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Subject: 2013 Annual Radiological Environmental Operating Report

Attached is the 2013 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, and IV.B.3. Technical Specification 5.6.2 requires the Annual Radiological Environmental Operating Report to be submitted by May 15 of each year.

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Docket No: 50-456  
50-457

# **BRAIDWOOD STATION UNITS 1 and 2**

Annual Radiological  
Environmental Operating Report

1 January through 31 December 2013

**Prepared By**

Teledyne Brown Engineering  
Environmental Services



Braidwood Station  
Braceville, IL 60407

**May 2014**

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## Table Of Contents

I. Summary and Conclusions.....	1
II. Introduction .....	3
A. Objectives of the REMP .....	3
B. Implementation of the Objectives.....	3
III. Program Description .....	3
A. Sample Collection .....	3
B. Sample Analysis .....	6
C. Data Interpretation .....	6
D. Program Exceptions.....	7
E. Program Changes .....	10
IV. Results and Discussion .....	10
A. Aquatic Environment .....	10
1. Surface Water.....	10
2. Public Water .....	11
3. Ground/well Water.....	12
4. Fish .....	12
5. Sediment.....	12
B. Atmospheric Environment .....	13
1. Airborne .....	13
a. Air Particulates.....	13
b. Airborne Iodine .....	14
C. Terrestrial Environment.....	14
1. Milk.....	14
2. Food Products .....	14
D. Ambient Gamma Radiation.....	15
E. Land Use Survey.....	15
F. Errata Data .....	16
G. Summary of Results – Inter-laboratory Comparison Program .....	17

## Appendices

Appendix A Radiological Environmental Monitoring Report Annual Summary

### Tables

Table A-1 Radiological Environmental Monitoring Program Annual Summary for Braidwood Station, 2013

Appendix B Location Designation, Distance & Direction, and Sample Collection & Analytical Methods

### Tables

Table B-1 Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Braidwood Station, 2013

Table B-2 Radiological Environmental Monitoring Program - Summary of Sample Collection and Analytical Methods, Braidwood Station, 2013

### Figures

Figure B-1 Inner Ring OSLD Locations of the Braidwood Station, 2013

Figure B-2 Fixed Air Sampling and Outer Ring OSLD Locations of the Braidwood Station, 2013

Figure B-3 Ingestion and Waterborne Exposure Pathway Sample Locations of the Braidwood Station, 2013

Appendix C Data Tables and Figures - Primary Laboratory

### Tables

Table C-I.1 Concentrations of Gross Beta in Surface Water Samples Collected in the Vicinity of Braidwood Station, 2013.

Table C-I.2 Concentrations of Tritium in Surface Water Samples Collected in the Vicinity of Braidwood Station, 2013.

Table C-I.3 Concentrations of Nickel-63 in Surface Water Samples Collected in the Vicinity of Braidwood Station, 2013.

Table C-I.4 Concentrations of Gamma Emitters in Surface Water Samples Collected in the Vicinity of Braidwood Station, 2013.

Table C-II.1 Concentrations of Gross Beta in Public Water Samples Collected in the Vicinity of Braidwood Station, 2013.

Table C-II.2	Concentrations of Tritium in Public Water Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-II.3	Concentrations of I-131 in Public Water Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-II.4	Concentrations of Gamma Emitters in Public Water Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-III.1	Concentrations of Tritium in Ground/Well Water Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-III.2	Concentrations of Gamma Emitters in Ground/Well Water Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-IV.1	Concentrations of Nickel-63 and Gamma Emitters in Fish Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-V.1	Concentrations of Nickel-63 and Gamma Emitters in Sediment Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-VI.1	Concentrations of Gross Beta in Air Particulate Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-VI.2	Monthly and Yearly Mean Values of Gross Beta Concentrations in Air Particulate Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-VI.3	Concentrations of Gamma Emitters in Air Particulate Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-VII.1	Concentrations of I-131 in Air Iodine Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-VIII.1	Concentrations of I-131 in Milk Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-VIII.2	Concentrations of Gamma Emitters in Milk Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-IX.1	Concentrations of Gamma Emitters in Vegetation Samples Collected in the Vicinity of Braidwood Station, 2013.
Table C-X.1	Quarterly OSLD Results for Braidwood Station, 2013.
Table C-X.2	Mean Quarterly OSLD Results for the Inner Ring, Outer Ring, Other, and Control Locations for Braidwood Station, 2013.
Table C-X.3	Summary of the Ambient Dosimetry Program for Braidwood Station, 2013.

### Figures

Figure C-1	Surface Water - Gross Beta – Stations BD-10 and BD-25 (C) Collected in the Vicinity of Braidwood Station, 2000 - 2013.
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- Figure C-2 Surface Water - Gross Beta – Stations BD-38 and BD-40 Collected in the Vicinity of Braidwood Station, 2007 - 2013.
- Figure C-3 Surface Water - Gross Beta – Stations BD-55 and BD-56 Collected in the Vicinity of Braidwood Station, 2007 - 2013.
- Figure C-4 Surface Water - Tritium – Stations BD-10 and BD-25 (C) Collected in the Vicinity of Braidwood Station, 2000 - 2013.
- Figure C-5 Surface Water - Tritium – Stations BD-38 and BD-40 Collected in the Vicinity of Braidwood Station, 2006 - 2013.
- Figure C-6 Surface Water - Tritium – Stations BD-55 and BD-56 Collected in the Vicinity of Braidwood Station, 2007 - 2013.
- Figure C-7 Public Water - Gross Beta – Station BD-22 Collected in the Vicinity of Braidwood Station, 2000 - 2013.
- Figure C-8 Public Water - Tritium – Station BD-22 Collected in the Vicinity of Braidwood Station, 2000 - 2013.
- Figure C-9 Ground/Well Water - Tritium – Stations BD-13 and BD-34 Collected in the Vicinity of Braidwood Station, 2000 - 2013.
- Figure C-10 Ground/Well Water - Tritium – Stations BD-35 and BD-36 Collected in the Vicinity of Braidwood Station, 2000 - 2013.
- Figure C-11 Ground/Well Water - Tritium – Station BD-37 Collected in the Vicinity of Braidwood Station, 2000 - 2013.
- Figure C-12 Ground/Well Water – Tritium – Stations BD-50 and BD-51 Collected in the Vicinity of Braidwood Station, 2007 - 2013.
- Figure C-13 Ground/Well Water – Tritium – Stations BD-53 and BD-54 Collected in the Vicinity of Braidwood Station, 2007 - 2013.
- Figure C-14 Air Particulate - Gross Beta – Stations BD-03 (C) and BD-06 Collected in the Vicinity of Braidwood Station, 2000 - 2013.
- Figure C-15 Air Particulate - Gross Beta – Stations BD-19 and BD-20 Collected in the Vicinity of Braidwood Station, 2000 - 2013.
- Figure C-16 Air Particulate - Gross Beta – Station BD-21 Collected in the Vicinity of Braidwood Station, 2000 - 2013.
- Figure C-17 Air Particulate - Gross Beta – Stations BD-02 and BD-04 Collected in the Vicinity of Braidwood Station, 2005 - 2013.
- Figure C-18 Air Particulate - Gross Beta – Station BD-05 Collected in the Vicinity of Braidwood Station, 2005 - 2013.

Appendix D Inter-Laboratory Comparison Program

Tables

Table D-1	Analytics Environmental Radioactivity Cross Check Program Teledyne Brown Engineering, 2013
Table D-2	ERA Environmental Radioactivity Cross Check Program Teledyne Brown Engineering, 2013
Table D-3	DOE's Mixed Analyte Performance Evaluation Program (MAPEP) Teledyne Brown Engineering, 2013
Table D-4	ERA Statistical Summary Proficiency Testing Program for Environmental, Inc., 2013
Table D-5	DOE's Mixed Analyte Performance Evaluation Program (MAPEP) Environmental, Inc., 2013

Appendix E Effluent Data

Appendix F Meteorological Data

Appendix G Errata Data

Appendix H Annual Radiological Groundwater Protection Program Report  
(ARGPPR)

## I. Summary and Conclusions

This report on the Radiological Environmental Monitoring Program (REMP) conducted for Exelon's Braidwood Station covers the period January 1, 2013 through December 31, 2013. During that time period 1,576 analyses were performed on 1,328 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, 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 has 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 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 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 K-40 were detected. No fission or activation products were found and all required LLDs (Lower Limit of Detection) were met.

Food Product samples were analyzed for concentrations of gamma emitting nuclides. No plant produced fission or activation products were detected.

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).

## II. Introduction

The Braidwood Station, consisting of two 3,587 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, 15 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), Landauer Technologies and Environmental Inc. (Midwest Labs) on samples collected during the period January 1, 2013 through December 31, 2013.

### A. Objective 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.

## III. Program Description

### A. Sample Collection

Samples for the Braidwood Station REMP were collected for Exelon Nuclear by Environmental Inc. (Midwest Labs). This section describes the

general collection methods used by Environmental Inc. (Midwest Labs) to obtain environmental samples for the Braidwood Station REMP in 2013. 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 Environmental Inc. 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], BD-38, BD-40, BD-55 and BD-56), and one weekly composite samples 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 unused plastic bottles, which were rinsed with source water prior to collection. Fish samples comprising the flesh of largemouth bass, golden redhorse, channel catfish, and common carp were collected semiannually at three locations, BD-25 (control), BD-28 and BD-41. Sediment samples composed of recently deposited substrate were collected at three locations semiannually, BD-10, BD-25 (control), 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, BD-04, BD-05, BD-06, BD-19, BD-20 and BD-21). The control location was BD-03. Airborne iodine and particulate samples were obtained at each location, using a vacuum pump with charcoal and glass fiber filters attached. The pumps were run continuously and sampled air at the rate of approximately one cubic foot per minute. The air filters and air iodine samples 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 two locations (BD-17 and BD-18) from May through October and monthly from November through April. The control location was BD-18. All samples were collected in new unused two gallon plastic bottles from the bulk tank at each location, preserved with sodium bisulfite and shipped promptly to the laboratory. Food products were collected

annually in September at five locations (BD-Control, BD-Quad 1, BD-Quad 2, BD-Quad 3 and BD-Quad 4). The control location was BD-Control. 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 Dosimetry were deployed and the use of Thermoluminescent 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).

Each location consisted of 2 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 16 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 16 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 (other) set consisting of seven locations (BD-02, BD-04, BD-05, BD-06, BD-19, BD-20 and BD-21).

The balance of one location (BD-03) represents the control area.

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 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 and Environmental Inc. (Midwest Labs) to analyze the environmental samples for radioactivity for the Braidwood Station REMP in 2013. 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, 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, ground/well water, and fish 12 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 public water, sediment, air particulate, milk and vegetation 11 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 2013 the Braidwood Station REMP had a sample recovery rate in excess of 97.9%. 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
A/I	BD-03	05/02/13	No apparent reason for low reading of 168.0 hours. Hours estimated by vendor.
OSLD	BD-104-1	06/27/13	OSLD found on ground during quarterly exchange; cricket cage missing; collector placed new 3 <sup>rd</sup> quarter OSLD.
A/I	BD-03	07/11/13	No apparent reason for the low reading of 160.0 hours.
A/I	BD-03	07/25/13	No apparent reason for the low reading of 132.9 hours.
A/I	BD-03	08/01/13	No apparent reason for the low reading of 132.9 hours.
A/I	BD-03	08/08/13	No apparent reason for the low reading of 140.2 hours; collector added extra timer.
A/I	BD-03	09/19/13	Low reading of 89.5 hours due to new transformer installation; circuit breaker off at sampler. Collector reset breaker; sampler working properly.
A/I	BD-03	11/27/13	No apparent reason for low reading of 118.1 hours.

Table D-2 LISTING OF MISSED SAMPLES

Sample Type	Location Code	Collection Date	Reason
SW	BD-55, BD-56	01/03/13	No sample; water frozen.
SW	BD-55, BD-56	01/10/13	No sample; water frozen.
SW	BD-55, BD-56	01/17/13	No sample; water frozen.
SW	BD-38, BD-56	01/24/13	No sample; water frozen.

Table D-2 LISTING OF MISSED SAMPLES (continued)

Sample Type	Location Code	Collection Date	Reason
SW	BD-56	01/31/13	No sample; water frozen.
SW	BD-55, BD-56	02/07/13	No sample; water frozen.
SW	BD-56	02/14/13	No sample; water frozen.
SW	BD-56	02/21/13	No sample; water frozen.
SW	BD-56	02/28/13	No sample; water frozen.
SW	BD-56	03/07/13	No sample; water frozen.
OSLD	BD-201-1, BD-201-2	06/27/13	OSLDs found missing during quarterly exchange; cricket cages also missing; collector placed new 3 <sup>rd</sup> quarter OSLD.
SW	BD-38	07/04/13	Monthly composite sample spilled at lab. Original sample media insufficient to create new composite or support quarterly tritium analysis.
SW	BD-56	11/27/13	No sample; water frozen.
SW	BD-55, BD-56	12/12/13	No sample; water frozen.
SW	BD-55, BD-56	12/19/13	No sample; water frozen.
SW	BD-55, BD-56	12/26/13	No sample; water frozen.
OSLD	BD-205-2	01/02/14	OSLD found missing during 4 <sup>th</sup> quarter exchange; collector placed new 1 <sup>st</sup> quarter OSLD.
OSLD	BD-216-2	01/02/14	OSLD found missing during 4 <sup>th</sup> quarter exchange; collector placed new 1 <sup>st</sup> quarter OSLD.

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

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, 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 has requested that Ni-63 be evaluated in the downstream surface water, sediment, and fish analyses.

### IV. Results and Discussion

#### A. Aquatic Environment

##### 1. Surface Water

Samples were taken weekly and composited monthly at six locations (BD-10, BD-25, 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-1.1, Appendix C). Gross beta was detected in 66 of 69 samples. The values ranged from 2.2 to 11.7 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-1.2, Appendix C). Tritium activity was detected in three samples. The values ranged from 254 to 2,840

pCi/l (Figures C-4 through C-6, Appendix C).

### Nickel-63

Beginning in the fall of 2013, monthly samples were analyzed for Nickel-63 activity (Table C-I.3, Appendix C). Nickel-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

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 all 12 samples. The values ranged from 3.1 to 5.0 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 all 12 samples. The concentration ranged from 238 to 5,760 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

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. (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 largemouth bass, golden redhorse, channel catfish and common carp 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 analysis was performed:

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

Aquatic sediment samples were collected at three locations (BD-10, BD-25, and BD-57) semiannually. The locations at the Braidwood Station outfall to the Kanakakee River and downstream of the outfall, could be affected by Braidwood Station's effluent releases. The following analysis was performed:

## 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 locations BD-10 and BD-57. The concentration ranged from 109 to 157 pCi/kg dry. The activity detected was consistent with those detected in previous years (29 pCi/kg to 260 pCi/kg from 1995 to 2006). No other Braidwood fission or activation products were found and all required LLDs were met.

### B. Atmospheric Environment

#### 1. Airborne

##### 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 5.61E-03 to 5.17E-02 pCi/m<sup>3</sup> with a mean of 1.95E-02 pCi/m<sup>3</sup>. The results from the far field (Group II) ranged from 5.74E-03 to 5.16E-02 pCi/m<sup>3</sup> with a mean of 1.96E-02 pCi/m<sup>3</sup>. The results from the Control location (Group III) ranged from 7.89E-03 to 5.19E-02 pCi/m<sup>3</sup> with a mean of 1.90E-02 pCi/m<sup>3</sup>. Comparison of the 2013 air particulate data with previous years data indicate no effects from the operation of Braidwood Station. In addition a comparison of the weekly mean values for 2013 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 for I-131 (Table C–VII.1, Appendix C). All results were less than the minimum detectable concentration for I-131.

### C. Terrestrial Environment

#### 1. Milk

Samples were collected from two locations (BD-17 and BD-18). Sampling frequencies were increased to biweekly in May and continued through October and monthly sampling was performed November through April. The following analyses were performed:

#### Iodine-131

Milk samples from both locations 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 sample was analyzed for concentrations of gamma emitting nuclides (Table C–VIII.2, Appendix C). No nuclides were detected and all required LLDs were met.

#### 2. Food Products

Food product samples were collected at five locations (BD-Control, BD-Quad 1, BD-Quad 2, BD-Quad 3 and BD-Quad 4) when available. Four locations, (located downwind, BD-Quad 1, BD-Quad 2, BD-Quad 3 and BD-Quad 4) could be affected by Braidwood Station's effluent releases. The following analysis was performed:

### Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C–IX.1, Appendix C). No 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). Eighty OSLD locations were established around the site. Results of OSLD measurements are listed in Tables C–X.1 to C–X.3, Appendix C.

All OSLD measurements were below 30 mrem/quarter, with a range of 14.1 to 29.1 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.

#### E. Land Use Survey

A Land Use Survey conducted during August 2013 around the Braidwood Station was performed by Environmental Inc. (Midwest Labs) for Exelon Nuclear to comply with section 12.5.2 of the Braidwood Station's Offsite Dose Calculation Manual. The purpose of the survey was to document the nearest resident, milk producing animal and garden of greater than 500 ft<sup>2</sup> in each of the sixteen 22 ½ degree sectors around the site. For dose calculation, a garden is assumed at the nearest residence. There were no changes required to the Braidwood Station REMP, as a result of this survey. 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	0.5	2.6	-
(B) NNE	0.9	-	-
(C) NE	0.7	0.9	-
(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
(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	-	-

F. Errata Data

1. Teledyne Brown Engineering (TBE) provides data results [activity, uncertainty and minimum detectable concentration {MDC}]. We are required to calculate the MDC using a multiplier of 4.66.

$$MDA = \frac{4.66 \sqrt{\beta}}{2.22 (v)(y)(a)(\epsilon)}$$

Where:

$\Delta t$  = counting time for sample (minutes)

$\beta$  = background rate of instrument blank (cpm)

2.22 = dpm/pCi or :  $2.22 \times 10^6$  dpm/ $\mu$ Ci

v = volume or mass of sample analyzed

y = chemical yield

$\epsilon$  = efficiency of the counter

The formulas for calculating the activity, uncertainty and MDC are contained in the software of the counting equipment. For the gamma system, when the new detector number 08 was added to the system in January 2012, the default value of 3.29 was used to

calculated the MDCs on detector 08. The activity and uncertainty were not affected. The multiplier has been changed from 3.29 to the required 4.66.

When the MDCs are recalculated using 4.66, the MDC values will increase by 41.6%. The greatest impact will be on the short-lived nuclides which have an LLD requirement, e.g. I-131, Ba-140 and La-140. Which means there could be some missed LLDs which will be identified in the Errata Data Appendix table of the 2013 annual report. This is not a reportable issue for the NRC. There is also the possibility that naturally produced nuclides that were detected would become a non-detect, e.g Th-228, Th-230, etc.

2. Figure C-12 of the Appendix C Data Tables and Figures for the 2012 Annual Radiological Environmental Operating Report (AREOR) incorrectly displays the tritium data for groundwater wells BD-50 (Skole Well) and BD-51 (Fatlan Well). The data series selection for the 2012 tritium results of BD-50 and BD-51 did not include the actual value but the "less than symbol (<) preceding the value. This error has been identified and corrected for the 2013 AREOR and shown in the Errata Data Appendix Table.

#### G. Summary of Results – Inter-Laboratory Comparison Program

The primary and secondary laboratories analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation and water matrices (Appendix D). The PE samples supplied by Analytics Inc., Environmental Resource Associates (ERA) and DOE's 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 laboratory results and Analytics' known value. Since flag values are not assigned by Analytics, TBE-ES evaluates the reported ratios based on internal QC requirements, which are based on the DOE MAPEP criteria.

##### 2. ERA Evaluation Criteria

ERA's evaluation report provides an acceptance range for control and warning limits with associated flag values. ERA's acceptance limits are established per the USEPA, NELAC, State Specific 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.

The MAPEP defines three levels of performance: Acceptable (flag = "A"), Acceptable with Warning (flag = "W"), and Not Acceptable (flag = "N"). Performance is considered acceptable when a mean result for the specified analyte is  $\pm 20\%$  of the reference value. Performance is acceptable with warning when a mean result falls in the range from  $\pm 20\%$  to  $\pm 30\%$  of the reference value (i.e.,  $20\% < \text{bias} < 30\%$ ). If the bias is greater than 30%, the results are deemed not acceptable.

For the TBE laboratory, 178 out of 185 analyses performed met the specified acceptance criteria. Seven analyses (Sr-89 and Sr-90 in milk, Co-57, Zn-65 and Sr-90 in soil, Cs-134 in air particulate and Sr-90 in vegetation [two low warning in a row]) did not meet the specified acceptance criteria or internal QA requirements for the following reason:

1. Teledyne Brown Engineering's Analytics September 2013 Sr-89 in milk result of 63.9 pCi/L was lower than the known value of 96.0 pCi/L. The failure was a result of analyst error and was specific to the Analytics sample. Client samples for the associated time period were evaluated and no client samples were affected by this failure. NCR 13-15
2. Teledyne Brown Engineering's Analytics September 2013 Sr-90 in milk result of 8.88 pCi/L was lower than the known value of 13.2 pCi/L. The failure was a result of analyst error and was specific to the Analytics sample. Client samples for the associated time period were evaluated and no client samples were affected by this failure. NCR 13-15
3. & 4. Teledyne Brown Engineering's MAPEP September 2013 Co-57 and Zn-65 in soil were evaluated as failing the false positive test. While MAPEP evaluated the results as failures, the gamma software listed the results as non identified nuclides. The two nuclides would never have been reported as detected nuclides to a client. MAPEP does not allow laboratories to put in qualifiers for the submitted data nor "less than" results. MAPEP evaluates results based on the relationship between the activity and the

uncertainty. MAPEP spiked the soil sample with an extremely large concentration of Eu-152, which was identified by the gamma software as an interfering nuclide, resulting in forced activity results that were evaluated by MAPEP as detected Co-57 and Zn-65. No client samples were affected by these failures. NCR 13-14

5. Teledyne Brown Engineering's MAPEP September 2013 Sr-90 in soil result of 664 Bq/kg was higher than the known value of 460 Bq/kg, exceeding the upper control limit of 598 Bq/kg. An incorrect Sr-90 result was entered into the MAPEP database. The correct Sr-90 activity of 322 Bq/kg would have been evaluated as acceptable with warning. No client samples were affected by this failure. NCR 13-14
6. Teledyne Brown Engineering's MAPEP September 2013 Cs-134 in air particulate activity of -0.570 Bq/sample was evaluated as a failed false positive test, based on MAPEP's evaluation of the result as a significant negative value at 3 standard deviations. A negative number would never have been reported as a detected nuclide to a client, therefore no client samples were affected by this failure. NCR 13-14
7. Teledyne Brown Engineering's MAPEP September 2013 Sr-90 in vegetation result was investigated due to two low warnings in a row. It appears the September sample was double spiked with carrier, resulting in a low activity. With a recovery of around 50% lower, the Sr-90 result would have fallen within the acceptance range. No client samples were affected by this issue. NCR 13-14

For the EIML laboratory, 89 of 92 analyses met the specified acceptance criteria. Three analyses (AP - Gross Alpha, Soil - Sr-90 and Co-57) did not meet the specified acceptance criteria for the following reasons:

1. Environmental Inc., Midwest Laboratory's MAPEP February 2013 air particulate gross alpha result of 0.14 Bq/total sample was lower than the known value of 1.20 Bq/total sample, exceeding the lower control limit of 0.36 Bq/total sample. The filter was recounted overnight. No significant activity could be detected.
2. Environmental Inc., Midwest Laboratory's MAPEP February 2013 soil Co-57 result of 408.40 Bq/kg was lower than the known value of 628.0 Bq/kg, exceeding the lower control limit of 440.0 Bq/kg. The sample was reanalyzed using additional fuming nitric separations. The reanalysis result of 574.4 fell within the control limits.
3. Environmental Inc., Midwest Laboratory's MAPEP August 2013 soil Co-57 result of 699.60 Bq/kg was higher than the known value of

0.00 Bq/kg, exceeding the upper control limit of 5.00 Bq/kg.  
Interference from Eu-152 resulted in misidentification of Co-57.

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

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**APPENDIX A**

**RADIOLOGICAL ENVIRONMENTAL  
MONITORING REPORT ANNUAL SUMMARY**

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**TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR  
BRAIDWOOD STATION, 2013**

NAME OF FACILITY: BRAIDWOOD LOCATION OF FACILITY: BRACEVILLE, IL				DOCKET NUMBER: 50-456 & 50-457 2013 REPORTING PERIOD: ANNUAL						
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS	
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION			
SURFACE WATER (PCI/LITER)	GR-B	69	4	5.9 (54/57) (2.2/11.7)	8.2 (12/12) (5.3/10.6)	9.9 (12/12) (7.9/11.7)	BD-40 INDICATOR BRAIDWOOD STATION COOLING LAKE ONSITE			0
	H-3	24	200	1288 (3/20) (254/2840)	<LLD	1806 (2/4) (771/2840)	BD-10 INDICATOR KANKAKEE RIVER DOWNSTREAM 5.4 MILES NE OF SITE			0
	NI-63	24	30	<LLD	<LLD	-				0
	GAMMA MN-54	69	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

\* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES  
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

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NAME OF FACILITY: BRAIDWOOD LOCATION OF FACILITY: BRACEVILLE, IL				DOCKET NUMBER: 50-456 & 50-457 2013 REPORTING PERIOD: ANNUAL					
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
SURFACE WATER (PCI/LITER)	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	4.0 (12/12) (3.1/5.0)	NA	4.0 (12/12) (3.1/5.0)	BD-22 INDICATOR WILMINGTON 6.0 MILES NE OF SITE	0	

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MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
PUBLIC WATER (PCI/LITER)	H-3	12	200	1256 (12/12) (238/5760)	NA	1256 (12/12) (238/5760)	BD-22 INDICATOR WILMINGTON 6.0 MILES NE OF SITE	0	
	I-131	12	1	<LLD	NA	-		0	
	GAMMA MN-54	12	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	

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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	LOCATION WITH HIGHEST ANNUAL MEAN (M)			
					CONTROL LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
PUBLIC WATER (PCI/LITER)	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 MN-54	32	15	<LLD	NA	-		0
	CO-58		15	<LLD	NA	-		0

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					LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
GROUND WATER (PC/LITER)	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

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					LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
GROUND WATER (PCI/LITER)	BA-140		60	<LLD	NA	-			0
	LA-140		15	<LLD	NA	-			0
FISH (PCI/KG WET)	NI-63	6	260	<LLD	<LLD	-			0
	GAMMA MN-54	12	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

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					LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
FISH (PCI/KG WET)	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	3	260	<LLD	<LLD	-			0

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FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

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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 WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
					LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
SEDIMENT (PCI/KG DRY)	GAMMA MN-54	6	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

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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) 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
SEDIMENT (PCI/KG DRY)	CS-137		180	133 (3/4) (109/157)	<LLD	134 (1/2)	BD-10 INDICATOR KANKAKEE RIVER DOWNSTREAM 5.4 MILES NE OF SITE	0
	BA-140		NA	<LLD	<LLD	-		0
	LA-140		NA	<LLD	<LLD	-		0
AIR PARTICULATE (E-3 PCI/CU.METER)	GR-B	416	10	20 (362/364) (6/52)	19 (51/52) (8/52)	20 (52/52) (9/52)	BD-05 INDICATOR GARDNER 5.5 MILES SW OF SITE	0
	GAMMA MN-54	32	NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0
	FE-59		NA	<LLD	<LLD	-		0
	CO-60		NA	<LLD	<LLD	-		0

A-9

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**TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR  
BRAIDWOOD STATION, 2013**

NAME OF FACILITY: BRAIDWOOD LOCATION OF FACILITY: BRACEVILLE, IL				DOCKET NUMBER: 50-456 & 50-457 2013 REPORTING PERIOD: ANNUAL					
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)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
						MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
AIR PARTICULATE (E-3 PCI/CU.METER)	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 (E-3 PCI/CU.METER)	GAMMA I-131	416	70	<LLD	<LLD	-			0

A-10

\* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES  
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

**TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR  
BRAIDWOOD STATION, 2013**

NAME OF FACILITY: BRAIDWOOD LOCATION OF FACILITY: BRACEVILLE, IL				DOCKET NUMBER: 50-456 & 50-457 2013 REPORTING PERIOD: ANNUAL					
MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR	CONTROL	LOCATION WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
				LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
MILK (PC/LITER)	I-131	40	1	<LLD	<LLD	-			0
	GAMMA MN-54	40	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

\* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES  
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

**TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR  
BRAIDWOOD STATION, 2013**

NAME OF FACILITY: BRAIDWOOD LOCATION OF FACILITY: BRACEVILLE, IL				DOCKET NUMBER: 50-456 & 50-457 2013 REPORTING PERIOD: ANNUAL				
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 WITH HIGHEST ANNUAL MEAN (M)		NUMBER OF NONROUTINE REPORTED MEASUREMENTS
					LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	
MILK (PCI/LITER)	CS-134		15	<LLD	<LLD	-		0
	CS-137		18	<LLD	<LLD	-		0
	BA-140		60	<LLD	<LLD	-		0
	LA-140		15	<LLD	<LLD	-		0
VEGETATION (PCI/KG WET)	GAMMA MN-54	10	NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0
	FE-59		NA	<LLD	<LLD	-		0
	CO-60		NA	<LLD	<LLD	-		0

\* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES  
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

**TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR  
BRAIDWOOD STATION, 2013**

NAME OF FACILITY: BRAIDWOOD LOCATION OF FACILITY: BRACEVILLE, IL				DOCKET NUMBER: 50-456 & 50-457 2013 REPORTING PERIOD: ANNUAL					
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 WITH HIGHEST ANNUAL MEAN (M)			NUMBER OF NONROUTINE REPORTED MEASUREMENTS
					LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION		
VEGETATION (PCI/KG WET)	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
DIRECT RADIATION (MILLIREM/QTR.)	OSLD-QUARTERLY	315	NA	19.3 (307/307) (14.1/29.1)	19.6 (8/8) (17.1/22.0)	24.7 (4/4) (21.4/29.1)	BD-209-2 INDICATOR 4.8 MILES S		0

\* THE MEAN AND 2 STANDARD DEVIATION VALUES ARE CALCULATED USING THE POSITIVE VALUES  
FRACTION OF DETECTABLE MEASUREMENTS AT SPECIFIED LOCATIONS IS INDICATED IN PARENTHESES (F)

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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, 2013

Location	Location Description	Distance & Direction From Site
<u>A. Surface Water</u>		
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 (indicator)	0.6 miles NE
<u>B. Drinking (Potable) Water</u>		
BD-22	Wilmington (indicator)	6.0 miles NE
<u>C. Ground/Well Water</u>		
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
<u>D. Milk - bi-weekly / monthly</u>		
BD-17	Halpin's Dairy (indicator)	5.5 miles SSW
BD-18	Biros' Farm (control)	8.7 miles W
<u>E. Air Particulates / Air Iodine</u>		
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
<u>F. Fish</u>		
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
<u>G. Sediment</u>		
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

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Braidwood Station, 2013

Location	Location Description	Distance & Direction From Site
<u>H. Food Products</u>		
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
<u>I. Environmental Dosimetry - OSLD</u>		
<u>Site Boundary</u>		
BD-101-3 and -4		0.5 miles N
BD-102-1 and -2		1.1 miles NNE
BD-103-1 and -2		1.0 mile NE
BD-104-1 and -2		0.7 miles ENE
BD-105-1 and -2		2.2 miles E
BD-106-1 and -2		2.5 miles ESE
BD-107-1 and -2		3.2 miles SE
BD-108-1 and -2		3.2 miles SSE
BD-109-1 and -2		3.8 miles S
BD-110-1 and -2		2.8 miles SSW
BD-111a-1 and -2		1.4 miles SW
BD-112-1 and -2		0.7 miles WSW
BD-113a-1 and -2		0.5 miles W
BD-114-1 and -2		0.4 miles WNW
BD-115-1 and -2		0.3 miles NW
BD-116-1		0.4 miles NNW
BD-116-2		0.5 miles NNW
<u>Intermediate Distance</u>		
BD-201-1 and -2		4.2 miles N
BD-202-1 and -2		4.8 miles NNE
BD-203-1 and -2		4.9 miles NE
BD-204-1 and -2		4.3 miles ENE
BD-205-1 and -2		4.0 miles E
BD-206-1 and -2		4.5 miles ESE
BD-207-1 and -2		4.5 miles SE
BD-208-1 and -2		4.5 miles SSE
BD-209-1 and -2		4.8 miles S
BD-210-1 and -2		5.3 miles SSW
BD-211-1 and -2		4.8 miles SW
BD-212-3 and -4		5.0 miles WSW
BD-213-3 and -4		4.8 miles W
BD-214-1 and -2		4.3 miles WNW
BD-215-1 and -2		4.5 miles NW
BD-216-1 and -2		4.0 miles NNW
<u>Other</u>		
BD-02-1 and -2	Custer Park (indicator)	5.0 miles E
BD-04-1 and -2	Essex (indicator)	4.8 miles SSE
BD-05-1 and -2	Gardner (indicator)	5.5 miles SW
BD-06-1 and -2	Godley (indicator)	0.5 miles WSW
BD-19-1 and -2	Nearsite NW (indicator)	0.3 miles NW
BD-20-1 and -2	Nearsite N (indicator)	0.6 miles N
BD-21-1 and -2	Nearsite NE (indicator)	0.5 miles NE

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Braidwood Station, 2013

Location	Location Description	Distance & Direction From Site
<u>I. Environmental Dosimetry – OSLD (cont'd)</u>		
<u>Control</u>		
BD-03-1 and -2	13000 W. Road	6.2 miles ESE

TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Braidwood Station, 2013

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 grab samples.	TBE, TBE-2008 Gross Alpha and/or Gross Beta activity in various matrices
Drinking Water	Gamma Spectroscopy	Monthly composite from weekly grab samples.	TBE, TBE-2007 Gamma emitting radioisotope analysis
Drinking Water	Tritium	Quarterly composite from weekly grab samples.	TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation
Drinking Water	Iodine	Weekly grab and monthly composite from weekly grab	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

TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Braidwood Station, 2013

Sample Medium	Analysis	Sampling Method	Analytical Procedure Number
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
Air Iodine	Gamma Spectroscopy	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 <sub>2</sub> O <sub>3</sub> :C Landauer Incorporated elements.	Landauer Incorporated



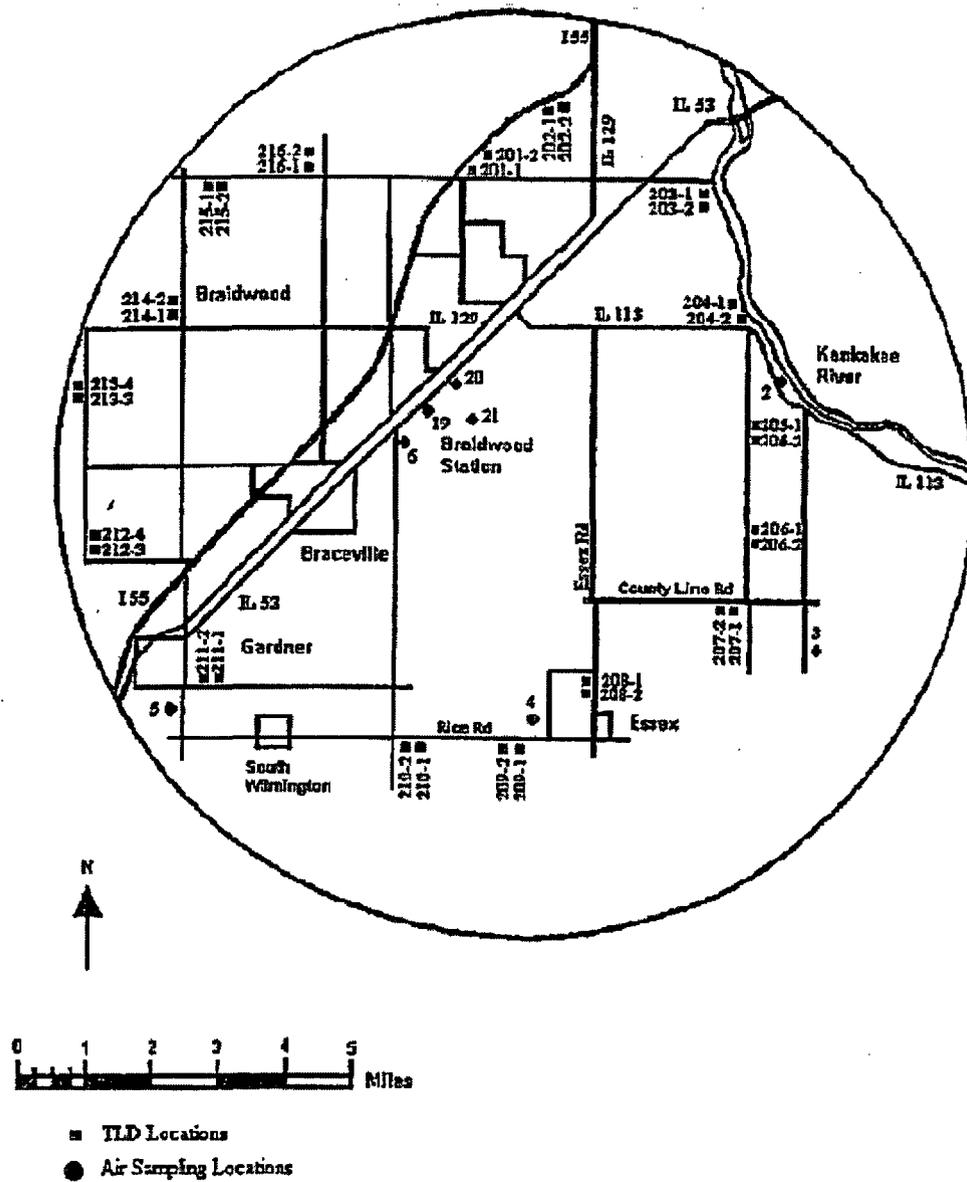


Figure B-2  
 Fixed Air Sampling and Outer Ring OSLD Locations  
 of the Braidwood Station, 2013

