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May 14, 2019
BW190045

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

Braidwood Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Subject: 2018 Annual Radiological Environmental Operating Report

Attached is the 2018 Annual Radiological Environmental Operating Report for Braidwood Station. This report is being submitted in accordance with Technical Specification 5.6.2, "Annual Radiological Environmental Operating Report." This report contains information associated with the station's radiological environmental and meteorological monitoring programs. This information is consistent with the objectives described in the Offsite Dose Calculation Manual and 10 CFR 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low as is Reasonably Achievable' for Radioactive Material In Light-Water-Cooled Nuclear Power Reactor Effluents," Sections IV.B.2, IV.B.3, and IV.C. Technical Specification 5.6.2 requires the Annual Radiological Environmental Operating Report to be submitted by May 15 of each year.

Should you have any questions concerning this letter, please contact Ms. Marta Spillie, Acting Regulatory Assurance Manager, at (815) 417-4833.

Respectfully,

Marri Marchionda-Palmer
Site Vice President
Braidwood Station

cc: US NRC Regional Administrator, Region III
US NRC Senior Resident Inspector - Braidwood Station
NRR Project Manager - Braidwood Station
Illinois Emergency Management Agency - Division of Nuclear Safety

Docket No: 50-456
50-457

BRAIDWOOD STATION

UNIT 1 and UNIT 2

Annual Radiological
Environmental Operating Report

1 January through 31 December 2018

Prepared By
Teledyne Brown Engineering
Environmental Services

Exelon Generation®

Braidwood Station
Braceville, IL 60407

May 2019

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Table Of Contents

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.

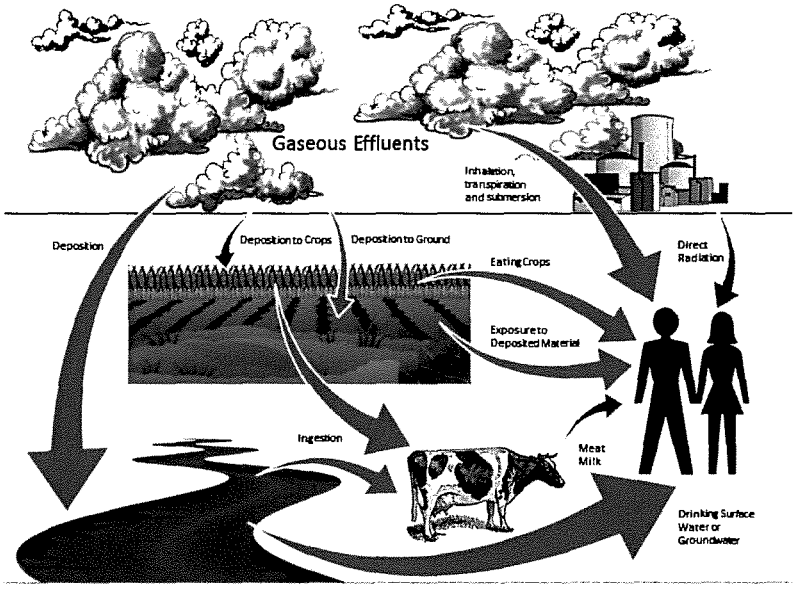
Annual Reports

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

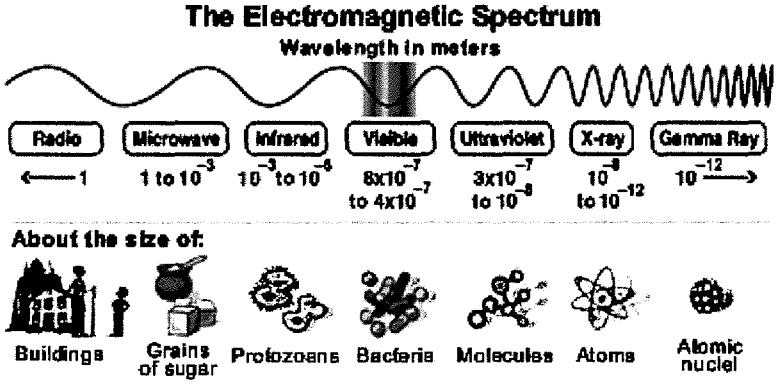


Graphic 1 demonstrates some potential exposure pathways from Braidwood Nuclear Power Station. The ARERR and AREOR together ensure Nuclear Power Plants are operating in a manner that is within established regulatory commitments meant to adequately protect the public.

Understanding Radiation

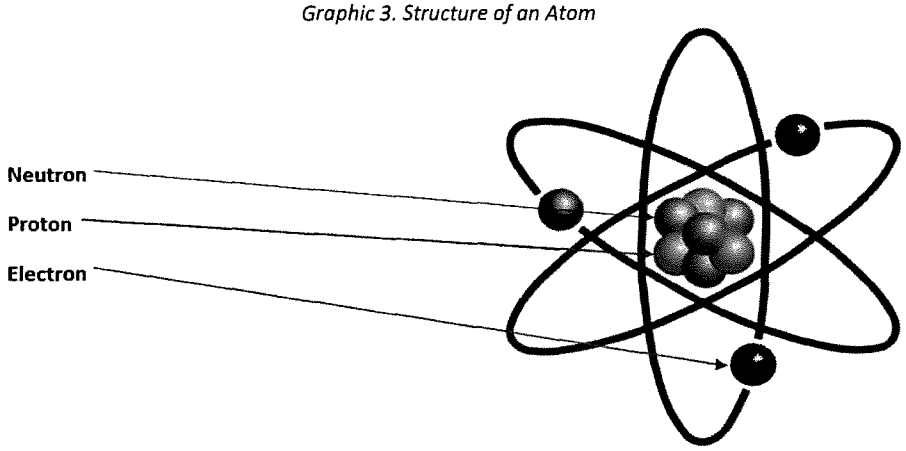
Generally radiation is defined as emitted energy in the form of waves or particles. If radiation has enough energy to displace electrons from an atom it is termed "ionizing", otherwise it is "non-ionizing". Non-Ionizing radiation includes light, heat given off from a stove, radiowaves and microwaves. 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.

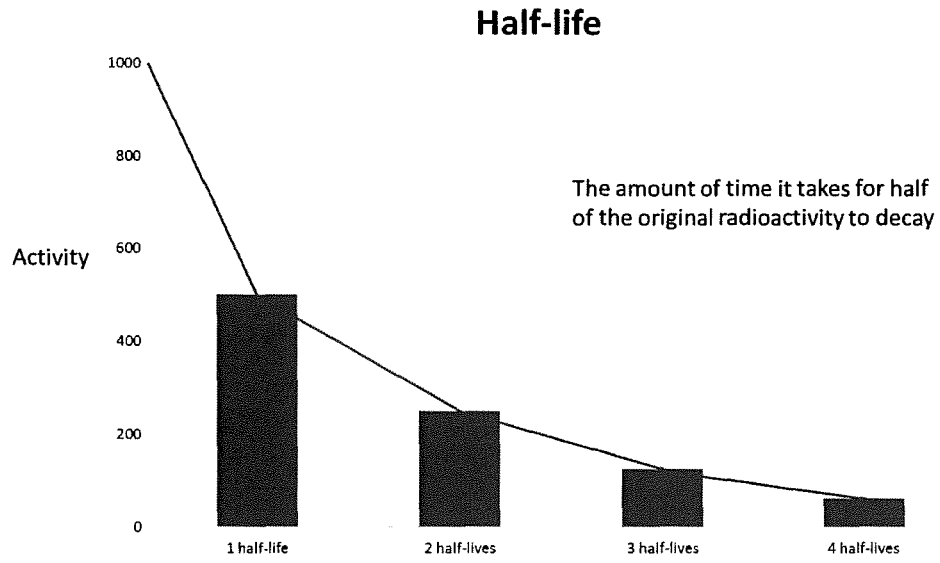
Isotopes are atoms that have the same number of protons but different numbers of neutrons. Different isotopes of an element will all have the same chemical properties and many isotopes are radioactive while other isotopes are not radioactive. A radioactive isotope can emit radiation because it contains 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

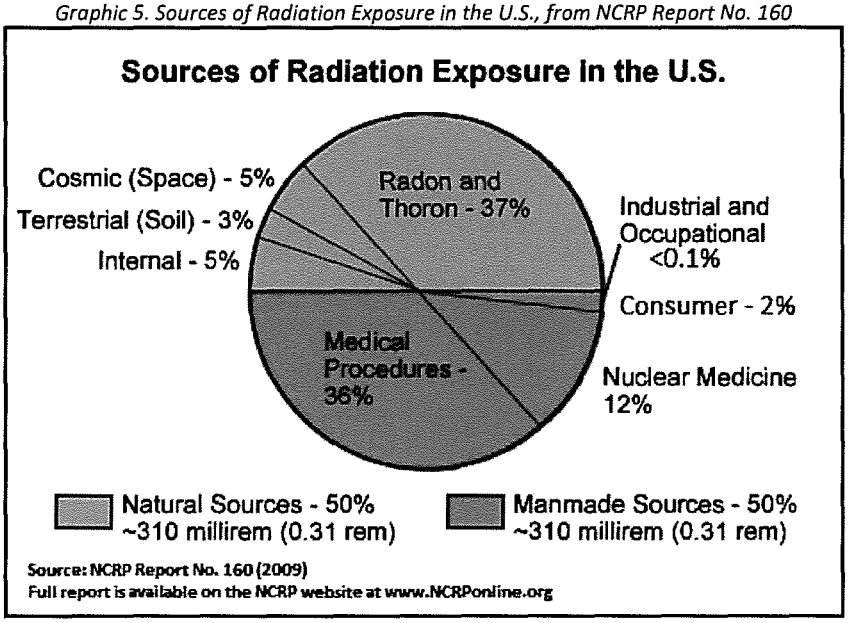
and ARERR are the rad. Noble gas air doses are reported by the site are measured in millirad (mrad), 1/1,000 of one rad.

- 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

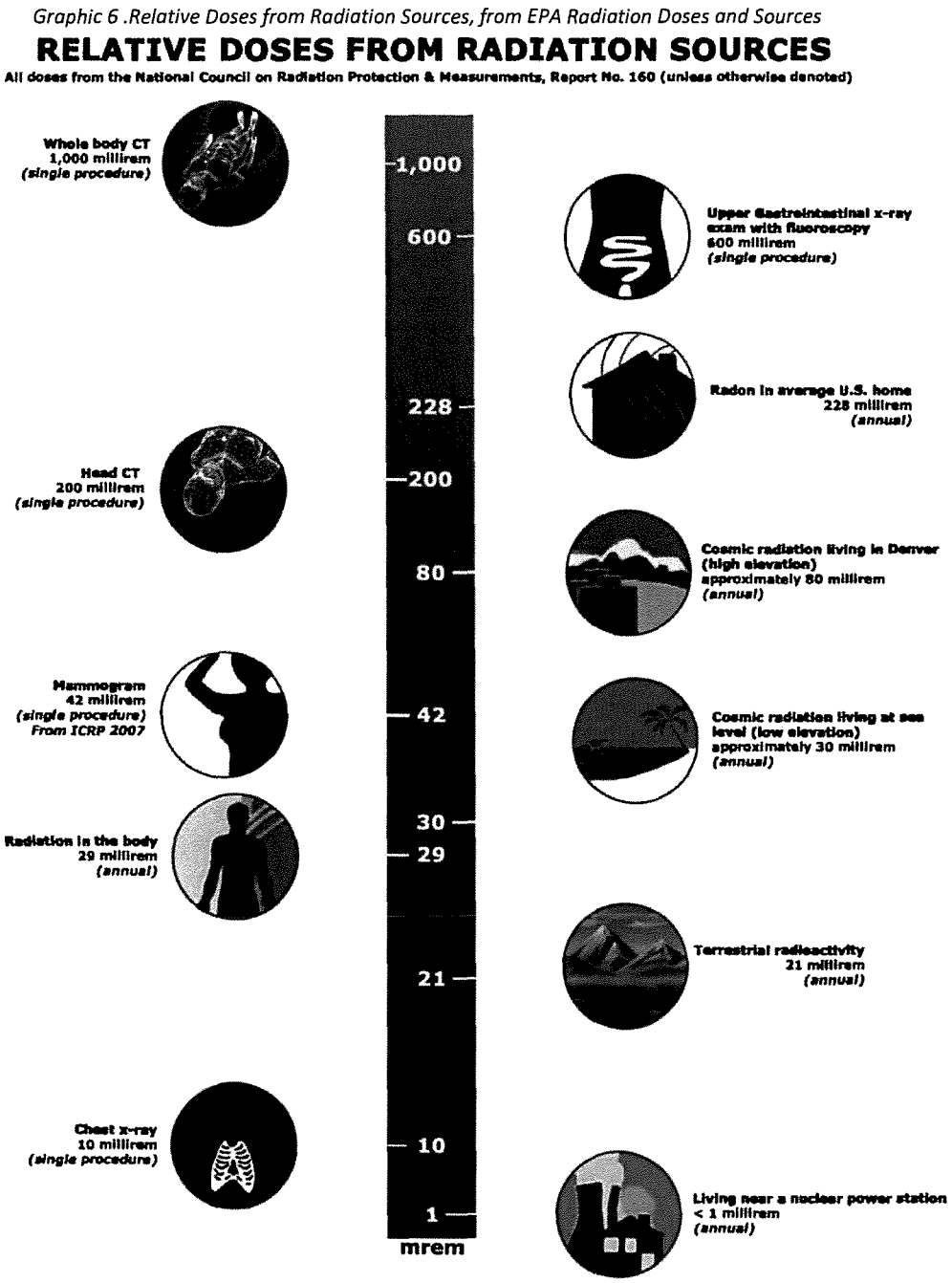
People are exposed to radiation every day of their lives and have been since the dawn of mankind. Some of this radiation is naturally occurring while some is man-made. There are many factors that will determine the amount of radiation individuals will be exposed to such as where they live, medical treatments, 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

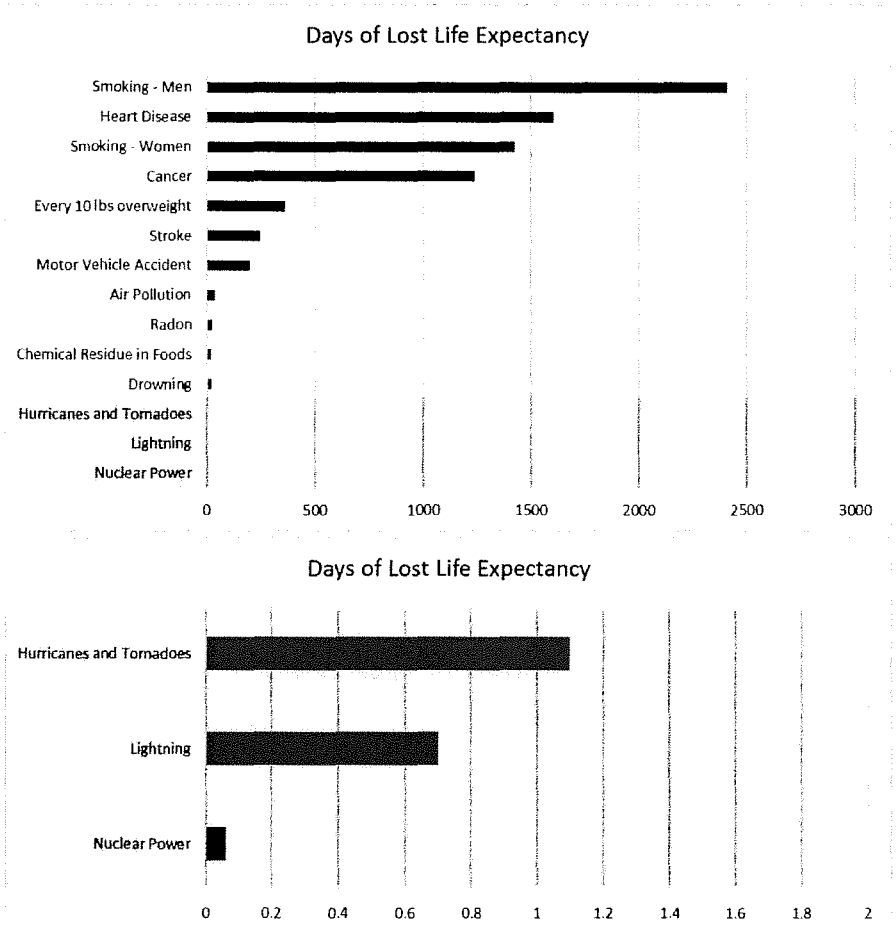


Radiation Risk

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 Exelon's Braidwood Station covers the period January 1, 2018 through December 31, 2018. During that time period 1,505 analyses were performed on 1,197 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. Ni-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. Three of six sediment samples had Cs-137. The concentration was consistent with levels observed during the preoperational years. 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. Substitute grass samples were also analyzed for concentrations of gamma-emitting nuclides. 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. One of thirty-seven vegetation samples had Cs-137. The 2018 effluent data and historical trends were reviewed and positive results are consistent with Cs-137 concentrations present in background radiation from weapons testing

fallout.

Environmental gamma radiation measurements were performed quarterly using Optically Stimulated Luminescence Dosimeters (OSLD). Beginning in 2012, 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). Two ISFSI OLSD locations were statistically different, and the direct dose to the nearest resident was assessed in the ARERR and found to be 0.25 mrem per year.

III. 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 Landauer Technologies on samples collected during the period January 1, 2018 through December 31, 2018.

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 Exelon Nuclear 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 2018. 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 comprising the flesh of golden redhorse, smallmouth bass, common carp, bluegill, and largemouth bass 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), and BD-57.

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 milk and food product samples. Milk samples were collected biweekly at one location, BD-18 (C), from May through October and monthly from November through April. Milk samples were also collected

monthly at another location (BD-17) from January to April and then biweekly from May to June, until the farmer sold all dairy cows. All samples were collected in new two-gallon plastic bottles from the bulk tank at each location, preserved with sodium bisulfite and shipped promptly to the laboratory. Substitute grass samples were collected at BD-18 when the farmer was resting the cows.

Food products and broadleaf vegetation were collected annually at eight locations (BD-Control, BD-ENE, BD-N, BD-NNW, BD-Quad 1, BD-Quad 2, BD-Quad 3 and BD-Quad 4). 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, 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 2018. 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 2018, the Braidwood Station REMP had a sample recovery rate in excess of 99.8%. 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
AP/AI	BD-04	01/25/18	No apparent reason for low reading of 160.7 hours; timer working properly. NOTE: Timer reading on 02/01/18 = 166.9 hours, normal reading
SW	BD-10	02/22/18	Area flooded; sample taken 400 yards from usual location
SW	BD-25	02/22/18	Area flooded; sample taken 50 yards from usual location
AP/AI	BD-06	04/12/18	No apparent reason for low reading of 159.7 hours; timer working properly. NOTE: Timer reading on 04/18/18 = 147.0 hours, normal reading (6 days)
MI	BD-18	05/03/18	Farmer resting cows; grass sample substituted
MI	BD-18	05/17/18	Farmer resting cows; grass sample substituted
MI	BD-18	06/27/18	Farmer resting cows; grass sample substituted
AP/AI	BD-20	11/08/18	No apparent reason for low reading of 163.9 hours; timer working properly. NOTE: Timer reading on 11/15/18 = 167.9 hours, normal reading
AP/AI	BD-03	11/29/18	No apparent reason for low reading of 179.8 hours; timer working properly.
AP/AI	BD-02	12/06/18	Lower reading due to 6 days run caused by improperly sealed cartridge.
AP/AI	BD-03	12/06/18	Lower reading; timer seems to work properly; possibly power failure.
AP/AI	BD-03	12/13/18	Lower reading; heavy rain prevented timer exchange. Exchanged planned for 12/20/18.
AP/AI	BD-03	12/20/18	Lower reading due to possibly faulty timer. Timer replaced
OSLD	BD-309	12/27/18	Location locked; unable to access and exchange the OSLD. NOTE: OSLD exchanged on 01/24/19. IDNR was contacted to unlock gates. A change of the locking method was implemented to utilize Exelon lock and assure accessibility.

Table D-2 LISTING OF MISSED SAMPLES

Sample Type	Location Code	Collection Date	Reason
SW	BD-10,25,38, BD-55,56	01/04/18	No sample; water frozen
SW	BD-10,25,55,56	01/11/18	No sample; water frozen
SW	BD-10,25,38, BD-55,56	01/18/18	No sample; water frozen
SW	BD-25,55,56	01/25/18	No sample; water frozen
SW	BD-55,56	02/01/18	No sample; water frozen
SW	BD-10,25,38, BD-55,56	02/08/18	No sample; water frozen
SW	BD-25,55,56	02/15/18	No sample; water frozen
VE	Quad 4	06/21/18	No broadleaf vegetables available at this time; late planting due to excessively wet spring. NOTE: Broadleaf collected 08/15/18
VE	Quad 1,3 & Control	06/18/18	No vegetables available at this time; gardens were replanted due to seems flooded by excessively wet weather
VE	Quad 3	07/12/18	No root vegetables available at this time; see above notation
VE	Quad 1,2,4	July	No vegetables available at this time; see above notation
MI	BD-17	07/12/18	No sample; farmer sold cows
VE	Quad 3	08/15/18	No root vegetables available at this time
VE	Control	August	No vegetables available at this time; replanted smaller amount after seeds flooded out.
VE	Quad 2,3,4 & Control	September	No vegetables available
VE	Quad 1,3,4 & Control	October	No samples available
SW	BD-55,56	12/13/18	No sample; water 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

Milk indicator location BD-17 notified Braidwood Station of intent to sell all dairy cows in June, 2018. The Braidwood ODCM Revision 10 was implemented to remove BD-17 sample location and include monthly vegetation sampling (during growing season when available) in lieu of milk sampling when milk not available.

IV. 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 65 of 69 samples. The values ranged from 2.6 to 13.1 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 2 of 24 samples. The values ranged from 260 to 827 pCi/L. Concentrations detected 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 (Table C–I.3, Appendix C). Ni-63 was not detected and the required LLD was met.

Gamma Spectrometry

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

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 12 of 12 samples. The values ranged from 2.2 to 5.3 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 12 of 12 samples. Concentrations ranged from 219 to 1,900 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 (Table C-II.3, Appendix C). Iodine was not detected in any samples and the required LLD was met.

Gamma Spectrometry

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

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 not detected in any sample and the required LLD was met. 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 (Table C–III.2, Appendix C). No nuclides were detected

and all required LLDs were met.

4. Fish

Fish samples comprised of golden redhorse, smallmouth bass, common carp, bluegill, 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:

Nickel-63

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

Gamma Spectrometry

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

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. The following analyses were performed:

Nickel-63

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

Gamma Spectrometry

Sediment samples from the location were analyzed for gamma-emitting nuclides (Table C–V.1, Appendix C). Concentrations of the fission product Cs-137 were found at two locations. The concentrations ranged from 79 ± 42 pCi/kg dry to 168 ± 75 pCi/kg dry. These concentrations of Cs-137 were less than the required Cs-137 in sediment LLD of 180 pCi/kg dry. Based on values calculated using NCRP Report 154, *Cesium-137 In the Environment:*

Radioecology and Approaches to Assessment and Management (2006), expected decay-corrected concentrations of Cs-137 from fallout would be between 321 and 4819 pCi/kg dry. The activity detected is below these levels and consistent with fallout. No other Braidwood fission or activation products were found and all required LLDs were met.

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 7E-03 to 41E-03 pCi/m^3 with a mean of 17E-03 pCi/m^3. The results from the far field (Group II) ranged from 6E-03 to 39E-03 pCi/m^3 with a mean of 17E-03 pCi/m^3. The results from the Control location (Group III) ranged from 8E-03 to 38E-03 pCi/m^3 with a mean of 17E-03 pCi/m^3. Comparison of the 2018 air particulate data with previous years' data indicate no effects from the operation of Braidwood Station. Additionally, a comparison of the weekly values for 2018 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 (Table C–VI.3, Appendix C). No nuclides were detected and all required LLDs were met.

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

C. Terrestrial Environment

1. Milk (MI)

Samples were collected from two locations (BD-17 and control location BD-18). Sampling frequencies were increased to biweekly in May and continued through October and monthly sampling was performed November through April. Location BD-17 sold all dairy cows in June, 2018, and milk location was discontinued. Three grass samples collected at BD-18 were substituted for milk samples. The following analyses were performed:

Iodine-131

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

Gamma Spectrometry

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

2. Food Products (VE)

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

Gamma Spectrometry

Samples from all locations were analyzed for gamma-emitting nuclides (Table C–IX.1, Appendix C). Cs-137 was found at one location at a concentration of 33 ± 18 pCi/kg wet (leafy vegetable). Gaseous effluent data was reviewed for 2018 and showed no Cs-137 values above LLD concentrations. The results are below the expected fallout concentrations of sediment for Braidwood calculated using NCRP Report 154. Additionally, these results were trended against historical vegetation, soil, and sediment results and were consistent with previous positive results. No other nuclides were detected and all required LLDs were met.

D. Ambient Gamma Radiation

Ambient gamma radiation levels were measured utilizing Optically Stimulated Luminescence Dosimeter (OSLD). 48 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 were below 19 mrem/quarter, with a range of 7.3 to 18.8 mrem/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.

Two ISFSI locations were statistically different, therefore Annual Facility Dose was reported for stations BD-ISFSI-105-4 and BD-ISFSI-110-4. The direct dose to the nearest resident was then assessed in the ARERR and was found to be 0.25 mrem for the year.

E. Land Use Survey

A Land Use Survey conducted during September 2018 around the Braidwood Station was performed by EIML for Exelon Nuclear 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. The only changes identified between the 2018 survey and the previous year's survey were related to milk farms. Milk indicator location BD-17 notified Braidwood Station of

intent to sell all dairy cows in June, 2018. The Braidwood ODCM Revision 10 was implemented to remove BD-17 sample location and include monthly vegetation sampling (during growing season when available) in lieu of milk sampling when milk not available. 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	0.75	-	-
(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	1.30	5.3	*(1)*
(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 2018.

