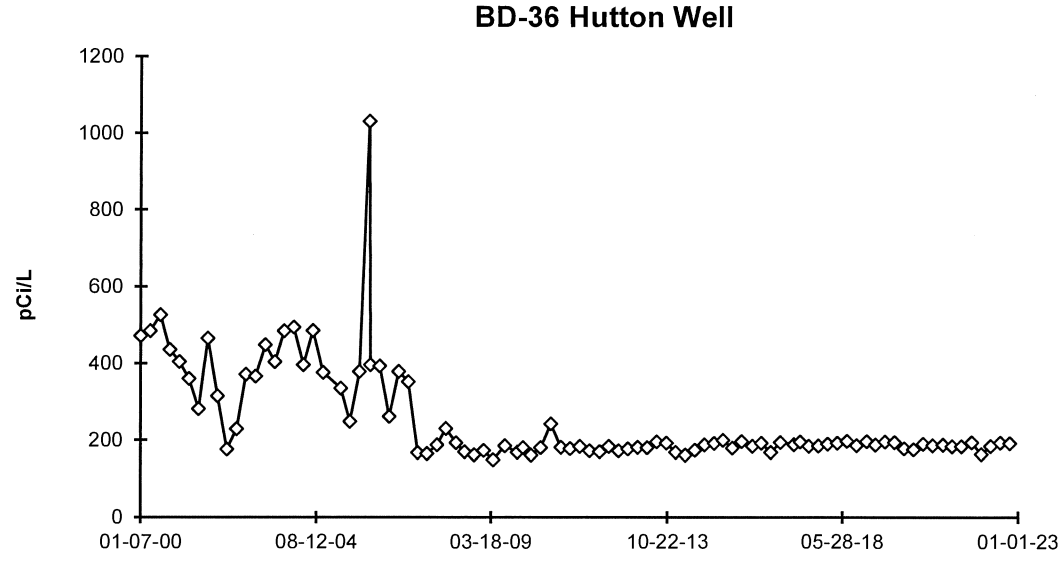



*DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JULY.*

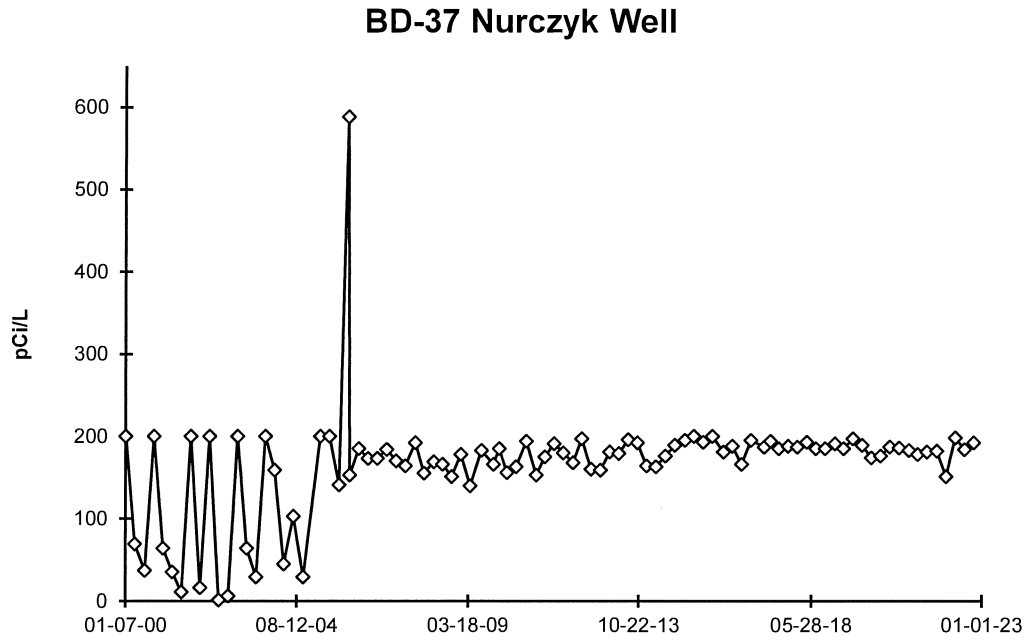
# FIGURE C-10
# Ground/Well Water - Tritium - Stations BD-35 and BD-36 Collected in the Vicinity of Braidwood Station, 2000 - 2022



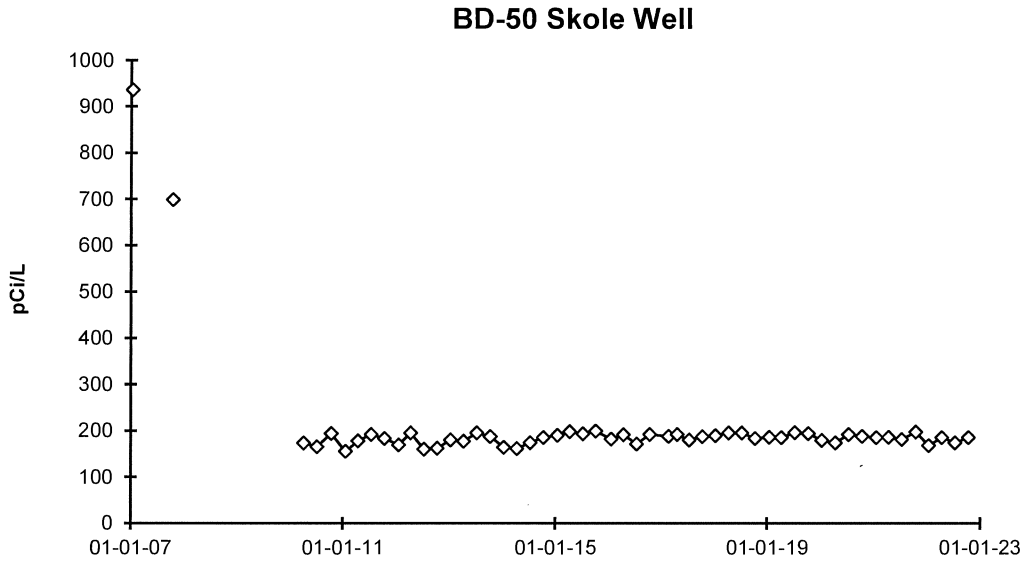

*DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JULY.*

# FIGURE C-11
# Ground/Well Water - Tritium - Station BD-37
# Collected in the Vicinity of Braidwood Station, 2000 - 2022

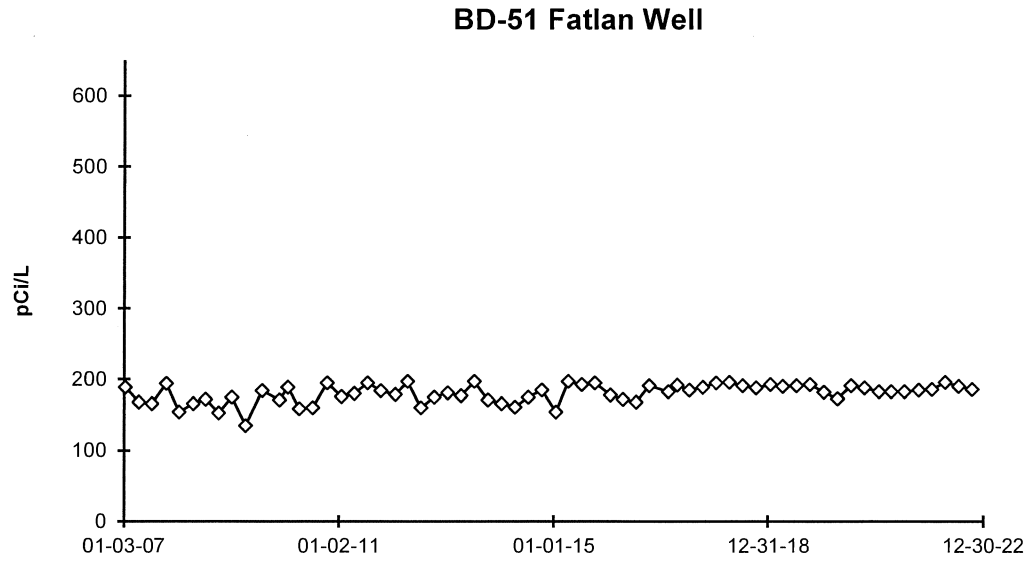



*DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JULY.*

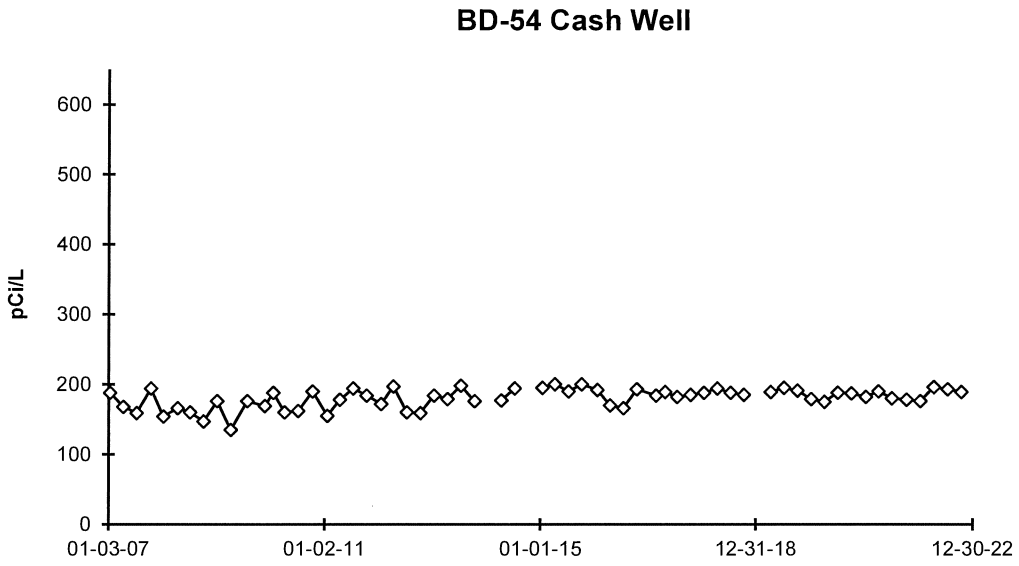
# FIGURE C-12
# Ground/Well Water - Tritium - Station BD-50 and BD-51 Collected in the Vicinity of Braidwood Station, 2007 - 2022