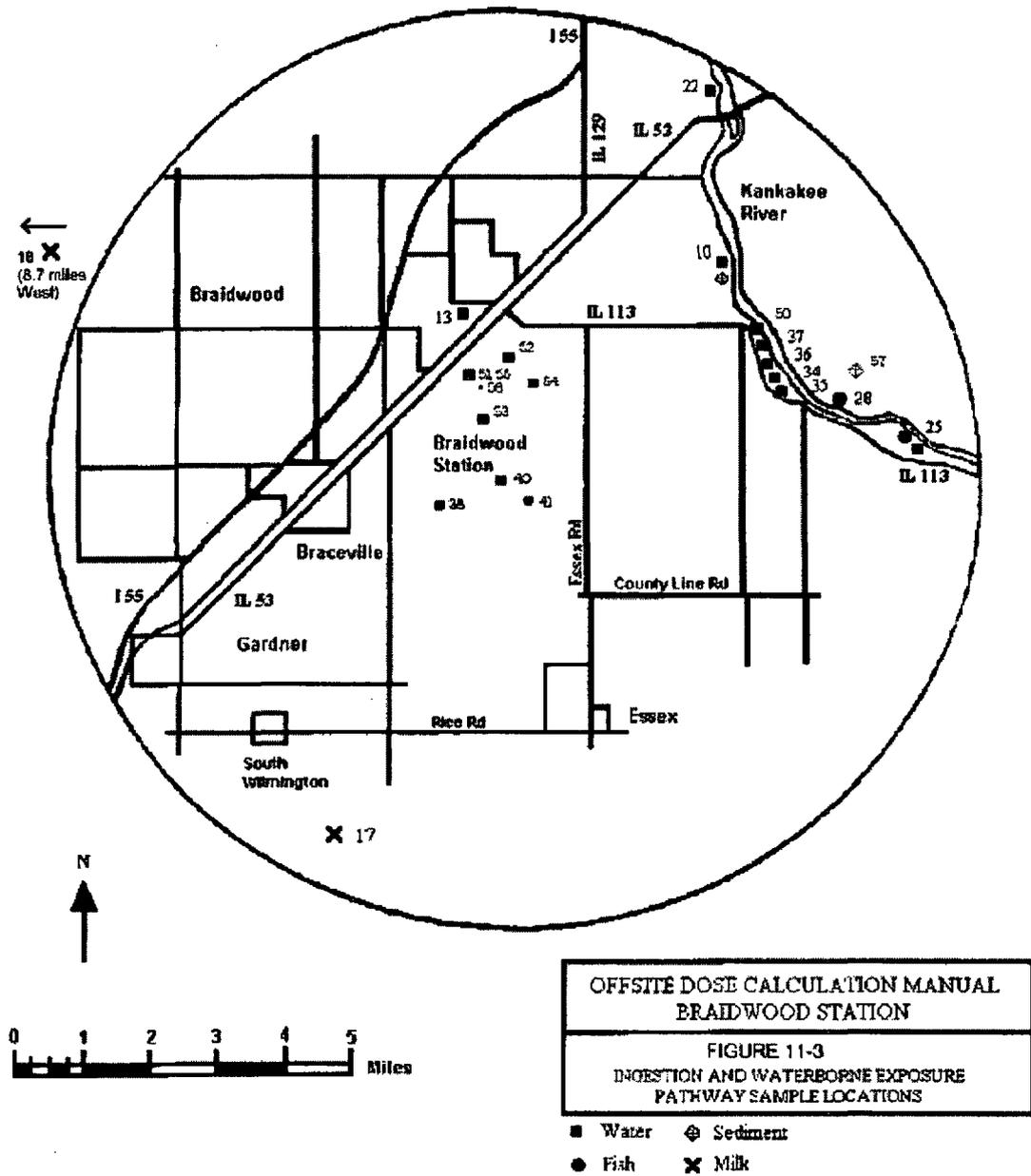


Figure B-3  
Ingestion and Waterborne Exposure Pathway Sample Locations  
of the Braidwood Station, 2013

## **APPENDIX C**

### **DATA TABLES AND FIGURES PRIMARY LABORATORY**

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**Table C-I.1**

**CONCENTRATIONS OF GROSS BETA IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	BD-10	BD-25	BD-38	BD-40	BD-55	BD-56
01/03/13 - 01/31/13	6.3 ± 1.8	10.6 ± 2.1	8.2 ± 2.2 (1)	10.7 ± 2.2	4.3 ± 1.5 (1)	(1)
02/14/13 - 02/28/13	5.0 ± 1.7	9.4 ± 2.1	8.6 ± 2.2	11.5 ± 2.2	4.8 ± 1.4 (1)	(1)
03/14/13 - 03/28/13	2.9 ± 1.7	9.3 ± 2.2	5.9 ± 2.2	10.6 ± 2.2	2.6 ± 1.4	< 2.7 (1)
04/04/13 - 04/25/13	4.4 ± 1.7	8.2 ± 2.0	5.6 ± 1.9	9.5 ± 2.1	4.2 ± 1.5	4.3 ± 1.8
05/02/13 - 05/30/13	5.4 ± 1.7	7.3 ± 1.8	6.6 ± 2.1	8.4 ± 2.0	3.4 ± 1.5	3.2 ± 1.8
06/06/13 - 06/27/13	6.0 ± 1.5	7.8 ± 1.8	4.5 ± 1.8	7.9 ± 1.9	6.2 ± 1.5	< 2.4
07/04/13 - 07/25/13	4.1 ± 2.3	8.7 ± 2.7	(1)	9.8 ± 2.8	< 2.8	4.7 ± 2.6
08/01/13 - 08/29/13	3.6 ± 1.6	8.7 ± 1.8	6.9 ± 2.0	10.1 ± 1.9	4.9 ± 1.5	3.2 ± 1.6
09/05/13 - 09/26/13	3.9 ± 1.4	8.3 ± 1.6	6.0 ± 1.8	8.5 ± 1.7	3.2 ± 1.1	2.2 ± 1.3
10/03/13 - 10/31/13	4.3 ± 1.6	5.8 ± 1.7	7.0 ± 2.0	9.3 ± 2.1	3.1 ± 1.2	5.1 ± 1.5
11/07/13 - 11/27/13	3.9 ± 1.3	5.3 ± 1.5	4.5 ± 1.7	11.7 ± 1.9	3.4 ± 1.1	8.6 ± 1.7 (1)
12/05/13 - 12/05/13	5.1 ± 1.4	9.1 ± 1.8	2.2 ± 0.9	10.3 ± 2.0	2.3 ± 1.0 (1)	3.8 ± 1.4 (1)
MEAN	4.6 ± 2.0	8.2 ± 3.0	6.0 ± 3.6	9.9 ± 2.4	3.9 ± 2.3	4.4 ± 3.9

**Table C-I.2**

**CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	BD-10	BD-25	BD-38	BD-40	BD-55	BD-56
01/24/13 - 03/28/13	< 181	< 192	< 193 (1)	< 198	< 194 (1)	< 198
04/04/13 - 06/27/13	< 197	< 197	< 197	< 197	< 198	< 197
07/04/13 - 09/26/13	2840 ± 330	< 178	(1) 254 ± 129	< 184	< 181	< 162
10/03/13 - 12/05/13	771 ± 153	< 166	< 163	< 166	< 190 (1)	< 189 (1)
MEAN	1806 ± 2926	-	-	-	-	-

**Table C-I.3**

**(2) CONCENTRATIONS OF NICKEL-63 IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	BD-10	BD-25	BD-38	BD-40	BD-55	BD-56
09/05/13 - 09/26/13	< 13.8	< 13.8	< 14.0	< 14.0	< 13.3	< 13.2
10/03/13 - 10/31/13	< 4.3	< 4.3	< 4.7	< 4.8	< 4.5	< 4.7
11/07/13 - 11/27/13	< 4.2	< 4.1	< 4.2	< 5.3	< 5.1	< 4.0
12/05/13 - 12/05/13	< 13.8	< 13.8	< 12.5	< 14.3	< 13.8	< 14.4
MEAN	-	-	-	-	-	-

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

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

(2) SEE PROGRAM CHANGES SECTION FOR EXPLANATION

Table C-I.4

**CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  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	01/03/13 - 01/31/13	< 4	< 3	< 10	< 3	< 7	< 4	< 7	< 11	< 4	< 4	< 23	< 8
	02/07/13 - 02/28/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 19	< 6
	03/07/13 - 03/28/13	< 1	< 2	< 3	< 1	< 3	< 2	< 3	< 8	< 1	< 2	< 15	< 3
	04/04/13 - 04/25/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 9	< 2	< 2	< 17	< 6
	05/02/13 - 05/30/13	< 1	< 1	< 3	< 1	< 3	< 2	< 3	< 8	< 1	< 1	< 14	< 4
	06/06/13 - 06/27/13	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 13	< 1	< 1	< 15	< 6
	07/04/13 - 07/25/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 17	< 6
	08/01/13 - 08/29/13	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 9	< 1	< 1	< 15	< 5
	09/05/13 - 09/26/13	< 1	< 1	< 3	< 1	< 2	< 1	< 3	< 12	< 1	< 1	< 18	< 5
	10/03/13 - 10/31/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 10	< 1	< 2	< 16	< 6
	11/07/13 - 11/27/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 13	< 2	< 2	< 21	< 7
	12/05/13 - 12/26/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 18	< 6
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-25	01/03/13 - 01/31/13	< 4	< 5	< 9	< 5	< 9	< 4	< 9	< 13	< 4	< 5	< 26	< 9
	02/07/13 - 02/28/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 12	< 2	< 2	< 20	< 7
	03/07/13 - 03/28/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 9	< 2	< 2	< 16	< 5
	04/04/13 - 04/25/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 18	< 5
	05/02/13 - 05/30/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 18	< 6
	06/06/13 - 06/27/13	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 14	< 1	< 1	< 17	< 6
	07/04/13 - 07/25/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 20	< 6
	08/01/13 - 08/29/13	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 11	< 2	< 2	< 19	< 5
	09/05/13 - 09/26/13	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 12	< 1	< 1	< 18	< 6
	10/03/13 - 10/31/13	< 1	< 1	< 3	< 1	< 3	< 1	< 3	< 9	< 1	< 1	< 14	< 4
	11/07/13 - 11/27/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 13	< 2	< 2	< 21	< 6
	12/05/13 - 12/26/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 9	< 2	< 2	< 16	< 5
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-1.4

**CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

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-38	01/03/13 - 01/31/13 (1)	< 5	< 5	< 10	< 4	< 11	< 4	< 8	< 13	< 5	< 5	< 29	< 9
	02/07/13 - 02/28/13	< 2	< 3	< 7	< 2	< 5	< 3	< 5	< 14	< 2	< 2	< 24	< 8
	03/07/13 - 03/28/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 8	< 2	< 2	< 15	< 5
	04/04/13 - 04/25/13	< 2	< 3	< 6	< 3	< 5	< 3	< 5	< 12	< 2	< 3	< 23	< 8
	05/02/13 - 05/30/13	< 2	< 3	< 6	< 2	< 5	< 3	< 5	< 13	< 2	< 2	< 23	< 7
	06/06/13 - 06/27/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 33	< 11
	07/04/13 - 07/25/13 (1)	-	-	-	-	-	-	-	-	-	-	-	-
	08/01/13 - 08/29/13	< 2	< 2	< 5	< 2	< 4	< 3	< 4	< 13	< 2	< 2	< 23	< 8
	09/05/13 - 09/26/13	< 2	< 2	< 4	< 1	< 3	< 2	< 3	< 12	< 1	< 2	< 20	< 7
	10/03/13 - 10/31/13	< 2	< 3	< 6	< 2	< 4	< 3	< 4	< 14	< 2	< 2	< 23	< 8
	11/07/13 - 11/27/13	< 2	< 3	< 7	< 3	< 6	< 3	< 5	< 15	< 2	< 2	< 25	< 9
	12/05/13 - 12/26/13	< 2	< 2	< 6	< 2	< 4	< 3	< 4	< 11	< 2	< 2	< 20	< 7
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-40	01/03/13 - 01/31/13	< 7	< 9	< 18	< 9	< 15	< 8	< 15	< 17	< 7	< 9	< 49	< 20
	02/07/13 - 02/28/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 20	< 7
	03/07/13 - 03/28/13	< 2	< 3	< 6	< 3	< 5	< 3	< 5	< 11	< 2	< 2	< 21	< 7
	04/04/13 - 04/25/13	< 2	< 3	< 6	< 3	< 5	< 3	< 5	< 12	< 2	< 2	< 23	< 8
	05/02/13 - 05/30/13	< 2	< 2	< 4	< 2	< 3	< 2	< 4	< 10	< 2	< 2	< 19	< 5
	06/06/13 - 06/27/13	< 1	< 1	< 2	< 1	< 1	< 1	< 2	< 12	< 1	< 1	< 15	< 4
	07/04/13 - 07/25/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 20	< 7
	08/01/13 - 08/29/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 14	< 2	< 2	< 23	< 7
	09/05/13 - 09/26/13	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 13	< 1	< 1	< 18	< 4
	10/03/13 - 10/31/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 11	< 1	< 2	< 18	< 5
	11/07/13 - 11/27/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 13	< 2	< 2	< 20	< 6
	12/05/13 - 12/26/13	< 2	< 2	< 6	< 2	< 4	< 3	< 4	< 12	< 2	< 2	< 23	< 7
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-1.4

**CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

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-55	01/03/13 - 01/31/13 (1)	< 5	< 5	< 10	< 5	< 10	< 7	< 10	< 15	< 5	< 5	< 32	< 7
	02/14/13 - 02/28/13 (1)	< 1	< 1	< 3	< 1	< 3	< 2	< 3	< 8	< 1	< 1	< 14	< 5
	03/07/13 - 03/28/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 9	< 1	< 2	< 16	< 4
	04/04/13 - 04/25/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 19	< 5
	05/02/13 - 05/30/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 11	< 2	< 2	< 18	< 5
	06/06/13 - 06/27/13	< 1	< 1	< 2	< 1	< 2	< 1	< 2	< 14	< 1	< 1	< 18	< 6
	07/04/13 - 07/25/13	< 2	< 3	< 6	< 2	< 5	< 3	< 5	< 12	< 2	< 2	< 24	< 8
	08/01/13 - 08/29/13	< 2	< 3	< 6	< 2	< 5	< 3	< 5	< 15	< 2	< 2	< 25	< 7
	09/05/13 - 09/26/13	< 1	< 2	< 3	< 1	< 3	< 1	< 3	< 12	< 1	< 1	< 18	< 5
	10/03/13 - 10/31/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 12	< 2	< 2	< 19	< 6
	11/07/13 - 11/27/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 14	< 2	< 2	< 24	< 6
	12/05/13 - 12/05/13 (1)	< 2	< 2	< 6	< 2	< 3	< 3	< 4	< 52	< 2	< 2	< 50	< 16
MEAN		-	-	-	-	-	-	-	-	-	-	-	-
BD-56	01/03/13 - 01/31/13 (1)	-	-	-	-	-	-	-	-	-	-	-	-
	02/14/13 - 02/28/13 (1)	-	-	-	-	-	-	-	-	-	-	-	-
	03/14/13 - 03/28/13 (1)	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 9	< 2	< 2	< 16	< 5
	04/04/13 - 04/25/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 19	< 6
	05/02/13 - 05/30/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 19	< 6
	06/06/13 - 06/27/13	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 14	< 1	< 1	< 15	< 6
	07/04/13 - 07/25/13	< 3	< 3	< 7	< 3	< 6	< 3	< 6	< 14	< 2	< 3	< 27	< 9
	08/01/13 - 08/29/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 12	< 2	< 2	< 21	< 7
	09/05/13 - 09/26/13	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 10	< 1	< 1	< 16	< 5
	10/03/13 - 10/31/13	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 11	< 1	< 2	< 18	< 6
	11/07/13 - 11/27/13 (1)	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 15	< 2	< 2	< 23	< 8
	12/05/13 - 12/05/13 (1)	< 2	< 3	< 7	< 2	< 5	< 3	< 5	< 59	< 2	< 2	< 60	< 19
MEAN		-	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

**TABLE C-II.1 CONCENTRATIONS OF GROSS BETA IN PUBLIC WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  2 SIGMA

COLLECTION PERIOD	BD-22
01/03/13 - 01/31/13	4.0 $\pm$ 1.2
01/31/13 - 02/28/13	3.3 $\pm$ 1.5
02/28/13 - 03/28/13	3.5 $\pm$ 2.1
03/28/13 - 04/25/13	3.1 $\pm$ 1.4
04/25/13 - 05/30/13	3.8 $\pm$ 1.4
05/30/13 - 06/27/13	5.0 $\pm$ 1.5
06/27/13 - 08/01/13	4.4 $\pm$ 2.0
08/01/13 - 08/29/13	3.2 $\pm$ 1.6
08/29/13 - 10/03/13	3.3 $\pm$ 1.4
10/03/13 - 10/31/13	4.9 $\pm$ 1.2
10/31/13 - 11/27/13	5.0 $\pm$ 1.7
11/27/13 - 01/02/14	4.9 $\pm$ 2.1
MEAN	4.0 $\pm$ 1.5

**TABLE C-II.2 CONCENTRATIONS OF TRITIUM IN PUBLIC WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  2 SIGMA

COLLECTION PERIOD	BD-22
01/03/13 - 01/31/13	388 $\pm$ 128
01/31/13 - 02/28/13	391 $\pm$ 124
02/28/13 - 03/28/13	311 $\pm$ 132
03/28/13 - 04/25/13	678 $\pm$ 146
04/25/13 - 05/30/13	409 $\pm$ 131
05/30/13 - 06/27/13	239 $\pm$ 132
06/27/13 - 08/01/13	892 $\pm$ 142
08/01/13 - 08/29/13	3300 $\pm$ 383
08/29/13 - 10/03/13	5760 $\pm$ 619
10/03/13 - 10/31/13	1310 $\pm$ 203
10/31/13 - 11/27/13	1150 $\pm$ 175
11/27/13 - 01/02/14	238 $\pm$ 118
MEAN	1256 $\pm$ 3310

**TABLE C-II.3 CONCENTRATIONS OF I-131 IN PUBLIC WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  2 SIGMA

COLLECTION PERIOD	BD-22
01/03/13 - 01/31/13	< 0.8
01/31/13 - 02/28/13	< 1.0
02/28/13 - 03/28/13	< 0.9
03/28/13 - 04/25/13	< 0.7
04/25/13 - 05/30/13	< 0.5
05/30/13 - 06/27/13	< 0.7
06/27/13 - 08/01/13	< 0.7
08/01/13 - 08/29/13	< 0.6
08/29/13 - 10/03/13	< 0.7
10/03/13 - 10/31/13	< 0.7
10/31/13 - 11/27/13	< 0.8
11/27/13 - 01/02/14	< 0.7
MEAN	-

Table C-II.4

**CONCENTRATIONS OF GAMMA EMITTERS IN PUBLIC WATER SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

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	01/03/13 - 01/31/13	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 1	< 1	< 18	< 6
	01/31/13 - 02/28/13	< 1	< 1	< 3	< 2	< 3	< 2	< 3	< 1	< 1	< 15	< 5
	02/28/13 - 03/28/13	< 3	< 4	< 8	< 2	< 7	< 4	< 6	< 3	< 3	< 37	< 11
	03/28/13 - 04/25/13	< 1	< 1	< 2	< 1	< 2	< 1	< 2	< 1	< 1	< 17	< 5
	04/25/13 - 05/30/13	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 24	< 8
	05/30/13 - 06/27/13	< 1	< 1	< 2	< 1	< 2	< 1	< 1	< 1	< 1	< 13	< 4
	06/27/13 - 08/01/13	< 1	< 1	< 3	< 1	< 3	< 2	< 3	< 1	< 1	< 13	< 4
	08/01/13 - 08/29/13	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 17	< 5
	08/29/13 - 10/03/13	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 1	< 1	< 30	< 9
	10/03/13 - 10/31/13	< 2	< 2	< 5	< 2	< 3	< 2	< 4	< 2	< 2	< 39	< 11
	10/31/13 - 11/27/13	< 2	< 2	< 5	< 2	< 3	< 2	< 4	< 1	< 2	< 41	< 13
	11/27/13 - 01/02/14	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 17	< 6
MEAN		-	-	-	-	-	-	-	-	-	-	-

C-6

**Table C-III.1**

**CONCENTRATIONS OF TRITIUM IN GROUND/WELL WATER SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

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
01/11/13 - 01/11/13	< 186	< 186	< 187	< 181	< 181	< 180	< 181	< 184
04/11/13 - 04/11/13	< 194	< 198	< 194	< 180	< 179	< 177	< 177	< 179
07/11/13 - 07/11/13	< 197	(1)	< 197	< 195	< 196	< 195	< 197	< 198
08/01/13 - 08/01/13		< 182						
10/11/13 - 10/11/13	< 193	(1)	< 194	< 192	< 192	< 187	< 171	< 176
11/07/13 - 11/07/13		< 158						
MEAN	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-III.2

**CONCENTRATIONS OF GAMMA EMITTERS IN GROUND/WELL WATER SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  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	01/11/13 - 01/11/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 4	< 2	< 2	< 10	< 4
	04/11/13 - 04/11/13	< 3	< 3	< 6	< 3	< 6	< 4	< 7	< 9	< 3	< 3	< 21	< 6
	07/11/13 - 07/11/13	< 4	< 4	< 9	< 3	< 8	< 4	< 7	< 11	< 4	< 4	< 28	< 8
	10/10/13 - 10/10/13	< 4	< 4	< 9	< 4	< 7	< 4	< 7	< 11	< 4	< 4	< 24	< 10
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-34	01/11/13 - 01/11/13	< 2	< 3	< 5	< 2	< 5	< 3	< 4	< 6	< 2	< 3	< 13	< 4
	04/11/13 - 04/11/13	< 5	< 5	< 9	< 5	< 10	< 5	< 8	< 13	< 4	< 5	< 27	< 10
	08/01/13 - 08/01/13	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 5	< 2	< 2	< 12	< 4
	11/07/13 - 11/07/13	< 5	< 5	< 11	< 6	< 11	< 6	< 10	< 14	< 5	< 6	< 34	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-35	01/11/13 - 01/11/13	< 3	< 3	< 6	< 3	< 5	< 3	< 4	< 6	< 2	< 3	< 16	< 5
	04/11/13 - 04/11/13	< 5	< 5	< 9	< 6	< 10	< 5	< 8	< 13	< 4	< 5	< 28	< 10
	07/11/13 - 07/11/13	< 3	< 4	< 8	< 4	< 8	< 5	< 7	< 11	< 4	< 4	< 25	< 9
	10/11/13 - 10/11/13	< 5	< 5	< 9	< 4	< 9	< 6	< 9	< 14	< 4	< 5	< 34	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-36	01/11/13 - 01/11/13	< 2	< 2	< 5	< 2	< 5	< 3	< 4	< 6	< 2	< 2	< 14	< 4
	04/11/13 - 04/11/13	< 4	< 4	< 9	< 4	< 9	< 5	< 8	< 12	< 4	< 4	< 25	< 9
	07/11/13 - 07/11/13	< 4	< 4	< 9	< 4	< 8	< 5	< 8	< 12	< 4	< 5	< 25	< 8
	10/11/13 - 10/11/13	< 4	< 5	< 9	< 4	< 8	< 5	< 7	< 13	< 4	< 4	< 29	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-37	01/11/13 - 01/11/13	< 3	< 3	< 6	< 3	< 6	< 3	< 5	< 6	< 3	< 3	< 16	< 5
	04/11/13 - 04/11/13	< 3	< 4	< 8	< 4	< 6	< 4	< 8	< 10	< 3	< 4	< 24	< 8
	07/11/13 - 07/11/13	< 4	< 5	< 6	< 4	< 8	< 5	< 7	< 13	< 5	< 4	< 28	< 10
	10/11/13 - 10/11/13	< 4	< 5	< 8	< 5	< 7	< 5	< 8	< 12	< 4	< 4	< 29	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-III.2

**CONCENTRATIONS OF GAMMA EMITTERS IN GROUND/WELL WATER SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

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	01/11/13 - 01/11/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 5	< 2	< 2	< 12	< 4
	04/11/13 - 04/11/13	< 5	< 5	< 12	< 6	< 10	< 5	< 9	< 13	< 5	< 5	< 34	< 12
	07/11/13 - 07/11/13	< 5	< 6	< 10	< 5	< 8	< 6	< 8	< 13	< 5	< 5	< 28	< 12
	10/11/13 - 10/11/13	< 4	< 5	< 9	< 4	< 7	< 5	< 8	< 13	< 4	< 5	< 30	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-51	01/11/13 - 01/11/13	< 3	< 3	< 6	< 3	< 5	< 3	< 5	< 6	< 3	< 3	< 16	< 5
	04/11/13 - 04/11/13	< 4	< 4	< 9	< 3	< 8	< 4	< 8	< 11	< 3	< 4	< 25	< 9
	07/11/13 - 07/11/13	< 5	< 4	< 11	< 6	< 10	< 5	< 9	< 11	< 4	< 5	< 26	< 9
	10/11/13 - 10/11/13	< 5	< 5	< 11	< 5	< 9	< 5	< 8	< 14	< 5	< 5	< 32	< 10
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-54	01/11/13 - 01/11/13	< 2	< 2	< 5	< 2	< 5	< 2	< 4	< 5	< 2	< 3	< 13	< 5
	04/11/13 - 04/11/13	< 4	< 4	< 10	< 5	< 8	< 5	< 8	< 11	< 4	< 5	< 28	< 8
	07/11/13 - 07/11/13	< 6	< 6	< 9	< 5	< 11	< 5	< 10	< 13	< 5	< 6	< 30	< 12
	10/11/13 - 10/11/13	< 5	< 5	< 10	< 6	< 10	< 6	< 10	< 14	< 5	< 5	< 31	< 10
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-IV.1

(1) CONCENTRATIONS OF NICKEL-63 AND GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013

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
<b>BD-25</b>														
Golden Redhorse	05/02/13		< 42	< 46	< 102	< 39	< 93	< 52	< 80	< 414	< 36	< 32	< 662	< 163
Channel Catfish	05/02/13		< 58	< 63	< 129	< 51	< 103	< 53	< 111	< 561	< 53	< 54	< 777	< 156
Golden Redhorse	10/01/13	< 231	< 49	< 61	< 141	< 48	< 80	< 63	< 98	< 557	< 52	< 56	< 958	< 198
Channel Catfish	10/01/13	< 150	< 43	< 51	< 141	< 45	< 99	< 60	< 95	< 368	< 41	< 45	< 650	< 239
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>BD-28</b>														
Golden Redhorse	05/02/13		< 84	< 87	< 156	< 70	< 150	< 84	< 161	< 860	< 68	< 81	< 1209	< 278
Channel Catfish	05/02/13		< 38	< 36	< 120	< 49	< 97	< 47	< 81	< 371	< 40	< 42	< 584	< 257
Common Carp	10/01/13	< 186	< 62	< 69	< 140	< 59	< 130	< 79	< 118	< 596	< 59	< 55	< 999	< 247
Channel Catfish	10/01/13	< 157	< 50	< 62	< 141	< 61	< 120	< 64	< 115	< 538	< 47	< 63	< 898	< 225
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>BD-41</b>														
Largemouth Bass	05/01/13		< 63	< 79	< 188	< 68	< 144	< 75	< 139	< 696	< 63	< 76	< 1132	< 332
Channel Catfish	05/01/13		< 74	< 81	< 190	< 62	< 158	< 81	< 137	< 796	< 58	< 72	< 1030	< 273
Common Carp	10/01/13	< 181	< 67	< 78	< 144	< 63	< 133	< 89	< 122	< 729	< 69	< 65	< 926	< 362
Largemouth Bass	10/01/13	< 173	< 62	< 72	< 180	< 66	< 108	< 76	< 119	< 611	< 47	< 61	< 836	< 360
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-	-

C-10

(1) SEE PROGRAM CHANGES SECTION FOR EXPLANATION

**Table C-V.1 (2) CONCENTRATIONS OF NICKEL-63 AND GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

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	05/16/13		< 98	< 105	< 274	< 137	< 249	< 148	< 183	< 102	134 ± 72	< 734	< 197
	10/04/13	< 194	< 65	< 82	< 214	< 74	< 144	< 96	< 157	< 61	< 67	< 1182	< 396
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-25	05/16/13		< 120	< 119	< 282	< 118	< 256	< 137	< 221	< 112	< 147	< 860	< 209
	10/03/13	< 216	< 51	< 51	< 142	< 47	< 112	< 60	< 108	< 35	< 49	< 714	< 193
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BD-57	05/16/13		< 64	< 69	< 227	< 75	< 151	< 85	< 123	< 52	109 ± 80	< 359	< 151
	10/04/13	< 203	< 98	< 107	< 268	< 105	< 206	< 135	< 207	< 78	157 ± 110	< 1613	< 497
	MEAN	-	-	-	-	-	-	-	-	-	133 ± 68	-	-

C-11

(2) SEE PROGRAM CHANGES SECTION FOR EXPLANATION

Table C-VI.1

**CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

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

COLLECTION PERIOD	GROUP I				GROUP II			GROUP III
	BD-06	BD-19	BD-20	BD-21	BD-02	BD-04	BD-05	BD-03
01/03/13 - 01/10/13	42 ± 6	49 ± 6	52 ± 6	46 ± 6	43 ± 6	49 ± 6	52 ± 6	52 ± 6
01/10/13 - 01/17/13	27 ± 5	25 ± 5	23 ± 5	26 ± 5	29 ± 5	24 ± 5	25 ± 5	24 ± 5
01/17/13 - 01/24/13	17 ± 4	19 ± 5	20 ± 5	21 ± 5	21 ± 5	22 ± 5	22 ± 5	20 ± 5
01/24/13 - 01/31/13	25 ± 5	21 ± 5	25 ± 5	25 ± 5	11 ± 4	26 ± 5	29 ± 5	28 ± 5
01/31/13 - 02/07/13	33 ± 5	32 ± 5	29 ± 5	31 ± 5	29 ± 5	29 ± 5	33 ± 5	36 ± 5
02/07/13 - 02/14/13	19 ± 4	21 ± 5	21 ± 5	21 ± 5	20 ± 5	19 ± 4	23 ± 5	18 ± 4
02/14/13 - 02/21/13	17 ± 4	18 ± 4	13 ± 4	14 ± 4	14 ± 4	14 ± 4	16 ± 4	16 ± 4
02/21/13 - 02/28/13	12 ± 4	13 ± 4	14 ± 4	11 ± 4	11 ± 4	15 ± 4	16 ± 4	13 ± 4
02/28/13 - 03/07/13	15 ± 4	14 ± 4	12 ± 4	12 ± 4	10 ± 4	16 ± 4	12 ± 4	14 ± 4
03/07/13 - 03/14/13	13 ± 4	15 ± 5	13 ± 4	16 ± 5	14 ± 5	15 ± 5	13 ± 4	15 ± 5
03/14/13 - 03/21/13	21 ± 5	20 ± 4	21 ± 5	18 ± 4	20 ± 4	21 ± 4	22 ± 5	26 ± 5
03/21/13 - 03/28/13	9 ± 4	7 ± 4	8 ± 4	6 ± 3	6 ± 3	10 ± 4	10 ± 4	11 ± 4
03/28/13 - 04/04/13	23 ± 5	20 ± 4	15 ± 4	14 ± 4	20 ± 4	24 ± 5	19 ± 4	15 ± 4
04/04/13 - 04/11/13	12 ± 4	15 ± 4	18 ± 4	14 ± 4	14 ± 4	15 ± 4	16 ± 4	14 ± 4
04/11/13 - 04/18/13	13 ± 4	10 ± 4	10 ± 4	9 ± 4	8 ± 4	9 ± 4	14 ± 4	10 ± 4
04/18/13 - 04/25/13	12 ± 4	14 ± 4	17 ± 4	18 ± 4	18 ± 4	17 ± 4	16 ± 4	14 ± 4
04/25/13 - 05/02/13	19 ± 5	21 ± 5	21 ± 5	21 ± 5	18 ± 5	21 ± 5	20 ± 5	18 ± 5 (1)
05/02/13 - 05/09/13	< 6	6 ± 4	8 ± 4	8 ± 4	9 ± 4	9 ± 4	10 ± 4	10 ± 4
05/09/13 - 05/16/13	12 ± 5	10 ± 5	12 ± 5	14 ± 5	12 ± 5	9 ± 5	10 ± 5	17 ± 5
05/16/13 - 05/23/13	18 ± 4	16 ± 4	14 ± 4	13 ± 4	17 ± 4	16 ± 4	16 ± 4	14 ± 4
05/23/13 - 05/30/13	9 ± 4	16 ± 4	16 ± 4	8 ± 4	13 ± 4	10 ± 4	15 ± 4	12 ± 4
05/30/13 - 06/06/13	6 ± 3	< 5	7 ± 4	10 ± 4	12 ± 4	8 ± 4	9 ± 4	9 ± 4
06/06/13 - 06/13/13	16 ± 4	20 ± 4	17 ± 4	22 ± 4	17 ± 4	18 ± 4	18 ± 4	17 ± 4
06/13/13 - 06/20/13	14 ± 4	15 ± 4	9 ± 4	11 ± 4	10 ± 4	11 ± 4	12 ± 4	11 ± 4
06/20/13 - 06/27/13	15 ± 4	16 ± 4	18 ± 4	17 ± 4	16 ± 4	18 ± 4	20 ± 5	13 ± 4
06/27/13 - 07/04/13	10 ± 4	10 ± 4	12 ± 4	8 ± 4	6 ± 4	10 ± 4	12 ± 4	8 ± 4
07/04/13 - 07/11/13	14 ± 4	18 ± 5	19 ± 5	20 ± 5	18 ± 5	16 ± 5	19 ± 5	18 ± 5 (1)
07/11/13 - 07/18/13	12 ± 4	10 ± 4	9 ± 4	9 ± 4	9 ± 4	13 ± 4	10 ± 4	< 6
07/18/13 - 07/25/13	14 ± 4	17 ± 4	17 ± 4	14 ± 4	15 ± 4	13 ± 4	14 ± 4	14 ± 5 (1)
07/25/13 - 08/01/13	13 ± 4	12 ± 4	15 ± 4	11 ± 4	13 ± 4	11 ± 4	17 ± 4	13 ± 5 (1)
08/01/13 - 08/08/13	19 ± 4	16 ± 4	18 ± 4	20 ± 4	20 ± 5	17 ± 4	20 ± 4	18 ± 5 (1)
08/08/13 - 08/15/13	22 ± 4	17 ± 4	22 ± 4	19 ± 4	20 ± 4	18 ± 4	15 ± 4	17 ± 4
08/15/13 - 08/22/13	31 ± 5	28 ± 5	31 ± 5	27 ± 5	34 ± 6	27 ± 5	30 ± 5	24 ± 5
08/22/13 - 08/29/13	24 ± 5	25 ± 5	30 ± 5	26 ± 5	24 ± 5	23 ± 5	22 ± 5	26 ± 5
08/29/13 - 09/05/13	20 ± 5	22 ± 5	21 ± 5	18 ± 4	19 ± 5	17 ± 4	17 ± 4	19 ± 5
09/05/13 - 09/12/13	34 ± 5	32 ± 5	34 ± 5	34 ± 5	37 ± 6	34 ± 5	36 ± 6	34 ± 5
09/12/13 - 09/19/13	19 ± 4	17 ± 4	17 ± 4	17 ± 4	18 ± 4	21 ± 5	20 ± 5	13 ± 7 (1)
09/19/13 - 09/26/13	16 ± 4	16 ± 4	14 ± 4	16 ± 4	16 ± 4	16 ± 4	13 ± 4	18 ± 4
09/26/13 - 10/03/13	24 ± 5	21 ± 4	22 ± 4	21 ± 4	25 ± 5	23 ± 5	24 ± 5	18 ± 4
10/03/13 - 10/10/13	21 ± 4	18 ± 4	20 ± 4	20 ± 4	17 ± 4	19 ± 4	20 ± 4	17 ± 4
10/10/13 - 10/17/13	25 ± 5	21 ± 5	25 ± 5	23 ± 5	20 ± 4	24 ± 5	21 ± 5	18 ± 4
10/17/13 - 10/24/13	17 ± 4	18 ± 4	18 ± 4	17 ± 4	17 ± 4	18 ± 4	14 ± 4	17 ± 4
10/24/13 - 10/31/13	19 ± 5	23 ± 5	19 ± 5	22 ± 5	26 ± 5	21 ± 5	20 ± 5	17 ± 5
10/31/13 - 11/07/13	26 ± 5	23 ± 5	26 ± 5	24 ± 5	19 ± 5	24 ± 5	24 ± 5	23 ± 5
11/07/13 - 11/14/13	15 ± 5	17 ± 5	16 ± 5	16 ± 5	19 ± 5	18 ± 5	19 ± 5	17 ± 5
11/14/13 - 11/21/13	16 ± 6	13 ± 6	16 ± 6	13 ± 6	18 ± 6	13 ± 6	20 ± 6	16 ± 6
11/21/13 - 11/27/13	15 ± 5	22 ± 5	21 ± 5	17 ± 5	19 ± 5	19 ± 5	22 ± 5	17 ± 6 (1)
11/27/13 - 12/05/13	36 ± 5	37 ± 5	35 ± 5	40 ± 5	37 ± 5	41 ± 5	43 ± 5	35 ± 5
12/05/13 - 12/12/13	36 ± 5	32 ± 5	35 ± 5	38 ± 6	33 ± 5	33 ± 5	35 ± 5	31 ± 5
12/12/13 - 12/19/13	30 ± 5	36 ± 5	31 ± 5	29 ± 5	25 ± 5	29 ± 5	29 ± 5	28 ± 5
12/19/13 - 12/26/13	30 ± 5	24 ± 5	24 ± 5	28 ± 5	25 ± 5	25 ± 5	29 ± 5	25 ± 5
12/26/13 - 01/02/14	26 ± 5	24 ± 5	30 ± 5	30 ± 5	25 ± 5	30 ± 5	30 ± 5	23 ± 5
MEAN	20 ± 16	20 ± 16	20 ± 17	19 ± 17	19 ± 16	20 ± 16	20 ± 17	19 ± 16