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.

(1) See Program Exceptions for Explanation

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, 166 out of 172 analyses performed met the specified acceptance criteria. Six analyses did not meet the specified acceptance criteria for the following reasons and were addressed through the TBE Corrective Action Program.

1. TBE was unable to report the February 2018 DOE MAPEP vegetation Sr-90 result due to QC failure and limited sample amount. (NCR 18-09)

2. The Analytics September 2018 milk Fe-59 result was evaluated as *Not Acceptable* (Ratio of TBE to known result at 132%). The reported value was 158 ± 17.6 pCi/L and the known value was 119 ± 19.9 pCi/L. No cause for the failure could be determined. TBE has passed 24 of the previous 27 milk cross-check results since 2012. This sample was run in duplicate on a different detector with

comparable results (162 +/- 16 pCi/L). *NOTE: TBE's 4th Qtr result passed at 105%* (NCR 18-20)

3. The Analytics September milk I-131 result was evaluated as *Not Acceptable* (Ratio of TBE to known result at 143%). Due to a personnel change in the gamma prep lab, the sample was not prepped/counted in a timely manner such as to accommodate the I-131 8-day half-life. Analysts have been made aware of the urgency for this analysis and it will be monitored more closely by QA. *NOTE: TBE's 4th Qtr result passed at 101%* (NCR 18-24)

4. The Analytics September soil Cr-51 result was evaluated as *Not Acceptable* (Ratio of TBE to known result at 131%). As with #3 above, the sample was not prepped/counted in a timely manner such as to accommodate the Cr-51 27-day half-life. The same corrective action applies here as in #3. (NCR 18-21)

5. The MAPEP November vegetation Sr-90 result of 0.338 Bq/sample was evaluated as Not Acceptable (Lower acceptable range was 0.554 Bq/sample). It appears that there has been incomplete dissolution of Sr-90 due to the composition of the MAPEP vegetation "matrix". To resolve this issue, the TBE-2018 procedure has been modified to add H_2O_2 to assist in breaking down the organic material that comprises this "matrix". This corrective action will be monitored closely by QA. (NCR 18-25).

6. The ERA October 2018 water Sr-90 sample was evaluated as *Not Acceptable*. TBE's initial reported result of 36.8 pCi/L exceeded the upper acceptance range (22.9 – 36.4 pCi/L). After reviewing the data for this sample, it was discovered that there was a typographical error at the time the results were entered at the ERA website. The correct result in LIMS of 36.2 should have been submitted instead. This result is within ERA's acceptance limits. In addition to the typo error, ERA's very stringent upper acceptance limit of 116% is not a reflection of TBE's ability to successfully perform this analysis. (NCR 18-23)

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, 2018

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

LOCATION OF FACILITY: BRACEVILLE, IL **REPORTING PERIOD: 2018**

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**	69	4	5.7 (54/58) *(2.6/13.1)*	4.4 (11/11) *(2/8.1)*	8.9 (12/12) *(4.2/13.1)*	BD-40 INDICATOR BRAIDWOOD STATION COOLING LAKE ONSITE	0
	H-3	24	200	544 (2/20) *(260/827)*	<LLD	544 (2/4) (260/827)	BD-10 INDICATOR KANKAKEE RIVER DOWNSTREAM 5.4 MILES NE OF SITE	0
	NI-63	69	30	<LLD	<LLD	-		0
	GAMMA	69						
	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	3.8 (12/12) *(2.2/5.3)*	NA	3.8 (12/12) *(2.2/5.3)*	BD-22 INDICATOR WILMINGTON 6.0 MILES NE OF SITE	0
	H-3	12	200	808 (12/12) *(219/1900)*	NA	808 (12/12) *(219/1900)*	BD-22 INDICATOR WILMINGTON 6.0 MILES NE OF SITE	0
	I-131	12	1	<LLD	NA	-		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, 2018

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

LOCATION OF FACILITY: BRACEVILLE, IL **REPORTING PERIOD: 2018**

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	**GAMMA**	12						
(PCI/LITER)	*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	<LLD	NA	-		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)*	**NI-63**	12	260	<LLD	<LLD	-		0

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

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NAME OF FACILITY: BRAIDWOOD						DOCKET NUMBERS:	50-456 & 50-457	
LOCATION OF FACILITY: BRACEVILLE, IL						REPORTING PERIOD:	2018	
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	**GAMMA**	12						
(PCI/KG WET)	*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 *(PCI/KG DRY)*	**NI-63**	6	260	<LLD	<LLD	-		0
	GAMMA	6						
	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	112 (3/4) *(79/168)*	<LLD	124 (2/2) *(79/168)*	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.

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NAME OF FACILITY: BRAIDWOOD							DOCKET NUMBERS:	50-456 & 50-457
LOCATION OF FACILITY: BRACEVILLE, IL							REPORTING PERIOD:	2018

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*	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIR PARTICULATE	**GR-B**	408	10	17	17	18	BD-06 INDICATOR	0
(E-3 PCI/CU.METER)				(356/357)	(51/51)	(51/51)	GODLEY	
				(6/41)	*(8/38)*	*(7/41)*	0.5 MILEW WSW 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**	408						
(E-3 PCI/CU.METER)	*I-131*		70	<LLD	<LLD	-		0
MILK	**I-131**	25	1	<LLD	<LLD	-		0
(PCI/LITER)								
	GAMMA	25						
	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.

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

LOCATION OF FACILITY: BRACEVILLE, IL **REPORTING PERIOD: 2018**

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**	3						
(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
	CS-134		60	<LLD	<LLD	-		0
	CS-137		80	<LLD	<LLD	-		0
	BA-140		NA	<LLD	<LLD	-		0
	LA-140		NA	<LLD	<LLD	-		0
VEGETATION	**GAMMA**	38						
(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	28 (2/25) *(22/33)*	<LLD	28 (2/9) *(22/33)*	BD-QUAD 2 INDICATOR W.F. SOLTWISCH 4.5 MILES SSE OF SITE	0
	BA-140		NA	<LLD	<LLD	-		0
	LA-140		NA	<LLD	<LLD	-		0
DIRECT RADIATION *(MILLIREM/QTR.)*	**OSLD-QUARTERLY**	184	NA	13.5 (180/180) *(7.3/30.4)*	13 (4/4) *(10.7/15.4)*	28.8 (4/4) *(26.3/30.4)*	BD-ISFSI-105-4 INDICATOR 0.20 MILES SE	0

(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, 2018

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
BD-55	North Pond Fatlan Site (indicator)	0.6 miles NE
BD-56	South Pond Fatlan Site (indictor)	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-17	Halpin's Dairy (indicator)[1]	5.5 miles SSW
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)	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

[1] *See Program Exceptions for Explanation*

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Braidwood Station, 2018

Location	Location Description	Distance & Direction From Site
H. Food Products		
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
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

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Braidwood Station, 2018

Location	Location Description	Distance & Direction From Site
I. Environmental Dosimetry – OSLD (cont'd)		
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

Distance in Miles from the Braidwood Station ISFSI Pad, 2018

Sector	Residence Miles
(N) W	0.7
(P) WNW	0.7
(Q) NW	0.7
(R) NNW	0.7

Distance in Miles from the Braidwood Station Reactor Buildings, 2018

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	5.5[(1)]
(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	-	-

[(1)] *See Program Exceptions for Explanation*

TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Braidwood Station, 2018

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	Tritium	Quarterly composite from weekly grab samples.	TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation
Surface Water	Nickel-63	Monthly composite from weekly grab samples.	TBE, TBE-2013 Radionickel activity in various matrices
Drinking Water	Gross Beta	Monthly composite from weekly composite samples.	TBE, TBE-2008 Gross Alpha and/or Gross Beta activity in various matrices
Drinking Water	Gamma Spectroscopy	Monthly composite from weekly composite samples.	TBE, TBE-2007 Gamma emitting radioisotope analysis
Drinking Water	Tritium	Monthly composite from weekly composite samples.	TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation
Drinking Water	Iodine	Monthly composite from weekly composite samples.	TBE, TBE-2031 Radioactive Iodine in drinking water
Ground/ Well Water	Gamma Spectroscopy	Quarterly grab samples.	TBE, TBE-2007 Gamma emitting radioisotope analysis
Ground/ Well Water	Tritium	Quarterly grab samples.	TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation
Fish	Nickel-63	Semi-annual samples collected via electroshocking or other techniques	TBE, TBE-2013 Radionickel activity in various matrices
Fish	Gamma Spectroscopy	Samples collected twice annually via electro-shocking or other techniques	TBE-2007 Gamma emitting radioisotope analysis
Sediment	Gamma Spectroscopy	Semi-annual grab samples	TBE, TBE-2007 Gamma emitting radioisotope analysis
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

TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Braidwood Station, 2018

Sample Medium	Analysis	Sampling Method	Analytical Procedure Number
Air Iodine	I-131	Weekly composite of continuous air sampling through charcoal filter	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
Milk	Gamma Spectroscopy	Bi-weekly grab sample May through October. Monthly all other times	TBE, TBE-2007 Gamma emitting radioisotope analysis
Food Products	Gamma Spectroscopy	Annual grab samples.	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

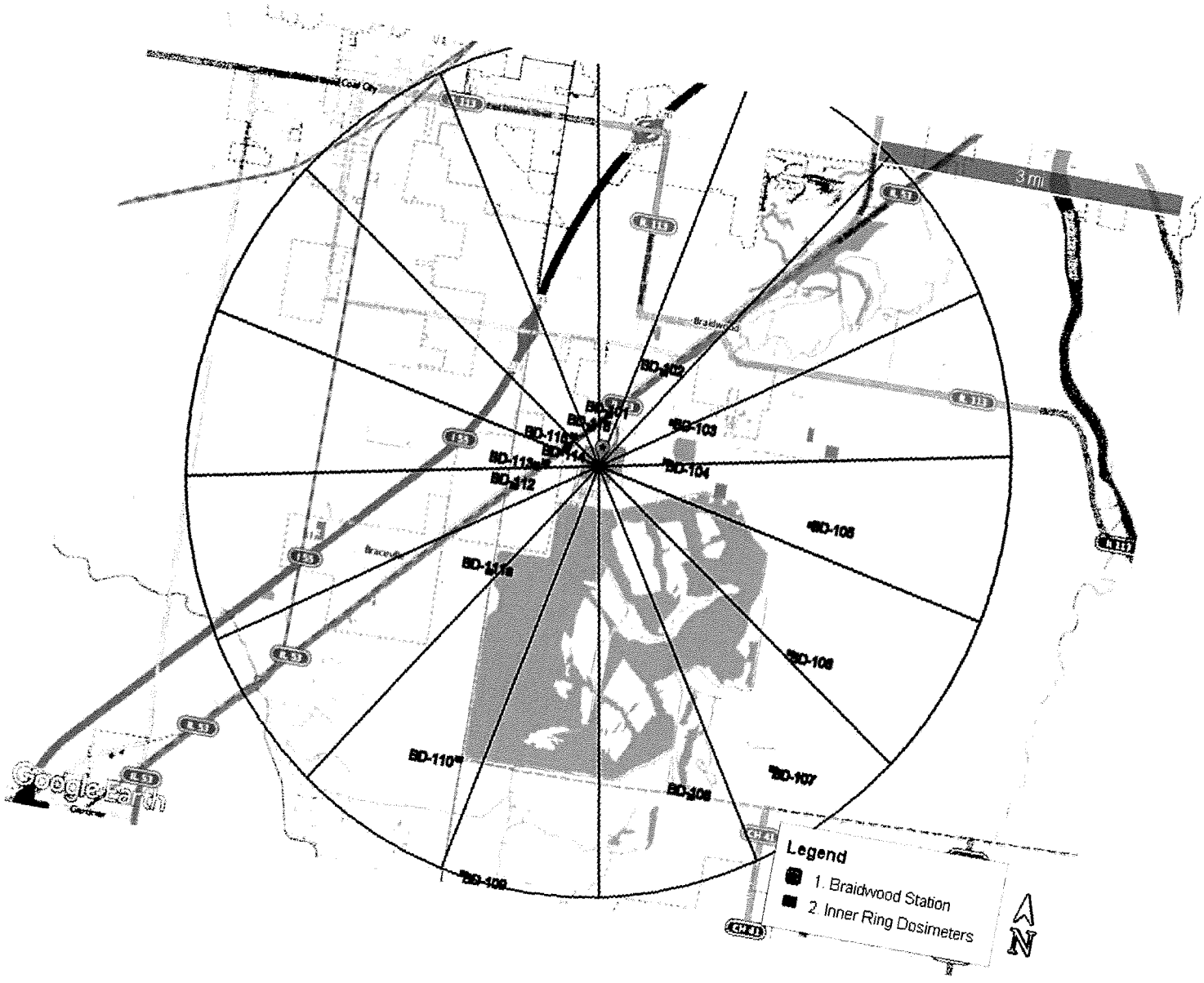

Figure B-1
Inner Ring and Other OSLD Locations
of Braidwood Station, 2018

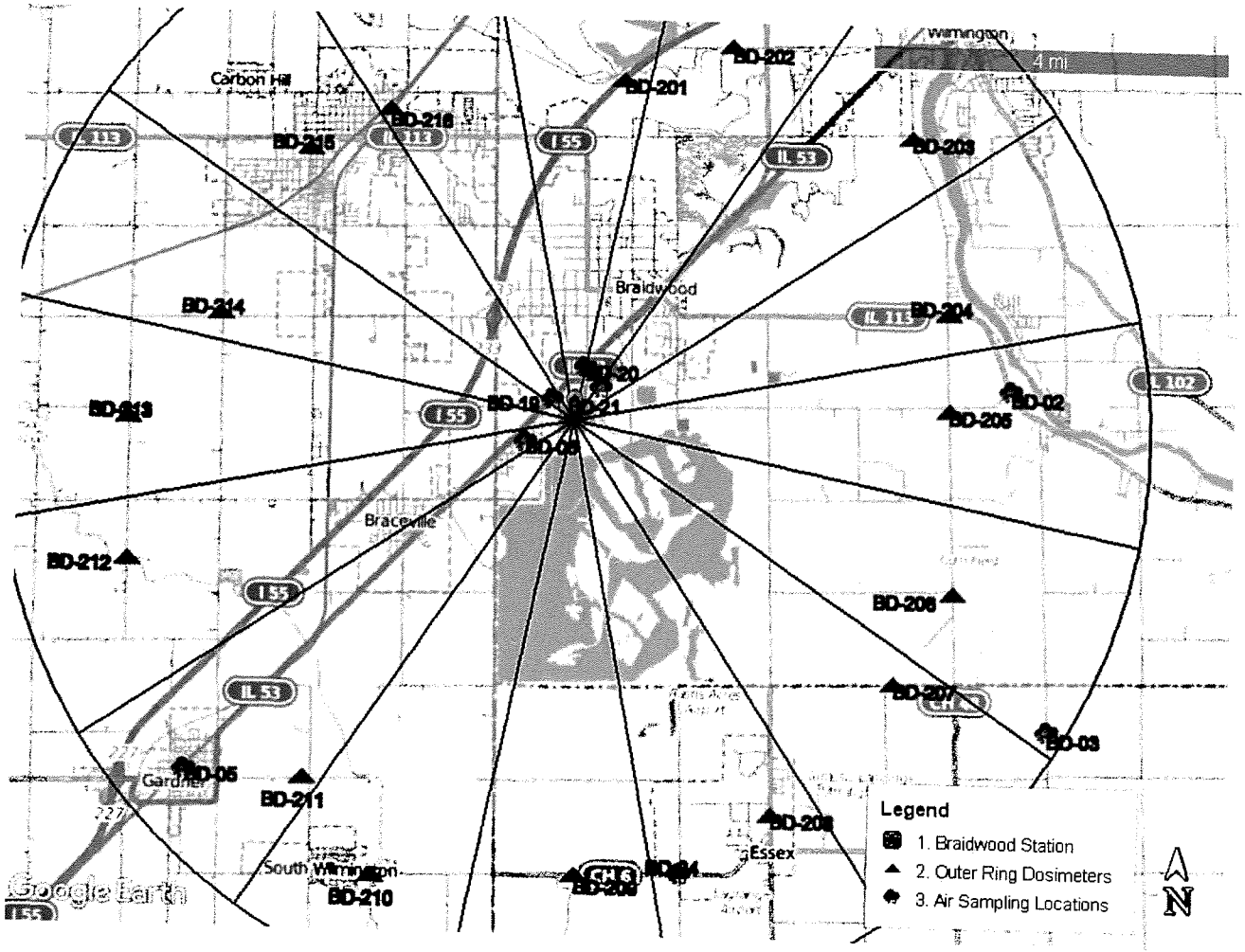

Figure B-2
Fixed Air Sampling and Outer Ring
OSLD Locations of Braidwood Station, 2018

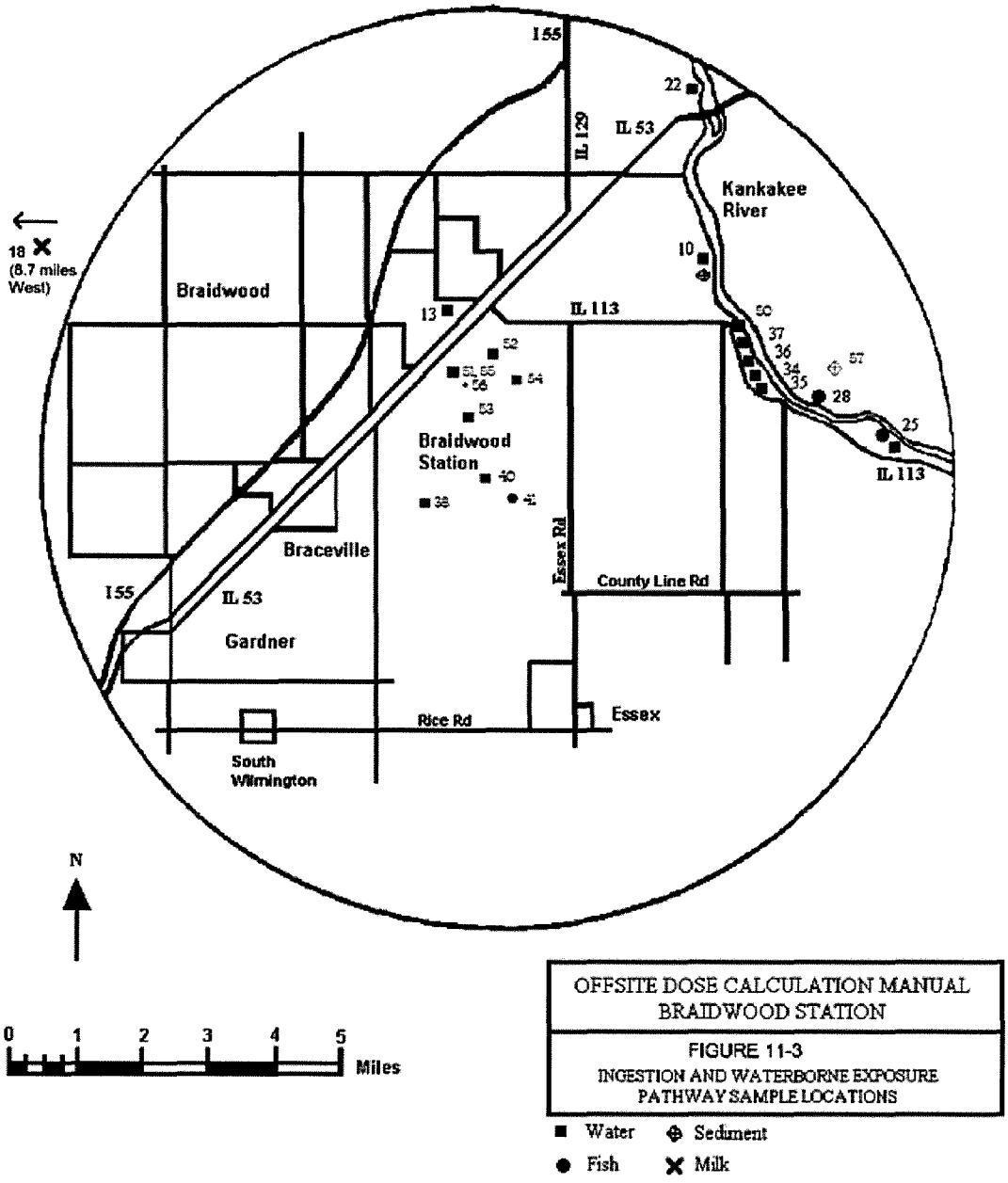

Figure B-3
Ingestion and Waterborne Exposure Pathway
Sample Locations of Braidwood Station, 2018

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, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	BD-10	BD-25	BD-38	BD-40	BD-55	BD-56
01/25/18 - 01/25/18	3.9 ± 1.7	*(1)*	8.0 ± 2.7	10.1 ± 2.6	*(1)*	*(1)*
02/22/18 - 02/22/18	5.7 ± 2.1	8.1 ± 2.3	3.9 ± 2.0	7.0 ± 2.4	3.6 ± 1.7	2.9 ± 1.9
03/01/18 - 03/29/18	5.1 ± 1.7	5.7 ± 1.8	3.7 ± 1.9	8.8 ± 2.3	4.4 ± 1.5	3.1 ± 1.7
04/05/18 - 04/26/18	3.3 ± 1.9	3.8 ± 1.9	3.3 ± 2.1	8.5 ± 2.4	2.6 ± 1.6	3.2 ± 2.0
05/03/18 - 05/31/18	3.1 ± 1.6	3.3 ± 1.6	5.1 ± 2.2	9.2 ± 3.8	4.3 ± 1.7	3.0 ± 1.9
06/07/18 - 06/28/18	5.9 ± 2.6	4.8 ± 2.0	4.9 ± 2.2	13.1 ± 3.4	< 2.5	7.2 ± 2.8
07/05/18 - 07/26/18	4.7 ± 2.3	5.2 ± 2.3	8.4 ± 3.4	8.9 ± 2.4	4.1 ± 1.8	6.9 ± 2.6
08/02/18 - 08/30/18	4.5 ± 1.7	2.0 ± 1.3	7.9 ± 2.4	7.6 ± 2.1	3.0 ± 1.3	5.1 ± 1.9
09/06/18 - 09/27/18	4.0 ± 1.9	4.0 ± 1.9	4.8 ± 2.1	11.7 ± 2.6	3.0 ± 1.5	< 2.5
10/04/18 - 10/25/18	4.8 ± 2.0	5.1 ± 2.0	7.2 ± 2.9	8.2 ± 2.8	5.1 ± 1.8	4.3 ± 2.2
11/01/18 - 11/29/18	4.9 ± 2.1	4.2 ± 2.0	7.5 ± 2.5	10.0 ± 2.6	4.0 ± 1.7	5.3 ± 2.2
12/06/18 - 12/27/18	< 2.6	2.7 ± 1.8	5.1 ± 2.3	4.2 ± 2.0	4.0 ± 1.7	< 2.7
MEAN ± 2 STD DEV	4.5 ± 1.8	4.4 ± 3.3	5.8 ± 3.7	8.9 ± 4.5	3.8 ± 1.5	4.6 ± 3.4

Table C-I.2 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	BD-10	BD-25	BD-38	BD-40	BD-55	BD-56
01/25/18 - 03/29/18	< 189		< 185	< 185		
02/22/18 - 03/29/18	*(1)*	< 187	*(1)*	*(1)*	< 182	< 178
04/05/18 - 06/28/18	< 183	< 186	< 182	< 181	< 184	< 179
07/05/18 - 09/27/18	827 ± 161	< 184	< 198	< 193	< 194	< 198
10/04/18 - 12/27/18	260 ± 129	< 192	< 188	< 195	< 189	< 195
MEAN ± 2 STD DEV	544 ± 802	-	-	-	-	-

Table C-I.3 CONCENTRATIONS OF NICKEL-63 IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	BD-10	BD-25	BD-38	BD-40	BD-55	BD-56
01/25/18 - 01/25/18	< 17	*(1)*	< 16	< 16	*(1)*	*(1)*
02/22/18 - 02/22/18	< 18	< 18	< 19	< 19	< 18	< 19
03/01/18 - 03/29/18	< 18	< 19	< 18	< 18	< 17	< 18
04/05/18 - 04/26/18	< 17	< 17	< 17	< 18	< 17	< 18
05/03/18 - 05/31/18	< 17	< 17	< 17	< 18	< 16	< 17
06/07/18 - 06/28/18	< 17	< 17	< 17	< 18	< 17	< 18
07/05/18 - 07/26/18	< 16	< 16	< 16	< 16	< 15	< 15
08/02/18 - 08/30/18	< 16	< 16	< 18	< 18	< 16	< 17
09/06/18 - 09/27/18	< 18	< 18	< 18	< 19	< 18	< 18
10/04/18 - 10/25/18	< 21	< 21	< 22	< 22	< 20	< 20
11/01/18 - 11/29/18	< 20	< 20	< 21	< 21	< 20	< 22
12/06/18 - 12/27/18	< 18	< 18	< 19	< 20	< 19	< 19
MEAN	-	-	-	-	-	-