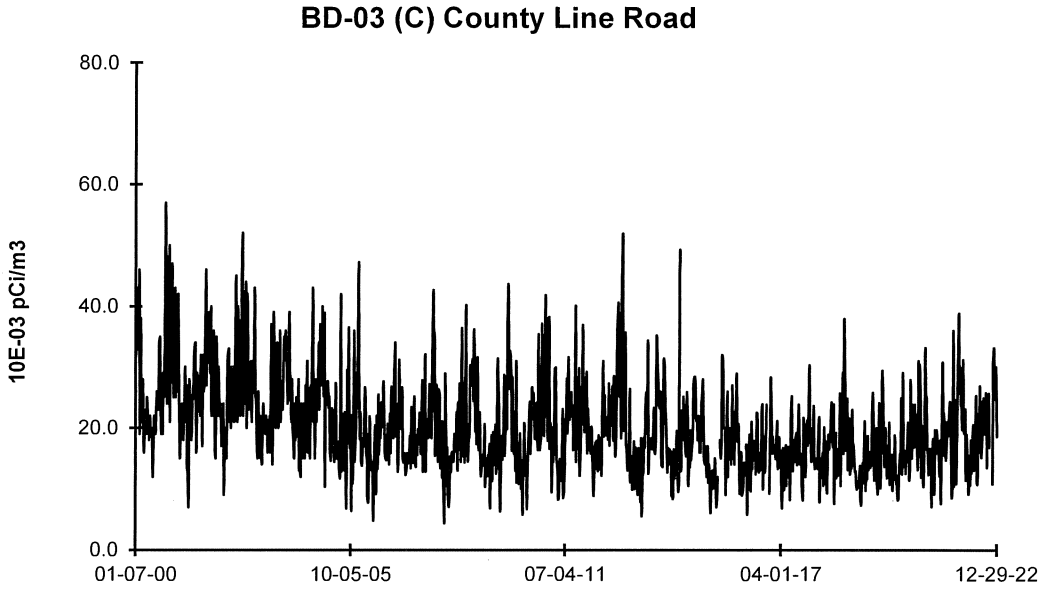

*STATION BD-50 WAS INITIALLY DISCONTINUED ON 10/18/07 AND RESUMED ON 04/08/10*

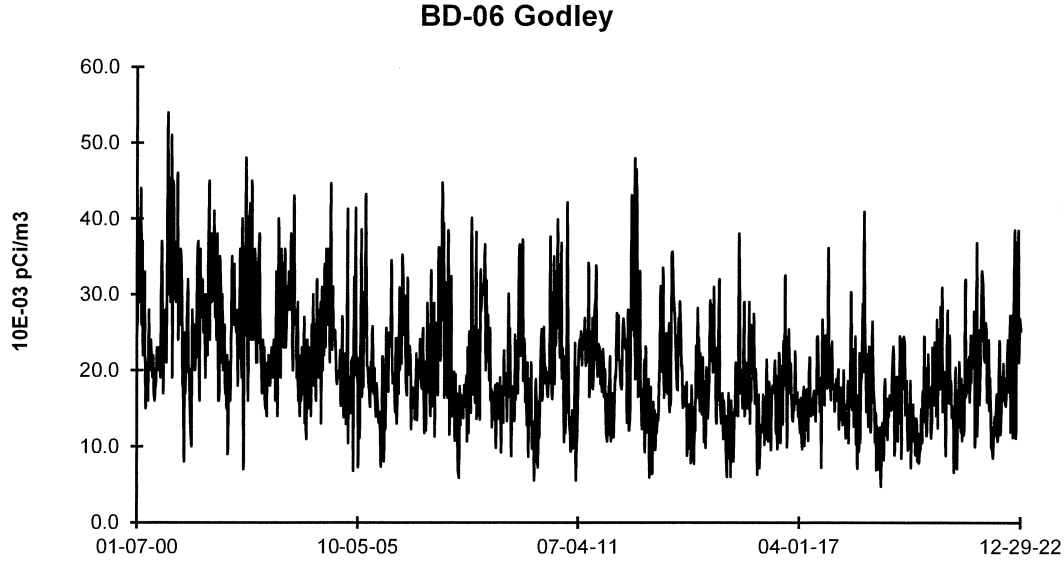


# FIGURE C-13
# Ground/Well Water - Tritium - Station BD-54
# Collected in the Vicinity of Braidwood Station, 2007 - 2022

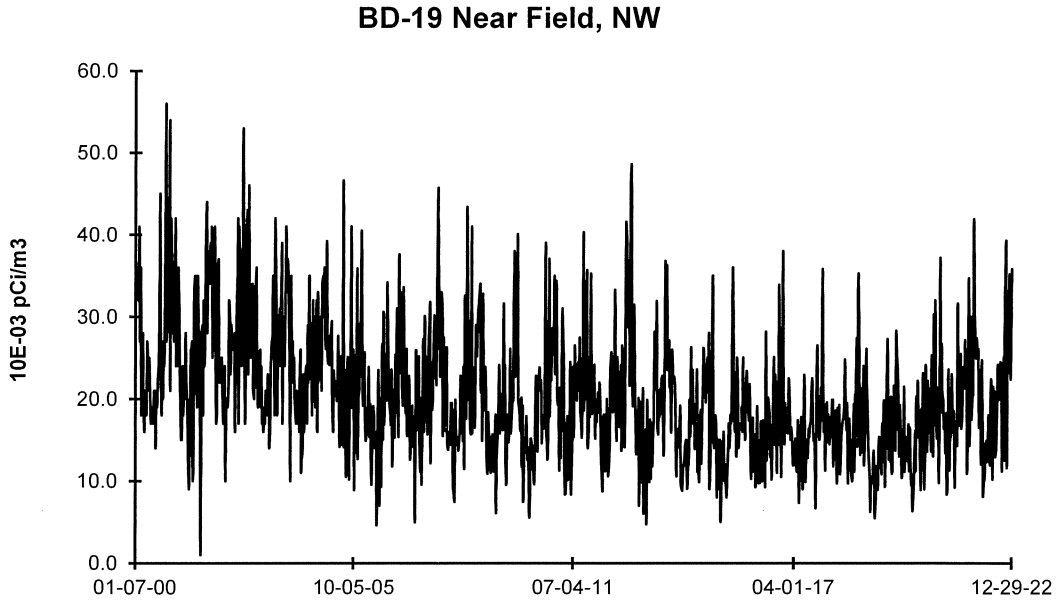


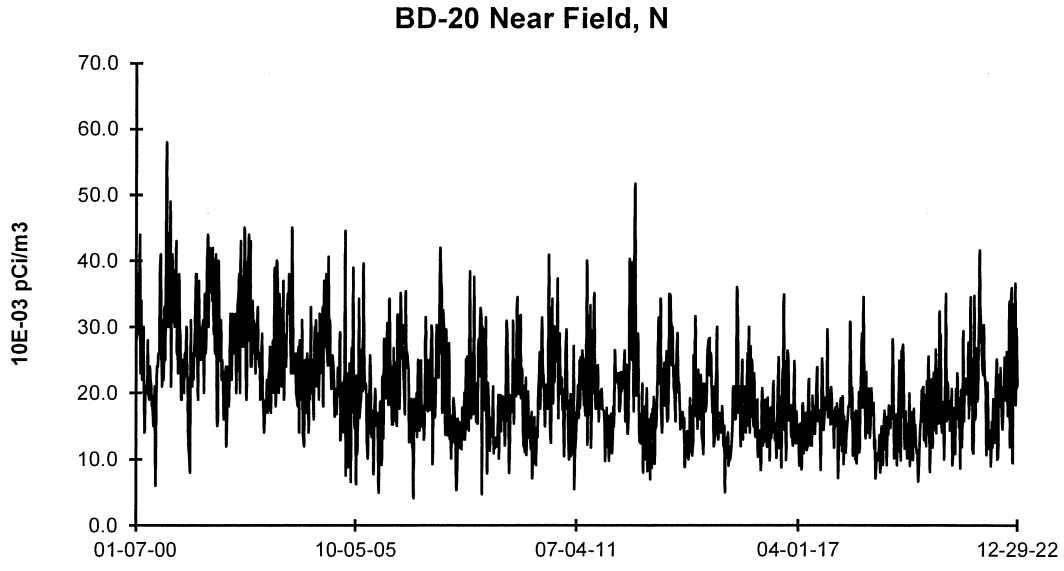
# FIGURE C-14
# Air Particulate - Gross Beta- Stations BD-03 (C) and BD-06 Collected in the Vicinity of Braidwood Station, 2000 - 2022



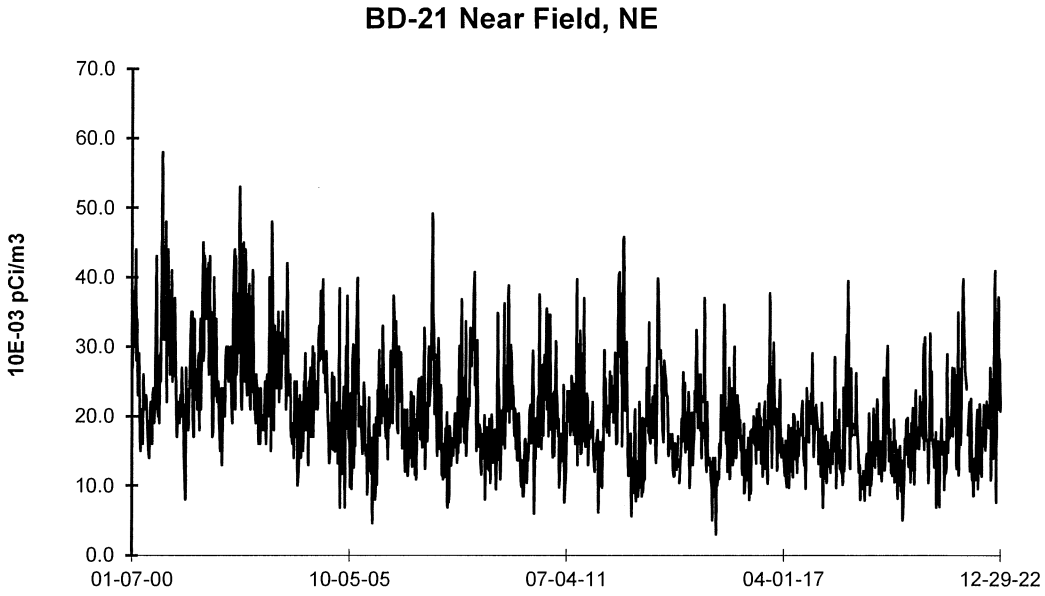



# FIGURE C-15
# Air Particulate - Gross Beta- Stations BD-19 and BD-20 Collected in the Vicinity of Braidwood Station, 2000 - 2022