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

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

**Table C-VI.2 MONTHLY AND YEARLY VALUES OF GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

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
01/03/13 - 01/31/13	17	52	29 ± 23	01/03/13 - 01/31/13	11	52	29 ± 25	01/03/13 - 01/31/13	20	52	31 ± 29
01/31/13 - 02/28/13	11	33	20 ± 15	01/31/13 - 02/28/13	11	33	20 ± 14	01/31/13 - 02/28/13	13	36	21 ± 20
02/28/13 - 04/04/13	6	23	15 ± 10	02/28/13 - 04/04/13	6	24	15 ± 11	02/28/13 - 04/04/13	11	26	16 ± 12
04/04/13 - 05/02/13	9	21	15 ± 8	04/04/13 - 05/02/13	8	21	15 ± 8	04/04/13 - 05/02/13	10	18	14 ± 7
05/02/13 - 05/30/13	6	18	12 ± 7	05/02/13 - 05/30/13	9	17	12 ± 6	05/02/13 - 05/30/13	10	17	13 ± 6
05/30/13 - 07/04/13	6	22	13 ± 9	05/30/13 - 07/04/13	6	20	13 ± 9	05/30/13 - 07/04/13	8	17	12 ± 7
07/04/13 - 08/01/13	9	20	14 ± 7	07/04/13 - 08/01/13	9	19	14 ± 6	07/04/13 - 08/01/13	13	18	15 ± 6
08/01/13 - 08/29/13	16	31	23 ± 10	08/01/13 - 08/29/13	15	34	22 ± 11	08/01/13 - 08/29/13	17	26	21 ± 9
08/29/13 - 10/03/13	14	34	22 ± 13	08/29/13 - 10/03/13	13	37	22 ± 15	08/29/13 - 10/03/13	13	34	20 ± 16
10/03/13 - 10/31/13	17	25	20 ± 5	10/03/13 - 10/31/13	14	26	20 ± 6	10/03/13 - 10/31/13	17	18	17 ± 2
10/31/13 - 11/27/13	13	26	19 ± 9	10/31/13 - 11/27/13	13	24	19 ± 6	10/31/13 - 11/27/13	16	23	18 ± 7
11/27/13 - 01/02/14	24	40	31 ± 10	11/27/13 - 01/02/14	25	43	31 ± 11	11/27/13 - 01/02/14	23	35	28 ± 10
01/03/13 - 01/02/14	6	52	20 ± 16	01/03/13 - 01/02/14	6	52	20 ± 17	01/03/13 - 01/02/14	8	52	19 ± 16

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, 2013**

RESULTS IN UNITS OF E-3 PCI/CU METER  $\pm$  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	01/03/13 - 04/04/13	< 3	< 3	< 8	< 3	< 9	< 4	< 7	< 5	< 3	< 42	< 16
	04/04/13 - 07/04/13	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 22	< 5
	07/04/13 - 10/03/13	< 2	< 3	< 7	< 2	< 6	< 3	< 8	< 2	< 2	< 70	< 28
	10/03/13 - 01/02/14	< 2	< 2	< 4	< 2	< 7	< 3	< 5	< 3	< 3	< 30	< 14
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BD-03	01/03/13 - 04/04/13	< 2	< 3	< 8	< 3	< 7	< 2	< 4	< 2	< 2	< 21	< 10
	04/04/13 - 07/04/13	< 2	< 3	< 8	< 3	< 5	< 3	< 4	< 2	< 2	< 23	< 6
	07/04/13 - 10/03/13	< 2	< 3	< 10	< 2	< 6	< 4	< 5	< 2	< 3	< 64	< 27
	10/03/13 - 01/02/14	< 3	< 3	< 8	< 3	< 7	< 3	< 5	< 3	< 3	< 30	< 15
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BD-04	01/03/13 - 04/04/13	< 1	< 2	< 6	< 2	< 7	< 3	< 4	< 3	< 2	< 32	< 13
	04/04/13 - 07/04/13	< 2	< 3	< 4	< 3	< 4	< 3	< 4	< 2	< 2	< 23	< 12
	07/04/13 - 10/03/13	< 2	< 3	< 7	< 2	< 5	< 2	< 6	< 2	< 2	< 53	< 24
	10/03/13 - 01/02/14	< 3	< 4	< 7	< 3	< 9	< 4	< 7	< 4	< 3	< 43	< 16
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BD-05	01/03/13 - 04/04/13	< 3	< 3	< 5	< 3	< 8	< 3	< 7	< 3	< 2	< 36	< 14
	04/04/13 - 07/04/13	< 3	< 3	< 9	< 3	< 6	< 3	< 6	< 2	< 3	< 29	< 11
	07/04/13 - 10/03/13	< 2	< 3	< 11	< 3	< 8	< 5	< 6	< 3	< 3	< 67	< 21
	10/03/13 - 01/02/14	< 2	< 2	< 6	< 2	< 6	< 2	< 4	< 2	< 2	< 23	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BD-06	01/03/13 - 04/04/13	< 3	< 3	< 10	< 3	< 8	< 3	< 5	< 3	< 3	< 35	< 12
	04/04/13 - 07/04/13	< 3	< 4	< 7	< 5	< 11	< 4	< 8	< 3	< 4	< 42	< 12
	07/04/13 - 10/03/13	< 2	< 3	< 6	< 1	< 6	< 3	< 5	< 2	< 3	< 52	< 18
	10/03/13 - 01/02/14	< 3	< 2	< 7	< 3	< 5	< 3	< 6	< 3	< 3	< 31	< 7
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-VI.3

**CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

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	01/03/13 - 04/04/13	< 3	< 4	< 8	< 3	< 7	< 4	< 7	< 4	< 3	< 36	< 12
	04/04/13 - 07/04/13	< 3	< 3	< 8	< 3	< 6	< 3	< 4	< 3	< 3	< 26	< 6
	07/04/13 - 10/03/13	< 2	< 3	< 10	< 3	< 5	< 3	< 5	< 2	< 2	< 62	< 19
	10/03/13 - 01/02/14	< 2	< 3	< 9	< 2	< 5	< 3	< 5	< 2	< 3	< 31	< 14
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BD-20	01/03/13 - 04/04/13	< 3	< 4	< 8	< 2	< 7	< 3	< 7	< 4	< 3	< 48	< 16
	04/04/13 - 07/04/13	< 2	< 3	< 5	< 2	< 5	< 2	< 5	< 2	< 2	< 19	< 7
	07/04/13 - 10/03/13	< 2	< 3	< 7	< 3	< 4	< 3	< 5	< 2	< 2	< 50	< 17
	10/03/13 - 01/02/14	< 4	< 5	< 13	< 3	< 9	< 5	< 8	< 4	< 4	< 43	< 14
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BD-21	01/03/13 - 04/04/13	< 2	< 2	< 6	< 3	< 4	< 2	< 3	< 2	< 2	< 28	< 13
	04/04/13 - 07/04/13	< 2	< 2	< 5	< 2	< 4	< 3	< 4	< 2	< 2	< 18	< 7
	07/04/13 - 10/03/13	< 2	< 4	< 9	< 2	< 6	< 3	< 8	< 3	< 3	< 58	< 31
	10/03/13 - 01/02/14	< 3	< 2	< 6	< 3	< 7	< 3	< 5	< 2	< 2	< 32	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-VII.1

**CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN  
THE VICINITY OF BRAIDWOOD STATION, 2013**

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

COLLECTION PERIOD	GROUP I				GROUP II			GROUP III
	BD-06	BD-19	BD-20	BD-21	BD-02	BD-04	BD-05	BD-03
01/03/13 - 01/10/13	< 25	< 25	< 25	< 25	< 32	< 32	< 32	< 32
01/10/13 - 01/17/13	< 36	< 36	< 36	< 36	< 49	< 49	< 46	< 19
01/17/13 - 01/24/13	< 32	< 33	< 33	< 33	< 36	< 37	< 36	< 36
01/24/13 - 01/31/13	< 41	< 41	< 41	< 41	< 38	< 15	< 38	< 38
01/31/13 - 02/07/13	< 30	< 30	< 30	< 30	< 46	< 46	< 47	< 46
02/07/13 - 02/14/13	< 57	< 57	< 57	< 57	< 51	< 51	< 23	< 51
02/14/13 - 02/21/13	< 55	< 55	< 55	< 55	< 61	< 61	< 59	< 61
02/21/13 - 02/28/13	< 15	< 26	< 26	< 26	< 35	< 35	< 35	< 35
02/28/13 - 03/07/13	< 26	< 26	< 26	< 26	< 49	< 49	< 49	< 49
03/07/13 - 03/14/13	< 40	< 16	< 40	< 40	< 23	< 23	< 24	< 24
03/14/13 - 03/21/13	< 38	< 38	< 38	< 38	< 40	< 39	< 42	< 39
03/21/13 - 03/28/13	< 33	< 33	< 14	< 33	< 40	< 43	< 41	< 40
03/28/13 - 04/04/13	< 21	< 21	< 21	< 21	< 27	< 27	< 28	< 27
04/04/13 - 04/11/13	< 35	< 35	< 35	< 15	< 31	< 31	< 31	< 31
04/11/13 - 04/18/13	< 32	< 32	< 32	< 32	< 41	< 41	< 41	< 41
04/18/13 - 04/25/13	< 39	< 39	< 39	< 41	< 22	< 53	< 53	< 53
04/25/13 - 05/02/13	< 32	< 33	< 32	< 32	< 39	< 40	< 40	< 41 (1)
05/02/13 - 05/09/13	< 46	< 46	< 46	< 46	< 48	< 48	< 48	< 21
05/09/13 - 05/16/13	< 42	< 43	< 43	< 43	< 46	< 46	< 46	< 46
05/16/13 - 05/23/13	< 56	< 38	< 39	< 38	< 56	< 22	< 56	< 56
05/23/13 - 05/30/13	< 24	< 24	< 24	< 24	< 37	< 37	< 37	< 37
05/30/13 - 06/06/13	< 54	< 54	< 54	< 54	< 60	< 60	< 32	< 60
06/06/13 - 06/13/13	< 53	< 53	< 53	< 53	< 66	< 66	< 66	< 66
06/13/13 - 06/20/13	< 22	< 58	< 58	< 58	< 43	< 43	< 43	< 43
06/20/13 - 06/27/13	< 23	< 23	< 23	< 23	< 21	< 21	< 21	< 21
06/27/13 - 07/04/13	< 30	< 12	< 30	< 30	< 48	< 49	< 30	< 48
07/04/13 - 07/11/13	< 32	< 32	< 32	< 32	< 31	< 31	< 31	< 33 (1)
07/11/13 - 07/18/13	< 37	< 38	< 38	< 38	< 47	< 47	< 47	< 47
07/18/13 - 07/25/13	< 50	< 50	< 50	< 50	< 47	< 48	< 48	< 60 (1)
07/25/13 - 08/01/13	< 63	< 63	< 63	< 22	< 68	< 55	< 63	< 70 (1)
08/01/13 - 08/08/13	< 64	< 64	< 62	< 64	< 60	< 60	< 60	< 66 (1)
08/08/13 - 08/15/13	< 66	< 57	< 57	< 57	< 26	< 66	< 66	< 66
08/15/13 - 08/22/13	< 39	< 39	< 39	< 39	< 57	< 57	< 57	< 57
08/22/13 - 08/29/13	< 29	< 22	< 22	< 22	< 29	< 29	< 29	< 11
08/29/13 - 09/05/13	< 60	< 60	< 60	< 60	< 56	< 56	< 56	< 56
09/05/13 - 09/12/13	< 30	< 27	< 27	< 27	< 29	< 10	< 30	< 29
09/12/13 - 09/19/13	< 70	< 70	< 70	< 53	< 44	< 44	< 44	< 69 (1)
09/19/13 - 09/26/13	< 67	< 51	< 51	< 51	< 66	< 66	< 40	< 66
09/26/13 - 10/03/13	< 47	< 47	< 47	< 47	< 39	< 39	< 39	< 39
10/03/13 - 10/10/13	< 24	< 56	< 56	< 56	< 67	< 67	< 67	< 67
10/10/13 - 10/17/13	< 63	< 63	< 63	< 63	< 55	< 55	< 55	< 55
10/17/13 - 10/24/13	< 30	< 13	< 30	< 30	< 39	< 40	< 30	< 39
10/24/13 - 10/31/13	< 56	< 56	< 57	< 57	< 59	< 59	< 59	< 59
10/31/13 - 11/07/13	< 63	< 63	< 27	< 63	< 67	< 67	< 68	< 67
11/07/13 - 11/14/13	< 44	< 44	< 44	< 44	< 59	< 59	< 59	< 59
11/14/13 - 11/21/13	< 54	< 54	< 54	< 21	< 45	< 45	< 45	< 45
11/21/13 - 11/27/13	< 40	< 40	< 40	< 40	< 56	< 56	< 56	< 68 (1)
11/27/13 - 12/05/13	< 23	< 23	< 23	< 23	< 9	< 22	< 22	< 22
12/05/13 - 12/12/13	< 58	< 58	< 58	< 59	< 62	< 62	< 62	< 62
12/12/13 - 12/19/13	< 65	< 58	< 58	< 58	< 65	< 65	< 65	< 25
12/19/13 - 12/26/13	< 60	< 60	< 60	< 60	< 68	< 68	< 68	< 68
12/26/13 - 01/02/14	< 59	< 63	< 64	< 64	< 58	< 23	< 59	< 58
MEAN	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

**Table C-VIII.1**

**CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED IN  
THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CONTROL FARM	INDICATOR FARM
	BD-18	BD-17
01/04/13	< 0.5	< 0.5
02/07/13	< 0.7	< 0.8
03/07/13	< 0.7	< 0.6
04/04/13	< 0.8	< 0.6
05/02/13	< 0.7	< 0.7
05/16/13	< 0.7	< 0.6
05/30/13	< 0.6	< 0.6
06/13/13	< 0.6	< 0.5
06/27/13	< 0.8	< 0.7
07/11/13	< 0.6	< 0.5
07/25/13	< 0.7	< 0.6
08/08/13	< 0.7	< 0.7
08/22/13	< 0.6	< 0.5
09/05/13	< 0.8	< 0.7
09/19/13	< 0.9	< 0.4
10/03/13	< 0.8	< 0.7
10/17/13	< 0.9	< 0.8
10/31/13	< 0.6	< 0.6
11/14/13	< 0.7	< 0.8
12/05/13	< 0.8	< 0.9
MEAN	-	-

Table C-VIII.2

**CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  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	01/04/13	< 5	< 6	< 13	< 6	< 11	< 5	< 9	< 5	< 5	< 34	< 10
	02/07/13	< 6	< 8	< 17	< 8	< 14	< 7	< 12	< 6	< 6	< 43	< 12
	03/07/13	< 4	< 4	< 11	< 5	< 9	< 5	< 8	< 4	< 4	< 30	< 8
	04/04/13	< 6	< 6	< 12	< 6	< 14	< 7	< 12	< 6	< 6	< 41	< 13
	05/02/13	< 7	< 7	< 18	< 8	< 17	< 9	< 14	< 6	< 6	< 46	< 9
	05/16/13	< 6	< 6	< 15	< 8	< 14	< 6	< 12	< 5	< 6	< 37	< 13
	05/30/13	< 6	< 7	< 14	< 8	< 15	< 7	< 11	< 6	< 8	< 30	< 9
	06/13/13	< 6	< 5	< 14	< 7	< 13	< 6	< 13	< 5	< 6	< 27	< 7
	06/27/13	< 4	< 5	< 10	< 7	< 12	< 6	< 9	< 4	< 5	< 33	< 8
	07/11/13	< 4	< 5	< 12	< 6	< 10	< 4	< 9	< 4	< 5	< 29	< 7
	07/25/13	< 5	< 6	< 17	< 8	< 13	< 6	< 11	< 6	< 6	< 42	< 11
	08/08/13	< 5	< 6	< 14	< 6	< 11	< 7	< 11	< 5	< 5	< 34	< 14
	08/22/13	< 5	< 5	< 11	< 6	< 10	< 5	< 8	< 4	< 5	< 32	< 8
	09/05/13	< 6	< 6	< 14	< 7	< 14	< 7	< 11	< 5	< 6	< 40	< 11
	09/19/13	< 7	< 7	< 18	< 8	< 18	< 7	< 14	< 6	< 8	< 52	< 14
	10/03/13	< 8	< 7	< 17	< 9	< 18	< 8	< 13	< 6	< 7	< 48	< 15
	10/17/13	< 2	< 2	< 5	< 2	< 5	< 2	< 4	< 2	< 2	< 18	< 5
10/31/13	< 7	< 7	< 17	< 7	< 17	< 7	< 11	< 6	< 6	< 45	< 14	
11/14/13	< 5	< 6	< 15	< 7	< 12	< 6	< 10	< 4	< 5	< 53	< 15	
12/05/13	< 7	< 7	< 15	< 8	< 15	< 8	< 12	< 7	< 8	< 43	< 11	
MEAN		-	-	-	-	-	-	-	-	-	-	-

Table C-VIII.2

**CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
BD-18	01/04/13	< 7	< 8	< 20	< 10	< 16	< 8	< 13	< 5	< 7	< 46	< 16
	02/07/13	< 5	< 6	< 14	< 7	< 11	< 7	< 10	< 5	< 5	< 39	< 9
	03/07/13	< 5	< 6	< 13	< 6	< 13	< 6	< 10	< 5	< 6	< 36	< 7
	04/04/13	< 6	< 5	< 14	< 8	< 12	< 6	< 13	< 6	< 6	< 46	< 12
	05/02/13	< 5	< 6	< 15	< 7	< 15	< 6	< 11	< 5	< 6	< 40	< 12
	05/16/13	< 6	< 7	< 15	< 7	< 14	< 7	< 9	< 5	< 6	< 44	< 13
	05/30/13	< 6	< 5	< 13	< 7	< 13	< 5	< 9	< 6	< 6	< 27	< 8
	06/13/13	< 6	< 7	< 15	< 8	< 13	< 7	< 11	< 5	< 7	< 28	< 9
	06/27/13	< 5	< 6	< 14	< 7	< 13	< 7	< 10	< 6	< 6	< 39	< 10
	07/11/13	< 5	< 5	< 11	< 5	< 10	< 5	< 9	< 4	< 5	< 33	< 8
	07/25/13	< 6	< 6	< 14	< 7	< 13	< 7	< 11	< 6	< 6	< 44	< 14
	08/08/13	< 7	< 7	< 16	< 7	< 15	< 8	< 13	< 6	< 7	< 49	< 13
	08/22/13	< 5	< 5	< 10	< 6	< 10	< 5	< 9	< 5	< 5	< 36	< 8
	09/05/13	< 6	< 7	< 16	< 9	< 15	< 7	< 13	< 6	< 6	< 39	< 11
	09/19/13	< 6	< 7	< 13	< 8	< 14	< 7	< 11	< 6	< 6	< 42	< 11
	10/03/13	< 7	< 7	< 14	< 7	< 15	< 7	< 10	< 5	< 6	< 45	< 8
	10/17/13	< 2	< 2	< 6	< 3	< 5	< 3	< 4	< 2	< 2	< 20	< 6
10/31/13	< 7	< 7	< 16	< 7	< 14	< 7	< 14	< 6	< 7	< 42	< 15	
11/14/13	< 5	< 6	< 15	< 6	< 12	< 6	< 12	< 4	< 6	< 51	< 14	
12/05/13	< 7	< 6	< 17	< 9	< 15	< 6	< 12	< 6	< 7	< 45	< 9	
MEAN		-	-	-	-	-	-	-	-	-	-	-

Table C-IX.1

**CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PC/KG WET ± 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
<b>BD-CONTROL</b>												
Beets	09/11/13	< 9	< 10	< 27	< 13	< 23	< 12	< 19	< 9	< 10	< 104	< 30
Brussel sprouts	09/11/13	< 9	< 9	< 24	< 9	< 20	< 10	< 18	< 8	< 19	< 95	< 32
	MEAN	-	-	-	-	-	-	-	-	-	-	-
<b>BD-QUAD 1</b>												
Beets	09/11/13	< 7	< 8	< 18	< 7	< 15	< 9	< 15	< 6	< 7	< 76	< 19
Cabbage	09/11/13	< 7	< 8	< 22	< 9	< 15	< 10	< 14	< 7	< 16	< 79	< 27
	MEAN	-	-	-	-	-	-	-	-	-	-	-
<b>BD-QUAD 2</b>												
Beet greens	09/11/13	< 9	< 10	< 24	< 11	< 21	< 11	< 18	< 8	< 9	< 91	< 19
Beets	09/11/13	< 7	< 8	< 19	< 8	< 18	< 8	< 13	< 6	< 6	< 64	< 18
	MEAN	-	-	-	-	-	-	-	-	-	-	-
<b>BD-QUAD 3</b>												
Beet greens	09/04/13	< 10	< 13	< 35	< 16	< 30	< 13	< 24	< 10	< 11	< 96	< 27
Beets	09/04/13	< 10	< 11	< 29	< 13	< 24	< 12	< 19	< 10	< 10	< 94	< 30
	MEAN	-	-	-	-	-	-	-	-	-	-	-
<b>BD-QUAD 4</b>												
Lettuce	09/04/13	< 12	< 12	< 36	< 16	< 29	< 13	< 24	< 10	< 11	< 98	< 23
Radishes	09/04/13	< 12	< 13	< 36	< 18	< 31	< 14	< 26	< 9	< 14	< 98	< 26
	MEAN	-	-	-	-	-	-	-	-	-	-	-

**Table C-X.1 QUARTERLY OSLD RESULTS FOR BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF MREM/QUARTER ± 2 STANDARD DEVIATIONS

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
BD-02-1	19.4 ± 4.9	17	20	19	23
BD-02-2	19.1 ± 4.4	17	18	20	22
BD-03-1	19.5 ± 4.3	17	18	20	22
BD-03-2	19.8 ± 4.1	17	19	21	22
BD-04-1	18.6 ± 4.5	17	17	19	22
BD-04-2	18.2 ± 5.6	16	16	19	22
BD-05-1	19.5 ± 3.6	17	19	20	22
BD-05-2	19.4 ± 4.4	17	18	20	22
BD-06-1	17.9 ± 3.8	16	18	17	21
BD-06-2	18.3 ± 4.3	16	17	19	21
BD-19-1	19.3 ± 4.2	17	18	20	22
BD-19-2	20.4 ± 4.8	17	20	21	23
BD-20-1	19.2 ± 3.7	17	18	20	22
BD-20-2	19.5 ± 5.0	17	18	20	23
BD-21-1	18.6 ± 3.9	17	17	20	21
BD-21-2	19.0 ± 4.7	17	17	21	22
BD-101-3	19.5 ± 4.0	18	19	20	22
BD-101-4	19.3 ± 3.4	17	19	20	21
BD-102-1	18.3 ± 4.1	17	17	19	21
BD-102-2	20.6 ± 6.1	18	19	21	25
BD-103-1	18.8 ± 3.6	16	19	19	21
BD-103-2	20.1 ± 3.5	18	20	22	21
BD-104-1	18.4 ± 6.7	15	(1)	19	22
BD-104-2	18.3 ± 3.4	17	18	18	21
BD-105-1	18.0 ± 5.1	16	17	18	22
BD-105-2	18.8 ± 5.1	17	17	20	22
BD-106-1	17.2 ± 4.5	15	17	17	20
BD-106-2	18.0 ± 4.5	15	18	18	21
BD-107-1	17.5 ± 5.1	14	17	19	20
BD-107-2	18.1 ± 4.3	16	16	20	20
BD-108-1	18.1 ± 4.3	15	19	18	21
BD-108-2	18.9 ± 4.6	16	19	20	22
BD-109-1	22.2 ± 5.9	19	21	23	26
BD-109-2	21.5 ± 5.5	19	20	23	25
BD-110-1	17.9 ± 4.6	15	17	18	21
BD-110-2	17.9 ± 4.7	16	17	18	21
BD-112-1	18.3 ± 4.2	16	18	19	21
BD-112-2	18.6 ± 5.1	16	18	19	22
BD-114-1	19.6 ± 5.5	18	18	19	24
BD-114-2	18.4 ± 4.2	17	17	19	21
BD-115-1	18.9 ± 3.2	17	18	20	21
BD-115-2	19.0 ± 4.7	17	18	19	22
BD-116-1	19.7 ± 3.5	18	19	20	22
BD-116-2	19.5 ± 4.2	17	19	19	22
BD-201-1	24.3 ± 7.1	21	(1)	25	28
BD-201-2	20.8 ± 5.9	18	(1)	21	24
BD-202-1	18.7 ± 5.2	17	17	19	22

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

**Table C-X.1 QUARTERLY OSLD RESULTS FOR BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF MREM/QUARTER ± 2 STANDARD DEVIATIONS

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
BD-202-2	19.0 ± 4.5	17	18	19	22
BD-203-1	19.3 ± 4.5	16	20	20	21
BD-203-2	18.1 ± 3.4	17	17	19	20
BD-204-1	17.6 ± 4.5	15	18	18	20
BD-204-2	18.1 ± 5.6	15	18	17	22
BD-205-1	18.1 ± 5.1	16	17	19	21
BD-205-2	16.8 ± 2.7	16	16	18	(1)
BD-206-1	19.4 ± 4.6	17	18	20	22
BD-206-2	19.3 ± 4.3	17	19	20	22
BD-207-1	17.8 ± 5.2	14	17	19	20
BD-207-2	18.3 ± 4.8	16	17	19	21
BD-208-1	18.6 ± 4.4	16	18	19	22
BD-208-2	19.0 ± 5.1	17	17	19	23
BD-209-1	22.9 ± 4.4	21	22	23	26
BD-209-2	24.7 ± 6.4	21	24	24	29
BD-210-1	20.1 ± 2.8	20	19	19	22
BD-210-2	21.8 ± 6.1	18	22	23	25
BD-211-1	23.4 ± 5.1	20	24	24	26
BD-211-2	24.1 ± 6.2	20	25	26	26
BD-212-3	20.1 ± 5.1	17	21	20	23
BD-212-4	23.5 ± 5.2	21	23	24	27
BD-213-3	17.3 ± 3.2	15	18	17	19
BD-213-4	17.9 ± 5.1	16	17	18	21
BD-214-1	19.2 ± 6.3	16	17	21	23
BD-214-2	22.2 ± 5.5	19	22	23	25
BD-215-1	18.5 ± 3.7	16	18	20	20
BD-215-2	18.0 ± 4.9	15	17	19	21
BD-216-1	20.5 ± 4.7	18	19	21	24
BD-216-2	20.5 ± 3.5	19	22	22	(1)
BD-111A-1	18.2 ± 4.3	16	18	19	21
BD-111A-2	19.2 ± 5.6	15	19	20	22
BD-113A-1	18.6 ± 4.5	16	18	19	22
BD-113A-2	18.9 ± 3.8	17	18	20	21

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

**TABLE C-X.2 MEAN QUARTLY OSLD RESULTS FOR THE INNER RING, OUTER RING, OTHER AND CONTROL LOCATIONS FOR BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF MREM/QUARTER ± 2 STANDARD DEVIATION

COLLECTION PERIOD	SITE BOUNDARY ± 2 S.D.	INTERMEDIATE DISTANCE	OTHER	CONTROL
JAN-MAR	16.5 ± 2.4	17.2 ± 3.9	16.9 ± 1.0	17.2 ± 0.3
APR-JUN	18.0 ± 2.1	19.1 ± 4.9	17.9 ± 2.3	18.6 ± 0.6
JUL-SEP	19.3 ± 2.8	20.5 ± 4.8	19.6 ± 1.8	20.9 ± 1.6
OCT-DEC	21.6 ± 2.8	22.8 ± 5.0	21.8 ± 1.5	21.8 ± 0.7

**TABLE C-X.3 MEAN QUARTLY OSLD RESULTS FOR THE INNER RING, OUTER RING, OTHER AND CONTROL LOCATIONS FOR BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF MREM/QUARTER ± 2 STANDARD DEVIATION

LOCATION	SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN ± 2 S.D.
SITE BOUNDARY	127	14.1	26.1	18.9 ± 4.5
INTERMEDIATE DISTANCE	124	14.4	29.1	19.9 ± 6.2
OTHER	56	15.9	23.1	19.0 ± 4.1
CONTROL	8	17.1	22.0	19.6 ± 3.9

SITE BOUNDARY STATIONS - BD-101-3, BD-101-4, BD-102-1, BD-102-2, BD-103-1, BD-103-2, BD-104-1, BD-104-2, BD-105-1, BD-105-2, BD-106-1, BD-106-2, BD-107-1, BD-107-2, BD-108-1, BD-108-2, BD-109-1, BD-109-2, BD-110-1, BD-110-2, BD-111A-1, BD-111A-2, BD-112-1, BD-112-2, BD-113A-1, BD-113A-2, BD-114-1, BD-114-2, BD-115-1, BD-115-2, BD-116-1, BD-116-2

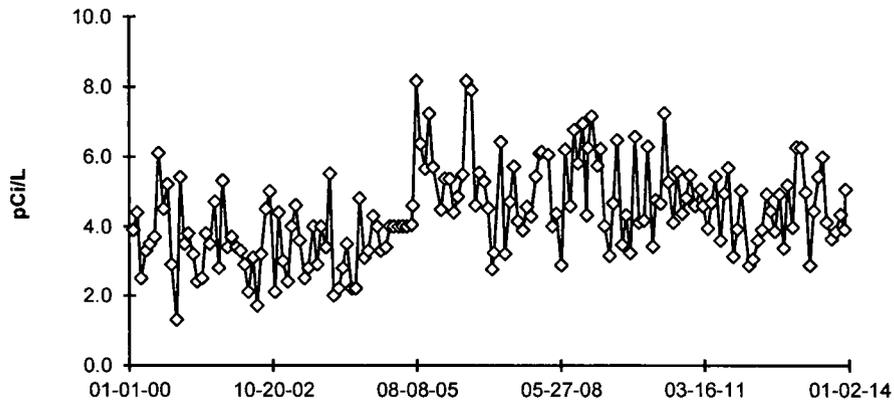
INTERMEDIATE DISTANCE STATIONS - BD-201-1, BD-201-2, BD-202-1, BD-202-2, BD-203-1, BD-203-2, BD-204-1, BD-204-2, BD-205-1, BD-205-2, BD-206-1, BD-206-2, BD-207-1, BD-207-2, BD-208-1, BD-208-2, BD-209-1, BD-209-2, BD-210-1, BD-210-2, BD-211-1, BD-211-2, BD-212-3, BD-212-4, BD-213-3, BD-213-4, BD-214-1, BD-214-2, BD-215-1, BD-215-2, BD-216-1, BD-216-2

OTHER STATIONS - BD-02-1, BD-02-2, BD-04-1, BD-04-2, BD-05-1, BD-05-2, BD-06-1, BD-06-2, BD-19-1, BD-19-2, BD-20-1, BD-20-2, BD-21-1, BD-21-2

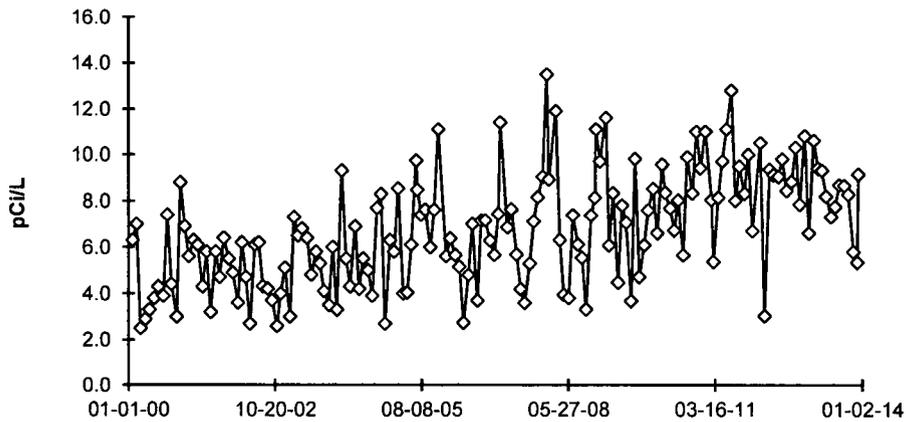
CONTROL STATIONS - BD-03-1, BD-03-2

**FIGURE C-1**  
**Surface Water - Gross Beta - Stations BD-10 and BD-25 (C)**  
**Collected in the Vicinity of Braidwood Station, 2000 - 2013**

**BD-10 Kankakee River, Downstream**



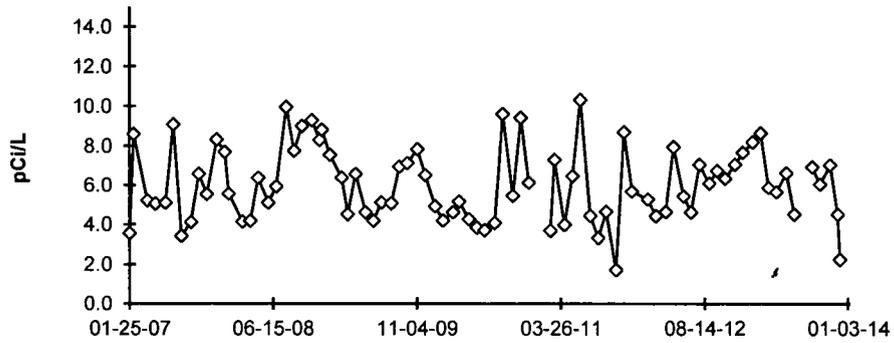
**BD-25 (C) Kankakee River, Upstream**



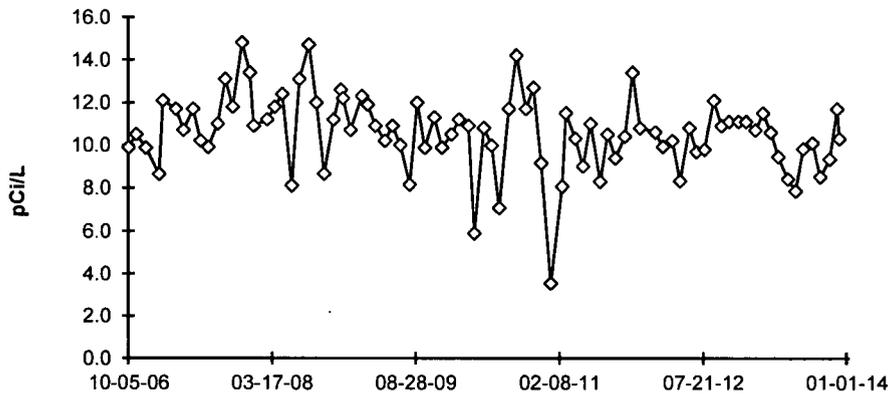
DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JUNE 2005