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

(1) SEE PROGRAM EXCEPTIONS FOR EXPLANATION

Table C-I.4 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018**

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	01/25/18 - 01/25/18	< 4	< 4	< 10	< 4	< 8	< 4	< 7	< 14	< 4	< 4	< 28	< 9
	02/01/18 - 02/22/18	< 2	< 3	< 6	< 3	< 5	< 3	< 5	< 12	< 3	< 3	< 23	< 8
	03/01/18 - 03/29/18	< 2	< 2	< 5	< 2	< 5	< 2	< 4	< 12	< 2	< 2	< 21	< 7
	04/05/18 - 04/26/18	< 4	< 4	< 10	< 4	< 8	< 5	< 8	< 14	< 4	< 5	< 28	< 8
	05/03/18 - 05/31/18	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 7	< 2	< 2	< 14	< 6
	06/07/18 - 06/28/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 18	< 6
	07/05/18 - 07/26/18	< 1	< 2	< 4	< 2	< 3	< 2	< 3	< 15	< 2	< 1	< 21	< 7
	08/02/18 - 08/30/18	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 8	< 2	< 2	< 16	< 5
	09/06/18 - 09/27/18	< 2	< 2	< 5	< 2	< 4	< 2	< 3	< 10	< 2	< 2	< 18	< 6
	10/04/18 - 10/25/18	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 11	< 2	< 2	< 18	< 6
	11/01/18 - 11/29/18	< 4	< 3	< 9	< 4	< 7	< 5	< 6	< 11	< 4	< 4	< 27	< 8
	12/06/18 - 12/27/18	< 5	< 6	< 10	< 6	< 16	< 7	< 11	< 15	< 6	< 6	< 35	< 13
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-25	01/25/18 - 01/25/18 *(1)*												
	02/01/18 - 02/22/18	< 2	< 2	< 6	< 2	< 5	< 3	< 4	< 12	< 2	< 2	< 22	< 7
	03/01/18 - 03/29/18	< 2	< 2	< 5	< 2	< 4	< 2	< 3	< 9	< 2	< 2	< 16	< 6
	04/05/18 - 04/26/18	< 3	< 4	< 8	< 4	< 7	< 4	< 6	< 10	< 4	< 4	< 24	< 7
	05/03/18 - 05/31/18	< 2	< 2	< 5	< 2	< 4	< 3	< 4	< 11	< 2	< 2	< 20	< 7
	06/07/18 - 06/28/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 19	< 6
	07/05/18 - 07/26/18	< 2	< 2	< 5	< 2	< 3	< 2	< 3	< 15	< 2	< 2	< 22	< 8
	08/02/18 - 08/30/18	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 9	< 2	< 2	< 17	< 5
	09/06/18 - 09/27/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 20	< 6
	10/04/18 - 10/25/18	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 10	< 2	< 2	< 18	< 6
	11/01/18 - 11/29/18	< 4	< 4	< 9	< 5	< 9	< 4	< 7	< 12	< 4	< 4	< 24	< 8
	12/06/18 - 12/27/18	< 5	< 5	< 12	< 4	< 12	< 7	< 8	< 13	< 6	< 6	< 33	< 15
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-38	01/11/18 - 01/25/18	< 4	< 4	< 8	< 3	< 7	< 4	< 7	< 13	< 4	< 4	< 26	< 9
	02/01/18 - 02/22/18	< 3	< 3	< 6	< 3	< 5	< 3	< 5	< 14	< 3	< 3	< 27	< 9
	03/01/18 - 03/29/18	< 2	< 3	< 6	< 2	< 5	< 3	< 5	< 13	< 3	< 3	< 23	< 8
	04/05/18 - 04/26/18	< 4	< 4	< 9	< 5	< 7	< 5	< 8	< 14	< 4	< 4	< 28	< 8
	05/03/18 - 05/31/18	< 2	< 2	< 5	< 2	< 3	< 2	< 3	< 8	< 2	< 2	< 16	< 5
	06/07/18 - 06/28/18	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 9	< 2	< 2	< 16	< 4
	07/05/18 - 07/26/18	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 15	< 2	< 2	< 22	< 7
	08/02/18 - 08/30/18	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 8	< 1	< 1	< 14	< 4
	09/06/18 - 09/27/18	< 1	< 2	< 4	< 2	< 3	< 2	< 3	< 10	< 2	< 2	< 18	< 6
	10/04/18 - 10/25/18	< 1	< 1	< 3	< 1	< 3	< 2	< 3	< 9	< 1	< 1	< 14	< 5
	11/01/18 - 11/29/18	< 5	< 5	< 10	< 5	< 9	< 5	< 9	< 14	< 6	< 5	< 34	< 11
	12/06/18 - 12/27/18	< 5	< 6	< 12	< 6	< 11	< 6	< 9	< 12	< 5	< 6	< 31	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS FOR EXPLANATION

Table C-I.4 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018**

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	01/04/18 - 01/25/18	< 3	< 3	< 8	< 4	< 6	< 4	< 6	< 13	< 4	< 4	< 28	< 8
	02/01/18 - 02/22/18	< 2	< 2	< 5	< 2	< 4	< 3	< 5	< 13	< 2	< 2	< 23	< 6
	03/01/18 - 03/29/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 20	< 6
	04/05/18 - 04/26/18	< 4	< 4	< 10	< 4	< 8	< 4	< 7	< 11	< 4	< 4	< 26	< 9
	05/03/18 - 05/31/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 9	< 2	< 2	< 17	< 6
	06/07/18 - 06/28/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 8	< 2	< 2	< 17	< 6
	07/05/18 - 07/26/18	< 2	< 2	< 5	< 2	< 3	< 2	< 3	< 15	< 2	< 2	< 21	< 7
	08/02/18 - 08/30/18	< 2	< 2	< 5	< 2	< 3	< 2	< 4	< 9	< 2	< 2	< 18	< 6
	09/06/18 - 09/27/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 20	< 7
	10/04/18 - 10/25/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 12	< 2	< 2	< 21	< 8
	11/01/18 - 11/29/18	< 4	< 4	< 8	< 3	< 8	< 5	< 6	< 11	< 4	< 4	< 25	< 9
	12/06/18 - 12/27/18	< 5	< 6	< 11	< 5	< 12	< 6	< 10	< 15	< 6	< 5	< 34	< 10
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-55	01/25/18 - 01/25/18 *(1)*												
	02/22/18 - 02/22/18	< 3	< 3	< 7	< 3	< 6	< 3	< 5	< 14	< 3	< 3	< 28	< 9
	03/01/18 - 03/29/18	< 2	< 3	< 6	< 3	< 5	< 3	< 5	< 15	< 3	< 2	< 25	< 7
	04/05/18 - 04/26/18	< 4	< 4	< 9	< 4	< 9	< 5	< 8	< 15	< 4	< 4	< 33	< 10
	05/03/18 - 05/31/18	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 9	< 2	< 2	< 18	< 6
	06/07/18 - 06/28/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 18	< 6
	07/05/18 - 07/26/18	< 2	< 2	< 5	< 2	< 4	< 2	< 3	< 15	< 2	< 2	< 23	< 7
	08/02/18 - 08/30/18	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 9	< 2	< 2	< 18	< 6
	09/06/18 - 09/27/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 19	< 6
	10/04/18 - 10/25/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 20	< 6
	11/01/18 - 11/29/18	< 3	< 4	< 9	< 4	< 9	< 4	< 7	< 10	< 4	< 4	< 25	< 9
	12/06/18 - 12/27/18	< 6	< 5	< 13	< 6	< 12	< 7	< 10	< 14	< 6	< 5	< 34	< 10
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-56	01/25/18 - 01/25/18 *(1)*												
	02/22/18 - 02/22/18	< 3	< 3	< 6	< 3	< 6	< 3	< 6	< 14	< 3	< 3	< 27	< 8
	03/01/18 - 03/29/18	< 3	< 3	< 6	< 3	< 6	< 3	< 5	< 14	< 3	< 3	< 26	< 9
	04/05/18 - 04/26/18	< 3	< 3	< 6	< 3	< 5	< 3	< 6	< 11	< 3	< 3	< 22	< 7
	05/03/18 - 05/31/18	< 2	< 2	< 5	< 2	< 5	< 2	< 4	< 10	< 2	< 2	< 20	< 7
	06/07/18 - 06/28/18	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 8	< 2	< 2	< 16	< 5
	07/05/18 - 07/26/18	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 15	< 2	< 2	< 22	< 6
	08/02/18 - 08/30/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 18	< 6
	09/06/18 - 09/27/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 12	< 2	< 2	< 22	< 8
	10/04/18 - 10/25/18	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 10	< 2	< 2	< 17	< 6
	11/01/18 - 11/29/18	< 4	< 4	< 8	< 4	< 8	< 4	< 6	< 11	< 4	< 4	< 28	< 8
	12/06/18 - 12/27/18	< 6	< 5	< 14	< 6	< 10	< 6	< 9	< 15	< 5	< 6	< 42	< 12
	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, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	BD-22
01/04/18 - 02/01/18	3.3 ± 1.6
02/01/18 - 03/01/18	4.4 ± 2.3
03/01/18 - 03/29/18	2.2 ± 1.4
03/29/18 - 05/03/18	4.3 ± 1.6
05/03/18 - 05/31/18	2.3 ± 1.4
05/31/18 - 06/28/18	4.2 ± 1.6
06/28/18 - 08/02/18	3.7 ± 1.6
08/02/18 - 08/30/18	2.9 ± 1.5
08/30/18 - 09/27/18	4.5 ± 1.5
09/27/18 - 11/01/18	4.1 ± 1.6
11/01/18 - 11/29/18	5.3 ± 1.9
11/29/18 - 12/27/18	4.0 ± 1.6
MEAN ± 2 STD DEV	3.8 ± 1.9

Table C-II.2 CONCENTRATIONS OF TRITIUM IN PUBLIC WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	BD-22
01/04/18 - 02/01/18	584 ± 142
02/01/18 - 03/01/18	1530 ± 213
03/01/18 - 03/29/18	326 ± 130
03/29/18 - 05/03/18	219 ± 122
05/03/18 - 05/31/18	1000 ± 172
05/31/18 - 06/28/18	391 ± 132
06/28/18 - 08/02/18	617 ± 146
08/02/18 - 08/30/18	933 ± 165
08/30/18 - 09/27/18	1900 ± 255
09/27/18 - 11/01/18	1270 ± 200
11/01/18 - 11/29/18	843 ± 148
11/29/18 - 12/27/18	400 ± 136
MEAN ± 2 STD DEV	808 ± 1015

Table C-II.3 CONCENTRATIONS OF I-131 IN PUBLIC WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	BD-22
01/04/18 - 02/01/18	< 0.8
02/01/18 - 03/01/18	< 0.8
03/01/18 - 03/29/18	< 0.9
03/29/18 - 05/03/18	< 0.7
05/03/18 - 05/31/18	< 0.6
05/31/18 - 06/28/18	< 0.8
06/28/18 - 08/02/18	< 0.5
08/02/18 - 08/30/18	< 0.3
08/30/18 - 09/27/18	< 1.0
09/27/18 - 11/01/18	< 0.4
11/01/18 - 11/29/18	< 0.8
11/29/18 - 12/27/18	< 0.7
MEAN	-

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

Table C-II.4

CONCENTRATIONS OF GAMMA EMITTERS IN PUBLIC WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

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	01/04/18 - 02/01/18	< 2	< 3	< 6	< 2	< 4	< 3	< 5	< 3	< 2	< 22	< 6
	02/01/18 - 03/01/18	< 1	< 2	< 3	< 1	< 3	< 2	< 3	< 2	< 1	< 13	< 4
	03/01/18 - 03/29/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 19	< 6
	03/29/18 - 05/03/18	< 1	< 2	< 3	< 2	< 3	< 2	< 3	< 2	< 2	< 11	< 3
	05/03/18 - 05/31/18	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 16	< 6
	05/31/18 - 06/28/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 19	< 7
	06/28/18 - 08/02/18	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 18	< 6
	08/02/18 - 08/30/18	< 1	< 1	< 3	< 1	< 3	< 2	< 3	< 1	< 1	< 13	< 5
	08/30/18 - 09/27/18	< 1	< 2	< 5	< 1	< 3	< 2	< 3	< 2	< 1	< 38	< 13
	09/27/18 - 11/01/18	< 2	< 2	< 5	< 2	< 4	< 2	< 3	< 2	< 2	< 17	< 6
	11/01/18 - 11/29/18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 17	< 6
	11/29/18 - 12/27/18	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 2	< 2	< 14	< 5
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-III.1 **CONCENTRATIONS OF TRITIUM IN GROUND/WELL WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018**

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
01/11/18 - 01/11/18	< 192	< 190	< 192	< 190	< 187	< 189	< 195	< 188
04/12/18 - 04/12/18	< 180	< 179	< 181	< 192	< 193	< 195	< 196	< 194
07/12/18 - 07/12/18	< 190	< 196	< 190	< 197	< 185	< 195	< 191	< 188
10/11/18 - 10/11/18	< 186	< 186	< 188	< 186	< 185	< 183	< 188	< 185
MEAN	-	-	-	-	-	-	-	-

Table C-III.2

CONCENTRATIONS OF GAMMA EMITTERS IN GROUND/WELL WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

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	01/11/18 - 01/11/18	< 4	< 4	< 8	< 4	< 6	< 4	< 7	< 8	< 4	< 3	< 20	< 7
	04/12/18 - 04/12/18	< 5	< 5	< 11	< 5	< 12	< 6	< 9	< 8	< 6	< 5	< 21	< 9
	07/12/18 - 07/12/18	< 6	< 7	< 11	< 7	< 11	< 5	< 11	< 11	< 8	< 8	< 28	< 9
	10/11/18 - 10/11/18	< 6	< 6	< 15	< 6	< 10	< 5	< 9	< 14	< 6	< 5	< 33	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-34	01/11/18 - 01/11/18	< 3	< 2	< 6	< 3	< 5	< 3	< 5	< 7	< 3	< 2	< 15	< 5
	04/12/18 - 04/12/18	< 7	< 8	< 11	< 6	< 13	< 8	< 13	< 10	< 8	< 8	< 31	< 8
	07/12/18 - 07/12/18	< 7	< 10	< 12	< 6	< 7	< 6	< 11	< 10	< 7	< 6	< 35	< 12
	10/11/18 - 10/11/18	< 5	< 6	< 12	< 6	< 11	< 5	< 9	< 15	< 6	< 5	< 38	< 12
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-35	01/11/18 - 01/11/18	< 3	< 3	< 7	< 3	< 6	< 3	< 5	< 8	< 3	< 3	< 18	< 6
	04/12/18 - 04/12/18	< 5	< 5	< 12	< 7	< 14	< 7	< 9	< 10	< 7	< 6	< 25	< 7
	07/12/18 - 07/12/18	< 6	< 5	< 11	< 6	< 13	< 7	< 13	< 10	< 8	< 7	< 31	< 11
	10/11/18 - 10/11/18	< 4	< 4	< 9	< 5	< 9	< 5	< 9	< 14	< 4	< 5	< 30	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-36	01/11/18 - 01/11/18	< 3	< 3	< 7	< 3	< 6	< 3	< 5	< 8	< 3	< 3	< 18	< 5
	04/12/18 - 04/12/18	< 7	< 6	< 15	< 7	< 11	< 9	< 13	< 13	< 8	< 8	< 37	< 12
	07/12/18 - 07/12/18	< 9	< 8	< 15	< 8	< 16	< 8	< 12	< 13	< 7	< 8	< 39	< 12
	10/11/18 - 10/11/18	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 6	< 2	< 2	< 13	< 4
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-37	01/11/18 - 01/11/18	< 3	< 3	< 6	< 3	< 5	< 3	< 5	< 7	< 3	< 3	< 17	< 5
	04/12/18 - 04/12/18	< 7	< 7	< 15	< 6	< 13	< 8	< 11	< 9	< 7	< 8	< 28	< 9
	07/12/18 - 07/12/18	< 7	< 7	< 13	< 5	< 14	< 7	< 14	< 10	< 4	< 7	< 25	< 11
	10/11/18 - 10/11/18	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 6	< 2	< 2	< 13	< 4
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-III.2

CONCENTRATIONS OF GAMMA EMITTERS IN GROUND/WELL WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

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	01/11/18 - 01/11/18	< 2	< 2	< 6	< 3	< 5	< 3	< 5	< 6	< 3	< 3	< 15	< 6
	04/12/18 - 04/12/18	< 5	< 5	< 10	< 5	< 9	< 5	< 9	< 8	< 5	< 5	< 24	< 7
	07/12/18 - 07/12/18	< 5	< 5	< 9	< 6	< 10	< 6	< 10	< 9	< 5	< 6	< 28	< 9
	10/11/18 - 10/11/18	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 6	< 2	< 2	< 14	< 5
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-51	01/11/18 - 01/11/18	< 3	< 3	< 7	< 3	< 6	< 3	< 5	< 9	< 3	< 3	< 20	< 5
	04/12/18 - 04/12/18	< 6	< 5	< 11	< 6	< 12	< 7	< 10	< 10	< 6	< 7	< 26	< 6
	07/12/18 - 07/12/18	< 7	< 7	< 17	< 9	< 14	< 8	< 14	< 12	< 9	< 8	< 36	< 10
	10/11/18 - 10/11/18	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 6	< 2	< 2	< 13	< 4
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-54	01/11/18 - 01/11/18	< 2	< 2	< 5	< 2	< 4	< 3	< 4	< 6	< 2	< 2	< 14	< 4
	04/12/18 - 04/12/18	< 6	< 6	< 11	< 5	< 9	< 6	< 10	< 9	< 6	< 5	< 26	< 9
	07/12/18 - 07/12/18	< 7	< 7	< 10	< 6	< 16	< 9	< 13	< 11	< 7	< 7	< 29	< 14
	10/11/18 - 10/11/18	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 6	< 2	< 2	< 13	< 4
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-IV.1

CONCENTRATIONS OF NICKEL-63 AND GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	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														
Common Carp	05/07/18	< 58	< 58	< 55	< 133	< 63	< 112	< 57	< 108	< 224	< 76	< 58	< 384	< 176
Golden Redhorse	05/07/18	< 69	< 57	< 52	< 141	< 45	< 115	< 76	< 121	< 240	< 67	< 56	< 457	< 92
Smallmouth Bass	10/16/18	< 46	< 55	< 68	< 121	< 76	< 100	< 65	< 117	< 191	< 71	< 54	< 426	< 173
Golden Redhorse	10/16/18	< 50	< 85	< 83	< 193	< 92	< 160	< 102	< 150	< 309	< 92	< 95	< 688	< 199
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-
BD-28														
Common Carp	05/07/18	< 62	< 36	< 41	< 104	< 40	< 70	< 48	< 80	< 160	< 55	< 43	< 425	< 129
Golden Redhorse	05/07/18	< 47	< 70	< 67	< 170	< 66	< 99	< 76	< 131	< 281	< 69	< 64	< 559	< 170
Smallmouth Bass	10/16/18	< 42	< 63	< 68	< 128	< 64	< 162	< 86	< 102	< 196	< 79	< 60	< 570	< 132
Golden Redhorse	10/16/18	< 72	< 66	< 72	< 147	< 84	< 156	< 67	< 154	< 240	< 76	< 70	< 494	< 213
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-
BD-41														
Common Carp	05/07/18	< 70	< 47	< 50	< 100	< 45	< 126	< 59	< 108	< 190	< 47	< 64	< 384	< 85
Largemouth Bass	05/07/18	< 50	< 44	< 49	< 97	< 47	< 123	< 47	< 77	< 192	< 51	< 44	< 322	< 118
Bluegill	10/16/18	< 123	< 82	< 70	< 193	< 95	< 190	< 86	< 135	< 338	< 88	< 88	< 538	< 180
Largemouth Bass	10/16/18	< 44	< 51	< 52	< 197	< 78	< 113	< 71	< 106	< 236	< 71	< 45	< 451	< 120
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-

Table C-V.1

CONCENTRATIONS OF NICKEL-63 AND GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/KG DRY ± 2 SIGMA

SITE	COLLECTION PERIOD	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	05/16/18	< 230	< 70	< 63	< 137	< 83	< 127	< 70	< 156	< 92	168 ± 75	< 379	< 87
	10/16/18	< 144	< 41	< 39	< 104	< 44	< 103	< 43	< 71	< 52	79 ± 42	< 234	< 70
	MEAN ± 2 STD DEV	-	-	-	-	-	-	-	-	-	124 ± 126	-	-
BD-25	05/16/18	< 233	< 62	< 56	< 129	< 60	< 125	< 67	< 101	< 66	< 73	< 301	< 86
	10/16/18	< 142	< 53	< 63	< 135	< 63	< 140	< 56	< 98	< 64	< 70	< 334	< 107
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-57	05/16/18	< 231	< 59	< 60	< 138	< 63	< 162	< 72	< 107	< 83	< 84	< 330	< 107
	10/16/18	< 148	< 67	< 57	< 145	< 59	< 164	< 73	< 124	< 75	90 ± 60	< 344	< 117
	MEAN ± 2 STD DEV	-	-	-	-	-	-	-	-	-	90 ± 0	-	-

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

Table C-VI.1

CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

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
01/04/18 - 01/11/18	22 ± 5	22 ± 5	16 ± 4	18 ± 5	20 ± 5	18 ± 5	24 ± 5	21 ± 5
01/11/18 - 01/18/18	19 ± 4	16 ± 4	17 ± 4	14 ± 4	15 ± 4	17 ± 4	20 ± 4	19 ± 4
01/18/18 - 01/25/18	17 ± 4	19 ± 4	20 ± 4	17 ± 4	20 ± 4	20 ± 4	17 ± 4	14 ± 4
01/25/18 - 02/01/18	16 ± 4	11 ± 4	15 ± 4	19 ± 4	14 ± 4	15 ± 4	14 ± 4	16 ± 4
02/01/18 - 02/08/18	24 ± 5	19 ± 4	21 ± 4	22 ± 4	20 ± 4	21 ± 5	17 ± 4	18 ± 4
02/08/18 - 02/15/18	19 ± 4	20 ± 4	20 ± 4	20 ± 5	16 ± 4	15 ± 4	16 ± 4	24 ± 5
02/15/18 - 02/22/18	18 ± 4	15 ± 4	16 ± 4	19 ± 4	15 ± 4	19 ± 4	14 ± 4	16 ± 4
02/22/18 - 03/01/18	18 ± 4	18 ± 4	17 ± 4	18 ± 4	14 ± 4	20 ± 4	17 ± 4	13 ± 4
03/01/18 - 03/08/18	15 ± 4	15 ± 4	12 ± 4	13 ± 4	13 ± 4	17 ± 4	15 ± 4	14 ± 4
03/08/18 - 03/15/18	18 ± 4	15 ± 4	17 ± 4	18 ± 4	19 ± 4	20 ± 4	18 ± 4	14 ± 4
03/15/18 - 03/22/18	19 ± 4	18 ± 4	18 ± 4	17 ± 4	14 ± 4	17 ± 4	14 ± 4	15 ± 4
03/22/18 - 03/29/18	16 ± 4	15 ± 4	16 ± 4	11 ± 4	12 ± 4	16 ± 4	15 ± 4	13 ± 4
03/29/18 - 04/05/18	19 ± 4	20 ± 4	18 ± 4	22 ± 4	16 ± 4	19 ± 4	21 ± 4	21 ± 4
04/05/18 - 04/12/18	20 ± 5	20 ± 4	17 ± 4	18 ± 4	18 ± 4	17 ± 4	13 ± 4	22 ± 5
04/12/18 - 04/18/18	12 ± 4	12 ± 4	7 ± 4	7 ± 4	6 ± 4	9 ± 4	8 ± 4	8 ± 4
04/18/18 - 04/26/18	15 ± 4	15 ± 4	13 ± 3	14 ± 4	11 ± 3	15 ± 4	12 ± 3	13 ± 4
04/26/18 - 05/03/18	18 ± 5	16 ± 5	14 ± 4	15 ± 5	15 ± 5	15 ± 5	13 ± 5	14 ± 5
05/03/18 - 05/10/18	16 ± 4	19 ± 4	19 ± 4	17 ± 4	16 ± 4	18 ± 4	17 ± 4	15 ± 4
05/10/18 - 05/17/18	14 ± 4	13 ± 4	14 ± 4	16 ± 4	14 ± 4	16 ± 4	18 ± 4	16 ± 4
05/17/18 - 05/24/18	13 ± 4	10 ± 4	11 ± 4	10 ± 4	9 ± 4	10 ± 4	15 ± 4	11 ± 4
05/24/18 - 05/31/18	20 ± 5	19 ± 5	20 ± 5	16 ± 4	17 ± 4	16 ± 4	18 ± 4	20 ± 5
05/31/18 - 06/07/18	14 ± 4	13 ± 4	9 ± 3	14 ± 4	12 ± 4	13 ± 4	12 ± 4	15 ± 4
06/07/18 - 06/14/18	16 ± 4	19 ± 4	16 ± 4	14 ± 4	13 ± 4	20 ± 5	20 ± 4	18 ± 4
06/14/18 - 06/21/18	11 ± 4	11 ± 4	13 ± 4	14 ± 4	15 ± 4	12 ± 4	14 ± 4	11 ± 4
06/21/18 - 06/28/18	12 ± 4	12 ± 4	11 ± 4	12 ± 4	10 ± 4	9 ± 4	9 ± 4	9 ± 4
06/28/18 - 07/05/18	15 ± 4	16 ± 4	14 ± 4	16 ± 4	16 ± 4	14 ± 4	19 ± 4	16 ± 4
07/05/18 - 07/12/18	19 ± 5	17 ± 4	15 ± 4	18 ± 5	17 ± 4	14 ± 4	18 ± 5	19 ± 5
07/12/18 - 07/19/18	11 ± 4	17 ± 4	17 ± 4	13 ± 4	13 ± 4	15 ± 4	19 ± 4	17 ± 4
07/19/18 - 07/26/18	18 ± 4	18 ± 4	18 ± 4	17 ± 4	19 ± 4	17 ± 4	17 ± 4	18 ± 4
07/26/18 - 08/02/18	16 ± 4	20 ± 4	18 ± 4	18 ± 4	20 ± 4	20 ± 4	19 ± 5	20 ± 5
08/02/18 - 08/09/18	30 ± 5	25 ± 5	31 ± 5	29 ± 5	25 ± 4	30 ± 5	33 ± 5	24 ± 5
08/09/18 - 08/15/18	23 ± 5	18 ± 5	23 ± 5	20 ± 5	21 ± 5	24 ± 5	22 ± 5	21 ± 5
08/15/18 - 08/23/18	15 ± 4	16 ± 4	16 ± 4	10 ± 3	16 ± 4	21 ± 4	22 ± 4	17 ± 4
08/23/18 - 08/30/18	23 ± 5	20 ± 5	21 ± 5	19 ± 5	18 ± 4	23 ± 5	25 ± 5	24 ± 5
08/30/18 - 09/06/18	13 ± 4	10 ± 4	11 ± 4	14 ± 4	8 ± 4	11 ± 4	11 ± 4	8 ± 4
09/06/18 - 09/13/18	13 ± 4	15 ± 4	12 ± 4	13 ± 4	13 ± 4	11 ± 4	15 ± 4	12 ± 4
09/13/18 - 09/20/18	25 ± 4	18 ± 4	17 ± 4	21 ± 4	21 ± 4	20 ± 4	17 ± 4	19 ± 4
09/20/18 - 09/27/18	10 ± 4	15 ± 4	10 ± 4	12 ± 4	8 ± 4	10 ± 4	13 ± 4	12 ± 4
09/27/18 - 10/04/18	15 ± 4	14 ± 4	17 ± 4	15 ± 4	15 ± 4	19 ± 4	19 ± 4	17 ± 4
10/04/18 - 10/11/18	7 ± 4	11 ± 4	9 ± 4	12 ± 4	8 ± 4	10 ± 4	9 ± 4	12 ± 4
10/11/18 - 10/18/18	17 ± 4	10 ± 3	12 ± 4	12 ± 4	11 ± 4	12 ± 4	< 4	16 ± 4
10/18/18 - 10/25/18	9 ± 4	15 ± 4	11 ± 4	10 ± 4	9 ± 4	9 ± 4	11 ± 4	12 ± 4
10/25/18 - 11/01/18	22 ± 5	19 ± 4	20 ± 4	24 ± 5	18 ± 4	21 ± 4	21 ± 5	26 ± 5
11/01/18 - 11/08/18	11 ± 4	11 ± 4	11 ± 4	12 ± 4	10 ± 3	12 ± 4	14 ± 4	11 ± 3
11/08/18 - 11/15/18	21 ± 4	21 ± 4	18 ± 4	21 ± 5	20 ± 4	18 ± 4	17 ± 4	19 ± 4
11/15/18 - 11/21/18	19 ± 5	19 ± 5	22 ± 6	24 ± 6	20 ± 6	21 ± 6	20 ± 5	22 ± 6
11/21/18 - 11/29/18	29 ± 5	27 ± 5	29 ± 5	32 ± 5	29 ± 5	29 ± 5	33 ± 5	29 ± 5
11/29/18 - 12/06/18	20 ± 5	14 ± 4	18 ± 5	19 ± 5	12 ± 5	16 ± 4	15 ± 4	16 ± 5
12/06/18 - 12/13/18	41 ± 6	35 ± 5	35 ± 5	39 ± 6	38 ± 5	34 ± 5	39 ± 5	38 ± 6
12/13/18 - 12/20/18	25 ± 5	30 ± 5	23 ± 4	25 ± 5	26 ± 5	22 ± 5	27 ± 5	28 ± 5
12/20/18 - 12/27/18	23 ± 5	17 ± 4	19 ± 4	19 ± 4	16 ± 4	19 ± 4	20 ± 4	22 ± 5
MEAN ± 2 STD DEV	18 ± 12	17 ± 10	17 ± 11	17 ± 11	16 ± 11	17 ± 10	18 ± 12	17 ± 11