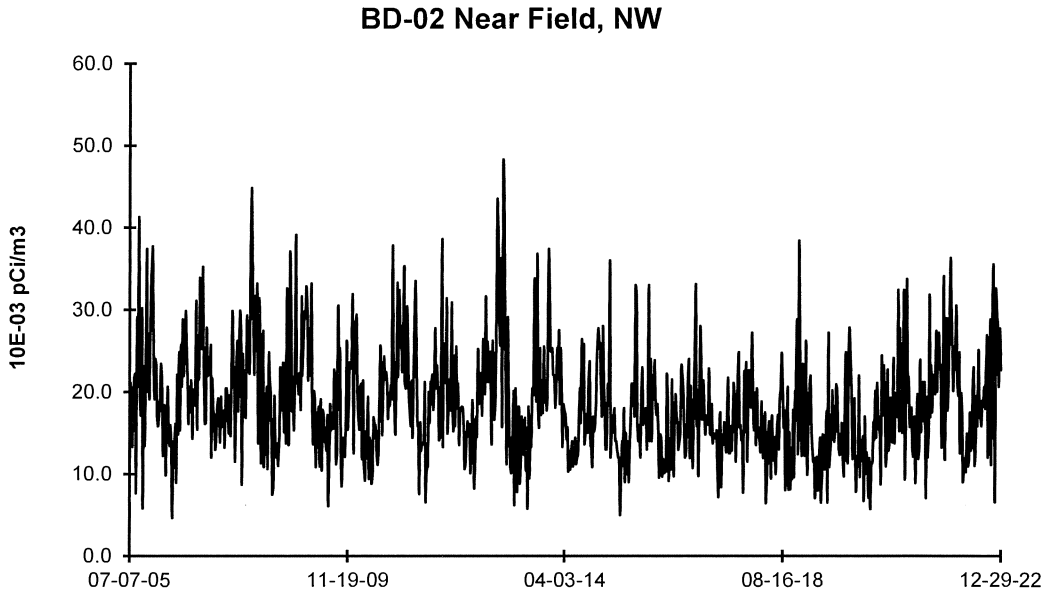


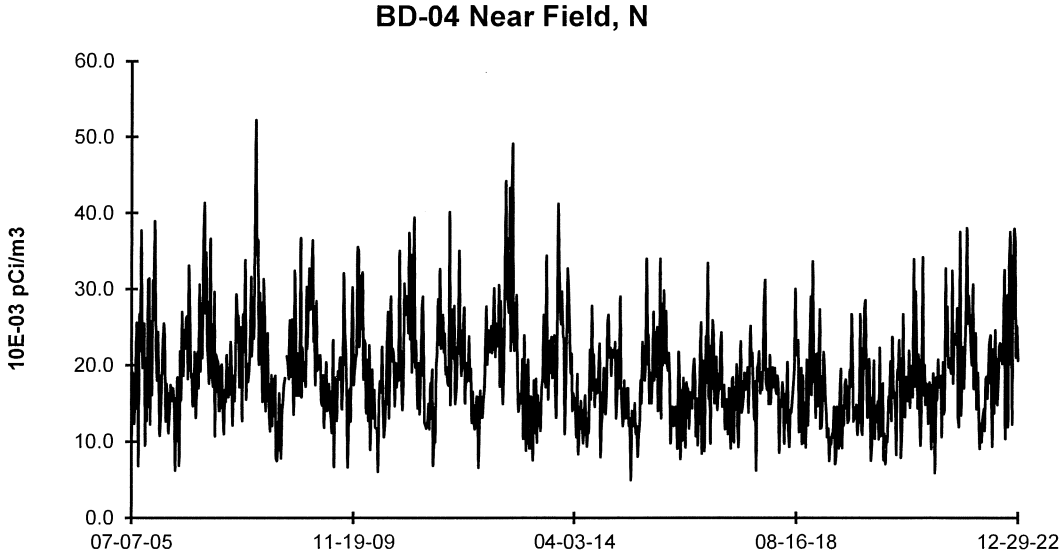



# FIGURE C-16
# Air Particulate - Gross Beta- Station BD-21
# Collected in the Vicinity of Braidwood Station, 2000 - 2022

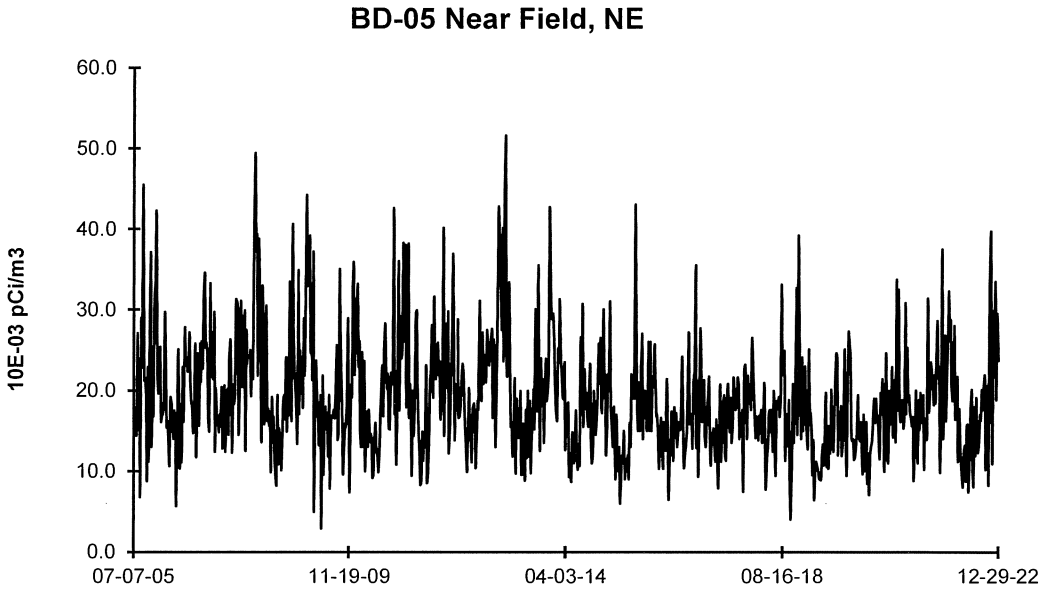


# FIGURE C-17
# Air Particulate - Gross Beta- Stations BD-02 and BD-04 Collected in the Vicinity of Braidwood Station, 2005 - 2022



# FIGURE C-18
# Air Particulate - Gross Beta- Station BD-05
# Collected in the Vicinity of Braidwood Station, 2005 - 2022



# APPENDIX D

# INTER-LABORATORY COMPARISON PROGRAM

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

| Month/Year | Identification Number | Matrix | Nuclide | Units | TBE Reported Value | Known Value [a] | Ratio of TBE to Analytics Result | Evaluation [b] |
|---|---|---|---|---|---|---|---|---|
| March 2022 | E13706 | Milk | Sr-89 | pCi/L | 80.3 | 96.8 | 0.83 | A |
| | | | Sr-90 | pCi/L | 12.7 | 12.6 | 1.01 | A |
| | E13707 | Milk | Ce-141 | pCi/L | 62.3 | 65 | 0.96 | A |
| | | | Co-58 | pCi/L | 158 | 164 | 0.96 | A |
| | | | Co-60 | pCi/L | 286 | 302 | 0.95 | A |
| | | | Cr-51 | pCi/L | 314 | 339 | 0.93 | A |
| | | | Cs-134 | pCi/L | 155 | 182 | 0.85 | A |
| | | | Cs-137 | pCi/L | 210 | 223 | 0.94 | A |
| | | | Fe-59 | pCi/L | 211 | 185 | 1.14 | A |
| | | | I-131 | pCi/L | 88.0 | 96.7 | 0.91 | A |
| | | | Mn-54 | pCi/L | 169 | 164 | 1.03 | A |
| | | | Zn-65 | pCi/L | 238 | 246 | 0.97 | A |
| | E13708 | Charcoal | I-131 | pCi | 79.9 | 87.1 | 0.92 | A |
| | E13709 | AP | Ce-141 | pCi | 60.9 | 42.0 | 1.45 | N(1) |
| | | | Co-58 | pCi | 118 | 107 | 1.11 | A |
| | | | Co-60 | pCi | 218 | 196 | 1.11 | A |
| | | | Cr-51 | pCi | 251 | 221 | 1.14 | A |
| | | | Cs-134 | pCi | 129 | 118 | 1.09 | A |
| | | | Cs-137 | pCi | 156 | 145.0 | 1.07 | A |
| | | | Fe-59 | pCi | 124 | 120.0 | 1.03 | A |
| | | | Mn-54 | pCi | 120 | 107 | 1.12 | A |
| | | | Zn-65 | pCi | 162 | 160 | 1.01 | A |
| | E13710 | Soil | Ce-141 | pCi/g | 0.123 | 0.103 | 1.19 | A |
| | | | Co-58 | pCi/g | 0.254 | 0.263 | 0.97 | A |
| | | | Co-60 | pCi/g | 0.493 | 0.483 | 1.02 | A |
| | | | Cr-51 | pCi/g | 0.603 | 0.543 | 1.11 | A |
| | | | Cs-134 | pCi/g | 0.268 | 0.292 | 0.92 | A |
| | | | Cs-137 | pCi/g | 0.399 | 0.431 | 0.93 | A |
| | | | Fe-59 | pCi/g | 0.320 | 0.296 | 1.08 | A |
| | | | Mn-54 | pCi/g | 0.263 | 0.263 | 1.00 | A |
| | | | Zn-65 | pCi/g | 0.407 | 0.395 | 1.03 | A |
| | E13711 | AP | Sr-89 | pCi | 83.2 | 97.4 | 0.85 | A |
| | | | Sr-90 | pCi | 12.7 | 12.7 | 1.00 | 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*