**FIGURE C-2**  
**Surface Water - Gross Beta - Stations BD-38 and BD-40**  
**Collected in the Vicinity of Braidwood Station, 2007 - 2013**

**BD-38 Main Drainage Ditch**

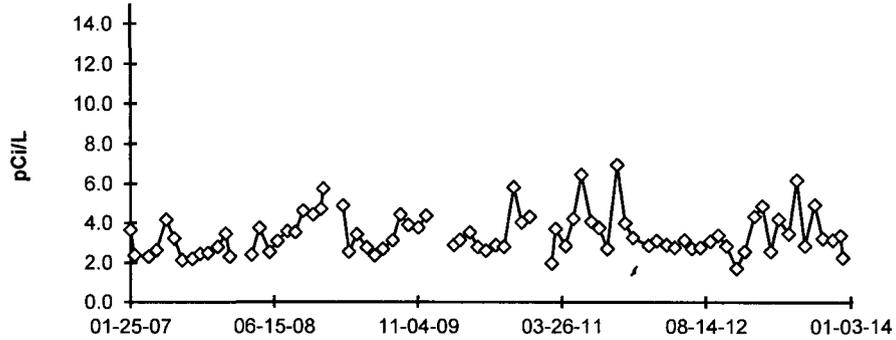


**BD-40 Braidwood Station Cooling Lake**

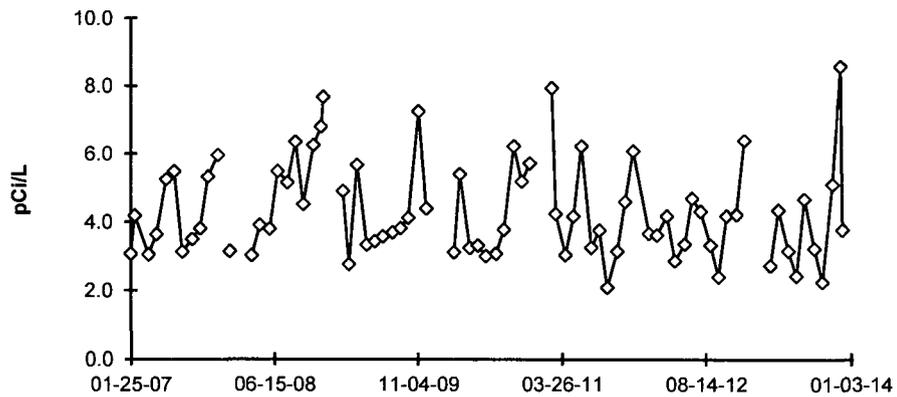


**FIGURE C-3**  
**Surface Water - Gross Beta - Stations BD-55 and BD-56**  
**Collected in the Vicinity of Braidwood Station, 2007 - 2013**

**BD-55 North Pond Fatlan Site**



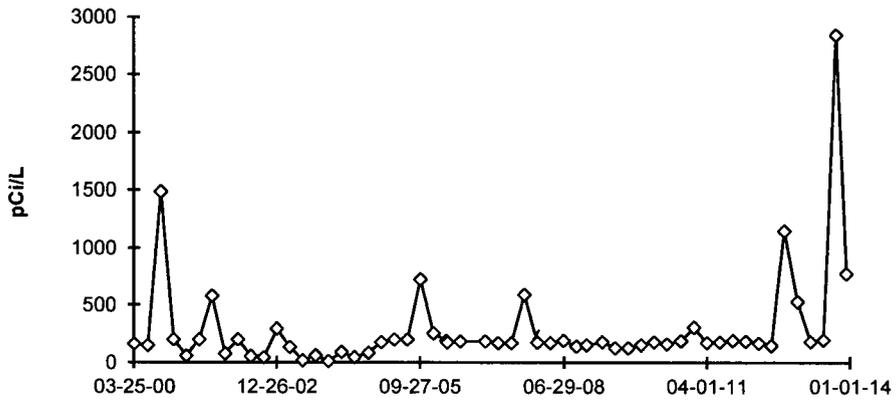
**BD-56 South Pond Fatlan Site**



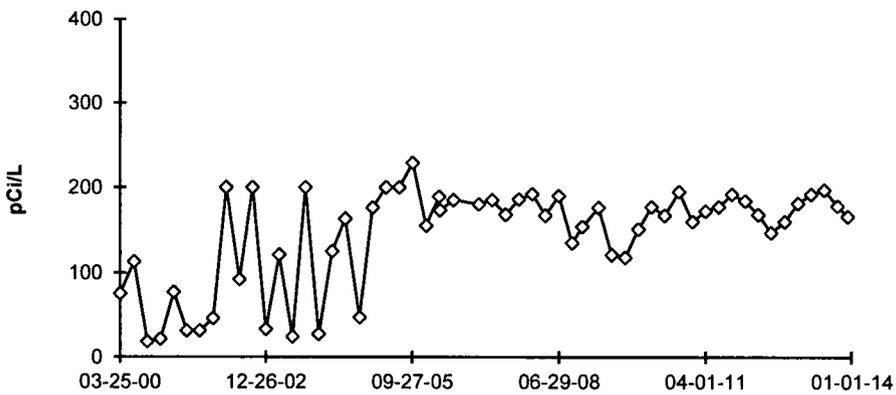
GAPS IN DATA ARE DUE TO SAMPLING POINTS BEING FROZEN AT TIME OF COLLECTION

**FIGURE C-4**  
**Surface Water - Tritium - Stations BD-10 and BD-25 (C)**  
**Collected in the Vicinity of Braidwood Station, 2000 - 2013**

**BD-10 Kankakee River, Downstream**



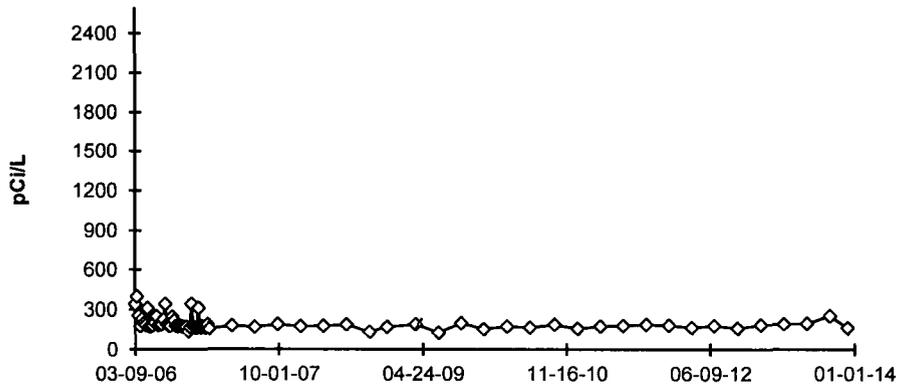
**BD-25 (C) Kankakee River, Upstream**



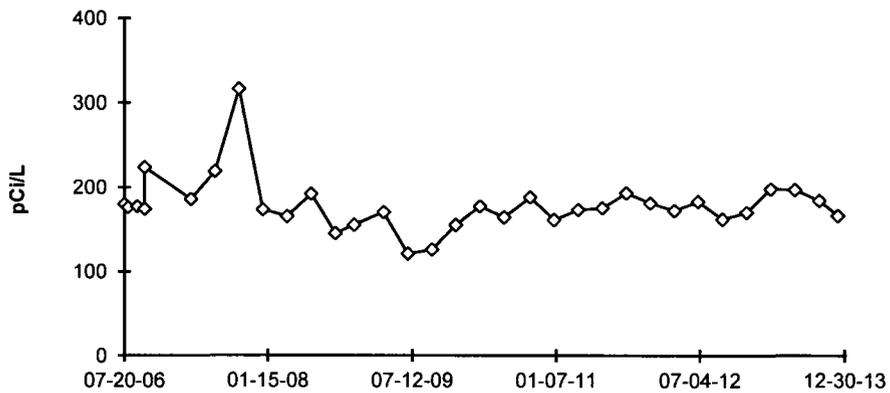
DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JUNE 2005

**FIGURE C-5**  
**Surface Water - Tritium - Stations BD-38 and BD-40**  
**Collected in the Vicinity of Braidwood Station, 2006 - 2013**

**BD-38 Main Drainage Ditch**

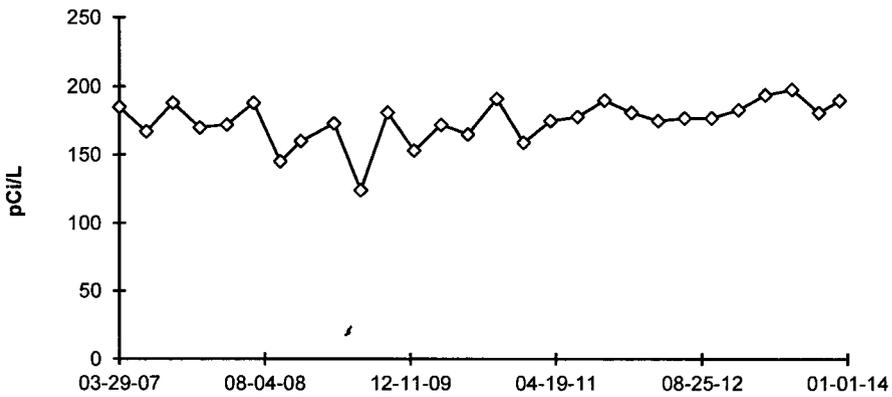


**BD-40 Braidwood Station Cooling Lake**

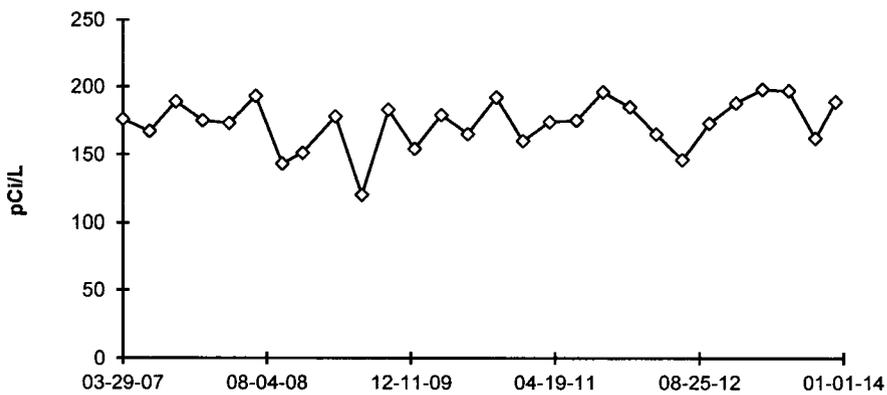


**FIGURE C-6**  
**Surface Water - Tritium - Stations BD-55 and BD-56**  
**Collected in the Vicinity of Braidwood Station, 2007 - 2013**

**BD-55 North Pond Fatlan Site**

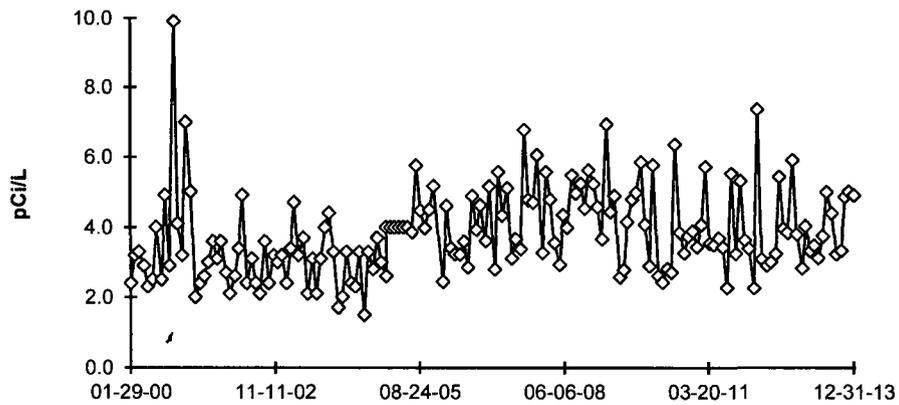


**BD-56 South Pond Fatlan Site**



**FIGURE C-7**  
**Public Water - Gross Beta - Station BD-22**  
**Collected in the Vicinity of Braidwood Station, 2000 - 2013**

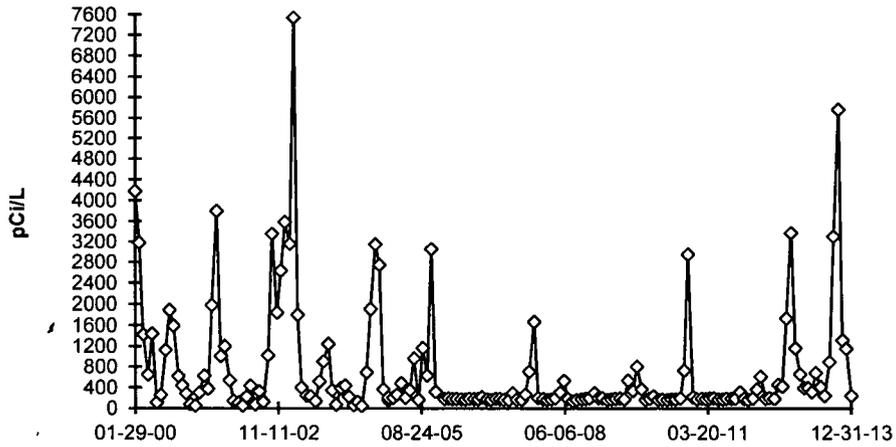
**BD-22 Wilmington**



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 - 2013**

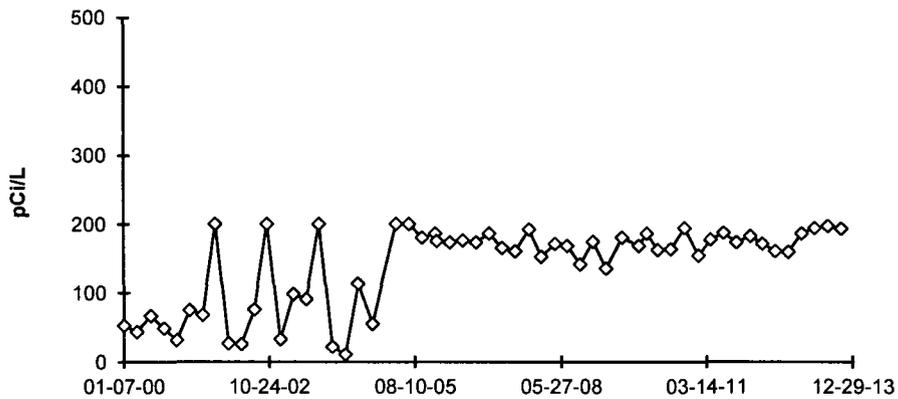
**BD-22 Wilmington**



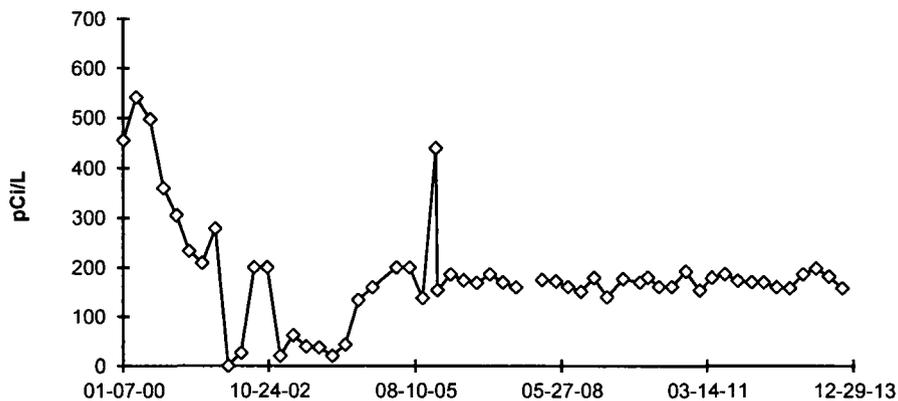
DUE TO VENDOR CHANGE, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JUNE 2005

**FIGURE C-9**  
**Ground/Well Water - Tritium - Stations BD-13 and BD-34**  
**Collected in the Vicinity of Braidwood Station, 2000 - 2013**

**BD-13 Braidwood City Hall Well**



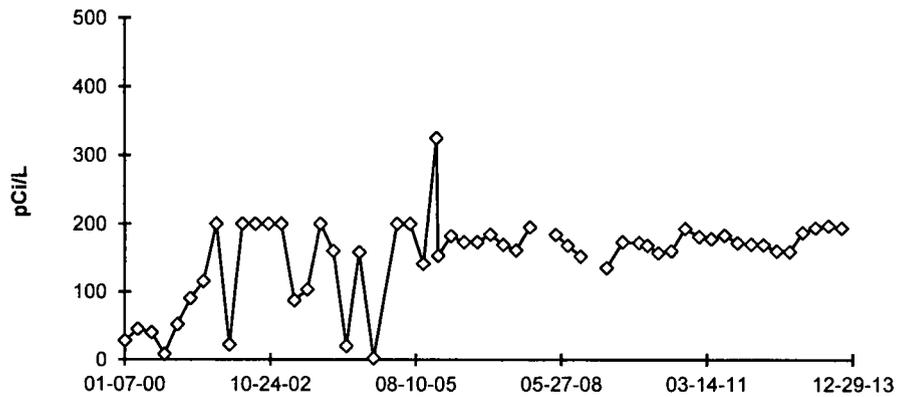
**BD-34 Gibson Well**



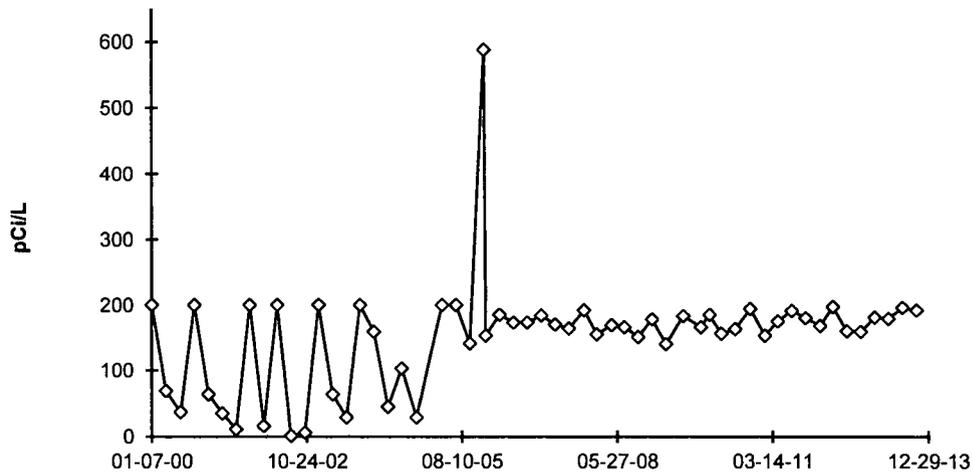
DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JULY.

**FIGURE C-10**  
**Ground/Well Water - Tritium - Stations BD-35 and BD-36**  
**Collected in the Vicinity of Braidwood Station, 2000 - 2013**

**BD-35 Joly Well**

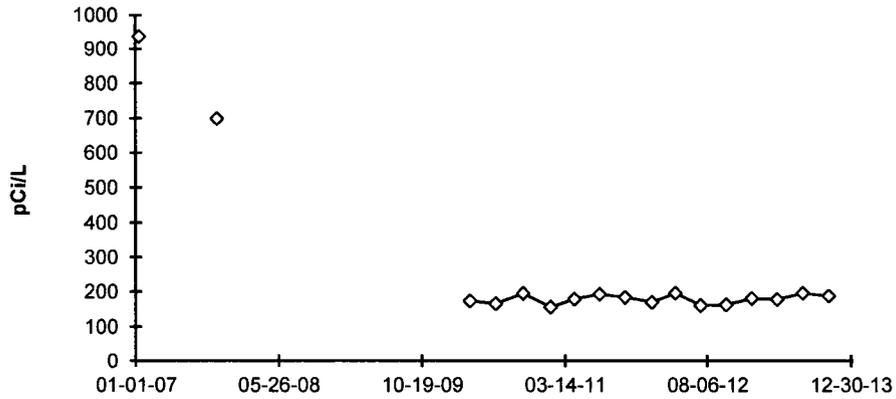


**FIGURE C-11**  
**Ground/Well Water - Tritium - Station BD-37**  
**Collected in the Vicinity of Braidwood Station, 2000 - 2013**  
**BD-37 Nurczyk Well**

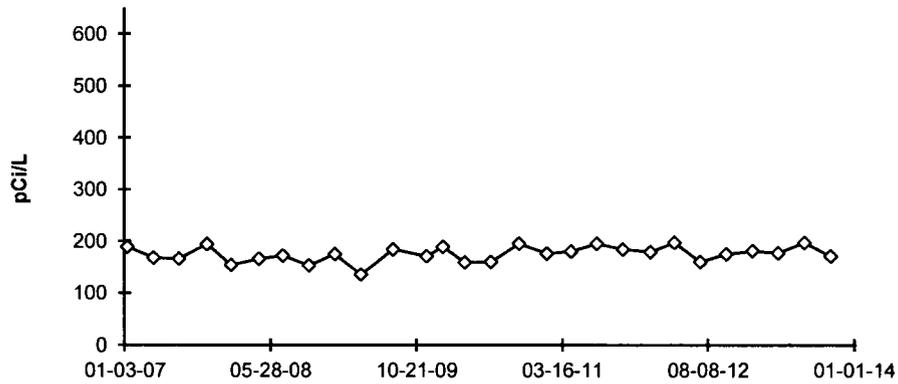


**FIGURE C-12**  
**Ground/Well Water - Tritium - Station BD-50 and BD-51**  
**Collected in the Vicinity of Braidwood Station, 2007 - 2013**

**BD-50 Skole Well**



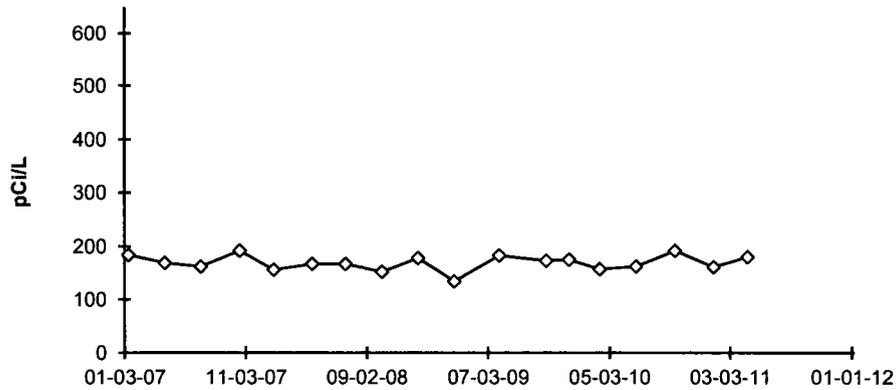
**BD-51 Fatlan Well**



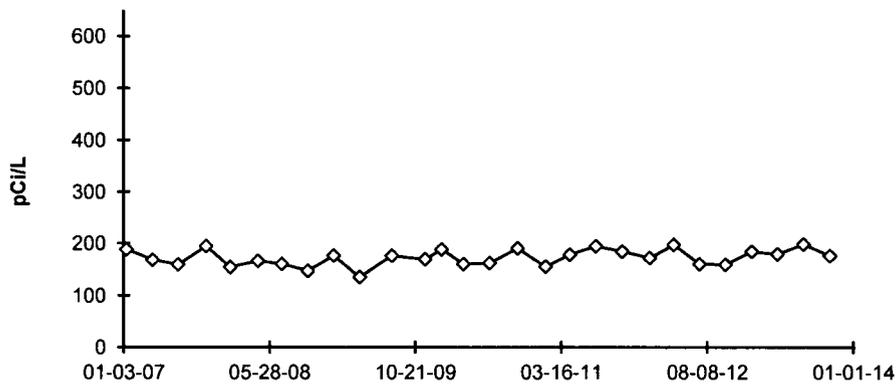
NEW STATIONS BD-50 AND BD-51 ADDED IN 2007  
 STATION BD-50 WAS INITIALLY DISCONTINUED ON 10/18/07 AND RESUMED ON 04/08/10

**FIGURE C-13**  
**Ground/Well Water - Tritium - StationS BD-53 and BD-54**  
**Collected in the Vicinity of Braidwood Station, 2007 - 2013**

**BD-53 Phelps Well**



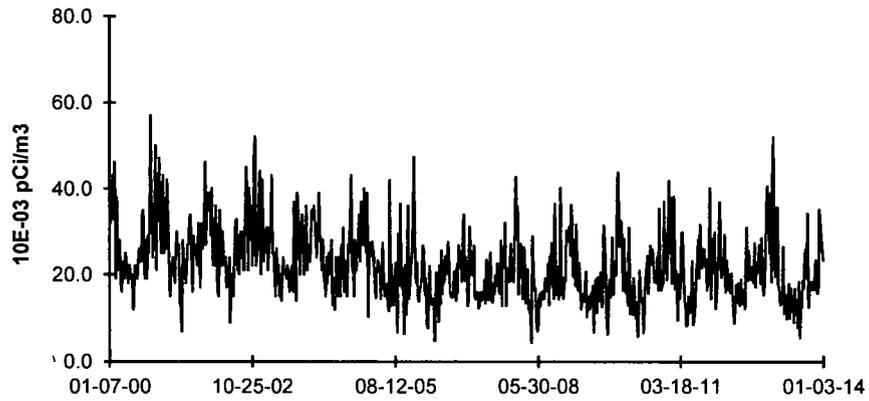
**BD-54 Cash Well**



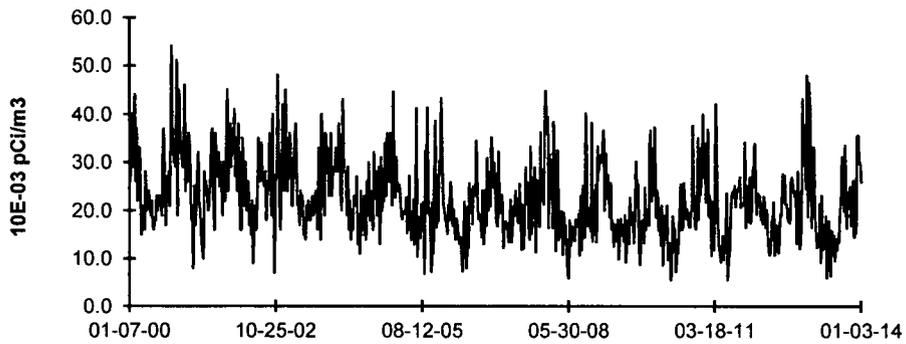
BD-53 was removed from the program during the 3rd quarter of 2011

**FIGURE C-14**  
**Air Particulate - Gross Beta- Stations BD-03 (C) and**  
**BD-06 Collected in the Vicinity of Braidwood Station, 2000 - 2013**

**BD-03 (C) County Line Road**

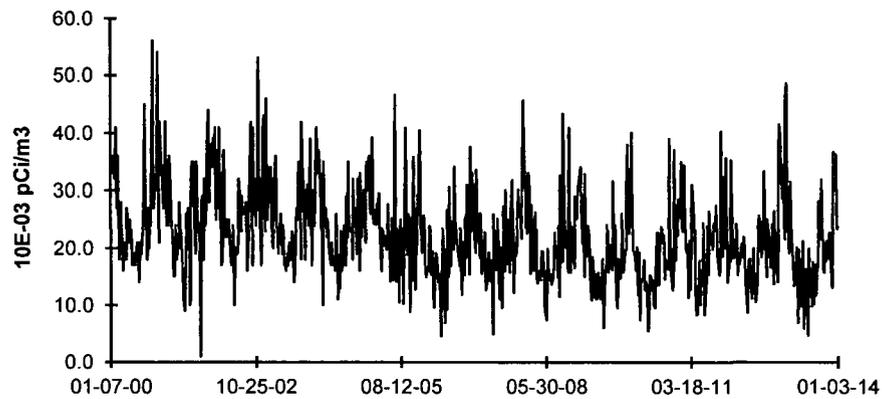


**BD-06 Godley**

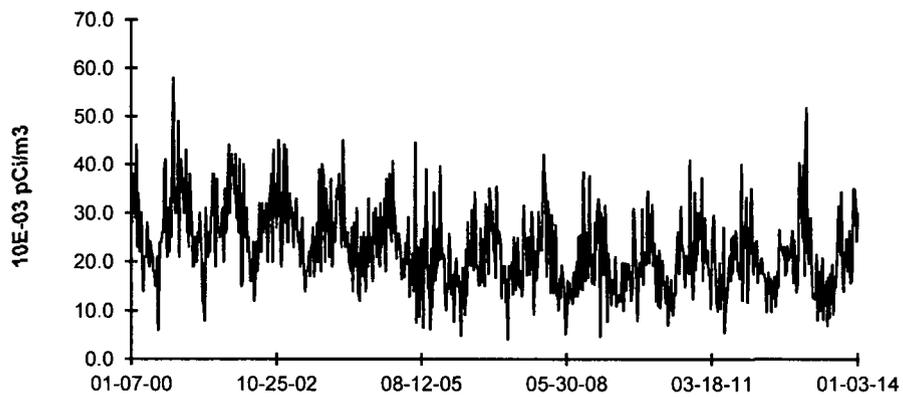


**FIGURE C-15**  
**Air Particulate - Gross Beta- Stations BD-19 and**  
**BD-20 Collected in the Vicinity of Braidwood Station, 2000 - 2013**

**BD-19 Nearsite, NW**

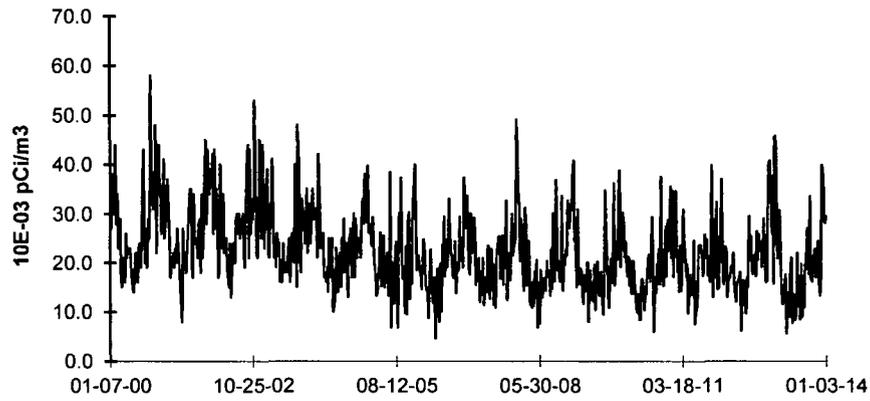


**BD-20 Nearsite, N**



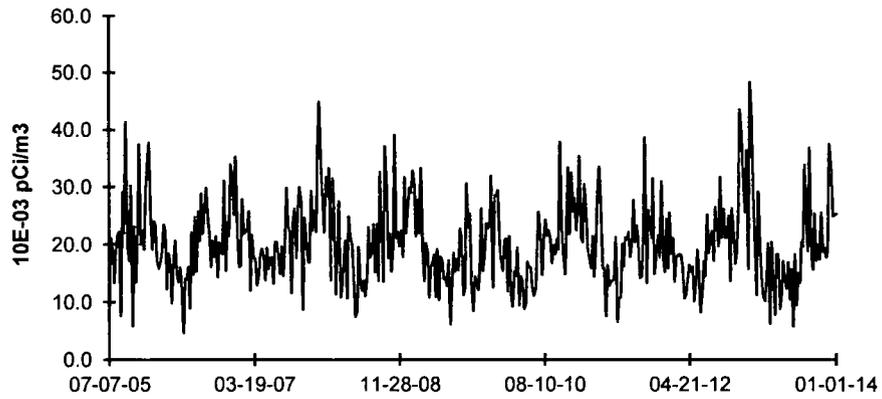
**FIGURE C-16**  
**Air Particulate - Gross Beta- Station BD-21**  
**Collected in the Vicinity of Braidwood Station, 2000 - 2013**

**BD-21 Nearsite, NE**

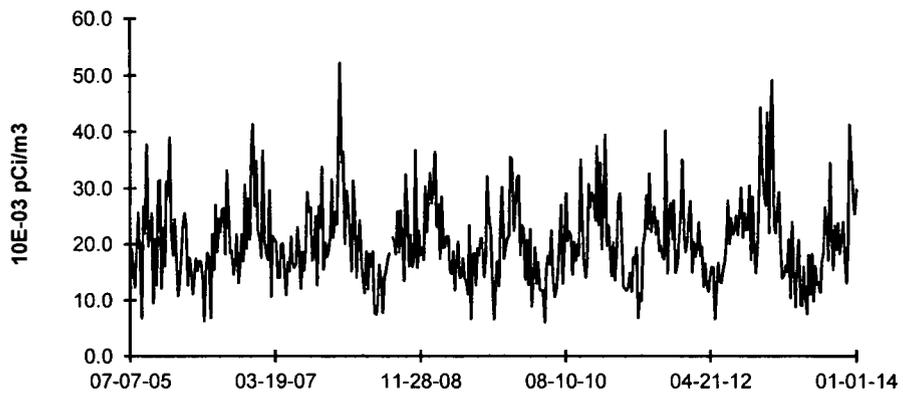


**FIGURE C-17**  
**Air Particulate - Gross Beta- Stations BD-02 and**  
**BD-04 Collected in the Vicinity of Braidwood Station, 2005 - 2013**

**BD-02 Nearsite, NW**

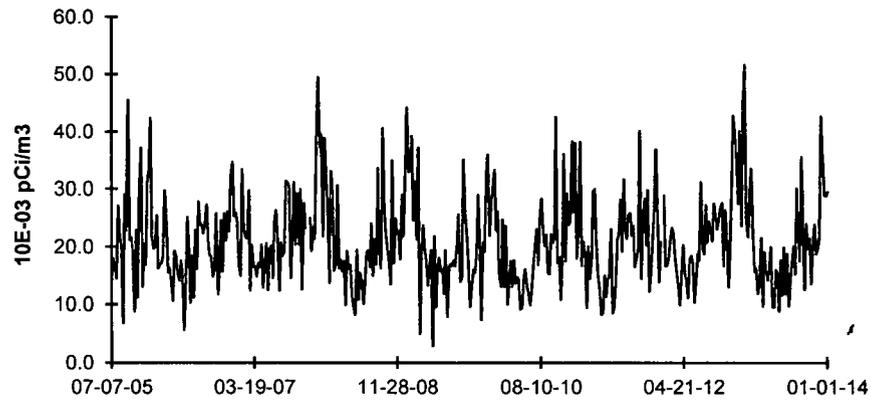


**BD-04 Nearsite, N**



**FIGURE C-18**  
**Air Particulate - Gross Beta- Station BD-05**  
**Collected in the Vicinity of Braidwood Station, 2005 - 2013**