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

Table C-VI.2 **MONTHLY AND YEARLY VALUES OF GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018**

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
01/04/18 - 02/01/18	11	22	18 ± 6	01/04/18 - 02/01/18	14	24	18 ± 6	01/04/18 - 02/01/18	14	21	18 ± 6
02/01/18 - 03/01/18	15	24	19 ± 4	02/01/18 - 03/01/18	14	21	17 ± 5	02/01/18 - 03/01/18	13	24	18 ± 9
03/01/18 - 03/29/18	11	19	16 ± 5	03/01/18 - 03/29/18	12	20	16 ± 5	03/01/18 - 03/29/18	13	15	14 ± 1
03/29/18 - 05/03/18	7	22	16 ± 8	03/29/18 - 05/03/18	6	21	14 ± 8	03/29/18 - 05/03/18	8	22	16 ± 12
05/03/18 - 05/31/18	10	20	15 ± 7	05/03/18 - 05/31/18	9	18	15 ± 6	05/03/18 - 05/31/18	11	20	15 ± 8
05/31/18 - 06/28/18	9	19	13 ± 5	05/31/18 - 06/28/18	9	20	13 ± 7	05/31/18 - 06/28/18	9	18	13 ± 7
06/28/18 - 08/02/18	11	20	16 ± 4	06/28/18 - 08/02/18	13	20	17 ± 5	06/28/18 - 08/02/18	16	20	18 ± 3
08/02/18 - 08/30/18	10	31	21 ± 11	08/02/18 - 08/30/18	16	33	23 ± 10	08/02/18 - 08/30/18	17	24	21 ± 7
08/30/18 - 10/04/18	10	25	14 ± 7	08/30/18 - 10/04/18	8	21	14 ± 8	08/30/18 - 10/04/18	8	19	13 ± 9
10/04/18 - 11/01/18	7	24	14 ± 10	10/04/18 - 11/01/18	8	21	13 ± 10	10/04/18 - 11/01/18	12	26	17 ± 13
11/01/18 - 11/29/18	11	32	20 ± 13	11/01/18 - 11/29/18	10	33	20 ± 14	11/01/18 - 11/29/18	11	29	20 ± 15
11/29/18 - 12/27/18	14	41	25 ± 17	11/29/18 - 12/27/18	12	39	24 ± 19	11/29/18 - 12/27/18	16	38	26 ± 19
01/04/18 - 12/27/18	7	41	17 ± 11	01/04/18 - 12/27/18	6	39	17 ± 11	01/04/18 - 12/27/18	8	38	17 ± 11

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, 2018

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	01/04/18 - 03/29/18	< 3	< 4	< 7	< 2	< 8	< 3	< 7	< 3	< 4	< 56	< 17
	03/29/18 - 06/28/18	< 2	< 2	< 3	< 2	< 5	< 2	< 3	< 2	< 1	< 19	< 4
	06/28/18 - 09/27/18	< 3	< 2	< 3	< 2	< 5	< 2	< 5	< 2	< 2	< 33	< 8
	09/27/18 - 12/27/18	< 3	< 3	< 4	< 2	< 5	< 2	< 4	< 2	< 3	< 19	< 6
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BD-03	01/04/18 - 03/29/18	< 4	< 3	< 6	< 2	< 7	< 3	< 8	< 5	< 3	< 59	< 12
	03/29/18 - 06/28/18	< 3	< 3	< 7	< 3	< 7	< 3	< 5	< 3	< 3	< 20	< 10
	06/28/18 - 09/27/18	< 4	< 5	< 9	< 4	< 9	< 4	< 8	< 4	< 3	< 63	< 24
	09/27/18 - 12/27/18	< 2	< 2	< 5	< 2	< 5	< 3	< 3	< 1	< 3	< 14	< 7
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BD-04	01/04/18 - 03/29/18	< 4	< 4	< 9	< 3	< 10	< 3	< 6	< 4	< 3	< 38	< 21
	03/29/18 - 06/28/18	< 4	< 4	< 10	< 4	< 8	< 3	< 8	< 4	< 3	< 27	< 12
	06/28/18 - 09/27/18	< 2	< 3	< 7	< 3	< 4	< 2	< 5	< 2	< 2	< 35	< 14
	09/27/18 - 12/27/18	< 2	< 2	< 6	< 3	< 6	< 2	< 4	< 2	< 3	< 15	< 6
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BD-05	01/04/18 - 03/29/18	< 3	< 3	< 12	< 4	< 8	< 3	< 3	< 4	< 2	< 50	< 21
	03/29/18 - 06/28/18	< 2	< 3	< 6	< 3	< 6	< 2	< 4	< 2	< 2	< 22	< 6
	06/28/18 - 09/27/18	< 4	< 4	< 11	< 3	< 10	< 5	< 9	< 4	< 3	< 68	< 27
	09/27/18 - 12/27/18	< 2	< 2	< 4	< 3	< 5	< 2	< 4	< 2	< 2	< 14	< 7
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BD-06	01/04/18 - 03/29/18	< 3	< 3	< 7	< 2	< 9	< 3	< 7	< 2	< 3	< 50	< 25
	03/29/18 - 06/28/18	< 3	< 3	< 7	< 2	< 7	< 3	< 6	< 3	< 3	< 25	< 10
	06/28/18 - 09/27/18	< 3	< 3	< 7	< 3	< 5	< 3	< 5	< 3	< 2	< 39	< 12
	09/27/18 - 12/27/18	< 3	< 2	< 5	< 3	< 5	< 2	< 3	< 2	< 2	< 15	< 5
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-VI.3

CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

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	01/04/18 - 03/29/18	< 3	< 4	< 7	< 4	< 7	< 4	< 5	< 3	< 3	< 45	< 12
	03/29/18 - 06/28/18	< 2	< 3	< 6	< 3	< 4	< 2	< 4	< 2	< 2	< 18	< 7
	06/28/18 - 09/27/18	< 2	< 4	< 8	< 3	< 6	< 3	< 5	< 3	< 2	< 50	< 12
	09/27/18 - 12/27/18	< 3	< 3	< 7	< 3	< 7	< 3	< 4	< 3	< 3	< 17	< 7
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BD-20	01/04/18 - 03/29/18	< 3	< 3	< 5	< 5	< 10	< 4	< 8	< 4	< 3	< 40	< 21
	03/29/18 - 06/28/18	< 2	< 2	< 4	< 2	< 5	< 2	< 4	< 2	< 2	< 18	< 5
	06/28/18 - 09/27/18	< 2	< 2	< 7	< 2	< 5	< 3	< 4	< 2	< 2	< 37	< 9
	09/27/18 - 12/27/18	< 2	< 2	< 5	< 2	< 7	< 3	< 5	< 2	< 2	< 13	< 7
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BD-21	01/04/18 - 03/29/18	< 4	< 3	< 11	< 3	< 6	< 2	< 8	< 4	< 2	< 54	< 17
	03/29/18 - 06/28/18	< 2	< 3	< 6	< 2	< 5	< 3	< 4	< 2	< 2	< 21	< 8
	06/28/18 - 09/27/18	< 4	< 4	< 11	< 4	< 6	< 4	< 6	< 4	< 3	< 76	< 27
	09/27/18 - 12/27/18	< 3	< 3	< 6	< 3	< 7	< 3	< 6	< 4	< 3	< 18	< 6
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-VII.1 CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

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
01/04/18 - 01/11/18	< 63	< 65	< 64	< 65	< 65	< 68	< 27	< 65
01/11/18 - 01/18/18	< 46	< 46	< 43	< 45	< 55	< 57	< 57	< 57
01/18/18 - 01/25/18	< 48	< 48	< 48	< 22	< 41	< 44	< 41	< 42
01/25/18 - 02/01/18	< 25	< 24	< 20	< 25	< 46	< 44	< 47	< 45
02/01/18 - 02/08/18	< 30	< 30	< 30	< 30	< 36	< 38	< 35	< 36
02/08/18 - 02/15/18	< 50	< 50	< 51	< 53	< 46	< 49	< 47	< 49
02/15/18 - 02/22/18	< 31	< 30	< 24	< 29	< 49	< 50	< 49	< 49
02/22/18 - 03/01/18	< 32	< 31	< 31	< 31	< 49	< 46	< 48	< 48
03/01/18 - 03/08/18	< 36	< 34	< 34	< 34	< 33	< 34	< 33	< 33
03/08/18 - 03/15/18	< 33	< 32	< 32	< 33	< 53	< 54	< 53	< 53
03/15/18 - 03/22/18	< 28	< 27	< 27	< 27	< 38	< 39	< 38	< 40
03/22/18 - 03/29/18	< 34	< 34	< 34	< 33	< 39	< 38	< 40	< 40
03/29/18 - 04/05/18	< 51	< 50	< 51	< 51	< 59	< 61	< 58	< 56
04/05/18 - 04/12/18	< 36	< 36	< 35	< 37	< 52	< 53	< 53	< 54
04/12/18 - 04/18/18	< 28	< 29	< 28	< 30	< 61	< 61	< 61	< 62
04/18/18 - 04/26/18	< 35	< 35	< 34	< 37	< 5	< 13	< 13	< 13
04/26/18 - 05/03/18	< 15	< 28	< 27	< 29	< 51	< 60	< 64	< 63
05/03/18 - 05/10/18	< 20	< 56	< 53	< 60	< 15	< 40	< 38	< 39
05/10/18 - 05/17/18	< 39	< 39	< 39	< 40	< 24	< 25	< 25	< 25
05/17/18 - 05/24/18	< 65	< 66	< 66	< 68	< 38	< 46	< 47	< 46
05/24/18 - 05/31/18	< 38	< 37	< 38	< 38	< 20	< 20	< 22	< 21
05/31/18 - 06/07/18	< 29	< 29	< 29	< 30	< 25	< 25	< 26	< 27
06/07/18 - 06/14/18	< 44	< 43	< 43	< 46	< 30	< 33	< 30	< 32
06/14/18 - 06/21/18	< 26	< 28	< 26	< 27	< 40	< 41	< 41	< 38
06/21/18 - 06/28/18	< 48	< 46	< 49	< 51	< 58	< 59	< 64	< 64
06/28/18 - 07/05/18	< 59	< 59	< 59	< 61	< 51	< 54	< 51	< 51
07/05/18 - 07/12/18	< 33	< 33	< 33	< 35	< 36	< 37	< 37	< 37
07/12/18 - 07/19/18	< 63	< 63	< 64	< 64	< 43	< 45	< 45	< 46
07/19/18 - 07/26/18	< 17	< 17	< 17	< 17	< 11	< 28	< 28	< 28
07/26/18 - 08/02/18	< 20	< 20	< 20	< 21	< 33	< 32	< 36	< 34
08/02/18 - 08/09/18	< 53	< 53	< 53	< 55	< 55	< 61	< 59	< 60
08/09/18 - 08/15/18	< 44	< 44	< 45	< 45	< 59	< 60	< 59	< 60
08/15/18 - 08/23/18	< 43	< 41	< 41	< 44	< 40	< 42	< 42	< 42
08/23/18 - 08/30/18	< 33	< 34	< 33	< 34	< 63	< 65	< 65	< 64
08/30/18 - 09/06/18	< 35	< 43	< 42	< 43	< 58	< 57	< 62	< 61
09/06/18 - 09/13/18	< 50	< 50	< 50	< 54	< 50	< 54	< 21	< 53
09/13/18 - 09/20/18	< 43	< 42	< 44	< 45	< 28	< 27	< 28	< 27
09/20/18 - 09/27/18	< 29	< 28	< 29	< 29	< 27	< 25	< 27	< 26
09/27/18 - 10/04/18	< 53	< 51	< 53	< 56	< 27	< 27	< 26	< 26
10/04/18 - 10/11/18	< 63	< 31	< 62	< 63	< 59	< 57	< 57	< 57
10/11/18 - 10/18/18	< 51	< 50	< 51	< 54	< 35	< 35	< 28	< 36
10/18/18 - 10/25/18	< 47	< 46	< 47	< 49	< 51	< 50	< 50	< 50
10/25/18 - 11/01/18	< 43	< 43	< 43	< 46	< 37	< 35	< 37	< 37
11/01/18 - 11/08/18	< 36	< 36	< 37	< 37	< 43	< 45	< 43	< 43
11/08/18 - 11/15/18	< 65	< 63	< 66	< 69	< 50	< 49	< 49	< 49
11/15/18 - 11/21/18	< 52	< 52	< 53	< 55	< 56	< 54	< 54	< 54
11/21/18 - 11/29/18	< 53	< 54	< 54	< 56	< 55	< 55	< 55	< 60
11/29/18 - 12/06/18	< 42	< 41	< 43	< 43	< 51	< 43	< 44	< 48
12/06/18 - 12/13/18	< 28	< 27	< 27	< 29	< 18	< 18	< 18	< 20
12/13/18 - 12/20/18	< 55	< 55	< 55	< 57	< 57	< 57	< 55	< 62
12/20/18 - 12/27/18	< 56	< 53	< 56	< 57	< 51	< 47	< 49	< 48
MEAN	-	-	-	-	-	-	-	-

Table C-VIII.1 CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION	INDICATOR FARM	CONTROL FARM
PERIOD	BD-17	BD-18
01/04/18	< 0.7	< 0.8
02/01/18	< 0.4	< 0.7
03/01/18	< 0.4	< 0.5
04/05/18	< 0.7	< 0.8
05/03/18	< 1.0	*(1)*
05/17/18	< 0.7	*(1)*
05/31/18	< 0.6	< 0.9
06/14/18	< 0.2	< 0.4
06/28/18	< 0.7	*(1)*
07/11/18	*(1)*	< 1.0
07/26/18	*(1)*	< 0.8
08/09/18	*(1)*	< 0.9
08/23/18	*(1)*	< 0.9
09/05/18	*(1)*	< 0.6
09/20/18	*(1)*	< 0.9
10/04/18	*(1)*	< 0.7
10/18/18	*(1)*	< 0.4
10/31/18	*(1)*	< 0.7
12/05/18	*(1)*	< 1.0
MEAN	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VIII.2 **CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018**

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-17	01/04/18	< 7	< 7	< 14	< 8	< 15	< 9	< 12	< 8	< 7	< 31	< 8
	02/01/18	< 6	< 5	< 11	< 5	< 13	< 6	< 9	< 6	< 5	< 24	< 5
	03/01/18	< 7	< 8	< 17	< 9	< 18	< 8	< 17	< 9	< 9	< 34	< 12
	04/05/18	< 7	< 6	< 15	< 8	< 17	< 7	< 12	< 6	< 8	< 30	< 9
	05/03/18	< 11	< 10	< 17	< 9	< 21	< 11	< 18	< 9	< 12	< 50	< 8
	05/17/18	< 5	< 6	< 13	< 6	< 13	< 6	< 9	< 7	< 6	< 25	< 7
	05/31/18	< 7	< 6	< 21	< 9	< 18	< 9	< 15	< 10	< 10	< 36	< 11
	06/14/18	< 7	< 6	< 14	< 7	< 12	< 6	< 12	< 7	< 6	< 26	< 9
	06/28/18	< 7	< 8	< 15	< 6	< 19	< 8	< 14	< 10	< 9	< 34	< 7
	> July, 2018 *(1)*											
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BD-18	01/04/18	< 7	< 7	< 18	< 8	< 21	< 8	< 13	< 10	< 9	< 37	< 12
	02/01/18	< 5	< 6	< 15	< 8	< 13	< 5	< 10	< 6	< 7	< 26	< 7
	02/28/18	< 7	< 8	< 17	< 10	< 17	< 8	< 13	< 10	< 8	< 41	< 12
	04/05/18	< 6	< 5	< 11	< 7	< 14	< 6	< 11	< 6	< 5	< 27	< 8
	05/02/18 *(1)*											
	05/17/18 *(1)*											
	05/31/18	< 6	< 6	< 10	< 5	< 13	< 6	< 9	< 6	< 5	< 25	< 9
	06/14/18	< 8	< 9	< 21	< 9	< 19	< 10	< 16	< 10	< 10	< 43	< 15
	06/27/18 *(1)*											
	07/11/18	< 6	< 8	< 15	< 7	< 13	< 7	< 13	< 8	< 7	< 36	< 8
	07/26/18	< 6	< 7	< 12	< 9	< 16	< 7	< 13	< 8	< 6	< 32	< 9
	08/09/18	< 9	< 8	< 20	< 10	< 20	< 10	< 15	< 9	< 9	< 38	< 11
	08/23/18	< 6	< 8	< 20	< 6	< 18	< 8	< 13	< 8	< 8	< 40	< 9
	09/05/18	< 9	< 8	< 20	< 9	< 18	< 7	< 14	< 8	< 8	< 45	< 9
	09/20/18	< 6	< 7	< 17	< 6	< 13	< 8	< 12	< 7	< 7	< 31	< 6
	10/04/18	< 6	< 7	< 16	< 6	< 15	< 7	< 10	< 5	< 6	< 39	< 14
	10/18/18	< 5	< 7	< 14	< 8	< 16	< 5	< 9	< 5	< 6	< 26	< 7
	10/31/18	< 7	< 7	< 16	< 7	< 15	< 8	< 14	< 8	< 7	< 40	< 12
	12/05/18	< 6	< 7	< 15	< 8	< 14	< 6	< 12	< 5	< 7	< 29	< 10
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-VIII.3 **CONCENTRATIONS OF GAMMA EMITTERS IN GRASS SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018**

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
BIROS	05/02/18	< 22	< 23	< 51	< 26	< 55	< 25	< 40	< 43	< 28	< 24	< 115	< 31
	07/26/18	< 18	< 19	< 41	< 20	< 42	< 17	< 30	< 30	< 19	< 17	< 84	< 25
	09/06/18	< 43	< 48	< 100	< 50	< 101	< 48	< 81	< 93	< 52	< 49	< 255	< 71
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-IX.1

CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

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													
Turnips	07/26/18	< 27	< 27	< 58	< 28	< 66	< 28	< 46	< 41	< 30	< 29	< 123	< 36
Turnip Greens	07/26/18	< 24	< 23	< 47	< 24	< 51	< 24	< 41	< 42	< 26	< 26	< 116	< 29
Dandelion Leaves	09/06/18	< 30	< 29	< 69	< 33	< 67	< 33	< 55	< 93	< 32	< 30	< 207	< 64
Dandelion Leaves	10/11/18	< 21	< 22	< 51	< 19	< 47	< 22	< 38	< 56	< 23	< 20	< 126	< 36
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-QUAD 1													
Swiss Chard	06/21/18	< 17	< 17	< 36	< 18	< 35	< 17	< 29	< 26	< 19	< 20	< 76	< 22
Cabbage	06/21/18	< 15	< 14	< 30	< 16	< 30	< 15	< 25	< 21	< 16	< 15	< 63	< 19
Swiss Chard	08/02/18	< 23	< 23	< 56	< 23	< 57	< 26	< 49	< 58	< 25	< 31	< 157	< 39
Cabbage	08/02/18	< 21	< 20	< 53	< 25	< 56	< 25	< 42	< 57	< 25	< 24	< 131	< 38
Kohlrabi	08/02/18	< 21	< 25	< 58	< 21	< 60	< 22	< 40	< 50	< 24	< 20	< 122	< 33
Kale	08/02/18	< 24	< 26	< 49	< 23	< 46	< 27	< 38	< 58	< 30	< 30	< 145	< 43
Swiss Chard	08/09/18	< 39	< 33	< 84	< 37	< 75	< 40	< 62	< 59	< 39	< 49	< 178	< 44
Kohlrabi	08/09/18	< 25	< 26	< 66	< 27	< 52	< 25	< 46	< 45	< 31	< 30	< 127	< 50
Kohlrabi Leaves	08/09/18	< 29	< 29	< 62	< 32	< 69	< 32	< 52	< 51	< 32	< 34	< 141	< 46
Kohlrabi	09/06/18	< 26	< 26	< 56	< 16	< 60	< 35	< 43	< 55	< 32	< 24	< 129	< 34
Kohlrabi Leaves	09/06/18	< 19	< 18	< 43	< 19	< 42	< 21	< 38	< 54	< 21	< 21	< 129	< 37
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-QUAD 2													
Lettuce	06/28/18	< 21	< 21	< 61	< 24	< 49	< 26	< 44	< 52	< 25	33 ± 18	< 137	< 36
Lettuce	06/28/18 (R1)										22 ± 10		
Red Beets	06/28/18	< 22	< 22	< 53	< 22	< 46	< 24	< 41	< 54	< 25	< 22	< 136	< 45
Red Beets	08/02/18	< 21	< 22	< 50	< 23	< 51	< 25	< 39	< 53	< 24	< 24	< 137	< 38
Red Beet Leaves	08/02/18	< 22	< 24	< 50	< 24	< 52	< 24	< 41	< 54	< 25	< 23	< 140	< 40
Potatoes	08/02/18	< 14	< 14	< 30	< 14	< 33	< 15	< 26	< 33	< 15	< 15	< 79	< 23
Cabbage	10/18/18	< 17	< 16	< 38	< 14	< 38	< 16	< 30	< 36	< 17	< 18	< 90	< 26
Carrots	10/18/18	< 15	< 19	< 39	< 20	< 38	< 18	< 31	< 58	< 18	< 18	< 125	< 36
Red Beets	10/18/18	< 19	< 19	< 47	< 20	< 41	< 21	< 36	< 41	< 21	< 20	< 106	< 26
	MEAN ± 2 STD DEV	-	-	-	-	-	-	-	-	-	27 ± 16	-	-
BD-QUAD 3													
Cabbage	07/12/18	< 17	< 16	< 39	< 17	< 41	< 16	< 30	< 24	< 16	< 18	< 76	< 21
Cabbage	08/15/18	< 25	< 21	< 39	< 25	< 58	< 25	< 34	< 45	< 24	< 25	< 119	< 29
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