*(1) See **NCR 22-04***

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

| Month/Year | Identification Number | Matrix | Nuclide | Units | TBE Reported Value | Known Value [(a)] | Ratio of TBE to Analytics Result | Evaluation [(b)] |
|---|---|---|---|---|---|---|---|---|
| September 2022 | E13712 | Milk | Sr-89 | pCi/L | 71.1 | 89.1 | 0.80 | A |
| | | | Sr-90 | pCi/L | 12.0 | 13.6 | 0.88 | A |
| | E13713 | Milk | Ce-141 | pCi/L | 148 | 161 | 0.92 | A |
| | | | Co-58 | pCi/L | 178 | 189 | 0.94 | A |
| | | | Co-60 | pCi/L | 229 | 260 | 0.88 | A |
| | | | Cr-51 | pCi/L | 486 | 456 | 1.07 | A |
| | | | Cs-134 | pCi/L | 220 | 252 | 0.87 | A |
| | | | Cs-137 | pCi/L | 203 | 222 | 0.92 | A |
| | | | Fe-59 | pCi/L | 174 | 173 | 1.01 | A |
| | | | I-131 | pCi/L | 75.9 | 94.2 | 0.81 | A |
| | | | Mn-54 | pCi/L | 269 | 282 | 0.95 | A |
| | | | Zn-65 | pCi/L | 364 | 373 | 0.97 | A |
| | E13714 | Charcoal | I-131 | pCi | 81.4 | 83.6 | 0.97 | A |
| | E13715 | AP | Ce-141 | pCi | 102 | 91 | 1.12 | A |
| | | | Co-58 | pCi | 118 | 107 | 1.11 | A |
| | | | Co-60 | pCi | 207 | 147 | 1.41 | N[(2)] |
| | | | Cr-51 | pCi | 310 | 257 | 1.21 | W |
| | | | Cs-134 | pCi | 148 | 142 | 1.04 | A |
| | | | Cs-137 | pCi | 137 | 125 | 1.10 | A |
| | | | Fe-59 | pCi | 115 | 98 | 1.18 | A |
| | | | Mn-54 | pCi | 168 | 159 | 1.05 | A |
| | | | Zn-65 | pCi | 240 | 211 | 1.14 | A |
| | E13716 | Soil | Ce-141 | pCi/g | 0.288 | 0.284 | 1.01 | A |
| | | | Co-58 | pCi/g | 0.320 | 0.334 | 0.96 | A |
| | | | Co-60 | pCi/g | 0.445 | 0.459 | 0.97 | A |
| | | | Cr-51 | pCi/g | 0.883 | 0.805 | 1.10 | A |
| | | | Cs-134 | pCi/g | 0.410 | 0.446 | 0.92 | A |
| | | | Cs-137 | pCi/g | 0.447 | 0.465 | 0.96 | A |
| | | | Fe-59 | pCi/g | 0.314 | 0.305 | 1.03 | A |
| | | | Mn-54 | pCi/g | 0.489 | 0.499 | 0.98 | A |
| | | | Zn-65 | pCi/g | 0.666 | 0.660 | 1.01 | A |
| | E13717 | AP | Sr-89 | pCi | 87.5 | 98.3 | 0.89 | A |
| | | | Sr-90 | pCi | 12.6 | 15.0 | 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*

*(2) See **NCR 22-21***

**DOE's Mixed Analyte Performance Evaluation Program (MAPEP)**

**Table D.2 Teledyne Brown Engineering Environmental Services**

| Month/Year | Identification Number | Matrix | Nuclide | Units | TBE Reported Value | Known Value [a] | Acceptance Range | Evaluation [b] |
|---|---|---|---|---|---|---|---|---|
| February 2022 | 22-GrF46 | AP | Gross Alpha | Bq/sample | 0.402 | 1.20 | 0.36 - 2.04 | A |
| | | | Gross Beta | Bq/sample | 0.669 | 0.68 | 0.341 - 1.022 | A |
| | 22-MaS46 | Soil | Ni-63 | Bq/kg | 645 | 780 | 546 - 1014 | A |
| | | | Tc-99 | Bq/kg | 526 | 778 | 545 - 1011 | N(3) |
| | 22-MaSU46 | Urine | Cs-134 | Bq/L | 1.67 | 1.77 | 1.24 - 2.30 | A |
| | | | Cs-137 | Bq/L | 1.50 | 1.56 | 1.09 - 2.03 | A |
| | | | Co-57 | Bq/L | 4.93 | 5.39 | 3.77 - 7.01 | A |
| | | | Co-60 | Bq/L | 2.13 | 2.06 | 1.44 - 2.68 | A |
| | | | Mn-54 | Bq/L | 4.83 | 5.08 | 3.56 - 6.60 | A |
| | | | U-234 | Bq/L | 0.142 | 0.0074 | 0.0052 - 0.0096 | N(4) |
| | | | U-238 | Bq/L | 0.0254 | 0.0103 | 0.0072 - 0.0134 | N(4) |
| | | | Zn-65 | Bq/L | 4.71 | 4.48 | 3.14 - 5.82 | A |
| | 22-MaW46 | Water | Ni-63 | Bq/L | 28.6 | 34.0 | 23.8 - 44.2 | A |
| | | | Tc-99 | Bq/L | 8.59 | 7.90 | 5.5 - 10.3 | A |
| | 22-RdV46 | Vegetation | Cs-134 | Bq/sample | 6.61 | 7.61 | 5.33 - 9.89 | A |
| | | | Cs-137 | Bq/sample | 1.50 | 1.52 | 1.06 - 1.98 | A |
| | | | Co-57 | Bq/sample | 5.11 | 5.09 | 3.56 - 6.62 | A |
| | | | Co-60 | Bq/sample | 0.0162 | | *(1)* | A |
| | | | Mn-54 | Bq/sample | 2.42 | 2.59 | 1.81 - 3.37 | A |
| | | | Sr-90 | Bq/sample | 0.684 | 0.789 | 0.552 - 1.026 | A |
| | | | Zn-65 | Bq/sample | 1.44 | 1.47 | 1.03 - 1.91 | A |
| August 2022 | 22-MaS47 | Soil | Ni-63 | Bq/kg | 14.6 | | *(1)* | A |
| | | | Tc-99 | Bq/kg | 994 | 1000 | 700 - 1300 | A |
| | 22-MaW47 | Water | Ni-63 | Bq/L | 24.4 | 32.9 | 23.0 - 42.8 | A |
| | | | Tc-99 | Bq/L | 1.9 | | *(1)* | N(5) |
| | 25-RdV47 | Vegetation | Cs-134 | Bq/sample | 0.032 | | *(1)* | A |
| | | | Cs-137 | Bq/sample | 0.891 | 1.08 | 0.758 - 1.408 | A |
| | | | Co-57 | Bq/sample | 0.006 | | *(1)* | A |
| | | | Co-60 | Bq/sample | 4.04 | 4.62 | 3.23 - 6.01 | A |
| | | | Mn-54 | Bq/sample | 2.01 | 2.43 | 1.70 - 3.16 | A |
| | | | Sr-90 | Bq/sample | 1.25 | 1.60 | 1.12 - 2.08 | W |
| | | | Zn-65 | Bq/sample | 6.16 | 7.49 | 5.24 - 9.74 | 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) Tc-99 soil cross-checks done for TBE information only - not required*