**BD-05 Nearsite, 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, 2013**

(PAGE 1 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)			
March 2013	E10477	Milk	Sr-89	pCi/L	120	99.7	1.20	A			
			Sr-90	pCi/L	9.21	11.0	0.84	A			
March 2013	E10478	Milk	I-131	pCi/L	87.1	100	0.87	A			
			Ce-141	pCi/L	186	187	0.99	A			
			Cr-51	pCi/L	463	472	0.98	A			
			Cs-134	pCi/L	201	214	0.94	A			
			Cs-137	pCi/L	262	266	0.98	A			
			Co-58	pCi/L	200	208	0.96	A			
			Mn-54	pCi/L	215	208	1.03	A			
			Fe-59	pCi/L	266	252	1.06	A			
			Zn-65	pCi/L	311	301	1.03	A			
			Co-60	pCi/L	384	400	0.96	A			
			March 2013	E10480	AP	Ce-141	pCi	95.3	95.6	1.00	A
						Cr-51	pCi	264	241	1.10	A
						Cs-134	pCi	123	109	1.13	A
						Cs-137	pCi	142	136	1.04	A
Co-58	pCi	112				106	1.06	A			
Mn-54	pCi	115				106	1.08	A			
Fe-59	pCi	139				129	1.08	A			
Zn-65	pCi	163				153	1.07	A			
Co-60	pCi	212	204	1.04	A						
March 2013	E10479	Charcoal	I-131	pCi	90.1	92.6	0.97	A			
March 2013	E10481	Water	Fe-55	pCi/L	1840	1890	0.97	A			
June 2013	E10564	Milk	Sr-89	pCi/L	110	95.0	1.16	A			
			Sr-90	pCi/L	15.8	17.0	0.93	A			
June 2013	E10545	Milk	I-131	pCi/L	92.6	95.5	0.97	A			
			Ce-141	pCi/L	83.1	90.4	0.92	A			
			Cr-51	pCi/L	253	250	1.01	A			
			Cs-134	pCi/L	118	125	0.94	A			
			Cs-137	pCi/L	143	151	0.95	A			
			Co-58	pCi/L	87.1	94.0	0.93	A			
			Mn-54	pCi/L	171	172	0.99	A			
			Fe-59	pCi/L	125	120	1.04	A			
			Zn-65	pCi/L	220	217	1.01	A			
			Co-60	pCi/L	169	175	0.97	A			
			June 2013	E10547	AP	Ce-141	pCi	56.8	56.7	1.00	A
						Cr-51	pCi	168	157	1.07	A
						Cs-134	pCi	85.2	78.4	1.09	A
						Cs-137	pCi	101	94.6	1.07	A
Co-58	pCi	62.7				58.9	1.06	A			
Mn-54	pCi	125				108	1.16	A			
Fe-59	pCi	85.7				75.0	1.14	A			
Zn-65	pCi	169				136	1.24	W			
Co-60	pCi	116	110	1.05	A						
June 2013	E10546	Charcoal	I-131	pCi	86.5	89.7	0.96	A			

TABLE D-1

**ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM  
TELEDYNE BROWN ENGINEERING, 2013**

(PAGE 2 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)			
June 2013	E10549	Water	Fe-55	pCi/L	1610	1610	1.00	A			
September 2013	E10646	Milk	Sr-89	pCi/L	63.9	96.0	0.67	N (1)			
			Sr-90	pCi/L	8.88	13.2	0.67	N (1)			
	E10647	Milk	I-131	pCi/L	93.9	98.3	0.96	A			
			Ce-141	pCi/L				NA (2)			
			Cr-51	pCi/L	272	277	0.98	A			
			Cs-134	pCi/L	150	172	0.87	A			
			Cs-137	pCi/L	125	131	0.95	A			
			Co-58	pCi/L	105	108	0.97	A			
			Mn-54	pCi/L	138	139	0.99	A			
			Fe-59	pCi/L	125	130	0.96	A			
			Zn-65	pCi/L	264	266	0.99	A			
			Co-60	pCi/L	187	196	0.95	A			
				E10672	AP	Ce-141	pCi				NA (2)
						Cr-51	pCi	208	223	0.93	A
						Cs-134	pCi	143	139	1.03	A
Cs-137	pCi	106				105	1.01	A			
Co-58	pCi	97.0				86.5	1.12	A			
Mn-54	pCi	116				112	1.04	A			
Fe-59	pCi	98.6				105	0.94	A			
Zn-65	pCi	219				214	1.02	A			
	E10648	Charcoal	I-131	pCi	76.3	71.7	1.06	A			
	E10673	Water	Fe-55	pCi/L	1790	1690	1.06	A			
December 2013	E10774	Milk	Sr-89	pCi/L	97.3	93.8	1.04	A			
			Sr-90	pCi/L	13.3	12.9	1.03	A			
	E10775	Milk	I-131	pCi/L	89.7	96.1	0.93	A			
			Ce-141	pCi/L	99.8	110	0.91	A			
			Cr-51	pCi/L	297	297	1.00	A			
			Cs-134	pCi/L	129	142	0.91	A			
			Cs-137	pCi/L	126	126	1.00	A			
			Co-58	pCi/L	116	112	1.04	A			
			Mn-54	pCi/L	167	168	0.99	A			
			Fe-59	pCi/L	117	110	1.06	A			
			Zn-65	pCi/L	757	741	1.02	A			
			Co-60	pCi/L	141	147	0.96	A			
				E10777	AP	Ce-141	pCi	85.1	88.0	0.97	A
Cr-51	pCi	278				238	1.17	A			
Cs-134	pCi	123				114	1.08	A			
Cs-137	pCi	102				101	1.01	A			
Co-58	pCi	84.4				89.9	0.94	A			
Mn-54	pCi	132				135	0.98	A			
Fe-59	pCi	101				88.3	1.14	A			
Zn-65	pCi	506				595	0.85	A			
Co-60	pCi	118				118	1.00	A			

**TABLE D-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM  
TELEDYNE BROWN ENGINEERING, 2013  
(PAGE 3 OF 3)**

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2013	E10776	Charcoal	I-131	pCi	84.7	80.5	1.05	A
	E10778	Water	Fe-55	pCi/L	2010	1910	1.05	A

- (1) Milk, Sr-89/90 - The failure was due to analyst error. No client samples were affected by this failure. NCR 13-15
- (2) The sample was not spiked with Ce-141
- (a) Teledyne Brown Engineering reported result.
- (b) 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.
- (c) Ratio of Teledyne Brown Engineering to Analytics results.
- (d) 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

**ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM  
TELEDYNE BROWN ENGINEERING, 2013**

(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2013	RAD-93	Water	Sr-89	pCi/L	48.3	41.3	31.6 - 48.4	A
			Sr-90	pCi/L	19.3	23.9	17.2 - 28.0	A
			Ba-133	pCi/L	81.9	82.1	69.0 - 90.3	A
			Cs-134	pCi/L	40.9	42.8	34.2 - 47.1	A
			Cs-137	pCi/L	44.0	41.7	37.0 - 48.8	A
			Co-60	pCi/L	61.9	65.9	59.3 - 75.0	A
			Zn-65	pCi/L	202	189	170 - 222	A
			Gr-A	pCi/L	34.2	40.8	21.1 - 51.9	A
			Gr-B	pCi/L	18.0	21.6	13.0 - 29.7	A
			I-131	pCi/L	23.8	23.8	19.7 - 28.3	A
			U-Nat	pCi/L	60.4	61.2	49.8 - 67.9	A
			H-3	pCi/L	3970	4050	3450 - 4460	A
				MRAD-18	Filter	Gr-A	pCi/filter	Lost during processing
November 2013	RAD-95	Water	Sr-89	pCi/L	25.5	21.9	14.4 - 28.2	A
			Sr-90	pCi/L	14.3	18.1	12.8 - 21.5	A
			Ba-133	pCi/L	57.2	54.2	44.7 - 59.9	A
			Cs-134	pCi/L	83.3	86.7	71.1 - 95.4	A
			Cs-137	pCi/L	201	206	185 - 228	A
			Co-60	pCi/L	104	102	91.8 - 114	A
			Zn-65	pCi/L	361	333	300 - 389	A
			Gr-A	pCi/L	29.5	42.8	22.2 - 54.3	A
			Gr-B	pCi/L	30.1	32.2	20.8 - 39.9	A
			I-131	pCi/L	23.1	23.6	19.6 - 28.0	A
			U-Nat	pCi/L	5.53	6.24	47.0 - 7.44	A
			H-3	pCi/L	17650	17700	15500 - 19500	A
				MRAD-19	Filter	Gr-A	pCi/filter	33.0

(a) Teledyne Brown Engineering reported result.

(b) 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.

(c) ERA evaluation: A=acceptable. Reported result falls within the Warning Limits. NA=not acceptable. Reported result falls outside of the Control Limits. CE=check for Error. Reported result falls within the Control Limits and outside of the Warning Limit.

TABLE D-3

DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)  
TELEDYNE BROWN ENGINEERING, 2013

(PAGE 1 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2013	13-MaW28	Water	Cs-134	Bq/L	21.0	24.4	17.1 - 31.7	A
			Cs-137	Bq/L	0.0446		(1)	A
			Co-57	Bq/L	28.3	30.9	21.6 - 40.2	A
			Co-60	Bq/L	18.2	19.56	13.69 - 25.43	A
			H-3	Bq/L	506	507	355 - 659	A
			Mn-54	Bq/L	25.7	27.4	19.2 - 35.6	A
			K-40	Bq/L	2.09		(1)	A
			Sr-90	Bq/L	10.5	10.5	7.4 - 13.7	A
			Zn-65	Bq/L	29.2	30.4	21.3 - 39.5	A
	13-GrW28	Water	Gr-A	Bq/L	2.74	2.31	0.69 - 3.93	A
			Gr-B	Bq/L	15.6	13.0	6.5 - 19.5	A
	13-MaS28	Soil	Cs-134	Bq/kg	859	887	621 - 1153	A
			Cs-137	Bq/kg	633	587	411 - 763	A
			Co-57	Bq/kg	0.256		(1)	A
			Co-60	Bq/kg	738	691	484 - 898	A
			Mn-54	Bq/kg	0.671		(1)	A
			K-40	Bq/kg	714	625.3	437.7 - 812.9	A
			Sr-90	Bq/kg	442	628	440 - 816	W
			Zn-65	Bq/kg	1057	995	697 - 1294	A
	13-RdF28	AP	Cs-134	Bq/sample	1.73	1.78	1.25 - 2.31	A
			Cs-137	Bq/sample	2.73	2.60	1.82 - 3.38	A
			Co-57	Bq/sample	2.38	2.36	1.65 - 3.07	A
			Co-60	Bq/sample	0.0302		(1)	A
			Mn-54	Bq/sample	4.36	4.26	2.98 - 5.54	A
			Sr-90	Bq/sample	1.43	1.49	1.04 - 1.94	A
			Zn-65	Bq/sample	3.14	3.13	2.19 - 4.07	A
	13-GrF28	AP	Gr-A	Bq/sample	0.767	1.20	0.36 - 2.04	A
			Gr-B	Bq/sample	0.871	0.85	0.43 - 1.28	A
13-RdV28	Vegetation	Cs-134	Bq/sample	-0.197		(1)	A	
		Cs-137	Bq/sample	7.39	6.87	4.81 - 8.93	A	
		Co-57	Bq/sample	9.87	8.68	6.08 - 11.28	A	
		Co-60	Bq/sample	6.08	5.85	4.10 - 7.61	A	
		Mn-54	Bq/sample	-0.0104		(1)	A	
		Sr-90	Bq/sample	1.28	1.64	1.15 - 2.13	W	
		Zn-65	Bq/sample	6.84	6.25	4.38 - 8.13	A	
September 2013	13-MaW29	Water	Cs-134	Bq/L	29.1	30.0	21.0 - 39.0	A
			Cs-137	Bq/L	34.5	31.6	22.1 - 41.1	A
			Co-57	Bq/L	0.0358		(1)	A
			Co-60	Bq/L	24.6	23.58	16.51 - 30.65	A
			H-3	Bq/L	2.45		(1)	A
			Mn-54	Bq/L	0.0337		(1)	A
			K-40	Bq/L	0.193		(1)	A
			Sr-90	Bq/L	9.12	7.22	5.05 - 9.39	W
			Zn-65	Bq/L	38.1	34.6	24.2 - 45.0	A
	13-GrW29	Water	Gr-A	Bq/L	1.13	0.701	0.210 - 1.192	A
			Gr-B	Bq/L	7.61	5.94	2.97 - 8.91	A

TABLE D-3

DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)  
TELEDYNE BROWN ENGINEERING, 2013

(PAGE 2 OF 2)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
September 2013	13-MaS29	Soil	Cs-134	Bq/kg	1150	1172	820 - 1524	A
			Cs-137	Bq/kg	1100	977	684 - 1270	A
			Co-57	Bq/kg	670		(1)	N (2)
			Co-60	Bq/kg	502	451	316 - 586	A
			Mn-54	Bq/kg	758	674	472 - 876	A
			K-40	Bq/kg	796	633	443 - 823	W
			Sr-90	Bq/kg	664	460	322 - 598	N (2)
			Zn-65	Bq/kg	210		(1)	N (2)
	13-RdF29	AP	Cs-134	Bq/sample	-0.570		(1)	N (2)
			Cs-137	Bq/sample	2.85	2.7	1.9 - 3.5	A
			Co-57	Bq/sample	3.30	3.4	2.4 - 4.4	A
			Co-60	Bq/sample	2.41	2.3	1.6 - 3.0	A
			Mn-54	Bq/sample	3.65	3.5	2.5 - 4.6	A
			Sr-90	Bq/sample	1.40	1.81	1.27 - 2.35	W
			Zn-65	Bq/sample	2.90	2.7	1.9 - 3.5	A
	13-GrF29	AP	Gr-A	Bq/sample	0.872	0.9	0.3 - 1.5	A
			Gr-B	Bq/sample	1.57	1.63	0.82 - 2.45	A
	13-RdV29	Vegetation	Cs-134	Bq/sample	5.29	5.20	3.64 - 6.76	A
			Cs-137	Bq/sample	7.48	6.60	4.62 - 8.58	A
			Co-57	Bq/sample	0.0129		(1)	A
			Co-60	Bq/sample	0.0523		(1)	A
			Mn-54	Bq/sample	8.78	7.88	5.52 - 10.24	A
			Sr-90	Bq/sample	1.63	2.32	1.62 - 3.02	W (2)
			Zn-65	Bq/sample	3.18	2.63	1.84 - 3.42	W

(1) False positive test.

(2) Soil, Co-57 &amp; Zn-65 identified by gamma software as not detected, MAPEP evaluated as failing the false positive test. A large concentration of Eu-152 was spiked into the sample, causing interference in the analysis. Gamma software recognized the interference and identified them as not detected. MAPEP does not allow clients to enter non-detect designation. NCR 13-04

Soil, Sr-90 - incorrect results were submitted to MAPEP. Actual result was 332 bq/kg, which is with the acceptance range. NCR 13-04

AP, Cs-134 - MAPEP evaluated the -0.570 as a failed false positive test. No client samples were affected by these failures. NCR 13-04  
Vegetation, Sr-90 - it appears that the carrier was double spiked into the sample, resulting in the low activity for this sample. NCR 13-04

(a) Teledyne Brown Engineering reported result.

(b) 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.

(c) DOE/MAPEP evaluation: A=acceptable, W=acceptable with warning, N=not acceptable.

TABLE D-4

**ERA (a) STATISTICAL SUMMARY PROFICIENCY TESTING PROGRAM<sup>a</sup>**  
**ENVIRONMENTAL, INC., 2013**

(Page 1 of 1)

Lab Code	Date	Analysis	Concentration (pCi/L)			Acceptance
			Laboratory Result (b)	ERA Result (c)	Control Limits	
ERW-1593	04/08/13	Sr-89	43.6 ± 4.3	41.30	31.6 - 48.4	Pass
ERW-1593	04/08/13	Sr-90	23.2 ± 1.7	23.90	17.2 - 28.0	Pass
ERW-1596	04/08/13	Ba-133	74.80 4.00	82.10	69.00 90.30	Pass
ERW-1596	04/08/13	Co-60	65.50 3.42	65.90	59.30 75.00	Pass
ERW-1596	04/08/13	Cs-134	41.10 3.47	42.80	34.20 47.10	Pass
ERW-1596	04/08/13	Cs-137	42.30 4.03	41.70	37.00 48.80	Pass
ERW-1596	04/08/13	Zn-65	200.3 ± 10.1	189.0	170.0 - 222.0	Pass
ERW-1598	04/08/13	Gr. Alpha	34.30 1.98	40.80	21.10 51.90	Pass
ERW-1598	04/08/13	Gr. Beta	18.70 0.98	21.60	13.00 29.70	Pass
ERW-1600	04/08/13	I-131	23.00 ± 1.10	23.80	19.70 - 28.30	Pass
ERW-1600	04/08/13	I-131(G)	23.48 ± 9.44	23.80	19.70 ± 28.30	Pass
ERW-1606	04/08/13	H-3	4041 ± 194	4050	3450 - 4460	Pass
ERW-6009	10/07/13	Sr-89	22.00 2.80	21.90	14.40 28.20	Pass
ERW-6009	10/07/13	Sr-90	17.10 2.55	18.10	12.80 21.50	Pass
ERW-6012	10/07/13	Ba-133	48.20 4.29	54.20	44.70 59.90	Pass
ERW-6012	10/07/13	Co-60	100.8 ± 4.7	102.0	91.8 - 114.0	Pass
ERW-6012	10/07/13	Cs-134	87.30 4.35	86.70	71.10 95.40	Pass
ERW-6012	10/07/13	Cs-137	199.6 ± 7.4	206.0	185.0 - 228.0	Pass
ERW-6012	10/07/13	Zn-65	356.2 ± 13.2	333.0	300.0 - 389.0	Pass
ERW-6015	10/07/13	Gr. Alpha	30.70 11.90	42.80	22.20 54.30	Pass
ERW-6015	10/07/13	Gr. Beta	25.70 6.48	32.20	20.80 39.90	Pass
ERW-6019	10/07/13	I-131	22.50 1.01	23.60	19.60 28.00	Pass
ERW-6024	10/07/13	H-3	18397 695	17700	15500 19500	Pass

a Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the crosscheck program for proficiency testing in drinking water conducted by Environmental Resources Associates (ERA).

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

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

TABLE D-5

DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)  
ENVIRONMENTAL, INC., 2013

(Page 1 of 2)

Lab Code (b)	Date	Analysis	Laboratory result	Concentration (a)		Acceptance
				Known Activity	Control Limits (c)	
MAAP-738	02/01/13	Co-57	2.58 ± 0.06	2.36	1.65 - 3.07	Pass
MAAP-738	02/01/13	Co-60	0.01 ± 0.03	0.00	0.00 - 0.10	Pass
MAAP-738	02/01/13	Cs-134	1.82 ± 0.13	1.78	1.25 - 2.31	Pass
MAAP-738	02/01/13	Cs-137	2.93 ± 0.10	2.60	1.82 - 3.38	Pass
MAAP-738	02/01/13	Mn-54	4.87 ± 0.13	4.26	2.98 - 5.54	Pass
MAAP-738	02/01/13	Sr-90	1.39 ± 0.14	1.49	1.04 - 1.94	Pass
MAAP-738	02/01/13	Zn-65	3.84 ± 0.20	3.13	2.19 - 4.07	Pass
MAAP-738 d	02/01/13	Gr. Alpha	0.14 ± 0.03	1.20	0.36 - 2.04	Fail (1)
MAAP-738	02/01/13	Gr. Beta	0.93 ± 0.06	0.85	0.43 - 1.28	Pass
MAW-806	02/01/13	Co-57	31.20 0.40	30.90	21.60 40.20	Pass
MAW-806	02/01/13	Co-60	19.70 ± 0.30	16.56	13.69 - 25.43	Pass
MAW-806	02/01/13	Cs-134	23.20 ± 0.50	24.40	17.10 - 31.70	Pass
MAW-806	02/01/13	Cs-137	0.03 ± 0.12	0.00	0.00 - 1.00	Pass
MAW-806	02/01/13	Fe-55	34.00 ± 3.30	44.00	30.80 - 57.20	Pass
MAW-806	02/01/13	H-3	511.60 ± 12.50	507.00	355.00 - 659.00	Pass
MAW-806	02/01/13	K-40	2.20 ± 0.90	0.00	0.00 - 5.00	Pass
MAW-806	02/01/13	Mn-54	27.60 ± 0.50	27.40	19.20 - 35.60	Pass
MAW-806	02/01/13	Sr-90	9.30 ± 0.80	10.50	7.40 - 13.70	Pass
MAW-806	02/01/13	Zn-65	31.60 ± 0.80	30.40	21.30 - 39.50	Pass
MAW-811	02/01/13	Gr. Alpha	1.87 ± 0.09	2.31	0.69 - 3.93	Pass
MAW-811	02/01/13	Gr. Beta	13.04 ± 0.13	13.00	6.50 - 19.50	Pass
MASO-739	02/01/13	Co-57	0.60 ± 0.50	0.00	0.00 - 5.00	Pass
MASO-739	02/01/13	Co-60	739.20 ± 28.50	691.00	484.00 - 898.00	Pass
MASO-739	02/01/13	Cs-134	863.30 ± 34.10	887.00	621.00 - 1153.00	Pass
MASO-739	02/01/13	Cs-137	661.80 ± 25.70	587.00	411.00 - 763.00	Pass
MASO-739	02/01/13	K-40	745.80 ± 33.30	625.30	437.70 - 812.90	Pass
MASO-739	02/01/13	Mn-54	1.10 ± 1.00	0.00	0.00 - 5.00	Pass
MASO-739	02/01/13	Zn-65	1109.60 ± 44.10	995.00	697.00 - 1294.00	Pass
MASO-744 e	02/01/13	Sr-90	408.40 ± 14.00	628.00	440.00 - 816.00	Fail (2)
MAVE-747	02/01/13	Co-57	10.37 ± 0.17	8.68	6.08 - 11.28	Pass
MAVE-747	02/01/13	Co-60	6.48 ± 0.17	5.85	4.10 - 7.61	Pass
MAVE-747	02/01/13	Cs-134	0.02 ± 0.04	0.00	0.00 - 0.10	Pass
MAVE-747	02/01/13	Cs-137	7.79 ± 0.21	6.87	4.81 - 8.93	Pass
MAVE-747	02/01/13	Mn-54	0.00 ± 0.05	0.00	0.00 - 0.10	Pass
MAVE-747	02/01/13	Zn-65	7.29 ± 0.33	6.25	4.38 - 8.13	Pass
MASO-5043 f	08/01/13	Co-57	699.60 ± 3.90	0.00	0.00 - 5.00	Fail (3)
MASO-5043	08/01/13	Cs-134	1191.70 ± 23.00	1172.00	820.00 - 1524.00	Pass
MASO-5043	08/01/13	Cs-137	1072.00 ± 5.10	977.00	684.00 - 1270.00	Pass
MASO-5043	08/01/13	K-40	760.00 ± 16.20	633.00	443.00 - 823.00	Pass
MASO-5043	08/01/13	Mn-54	753.80 ± 4.90	674.00	472.000 - 876.000	Pass

TABLE D-5

DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)  
ENVIRONMENTAL, INC., 2013

(Page 2 of 2)

Lab Code (b)	Date	Analysis	Laboratory result	Concentration (a)		Acceptance
				Known Activity	Control Limits (c)	
MASO-5043	08/01/13	Sr-90	383.90 ± 14.50	460.00	322.00 - 598.00	Pass
MASO-5043	08/01/13	Zn-65	-351.50 ± 5.50	0.00	0.00 - 0.00	Pass
MAW-5094	08/01/13	Co-57	0.01 ± 0.09	0.00	0.00 - 5.00	Pass
MAW-5094	08/01/13	Co-60	23.20 ± 0.32	23.58	16.51 - 30.65	Pass
MAW-5094	08/01/13	Cs-134	27.60 ± 0.58	30.40	21.00 - 39.00	Pass
MAW-5094	08/01/13	Cs-137	32.31 ± 0.52	31.60	22.10 - 41.10	Pass
MAW-5094	08/01/13	Fe-55	39.20 ± 3.50	53.30	37.30 - 69.30	Pass
MAW-5094	08/01/13	Gr. Alpha	0.54 ± 0.05	0.70	0.21 - 1.19	Pass
MAW-5094	08/01/13	Gr. Beta	5.85 ± 0.09	5.94	2.97 - 8.91	Pass
MAW-5094	08/01/13	H-3	1.20 ± 3.00	0.00	0.00 - 5.00	Pass
MAW-5094	08/01/13	K-40	2.22 ± 0.90	0.00	0.00 - 5.00	Pass
MAW-5094	08/01/13	Mn-54	0.010 ± 0.11	0.00	0.00 - 5.00	Pass
MAW-5094	08/01/13	Sr-90	6.40 ± 0.60	7.22	5.05 - 9.39	Pass
MAW-5094	08/01/13	Zn-65	35.30 ± 0.90	34.60	24.20 - 45.00	Pass
MAVE-5046	08/01/13	Co-57	0.01 ± 0.03	0.00	0.00 - 0.00	Pass
MAVE-5046	08/01/13	Co-60	0.00 ± 0.04	0.00	0.00 - 0.00	Pass
MAVE-5046	08/01/13	Cs-134	5.71 ± 0.23	5.20	3.64 - 6.76	Pass
MAVE-5046	08/01/13	Cs-137	7.64 ± 0.20	6.60	4.62 - 8.58	Pass
MAVE-5046	08/01/13	Mn-54	9.08 ± 0.24	7.88	5.52 - 10.24	Pass
MAVE-5046	08/01/13	Zn-65	2.92 ± 0.25	2.63	1.84 - 3.42	Pass
MAAP-5046	08/01/13	Co-57	3.48 ± 0.14	3.40	1.90 - 3.50	Pass
MAAP-5046	08/01/13	Co-60	2.44 ± 0.08	3.40	1.60 - 3.00	Pass
MAAP-5046	08/01/13	Cs-134	0.01 ± 0.03	0.00	0.02 - 0.04	Pass
MAAP-5046	08/01/13	Cs-137	3.09 ± 0.13	2.70	1.90 - 3.50	Pass
MAAP-5046	08/01/13	Gr. Alpha	0.28 ± 0.04	0.90	0.27 - 1.53	Pass
MAAP-5046	08/01/13	Gr. Beta	1.90 ± 0.08	1.63	0.82 - 2.45	Pass
MAAP-5046	08/01/13	Mn-54	3.95 ± 0.12	3.50	2.50 - 4.60	Pass
MAAP-5046	08/01/13	Sr-90	1.69 ± 4.10	1.81	1.27 - 2.35	Pass
MAAP-5046	08/01/13	Zn-65	3.27 ± 0.18	2.70	2.50 - 4.60	Pass

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

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

c MAPEP results are presented as the known values and expected laboratory precision (1 sigma, 1 determination) and control limits as defined by the MAPEP. A known value of "zero" indicates an analysis was included in the testing series as a "false positive". MAPEP does not provide control limits.

(1) The filter was recounted overnight, no significant alpha activity could be detected.

(2) The sample was reanalyzed using additional fuming nitric separations. Result of reanalysis: 574.4 ± 35.2 Bq/kg.

(3) Interference from Eu-152 resulted in misidentification of Co-57.

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**APPENDIX E**

**EFFLUENT DATA**

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## TABLE OF CONTENTS

INTRODUCTION .....	1
SUMMARY.....	2
1.0. EFFLUENTS.....	3
1.1. Gaseous Effluents to the Atmosphere .....	3
1.2. Liquids Released to Kankakee River .....	3
2.0. SOLID RADIOACTIVE WASTE .....	3
3.0. DOSE TO MAN.....	4
3.1. Gaseous Effluent Pathways .....	4
3.1.1. Noble Gases.....	4
3.1.1.1. Gamma Dose Rates.....	4
3.1.1.2. Beta Air and Skin Dose Rate .....	4
3.1.2. Radioactive Iodine & Particulate .....	5
3.2. Liquid Effluent Pathways .....	5
3.3. Assessment of Dose to Member of Public .....	6
4.0. SITE METEOROLOGY .....	7

Table of Contents (cont.)

APPENDIX E-1 DATA TABLES AND FIGURES..... E-1.1

Station Releases

Table 1.1-1 Gaseous Effluents Summation of all Releases ..... E-1.2

Table 1.2-1 Liquid Effluents Summation of all Releases ..... E-1.4

Table 3.1-1 Maximum Doses Resulting from Airborne Releases ..... E-1.6

Table 3.2-1 Maximum Doses Resulting from Liquid Effluents ..... E-1.16

Table 3.3-1 10CFR20 Compliance Assessment..... E-1.26

Table 3.4-1 Maximum Doses Resulting from Airborne Releases Based  
On Concurrent Meteorological Data ..... E-1.28

## INTRODUCTION

Braidwood Station, a two-unit PWR station, is located in Will County, Illinois, fifteen (15) miles south-southwest of Joliet, Illinois. Each reactor is designed to have a capacity of 3,587 thermal megawatts. Unit No. 1 went critical on May 29, 1987, and Unit No. 2 went critical on March 8, 1988. The station has been designed to keep releases to the environment at levels below those specified in the regulations.

Liquid effluents from Braidwood Station are released to the Kankakee River in controlled batches after radioassay of each batch. Gaseous effluents are released to the atmosphere and are calculated on the basis of analyses of grab samples of noble gases and tritium, as well as continuously collected composite samples of iodine and particulate activity sampled during the course of the year. The results of effluent analyses are summarized on a monthly basis. Airborne concentrations of noble gases, I-131, and particulate radioactivity in offsite areas are calculated using effluent and meteorological data. Carbon-14 concentration in offsite areas is calculated based on industry-approved methodology for estimation of the amount released and meteorological data.

Environmental monitoring is conducted by sampling at indicator and control (background) locations in the vicinity of Braidwood Station to measure changes in radiation or radioactivity levels that may be attributable to station operations. If significant changes attributable to Braidwood Station are measured, these changes are correlated with effluent releases. An environmental monitoring program is conducted which also includes all potential pathways at the site. Gaseous pathways include ground plane (direct), inhalation, vegetation, meat, and milk. Liquid pathways include potable water and freshwater fish. The critical pathway for 2013 gaseous dose was vegetation. The critical pathway for 2013 liquid dose was potable water.

## SUMMARY

Calculations based on gaseous and liquid effluents, Kankakee River Flow and meteorological data indicate that public dose due to radioactive material attributable to Braidwood Station during the period does not exceed regulatory or Offsite Dose Calculation Manual (ODCM) limits.

The maximally exposed individual's total body dose due to gaseous and liquid emissions from licensed activities at Braidwood Station is 6.06E-01 mrem.

The assessment of radiation doses to the public is performed in accordance with the ODCM. The results of these analyses confirm that the station is operating in compliance with 10CFR50 Appendix I, 10CFR20 and 40CFR190.

## 1.0 EFFLUENTS

### 1.1 Gaseous Effluents to the Atmosphere

Measured concentrations of noble gases, radioiodine, and particulate radioactivity released to the atmosphere during the year, are listed in Table 1.1-1.

A total of 1.25E+00 curies of fission and activation gases were released with a maximum quarterly average release rate of 4.59E-02  $\mu\text{Ci}/\text{sec}$  for Unit 1 and 4.59E-02  $\mu\text{Ci}/\text{sec}$  for Unit 2.

A total of 8.98E-04 curies of radioiodine were released during the year with a maximum average quarterly release rate of 6.77E-05  $\mu\text{Ci}/\text{sec}$  for Unit 1 and 4.50E-05  $\mu\text{Ci}/\text{sec}$  for Unit 2.

A total of 1.72E-04 curies of beta-gamma emitters were released as airborne particulate matter with a maximum average release rate of <LLD  $\mu\text{Ci}/\text{sec}$  for Unit 1 and 1.77E-05  $\mu\text{Ci}/\text{sec}$  for Unit 2. Alpha-emitting radionuclides were below the lower limit of detection (LLD) for the year.

A total of 4.04E+02 curies of tritium were released with a maximum average quarterly release rate of 7.20E+00  $\mu\text{Ci}/\text{sec}$  for Unit 1 and 1.07E+01  $\mu\text{Ci}/\text{sec}$  for Unit 2.

A total of 8.48E+00 curies of C-14 was released with a maximum average quarterly release rate of 1.41E-01  $\mu\text{Ci}/\text{sec}$  from Unit 1 and 1.41E-01  $\mu\text{Ci}/\text{sec}$  from Unit 2.

### 1.2 Liquids Released to Kankakee River

A total of 3.72E+06 liters of radioactive liquid wastes (prior to dilution) containing 1.60E-01 curies (excluding tritium, noble gases and alpha) were discharged from the station. These wastes were released at a maximum quarterly diluted average concentration of 1.32E-08  $\mu\text{Ci}/\text{ml}$ . Alpha-emitting radionuclides were less than the LLD for the year. A total of 4.08E+03 curies of tritium were released from the station. Quarterly release activities are given in Table 1.2-1.

## 2.0 SOLID RADIOACTIVE WASTE

Solid radioactive wastes were shipped by truck to the Envirocare of Utah and Waste Control Specialists disposal facilities and various waste processors. For details, refer to the Braidwood Station 2013 Radioactive Effluent

Release Report.

3.0 DOSE TO MAN

3.1 Gaseous Effluent Pathways

Table 3.1-1 summarizes the doses resulting from releases of airborne radioactivity via the different exposure pathways.

3.1.1 Noble Gases

3.1.1.1 Gamma Dose Rates

Offsite Gamma air and total body dose rates are shown in Table 3.1-1 and were calculated based on measured effluents and average meteorological data. Based on measured effluents and average meteorological data, the maximum total body dose to an individual would be 5.47E-01 mrem for the year (Table 3.1-1) with an occupancy or shielding factor of 0.7 used. The maximum total body dose based on measured effluents and concurrent meteorological data would be 4.31E-01 mrem (Table 3.4-1). The maximum gamma air dose was 2.31E-05 mrad (Table 3.1-1) based on measured effluents and average meteorological data and 2.98E-05 mrad based on concurrent meteorological data (Table 3.4-1).

3.1.1.2 Beta Air and Skin Dose Rates

The range of beta particles in air is relatively small (on the order of a few meters or less); consequently, plumes of gaseous effluents may be considered "infinite" for purpose of calculating the dose from beta radiation incident on the skin. However, the actual dose to sensitive skin tissues is difficult to calculate due to the effect of the beta particle energies, thickness of inert skin and clothing covering sensitive tissues. For purposes of this report the skin is taken to have a thickness of 7.0 mg/cm<sup>2</sup> and an occupancy factor of 1.0 is used. The skin dose from beta and gamma radiation for the year was 4.44E-05 mrem based on concurrent meteorological data (Table 3.4-1).

The maximum offsite beta air dose for the year was  $1.14\text{E-}05$  mrad (Table 3.1-1) based on measured effluents and average meteorological data and  $4.76\text{E-}05$  mrad based on concurrent meteorological data (Table 3.4-1).

### 3.1.2 Radioactive Iodine & Particulate

The human thyroid exhibits a significant capacity to concentrate ingested or inhaled iodine. I-131 released during routine operation of the station may be made available to man resulting in a dose to the thyroid. C-14 is also included in this category. C-14 exhibits a capacity to concentrate in bone. C-14 is released in gaseous form and is absorbed into vegetation through photosynthesis. The principal pathways of interest for C-14 are the consumption of vegetation by humans and milk from which animals have ingested C-14 through the consumption of vegetation. With the inclusion of C-14 in plant effluent calculations, human dose in this category is primarily driven by the release of C-14 from the plant.

The hypothetical dose to the maximum exposed individual living near the station via ingestion of milk and vegetation was calculated. The source of milk and vegetation was assumed to be at the nearest site boundary with the cows pastured and vegetation grown from May through October. The maximum dose from radioactive iodine and particulate (including C-14) to any organ was  $2.27\text{E}+00$  mrem (child/bone) based on measured effluents and average meteorological data and  $1.81\text{E}+00$  mrem based on concurrent meteorological data. The maximum dose from radioactive iodine and particulate (including C-14) to the whole body was  $5.47\text{E-}01$  mrem (child) based on measured effluents and average meteorological data and  $4.31\text{E-}01$  mrem based on concurrent meteorological data.

### 3.2 Liquid Effluent Pathways

The three principal pathways through the aquatic environment for potential doses to man from liquid waste are ingestion of potable water, eating aquatic foods, and exposure while on the shoreline. Not all of these pathways are significant or applicable at a given time or station but a reasonable approximation of the dose can be made by adjusting the dose formula for season of the year or type and degree of use of the aquatic environment. NRC developed equations\* were

used to calculate the doses to the whole body, lower GI tracts, thyroid, bone and skin; specific parameters for use in the equations are given in the Braidwood Offsite Dose Calculation Manual. The maximum whole body dose for the year was 5.92E-02 mrem and no organ dose exceeded 1.61E-01 mrem (Table 3.2-1 [adult]).

### 3.3 Assessment of Dose to Member of Public

During the period January to December, 2013, Braidwood Station did not exceed the following limits as shown in Table 3.1-1 and Table 3.2-1 (based on annual average meteorological data), Table 3.4-1 (based on concurrent meteorological data), and Table 3.3-1:

- The RETS limits on dose or dose commitment to an individual due to radioactive materials in liquid effluents from each reactor unit (1.5 mrem to the whole body or 5 mrem to any organ during any calendar year; 3 mrem to the whole body or 10 mrem to any organ during the calendar year).
- The RETS limits on air dose in noble gases released in gaseous effluents to a member of the public from each reactor unit (5 mrad for gamma radiation or 10 mrad for beta radiation during any calendar quarter; 10 mrad for gamma radiation or 20 mrad for beta radiation during a calendar year).
- The RETS limits on dose to a member of the public due to iodine-131, iodine-133, tritium, and radionuclides in particulate form with half-lives greater than eight days in gaseous effluents released from each reactor unit (7.5 mrem to any organ during any calendar quarter; 15 mrem to any organ during any calendar year).
- The 10CFR20 limit on Total Effective Dose Equivalent to individual members of the public (100 mrem) during any calendar year.