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

R1 - Sample re-analyzed for confirmation

Table C-IX.1

CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

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 4													
Green Onions	06/21/18	< 19	< 17	< 37	< 19	< 40	< 18	< 30	< 26	< 20	< 19	< 79	< 26
Cauliflower	08/15/18	< 21	< 25	< 51	< 24	< 50	< 28	< 41	< 42	< 24	< 22	< 108	< 35
Beet Roots	08/30/18	< 19	< 19	< 40	< 19	< 40	< 21	< 35	< 48	< 21	< 19	< 122	< 39
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-ENE													
Clover	09/20/18	< 16	< 14	< 29	< 15	< 33	< 14	< 25	< 23	< 16	< 15	< 69	< 20
Field Grass	10/11/18	< 21	< 22	< 51	< 23	< 49	< 23	< 39	< 59	< 24	< 23	< 142	< 39
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-N													
Kale	09/06/18	< 6	< 7	< 14	< 6	< 14	< 7	< 12	< 22	< 7	< 7	< 46	< 12
Cabbage	09/06/18	< 4	< 4	< 9	< 4	< 9	< 4	< 7	< 13	< 4	< 4	< 28	< 7
Swiss Chard	09/06/18	< 6	< 7	< 16	< 7	< 16	< 8	< 13	< 24	< 8	< 9	< 51	< 13
Kale	10/11/18	< 7	< 7	< 16	< 8	< 16	< 8	< 14	< 21	< 8	< 8	< 49	< 14
Cabbage	10/11/18	< 16	< 15	< 38	< 19	< 34	< 17	< 30	< 51	< 17	< 15	< 91	< 27
Kohlrabi Leaves	10/11/18	< 7	< 8	< 16	< 7	< 16	< 7	< 12	< 24	< 8	< 7	< 51	< 15
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-NNW													
Field Grass	10/11/18	< 14	< 14	< 32	< 15	< 33	< 15	< 25	< 22	< 16	< 15	< 64	< 17
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-X.1

QUARTERLY OSLD RESULTS FOR BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF MREM/QUARTER ± 2 STANDARD DEVIATIONS

2018	Monitoring Location	Location Quarterly Baseline, BQ (mrem)	B_Q + MDD_Q (mrem)	2018 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	9.60	16.86	*10.7*	*11.2*	*15.4*	*14.6*	ND	ND	ND	ND	38.60	60.38	51.84	ND
Ind - Far	BD-02	9.40	16.66	*9.9*	*10.6*	*15.2*	*14.4*	ND	ND	ND	ND	37.40	59.18	50.04	ND
	BD-04	8.50	15.76	*9.3*	*10.2*	*14.5*	*13.3*	ND	ND	ND	ND	34.10	55.88	47.24	ND
	BD-05	9.60	16.86	*10.6*	*12.6*	*15.5*	*15.5*	ND	ND	ND	ND	38.30	60.08	54.14	ND
Ind - Inner	BD-101	9.10	16.36	*10.3*	*11.2*	*15.0*	*14.4*	ND	ND	ND	ND	36.60	58.38	50.84	ND
	BD-102	9.00	16.26	*8.8*	*10.6*	*13.8*	*13.9*	ND	ND	ND	ND	36.10	57.88	47.04	ND
	BD-103	9.00	16.26	*8.8*	*9.7*	*14.8*	*13.2*	ND	ND	ND	ND	35.90	57.68	46.44	ND
	BD-104	8.00	15.26	*8.8*	*9.4*	*13.2*	*13.6*	ND	ND	ND	ND	32.00	53.78	44.94	ND
	BD-105	8.30	15.56	*8.4*	*11.6*	*15.6*	*12.6*	ND	ND	7.27	ND	33.10	54.88	48.14	ND
	BD-106	7.90	15.16	*8.9*	*9.5*	*14.6*	*14.1*	ND	ND	ND	ND	31.70	53.48	47.04	ND
	BD-107	8.20	15.46	*9.4*	*10.5*	*14.9*	*14.7*	ND	ND	ND	ND	32.60	54.38	49.44	ND
	BD-108	8.70	15.96	*9.3*	*11.4*	*14.5*	*13.3*	ND	ND	ND	ND	34.90	56.68	48.44	ND
	BD-109	11.80	19.06	*11.2*	*13.7*	*17.9*	*16.7*	ND	ND	ND	ND	47.10	68.88	59.44	ND
	BD-110	7.90	15.16	*7.3*	*10.4*	*15.1*	*13.5*	ND	ND	ND	ND	31.70	53.48	46.24	ND
	BD-111a	8.60	15.86	*8.5*	*10.4*	*13.7*	*13.0*	ND	ND	ND	ND	34.40	56.18	45.54	ND
	BD-112	7.90	15.16	*9.2*	*9.5*	*14.6*	*13.4*	ND	ND	ND	ND	31.80	53.58	46.64	ND
	BD-113a	9.10	16.36	*10.1*	*11.1*	*15.3*	*13.1*	ND	ND	ND	ND	36.50	58.28	49.54	ND
	BD-114	8.80	16.06	*10.2*	*11.9*	*14.7*	*13.9*	ND	ND	ND	ND	35.30	57.08	50.64	ND
	BD-115	8.90	16.16	*9.4*	*10.6*	*14.5*	*14.6*	ND	ND	ND	ND	35.70	57.48	49.04	ND
	BD-116	9.60	16.86	*9.7*	*12.0*	*15.2*	*13.6*	ND	ND	ND	ND	38.20	59.98	50.44	ND
Ind - Outer	BD-201	12.20	19.46	*12.9*	*14.6*	*18.6*	*17.7*	ND	ND	ND	ND	44.00	65.78	63.74	ND
	BD-202	9.10	16.36	*9.0*	*9.9*	*14.5*	*13.5*	ND	ND	ND	ND	36.30	58.08	46.84	ND
	BD-203	8.80	16.06	*8.6*	*11.2*	*15.6*	*14.8*	ND	ND	ND	ND	35.10	56.88	50.14	ND
	BD-204	7.90	15.16	*8.3*	*9.0*	*13.8*	*13.1*	ND	ND	ND	ND	31.60	53.38	44.14	ND
	BD-205	8.20	15.46	*8.2*	*9.7*	*13.9*	*12.8*	ND	ND	ND	ND	32.90	54.68	44.54	ND
	BD-206	8.80	16.06	*10.4*	*10.6*	*14.8*	*14.0*	ND	ND	ND	ND	35.40	57.18	49.74	ND
	BD-207	7.80	15.06	*8.8*	*9.4*	*13.2*	*13.7*	ND	ND	ND	ND	31.10	52.88	45.04	ND
	BD-208	8.70	15.96	*9.4*	*10.8*	*14.8*	*13.6*	ND	ND	ND	ND	34.90	56.68	48.54	ND
	BD-209	13.20	20.46	*13.8*	*14.0*	*18.5*	*17.3*	ND	ND	ND	ND	52.90	74.68	63.54	ND
	BD-210	10.70	17.96	*11.4*	*12.9*	*17.2*	*15.4*	ND	ND	ND	ND	42.60	64.38	56.84	ND
	BD-211	13.20	20.46	*12.8*	*15.0*	*18.8*	*18.4*	ND	ND	ND	ND	52.70	74.48	64.94	ND
	BD-212	11.30	18.56	*11.1*	*11.4*	*14.5*	*13.2*	ND	ND	ND	ND	45.10	66.88	50.14	ND
	BD-213	7.70	14.96	*7.8*	*9.7*	*14.6*	*13.1*	ND	ND	ND	ND	31.00	52.78	45.14	ND
	BD-214	10.10	17.36	*10.6*	*11.6*	*18.7*	*16.6*	ND	ND	8.57	ND	40.40	62.18	57.44	ND
	BD-215	8.40	15.66	*9.2*	*9.0*	*14.3*	*14.0*	ND	ND	ND	ND	33.50	55.28	46.44	ND
	BD-216	10.80	18.06	*10.0*	*11.8*	*16.5*	*15.3*	ND	ND	ND	ND	43.10	64.88	53.54	ND
Ind- Near	BD-06	8.50	15.76	*8.3*	*9.7*	*14.4*	*13.9*	ND	ND	ND	ND	33.80	55.58	46.24	ND
	BD-19	9.80	17.06	*10.3*	*11.3*	*17.2*	*15.6*	ND	ND	7.37	ND	39.20	60.98	54.34	ND
	BD-20	9.50	16.76	*10.0*	*11.1*	*13.7*	*13.5*	ND	ND	ND	ND	37.90	59.68	48.24	ND
	BD-21	8.90	16.16	*10.4*	*10.8*	*15.2*	*14.3*	ND	ND	ND	ND	35.60	57.38	50.64	ND
Other (ISFSI)	BD-ISFSI-104-3	12.80	20.06	*12.9*	*13.9*	*19.7*	*18.4*	ND	ND	ND	ND	51.10	72.88	64.84	ND
	BD-ISFSI-104-4	12.80	20.06	*13.9*	*18.5*	*16.5*	*18.9*	ND	ND	ND	ND	51.40	73.18	67.74	ND
	BD-ISFSI-105-3	13.20	20.46	*14.7*	*16.7*	*21.8*	*19.7*	ND	ND	8.57	ND	52.80	74.58	72.84	ND
	BD-ISFSI-105-4	17.10	24.36	*26.3*	*28.2*	*30.4*	*30.4*	9.20	11.10	13.27	13.27	68.40	90.18	115.24	46.84
	BD-ISFSI-110-3	11.40	18.66	*9.6*	*15.5*	*16.6*	*18.1*	ND	ND	ND	ND	45.80	67.58	59.74	ND
	BD-ISFSI-110-4	13.20	20.46	*17.1*	*21.3*	*24.1*	*22.3*	ND	8.10	10.87	9.07	52.80	74.58	84.74	31.94

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, 2018

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	9.3 ± 1.8	10.1 ± 3.7	9.8 ± 1.6	10.7 ± 0.0	15.8 ± 11.4
APR-JUN	10.8 ± 2.3	11.3 ± 3.9	10.9 ± 1.8	11.2 ± 0.0	19.0 ± 10.3
JUL-SEP	14.8 ± 2.1	15.7 ± 3.9	15.1 ± 2.2	15.4 ± 0.0	21.5 ± 10.5
OCT-DEC	13.8 ± 1.9	14.8 ± 3.6	14.3 ± 1.8	14.6 ± 0.0	21.3 ± 9.4

TABLE C-X.3 SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF MREM/QUARTER ± 2 STANDARD DEVIATION

LOCATION	SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN ± 2 S.D.
SITE BOUNDARY	64	7.3	17.9	12.2 ± 4.9
INTERMEDIATE DISTANCE	64	7.8	18.8	13.0 ± 6.0
OTHER	28	8.3	17.2	12.5 ± 4.8
CONTROL	4	10.7	15.4	13.0 ± 4.7
ISFSI	24	9.6	30.4	19.4 ± 10.8

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

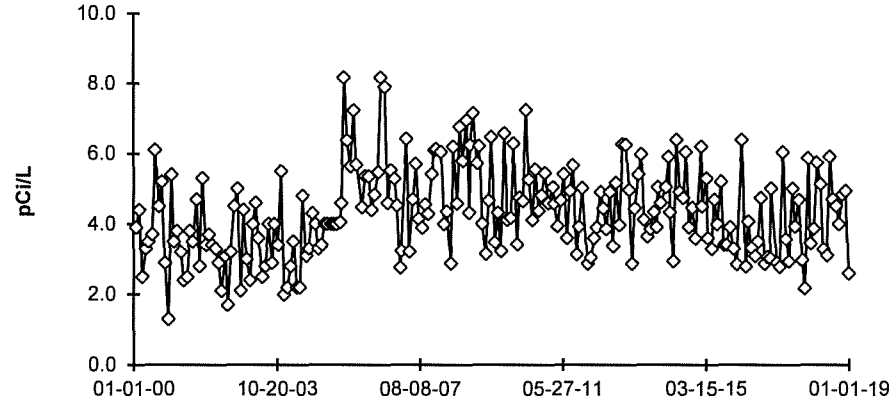
OTHER STATIONS - BD-02, BD-04, BD-05, BD-06, BD-19, BD-20, BD-21

CONTROL STATION - BD-03

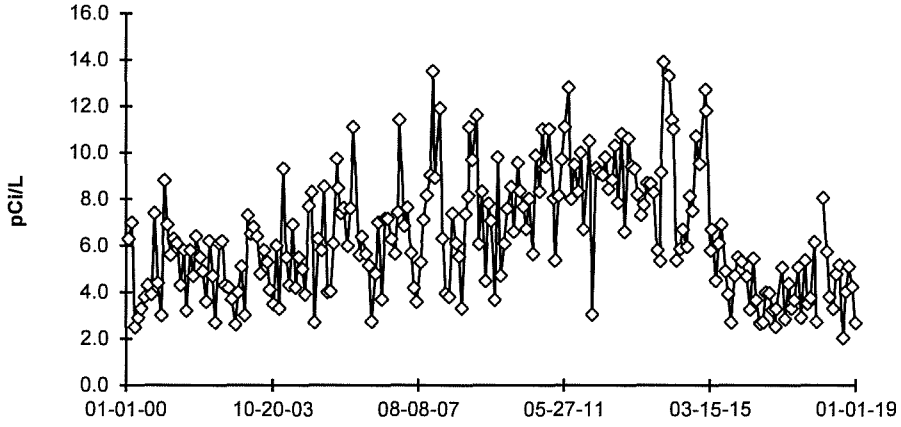
ISFSI STATIONS - BD-ISFSI-104-3, BD-ISFSI-104-4, BD-ISFSI-105-3, BD-ISFSI-105-4, BD-ISFSI-110-3, BS-ISFSI-110-4

FIGURE C-1
Surface Water - Gross Beta - Stations BD-10 and BD-25 (C) Collected in the Vicinity of Braidwood Station, 2000 - 2018

BD-10 Kankaee River, Downstream



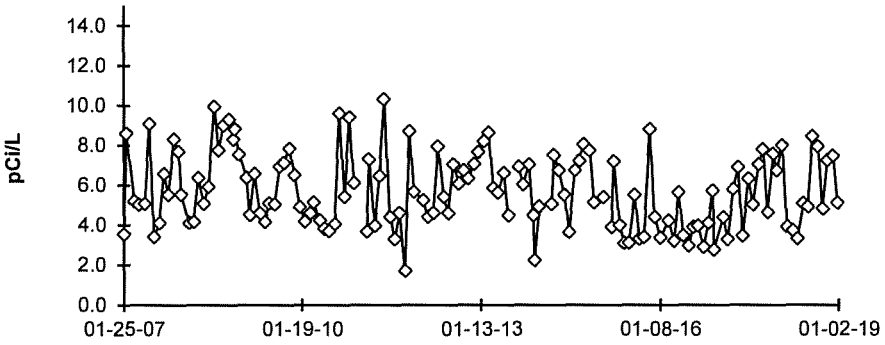
BD-25 (C) Kankakee River, Upstream



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, 2007 - 2018

BD-38 Main Drainage Ditch



BD-40 Braidwood Station Cooling Lake

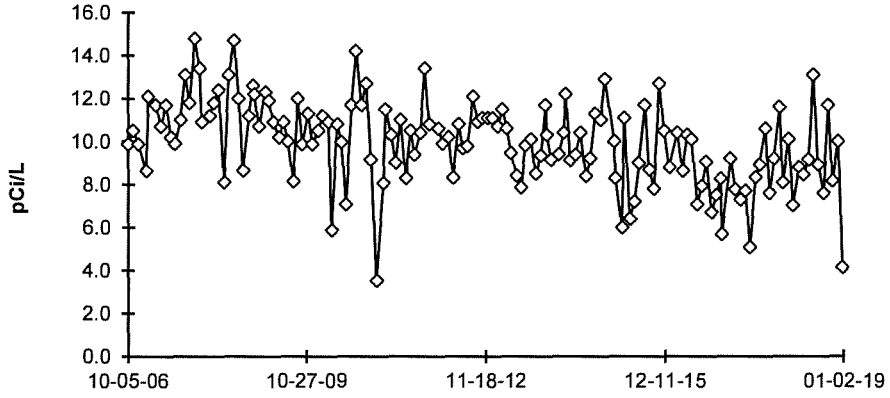
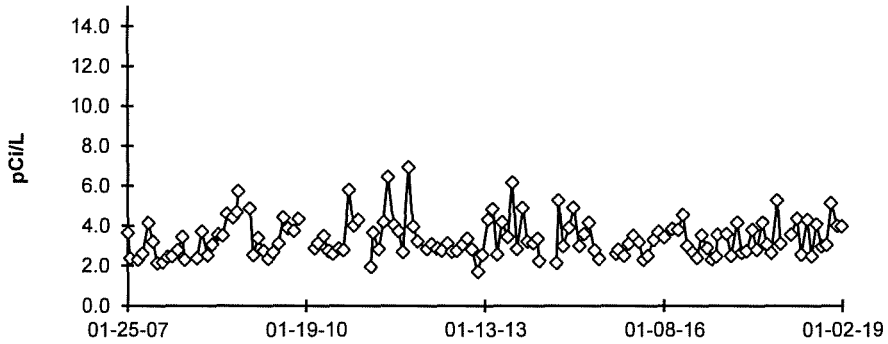
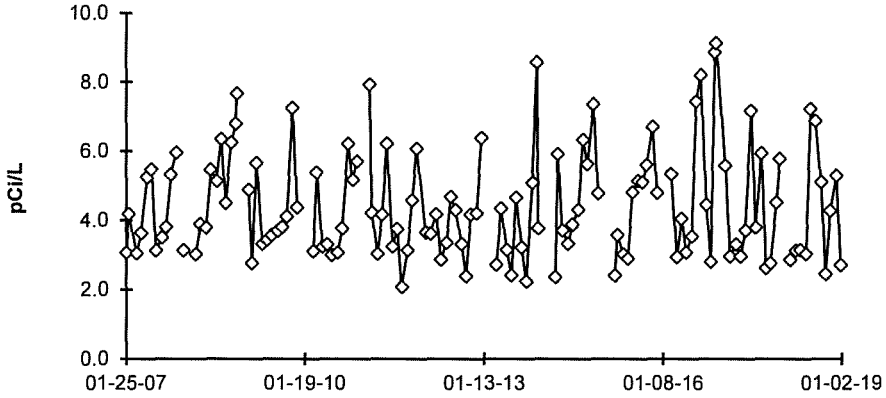


FIGURE C-3
Surface Water - Gross Beta - Stations BD-55 and BD-56 Collected in the Vicinity of Braidwood Station, 2007 - 2018

BD-55 North Pond Fatlan Site



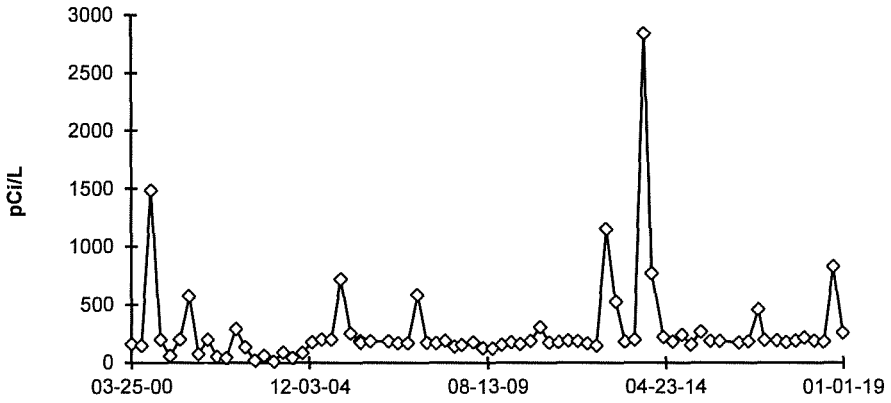
BD-56 South Pond Fatlan Site



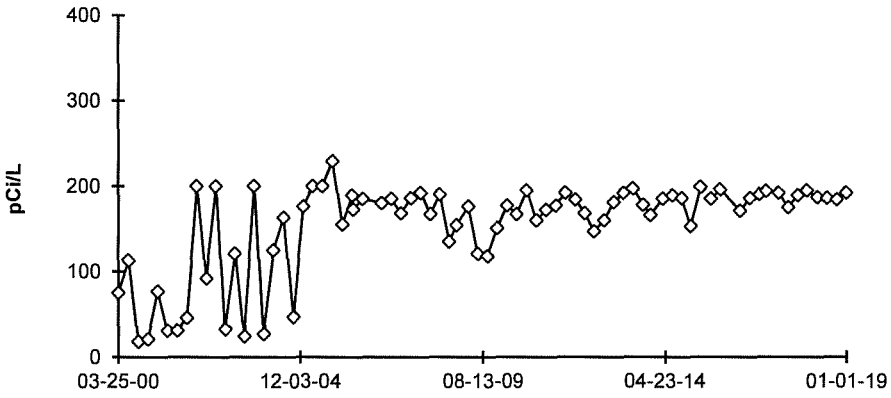
GAPS IN DATA ARE DUE TO SAMPLING POINTS BEING FROZEN AT TIME OF COLLECTION

FIGURE C-4
Surface Water - Tritium - Stations BD-10 and BD-25 (C) Collected in the Vicinity of Braidwood Station, 2000 - 2018

BD-10 Kankakee River, Downstream



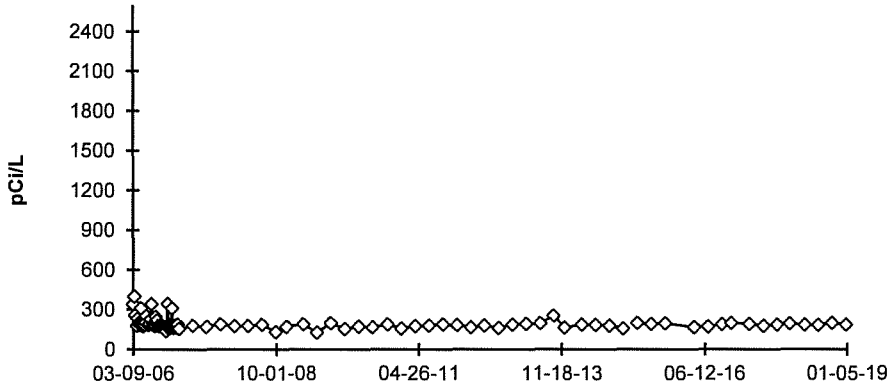
BD-25 (C) Kankakee River, Upstream



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 - 2018

BD-38 Main Drainage Ditch



BD-40 Braidwood Station Cooling Lake

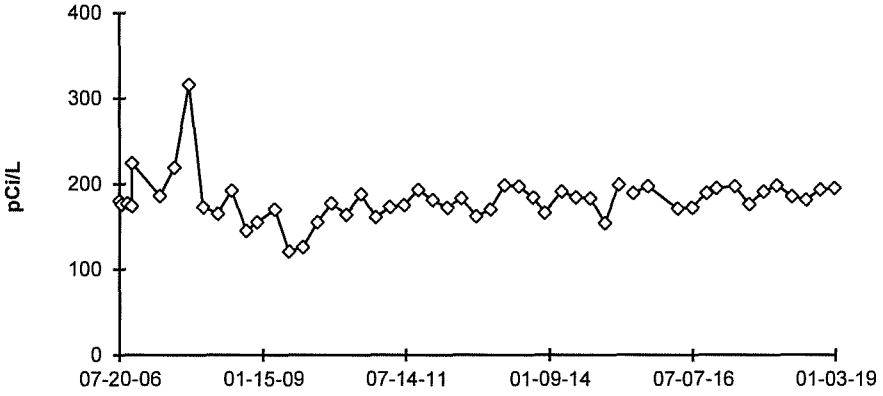
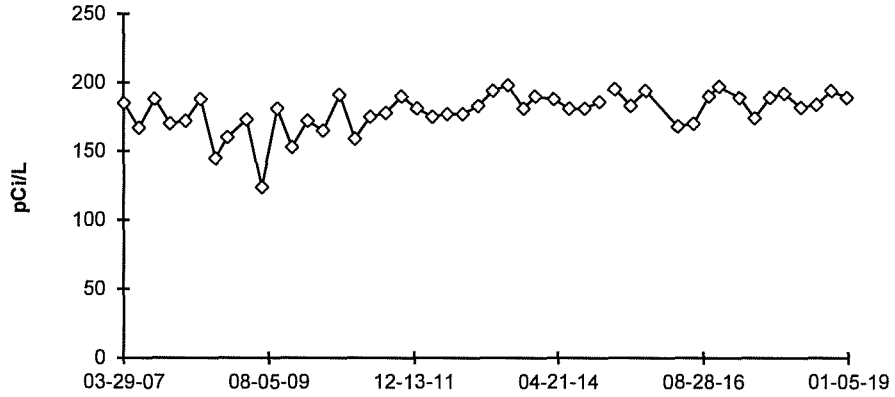


FIGURE C-6
Surface Water - Tritium - Stations BD-55 and BD-56 Collected in the Vicinity of Braidwood Station, 2007 - 2018