*(4) See **NCR 22-05***

*(5) See **NCR 22-22***

## ERA Environmental Radioactivity Cross Check Program

**Table D.3** **Teledyne Brown Engineering Environmental Services**

| Month/Year | Identification Number | Matrix | Nuclide | Units | TBE Reported Value | Known Value [a] | Acceptance Limits | Evaluation [b] |
|---|---|---|---|---|---|---|---|---|
| March 2022 | MRAD-36 | Water | Am-241 | pCi/L | 68.3 | 74.6 | 51.2 - 95.4 | A |
| | | | Fe-55 | pCi/L | 797 | 1140 | 670 - 1660 | A |
| | | | Pu-238 | pCi/L | 146 | 147 | 88.4 - 190 | A |
| | | | Pu-239 | pCi/L | 69.9 | 71.9 | 44.5 - 88.6 | A |
| | | Soil | Sr-90 | pCi/kg | 8050 | 6720 | 2090 - 10500 | A |
| | | AP | Fe-55 | pCi/filter | 148 | 127 | 46.4 - 203 | A |
| | | | Pu-238 | pCi/filter | 29.9 | 29.6 | 22.3 - 36.4 | A |
| | | | Pu-239 | pCi/filter | 51.6 | 49.7 | 37.2 - 60.0 | A |
| | | | U-234 | pCi/filter | 59.9 | 67.3 | 49.9 - 78.9 | A |
| | | | U-238 | pCi/filter | 59.0 | 66.7 | 50.4 - 79.6 | A |
| | | | GR-A | pCi/filter | 95.6 | 94.2 | 49.2 - 155 | A |
| | | | GR-B | pCi/filter | 71.2 | 66.8 | 40.5 - 101 | A |
| April 2022 | RAD-129 | Water | Ba-133 | pCi/L | 61.7 | 62.9 | 52.3 - 69.2 | A |
| | | | Cs-134 | pCi/L | 80.9 | 81.6 | 68.8 - 89.8 | A |
| | | | Cs-137 | pCi/L | 37.4 | 36.6 | 32.1 - 43.3 | A |
| | | | Co-60 | pCi/L | 103 | 97.4 | 87.7 - 109 | A |
| | | | Zn-65 | pCi/L | 318 | 302 | 272 - 353 | A |
| | | | GR-A | pCi/L | 26.9 | 20.8 | 10.4 - 28.3 | A |
| | | | GR-B | pCi/L | 49.7 | 51.0 | 34.7 - 58.1 | A |
| | | | U-Nat | pCi/L | 56.3 | 68.9 | 56.3 - 75.8 | A |
| | | | H-3 | pCi/L | 17,000 | 18,100 | 15,800 - 19,000 | A |
| | | | Sr-89 | pCi/L | 65.3 | 67.9 | 55.3 - 76.1 | A |
| | | | Sr-90 | pCi/L | 42.1 | 42.7 | 31.5 - 49.0 | A |
| | | | I-131 | pCi/L | 25.7 | 26.2 | 21.8 - 30.9 | A |
| September 2022 | MRAD-37 | Water | Am-241 | pCi/L | 111 | 96.2 | 66.0 - 123 | A |
| | | | Fe-55 | pCi/L | 850 | 926 | 544 - 1350 | A |
| | | | Pu-238 | pCi/L | 62.1 | 52.6 | 31.6 - 68.2 | A |
| | | | Pu-239 | pCi/L | 139.5 | 117 | 72.5 - 144 | A |
| | | Soil | Sr-90 | pCi/kg | 3350 | 6270 | 1950 - 9770 | A |
| | | | U-234 | pCi/kg | 1684 | 3350 | 1570 - 4390 | A |
| | | | U-238 | pCi/kg | 1658 | 3320 | 1820 - 4460 | N[2] |
| | | AP | Fe-55 | pCi/filter | 71.9 | 122 | 44.5 - 195 | A |
| | | | Pu-238 | pCi/filter | 38.8 | 29.9 | 22.6 - 36.7 | N[1] |
| | | | Pu-239 | pCi/filter | 14.5 | 13.0 | 9.73 - 15.7 | A |
| | | | U-234 | pCi/filter | 78.0 | 71.5 | 53.0 - 83.8 | A |
| | | | U-238 | pCi/filter | 79.7 | 70.9 | 53.5 - 84.6 | A |
| | | | GR-A | pCi/filter | 62.8 | 55.5 | 29.0 - 91.4 | A |
| | | | GR-B | pCi/filter | 70.9 | 64.8 | 39.3 - 97.9 | A |
| October 2022 | RAD-131 | Water | Ba-133 | pCi/L | 76.2 | 79.4 | 66.6 - 87.3 | A |
| | | | Cs-134 | pCi/L | 28.0 | 30.5 | 23.9 - 33.6 | A |
| | | | Cs-137 | pCi/L | 202 | 212 | 191 - 235 | A |
| | | | Co-60 | pCi/L | 52.4 | 51.4 | 46.3 - 59.1 | A |
| | | | Zn-65 | pCi/L | 216 | 216 | 194 - 253 | A |
| | | | GR-A | pCi/L | 19.7 | 16.9 | 8.28 - 23.7 | A |
| | | | GR-B | pCi/L | 49.8 | 53.0 | 36.1 - 60.0 | A |
| | | | U-Nat | pCi/L | 10.54 | 8.53 | 6.60 - 9.88 | N[3] |
| | | | H-3 | pCi/L | 13,900 | 15,100 | 13,200 - 16,600 | A |
| | | | Sr-89 | pCi/L | 59.7 | 64.5 | 52.3 - 72.5 | A |
| | | | Sr-90 | pCi/L | 32.9 | 37.3 | 27.4 - 43.0 | A |
| | | | I-131 | pCi/L | 26.9 | 24.4 | 20.2 - 28.9 | 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 22-19***

*(2) U soil cross-checks done for TBE information only - not required*

*(3) See **NCR 22-20***

# APPENDIX E

# ERRATA DATA

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There was no errata data for 2022.

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# APPENDIX F

# ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

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Docket No: 50-456
50-457

# BRAIDWOOD STATION

# UNIT 1 and UNIT 2

## Annual Radiological Groundwater Protection Program Report

## 1 January through 31 December 2022

Constellation®

Braidwood Station
Braceville, IL 60407

**May 2023**

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# Table Of Contents

Appendices

## I. Summary and Conclusions

In 2022, Exelon continued a comprehensive program that evaluates the impact of station operations on groundwater and surface water in the vicinity of Braidwood Station. This report reviews groundwater and surface water samples collected from the environment, both on and off station property, in 2022. During that time period, 199 analyses were performed on 125 samples from 32 locations.

In assessing all the data gathered for this report, it was concluded that the operation of Braidwood Station had no adverse radiological impact on the environment.

Gamma-emitting radionuclides associated with licensed plant operations were not detected at concentrations greater than their respective Lower Limits of Detection (LLDs) as specified in the Offsite Dose Calculation Manual (ODCM) in any of the groundwater or surface water samples. In the case of tritium, Exelon specified that its laboratories achieve a lower limit of detection 10 times less than Braidwood's ODCM and 100 times less than federal regulation.

Strontium-89/90 (Sr-89/90) was not detected at a concentration greater than the LLD of 10.0 and 1.0 picocuries per liter (pCi/L) respectively in any of the groundwater samples tested.

No tritium (H-3) was detected in any sample at concentrations greater than the United States Environmental Protection Agency (USEPA) drinking water standard (and the Nuclear Regulatory Commission Reporting Limit) of 20,000 pCi/L. Low levels of tritium were detected in groundwater at concentrations greater than the LLD of 200 pCi/L in 54 of 125 samples. The tritium concentrations ranged from 183 ± 117 pCi/L to 1630 ± 232 pCi/L. The tritium that was detected in the groundwater or surface water is believed to be the result of isolated historical releases and/or background from external sources greater than 200 pCi/L.

Gross Alpha analyses in the dissolved and suspended fractions were performed on one groundwater water sample in 2022. Neither Gross Alpha (dissolved) nor Gross Alpha (suspended) was detected.

Gross Alpha analyses in the dissolved and suspended fractions were not performed on surface water samples in 2022.

Hard-To-Detect analyses including americium-241 (Am-241), cerium-242 (Cm-242), cerium 243/244 (Cm-243/244), plutonium-238 (Pu-238), plutonium-239/240 (Pu-239/240), uranium-234 (U-234), uranium-235 (U-235) and uranium-238 (U-238) were performed on one sample in 2022. All HTD's were below required detection limits.

## II. Introduction

The Braidwood Station, consisting of two 3,645 MWt pressurized water reactors owned and operated by Exelon Corporation is located in Will County, Illinois. Unit No. 1 went critical on May 29, 1987. Unit No. 2 went critical on March 08, 1988. The site is located in northeastern Illinois, 20 miles south-southwest of Joliet, Illinois, 60 miles southwest of Chicago and southwest of the Kankakee River.

This report covers those analyses performed by Teledyne Brown Engineering (TBE) and Environmental Inc. Midwest Labs (EIML) on samples collected in 2022.

### A. Objective of the Radiological Groundwater Protection Program (RGPP)

The long-term objectives of the RGPP are as follows:

1. Identify suitable locations to monitor and evaluate potential impacts from station operations to preclude radiological impact to the environment and potential drinking water sources;

2. Understand the local hydrogeologic regime in the vicinity of the station and maintain up-to-date knowledge of flow patterns on the surface and shallow subsurface;

3. Perform routine water sampling and radiological analysis of water from selected locations;

4. Report new leaks, spills, or other detections with potential radiological significance to stakeholders in a timely manner;

5. Regularly assess analytical results to identify adverse trends;

6. Take necessary corrective actions to protect groundwater resources.

### B. Implementation of the Objectives

The objectives identified have been implemented at Braidwood Station as discussed below:

1. Exelon identified locations to monitor and evaluated potential impacts from station operations

2. The Braidwood Station reports describe the local hydrogeologic regime. Periodically, the flow patterns on the surface and shallow subsurface are updated based on ongoing measurements

3. Braidwood Station will continue to perform routine sampling and radiological analysis of water from selected locations

4. Braidwood Station has implemented procedures to identify and report new leaks, spills, or other detections with potential radiological significance in a timely manner

5. Braidwood Station staff and consulting hydrogeologist assess analytical results on an ongoing basis to identify adverse trends

C. Program Description

1. Sample Collection

Sample locations can be found in Table A-1 and Figures A-1 through A-5, Appendix A.

2. Groundwater and Surface Water

Samples of groundwater and surface water are collected, managed, transported and analyzed in accordance with EPA methods. Sample locations, sample collection frequencies and analytical frequencies are managed in accordance with approved station procedures. Contractor and/or station personnel are trained in the collection, preservation management and shipment of samples as well as in documentation of sampling events. Analytical laboratories are subject to internal quality assurance programs, industry cross-check programs as well as nuclear industry audits. Station personnel review and evaluate all analytical data as it is received. Additionally, analytical data results are reviewed by an independent hydrogeologist for adverse trends or changes to hydrogeologic conditions.

D. Characteristics of Tritium (H-3)

Tritium is a radioactive isotope of hydrogen. Its chemical properties are the same as hydrogen. Tritiated water behaves the same as ordinary water in both the environment and the body. Tritiated water can be taken into the body by drinking water, breathing air, eating food or absorption through the skin. Once tritiated water enters the body, it disperses quickly and is uniformly distributed. Tritiated water is excreted primarily through urine with a clearance rate characterized by an effective biological half-life of about 14 days. With such a short biological half-life, an acute ingestion would be cleared rapidly. Organically bound tritium (tritium that is incorporated into carbon containing compounds) can remain in the body for a longer period. Tritium is produced naturally in the upper atmosphere when cosmic rays interact with air molecules. Tritium is also produced during nuclear weapons explosions, as a by-product in reactors producing electricity and in special production reactors. Like normal water, tritiated water is colorless and odorless. Tritiated water behaves chemically and physically like non-tritiated water in the subsurface and therefore tritiated water will travel at the same velocity as non-tritiated groundwater.

## III. Program Description

### A. Sample Analysis

This section describes the general analytical methodologies used by Teledyne Brown Engineering (TBE) and Environmental Incorporated Midwest Laboratory (EIML) to analyze the environmental samples for radioactivity for the Braidwood Station RGPP in 2022.