#### 4.0 SITE METEOROLOGY

A summary of the site meteorological measurements taken during each calendar quarter of the year is given in Appendix E. The data are presented as cumulative joint frequency distributions of the wind direction for the 203' level and wind speed class by atmospheric stability class determined from the temperature difference between the 199' and 30' levels. Data recovery for these measurements was 99.8% during 2013.

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**APPENDIX E-1**

**DATA TABLES AND FIGURES**

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**Table 1.1-1**  
**BRAIDWOOD NUCLEAR POWER STATION**  
**ANNUAL EFFLUENT REPORT FOR 2013**  
**GAS RELEASES**  
**UNIT 1 (Docket Number 50-456)**  
**SUMMATION OF ALL RELEASES**

Units	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Est. Total Error%
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**A. Fission and activation gas releases**

1. Total Release Activity	Ci	6.82E-04	1.98E-01	3.65E-01	6.38E-02	7.59E+00
2. Average Release Rate	μCi/sec	8.77E-05	2.52E-02	4.59E-02	8.03E-03	
3. Percent of ODCM Limit - gamma	%	1.09E-07	3.30E-05	1.23E-04	7.56E-05	
4. Percent of ODCM Limit - beta	%	2.64E-07	7.79E-05	1.75E-04	4.72E-05	

**B. Iodine Releases**

1. Total Iodine	Ci	2.43E-07	5.36E-07	5.38E-04	2.62E-07	3.32E+01
2. Average Release Rate	μCi/sec	3.13E-08	6.82E-08	6.77E-05	3.30E-08	
3. Percent of ODCM Limit	%	1.74E-06	2.87E-06	3.18E-04	1.12E-06	

**C. Particulate (> 8 Day Half-Life) Release**

1. Particulates with half-lives > 8 days	Ci	<LLD	<LLD	<LLD	<LLD	1.98E+01
2. Average Release Rate	μCi/sec	<LLD	<LLD	<LLD	<LLD	
3. Percent of ODCM Limit	%	N/A	N/A	N/A	N/A	
4. Gross Alpha Radioactivity	Ci	<LLD	<LLD	<LLD	<LLD	

**D. Tritium Releases**

1. Total Release Activity	Ci	5.60E+01	3.08E+01	4.81E+01	4.72E+00	8.07E+00
2. Average Release Rate	μCi/sec	7.20E+00	3.92E+00	6.05E+00	5.94E-01	
3. Percent of ODCM Limit	%	1.59E-01	8.75E-02	1.38E-01	1.34E-02	

**E. Gross Alpha Releases**

1. Total Release Activity	Ci	<LLD	<LLD	<LLD	<LLD	1.98E+01
2. Average Release Rate	μCi/sec	<LLD	<LLD	<LLD	<LLD	
3. Percent of ODCM limit	%	N/A	N/A	N/A	N/A	

**F. Carbon-14 Releases**

1. Total Release Activity	Ci	1.10E+00	1.11E+00	8.64E-01	1.11E+00	
2. Average Release Rate	μCi/sec	1.41E-01	1.41E-01	1.09E-01	1.40E-01	

**Table 1.1-1 (cont)**  
**BRAIDWOOD NUCLEAR POWER STATION**  
**ANNUAL EFFLUENT REPORT FOR 2013**  
**GAS RELEASES**  
**UNIT 2 (Docket Number 50-457)**  
**SUMMATION OF ALL RELEASES**

Units	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Est. Total Error%
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**A. Fission and Activation Gas Releases**

1. Total Activity Released	Ci	6.82E-04	1.98E-01	3.65E-01	6.38E-02	7.59E+00
2. Average Release Rate	μCi/sec	8.77E-05	2.52E-02	4.59E-02	8.03E-03	
3. Percent of ODCM Limit - gamma	%	1.09E-07	3.30E-05	1.23E-04	7.56E-05	
4. Percent of ODCM Limit - beta	%	2.64E-07	7.79E-05	1.75E-04	4.72E-05	

**B. Iodine Releases**

1. Total Iodine	Ci	<LLD	9.08E-07	3.58E-04	<LLD	3.32E+01
2. Average Release Rate	μCi/sec	<LLD	1.16E-07	4.50E-05	<LLD	
3. Percent of ODCM Limit	%	N/A	2.15E-06	1.39E-04	N/A	

**C. Particulate (> 8 Day Half-Life) Release**

1. Particulates with half-lives > 8 days	Ci	<LLD	1.95E-05	1.42E-04	1.06E-05	1.98E+01
2. Average Release Rate	μCi/sec	<LLD	2.48E-06	1.77E-05	1.33E-06	
3. Percent of ODCM Limit	%	N/A	2.32E-06	1.96E-02	5.01E-07	
4. Gross Alpha Radioactivity	Ci	<LLD	<LLD	<LLD	<LLD	

**D. Tritium Releases**

1. Total Release Activity	Ci	8.31E+01	8.18E+01	6.83E+01	3.14E+01	8.07E+00
2. Average Release Rate	μCi/sec	1.07E+01	1.04E+01	8.59E+00	3.95E+00	
3. Percent of ODCM Limit	%	2.37E-01	2.32E-01	1.94E-01	8.92E-02	

**E. Gross Alpha Releases**

1. Total Release Activity	Ci	<LLD	<LLD	<LLD	<LLD	1.98E+01
2. Average Release Rate	μCi/sec	<LLD	<LLD	<LLD	<LLD	
3. Percent of ODCM Limit	%	N/A	N/A	N/A	N/A	

**F. Carbon-14 Releases**

1. Total Release Activity	Ci	1.10E+00	1.05E+00	1.03E+00	1.12E+00	
2. Average Release Rate	μCi/sec	1.41E-01	1.34E-01	1.30E-01	1.41E-01	

**Table 1.2-1**  
**BRAIDWOOD NUCLEAR POWER STATION**  
**ANNUAL EFFLUENT REPORT FOR 2013**  
**LIQUID RELEASES**  
**UNIT 1 (Docket Number 50-456)**  
**SUMMATION OF ALL RELEASES**

Units	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Est. Total Error %
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**A. Fission and Activation Products**

1. Total Release (not including Tritium, Dissolved Noble Gases, or Alpha)	Ci	2.56E-04	1.67E-03	6.07E-02	1.72E-02	2.64E+00
2. Average Diluted Concentration	μCi/ml	4.74E-11	3.52E-10	1.32E-08	4.13E-09	
3. Percent of applicable limit	%	*	*	*	*	

**B. Tritium**

1. Total Release	Ci	1.88E+02	3.29E+02	1.23E+03	2.91E+02	5.85E+00
2. Average Diluted Concentration	μCi/ml	3.49E-05	6.94E-05	2.67E-04	6.99E-05	
3. % of Limit (1E-2 μCi/ml)	%	3.49E-01	6.94E-01	2.67E+00	6.99E-01	

**C. Dissolved Noble Gases**

1. Total Release	Ci	0.00E+00	0.00E+00	1.42E-05	0.00E+00	2.64E+00
2. Average Diluted Concentration	μCi/ml	0.00E+00	0.00E+00	3.08E-12	0.00E+00	
3. % of Limit (2E-4 μCi/ml)	%	0.00E+00	0.00E+00	1.54E-06	0.00E+00	

**D. Gross Alpha**

1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+01
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<b>E. Volume of Waste Released</b> (prior to dilution)	liters	4.86E+05	8.78E+05	1.61E+06	7.50E+05	
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<b>F. Volume of Dilution Water</b>	liters	1.08E+10	9.46E+09	9.22E+09	8.33E+09	
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\*This limit is equal to 10 times the concentration values in Appendix B, Table 2, Column 2 to 10CFR20.1001-20.2402.

**Table 1.1-1 (cont)**  
**BRAIDWOOD NUCLEAR POWER STATION**  
**ANNUAL EFFLUENT REPORT FOR 2013**  
**GAS RELEASES**  
**UNIT 2 (Docket Number 50-457)**  
**SUMMATION OF ALL RELEASES**

Units	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Est. Total Error%
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**A. Fission and Activation Gas Releases**

1. Total Activity Released	Ci	6.82E-04	1.98E-01	3.65E-01	6.38E-02	7.59E+00
2. Average Release Rate	μCi/sec	8.77E-05	2.52E-02	4.59E-02	8.03E-03	
3. Percent of ODCM Limit - gamma	%	1.09E-07	3.30E-05	1.23E-04	7.56E-05	
4. Percent of ODCM Limit - beta	%	2.64E-07	7.79E-05	1.75E-04	4.72E-05	

**B. Iodine Releases**

1. Total Iodine	Ci	<LLD	9.08E-07	3.58E-04	<LLD	3.32E+01
2. Average Release Rate	μCi/sec	<LLD	1.16E-07	4.50E-05	<LLD	
3. Percent of ODCM Limit	%	N/A	2.15E-06	1.39E-04	N/A	

**C. Particulate (> 8 day half-life) Releases**

1. Particulates with half-lives > 8 days	Ci	<LLD	1.95E-05	1.42E-04	1.06E-05	1.98E+01
2. Average Release Rate	μCi/sec	<LLD	2.48E-06	1.77E-05	1.33E-06	
3. Percent of ODCM Limit	%	N/A	2.32E-06	1.96E-02	5.01E-07	
4. Gross Alpha Radioactivity	Ci	<LLD	<LLD	<LLD	<LLD	

**D. Tritium Releases**

1. Total Release Activity	Ci	8.31E+01	8.18E+01	6.83E+01	3.14E+01	8.07E+00
2. Average Release Rate	μCi/sec	1.07E+01	1.04E+01	8.59E+00	3.95E+00	
3. Percent of ODCM Limit	%	2.37E-01	2.32E-01	1.94E-01	8.92E-02	

**E. Gross Alpha Releases**

1. Total Release Activity	Ci	<LLD	<LLD	<LLD	<LLD	1.98E+01
2. Average Release Rate	μCi/sec	<LLD	<LLD	<LLD	<LLD	
3. Percent of ODCM Limit	%	N/A	N/A	N/A	N/A	

**F. Carbon-14 Releases**

1. Total Release Activity	Ci	1.10E+00	1.05E+00	1.03E+00	1.12E+00	
2. Average Release Rate	μCi/sec	1.41E-01	1.34E-01	1.30E-01	1.41E-01	

**Table 3.1-1**

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT  
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types  
 Period Start Date....: 01/01/2013 00:00  
 Period End Date.....: 01/01/2014 00:00  
 Period Duration (min): 5.256E+05  
 Coefficient Type.....: Historical  
 Unit.....: 1

=== RELEASE DATA ===  
 Total Release Duration (minutes)..... 5.547E+05  
 Total Release Volume (cf)..... 7.910E+10  
 Average Release Flowrate (cfm)..... 1.426E+05  
 Average Period Flowrate (cfm)..... 1.505E+05

=== NUCLIDE DATA ===

Nuclide	uCi	Average uCi/cc	ECrcent Ratio	EC
AR-41	1.85E+04	8.28E-12	8.28E-04	1.00E-08
KR-85M	2.95E+03	1.32E-12	1.32E-05	1.00E-07
KR-87	0.00E+00	0.00E+00	0.00E+00	2.00E-08
XE-133M	6.18E+03	2.76E-12	4.60E-06	6.00E-07
KR-89	0.00E+00	0.00E+00	0.00E+00	1.00E-09
KR-88	8.32E+01	3.71E-14	4.13E-06	9.00E-09
XE-131M	0.00E+00	0.00E+00	0.00E+00	2.00E-06
XE-135	7.76E+04	3.46E-11	4.95E-04	7.00E-08
XE-133	5.22E+05	2.33E-10	4.66E-04	5.00E-07
F&AG	6.27E+05	2.80E-10	1.81E-03	
I-131	1.50E+01	6.69E-15	3.35E-05	2.00E-10
I-132	5.17E+02	2.31E-13	1.15E-05	2.00E-08
I-133	7.72E+00	3.45E-15	3.45E-06	1.00E-09
I-135	3.22E-02	1.44E-17	2.39E-09	6.00E-09
Iodine	5.39E+02	2.41E-13	4.85E-05	
C-14	4.18E+06	1.87E-09	6.22E-01	3.00E-09
Other	4.18E+06	1.87E-09	6.22E-01	
H-3	1.40E+08	6.23E-08	6.23E-01	1.00E-07
H-3	1.40E+08	6.23E-08	6.23E-01	
Total	1.44E+08	6.45E-08	1.25E+00	

**Table 3.1-1 (cont.)**

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT  
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types  
 Period Start Date....: 01/01/2013 00:00  
 Period End Date.....: 01/01/2014 00:00  
 Period Duration (min): 5.256E+05  
 Coefficient Type.....: Historical  
 Unit.....: 1  
 Receptor.....: 5 Composite Crit. Receptor - IP  
 Distance (meters)....: 610  
 Compass Point.....: 0.0

=== PERIOD DOSE BY AGEGROUP, PATHWAY, ORGAN (mrem) ===

Age/Path	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
AGPD	4.79E-07	4.79E-07	4.79E-07	4.79E-07	4.79E-07	4.79E-07	0.00E+00	4.79E-07
AINHL	2.80E-03	4.22E-03	4.23E-03	4.22E-03	4.22E-03	4.22E-03	0.00E+00	4.22E-03
AVEG	1.38E-01	3.42E-02	3.45E-02	3.42E-02	3.42E-02	3.42E-02	0.00E+00	3.42E-02
AGMILK	4.14E-03	5.40E-03	6.70E-03	5.40E-03	5.39E-03	5.39E-03	0.00E+00	5.39E-03
ACMEAT	5.13E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02	1.12E-02	0.00E+00	1.12E-02
ACMILK	5.59E-02	1.34E-02	1.45E-02	1.34E-02	1.34E-02	1.34E-02	0.00E+00	1.34E-02
TGPD	4.79E-07	4.79E-07	4.79E-07	4.79E-07	4.79E-07	4.79E-07	0.00E+00	4.79E-07
TINHL	4.00E-03	4.47E-03	4.49E-03	4.47E-03	4.47E-03	4.47E-03	0.00E+00	4.47E-03
TVEG	2.23E-01	5.24E-02	5.26E-02	5.24E-02	5.24E-02	5.24E-02	0.00E+00	5.24E-02
TGMILK	7.49E-03	7.44E-03	9.49E-03	7.44E-03	7.43E-03	7.43E-03	0.00E+00	7.43E-03
TCMEAT	4.33E-02	9.22E-03	9.25E-03	9.22E-03	9.22E-03	9.22E-03	0.00E+00	9.22E-03
TCMILK	1.03E-01	2.35E-02	2.53E-02	2.35E-02	2.35E-02	2.35E-02	0.00E+00	2.35E-02
CGPD	4.79E-07	4.79E-07	4.79E-07	4.79E-07	4.79E-07	4.79E-07	0.00E+00	4.79E-07
CINHL	5.53E-03	4.33E-03	4.34E-03	4.33E-03	4.33E-03	4.33E-03	0.00E+00	4.33E-03
CVEG	5.39E-01	1.20E-01	1.20E-01	1.20E-01	1.20E-01	1.20E-01	0.00E+00	1.20E-01
CGMILK	2.40E-01	6.01E-02	6.41E-02	6.01E-02	6.00E-02	6.00E-02	0.00E+00	6.01E-02
CCMEAT	8.14E-02	1.70E-02	1.70E-02	1.70E-02	1.70E-02	1.70E-02	0.00E+00	1.70E-02
CCMILK	2.54E-01	5.53E-02	5.87E-02	5.53E-02	5.53E-02	5.53E-02	0.00E+00	5.53E-02
IGPD	4.79E-07	4.79E-07	4.79E-07	4.79E-07	4.79E-07	4.79E-07	0.00E+00	4.79E-07
IINHL	4.08E-03	2.71E-03	2.72E-03	2.71E-03	2.71E-03	2.71E-03	0.00E+00	2.71E-03
IGMILK	4.97E-01	1.20E-01	1.30E-01	1.20E-01	1.20E-01	1.20E-01	0.00E+00	1.20E-01
ICMILK	4.97E-01	1.13E-01	1.21E-01	1.13E-01	1.13E-01	1.13E-01	0.00E+00	1.13E-01

=== PERIOD DOSE BY AGEGROUP, ORGAN (mrem) ===

Agegroup	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
ADULT	2.52E-01	6.84E-02	7.11E-02	6.84E-02	6.84E-02	6.84E-02	0.00E+00	6.84E-02
TEEN	3.81E-01	9.70E-02	1.01E-01	9.71E-02	9.70E-02	9.70E-02	0.00E+00	9.70E-02
CHILD	1.12E+00	2.56E-01	2.64E-01	2.56E-01	2.56E-01	2.56E-01	0.00E+00	2.56E-01
INFANT	9.99E-01	2.36E-01	2.54E-01	2.36E-01	2.36E-01	2.36E-01	0.00E+00	2.36E-01

**Table 3.1-1 (cont.)**

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT  
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types  
 Period Start Date....: 01/01/2013 00:00  
 Period End Date.....: 01/01/2014 00:00  
 Period Duration (min): 5.256E+05  
 Coefficient Type.....: Historical  
 Unit.....: 1  
 Receptor.....: 5 Composite Crit. Receptor - IP  
 Distance (meters)....: 610  
 Compass Point.....: 0.0

=== MAXIMUM PERIOD DOSE TO LIMIT (Any Organ) ===

Dose Period	Age Group	Organ	Dose (mrem)	Limit Period	Admin Limit	Admin % of Limit	T.Spec Limit	T.Spec % of Limit
Strt->End	CHILD	BONE	1.12E+00	31-day	2.25E-01	4.98E+02	3.00E-01	3.73E+02
Qrtr->End	CHILD	BONE	1.12E+00	Quarter	5.63E+00	1.99E+01	7.50E+00	1.49E+01
Year->End	CHILD	BONE	1.12E+00	Annual	1.13E+01	9.95E+00	1.50E+01	7.47E+00

Critical Pathway.....: 2 Vegetation (VEG)  
 Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
H-3	0.00E+00
C-14	1.00E+02
I-131	2.13E-03
I-132	3.35E-05
I-133	1.62E-05
I-135	4.57E-09

=== MAXIMUM PERIOD DOSE TO LIMIT (Tot Body) ===

Dose Period	Age Group	Organ	Dose (mrem)	Limit Period	Admin Limit	Admin % of Limit	T.Spec Limit	T.Spec % of Limit
Strt->End	CHILD	TBODY	2.56E-01	31-day	1.50E-01	1.71E+02	2.00E-01	1.28E+02
Qrtr->End	CHILD	TBODY	2.56E-01	Quarter	5.25E+00	4.88E+00	7.50E+00	3.42E+00
Year->End	CHILD	TBODY	2.56E-01	Annual	1.05E+01	2.44E+00	1.50E+01	1.71E+00

Critical Pathway.....: 2 Vegetation (VEG)  
 Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
H-3	1.16E+01
C-14	8.86E+01
I-131	5.34E-03
I-132	1.45E-04
I-133	3.51E-05
I-135	1.94E-08

**Table 3.1-1 (cont.)**

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT  
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types  
 Period Start Date....: 01/01/2013 00:00  
 Period End Date.....: 01/01/2014 00:00  
 Period Duration (min): 5.256E+05  
 Coefficient Type.....: Historical  
 Unit.....: 1  
 Receptor.....: 4 Composite Crit. Receptor - NG  
 Distance (meters)....: 610  
 Compass Point.....: 0.0

=== MAXIMUM PERIOD NG DOSE TO LIMIT (Gamma) ===

Dose Period	Dose Type	Dose (mrad)	Limit Period	Admin Limit	Admin % of Limit	T.Spec Limit	T.Spec % of Limit
Strt->End	Gamma	1.16E-05	31-day	1.50E-01	7.71E-03	2.00E-01	5.78E-03
Qrtr->End	Gamma	1.16E-05	Quarter	3.75E+00	3.08E-04	5.00E+00	2.31E-04
Year->End	Gamma	1.16E-05	Annual	7.50E+00	1.54E-04	1.00E+01	1.16E-04

Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
AR-41	3.36E+01
KR-85M	7.08E-01
KR-87	0.00E+00
XE-133M	3.94E-01
KR-89	0.00E+00
KR-88	2.47E-01
XE-131M	0.00E+00
XE-135	2.91E+01
XE-133	3.59E+01

=== MAXIMUM PERIOD NG DOSE TO LIMIT (Beta) ===

Dose Period	Dose Type	Dose (mrad)	Limit Period	Admin Limit	Admin % of Limit	T.Spec Limit	T.Spec % of Limit
Strt->End	Beta	3.00E-05	31-day	3.00E-01	9.99E-03	4.00E-01	7.50E-03
Qrtr->End	Beta	3.00E-05	Quarter	7.50E+00	4.00E-04	1.00E+01	3.00E-04
Year->End	Beta	3.00E-05	Annual	1.50E+01	2.00E-04	2.00E+01	1.50E-04

Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
AR-41	7.47E+00
KR-85M	7.13E-01
KR-87	0.00E+00
XE-133M	1.12E+00
KR-89	0.00E+00
KR-88	2.99E-02
XE-131M	0.00E+00
XE-135	2.34E+01
XE-133	6.72E+01

**Table 3.1-1 (cont.)**

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT  
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types  
 Period Start Date....: 01/01/2013 00:00  
 Period End Date.....: 01/01/2014 00:00  
 Period Duration (min): 5.256E+05  
 Coefficient Type.....: Historical  
 Unit.....: 2

=== RELEASE DATA ===  
 Total Release Duration (minutes)..... 5.476E+05  
 Total Release Volume (cf)..... 6.989E+10  
 Average Release Flowrate (cfm)..... 1.276E+05  
 Average Period Flowrate (cfm)..... 1.330E+05

=== NUCLIDE DATA ===

Nuclide	uCi	Average uCi/cc	ECrcent Ratio	EC
AR-41	1.85E+04	9.37E-12	9.37E-04	1.00E-08
KR-85M	2.95E+03	1.49E-12	1.49E-05	1.00E-07
KR-85	0.00E+00	0.00E+00	0.00E+00	7.00E-07
KR-87	0.00E+00	0.00E+00	0.00E+00	2.00E-08
XE-133M	6.18E+03	3.12E-12	5.20E-06	6.00E-07
KR-89	0.00E+00	0.00E+00	0.00E+00	1.00E-09
KR-88	8.32E+01	4.20E-14	4.67E-06	9.00E-09
XE-131M	0.00E+00	0.00E+00	0.00E+00	2.00E-06
XE-135	7.76E+04	3.92E-11	5.60E-04	7.00E-08
XE-133	5.22E+05	2.64E-10	5.27E-04	5.00E-07
F&AG	6.27E+05	3.17E-10	2.05E-03	
I-131	6.50E+00	3.29E-15	1.64E-05	2.00E-10
I-132	3.52E+02	1.78E-13	8.89E-06	2.00E-08
I-133	3.74E-02	1.89E-17	1.89E-08	1.00E-09
Iodine	3.59E+02	1.81E-13	2.53E-05	
C-14	4.30E+06	2.17E-09	7.25E-01	3.00E-09
Other	4.30E+06	2.17E-09	7.25E-01	
H-3	2.65E+08	1.34E-07	1.34E+00	1.00E-07
H-3	2.65E+08	1.34E-07	1.34E+00	
CS-138	0.00E+00	0.00E+00	0.00E+00	8.00E-08
P<8	0.00E+00	0.00E+00	0.00E+00	

**Table 3.1-1 (cont.)**

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT  
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types  
Period Start Date....: 01/01/2013 00:00  
Period End Date.....: 01/01/2014 00:00  
Period Duration (min): 5.256E+05  
Coefficient Type.....: Historical  
Unit.....: 2

=== NUCLIDE DATA =====

Nuclide	uCi	Average uCi/cc	ECrcent Ratio	EC
NB-95M	6.37E+00	3.22E-15	1.07E-06	3.00E-09
CO-60	1.15E+02	5.83E-14	1.17E-03	5.00E-11
CE-141	5.01E+01	2.53E-14	3.16E-05	8.00E-10
P>=8	1.72E+02	8.68E-14	1.20E-03	
Total	2.69E+08	1.36E-07	2.06E+00	

**Table 3.1-1 (cont.)**

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT  
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types  
 Period Start Date....: 01/01/2013 00:00  
 Period End Date.....: 01/01/2014 00:00  
 Period Duration (min): 5.256E+05  
 Coefficient Type.....: Historical  
 Unit.....: 2  
 Receptor.....: 5 Composite Crit. Receptor - IP  
 Distance (meters)....: 610  
 Compass Point.....: 0.0

=== PERIOD DOSE BY AGEGROUP, PATHWAY, ORGAN (mrem) ===

Age/Path	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
AGPD	1.47E-03	1.47E-03	1.47E-03	1.47E-03	1.47E-03	1.47E-03	0.00E+00	1.47E-03
AINHL	2.88E-03	7.53E-03	7.54E-03	7.53E-03	7.56E-03	7.54E-03	0.00E+00	7.53E-03
AVEG	1.42E-01	4.09E-02	4.10E-02	4.09E-02	4.09E-02	4.11E-02	0.00E+00	4.09E-02
AGMILK	4.26E-03	9.50E-03	1.01E-02	9.50E-03	9.50E-03	9.50E-03	0.00E+00	9.50E-03
ACMEAT	5.27E-02	1.24E-02	1.24E-02	1.23E-02	1.23E-02	1.24E-02	0.00E+00	1.24E-02
ACMILK	5.75E-02	1.57E-02	1.62E-02	1.57E-02	1.57E-02	1.58E-02	0.00E+00	1.57E-02
TGPD	1.47E-03	1.47E-03	1.47E-03	1.47E-03	1.47E-03	1.47E-03	0.00E+00	1.47E-03
TINHL	4.12E-03	7.83E-03	7.83E-03	7.83E-03	7.87E-03	7.83E-03	0.00E+00	7.83E-03
TVEG	2.30E-01	6.04E-02	6.05E-02	6.04E-02	6.04E-02	6.06E-02	0.00E+00	6.05E-02
TGMILK	7.70E-03	1.28E-02	1.37E-02	1.28E-02	1.28E-02	1.28E-02	0.00E+00	1.28E-02
TCMEAT	4.45E-02	9.98E-03	9.98E-03	9.97E-03	9.97E-03	1.00E-02	0.00E+00	9.98E-03
TCMILK	1.06E-01	2.67E-02	2.75E-02	2.67E-02	2.67E-02	2.68E-02	0.00E+00	2.67E-02
CGPD	1.47E-03	1.47E-03	1.47E-03	1.47E-03	1.47E-03	1.47E-03	0.00E+00	1.47E-03
CINHL	5.68E-03	7.30E-03	7.30E-03	7.30E-03	7.33E-03	7.30E-03	0.00E+00	7.30E-03
CVEG	5.54E-01	1.33E-01	1.33E-01	1.33E-01	1.33E-01	1.33E-01	0.00E+00	1.33E-01
CGMILK	2.47E-01	6.99E-02	7.17E-02	6.99E-02	6.99E-02	6.99E-02	0.00E+00	6.99E-02
CCMEAT	8.38E-02	1.81E-02	1.81E-02	1.81E-02	1.81E-02	1.81E-02	0.00E+00	1.81E-02
CCMILK	2.61E-01	6.08E-02	6.23E-02	6.08E-02	6.08E-02	6.08E-02	0.00E+00	6.08E-02
IGPD	1.47E-03	1.47E-03	1.47E-03	1.47E-03	1.47E-03	1.47E-03	0.00E+00	1.47E-03
IINHL	4.20E-03	4.43E-03	4.43E-03	4.43E-03	4.45E-03	4.43E-03	0.00E+00	4.43E-03
IGMILK	5.11E-01	1.36E-01	1.40E-01	1.36E-01	1.36E-01	1.36E-01	0.00E+00	1.36E-01
ICMILK	5.11E-01	1.22E-01	1.26E-01	1.22E-01	1.22E-01	1.22E-01	0.00E+00	1.22E-01

=== PERIOD DOSE BY AGEGROUP, ORGAN (mrem) ===

Agegroup	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
ADULT	2.61E-01	8.75E-02	8.87E-02	8.75E-02	8.75E-02	8.78E-02	0.00E+00	8.75E-02
TEEN	3.93E-01	1.19E-01	1.21E-01	1.19E-01	1.19E-01	1.19E-01	0.00E+00	1.19E-01
CHILD	1.15E+00	2.91E-01	2.94E-01	2.91E-01	2.91E-01	2.91E-01	0.00E+00	2.91E-01
INFANT	1.03E+00	2.64E-01	2.72E-01	2.64E-01	2.64E-01	2.64E-01	0.00E+00	2.64E-01

**Table 3.1-1 (cont.)**

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT  
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types  
 Period Start Date....: 01/01/2013 00:00  
 Period End Date.....: 01/01/2014 00:00  
 Period Duration (min): 5.256E+05  
 Coefficient Type.....: Historical  
 Unit.....: 2  
 Receptor.....: 5 Composite Crit. Receptor - IP  
 Distance (meters)....: 610  
 Compass Point.....: 0.0

=== MAXIMUM PERIOD DOSE TO LIMIT (Any Organ) ===

Dose Period	Age Group	Organ	Dose (mrem)	Limit Period	Admin Limit	Admin % of Limit	T.Spec Limit	T.Spec % of Limit
Strt->End	CHILD	BONE	1.15E+00	31-day	2.25E-01	5.13E+02	3.00E-01	3.84E+02
Qrtr->End	CHILD	BONE	1.15E+00	Quarter	5.63E+00	2.05E+01	7.50E+00	1.54E+01
Year->End	CHILD	BONE	1.15E+00	Annual	1.13E+01	1.03E+01	1.50E+01	7.69E+00

Critical Pathway.....: 2 Vegetation (VEG)  
 Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
H-3	0.00E+00
C-14	9.97E+01
CO-60	1.27E-01
I-131	8.93E-04
I-132	2.22E-05
I-133	7.61E-08
CS-138	0.00E+00
CE-141	3.88E-05

=== MAXIMUM PERIOD DOSE TO LIMIT (Tot Body) ===

Dose Period	Age Group	Organ	Dose (mrem)	Limit Period	Admin Limit	Admin % of Limit	T.Spec Limit	T.Spec % of Limit
Strt->End	CHILD	TBODY	2.91E-01	31-day	1.50E-01	1.94E+02	2.00E-01	1.45E+02
Qrtr->End	CHILD	TBODY	2.91E-01	Quarter	5.25E+00	5.54E+00	7.50E+00	3.88E+00
Year->End	CHILD	TBODY	2.91E-01	Annual	1.05E+01	2.77E+00	1.50E+01	1.94E+00

Critical Pathway.....: 2 Vegetation (VEG)  
 Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
H-3	1.94E+01
C-14	8.01E+01
CO-60	5.36E-01
I-131	2.03E-03
I-132	8.70E-05
I-133	1.50E-07
CS-138	0.00E+00

**Table 3.1-1 (cont.)**

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT  
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types  
Period Start Date....: 01/01/2013 00:00  
Period End Date.....: 01/01/2014 00:00  
Period Duration (min): 5.256E+05  
Coefficient Type.....: Historical  
Unit.....: 2  
Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
-----	-----
CE-141	1.25E-04

**Table 3.1-1 (cont.)**

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT  
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types  
 Period Start Date....: 01/01/2013 00:00  
 Period End Date.....: 01/01/2014 00:00  
 Period Duration (min): 5.256E+05  
 Coefficient Type.....: Historical  
 Unit.....: 2  
 Receptor.....: 4 Composite Crit. Receptor - NG  
 Distance (meters)....: 610  
 Compass Point.....: 0.0

=== MAXIMUM PERIOD NG DOSE TO LIMIT (Gamma) ===

Dose Period	Dose Type	Dose (mrad)	Limit Period	Admin Limit	Admin % of Limit	T.Spec Limit	T.Spec % of Limit
Strt->End	Gamma	1.16E-05	31-day	1.50E-01	7.71E-03	2.00E-01	5.78E-03
Qrtr->End	Gamma	1.16E-05	Quarter	3.75E+00	3.08E-04	5.00E+00	2.31E-04
Year->End	Gamma	1.16E-05	Annual	7.50E+00	1.54E-04	1.00E+01	1.16E-04

Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
AR-41	3.36E+01
KR-85M	7.08E-01
KR-85	0.00E+00
KR-87	0.00E+00
XE-133M	3.94E-01
KR-89	0.00E+00
KR-88	2.47E-01
XE-131M	0.00E+00
XE-135	2.91E+01
XE-133	3.59E+01

=== MAXIMUM PERIOD NG DOSE TO LIMIT (Beta) ===

Dose Period	Dose Type	Dose (mrad)	Limit Period	Admin Limit	Admin % of Limit	T.Spec Limit	T.Spec % of Limit
Strt->End	Beta	3.00E-05	31-day	3.00E-01	9.99E-03	4.00E-01	7.50E-03
Qrtr->End	Beta	3.00E-05	Quarter	7.50E+00	4.00E-04	1.00E+01	3.00E-04
Year->End	Beta	3.00E-05	Annual	1.50E+01	2.00E-04	2.00E+01	1.50E-04

Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
AR-41	7.47E+00
KR-85M	7.13E-01
KR-85	0.00E+00
KR-87	0.00E+00
XE-133M	1.12E+00
KR-89	0.00E+00
KR-88	2.99E-02
XE-131M	0.00E+00
XE-135	2.34E+01

**Table 3.1-1 (cont.)**

GASEOUS RELEASE AND DOSE SUMMARY REPORT - BY UNIT  
(Composite Critical Receptor - Limited Analysis)

Release ID.....: 1 All Gas Release Types  
Period Start Date....: 01/01/2013 00:00  
Period End Date.....: 01/01/2014 00:00  
Period Duration (min): 5.256E+05  
Coefficient Type.....: Historical  
Unit.....: 2  
Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
XE-133	6.72E+01

Table 3.2-1

LIQUID RELEASE AND DOSE SUMMARY REPORT  
----- (PERIOD BASIS - BY UNIT) -----

Release ID.....: 1 All Liquid Release Types  
Period Start Date.....: 01/01/2013 00:00  
Period End Date.....: 01/01/2014 00:00  
Period Duration (mins): 5.256E+05  
Unit.....: 1

=== MULTIPLE RELEASE POINT MESSAGE =====  
Undiluted and Diluted Flowrate(s) and Concentration(s) cannot be combined.