BD-55 North Pond Fatlan Site



BD-56 South Pond Fatlan Site

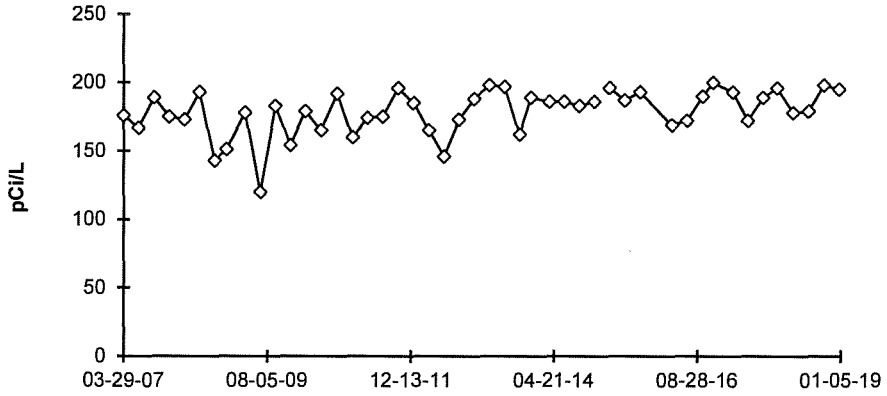
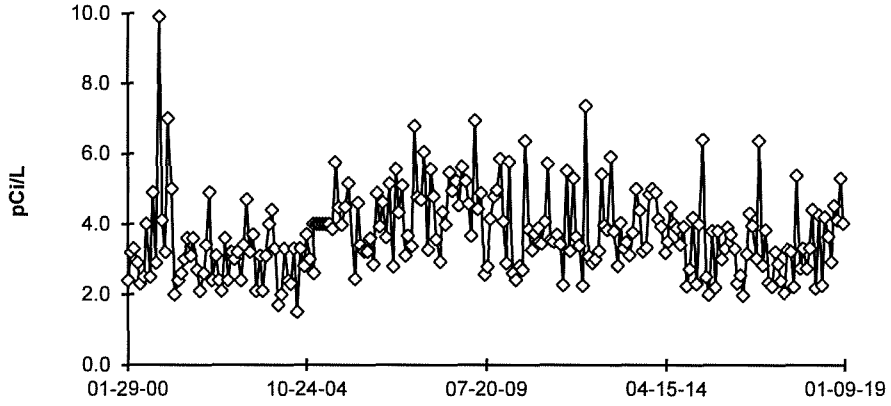


FIGURE C-7
Public Water - Gross Beta - Station BD-22
Collected in the Vicinity of Braidwood Station, 2000 - 2018

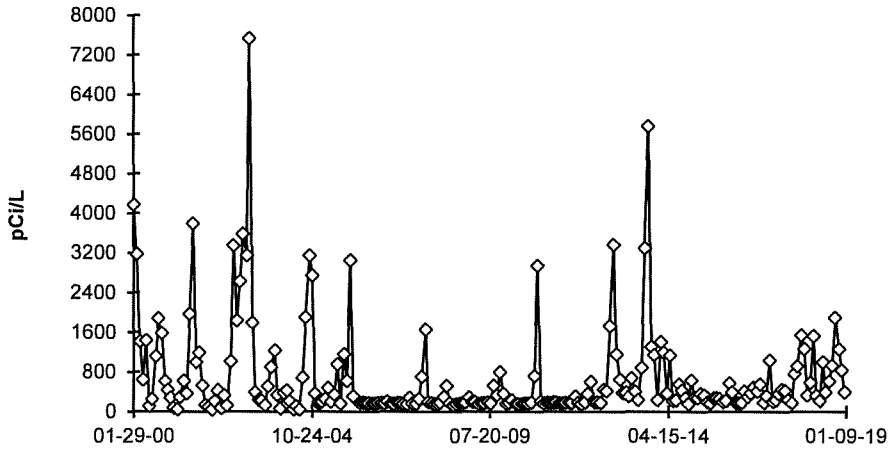
BD-22 Wilmington



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 - 2018

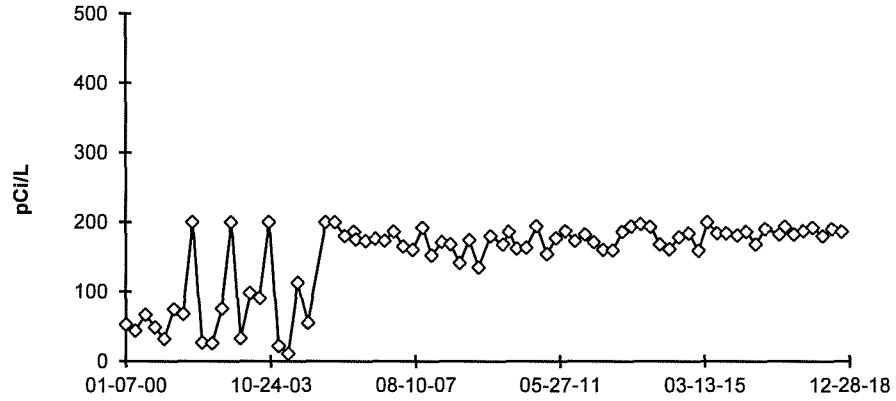
BD-22 Wilmington



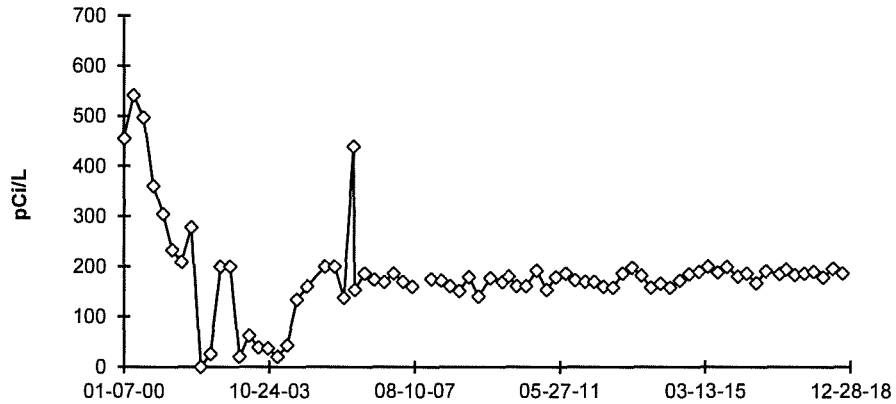
DUE TO VENDOR CHANGE, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JUNE 2005

FIGURE C-9
Ground/Well Water - Tritium - Stations BD-13 and BD-34 Collected in the Vicinity of Braidwood Station, 2000 - 2018

BD-13 Braidwood City Hall Well



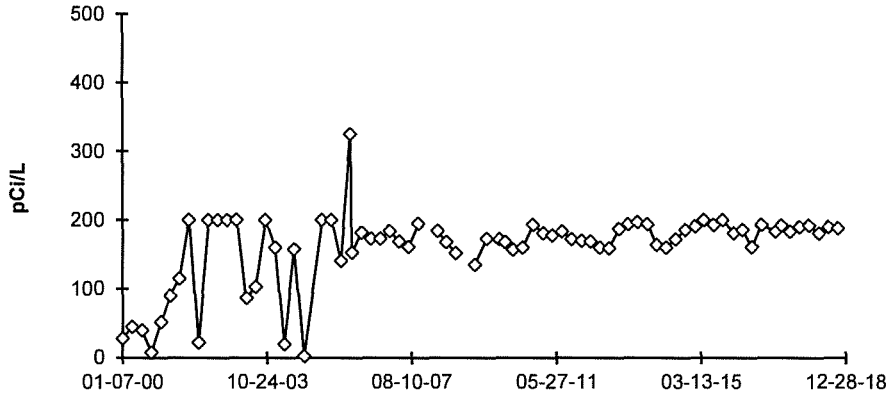
BD-34 Gibson Well



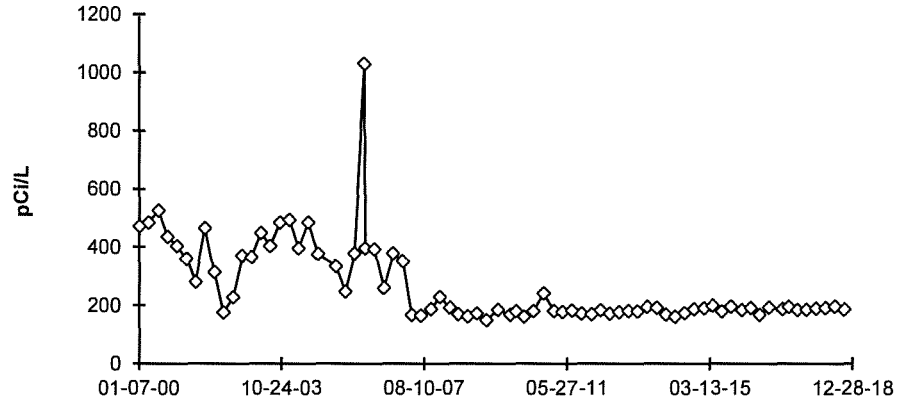
DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JULY.

FIGURE C-10
Ground/Well Water - Tritium - Stations BD-35 and BD-36 Collected in the Vicinity of Braidwood Station, 2000 - 2018

BD-35 Joly Well



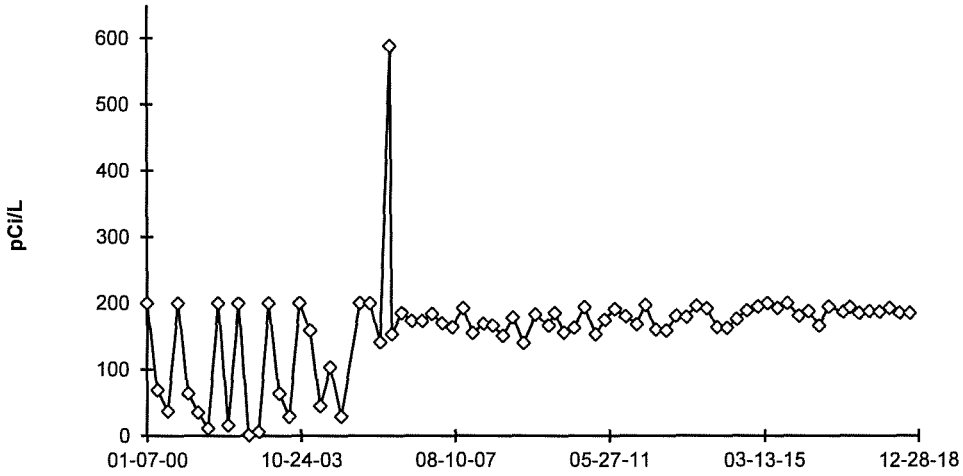
BD-36 Hutton Well



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 - 2018

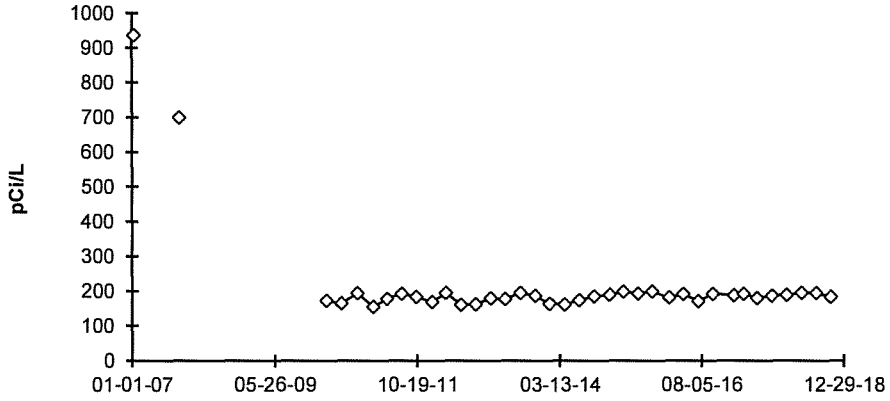
BD-37 Nurczyk Well



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

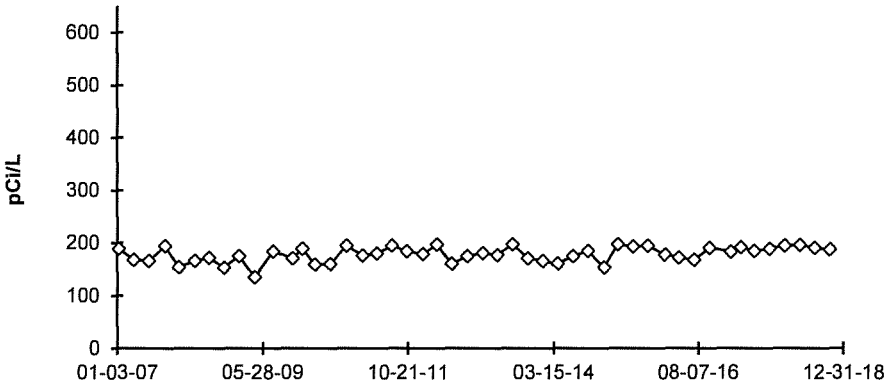
FIGURE C-12
Ground/Well Water - Tritium - Station BD-50 and BD-51 Collected in the Vicinity of Braidwood Station, 2007 - 2018

BD-50 Skole Well



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

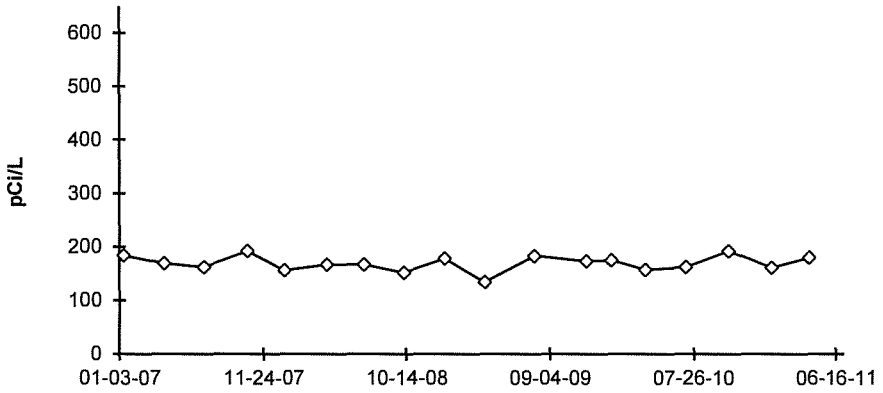
BD-51 Fatlan Well



NEW STATIONS BD-50 AND BD-51 ADDED IN 2007

FIGURE C-13
Ground/Well Water - Tritium - Stations BD-53 and BD-54 Collected in the Vicinity of Braidwood Station, 2007 - 2018

BD-53 Phelps Well*



**BD-53 was removed from the program during the 3rd quarter of 2011*

BD-54 Cash Well

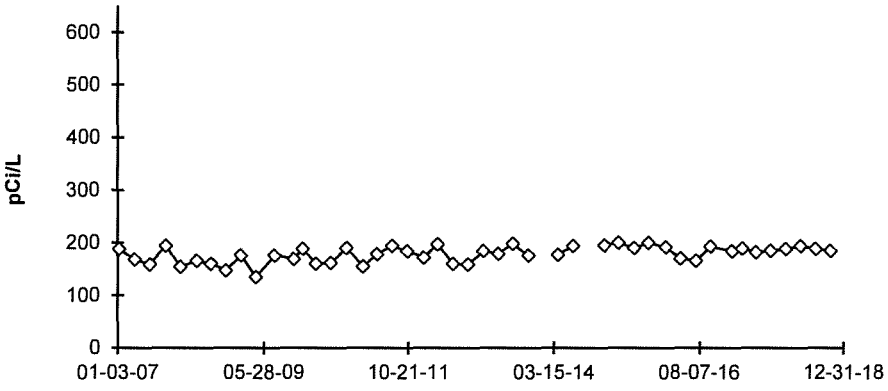
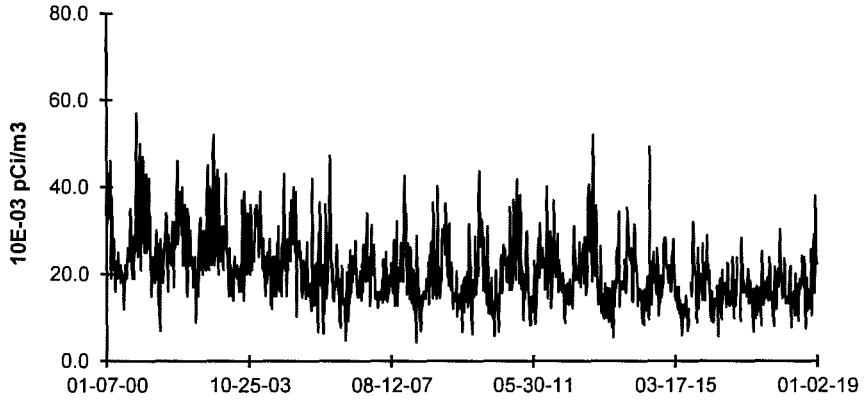


FIGURE C-14
Air Particulate - Gross Beta- Stations BD-03 (C) and BD-06 Collected in the Vicinity of Braidwood Station, 2000 - 2018

BD-03 (C) County Line Road



BD-06 Godley

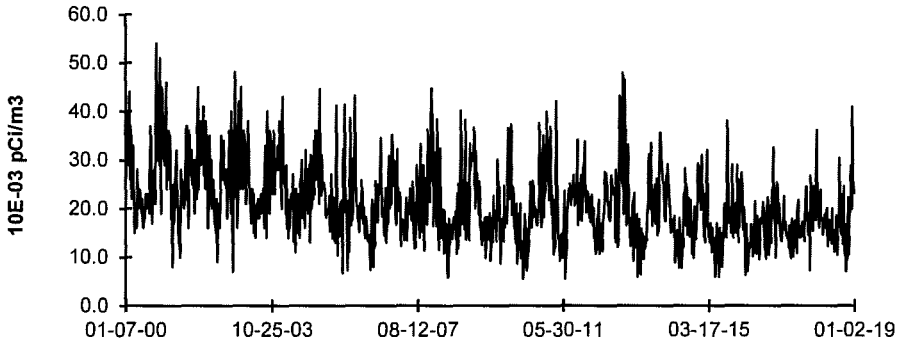
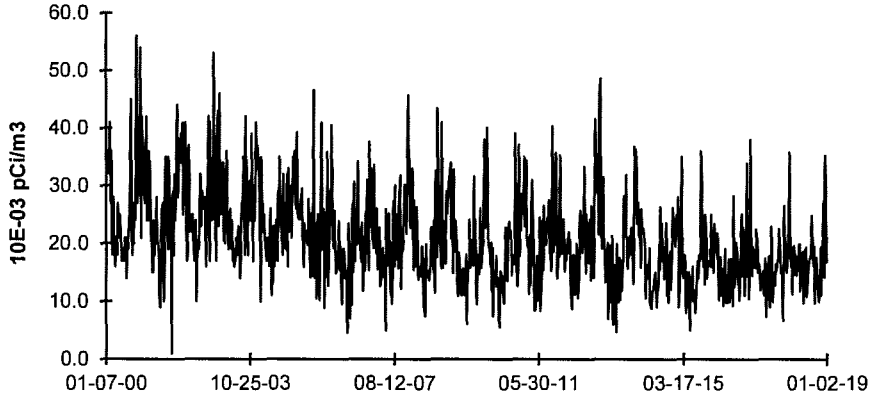


FIGURE C-15
Air Particulate - Gross Beta- Stations BD-19 and BD-20 Collected in the Vicinity of Braidwood Station, 2000 - 2018

BD-19 Near Field, NW



BD-20 Near Field, N

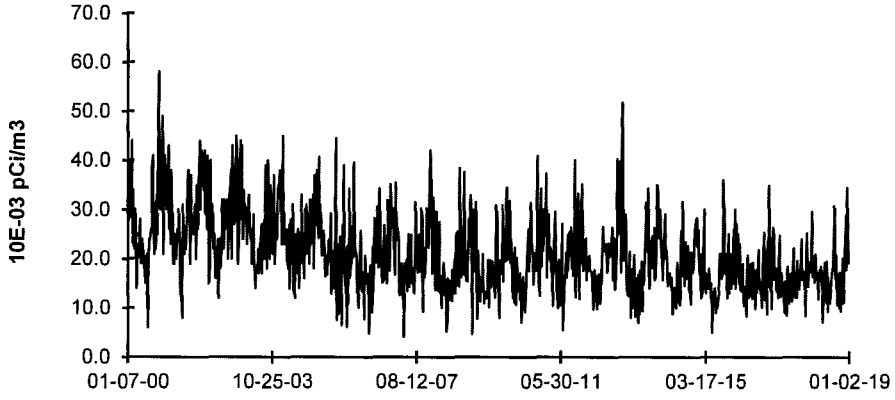


FIGURE C-16
Air Particulate - Gross Beta- Station BD-21
Collected in the Vicinity of Braidwood Station, 2000 - 2018

BD-21 Near Field, NE

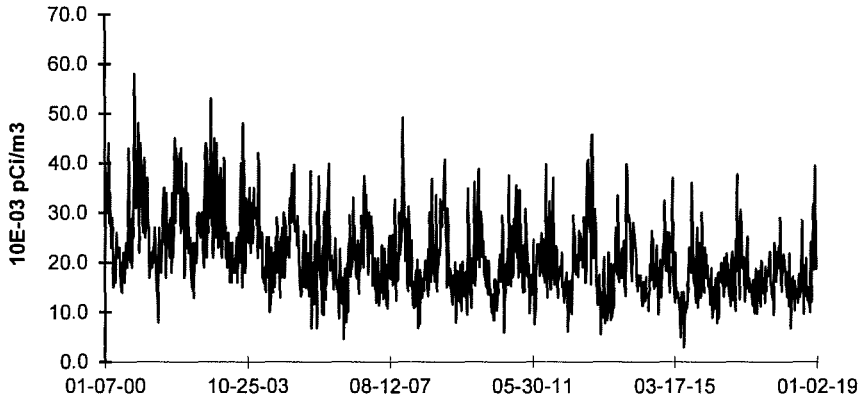
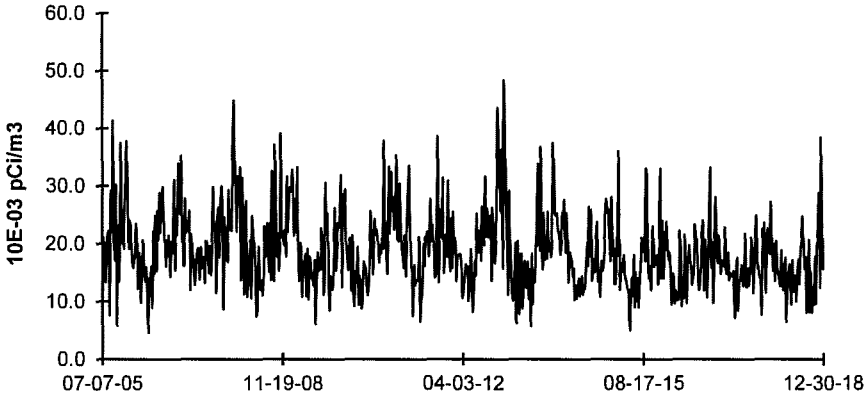


FIGURE C-17
Air Particulate - Gross Beta- Stations BD-02 and BD-04 Collected in the Vicinity of Braidwood Station, 2005 - 2018

BD-02 Near Field, NW



BD-04 Near Field, N

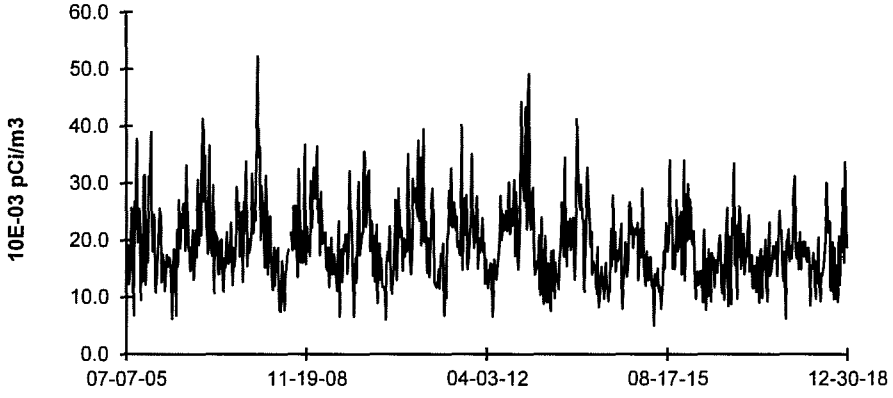
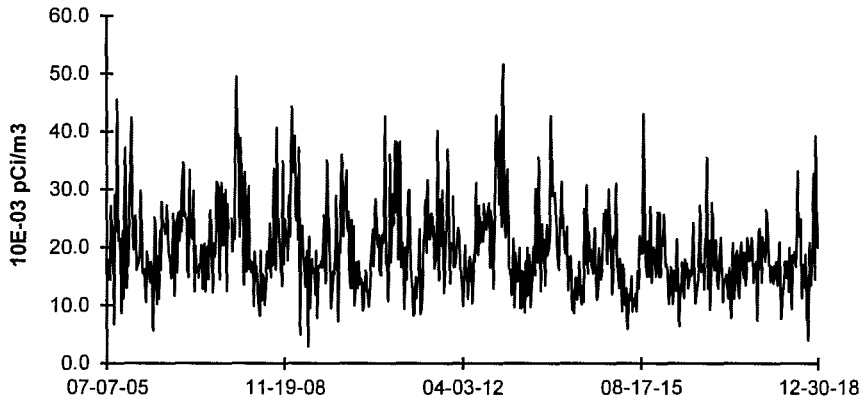


FIGURE C-18
Air Particulate - Gross Beta- Station BD-05
Collected in the Vicinity of Braidwood Station, 2005 - 2018

BD-05 Near Field, NE



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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 2018	E12133	Milk	Sr-89	pCi/L	76.1	90.1	0.84	A
			Sr-90	pCi/L	12.2	12.5	0.98	A
	E12134	Milk	Ce-141	pCi/L	77.8	77.0	1.01	A
			Co-58	pCi/L	105	114	0.92	A
			Co-60	pCi/L	181	187	0.97	A
			Cr-51	pCi/L	298	326	0.92	A
			Cs-134	pCi/L	150	180	0.84	A
			Cs-137	pCi/L	164	172	0.95	A
			Fe-59	pCi/L	140	139	1.01	A
			I-131	pCi/L	105	108.0	0.97	A
			Mn-54	pCi/L	133	131	1.01	A
			Zn-65	pCi/L	242	244	0.99	A
	E12135	Charcoal	I-131	pCi	93.7	95.4	0.98	A
	E12136	AP	Ce-141	pCi	92.6	85.3	1.09	A
			Co-58	pCi	130	126	1.03	A
			Co-60	pCi	237	207	1.14	A
			Cr-51	pCi	411	361	1.14	A
			Cs-134	pCi	194	199	0.98	A
			Cs-137	pCi	200	191	1.05	A
			Fe-59	pCi	160	154	1.04	A
			Mn-54	pCi	152	145	1.05	A
			Zn-65	pCi	267	271	0.99	A
	E12137	Water	Fe-55	pCi/L	1990	1700	1.17	A
	E12138	Soil	Ce-141	pCi/g	0.148	0.118	1.26	W
			Co-58	pCi/g	0.171	0.174	0.98	A
			Co-60	pCi/g	0.297	0.286	1.04	A
			Cr-51	pCi/g	0.537	0.498	1.08	A
			Cs-134	pCi/g	0.274	0.275	1.00	A
			Cs-137	pCi/g	0.355	0.337	1.05	A
			Fe-59	pCi/g	0.243	0.212	1.15	A
			Mn-54	pCi/g	0.228	0.201	1.14	A
			Zn-65	pCi/g	0.395	0.374	1.06	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