In order to achieve the stated objectives, the current program includes the following analyses:

1. Concentrations of gamma emitters in groundwater and surface water
2. Concentrations of strontium in groundwater and surface water
3. Concentrations of tritium in groundwater and surface water
4. Concentrations of Gross Alpha (Dissolved and Suspended) in groundwater and surface water
5. Concentrations of Am-241 in groundwater
6. Concentrations of Cm-242 and Cm-243/244 in groundwater
7. Concentrations of Pu-238 and Pu-239/240 in groundwater
8. Concentrations of U-234, U-235 and U-238 in groundwater
9. Concentrations of Fe-55 in groundwater
10. Concentrations of Ni-63 in groundwater

### B. Data Interpretation

The radiological data collected prior to Braidwood Station becoming operational was used as a baseline with which these operational data was compared. For the purpose of this report, Braidwood Station was considered operational at initial criticality. Several factors were important in the interpretation of the data:

1. Lower Limit of Detection and Minimum Detectable Concentration

   The lower limit of detection (LLD) is specified by federal regulation as a minimum sensitivity value that must be achieved routinely by the analytical parameter.

2. Laboratory Measurements Uncertainty

   The estimated uncertainty in measurement of tritium in environmental samples is frequently on the order of 50% of the measurement value.

   Statistically, the exact value of a measurement is expressed as a range with a stated level of confidence. The convention is to report results with a 95% level of confidence. The uncertainty comes from calibration standards, sample volume or weight measurements, sampling uncertainty and other factors. Exelon reports the uncertainty of a measurement created by statistical process (counting error) as well as

all sources of error (Total Propagated Uncertainty or TPU). Each result has two values calculated. Exelon reports the TPU by following the result with plus or minus (±) the estimated sample standard deviation, as TPU, that is obtained by propagating all sources of analytical uncertainty in measurements.

Analytical uncertainties are reported at the 95% confidence level in this report for reporting consistency with the AREOR.

Gamma spectroscopy results for each type of sample were grouped as follows:

> For groundwater and surface water 14 nuclides, Be-7, K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Nb-95, Zr-95, I-131, Cs-134, Cs-137, Ba-140 and La-140 were reported.

C. Background Analysis

A pre-operational radiological environmental monitoring program (REMP) was conducted to establish background radioactivity levels prior to operation of the Station. The environmental media sampled and analyzed during the pre-operational REMP were atmospheric radiation, fall-out, domestic water, surface water, marine life and foodstuffs. The results of the monitoring were detailed in the report entitled, Environmental Radiological Monitoring for Braidwood Nuclear Power Station Commonwealth Edison Company, Annual Report 1986, May 1987.

1. Background Concentrations of Tritium

The purpose of the following discussion is to summarize background measurements of tritium in various media performed by others.

a. Tritium Production

Tritium is created in the environment from naturally occurring processes both cosmic and subterranean, as well as from anthropogenic (i.e., man-made) sources. In the upper atmosphere, "Cosmogenic" tritium is produced from the bombardment of stable nuclides and combines with oxygen to form tritiated water, which will then enter the hydrologic cycle. Below ground, "lithogenic" tritium is produced by the bombardment of natural lithium present in crystalline rocks by neutrons produced by the radioactive decay of naturally abundant uranium and thorium. Lithogenic production of tritium is usually negligible compared to other sources due to the limited abundance of lithium in rock. The lithogenic tritium is introduced directly to groundwater.

A major anthropogenic source of tritium and Sr-90 comes from the former atmospheric testing of thermonuclear weapons. Levels of tritium in precipitation increased significantly during the 1950s and early 1960s and later with additional testing, resulting in the release of significant amounts of tritium to the atmosphere. The Canadian heavy water nuclear power reactors, other commercial power

reactors, nuclear research and weapons production continue to influence tritium concentrations in the environment.

b. Precipitation Data

Precipitation samples are routinely collected at stations around the world for the analysis of tritium and other radionuclides. Two publicly available databases that provide tritium concentrations in precipitation are Global Network of Isotopes in Precipitation (GNIP) and USEPA's RadNet database. GNIP provides tritium precipitation concentration data for samples collected worldwide from 1960 to 2014. RadNet provides tritium precipitation concentration data for samples collected at stations throughout the U.S. from 1960 up to and including 2022. Based on GNIP data for sample stations located in the U.S. Midwest, tritium concentrations peaked around 1963. This peak, which approached 10,000 pCi/L for some stations, coincided with the atmospheric testing of thermonuclear weapons. Tritium concentrations in surface water showed a sharp decline up until 1975 followed by a gradual decline since that time. Tritium concentrations in Midwest precipitation have typically been below 100 pCi/L since around 1980. Tritium concentrations in wells may still be above the 200 pCi/L detection limit from the external causes described above. Water from previous years and decades is naturally captured in groundwater, so some well water sources today are affected by the surface water from the 1960s that was elevated in tritium.

c. Surface Water Data

Tritium concentrations are routinely measured in large surface water bodies, including Lake Michigan and the Mississippi River. Illinois surface water data were typically less than 100 pCi/L.

The USEPA RadNet surface water data typically has a reported 'Combined Standard Uncertainty' of 35 to 50 pCi/L. According to USEPA, this corresponds to a ± 70 to 100 pCi/L 95% confidence bound on each given measurement. Therefore, the typical background data provided may be subject to measurement uncertainty of approximately ± 70 to 100 pCi/L.

The radio-analytical laboratory is counting tritium results to an Exelon-specified LLD of 200 pCi/L. Typically, the lowest positive measurement will be reported within a range of 40 – 240 pCi/L or 140 ± 100 pCi/L. These sample results cannot be distinguished as different from background at this concentration.

## IV. Results and Discussion

### A. Missed Samples

There were three missed samples during 2022.

1. MW-102R – a 1st Quarter sample could not be collected due to the annulus of the well being partially filled with sand.
2. MW-6 – a 3rd Quarter sample could not be collected due to insufficient water in the well. According to station personnel, an excavation project was performed along the western side of the Turbine Building as part of the Underground Piping Project between April and mid-November. The excavation extended approximately 220 feet and was approximately 14 feet wide. The excavation project included dewatering activities that lowered the groundwater elevation in the area and resulted in insufficient groundwater for sampling in MW-6 during the 3Q22 sampling round.
3. PS10 – a 3rd Quarter sample could not be collected due to insufficient water in the well.

### B. Groundwater Results

Samples were collected from on- and off-site wells throughout the year in accordance with the Station radiological groundwater protection program. Analytical results and anomalies are discussed below:

Tritium

Samples from all locations were analyzed for tritium activity. Tritium values ranged from the lower detection limit to 1630 pCi/L.
(Tables B-I.1, Appendix B)

Strontium

Thirty-two samples for analyzed for Sr-89 and Sr-90. Sr-89 was less than the required detection limit of 10.0 pCi/liter. Sr-90 was less than the required detection limit of 1.0 pCi/liter. (Table B-I.1, Appendix B)

Gross Alpha (dissolved and suspended)

Gross Alpha analyses in the dissolved and suspended fractions were performed on one groundwater water sample in 2022. Neither Gross Alpha (dissolved) or Gross Alpha (suspended) was detected.
(Table B-I.1, Appendix B)

Hard-To-Detect

Hard-To-Detect analyses including Am-241, Cm-242, Cm-243/244, Pu-238, Pu-239/240, U-234, U-235 and U-238 were performed on one sample in 2022. All HTD's were less than required detection limits.
(Table B-I.3, Appendix B)

Gamma Emitters

No samples were collected or analyzed for gamma-emitting nuclides in 2022. (Table B–I.2, Appendix B)

C. Surface Water Results

No samples were collected from surface water locations in accordance with the station radiological groundwater protection program. Analytical results and anomalies are discussed below:

Tritium

No samples were collected or analyzed for tritium activity. (Table B-II.1, Appendix B)

D. Summary of Results – Inter-Laboratory Comparison Program

Inter-Laboratory Comparison Program results for TBE are presented in the AREOR.

E. Leaks, Spills, and Releases

There were no leaks, spills or releases to groundwater in 2022.

F. Trends and Analyses

Since June 2017, the CWBD House well tritium concentrations have been decreasing steadily. Monitoring of groundwater wells surrounding the plant indicate that tritium concentrations in affected areas near the Turbine Building have remained relatively unchanged since 2010.

G. Investigations

There were no new investigations in 2022.

H. Actions Taken

1. Installation of Monitoring Wells

   Corrective actions taken in response to the CWBD House event included the placement of multiple monitoring wells at various depths in the vicinity of the CWBD house to determine soil contamination levels, as well as the establishment of soil remediation efforts to remove the tritium contamination from the area.

2. Compensatory Actions

   The discharges of the CWBD House remediation wells are treated as non-routine planned discharges. They are sampled regularly and permitted in the same manner as other ODCM pathways. The corresponding activity values are included as part of Table B-I.1 in this report.

3. Use of all remediation and support equipment from Exelon Braidwood Station property has stopped due to closure of the Braidwood Generating Station Consent Order No. 06 MR 248. Consent Order No. 06 MR 248 was terminated on May 14, 2020, by the Illinois Attorney General and Illinois Environmental Protection Agency.