=== RELEASE DATA =====  
Total Release Duration (minutes)..... 1.879E+06  
Total Undiluted Volume Released (gallons)..... NA  
Average Undiluted Flowrate (gpm)..... NA  
Total Dilution Volume (gallons)..... NA  
Average Dilution Flowrate (gpm)..... NA

=== NUCLIDE DATA =====  
Nuclide uCi  
-----  
CO-57 7.61E+01  
NB-97 1.66E+03  
SN-113 3.46E+02  
SB-122 8.74E-01  
SB-124 4.66E+02  
SB-125 2.69E+04  
TE-123M 1.34E+01  
CR-51 8.42E+03  
MN-54 1.15E+03  
FE-59 5.10E+02  
CO-58 1.02E+04  
CO-60 1.73E+04  
ZN-65 2.23E+01  
ZR-95 7.89E+02  
NB-95 1.48E+03  
MO-99 4.21E+01  
RU-103 4.89E+00  
AG-110M 1.93E+02  
CS-134 6.65E+00  
LA-140 2.73E+00  
-----  
Gamma 6.95E+04  
XE-133 1.42E+01  
-----  
D&EG 1.42E+01  
  
H-3 2.04E+09  
FE-55 9.41E+03  
NI-63 1.00E+03

**Table 3.2-1 (cont.)**

LIQUID RELEASE AND DOSE SUMMARY REPORT  
----- (PERIOD BASIS - BY UNIT) -----

Release ID.....: 1 All Liquid Release Types  
Period Start Date.....: 01/01/2013 00:00  
Period End Date.....: 01/01/2014 00:00  
Period Duration (mins): 5.256E+05

```
=== NUCLIDE DATA =====  
Nuclide      uCi  
-----  
Beta         2.04E+09  
-----  
Total        2.04E+09
```

**Table 3.2-1 (cont.)**

LIQUID RELEASE AND DOSE SUMMARY REPORT  
 ----- (PERIOD BASIS - BY UNIT) -----

Release ID.....: 1 All Liquid Release Types  
 Period Start Date.....: 01/01/2013 00:00  
 Period End Date.....: 01/01/2014 00:00  
 Period Duration (mins): 5.256E+05  
 Unit.....: 1  
 Receptor.....: 0 Liquid Receptor

=== PERIOD DOSE BY AGEGROUP, PATHWAY, ORGAN (mrem) ===

Age/Path	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
APWtr	1.92E-05	1.80E-02	1.80E-02	1.80E-02	1.80E-02	1.82E-02	0.00E+00	1.80E-02
AFWFSp	9.54E-04	8.05E-03	7.47E-03	7.58E-03	7.55E-03	6.23E-02	0.00E+00	7.94E-03
TPWtr	1.83E-05	1.27E-02	1.27E-02	1.27E-02	1.27E-02	1.28E-02	0.00E+00	1.27E-02
TFWFSp	9.88E-04	6.32E-03	5.74E-03	5.84E-03	5.83E-03	4.45E-02	0.00E+00	6.18E-03
CPWtr	5.55E-05	2.44E-02	2.44E-02	2.44E-02	2.44E-02	2.45E-02	0.00E+00	2.44E-02
CFWFSp	1.28E-03	5.26E-03	4.75E-03	4.83E-03	4.83E-03	1.86E-02	0.00E+00	5.20E-03
IPWtr	4.29E-05	2.40E-02	2.40E-02	2.40E-02	2.40E-02	2.40E-02	0.00E+00	2.40E-02

=== PERIOD DOSE BY AGEGROUP, ORGAN (mrem) ===

Agegroup	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
ADULT	9.73E-04	2.61E-02	2.55E-02	2.56E-02	2.56E-02	8.04E-02	0.00E+00	2.60E-02
TEEN	1.01E-03	1.90E-02	1.84E-02	1.86E-02	1.85E-02	5.73E-02	0.00E+00	1.89E-02
CHILD	1.34E-03	2.97E-02	2.92E-02	2.92E-02	2.92E-02	4.31E-02	0.00E+00	2.96E-02
INFANT	4.29E-05	2.40E-02	2.40E-02	2.40E-02	2.40E-02	2.40E-02	0.00E+00	2.40E-02

**Table 3.2-1 (cont.)**

LIQUID RELEASE AND DOSE SUMMARY REPORT  
 ----- (PERIOD BASIS - BY UNIT) -----

Release ID.....: 1 All Liquid Release Types  
 Period Start Date.....: 01/01/2013 00:00  
 Period End Date.....: 01/01/2014 00:00  
 Period Duration (mins): 5.256E+05  
 Unit.....: 1  
 Receptor.....: 0 Liquid Receptor

=== MAXIMUM PERIOD DOSE TO LIMIT (Any Organ) ===

Dose Period	Age Group	Organ	Dose (mrem)	Limit Period	Admin Limit	Admin % of Limit	T.Spec Limit	T.Spec % of Limit
Strt->End	ADULT	GILLI	8.04E-02	31-day	1.50E-01	5.36E+01	2.00E-01	4.02E+01
Qrtr->End	ADULT	GILLI	8.04E-02	Quarter	3.75E+00	2.15E+00	5.00E+00	1.61E+00
Year->End	ADULT	GILLI	8.04E-02	Annual	7.50E+00	1.07E+00	1.00E+01	8.04E-01

Critical Pathway.....: 1 Fresh Water Fish - Sport (FFSP)  
 Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
H-3	3.17E+01
CR-51	7.84E-02
MN-54	4.45E-01
FE-55	7.22E-02
FE-59	1.22E-01
CO-58	5.53E-01
CO-60	2.50E+00
NI-63	1.33E-02
ZN-65	2.98E-02
ZR-95	9.20E-03
NB-95	6.45E+01
MO-99	3.53E-04
RU-103	8.88E-05
AG-110M	3.59E-03
CS-134	2.37E-03
LA-140	4.74E-04

=== MAXIMUM PERIOD DOSE TO LIMIT (Tot Body) ===

Dose Period	Age Group	Organ	Dose (mrem)	Limit Period	Admin Limit	Admin % of Limit	T.Spec Limit	T.Spec % of Limit
Strt->End	CHILD	TBODY	2.96E-02	31-day	4.50E-02	6.58E+01	6.00E-02	4.94E+01
Qrtr->End	CHILD	TBODY	2.96E-02	Quarter	1.13E+00	2.63E+00	1.50E+00	1.98E+00
Year->End	CHILD	TBODY	2.96E-02	Annual	2.25E+00	1.32E+00	3.00E+00	9.88E-01

Critical Pathway.....: 0 Potable Water (PWtr)  
 Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
H-3	9.85E+01
CR-51	9.42E-04

**Table 3.2-1 (cont.)**

LIQUID RELEASE AND DOSE SUMMARY REPORT  
----- (PERIOD BASIS - BY UNIT) -----

Release ID.....: 1 All Liquid Release Types  
Period Start Date.....: 01/01/2013 00:00  
Period End Date.....: 01/01/2014 00:00  
Period Duration (mins): 5.256E+05  
Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
-----	-----
MN-54	8.13E-02
FE-55	1.14E-01
FE-59	4.35E-02
CO-58	1.89E-01
CO-60	9.04E-01
NI-63	1.18E-01
ZN-65	6.24E-02
ZR-95	8.74E-06
NB-95	1.71E-02
MO-99	1.25E-04
RU-103	1.24E-06
AG-110M	2.39E-05
CS-134	6.65E-02
LA-140	5.94E-09

**Table 3.2-1 (cont.)**

LIQUID RELEASE AND DOSE SUMMARY REPORT  
----- (PERIOD BASIS - BY UNIT) -----

Release ID.....: 1 All Liquid Release Types  
Period Start Date.....: 01/01/2013 00:00  
Period End Date.....: 01/01/2014 00:00  
Period Duration (mins): 5.256E+05  
Unit.....: 2

=== MULTIPLE RELEASE POINT MESSAGE =====  
Undiluted and Diluted Flowrate(s) and Concentration(s) cannot be combined.

=== RELEASE DATA =====  
Total Release Duration (minutes)..... 1.879E+06  
Total Undiluted Volume Released (gallons)..... NA  
Average Undiluted Flowrate (gpm)..... NA  
Total Dilution Volume (gallons)..... NA  
Average Dilution Flowrate (gpm)..... NA

=== NUCLIDE DATA =====

Nuclide	uCi
CO-57	7.61E+01
NB-97	1.66E+03
SN-113	3.46E+02
SB-122	8.74E-01
SB-124	4.66E+02
SB-125	2.69E+04
TE-123M	1.34E+01
CR-51	8.42E+03
MN-54	1.15E+03
FE-59	5.10E+02
CO-58	1.02E+04
CO-60	1.73E+04
ZN-65	2.23E+01
ZR-95	7.89E+02
NB-95	1.48E+03
MO-99	4.21E+01
RU-103	4.89E+00
AG-110M	1.93E+02
CS-134	6.65E+00
LA-140	2.73E+00
Gamma	6.95E+04
XE-133	1.42E+01
D&EG	1.42E+01
H-3	2.04E+09
FE-55	9.41E+03
NI-63	1.00E+03

**Table 3.2-1 (cont.)**

LIQUID RELEASE AND DOSE SUMMARY REPORT  
----- (PERIOD BASIS - BY UNIT) -----

Release ID.....: 1 All Liquid Release Types  
Period Start Date.....: 01/01/2013 00:00  
Period End Date.....: 01/01/2014 00:00  
Period Duration (mins): 5.256E+05

=== NUCLIDE DATA =====

Nuclide	uCi
-----	-----
Beta	2.04E+09
-----	-----
Total	2.04E+09

**Table 3.2-1 (cont.)**

LIQUID RELEASE AND DOSE SUMMARY REPORT  
 ----- (PERIOD BASIS - BY UNIT) -----

Release ID.....: 1 All Liquid Release Types  
 Period Start Date.....: 01/01/2013 00:00  
 Period End Date.....: 01/01/2014 00:00  
 Period Duration (mins): 5.256E+05  
 Unit.....: 2  
 Receptor.....: 0 Liquid Receptor

=== PERIOD DOSE BY AGEGROUP, PATHWAY, ORGAN (mrem) ===

Age/Path	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
APWtr	1.92E-05	1.80E-02	1.80E-02	1.80E-02	1.80E-02	1.82E-02	0.00E+00	1.80E-02
AFWFSp	9.54E-04	8.05E-03	7.47E-03	7.58E-03	7.55E-03	6.23E-02	0.00E+00	7.94E-03
TPWtr	1.83E-05	1.27E-02	1.27E-02	1.27E-02	1.27E-02	1.28E-02	0.00E+00	1.27E-02
TFWFSp	9.88E-04	6.32E-03	5.74E-03	5.84E-03	5.83E-03	4.45E-02	0.00E+00	6.18E-03
CPWtr	5.55E-05	2.44E-02	2.44E-02	2.44E-02	2.44E-02	2.45E-02	0.00E+00	2.44E-02
CFWFSp	1.28E-03	5.26E-03	4.75E-03	4.83E-03	4.83E-03	1.86E-02	0.00E+00	5.20E-03
IPWtr	4.29E-05	2.40E-02	2.40E-02	2.40E-02	2.40E-02	2.40E-02	0.00E+00	2.40E-02

=== PERIOD DOSE BY AGEGROUP, ORGAN (mrem) ===

Agegroup	Bone	Liver	Thyroid	Kidney	Lung	GI-Lli	Skin	TB
ADULT	9.73E-04	2.61E-02	2.55E-02	2.56E-02	2.56E-02	8.04E-02	0.00E+00	2.60E-02
TEEN	1.01E-03	1.90E-02	1.84E-02	1.86E-02	1.85E-02	5.73E-02	0.00E+00	1.89E-02
CHILD	1.34E-03	2.97E-02	2.92E-02	2.92E-02	2.92E-02	4.31E-02	0.00E+00	2.96E-02
INFANT	4.29E-05	2.40E-02	2.40E-02	2.40E-02	2.40E-02	2.40E-02	0.00E+00	2.40E-02

**Table 3.2-1 (cont.)**

LIQUID RELEASE AND DOSE SUMMARY REPORT  
 ----- (PERIOD BASIS - BY UNIT) -----

Release ID.....: 1 All Liquid Release Types  
 Period Start Date.....: 01/01/2013 00:00  
 Period End Date.....: 01/01/2014 00:00  
 Period Duration (mins): 5.256E+05  
 Unit.....: 2  
 Receptor.....: 0 Liquid Receptor

=== MAXIMUM PERIOD DOSE TO LIMIT (Any Organ) ===

Dose Period	Age Group	Organ	Dose (mrem)	Limit Period	Admin Limit	Admin % of Limit	T.Spec Limit	T.Spec % of Limit
Strt->End	ADULT	GILLI	8.04E-02	31-day	1.50E-01	5.36E+01	2.00E-01	4.02E+01
Qrtr->End	ADULT	GILLI	8.04E-02	Quarter	3.75E+00	2.15E+00	5.00E+00	1.61E+00
Year->End	ADULT	GILLI	8.04E-02	Annual	7.50E+00	1.07E+00	1.00E+01	8.04E-01

Critical Pathway.....: 1 Fresh Water Fish - Sport (FFSP)  
 Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
H-3	3.17E+01
CR-51	7.84E-02
MN-54	4.45E-01
FE-55	7.22E-02
FE-59	1.22E-01
CO-58	5.53E-01
CO-60	2.50E+00
NI-63	1.33E-02
ZN-65	2.98E-02
ZR-95	9.20E-03
NB-95	6.45E+01
MO-99	3.53E-04
RU-103	8.88E-05
AG-110M	3.59E-03
CS-134	2.37E-03
LA-140	4.74E-04

=== MAXIMUM PERIOD DOSE TO LIMIT (Tot Body) ===

Dose Period	Age Group	Organ	Dose (mrem)	Limit Period	Admin Limit	Admin % of Limit	T.Spec Limit	T.Spec % of Limit
Strt->End	CHILD	TBODY	2.96E-02	31-day	4.50E-02	6.58E+01	6.00E-02	4.94E+01
Qrtr->End	CHILD	TBODY	2.96E-02	Quarter	1.13E+00	2.63E+00	1.50E+00	1.98E+00
Year->End	CHILD	TBODY	2.96E-02	Annual	2.25E+00	1.32E+00	3.00E+00	9.88E-01

Critical Pathway.....: 0 Potable Water (PWtr)  
 Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
H-3	9.85E+01
CR-51	9.42E-04

**Table 3.2-1 (cont.)**

LIQUID RELEASE AND DOSE SUMMARY REPORT  
----- (PERIOD BASIS - BY UNIT) -----

Release ID.....: 1 All Liquid Release Types  
Period Start Date.....: 01/01/2013 00:00  
Period End Date.....: 01/01/2014 00:00  
Period Duration (mins): 5.256E+05  
Major Contributors.....: 0.0 % or greater to total

Nuclide	Percentage
MN-54	8.13E-02
FE-55	1.14E-01
FE-59	4.35E-02
CO-58	1.89E-01
CO-60	9.04E-01
NI-63	1.18E-01
ZN-65	6.24E-02
ZR-95	8.74E-06
NB-95	1.71E-02
MO-99	1.25E-04
RU-103	1.24E-06
AG-110M	2.39E-05
CS-134	6.65E-02
LA-140	5.94E-09

**Table 3-3.1**

**Braidwood Nuclear Station**

**Unit 1**

**10 CFR 20 Compliance Assessment**

Period of Assessment: 1/1/13 through 12/31/13  
Calculated: 04/14/14

10 CFR 20.1301(a)(1) Compliance

Total Effective Dose Equivalent (TEDE)	mrem/year	1.21 E+00
10 CFR 20.1301(a)(1) limit	mrem/year	100.00
	% of limit	1.21

Compliance Summary

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Total
TEDE (mrem)	2.98E-01	3.03E-01	2.86E-01	3.19E-01	1.21 E+00

**Table 3-3.1 (cont.)**

**Braidwood Nuclear Station**

**Unit 2**

**10 CFR 20 Compliance Assessment**

Period of Assessment: 1/1/13 through 12/31/13  
Calculated: 04/14/14

10 CFR 20.1301(a)(1) Compliance

Total Effective Dose Equivalent (TEDE)	mrem/year	1.24E+00
10 CFR 20.1301(a)(1) limit	mrem/year	100.00
	% of limit	1.24

Compliance Summary

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Total
TEDE (mrem)	2.98E-01	2.88E-01	3.32E-01	3.22E-01	1.24E+00

**Table 3.4-1**

Doses Resulting from Airborne Releases

The following are the maximum annual calculated cumulative offsite doses resulting from Braidwood Station airborne releases.

**Unit 1:**

<u>Dose</u>	<u>Maximum Value</u>	<u>Sector Affected</u>
gamma air <sup>(1)</sup>	1.490 x10 <sup>-5</sup> mrad	North
beta air <sup>(2)</sup>	2.380 x10 <sup>-5</sup> mrad	North
whole body <sup>(3)</sup>	2.018 x10 <sup>-1</sup> mrem	North
skin <sup>(4)</sup>	2.220 x 10 <sup>-5</sup> mrem	North
organ <sup>(5)</sup> (child-bone)	8.903 x10 <sup>-1</sup> mrem	North

**Unit 1 Compliance Status**

10 CFR 50 Appendix I	Yearly Objective	% of Appendix I
gamma air	10.0 mrad	0.00E+00
beta air	20.0 mrad	0.00E+00
whole body	5.0 mrem	4.04E+00
skin	15.0 mrem	0.00E+00
organ	15.0 mrem	5.94E+00

**Unit 2:**

<u>Dose</u>	<u>Maximum Value</u>	<u>Sector Affected</u>
gamma air <sup>(1)</sup>	1.490 x10 <sup>-5</sup> mrad	North
beta air <sup>(2)</sup>	2.380 x10 <sup>-5</sup> mrad	North
whole body <sup>(3)</sup>	2.294 x10 <sup>-1</sup> mrem	North
skin <sup>(4)</sup>	2.220 x10 <sup>-5</sup> mrem	North
organ <sup>(5)</sup> (child-bone)	9.169 x10 <sup>-1</sup> mrem	North

**Unit 2 Compliance Status**

10 CFR 50 Appendix I	Yearly Objective	% of Appendix I
gamma air	10.0 mrad	0.00E+00
beta air	20.0 mrad	0.00E+00
whole body	5.0 mrem	4.59E+00
skin	15.0 mrem	0.00E+00
organ	15.0 mrem	6.11E+00

- (1) Gamma Air Dose – GASPAR II, NUREG-0597
- (2) Beta Air Dose – GASPAR II, NUREG-0597
- (3) Whole Body Dose – GASPAR II, NUREG-0597
- (4) Skin Dose – GASPAR II, NUREG-0597
- (5) Inhalation and Food Pathways Dose – GASPAR II, NUREG-0597

**APPENDIX F**

**METEOROLOGICAL**

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Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Extremely Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	2	0	0	0	2
E	0	3	2	0	0	0	5
ESE	0	0	0	0	0	0	0
SE	0	0	3	0	0	0	3
SSE	0	0	0	0	0	0	0
S	0	0	0	1	0	0	1
SSW	0	0	1	0	0	0	1
SW	0	0	0	0	0	0	0
WSW	0	0	2	2	0	0	4
W	0	6	10	4	0	0	20
WNW	0	3	12	16	0	0	31
NW	0	1	27	0	0	0	28
NNW	0	0	9	3	0	0	12
Variable	0	0	0	0	0	0	0
Total	0	13	68	26	0	0	107

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Moderately Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	1	0	0	0	0	1
NE	0	1	0	0	0	0	1
ENE	0	0	0	0	0	0	0
E	0	2	0	0	0	0	2
ESE	0	1	0	0	0	0	1
SE	0	1	0	0	0	0	1
SSE	0	0	0	0	0	0	0
S	0	1	4	3	1	0	9
SSW	0	2	4	1	3	0	10
SW	0	0	1	0	0	0	1
WSW	0	0	2	2	0	0	4
W	0	1	2	1	0	0	4
WNW	0	6	5	5	0	0	16
NW	0	6	6	0	0	0	12
NNW	0	1	5	0	0	0	6
Variable	0	0	0	0	0	0	0
Total	0	23	29	12	4	0	68

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Slightly Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	3	0	0	0	3
NNE	0	2	1	0	0	0	3
NE	0	3	0	0	0	0	3
ENE	1	3	0	0	0	0	4
E	0	3	1	0	0	0	4
ESE	0	1	0	0	0	0	1
SE	0	3	0	0	0	0	3
SSE	0	2	0	0	0	0	2
S	0	0	3	3	0	0	6
SSW	0	0	2	1	2	0	5
SW	0	0	0	3	0	0	3
WSW	0	0	3	1	0	0	4
W	0	3	7	4	0	0	14
WNW	0	6	8	5	0	0	19
NW	0	6	4	0	0	0	10
NNW	0	6	8	0	0	0	14
Variable	0	0	0	0	0	0	0
Total	1	38	40	17	2	0	98

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Neutral - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	4	8	48	3	0	0	63
NNE	3	17	19	4	0	0	43
NE	2	12	19	4	0	0	37
ENE	9	25	11	1	0	0	46
E	7	33	7	0	0	0	47
ESE	1	22	3	0	0	0	26
SE	1	19	30	2	0	0	52
SSE	0	18	24	7	0	0	49
S	1	6	19	10	6	0	42
SSW	1	4	13	17	9	0	44
SW	2	10	45	16	1	0	74
WSW	1	26	39	7	6	0	79
W	3	29	31	24	7	0	94
WNW	7	71	86	42	0	0	206
NW	7	53	29	1	0	0	90
NNW	2	49	94	9	0	0	154
Variable	0	0	0	0	0	0	0
Total	51	402	517	147	29	0	1146

Hours of calm in this stability class: 1  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Slightly Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	6	6	4	0	0	0	16
NNE	5	7	1	0	0	0	13
NE	6	3	2	0	0	0	11
ENE	8	7	6	3	0	0	24
E	16	7	0	0	0	0	23
ESE	6	14	8	0	0	0	28
SE	0	10	30	1	0	0	41
SSE	0	7	22	1	0	0	30
S	0	19	23	15	1	0	58
SSW	0	11	19	20	10	0	60
SW	2	7	18	10	0	0	37
WSW	4	26	7	2	0	0	39
W	12	22	3	1	0	0	38
WNW	23	30	7	3	0	0	63
NW	20	22	5	0	0	0	47
NNW	15	21	3	1	0	0	40
Variable	1	0	0	0	0	0	1
Total	124	219	158	57	11	0	569

Hours of calm in this stability class: 4  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Moderately Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	6	0	0	0	0	0	6
NNE	5	0	0	0	0	0	5
NE	4	0	0	0	0	0	4
ENE	8	0	0	0	0	0	8
E	13	1	0	0	0	0	14
ESE	6	2	0	0	0	0	8
SE	2	0	0	0	0	0	2
SSE	1	3	0	0	0	0	4
S	1	1	0	0	0	0	2
SSW	0	1	2	0	0	0	3
SW	4	1	0	0	0	0	5
WSW	3	14	0	0	0	0	17
W	12	9	0	0	0	0	21
WNW	7	0	0	0	0	0	7
NW	7	0	0	0	0	0	7
NNW	5	0	0	0	0	0	5
Variable	0	0	0	0	0	0	0
Total	84	32	2	0	0	0	118

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Extremely Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	2	0	0	0	0	0	2
ENE	3	0	0	0	0	0	3
E	15	0	0	0	0	0	15
ESE	4	0	0	0	0	0	4
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	1	0	0	0	0	1
SW	0	0	0	0	0	0	0
WSW	2	1	0	0	0	0	3
W	5	2	0	0	0	0	7
WNW	2	0	0	0	0	0	2
NW	2	0	0	0	0	0	2
NNW	2	0	0	0	0	0	2
Variable	0	0	0	0	0	0	0
Total	37	4	0	0	0	0	41

Hours of calm in this stability class: 6  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Extremely Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	1	1	0	0	2
E	0	1	3	1	0	0	5
ESE	0	0	0	0	0	0	0
SE	0	0	3	0	0	0	3
SSE	0	0	0	0	0	0	0
S	0	0	0	1	1	0	2
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	6	1	0	7
W	0	0	10	7	7	6	30
WNW	0	2	8	9	12	0	31
NW	0	0	10	13	3	0	26
NNW	0	0	0	1	0	0	1
Variable	0	0	0	0	0	0	0
Total	0	3	35	39	24	6	107

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Moderately Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	1	0	0	0	0	1
NE	0	1	0	0	0	0	1
ENE	0	0	0	0	0	0	0
E	0	0	1	0	0	0	1
ESE	0	1	1	0	0	0	2
SE	0	0	1	0	0	0	1
SSE	0	0	0	0	0	0	0
S	0	1	4	3	3	4	15
SSW	0	0	2	1	0	1	4
SW	0	0	1	1	0	0	2
WSW	0	0	0	4	0	0	4
W	0	3	1	1	1	2	8
WNW	0	2	7	4	3	2	18
NW	0	0	4	5	0	0	9
NNW	0	0	0	2	0	0	2
Variable	0	0	0	0	0	0	0
Total	0	9	22	21	7	9	68

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Slightly Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	4	0	0	4
NNE	0	3	0	0	0	0	3
NE	0	2	0	0	0	0	2
ENE	0	1	2	0	0	0	3
E	1	2	0	3	0	0	6
ESE	0	0	1	0	0	0	1
SE	0	2	0	0	0	0	2
SSE	0	0	2	0	0	0	2
S	0	0	2	3	2	1	8
SSW	0	0	1	0	0	2	3
SW	0	0	0	0	3	0	3
WSW	0	0	0	4	2	0	6
W	0	3	4	6	5	2	20
WNW	0	1	7	5	2	1	16
NW	0	4	5	6	0	0	15
NNW	0	1	0	3	0	0	4
Variable	0	0	0	0	0	0	0
Total	1	19	24	34	14	6	98

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Neutral - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	3	8	21	20	1	0	53
NNE	1	3	14	8	4	0	30
NE	1	4	10	18	3	0	36
ENE	4	11	16	5	0	0	36
E	2	6	15	24	4	0	51
ESE	0	2	14	14	1	0	31
SE	0	2	17	25	14	0	58
SSE	0	2	18	14	1	5	40
S	1	1	8	11	10	15	46
SSW	0	1	6	16	11	4	38
SW	0	13	22	33	7	0	75
WSW	0	9	21	33	6	7	76
W	2	17	32	30	36	21	138
WNW	5	7	55	58	49	11	185
NW	0	25	46	59	7	0	137
NNW	1	7	37	63	9	0	117
Variable	0	0	0	0	0	0	0
Total	20	118	352	431	163	63	1147

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Slightly Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	5	9	3	0	0	18
NNE	1	1	4	1	0	0	7
NE	2	4	1	5	1	1	14
ENE	3	5	6	5	1	0	20
E	0	4	6	1	0	0	11
ESE	0	3	17	13	7	0	40
SE	0	1	6	24	17	0	48
SSE	0	0	2	11	11	2	26
S	0	1	16	16	14	12	59
SSW	0	3	13	21	11	16	64
SW	0	4	10	12	5	1	32
WSW	0	4	15	9	1	1	30
W	4	7	29	7	2	0	49
WNW	1	8	33	15	1	3	61
NW	0	12	42	8	2	0	64
NNW	0	12	13	4	0	0	29
Variable	0	1	0	0	0	0	1
Total	12	75	222	155	73	36	573

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Moderately Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	8	4	0	0	0	14
NNE	1	3	1	0	0	0	5
NE	1	2	1	0	0	0	4
ENE	0	3	0	0	0	0	3
E	0	5	2	2	0	0	9
ESE	0	1	4	1	0	0	6
SE	0	0	3	1	0	0	4
SSE	2	1	0	0	0	0	3
S	0	2	3	0	0	0	5
SSW	0	2	2	0	0	0	4
SW	0	3	4	1	0	0	8
WSW	0	1	5	1	0	0	7
W	0	3	8	4	0	0	15
WNW	1	5	12	0	0	0	18
NW	0	5	0	0	0	0	5
NNW	1	2	5	0	0	0	8
Variable	0	0	0	0	0	0	0
Total	8	46	54	10	0	0	118

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: January - March 2013  
 Stability Class - Extremely Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	3	0	0	0	0	4
NNE	0	0	1	0	0	0	1
NE	1	1	2	0	0	0	4
ENE	1	1	1	0	0	0	3
E	1	1	2	2	0	0	6
ESE	0	1	5	2	0	0	8
SE	1	0	1	0	0	0	2
SSE	0	1	0	0	0	0	1
S	0	0	0	0	0	0	0
SSW	0	1	0	0	0	0	1
SW	1	1	0	0	0	0	2
WSW	0	1	3	0	0	0	4
W	0	1	4	0	0	0	5
WNW	0	1	2	0	0	0	3
NW	0	0	0	0	0	0	0
NNW	1	2	0	0	0	0	3
Variable	0	0	0	0	0	0	0
Total	7	15	21	4	0	0	47

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 2

Braidwood Generating Station

Period of Record: April - June 2013  
 Stability Class - Extremely Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	1	1	0	0	0	2
NNE	0	5	9	0	0	0	14
NE	1	10	15	0	0	0	26
ENE	0	11	1	0	0	0	12
E	0	10	1	0	0	0	11
ESE	1	5	1	0	0	0	7
SE	0	11	18	0	0	0	29
SSE	0	14	6	2	0	0	22
S	0	5	6	4	0	0	15
SSW	0	0	6	14	0	0	20
SW	0	0	5	4	2	0	11
WSW	1	1	5	0	0	0	7
W	0	7	5	4	0	0	16
WNW	0	5	17	1	0	0	23
NW	0	9	24	3	0	0	36
NNW	0	2	7	0	0	0	9
Variable	0	0	0	0	0	0	0
Total	3	96	127	32	2	0	260

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: April - June 2013

Stability Class - Moderately Unstable - 199Ft-30Ft Delta-T (F)

Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	1	0	0	0	0	2
NNE	1	5	5	0	0	0	11
NE	1	8	8	0	0	0	17
ENE	0	4	0	0	0	0	4
E	1	6	0	0	0	0	7
ESE	1	4	0	0	0	0	5
SE	0	2	0	0	0	0	2
SSE	0	7	2	0	0	0	9
S	0	3	5	4	0	0	12
SSW	0	0	3	5	0	0	8
SW	0	2	3	2	0	0	7
WSW	0	5	1	0	1	0	7
W	0	10	4	2	0	0	16
WNW	0	4	2	0	0	0	6
NW	0	6	0	1	0	0	7
NNW	0	3	2	0	0	0	5
Variable	0	0	0	0	0	0	0
Total	5	70	35	14	1	0	125

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: April - June 2013  
 Stability Class - Slightly Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	1	3	0	0	0	5
NNE	0	3	7	0	0	0	10
NE	0	5	8	0	0	0	13
ENE	1	2	0	0	0	0	3
E	1	0	0	0	0	0	1
ESE	0	4	1	0	0	0	5
SE	0	4	3	0	0	0	7
SSE	0	2	2	1	0	0	5
S	0	1	5	5	0	0	11
SSW	0	2	3	9	3	0	17
SW	0	3	6	2	0	0	11
WSW	0	2	1	1	1	0	5
W	0	6	1	1	0	0	8
WNW	1	5	3	0	0	0	9
NW	1	3	3	0	0	0	7
NNW	0	1	1	0	0	0	2
Variable	0	0	0	0	0	0	0
Total	5	44	47	19	4	0	119

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: April - June 2013  
 Stability Class - Neutral - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	25	13	1	0	0	41
NNE	3	32	29	2	0	0	66
NE	5	46	43	0	0	0	94
ENE	7	43	20	0	0	0	70
E	8	21	4	0	0	0	33
ESE	5	20	0	0	0	0	25
SE	4	16	11	0	0	0	31
SSE	1	16	19	6	0	0	42
S	1	13	27	21	2	0	64
SSW	0	7	30	25	2	1	65
SW	1	6	38	14	1	0	60
WSW	0	25	23	16	2	0	66
W	5	15	22	14	2	0	58
WNW	2	9	3	1	0	0	15
NW	3	11	5	0	0	0	19
NNW	5	14	19	1	0	0	39
Variable	0	0	0	0	0	0	0
Total	52	319	306	101	9	1	788

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: April - June 2013  
 Stability Class - Slightly Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	3	13	1	0	0	0	17
NNE	5	36	13	0	0	0	54
NE	15	13	0	0	0	0	28
ENE	34	36	4	0	0	0	74
E	26	34	1	0	0	0	61
ESE	12	33	1	0	0	0	46
SE	3	31	9	0	0	0	43
SSE	7	33	29	4	0	0	73
S	1	28	41	9	2	0	81
SSW	1	10	16	5	4	1	37
SW	2	16	13	3	0	0	34
WSW	2	23	6	1	0	0	32
W	12	7	9	2	0	0	30
WNW	14	15	6	0	0	0	35
NW	12	13	1	0	0	0	26
NNW	7	11	3	0	0	0	21
Variable	1	0	0	0	0	0	1
Total	157	352	153	24	6	1	693

Hours of calm in this stability class: 2  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: April - June 2013  
 Stability Class - Moderately Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	9	3	0	0	0	0	12
NNE	4	3	0	0	0	0	7
NE	3	0	0	0	0	0	3
ENE	12	2	0	0	0	0	14
E	22	2	0	0	0	0	24
ESE	16	8	0	0	0	0	24
SE	7	6	0	0	0	0	13
SSE	5	2	0	0	0	0	7
S	0	2	0	0	0	0	2
SSW	1	0	0	0	0	0	1
SW	1	0	0	0	0	0	1
WSW	8	6	0	0	0	0	14
W	9	3	0	0	0	0	12
WNW	6	1	0	0	0	0	7
NW	2	0	0	0	0	0	2
NNW	5	2	0	0	0	0	7
Variable	0	0	0	0	0	0	0
Total	110	40	0	0	0	0	150

Hours of calm in this stability class: 4  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: April - June 2013  
 Stability Class - Extremely Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	4	0	0	0	0	0	4
NNE	3	1	0	0	0	0	4
NE	1	0	0	0	0	0	1
ENE	3	0	0	0	0	0	3
E	9	0	0	0	0	0	9
ESE	2	0	0	0	0	0	2
SE	1	0	0	0	0	0	1
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	1	0	0	0	0	1
SW	0	0	0	0	0	0	0
WSW	1	1	0	0	0	0	2
W	3	1	0	0	0	0	4
WNW	1	0	0	0	0	0	1
NW	5	1	0	0	0	0	6
NNW	2	0	0	0	0	0	2
Variable	0	0	0	0	0	0	0
Total	35	5	0	0	0	0	40

Hours of calm in this stability class: 3  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: April - June 2013  
 Stability Class - Extremely Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	1	1	3	0	0	5
NNE	0	2	10	1	0	0	13
NE	0	4	12	8	0	0	24
ENE	1	5	4	0	0	0	10
E	0	7	4	1	0	0	12
ESE	0	6	7	2	0	0	15
SE	0	4	8	14	1	0	27
SSE	0	8	6	4	1	0	19
S	0	4	2	3	5	1	15
SSW	0	0	0	8	12	1	21
SW	0	0	1	3	2	1	7
WSW	0	2	2	3	0	1	8
W	0	3	5	7	1	0	16
WNW	0	2	13	17	4	0	36
NW	0	0	8	21	2	0	31
NNW	0	0	1	0	0	0	1
Variable	0	0	0	0	0	0	0
Total	1	48	84	95	28	4	260

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: April - June 2013  
 Stability Class - Moderately Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	2	1	3	0	0	6
NNE	0	2	1	3	0	0	6
NE	1	2	6	6	0	0	15
ENE	1	1	3	0	0	0	5
E	0	7	2	0	0	0	9
ESE	1	2	2	1	0	0	6
SE	0	0	2	0	0	0	2
SSE	0	1	7	3	0	1	12
S	0	2	1	4	1	0	8
SSW	0	0	2	3	4	0	9
SW	0	1	2	2	1	0	6
WSW	0	5	3	0	0	1	9
W	0	5	4	6	1	0	16
WNW	0	1	3	1	0	0	5
NW	0	1	6	2	0	1	10
NNW	0	1	0	0	0	0	1
Variable	0	0	0	0	0	0	0
Total	3	33	45	34	7	3	125

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: April - June 2013  
 Stability Class - Slightly Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	1	3	2	0	0	7
NNE	0	2	4	4	0	0	10
NE	0	1	3	6	0	0	10
ENE	0	2	1	0	0	0	3
E	1	0	0	0	0	0	1
ESE	0	1	3	1	0	0	5
SE	0	1	3	3	1	0	8
SSE	0	1	2	2	1	1	7
S	0	0	1	4	2	2	9
SSW	0	0	1	5	8	4	18
SW	0	0	5	4	0	0	9
WSW	0	5	1	1	0	1	8
W	0	3	1	1	1	0	6
WNW	0	2	6	2	1	0	11
NW	0	2	2	1	0	0	5
NNW	0	0	1	1	0	0	2
Variable	0	0	0	0	0	0	0
Total	2	21	37	37	14	8	119

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: April - June 2013  
 Stability Class - Neutral - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	10	20	12	1	0	44
NNE	2	12	24	24	7	0	69
NE	1	13	41	38	2	0	95
ENE	2	10	33	5	1	0	51
E	0	12	14	10	1	0	37
ESE	2	4	9	11	0	0	26
SE	2	4	10	10	3	0	29
SSE	0	5	13	15	7	1	41
S	1	2	11	25	21	10	70
SSW	0	2	7	36	17	10	72
SW	1	3	17	17	3	3	44
WSW	1	7	23	18	7	11	67
W	0	3	17	18	12	6	56
WNW	0	3	10	2	3	0	18
NW	0	13	6	7	1	0	27
NNW	1	10	22	7	1	0	41
Variable	0	0	0	0	0	0	0
Total	14	113	277	255	87	41	787

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 1  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: April - June 2013  
 Stability Class - Slightly Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	6	15	2	1	0	24
NNE	1	2	28	11	0	0	42
NE	0	7	26	2	0	0	35
ENE	0	19	39	6	1	0	65
E	1	10	41	15	0	0	67
ESE	0	0	14	21	2	0	37
SE	0	7	17	21	3	0	48
SSE	1	6	18	37	13	1	76
S	2	3	14	44	17	7	87
SSW	0	2	8	12	8	5	35
SW	1	6	15	9	3	0	34
WSW	0	7	14	7	2	0	30
W	0	9	13	9	2	1	34
WNW	1	1	17	12	3	0	34
NW	1	3	22	7	0	0	33
NNW	0	3	9	2	0	0	14
Variable	0	0	0	0	0	0	0
Total	8	91	310	217	55	14	695