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]
June 2018	E12205	Milk	Sr-89	pCi/L	74.9	84.6	0.89	A
			Sr-90	pCi/L	10.5	11.4	0.92	A
	E12206	Milk	Ce-141	pCi/L	89.2	82.2	1.08	A
			Co-58	pCi/L	94.8	89	1.07	A
			Co-60	pCi/L	125	113	1.10	A
			Cr-51	pCi/L	256	239	1.07	A
			Cs-134	pCi/L	112	114	0.99	A
			Cs-137	pCi/L	107	98.8	1.08	A
			Fe-59	pCi/L	95.9	86.0	1.12	A
			I-131	pCi/L	69.8	71.9	0.97	A
			Mn-54	pCi/L	138	130	1.06	A
			Zn-65	pCi/L	186	157	1.18	A
	E12207	Charcoal	I-131	pCi	69.6	72.2	0.96	A
	E12208	AP	Ce-141	pCi	151	165	0.92	A
			Co-58	pCi	174	178	0.98	A
			Co-60	pCi	290	227	1.28	W
			Cr-51	pCi	452	478	0.95	A
			Cs-134	pCi	215	227	0.95	A
			Cs-137	pCi	206	198	1.04	A
			Fe-59	pCi	180	172	1.05	A
			Mn-54	pCi	265	260	1.02	A
			Zn-65	pCi	280	315	0.89	A
	E12209	Water	Fe-55	pCi/L	1790	1740	1.03	A
	E12210	AP	Sr-89	pCi	77.8	90.3	0.86	A
			Sr-90	pCi	9.54	12.2	0.78	W

(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

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 2018	E12271	Milk	Sr-89	pCi/L	79.4	81.7	0.97	A
			Sr-90	pCi/L	12.2	14.8	0.82	A
	E12272	Milk	Ce-141	pCi/L	152	128	1.19	A
			Co-58	pCi/L	161	144	1.12	A
			Co-60	pCi/L	208	190	1.10	A
			Cr-51	pCi/L	244	265	0.92	A
			Cs-134	pCi/L	124	123	1.01	A
			Cs-137	pCi/L	166	147	1.13	A
			Fe-59	pCi/L	158	119	1.32	N(1)
			I-131	pCi/L	83.1	58.2	1.43	N(2)
			Mn-54	pCi/L	191	167	1.14	A
			Zn-65	pCi/L	229	201	1.14	A
	E12273	Charcoal	I-131	pCi	83.0	80.7	1.03	A
	E12274	AP	Ce-141	pCi	101	85.6	1.18	A
			Co-58	pCi	92.7	96.0	0.97	A
			Co-60	pCi	142	127	1.12	A
			Cr-51	pCi	218	177	1.23	W
			Cs-134	pCi	81.2	81.9	0.99	A
			Cs-137	pCi	99.0	98.5	1.01	A
			Fe-59	pCi	93.7	79.7	1.18	A
			Mn-54	pCi	116	112	1.04	A
			Zn-65	pCi	139	134	1.04	A
	E12302	Water	Fe-55	pCi/L	2120	1820	1.17	A
	E12276	Soil	Ce-141	pCi/g	0.259	0.221	1.17	A
			Co-58	pCi/g	0.279	0.248	1.12	A
			Co-60	pCi/g	0.367	0.328	1.12	A
			Cr-51	pCi/g	0.597	0.457	1.31	N (3)
			Cs-134	pCi/g	0.261	0.212	1.23	W
			Cs-137	pCi/g	0.376	0.330	1.14	A
			Fe-59	pCi/g	0.248	0.206	1.20	A
			Mn-54	pCi/g	0.317	0.289	1.10	A
			Zn-65	pCi/g	0.407	0.347	1.17	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 18-20***
*(2) See **NCR 18-24***
*(3) See **NCR 18-21***

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]
December 2018	E12313	Milk	Sr-89	pCi/L	71.9	91.9	0.78	W
			Sr-90	pCi/L	12.1	13.3	0.91	A
	E12314	Milk	Ce-141	pCi/L	124	133	0.93	A
			Co-58	pCi/L	110	119	0.93	A
			Co-60	pCi/L	202	212	0.95	A
			Cr-51	pCi/L	292	298	0.98	A
			Cs-134	pCi/L	146	171	0.85	A
			Cs-137	pCi/L	118	121	0.98	A
			Fe-59	pCi/L	120	114	1.05	A
			I-131	pCi/L	94.2	93.3	1.01	A
			Mn-54	pCi/L	151	154	0.98	A
			Zn-65	pCi/L	266	264	1.01	A
	E12315	Charcoal	I-131	pCi	94.8	89.9	1.05	A
	E12316A	AP	Ce-141	pCi	92.3	94.0	0.98	A
			Co-58	pCi	73.4	83.8	0.88	A
			Co-60	pCi	137	150	0.91	A
			Cr-51	pCi	202	210	0.96	A
			Cs-134	pCi	115	121	0.95	A
			Cs-137	pCi	85.0	85.4	1.00	A
			Fe-59	pCi	83.1	80.8	1.03	A
			Mn-54	pCi	104	109	0.96	A
			Zn-65	pCi	168	187	0.90	A
	E12317	Water	Fe-55	pCi/L	2110	1840	1.15	A
	E12318	AP	Sr-89	pCi	81.1	83.0	0.98	A
			Sr-90	pCi	11.4	12.0	0.95	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

TABLE D.2 **DOE's Mixed Analyte Performance Evaluation Program (MAPEP)**
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Acceptance Range	Evaluation [b]
February 2018	18-MaS38	Soil	Ni-63	Bq/kg	9.94		*(1)*	A
			Sr-90	Bq/kg	0.846		*(1)*	A
	18-MaW38	Water	Am-241	Bq/L	0.785	0.709	0.496 - 0.922	A
			Ni-63	Bq/L	12.6	14.0	9.8 - 18.2	A
			Pu-238	Bq/L	0.0214	0.023	*(2)*	A
			Pu-239/240	Bq/L	0.544	0.600	0.420 - 0.780	A
	18-RdF38	AP	U-234/233	Bq/sample	0.111	0.124	0.087 - 0.161	A
			U-238	Bq/sample	0.123	0.128	0.090 - 0.166	A
	18-RdV38	Vegetation	Cs-134	Bq/sample	2.46	3.23	2.26 - 4.20	W
			Cs-137	Bq/sample	3.14	3.67	2.57 - 4.77	A
			Co-57	Bq/sample	4.12	4.42	3.09 - 5.75	A
			Co-60	Bq/sample	1.86	2.29	1.60 - 2.98	A
			Mn-54	Bq/sample	2.21	2.66	1.86 - 3.46	A
			Sr-90	Bq/sample				NR[3]
			Zn-65	Bq/sample	-0.201		*(1)*	A
November 2018	18-MaS39	Soil	Ni-63	Bq/kg	703	765	536 - 995	A
			Sr-90	Bq/kg	137	193	*135 - 251*	W
	18-MaW39	Water	Am-241	Bq/L	0.0363		*(1)*	A
			Ni-63	Bq/L	6.18	7.0	4.9 - 9.1	A
			Pu-238	Bq/L	0.73	0.674	0.472 - 0.876	A
			Pu-239/240	Bq/L	0.89	0.928	0.650 - 1.206	A
	18-RdF39	AP	U-234/233	Bq/sample	0.159	0.152	0.106 - 0.198	A
			U-238	Bq/sample	0.162	0.158	0.111 - 0.205	A
	18-RdV39	Vegetation	Cs-134	Bq/sample	1.85	1.94	1.36 - 2.52	A
			Cs-137	Bq/sample	2.5	2.36	1.65 - 3.07	A
			Co-57	Bq/sample	3.53	3.31	2.32 - 4.30	A
			Co-60	Bq/sample	1.6	1.68	1.18 - 2.18	A
			Mn-54	Bq/sample	2.61	2.53	1.77 - 3.29	A
			Sr-90	Bq/sample	0.338	0.791	0.554 - 1.028	N[4]
			Zn-65	Bq/sample	1.32	1.37	*0.96 - 1.78*	A

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

(b) DOE/MAPEP evaluation:

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

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

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

(1) False positive test

(2) Sensitivity evaluation

*(3) See **NCR 18-09***

*(4) See **NCR 18-25***

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

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [(a)]	Acceptance Limits	Evaluation [(b)]
March 2018	MRAD-28	AP	GR-A	pCi/sample	65.7	43.4	22.7 - 71.5	A
			GR-B	pCi/sample	57.2	52	31.5 - 78.6	A
April 2018	RAD-113	Water	Ba-133	pCi/L	91.2	91.5	77.1 - 101	A
			Cs-134	pCi/L	70.4	75.9	62.0 - 83.5	A
			Cs-137	pCi/L	122	123	111 - 138	A
			Co-60	pCi/L	64.8	64.3	57.9 - 73.2	A
			Zn-65	pCi/L	98.6	86.7	78.0 - 104	A
			GR-A	pCi/L	32.8	28.6	14.6 - 37.5	A
			GR-B	pCi/L	62.9	73.7	51.4 - 81.1	A
			U-Nat	pCi/L	6.7	6.93	5.28 - 8.13	A
			H-3	pCi/L	17100	17200	15000 - 18900	A
			Sr-89	pCi/L	38.6	48.8	38.3 - 56.2	A
			Sr-90	pCi/L	27.1	26.5	19.2 - 30.9	A
			I-131	pCi/L	26.7	24.6	20.4 - 29.1	A
September 2018	MRAD-29	AP	GR-A	pCi/sample	49.7	55.3	28.9 - 91.1	A
		AP	GR-B	pCi/sample	75.3	86.5	52.4 - 131	A
October 2018	RAD-115	Water	Ba-133	pCi/L	15.2	16.3	11.9 - 19.4	A
			Cs-134	pCi/L	85.9	93.0	76.4 - 102	A
			Cs-137	pCi/L	229	235	212 - 260	A
			Co-60	pCi/L	81.9	80.7	72.6 - 91.1	A
			Zn-65	pCi/L	348	336	302 - 392	A
			GR-A	pCi/L	38.9	60.7	31.8 - 75.4	A
			GR-B	pCi/L	36.5	41.8	27.9 - 49.2	A
			U-Nat	pCi/L	17.48	20.9	16.8 - 23.4	A
			H-3	pCi/L	2790	2870	2410 - 3170	A
			I-131	pCi/L	26.9	27.2	22.6 - 32.0	A
			Sr-89	pCi/L	57.2	56.9	45.5 - 64.6	A
			Sr-90	pCi/L	36.8	31.4	22.9- 36.4	N[(1)]

(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 18-23***

APPENDIX E

ERRATA DATA

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There is no errata data for 2018.

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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 2018

Prepared By
Teledyne Brown Engineering
Environmental Services

Braidwood Station
Braceville, IL 60407

May 2019

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Table Of Contents

Appendices

I. Summary and Conclusions

In 2018, 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 2018. During that time period, 363 analyses were performed on 181 samples from 38 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 was detected in surface water samples 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 and surface water at concentrations greater than the LLD of 200 pCi/L in 92 of 181 samples. The tritium concentrations ranged from 190 ± 124 pCi/L to 2,370 ± 306 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 and Gross Beta analyses in the dissolved and suspended fractions were performed on groundwater and surface water samples throughout the sampling year in 2018. Gross Alpha (dissolved) was not detected in any surface water or groundwater samples. Gross Alpha (suspended) was not detected in any surface water samples and was detected in 2 groundwater samples. The concentrations ranged from 1.5 to 2.3 pCi/L. Gross Beta (dissolved) was detected in 1 surface water and 22 groundwater samples. The concentrations ranged from 1.7 to 55.7 pCi/L. Gross Beta (suspended) was detected in 1 surface water and 1 groundwater sample. The concentrations ranged from 2.2 to 33.0 pCi/L.

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 not performed in 2018.

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 2018.

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 2018.

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 and Gross Beta (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 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. 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 2018. 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 no missed samples in 2018.

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 2,370 pCi/L. (Table B-I.1, Appendix B).

Strontium

Sr-89 and Sr-90 were analyzed for in 24 samples. 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 and Beta (dissolved and suspended)

Gross Alpha and Gross Beta analyses in the dissolved and suspended fractions were performed on groundwater and surface water samples throughout the sampling year in 2018. Gross Alpha (dissolved) was not detected in any surface water or groundwater samples. Gross Alpha (suspended) was not detected in any surface water samples and was detected in 2 groundwater samples. The concentrations ranged from 1.5 to 2.3 pCi/L. Gross Beta (dissolved) was detected in 1 surface water and 22 groundwater samples. The concentrations ranged from 1.7 to 55.7 pCi/L. Gross Beta (suspended) was detected in 1 surface water and 1 groundwater sample. The concentrations ranged from 2.2 to 33.0 pCi/L. (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 not analyzed in 2018. (Table B-I.3, Appendix B).

Gamma Emitters

Naturally-occurring K-40 was detected in two samples with results ranging from 49 to 84 pCi/L. No other gamma-emitting nuclides were detected in any of the samples analyzed. (Table B–I.2, Appendix B)

C. Surface Water Results

Samples were collected from two surface water locations 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 248 pCi/L. (Table B-II.1, Appendix B).

Strontium

Sr-89 and Sr-90 were analyzed in two samples. 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-II.1, Appendix B).

Gross Alpha and Beta (dissolved and suspended)

Two surface water samples for analyzed for Gross Alpha (dissolved and suspended) and Gross Beta (dissolved and suspended). Gross Alpha (dissolved) and Gross Alpha (suspended) were not detected in any surface water samples. Gross Beta (dissolved) was detected in 1 surface water sample at a concentrations of 3.4 ± 1.1 pCi/L. Gross Beta (suspended) was detected in 1 surface water samples at a concentration of 33.0 ± 3.9 pCi/L. (Table B-II.1, Appendix B).

Gamma Emitters

Two surface water samples were analyzed for gamma emitters. Naturally-occurring Be-7 was detected in 1 sample at a concentration of 53 ± 23 pCi/L. No other gamma-emitting nuclides were detected in any of the samples analyzed (Table B–II.2, 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 2018.

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 2018.

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. Actions to Recover/Reverse Plumes

   Remediation efforts for the CWBD House area 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 groundwater remediation efforts to remove the tritium contamination from the area.

4. Well Reduction Efforts

   Sampling was discontinued at monitoring wells PS-8, PS-11, and PS-15 during the 2nd Quarter 2018 when tritium concentrations fell below the lower level of detection.

APPENDIX A

LOCATION DESIGNATION

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TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations, Braidwood Station, 2018

Station Code	Sample Description
DITCH F (DS-2)	Surface Water
MW-102R	Monitoring Well
MW-11	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-2	Monitoring Well
MW-4	Monitoring Well
MW-5	Monitoring Well
MW-6	Monitoring Well
MW-7	Monitoring Well
MW-BW-201S	Monitoring Well
MW-BW-202S	Monitoring Well
MW-BW-203S	Monitoring Well
MW-BW-207I	Monitoring Well
0WM31P	Drinking Water
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
PS-16	Monitoring Well
RW-6	Recovery Well
RW-11	Recovery Well
RW-12	Recovery Well
SG-BW-102 DITCH C	Surface Water
VB10-1R	Monitoring Well
VB1-1	Monitoring Well
VB11-1	Monitoring Well
VB2-5DR	Monitoring Well
VB3-2	Monitoring Well
VB5-2	Monitoring Well
VB6-1	Monitoring Well
VB7-1	Monitoring Well
VB8-2R	Monitoring Well
VB9-1	Monitoring Well

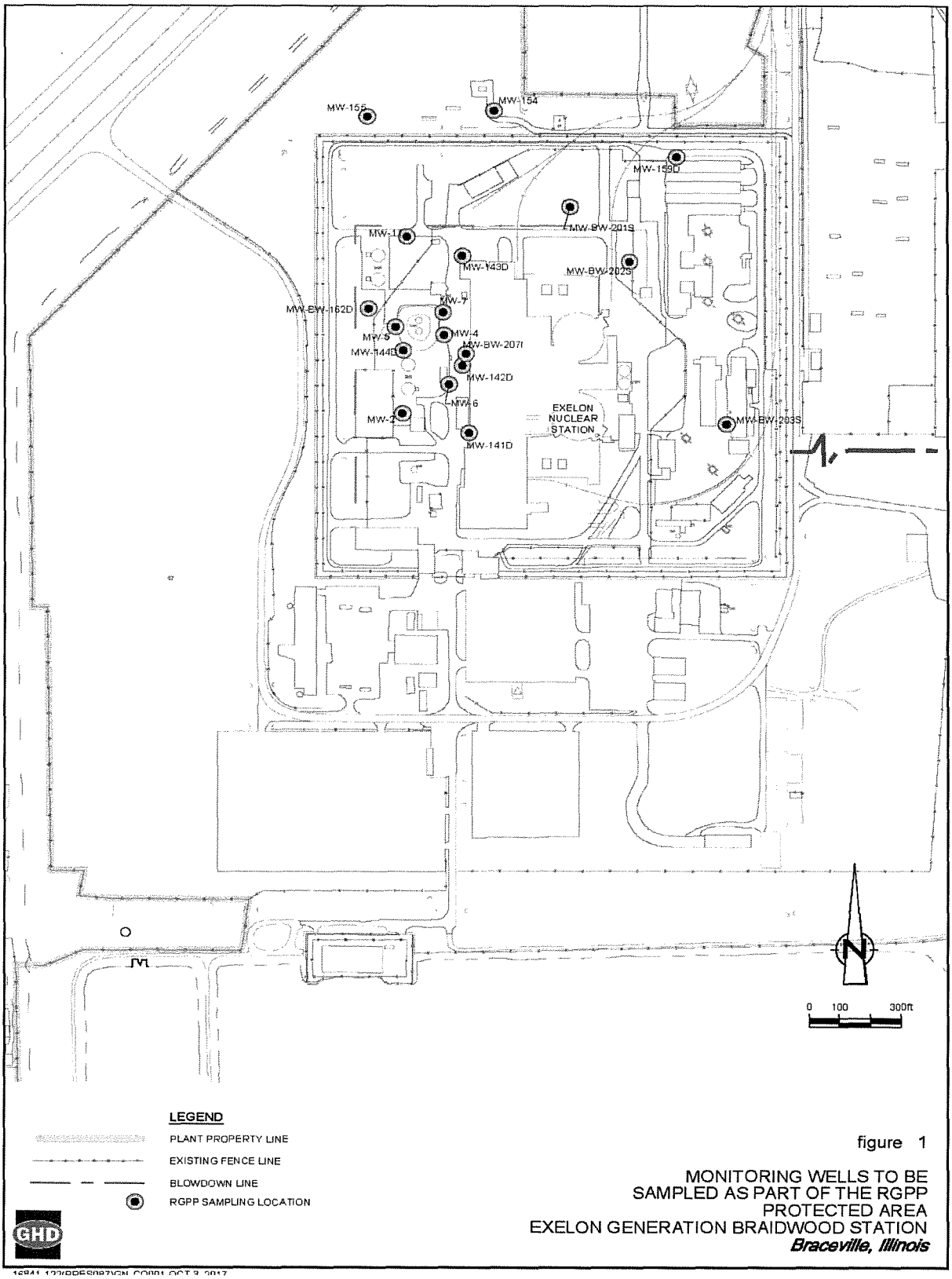

Figure A-1
RGPP Protected Area Monitoring Well Sample Locations
Braidwood Station, 2018

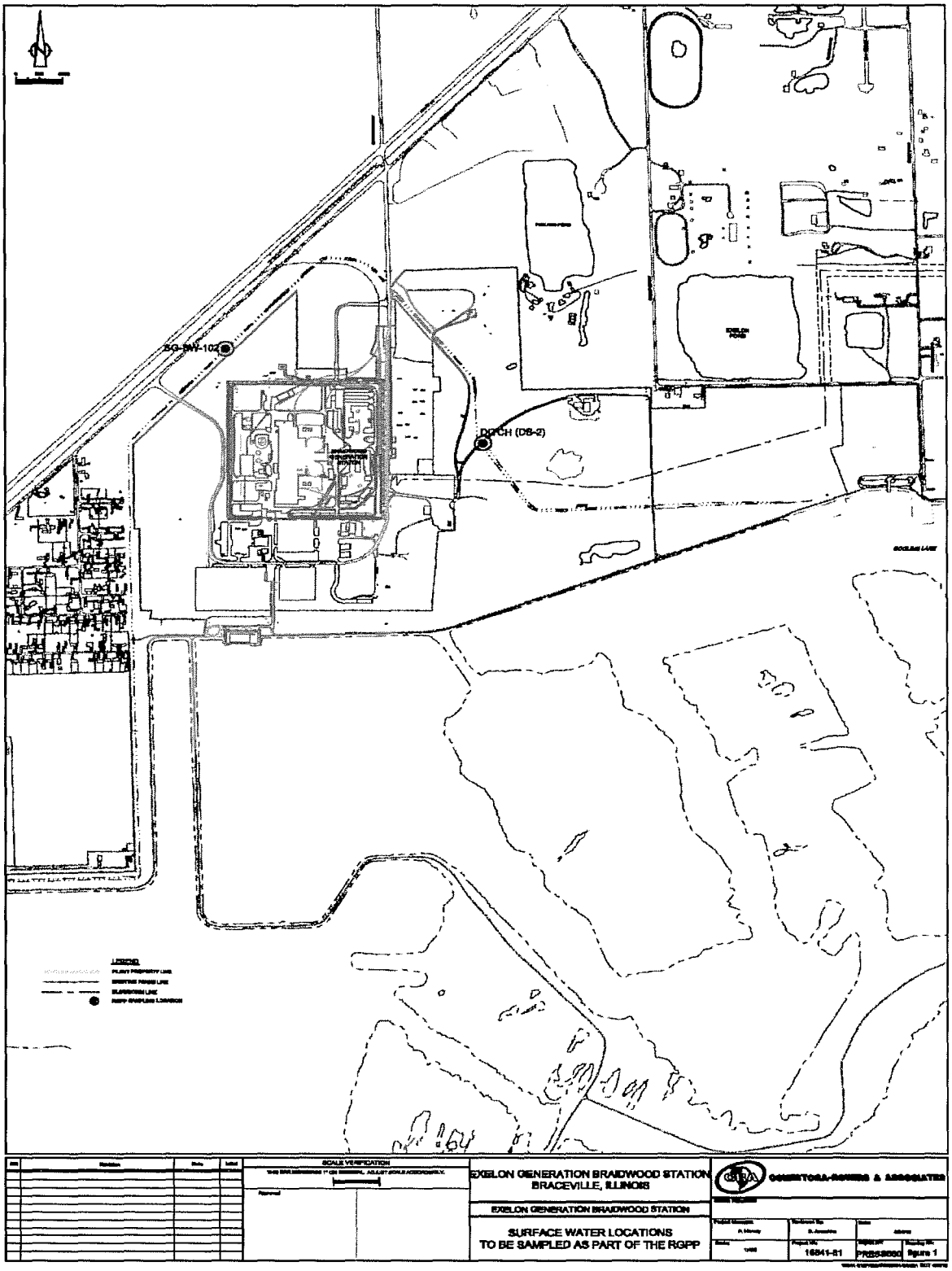

Figure A-2
RGPP Surface Water Sample Locations
Braidwood Station, 2018

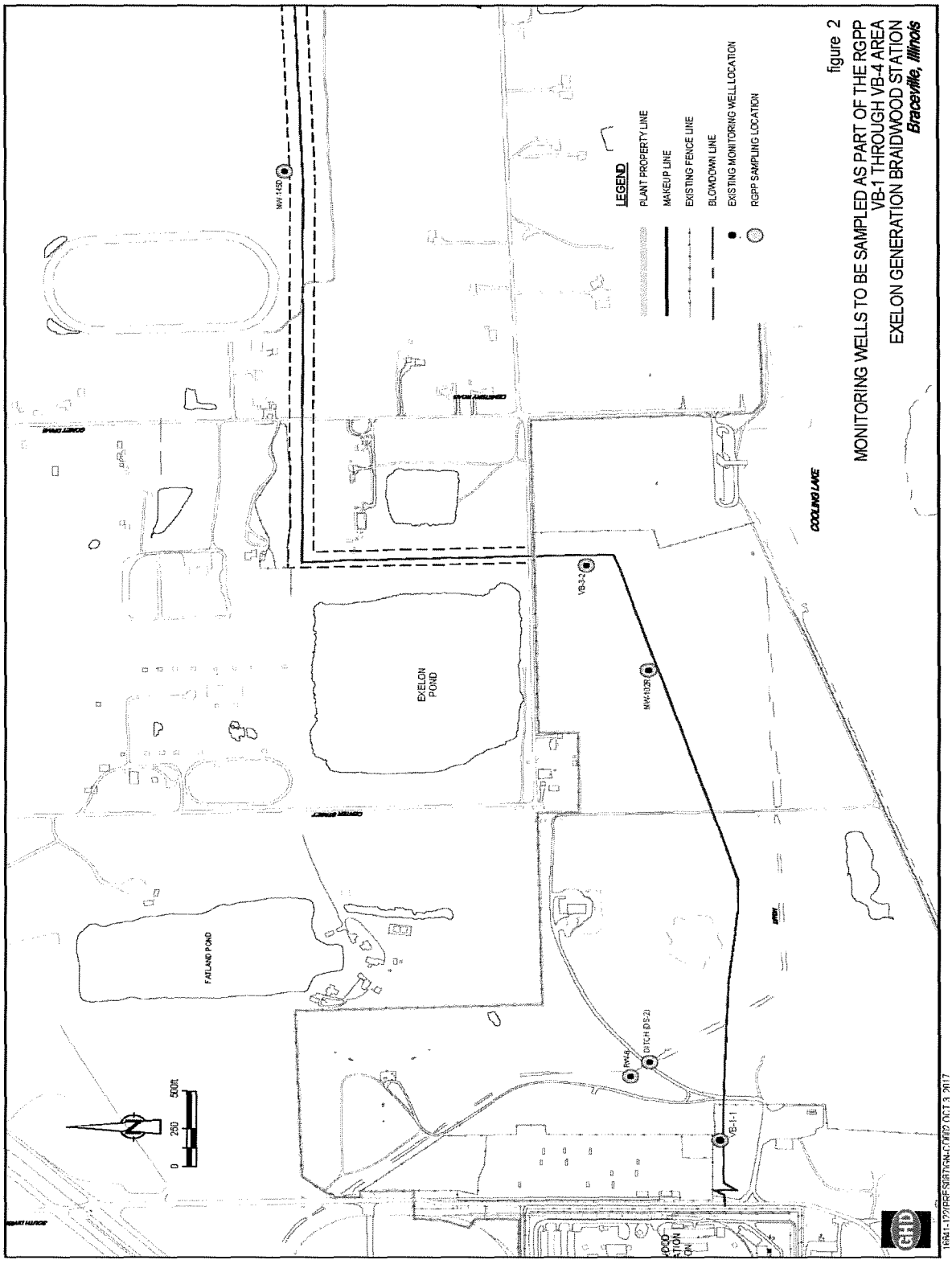

Figure A-3
RGPP VB-1 – VB-4 Area Monitoring Well Sample Locations
Braidwood Station, 2018