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# APPENDIX A

# LOCATION DESIGNATION

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TABLE A-1: Radiological Groundwater Protection Program Sampling Locations, Braidwood Station, 2022

| Station Code | Sample Description |
|---|---|
| 0WM31P | Drinking Water |
| DITCH F (DS-2) | Surface Water |
| MW-2 | Monitoring Well |
| MW-4 | Monitoring Well |
| MW-5 | Monitoring Well |
| MW-6 | Monitoring Well |
| MW-7 | Monitoring Well |
| MW-9 | Monitoring Well |
| MW-11 | Monitoring Well |
| MW-102R | Monitoring Well |
| MW-141D | Monitoring Well |
| MW-142D | Monitoring Well |
| MW-143D | Monitoring Well |
| MW-144D | Monitoring Well |
| MW-145D | Monitoring Well |
| MW-154 | Background Well |
| MW-155 | Background Well |
| MW-159D | Monitoring Well |
| MW-162D | Monitoring Well |
| MW-BW-201S | Monitoring Well |
| MW-BW-202S | Monitoring Well |
| MW-BW-203S | Monitoring Well |
| MW-BW-207I | Monitoring Well |
| PS-7 | Monitoring Well |
| PS-8 | Monitoring Well |
| PS-9 | Monitoring Well |
| PS-10 | Monitoring Well |
| PS-11 | Monitoring Well |
| PS-12 | Monitoring Well |
| PS-13 | Monitoring Well |
| PS-14 | Monitoring Well |
| PS-15 | Monitoring Well |
| RW-6 | Recovery Well |
| RW-11 | Recovery Well |
| RW-12 | Recovery Well |
| SG-BW-102 DITCH C | Surface Water |
| VB1-1 | Monitoring Well |
| VB2-5DR | Monitoring Well |
| VB3-2 | Monitoring Well |
| VB5-2 | Monitoring Well |
| VB6-1 | Monitoring Well |
| VB7-1 | Monitoring Well |
| VB6-1 | Monitoring Well |
| VB7-1 | Monitoring Well |
| VB8-2R | Monitoring Well |
| VB9-1 | Monitoring Well |
| VB10-1R | Monitoring Well |
| VB11-1 | Monitoring Well |

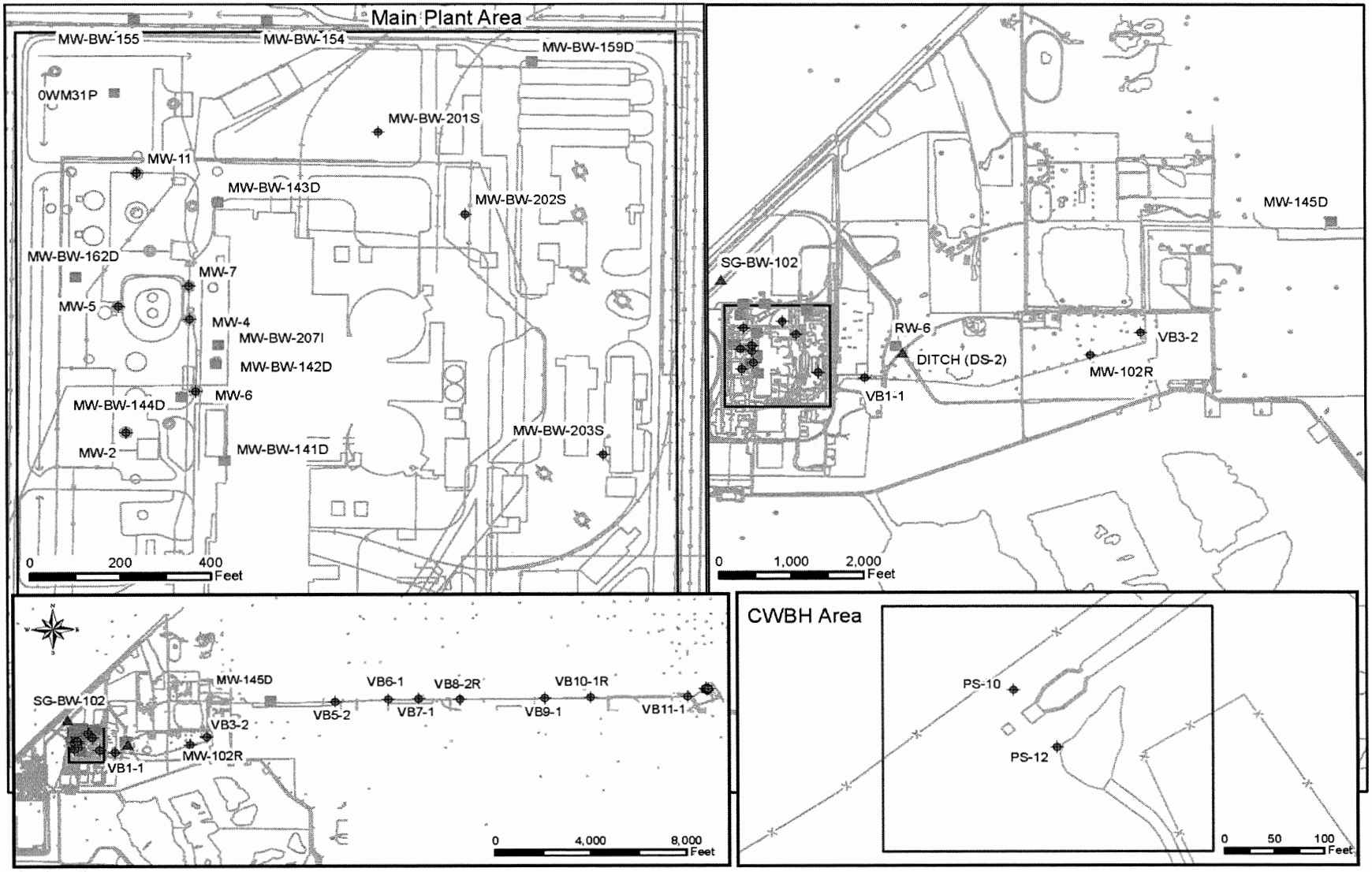


Figure A-1
RGPP Groundwater Monitoring Well Sample Locations
Braidwood Station, 2022

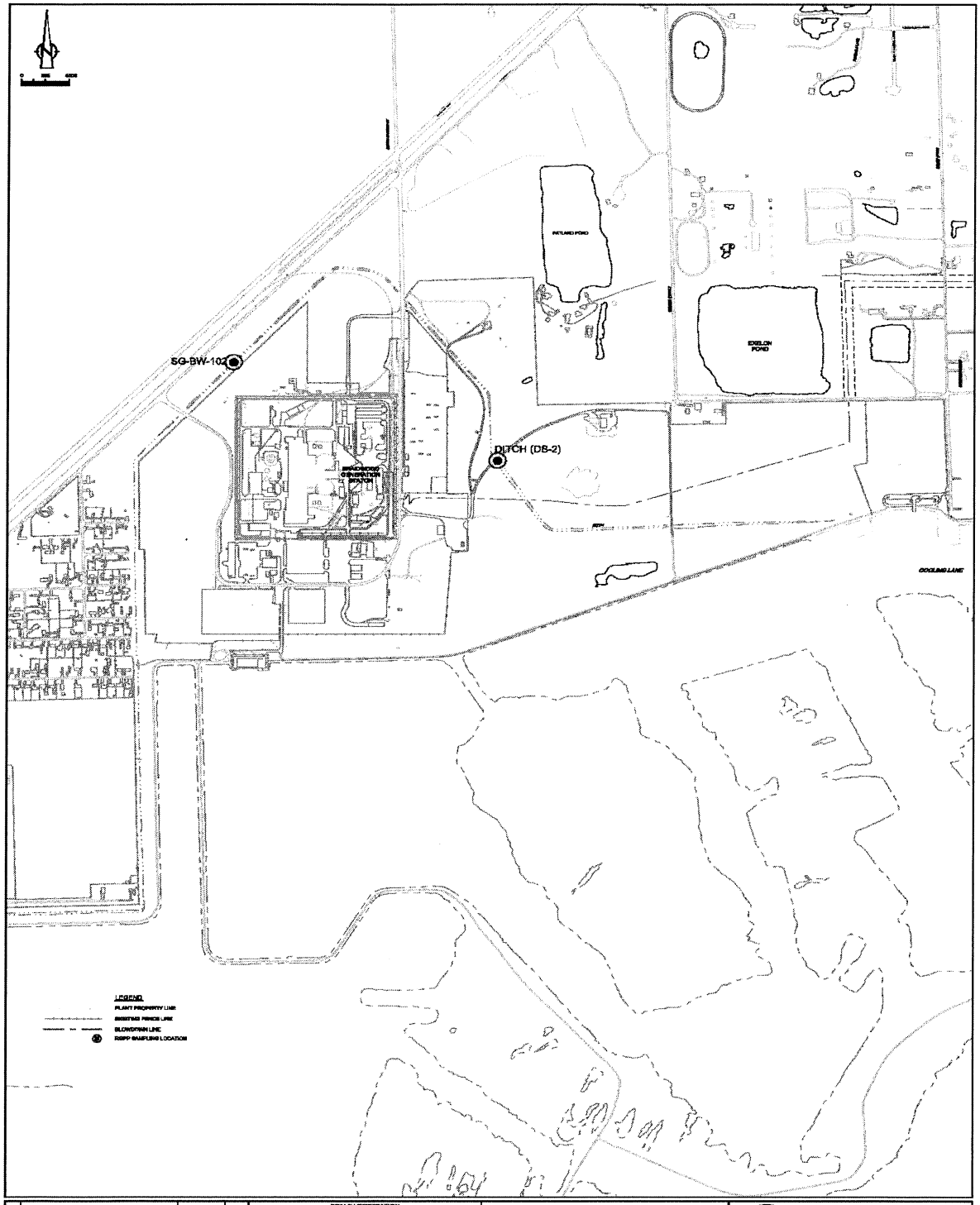


Figure A-5
RGPP CWBD Monitoring Water Sample Locations
Braidwood Station, 2022

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# APPENDIX B

# DATA TABLES

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**TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, AND GROSS ALPHA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITIY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| SITE | COLLECTION DATE | H-3 | Sr-89 | Sr-90 | Gr-A (Dis) | Gr-A (Sus) |
|---|---|---|---|---|---|---|
| MW-2 | 03/17/22 | 412 ± 132 | | | | |
| MW-2 | 06/23/22 | 434 ± 133 | < 7.6 | < 0.8 | | |
| MW-2 | 09/20/22 | 432 ± 137 | | | | |
| MW-2 | 10/14/22 | 314 ± 119 | | | | |
| MW-4 | 03/15/22 | 614 ± 147 | | | | |
| MW-4 | 06/24/22 | 340 ± 130 | < 8.0 | < 0.8 | | |
| MW-4 | 09/22/22 | 393 ± 127 | | | | |
| MW-4 | 12/17/22 | < 160 | | | | |
| MW-5 | 03/16/22 | 183 ± 117 | | | | |
| MW-5 | 06/22/22 | 312 ± 127 | < 9.2 | < 0.8 | | |
| MW-5 | 08/24/22 | 467 ± 132 | | | | |
| MW-5 | 10/14/22 | 373 ± 129 | | | | |
| MW-6 | 03/17/22 | 607 ± 139 | | | | |
| MW-6 | 06/24/22 | 547 ± 140 | < 5.5 | < 0.6 | | |
| MW-6 | 12/16/22 | 1630 ± 232 | | | | |
| MW-7 | 03/15/22 | 390 ± 133 | | | | |
| MW-7 | 06/24/22 | < 188 | < 5.2 | < 0.6 | | |
| MW-7 | 09/22/22 | 238 ± 120 | | | | |
| MW-7 | 12/17/22 | 259 ± 116 | | | | |
| MW-11 | 03/16/22 | 194 ± 117 | | | | |
| MW-11 | 06/21/22 | < 199 | < 6.8 | < 0.9 | | |
| MW-11 | 08/24/22 | < 194 | | | | |
| MW-11 | 10/14/22 | 232 ± 119 | | | | |
| MW-102R | 06/22/22 | < 191 | < 9.0 | < 0.8 | | |
| MW-102R | 08/23/22 | < 185 | | | | |
| MW-102R | 12/15/22 | < 175 | | | | |
| MW-141D | 03/17/22 | 406 ± 120 | | | | |
| MW-141D | 06/23/22 | 418 ± 132 | | | < 1.9 | < 0.9 |
| MW-141D | 09/20/22 | 502 ± 141 | < 8.9 | < 0.9 | | |
| MW-141D | 10/14/22 | 428 ± 130 | | | | |
| MW-142D | 03/15/22 | 777 ± 150 | | | | |
| MW-142D | 06/24/22 | 737 ± 155 | | | | |
| MW-142D | 09/22/22 | 508 ± 141 | < 8.3 | < 0.9 | | |
| MW-142D | 12/17/22 | 471 ± 124 | | | | |
| MW-143D | 03/15/22 | < 187 | | | | |
| MW-143D | 06/22/22 | < 181 | | | | |
| MW-143D | 08/24/22 | 202 ± 132 | < 4.9 | < 0.7 | | |
| MW-143D | 12/18/22 | < 169 | | | | |
| MW-144D | 03/16/22 | 324 ± 120 | | | | |
| MW-144D | 06/22/22 | 408 ± 127 | < 8.2 | < 0.9 | | |
| MW-144D | 08/24/22 | 318 ± 125 | | | | |
| MW-144D | 10/14/22 | 361 ± 137 | | | | |
| MW-145D | 03/16/22 | < 197 | < 9.3 | < 0.9 | | |
| MW-145D | 06/28/22 | < 189 | | | | |
| MW-145D | 09/20/22 | < 197 | | | | |
| MW-145D | 12/20/22 | < 185 | | | | |
| MW-154 | 03/16/22 | < 179 | | | | |
| MW-154 | 06/22/22 | < 197 | < 6.9 | < 0.8 | | |
| MW-154 | 08/23/22 | < 189 | | | | |

**TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, AND GROSS ALPHA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITIY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| SITE | COLLECTION DATE | H-3 | Sr-89 | Sr-90 | Gr-A (Dis) | Gr-A (Sus) |
|---|---|---|---|---|---|---|
| MW-154 | 12/16/22 | 316 ± 132 | | | | |
| MW-155 | 03/16/22 | < 185 | | | | |
| MW-155 | 06/22/22 | < 189 | < 7.2 | < 0.8 | | |
| MW-155 | 08/23/22 | < 197 | | | | |
| MW-155 | 12/16/22 | < 181 | | | | |
| MW-159D | 03/17/22 | 279 ± 124 | | | | |
| MW-159D | 06/20/22 | < 193 | < 7.7 | < 0.9 | | |
| MW-159D | 08/24/22 | 233 ± 134 | | | | |
| MW-159D | 12/17/22 | 327 ± 125 | | | | |
| MW-162D | 03/16/22 | 334 ± 128 | | | | |
| MW-162D | 06/21/22 | < 184 | < 6.7 | < 0.9 | | |
| MW-162D | 08/24/22 | 244 ± 118 | | | | |
| MW-162D | 10/14/22 | 282 ± 117 | | | | |
| MW-BW-201S | 03/16/22 | 352 ± 132 | | | | |
| MW-BW-201S | 06/21/22 | 223 ± 125 | < 5.2 | < 0.7 | | |
| MW-BW-201S | 08/24/22 | 320 ± 126 | | | | |
| MW-BW-201S | 12/18/22 | 283 ± 122 | | | | |
| MW-BW-202S | 03/16/22 | 191 ± 117 | | | | |
| MW-BW-202S | 06/23/22 | < 180 | < 8.5 | < 0.8 | | |
| MW-BW-202S | 08/24/22 | < 191 | | | | |
| MW-BW-202S | 10/14/22 | 235 ± 128 | | | | |
| MW-BW-203S | 03/15/22 | < 184 | | | | |
| MW-BW-203S | 06/21/22 | < 184 | < 6.5 | < 0.9 | | |
| MW-BW-203S | 08/24/22 | < 186 | | | | |
| MW-BW-203S | 12/17/22 | 218 ± 118 | | | | |
| MW-BW-207I | 03/17/22 | 714 ± 149 | | | | |
| MW-BW-207I | 06/24/22 | 522 ± 136 | < 7.7 | < 0.8 | | |
| MW-BW-207I | 09/22/22 | 542 ± 146 | | | | |
| MW-BW-207I | 12/17/22 | 621 ± 142 | | | | |
| PS-10 | 02/15/22 | < 192 | | | | |
| PS-10 | 06/21/22 | < 194 | < 7.2 | < 0.7 | | |
| PS-10 | 12/14/22 | < 167 | | | | |
| PS-12 | 02/15/22 | < 191 | | | | |
| PS-12 | 06/21/22 | < 187 | < 7.6 | < 0.9 | | |
| PS-12 | 08/22/22 | < 185 | | | | |
| PS-12 | 12/14/22 | < 170 | | | | |
| RW-6 | 03/15/22 | 352 ± 128 | | | | |
| RW-6 | 06/22/22 | < 181 | < 8.3 | < 0.9 | | |
| RW-6 | 08/23/22 | 263 ± 128 | | | | |
| RW-6 | 12/15/22 | 208 ± 120 | | | | |
| VB1-1 | 03/16/22 | < 182 | | | | |
| VB1-1 | 06/22/22 | < 172 | < 4.7 | < 1.0 | | |
| VB1-1 | 08/23/22 | < 194 | | | | |
| VB1-1 | 12/16/22 | 238 ± 123 | | | | |
| VB3-2 | 03/15/22 | < 197 | | | | |
| VB3-2 | 06/22/22 | < 199 | < 8.0 | < 0.9 | | |
| VB3-2 | 08/23/22 | < 176 | | | | |
| VB3-2 | 12/14/22 | < 189 | | | | |
| VB5-2 | 03/16/22 | < 193 | < 6.7 | < 0.8 | | |

**TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, AND GROSS ALPHA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITIY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| SITE | COLLECTION DATE | H-3 | Sr-89 | Sr-90 | Gr-A (Dis) | Gr-A (Sus) |
|---|---|---|---|---|---|---|
| VB5-2 | 06/28/22 | < 192 | | | | |
| VB5-2 | 09/20/22 | < 191 | | | | |
| VB5-2 | 12/20/22 | < 188 | | | | |
| VB6-1 | 03/16/22 | < 198 | < 9.3 | < 0.9 | | |
| VB6-1 | 06/28/22 | < 188 | | | | |
| VB6-1 | 09/20/22 | < 187 | | | | |
| VB6-1 | 12/20/22 | < 175 | | | | |
| VB7-1 | 03/16/22 | < 199 | < 8.2 | < 0.9 | | |
| VB7-1 | 06/28/22 | < 183 | | | | |
| VB7-1 | 09/20/22 | < 191 | | | | |
| VB7-1 | 12/20/22 | < 180 | | | | |
| VB8-2R | 03/16/22 | < 197 | < 8.7 | < 0.9 | | |
| VB8-2R | 06/28/22 | < 178 | | | | |
| VB8-2R | 09/20/22 | < 188 | | | | |
| VB8-2R | 12/20/22 | < 164 | | | | |
| VB9-1 | 03/16/22 | < 194 | < 9.0 | < 0.9 | | |
| VB9-1 | 06/28/22 | < 177 | | | | |
| VB9-1 | 09/20/22 | < 186 | | | | |
| VB9-1 | 12/20/22 | < 173 | | | | |
| VB10-1R | 03/16/22 | < 199 | < 8.9 | < 0.9 | | |
| VB10-1R | 06/28/22 | < 191 | | | | |
| VB10-1R | 09/20/22 | < 185 | | | | |
| VB10-1R | 12/20/22 | < 173 | | | | |
| VB11-1 | 03/16/22 | < 197 | < 9.1 | < 0.9 | | |
| VB11-1 | 06/28/22 | < 190 | | | | |
| VB11-1 | 09/20/22 | < 193 | | | | |
| VB11-1 | 12/21/22 | < 165 | | | | |

**TABLE B-I.2**

## CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

No groundwater samples collected or analyzed for gamma emitters in 2022

**TABLE B-I.3**

## CONCENTRATIONS OF HARD TO DETECTS IN GROUNDWATER SAMPLES AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

| SITE | COLLECTION DATE | Am-241 | Cm-242 | Cm-243/244 | Pu-238 | Pu-239/240 | U-234 | U-235 | U-238 |
|---|---|---|---|---|---|---|---|---|---|
| MW-2 | 09/05/21 | < 0.07 | < 0.07 | < 0.04 | < 0.07 | < 0.04 | < 0.13 | < 0.10 | < 0.08 |

**TABLE B-II.1** **CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

No surface water samples collected or analyzed for tritium in 2022

**TABLE B-II.2** **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2022**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

No surface water samples collected or analyzed for gamma emitters in 2022