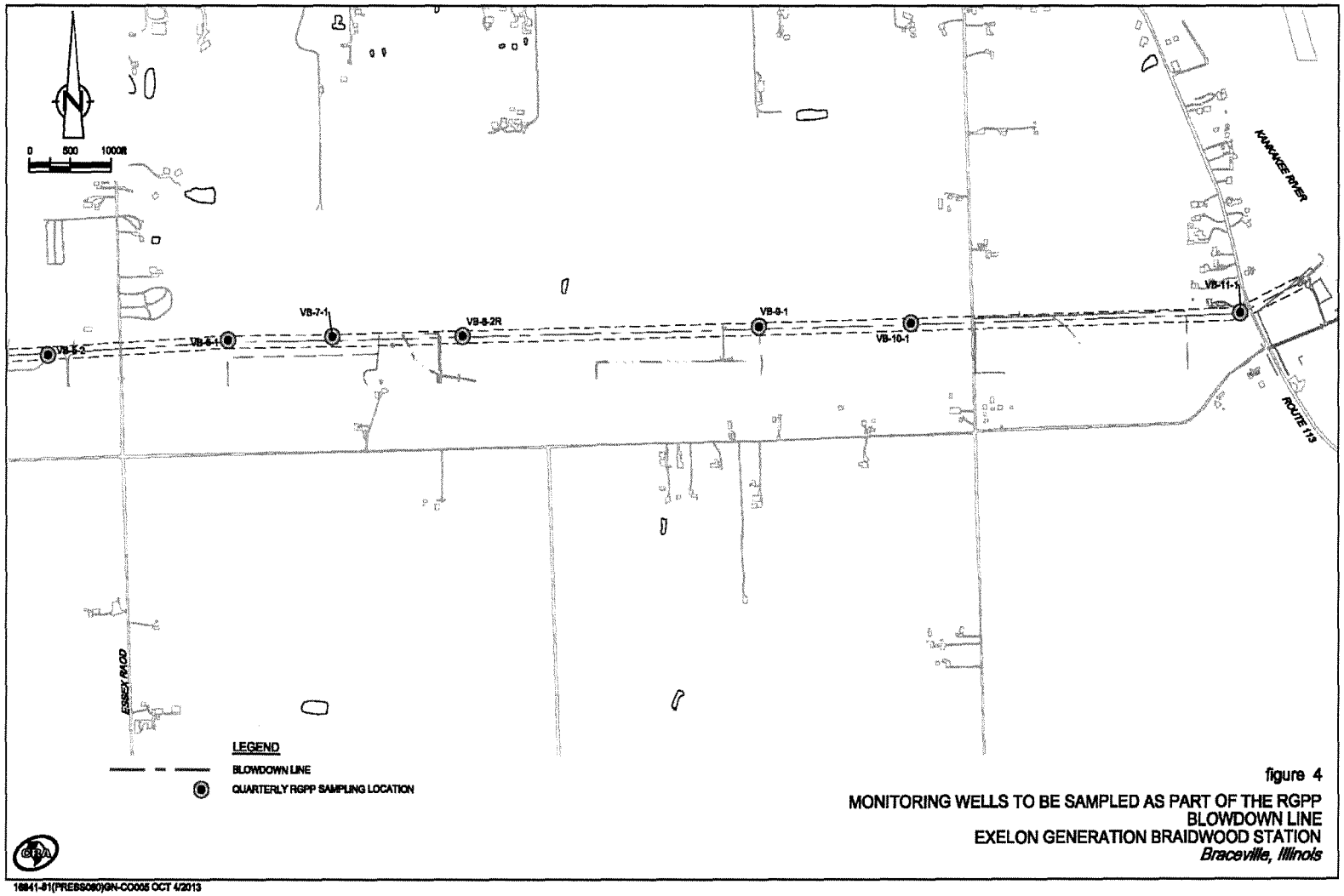

Figure A-4
RGPP Blowdown Line Monitoring Well Sample Locations
Braidwood Station, 2018

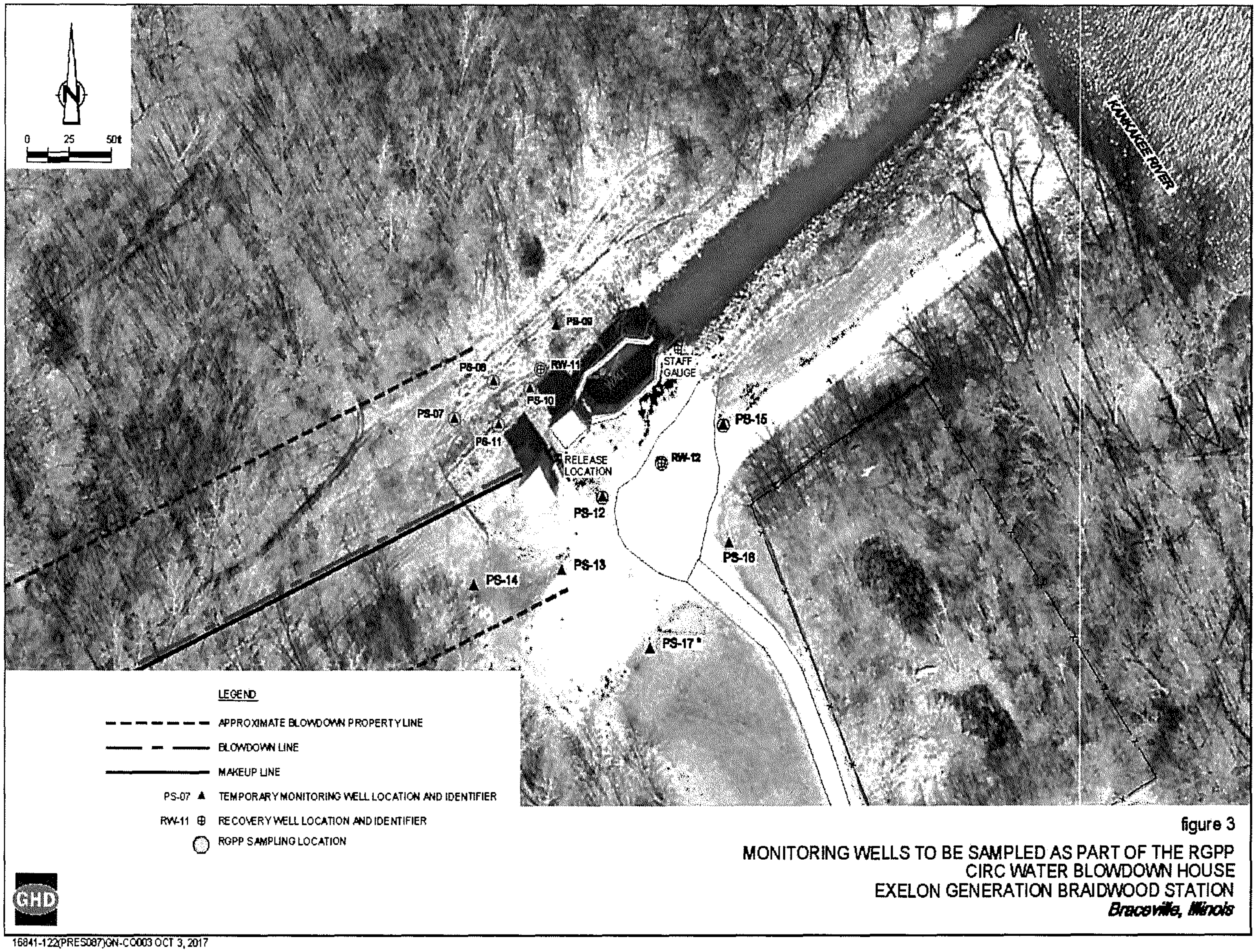

Figure A-5
RGPP CWBD Monitoring Water Sample Locations
Braidwood Station, 2018

APPENDIX B

DATA TABLES

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TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITIY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
MW-2	03/14/18	< 184						
MW-2	04/25/18	452 ± 137						
MW-2	09/20/18	860 ± 161	< 3.4	< 0.8	< 1.0	< 0.6	5.2 ± 0.9	< 1.5
MW-2	10/16/18	768 ± 149						
MW-4	03/16/18	480 ± 134						
MW-4	04/27/18	407 ± 132						
MW-4	09/19/18	860 ± 162	< 5.2	< 0.7	< **3.7**	< 0.6	6.7 ± 1.6	< 1.5
MW-4	10/06/18	641 ± 145						
MW-5	03/20/18	351 ± 128						
MW-5	04/27/18	< 189						
MW-5	09/21/18	291 ± 128	< 3.0	< 0.9	< 0.8	< 0.6	1.7 ± 0.7	< 1.5
MW-5	10/16/18	322 ± 130						
MW-6	03/19/18	838 ± 155						
MW-6	04/27/18	755 ± 149						
MW-6	09/18/18	613 ± 144	< 4.0	< 0.7	< **8.6**	< 0.8	11.2 ± 3.7	< 1.5
MW-6	10/14/18	574 ± 144						
MW-7	03/19/18	298 ± 127						
MW-7	04/27/18	514 ± 140						
MW-7	09/21/18	640 ± 146	< 4.9	< 0.9	< 1.3	2.3 ± 1.0	4.4 ± 1.1	2.2 ± 1.1
MW-7	10/14/18	638 ± 146						
MW-11	03/20/18	< 179						
MW-11	04/25/18	< 186						
MW-11	09/20/18	206 ± 126	< 6.6	< 0.8	< 1.7	< 0.8	6.6 ± 1.4	< 1.5
MW-11	10/14/18	< 186						
MW-102R	03/14/18	< 177						
MW-102R	04/27/18	< 183						
MW-102R	08/21/18	< 188	< 7.5	< 0.9	< 0.7	< 0.6	< 0.9	< 1.5
MW-102R	10/13/18	< 186						
MW-141D	03/20/18	472 ± 132						
MW-141D	04/28/18	374 ± 133						
MW-141D	09/20/18	509 ± 141	< 4.1	< 0.7	< **4.9**	< 1.1	34.1 ± 4.2	< 2.0
MW-141D	10/16/18	734 ± 149						
MW-142D	03/14/18	1050 ± 176						
MW-142D	04/26/18	1060 ± 176						
MW-142D	09/18/18	1010 ± 172	< 3.3	< 0.6	< **22.8**	< 0.4	55.7 ± 9.1	< 0.8
MW-142D	10/06/18	941 ± 166						
MW-143D	03/15/18	< 183						
MW-143D	04/27/18	< 191						
MW-143D	09/19/18	< 187	< 3.9	< 0.6	< **3.4**	< 0.8	32.7 ± 3.4	< 1.5
MW-143D	10/14/18	< 185						
MW-144D	03/22/18	511 ± 134						
MW-144D	04/27/18	497 ± 138						
MW-144D	09/21/18	395 ± 138	< 3.6	< 0.5	< 0.9	< 0.8	3.9 ± 0.8	< 1.5
MW-144D	10/16/18	485 ± 139						
MW-145D	02/06/18	< 194						
MW-145D	05/30/18	< 182						
MW-145D	09/04/18	< 198	< 4.0	< 0.6	< 0.9	< 0.3	< 1.1	< 1.4
MW-145D	12/20/18	< 183						
MW-154	03/14/18	< 178						
MW-154	04/27/18	< 188						

***BOLD** Values = Unable to meet detection limits due to high solids content*

TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITIY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
MW-154	09/12/18	< 189	< 7.5	< 1.0	< 0.7	< 0.6	1.8 ± 0.6	< 1.5
MW-154	10/13/18	271 ± 129						
MW-155	03/14/18	< 179						
MW-155	04/27/18	< 189						
MW-155	09/12/18	< 190	< 5.9	< 0.7	< 1.1	< 0.6	3.3 ± 0.8	< 1.5
MW-155	10/13/18	< 187						
MW-159D	03/15/18	306 ± 124						
MW-159D	04/25/18	290 ± 128						
MW-159D	09/11/18	250 ± 132	< 4.9	< 0.6	**< 4.3**	1.5 ± 0.8	15.7 ± 2.9	< 1.5
MW-159D	10/06/18	352 ± 131						
MW-162D	03/21/18	513 ± 135						
MW-162D	04/28/18	430 ± 135						
MW-162D	09/21/18	1070 ± 180	< 5.2	< 0.7	< 1.1	< 0.8	6.0 ± 1.0	< 1.5
MW-162D	10/19/18	600 ± 143						
MW-BW-201S	03/21/18	220 ± 122						
MW-BW-201S	04/25/18	< 189						
MW-BW-201S	09/20/18	302 ± 133	< 4.0	< 0.7	< 1.5	< 0.8	10.4 ± 1.5	< 1.5
MW-BW-201S	10/14/18	332 ± 130						
MW-BW-202S	03/15/18	388 ± 130						
MW-BW-202S	04/25/18	< 192						
MW-BW-202S	09/11/18	292 ± 131	< 5.0	< 0.7	**< 4.1**	< 0.8	16.9 ± 2.1	< 1.5
MW-BW-202S	10/06/18	289 ± 129						
MW-BW-203S	03/15/18	200 ± 120						
MW-BW-203S	04/25/18	< 185						
MW-BW-203S	09/11/18	237 ± 128	< 4.9	< 0.7	**< 4.3**	< 0.8	20.2 ± 2.2	< 1.5
MW-BW-203S	10/14/18	320 ± 127						
MW-BW-207I	03/19/18	932 ± 165						
MW-BW-207I	04/26/18	995 ± 171						
MW-BW-207I	09/19/18	985 ± 170	< 4.3	< 0.6	**< 7.6**	< 1.9	27.4 ± 4.5	< 3.7
MW-BW-207I	10/19/18	926 ± 165						
OWM31P	03/14/18	< 181						
OWM31P	04/25/18	< 188						
OWM31P	10/19/18	< 191						
PS-8	01/25/18	< 196						
PS-8	02/27/18	227 ± 130						
PS-8	03/13/18	280 ± 122						
PS-8	04/15/18	< 186						
PS-8	05/08/18	< 167						
PS-10	01/26/18	2370 ± 306						
PS-10	02/27/18	930 ± 163						
PS-10	03/13/18	1530 ± 213						
PS-10	04/15/18	775 ± 153						
PS-10	05/08/18	803 ± 149						
PS-10	06/12/18	1170 ± 191						
PS-10	12/21/18	1400 ± 216						
PS-11	01/25/18	221 ± 132						
PS-11	02/27/18	190 ± 124						
PS-11	03/13/18	< 177						
PS-12	01/25/18	2160 ± 288						
PS-12	02/27/18	1040 ± 186						
PS-12	03/13/18	877 ± 154						

***BOLD** Values = Unable to meet detection limits due to high solids content*

TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITIY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
PS-12	04/14/18	< 194						
PS-12	05/08/18	759 ± 141						
PS-12	06/28/18	241 ± 131						
PS-12	07/26/18	709 ± 149	< 3.7	< 0.5	< **3.1**	< 0.8	9.0 ± 1.5	< 1.6
PS-12	08/20/18	822 ± 156						
PS-12	09/20/18	347 ± 137						
PS-12	10/07/18	< 194						
PS-12	10/18/18	1610 ± 222						
PS-12	11/08/18	513 ± 142						
PS-12	12/21/18	< 197						
PS-15	01/25/18	552 ± 146						
PS-15	02/27/18	282 ± 136						
PS-15	03/13/18	336 ± 124						
PS-15	04/14/18	< 188						
PS-15	05/11/18	< 169						
RW-11	01/25/18	468 ± 144						
RW-11	02/14/18	335 ± 137						
RW-11	03/09/18	889 ± 156						
RW-11	04/15/18	226 ± 127						
RW-11	05/10/18	< 169						
RW-11	06/12/18	< 195						
RW-11	10/11/18	247 ± 129						
RW-11	11/08/18	770 ± 153						
RW-11	12/21/18	272 ± 135						
RW-12	01/25/18	699 ± 154						
RW-12	02/14/18	573 ± 147						
RW-12	03/09/18	466 ± 128						
RW-12	04/15/18	238 ± 126						
RW-12	05/10/18	279 ± 117						
RW-12	06/12/18	< 195						
RW-12	07/26/18	446 ± 138						
RW-12	12/21/18	< 199						
RW-6	03/14/18	295 ± 121						
RW-6	05/31/18	284 ± 129						
RW-6	08/21/18	284 ± 133	< 6.0	< 0.8	< **4.0**	< 1.0	9.0 ± 1.7	< 2.2
RW-6	10/18/18	425 ± 137						
VB10-1R	02/06/18	< 195						
VB10-1R	05/30/18	< 180						
VB10-1R	09/04/18	< 194						
VB10-1R	12/20/18	< 180						
VB1-1	03/14/18	< 180						
VB1-1	04/27/18	< 188						
VB1-1	09/12/18	< 192	< 5.1	< 0.9	< 1.6	< 0.6	6.1 ± 1.1	< 1.5
VB1-1	10/13/18	< 191						
VB11-1	02/06/18	< 194						
VB11-1	05/30/18	< 184						
VB11-1	09/04/18	< 195						
VB11-1	12/20/18	< 188						
VB3-2	03/14/18	< 183						
VB3-2	04/27/18	< 189						

***BOLD** Values = Unable to meet detection limits due to high solids content*

TABLE B-I.1 CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITIY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
VB3-2	08/21/18	< 192	< 7.1	< 0.8	< 1.0	< 0.6	7.0 ± 0.9	< 1.5
VB3-2	10/13/18	< 188						
VB5-2	02/06/18	< 194						
VB5-2	05/30/18	< 177						
VB5-2	09/04/18	< 197						
VB5-2	12/20/18	< 187						
VB6-1	02/06/18	< 192						
VB6-1	05/30/18	< 183						
VB6-1	09/04/18	< 197						
VB6-1	12/20/18	< 188						
VB7-1	02/06/18	< 194						
VB7-1	05/30/18	< 184						
VB7-1	09/04/18	< 192						
VB7-1	12/20/18	< 183						
VB8-2R	02/06/18	< 198						
VB8-2R	05/30/18	< 183						
VB8-2R	09/04/18	< 197						
VB8-2R	12/20/18	< 183						
VB9-1	02/06/18	< 195						
VB9-1	05/30/18	< 183						
VB9-1	09/04/18	< 195						
VB9-1	12/20/18	< 181						

***BOLD** Values = Unable to meet detection limits due to high solids content*

TABLE B-I.2

CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	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	La-140
MW-2	09/20/18	< 18	< 31	< 2	< 2	< 5	< 2	< 3	< 2	< 3	< 15	< 2	< 2	< 22	< 8
MW-4	09/19/18	< 17	49 ± 28	< 1	< 2	< 4	< 2	< 3	< 2	< 3	< 15	< 2	< 1	< 22	< 7
MW-5	09/21/18	< 22	< 37	< 2	< 2	< 6	< 2	< 5	< 2	< 4	< 13	< 2	< 2	< 21	< 9
MW-6	09/18/18	< 21	< 38	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 15	< 2	< 2	< 22	< 7
MW-7	09/21/18	< 17	84 ± 24	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 13	< 2	< 2	< 21	< 5
MW-11	09/20/18	< 22	< 35	< 2	< 2	< 6	< 2	< 4	< 3	< 4	< 14	< 2	< 2	< 23	< 7
MW-102R	08/21/18	< 23	< 14	< 2	< 2	< 7	< 1	< 3	< 2	< 4	**< 167**	< 2	< 1	**< 96**	**< 31**
MW-141D	09/20/18	< 21	< 51	< 2	< 2	< 5	< 2	< 4	< 2	< 5	< 15	< 2	< 2	< 23	< 8
MW-142D	09/18/18	< 26	< 20	< 2	< 3	< 6	< 2	< 4	< 3	< 5	< 4	< 2	< 2	< 35	< 11
MW-143D	09/19/18	< 17	< 40	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 14	< 2	< 2	< 22	< 7
MW-144D	09/21/18	< 23	< 19	< 2	< 2	< 5	< 2	< 5	< 2	< 4	< 12	< 2	< 2	< 23	< 7
MW-145D	09/04/18	< 65	< 74	< 8	< 8	< 17	< 8	< 17	< 8	< 14	< 15	< 9	< 8	< 41	< 12
MW-154	09/12/18	< 30	< 47	< 3	< 3	< 9	< 3	< 6	< 3	< 6	< 6	< 3	< 3	< 40	< 13
MW-155	09/12/18	< 35	< 67	< 3	< 3	< 8	< 2	< 6	< 4	< 7	< 10	< 3	< 3	< 51	< 15
MW-159D	09/11/18	< 28	< 49	< 3	< 3	< 7	< 2	< 5	< 3	< 5	< 10	< 3	< 2	< 41	< 14
MW-162D	09/21/18	< 17	< 17	< 2	< 2	< 5	< 2	< 3	< 2	< 3	< 15	< 2	< 2	< 20	< 7
MW-BW-201S	09/20/18	< 17	< 14	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 14	< 2	< 2	< 20	< 7
MW-BW-202S	09/11/18	< 23	< 15	< 2	< 2	< 5	< 2	< 4	< 3	< 4	< 13	< 2	< 2	< 42	< 13
MW-BW-203S	09/11/18	< 29	< 24	< 3	< 3	< 7	< 3	< 5	< 3	< 6	< 8	< 3	< 3	< 46	< 15
MW-BW-207I	09/19/18	< 15	< 32	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 14	< 1	< 1	< 20	< 7
PS-12	07/26/18	< 18	< 12	< 1	< 2	< 5	< 1	< 3	< 2	< 3	**< 91**	< 1	< 1	**< 60**	**< 21**
RW-6	08/21/18	< 26	< 39	< 2	< 3	< 8	< 2	< 4	< 3	< 5	**< 150**	< 2	< 2	**< 100**	**< 31**
VB1-1	09/12/18	< 29	< 41	< 2	< 3	< 7	< 3	< 5	< 3	< 6	< 9	< 3	< 2	< 41	< 14
VB3-2	08/21/18	< 23	< 24	< 2	< 2	< 6	< 2	< 3	< 2	< 4	**< 118**	< 2	< 2	**< 75**	**< 26**

BOLD *Values = Lab unable to meet client required detection limit due to the age of sample at time of receipt/analysis*

TABLE B-I.3

CONCENTRATIONS OF HARD TO DETECTS IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

There were no Hard To Detect Analyses in 2018

TABLE B-II.1

CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
DITCH F (DS-2)	03/14/18	< 180						
DITCH F (DS-2)	04/27/18	< 185						
DITCH F (DS-2)	08/21/18	< 195	< 7.1	< 0.8	< 1.4	< 0.9	3.4 ± 1.1	< 2.0
DITCH F (DS-2)	10/12/18	< 185						
SG-BW-102 DITCH C	03/14/18	< 179						
SG-BW-102 DITCH C	04/27/18	< 189						
SG-BW-102 DITCH C	08/21/18	248 ± 128	< 4.7	< 0.8	**< 3.8**	< 3.4	**< 4.6**	33.0 ± 3.9
SG-BW-102 DITCH C	10/12/18	189 ± 121						

BOLD *values = Unable to meet detection limits to to high solids content*

TABLE B-II.2

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2018

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	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	La-140
DITCH F (DS-2)	08/21/18	< 27	< 15	< 2	< 3	< 7	< 2	< 4	< 3	< 5	< **211**	< 2	< 2	< **118**	< 38
SG-BW-102 DITCH C	08/21/18	53 ± 23	< 34	< 2	< 3	< 7	< 2	< 4	< 3	< 5	< **147**	< 2	< 2	< **95**	< **30**

BOLD *Values = Lab unable to meet client-required detection limit due to the age of sample at time of receipt/analysis*