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: April - June 2013  
 Stability Class - Moderately Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	3	2	8	2	0	0	15
NNE	1	1	7	1	0	0	10
NE	1	0	2	0	0	0	3
ENE	0	4	1	0	0	0	5
E	0	2	9	2	0	0	13
ESE	1	0	11	4	0	0	16
SE	1	1	17	5	0	0	24
SSE	1	4	4	2	0	0	11
S	0	4	3	1	0	0	8
SSW	0	1	1	0	0	0	2
SW	0	1	0	0	0	0	1
WSW	0	2	7	1	0	0	10
W	0	2	9	1	0	0	12
WNW	0	2	11	0	0	0	13
NW	0	3	2	0	0	0	5
NNW	0	1	4	1	0	0	6
Variable	0	0	0	0	0	0	0
Total	8	30	96	20	0	0	154

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: April - June 2013  
 Stability Class - Extremely Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	3	2	0	0	0	5
NNE	2	3	1	1	0	0	7
NE	0	4	0	0	0	0	4
ENE	1	1	0	0	0	0	2
E	0	0	1	0	0	0	1
ESE	0	1	2	1	0	0	4
SE	0	0	2	0	0	0	2
SSE	0	1	0	0	0	0	1
S	0	1	0	0	0	0	1
SSW	0	1	0	0	0	0	1
SW	0	0	1	0	0	0	1
WSW	0	1	0	0	0	0	1
W	1	0	2	3	0	0	6
WNW	0	0	1	1	0	0	2
NW	0	0	0	1	0	0	1
NNW	1	2	1	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	5	18	13	7	0	0	43

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 0

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Extremely Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	7	5	0	0	0	12
NNE	0	9	10	0	0	0	19
NE	1	28	9	0	0	0	38
ENE	2	32	1	0	0	0	35
E	1	23	0	0	0	0	24
ESE	1	20	0	0	0	0	21
SE	3	14	1	0	0	0	18
SSE	0	31	1	0	0	0	32
S	0	30	6	1	0	0	37
SSW	0	13	24	3	0	0	40
SW	0	11	34	3	0	0	48
WSW	1	18	23	4	0	0	46
W	0	31	1	0	0	0	32
WNW	0	23	9	0	0	0	32
NW	1	12	14	0	0	0	27
NNW	0	9	17	0	0	0	26
Variable	0	1	0	0	0	0	1
Total	10	312	155	11	0	0	488

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Moderately Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	4	2	0	0	0	6
NNE	1	5	5	0	0	0	11
NE	0	7	0	0	0	0	7
ENE	1	8	0	0	0	0	9
E	1	6	0	0	0	0	7
ESE	1	3	0	0	0	0	4
SE	1	3	0	0	0	0	4
SSE	2	3	0	0	0	0	5
S	0	5	0	0	0	0	5
SSW	0	1	4	0	0	0	5
SW	0	4	6	0	0	0	10
WSW	0	8	4	0	0	0	12
W	0	5	1	0	0	0	6
WNW	0	6	0	0	0	0	6
NW	1	9	0	0	0	0	10
NNW	0	3	3	0	0	0	6
Variable	1	0	0	0	0	0	1
Total	9	80	25	0	0	0	114

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Slightly Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	2	1	0	0	0	5
NNE	2	4	2	1	0	0	9
NE	0	7	4	0	0	0	11
ENE	1	4	0	0	0	0	5
E	1	2	0	0	0	0	3
ESE	1	2	0	0	0	0	3
SE	0	2	0	0	0	0	2
SSE	0	5	0	0	0	0	5
S	0	6	0	0	0	0	6
SSW	0	3	3	1	0	0	7
SW	0	5	4	0	0	0	9
WSW	1	6	2	0	0	0	9
W	0	6	1	0	0	0	7
WNW	1	3	1	0	0	0	5
NW	1	2	0	0	0	0	3
NNW	0	7	2	0	0	0	9
Variable	0	0	0	0	0	0	0
Total	10	66	20	2	0	0	98

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Neutral - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	9	12	3	0	0	0	24
NNE	1	20	12	1	0	0	34
NE	1	36	7	0	0	0	44
ENE	13	21	1	0	0	0	35
E	12	9	0	0	0	0	21
ESE	3	9	0	0	0	0	12
SE	5	10	0	0	0	0	15
SSE	4	23	0	0	0	0	27
S	3	16	6	0	0	0	25
SSW	0	11	29	3	0	0	43
SW	2	28	34	0	0	0	64
WSW	1	22	4	0	0	0	27
W	3	17	4	0	0	0	24
WNW	7	8	0	0	0	0	15
NW	6	9	0	0	0	0	15
NNW	7	13	5	0	0	0	25
Variable	0	0	0	0	0	0	0
Total	77	264	105	4	0	0	450

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Slightly Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	9	8	1	0	0	0	18
NNE	6	40	6	0	0	0	52
NE	12	18	1	0	0	0	31
ENE	44	14	0	0	0	0	58
E	39	2	0	0	0	0	41
ESE	19	26	0	0	0	0	45
SE	6	23	0	0	0	0	29
SSE	17	46	0	0	0	0	63
S	6	48	17	0	0	0	71
SSW	1	31	33	0	0	0	65
SW	1	28	44	1	0	0	74
WSW	12	21	2	0	0	0	35
W	15	11	0	0	0	0	26
WNW	19	7	0	0	0	0	26
NW	12	2	0	0	0	0	14
NNW	8	9	0	0	0	0	17
Variable	0	0	0	0	0	0	0
Total	226	334	104	1	0	0	665

Hours of calm in this stability class: 7  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Moderately Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	7	1	0	0	0	0	8
NNE	8	1	0	0	0	0	9
NE	9	0	0	0	0	0	9
ENE	19	0	0	0	0	0	19
E	52	0	0	0	0	0	52
ESE	21	5	0	0	0	0	26
SE	6	3	0	0	0	0	9
SSE	7	4	0	0	0	0	11
S	4	1	1	0	0	0	6
SSW	2	3	1	0	0	0	6
SW	7	8	0	0	0	0	15
WSW	11	6	0	0	0	0	17
W	9	0	0	0	0	0	9
WNW	6	0	0	0	0	0	6
NW	6	0	0	0	0	0	6
NNW	3	1	0	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	177	33	2	0	0	0	212

Hours of calm in this stability class: 20  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Extremely Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	3	0	0	0	0	0	3
NNE	5	0	0	0	0	0	5
NE	4	0	0	0	0	0	4
ENE	13	0	0	0	0	0	13
E	18	0	0	0	0	0	18
ESE	5	0	0	0	0	0	5
SE	1	0	0	0	0	0	1
SSE	0	0	0	0	0	0	0
S	3	0	0	0	0	0	3
SSW	0	0	0	0	0	0	0
SW	2	0	0	0	0	0	2
WSW	12	2	0	0	0	0	14
W	9	0	0	0	0	0	9
WNW	5	0	0	0	0	0	5
NW	6	0	0	0	0	0	6
NNW	4	0	0	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	90	2	0	0	0	0	92

Hours of calm in this stability class: 53  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Extremely Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	4	7	1	0	0	13
NNE	0	4	9	3	0	0	16
NE	1	12	24	2	0	0	39
ENE	4	9	18	0	0	0	31
E	0	23	6	0	0	0	29
ESE	0	18	4	0	0	0	22
SE	0	10	6	0	0	0	16
SSE	1	19	11	0	0	0	31
S	0	18	21	1	1	0	41
SSW	0	3	23	5	1	2	34
SW	0	4	29	10	0	0	43
WSW	0	10	20	16	1	0	47
W	0	21	16	0	1	0	38
WNW	0	9	16	12	0	0	37
NW	0	9	10	8	3	0	30
NNW	0	3	14	3	0	0	20
Variable	0	1	0	0	0	0	1
Total	7	177	234	61	7	2	488

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Moderately Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	2	3	1	0	0	6
NNE	0	8	0	4	0	0	12
NE	1	2	2	1	0	0	6
ENE	1	5	2	0	0	0	8
E	1	5	1	0	0	0	7
ESE	0	4	1	0	0	0	5
SE	0	3	0	0	0	0	3
SSE	0	1	2	0	0	0	3
S	0	5	1	1	0	0	7
SSW	0	0	3	1	0	0	4
SW	0	1	8	2	0	0	11
WSW	0	2	6	2	0	0	10
W	0	4	3	2	0	0	9
WNW	0	2	2	0	0	0	4
NW	0	6	6	1	0	0	13
NNW	0	1	2	2	0	0	5
Variable	0	1	0	0	0	0	1
Total	3	52	42	17	0	0	114

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Slightly Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	2	0	0	0	0	2
NNE	0	6	0	2	0	0	8
NE	0	2	5	2	2	0	11
ENE	0	1	3	0	0	0	4
E	1	1	2	0	0	0	4
ESE	0	0	1	1	0	0	2
SE	0	2	1	0	0	0	3
SSE	0	0	2	0	0	0	2
S	0	5	4	0	0	0	9
SSW	0	0	3	1	1	0	5
SW	0	3	4	1	0	0	8
WSW	0	4	6	1	0	0	11
W	1	6	1	0	0	0	8
WNW	0	2	2	1	0	0	5
NW	1	2	1	0	0	0	4
NNW	1	4	5	2	0	0	12
Variable	0	0	0	0	0	0	0
Total	4	40	40	11	3	0	98

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Neutral - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	7	6	9	4	0	0	26
NNE	2	6	14	7	1	0	30
NE	1	4	35	6	0	0	46
ENE	2	11	12	3	0	0	28
E	0	8	14	0	0	0	22
ESE	1	2	10	1	0	0	14
SE	1	8	6	1	0	0	16
SSE	1	8	14	1	0	0	24
S	0	2	14	4	1	0	21
SSW	0	3	10	25	3	1	42
SW	1	11	45	13	0	0	70
WSW	1	10	18	3	0	0	32
W	0	12	10	4	0	0	26
WNW	0	8	4	3	0	0	15
NW	1	4	6	3	0	0	14
NNW	2	8	11	2	1	0	24
Variable	0	0	0	0	0	0	0
Total	20	111	232	80	6	1	450

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Slightly Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	4	9	1	0	0	16
NNE	1	1	30	12	0	0	44
NE	1	7	35	2	1	0	46
ENE	1	11	27	0	0	0	39
E	0	7	42	2	0	0	51
ESE	0	3	28	10	0	0	41
SE	1	5	14	9	0	0	29
SSE	0	2	31	4	0	0	37
S	2	6	39	13	1	0	61
SSW	1	4	44	51	0	0	100
SW	0	6	35	40	2	0	83
WSW	0	5	22	5	0	0	32
W	0	3	21	2	0	0	26
WNW	2	5	21	1	0	0	29
NW	1	2	12	0	0	0	15
NNW	2	2	19	0	0	0	23
Variable	0	0	0	0	0	0	0
Total	14	73	429	152	4	0	672

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Moderately Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	3	6	0	0	0	9
NNE	1	3	8	0	0	0	12
NE	0	3	5	0	0	0	8
ENE	0	12	5	0	0	0	17
E	1	7	22	2	0	0	32
ESE	0	3	13	14	0	0	30
SE	0	7	12	5	0	0	24
SSE	0	5	6	0	0	0	11
S	0	5	3	0	0	0	8
SSW	0	2	15	0	0	0	17
SW	0	5	9	0	1	0	15
WSW	0	2	8	0	0	0	10
W	0	3	6	1	0	0	10
WNW	0	4	6	0	0	0	10
NW	1	6	6	0	0	0	13
NNW	0	2	4	0	0	0	6
Variable	0	0	0	0	0	0	0
Total	3	72	134	22	1	0	232

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: July - September 2013  
 Stability Class - Extremely Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	7	2	0	0	0	9
NNE	0	8	2	0	0	0	10
NE	1	1	4	0	0	0	6
ENE	1	5	2	0	0	0	8
E	2	10	3	0	0	0	15
ESE	0	4	6	4	0	0	14
SE	0	3	3	1	0	0	7
SSE	0	4	0	0	0	0	4
S	2	2	0	0	0	0	4
SSW	3	2	0	0	0	0	5
SW	0	8	1	0	0	0	9
WSW	3	4	6	1	0	0	14
W	2	5	4	3	0	0	14
WNW	0	1	1	5	0	0	7
NW	0	6	3	0	0	0	9
NNW	0	7	2	0	0	0	9
Variable	0	0	0	0	0	0	0
Total	14	77	39	14	0	0	144

Hours of calm in this stability class: 1  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 9

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Extremely Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	1	1	0	0	0	0	2
ENE	1	2	0	0	0	0	3
E	0	13	0	0	0	0	13
ESE	0	1	0	0	0	0	1
SE	0	4	2	0	0	0	6
SSE	1	7	3	1	0	0	12
S	0	4	1	0	0	0	5
SSW	0	5	1	4	0	0	10
SW	0	3	6	5	0	0	14
WSW	0	1	11	7	0	0	19
W	0	2	7	6	0	0	15
WNW	0	5	8	3	0	0	16
NW	0	7	10	0	0	0	17
NNW	0	2	13	4	0	0	19
Variable	0	0	0	0	0	0	0
Total	3	57	62	30	0	0	152

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Moderately Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	1	1	0	0	0	2
NNE	0	1	0	0	0	0	1
NE	0	2	0	0	0	0	2
ENE	0	1	0	0	0	0	1
E	0	4	0	0	0	0	4
ESE	0	3	0	0	0	0	3
SE	3	2	0	0	0	0	5
SSE	1	4	0	0	0	0	5
S	0	2	2	0	0	0	4
SSW	0	1	4	2	0	0	7
SW	0	0	5	2	0	0	7
WSW	0	4	6	3	0	0	13
W	0	3	8	1	0	0	12
WNW	0	5	4	0	0	0	9
NW	0	1	2	0	0	0	3
NNW	0	1	3	1	0	0	5
Variable	0	0	0	0	0	0	0
Total	4	35	35	9	0	0	83

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Slightly Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	2	0	0	0	0	2
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	5	0	0	0	0	5
ESE	0	2	0	0	0	0	2
SE	0	4	1	0	0	0	5
SSE	1	7	2	0	0	0	10
S	0	0	4	3	0	0	7
SSW	0	4	5	4	1	0	14
SW	1	1	7	6	0	0	15
WSW	0	2	7	2	0	0	11
W	0	3	7	2	0	0	12
WNW	0	5	5	0	0	0	10
NW	0	4	0	0	0	0	4
NNW	0	3	5	2	0	0	10
Variable	0	0	0	0	0	0	0
Total	2	42	43	19	1	0	107

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Neutral - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	4	7	19	1	0	0	31
NNE	4	8	5	0	0	0	17
NE	3	21	1	0	0	0	25
ENE	9	15	0	0	0	0	24
E	6	14	0	0	0	0	20
ESE	2	16	0	0	0	0	18
SE	0	18	18	0	0	0	36
SSE	2	30	45	8	0	0	85
S	1	21	51	15	3	0	91
SSW	1	13	52	57	6	0	129
SW	1	21	58	16	1	0	97
WSW	4	29	31	1	1	0	66
W	3	56	59	11	3	0	132
WNW	11	52	33	7	0	0	103
NW	7	34	10	0	0	0	51
NNW	8	27	50	8	0	0	93
Variable	0	0	0	0	0	0	0
Total	66	382	432	124	14	0	1018

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Slightly Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	5	1	0	0	0	0	6
NNE	4	15	4	0	0	0	23
NE	3	11	3	0	0	0	17
ENE	15	7	0	0	0	0	22
E	17	5	0	0	0	0	22
ESE	8	26	0	0	0	0	34
SE	4	39	6	0	0	0	49
SSE	5	34	17	1	0	0	57
S	1	18	20	8	0	0	47
SSW	5	14	39	15	0	0	73
SW	6	36	24	1	0	0	67
WSW	8	36	1	0	0	0	45
W	15	31	12	2	0	0	60
WNW	28	35	10	0	0	0	73
NW	20	17	0	0	0	0	37
NNW	5	5	1	0	0	0	11
Variable	0	0	0	0	0	0	0
Total	149	330	137	27	0	0	643

Hours of calm in this stability class: 4  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Moderately Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	2	0	0	0	0	0	2
NE	1	0	0	0	0	0	1
ENE	2	0	0	0	0	0	2
E	7	0	0	0	0	0	7
ESE	7	5	0	0	0	0	12
SE	1	0	0	0	0	0	1
SSE	1	0	0	0	0	0	1
S	1	1	0	0	0	0	2
SSW	4	7	4	0	0	0	15
SW	8	3	0	0	0	0	11
WSW	11	14	0	0	0	0	25
W	14	4	0	0	0	0	18
WNW	13	0	0	0	0	0	13
NW	4	0	0	0	0	0	4
NNW	8	1	0	0	0	0	9
Variable	0	0	0	0	0	0	0
Total	84	35	4	0	0	0	123

Hours of calm in this stability class: 1  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Extremely Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 34 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	1	0	0	0	0	0	1
NE	5	0	0	0	0	0	5
ENE	4	0	0	0	0	0	4
E	10	0	0	0	0	0	10
ESE	3	1	0	0	0	0	4
SE	1	0	0	0	0	0	1
SSE	4	0	0	0	0	0	4
S	0	0	0	0	0	0	0
SSW	1	0	0	0	0	0	1
SW	1	0	0	0	0	0	1
WSW	3	4	0	0	0	0	7
W	8	0	0	0	0	0	8
WNW	4	0	0	0	0	0	4
NW	4	0	0	0	0	0	4
NNW	2	0	0	0	0	0	2
Variable	0	0	0	0	0	0	0
Total	51	5	0	0	0	0	56

Hours of calm in this stability class: 18  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Extremely Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	1	0	0	0	0	1
ENE	0	4	0	0	0	0	4
E	0	5	7	0	0	0	12
ESE	0	3	0	0	0	0	3
SE	0	5	1	2	0	0	8
SSE	0	1	5	2	1	0	9
S	0	3	3	1	0	0	7
SSW	0	2	2	0	5	1	10
SW	0	1	2	3	3	0	9
WSW	0	1	6	9	2	0	18
W	0	2	0	8	7	1	18
WNW	0	1	3	8	5	1	18
NW	0	1	11	13	0	0	25
NNW	0	0	2	4	4	0	10
Variable	0	0	0	0	0	0	0
Total	0	30	42	50	27	3	152

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Moderately Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	1	1	0	0	2
NNE	0	1	0	0	0	0	1
NE	0	1	1	0	0	0	2
ENE	0	0	1	0	0	0	1
E	0	1	2	0	0	0	3
ESE	0	2	2	0	0	0	4
SE	1	2	0	0	0	0	3
SSE	1	4	2	0	0	0	7
S	0	1	2	0	0	0	3
SSW	0	0	4	2	2	0	8
SW	0	0	3	3	1	0	7
WSW	0	4	2	3	3	0	12
W	0	2	4	5	2	0	13
WNW	0	2	2	3	2	0	9
NW	0	0	2	2	0	0	4
NNW	0	0	2	1	1	0	4
Variable	0	0	0	0	0	0	0
Total	2	20	30	20	11	0	83

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Slightly Unstable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	1	0	0	0	0	1
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	2	3	0	0	0	5
ESE	0	2	0	1	0	0	3
SE	0	3	1	0	0	0	4
SSE	1	3	4	1	1	0	10
S	0	0	0	2	3	2	7
SSW	0	2	2	5	2	2	13
SW	1	2	3	6	3	0	15
WSW	0	2	1	6	1	0	10
W	0	2	2	7	2	0	13
WNW	0	3	1	6	0	0	10
NW	0	0	6	1	0	0	7
NNW	0	0	5	3	1	0	9
Variable	0	0	0	0	0	0	0
Total	2	22	28	38	13	4	107

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Neutral - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	3	7	2	14	1	0	27
NNE	1	5	3	1	0	0	10
NE	0	5	17	4	0	0	26
ENE	1	11	10	0	0	0	22
E	2	6	15	1	0	0	24
ESE	0	3	10	1	0	0	14
SE	0	6	10	22	0	0	38
SSE	0	8	13	33	13	1	68
S	0	2	29	41	19	9	100
SSW	0	3	11	64	51	13	142
SW	4	6	40	38	7	1	96
WSW	0	4	24	25	1	0	54
W	0	13	43	46	14	4	120
WNW	3	7	37	48	20	4	119
NW	1	13	29	29	0	0	72
NNW	0	9	31	39	7	0	86
Variable	0	0	0	0	0	0	0
Total	15	108	324	406	133	32	1018

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Slightly Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	4	3	0	0	0	7
NNE	0	3	13	5	0	0	21
NE	0	5	11	4	0	0	20
ENE	0	7	11	0	0	0	18
E	0	4	10	0	0	0	14
ESE	0	1	15	13	0	0	29
SE	0	3	24	26	0	0	53
SSE	0	3	24	27	4	0	58
S	1	2	7	22	6	1	39
SSW	1	6	5	29	26	0	67
SW	3	4	33	33	2	0	75
WSW	0	2	30	4	0	0	36
W	0	5	43	9	4	0	61
WNW	2	9	32	31	5	0	79
NW	0	9	32	11	0	0	52
NNW	0	3	14	1	0	0	18
Variable	0	0	0	0	0	0	0
Total	7	70	307	215	47	1	647

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Moderately Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	4	0	0	0	4
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	1	2	1	0	0	0	4
E	0	0	2	0	0	0	2
ESE	0	0	4	3	0	0	7
SE	0	2	2	4	0	0	8
SSE	0	0	3	0	0	0	3
S	0	2	1	0	0	0	3
SSW	0	0	1	4	0	0	5
SW	0	1	8	4	0	0	13
WSW	0	3	11	4	0	0	18
W	0	2	15	8	0	0	25
WNW	0	0	9	1	0	0	10
NW	0	0	12	1	0	0	13
NNW	0	1	8	0	0	0	9
Variable	0	0	0	0	0	0	0
Total	1	13	81	29	0	0	124

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

Braidwood Generating Station

Period of Record: October - December 2013  
 Stability Class - Extremely Stable - 199Ft-30Ft Delta-T (F)  
 Winds Measured at 203 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	2	2	0	0	0	4
NNE	1	1	4	0	0	0	6
NE	0	5	0	0	0	0	5
ENE	1	1	1	0	0	0	3
E	0	0	4	0	0	0	4
ESE	0	0	5	1	0	0	6
SE	0	1	0	3	0	0	4
SSE	0	2	4	0	0	0	6
S	0	1	1	0	0	0	2
SSW	1	1	0	0	0	0	2
SW	0	3	3	0	0	0	6
WSW	0	1	2	2	0	0	5
W	0	0	1	3	0	0	4
WNW	0	1	6	0	0	0	7
NW	0	1	2	1	0	0	4
NNW	0	2	2	2	0	0	6
Variable	0	0	0	0	0	0	0
Total	3	22	37	12	0	0	74

Hours of calm in this stability class: 0  
 Hours of missing wind measurements in this stability class: 0  
 Hours of missing stability measurements in all stability classes: 3

## **APPENDIX G**

## **ERRATA DATA**

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## Teledyne Brown Engineering Detector 08

Due to an incorrect setting on Teledyne Brown Engineering's gamma detector 08, 3.29 rather than 4.66 was used in the minimum detectable concentration (MDC) calculation. Nonconformance 13-07 was initiated and corrective actions have been implemented to address this issue. All samples counted on detector 08 were reprocessed using the correct calculation. As a result, all MDCs for these samples have increased by 41.6%. The previously reported activities and uncertainties were not affected. In some cases, the increased MDC resulted in missed LLDs. All samples with MDCs affected by this issue follow. The samples with missed LLDs are shown in the table for 2011, 2012, and 2013. All other required LLDs were met.

# 2011

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
BD-25	12/01/11	12/29/11	Surface Water	*	*	*	*

\* Required LLDs were achieved.

# 2012

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
1Q12 BD-02	12/29/11	03/29/12	Air Particulate	*	*	*	*
1Q12 BD-04	12/29/11	03/29/12	Air Particulate	*	*	*	*
1Q12 BD-06**	12/29/11	03/29/12	Air Particulate	*	*	*	*
1Q12 BD-20	12/29/11	03/29/12	Air Particulate	*	*	*	*
1Q12 BD-21	12/29/11	03/29/12	Air Particulate	*	*	*	*
BD-38	01/05/12	01/26/12	Surface Water	I-131	<15	<19.43	pCi/L
BD-56	01/05/12	01/26/12	Surface Water	I-131	<15	<20.19	pCi/L
BD-36	01/19/12	01/19/12	Ground Water	I-131	<15	<16.56	pCi/L
BD-36	01/19/12	01/19/12	Ground Water	La-140	<15	<17.83	pCi/L
BD-18	03/01/12	03/01/12	Milk	*	*	*	*
2Q12 BD-03	03/29/12	07/05/12	Air Particulate	*	*	*	*
2Q12 BD-21	03/29/12	07/05/12	Air Particulate	*	*	*	*
BD-35	04/12/12	04/12/12	Ground Water	I-131	<15	<15.01	pCi/L
BD-35	04/12/12	04/12/12	Ground Water	La-140	<15	<18.28	pCi/L
BD-18	05/17/12	05/17/12	Milk	*	*	*	*
BD-17	05/31/12	05/31/12	Milk	*	*	*	*
BD-40	06/07/12	06/26/12	Surface Water	I-131	<15	<16.91	pCi/L
BD-18	06/26/12	06/26/12	Milk	*	*	*	*
3Q12 BD-05	07/05/12	10/04/12	Air Particulate	*	*	*	*
BD-40	07/05/12	07/26/12	Surface Water	I-131	<15	<19.17	pCi/L
BD-40	07/05/12	07/26/12	Surface Water	La-140	<15	<15.68	pCi/L
BD-13	07/12/12	07/12/12	Ground Water	*	*	*	*
BD-51	07/12/12	07/12/12	Ground Water	*	*	*	*
BD-18	07/12/12	07/12/12	Milk	La-140	<15	<17.34	pCi/L
Aug12 BD-22	08/02/12	08/30/12	Drinking Water	I-131	<15	<21.23	pCi/L
BD-38	08/02/12	08/30/12	Surface Water	*	*	*	*
BD-18	08/09/12	08/09/12	Milk	*	*	*	*
Sep12 BD-22	08/30/12	09/27/12	Drinking Water	*	*	*	*
BD-18	09/06/12	09/06/12	Milk	*	*	*	*
BD-QUAD 4	09/19/12	09/19/12	Vegetation	I-131	<60	<62.64	pCi/Kg Wet
4Q12 BD-03	10/04/12	01/03/13	Air Particulate	*	*	*	*
BD-40	10/04/12	10/25/12	Surface Water	*	*	*	*
BD-50	10/11/12	10/11/12	Ground Water	*	*	*	*
BD-18	10/18/12	10/18/12	Milk	La-140	<15	<16.27	pCi/L
BD-18	11/01/12	11/01/12	Milk	La-140	<15	<17.01	pCi/L

\* Required LLDs were achieved.

\*\* In one sample analyzed in 2012, the naturally occurring isotope of Beryllium-7 was originally detected. Due to the higher MDC after the calculation correction, the Beryllium-7 was no longer detected.

# 2012

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
MW-11	11/13/12		RGPP	I-131	<15	<19.07	pCi/L
MW-11	11/13/12		RGPP	La-140	<15	<17.02	pCi/L
MW-159D	11/13/12		RGPP	I-131	<15	<19.07	pCi/L
SW-104	11/13/12		RGPP	*	*	*	*
MW-113	11/14/12		RGPP	*	*	*	*
BD-56	12/06/12	12/27/12	Surface Water	*	*	*	*
BD-18	12/07/12	12/07/12	Milk	*	*	*	*
P-2D	12/13/12		RGPP	*	*	*	*

\* Required LLDs were achieved.

# 2013

CLIENT ID	START DATE	END DATE	MATRIX	NUCLIDE	REQUIRED MDC	REVISED MDC	UNITS
BD-40	01/03/13	01/31/13	Surface Water	I-131	<15	<16.93	pCi/L
BD-40	01/03/13	01/31/13	Surface Water	La-140	<15	<19.51	pCi/L
BD-18	01/04/13	01/04/13	Milk	La-140	<15	<16.26	pCi/L
BD-18	03/07/13	03/07/13	Milk				

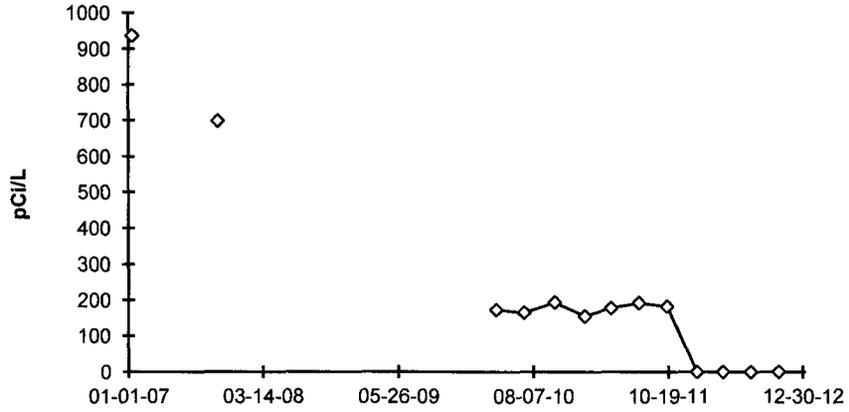
\* Required LLDs were achieved.

## Figure C-12 Graph

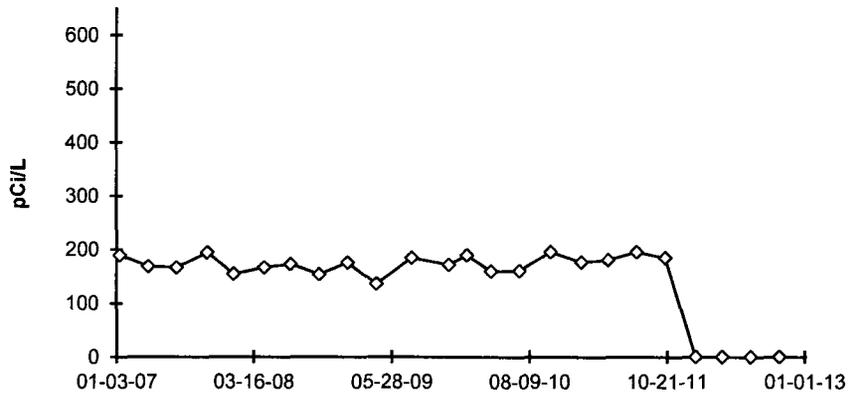
Figure C-12 of the Appendix C Data Tables and Figures for the 2012 Annual Radiological Environmental Operating Report (AREOR) incorrectly displays the tritium data for groundwater wells BD-50 (Skole Well) and BD-51 (Fatlan Well). The data series selection for the 2012 tritium results of BD-50 and BD-51 did not include the actual value but the "less than symbol (<) preceding the value. The following pages display the graphing error in 2012 and the correction for the 2013 AREOR.

# 2012 Figure C-12 Graph

## BD-50 Skole Well

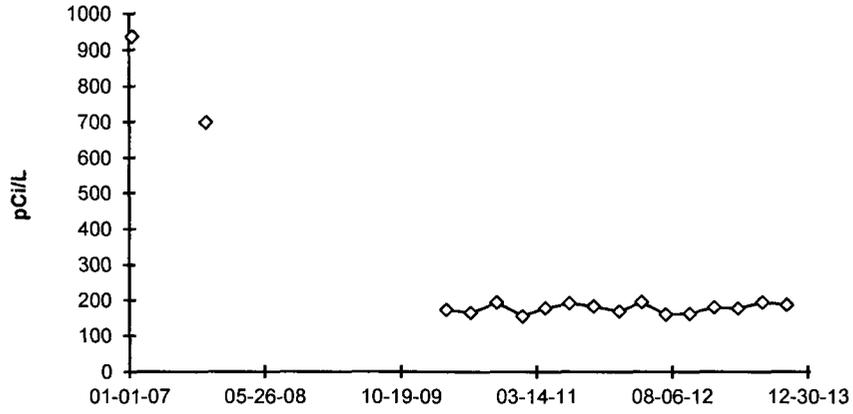


## BD-51 Fatlan Well

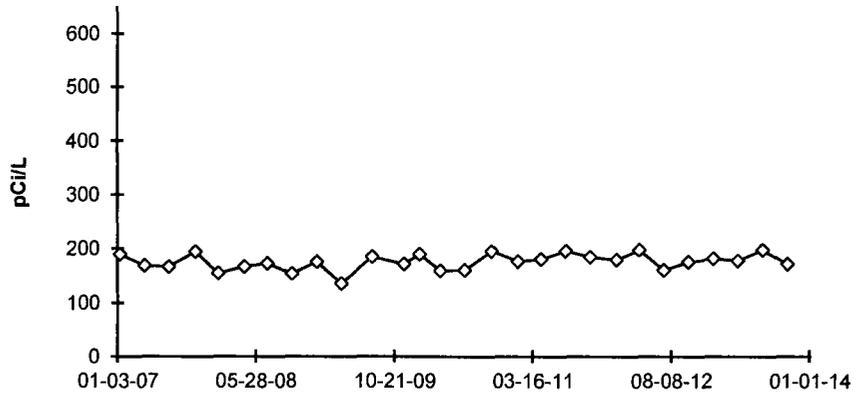


# 2013 Figure C-12 Graph

## BD-50 Skole Well



## BD-51 Fatlan Well



## **APPENDIX H**

# **ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)**

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Docket No: 50-456  
50-457

# **BRAIDWOOD STATION UNITS 1 and 2**

Annual Radiological  
Groundwater Protection Program Report

1 January through 31 December 2013

## **Prepared By**

Teledyne Brown Engineering  
Environmental Services



Braidwood Station  
Braceville, IL 60407

**May 2014**

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## Table Of Contents

I. Summary and Conclusions.....	1
II. Introduction .....	2
A. Objectives of the RGPP .....	2
B. Implementation of the Objectives.....	2
C. Program Description .....	3
D. Characteristics of Tritium (H-3) .....	3
III. Program Description .....	4
A. Sample Analysis.....	4
B. Data Interpretation.....	4
C. Background Analysis.....	5
1. Background Concentrations of Tritium .....	6
IV. Results and Discussion .....	7
A. Missed Samples .....	7
B. Groundwater Results.....	8
C. Surface Water Results .....	9
D. Drinking Water Well Survey.....	10
E. Summary of Results – Inter-laboratory Comparison.....	10
F. Leaks, Spills, and Releases .....	10
G. Trends .....	10
H. Investigations .....	10
I. Actions Taken .....	10

## Appendices

### Appendix A Location Designation

#### Tables

Table A-1 Radiological Groundwater Protection Program - Sampling Locations, Braidwood Station, 2013

#### Figures

Figure A-1 Sampling Locations near the Site Boundary of the Braidwood Station, 2013

Figure A-2 Intermediate Sampling Locations of the Braidwood Station, 2013

Figure A-3 Distant Sampling Locations of the Braidwood Station, 2013

### Appendix B Data Tables

#### Tables

Table B-I.1 Concentrations of Tritium, Strontium, Gross Alpha and Gross Beta in Groundwater Samples Collected in the Vicinity of Braidwood Station, 2013.

Table B-I.2 Concentrations of Gamma Emitters in Groundwater Samples Collected in the Vicinity of Braidwood Station, 2013.

Table B-I.3 Concentrations of Hard-To-Detects in Groundwater Samples Collected in the Vicinity of Braidwood Station, 2013.

Table B-II.1 Concentrations of Tritium, Strontium, Gross Alpha and Gross Beta in Surface Water Samples Collected in the Vicinity of Braidwood Station, 2013.

Table B-II.2 Concentrations of Gamma Emitters in Surface Water Samples Collected in the Vicinity of Braidwood Station, 2013.

## I. Summary and Conclusions

In 2013, Exelon continued a comprehensive program that evaluates the impact of station operations on groundwater and surface water in the vicinity of Braidwood Station. This evaluation involved numerous station personnel and contractor support personnel. This report covers groundwater and surface water samples collected from the environment, both on and off station property, in 2013. During that time period, 677 analyses were performed on 281 samples from 90 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 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 the groundwater or 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 77 of 285 analyses. The tritium concentrations ranged from  $196 \pm 108$  pCi/L to  $3,200 \pm 368$  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 2013. Gross Alpha (dissolved) was detected in ten groundwater and surface water samples. The concentrations ranged from 0.6 to 10.0 pCi/L. Gross Alpha (suspended) was detected in three groundwater samples. The concentrations ranged from 3.2 to 5.9 pCi/L. Gross Beta (dissolved) was detected in 53 groundwater and surface water samples. The concentrations ranged from 1.1 to 86.3 pCi/L. Gross Beta (suspended) was detected in three groundwater samples. The concentrations ranged from 6.1 to 9.6 pCi/L.

Hard-To-Detect or difficult to measure nuclides were not sampled or analyzed in 2013.

## II. Introduction

Braidwood Station, a two-unit PWR station is located in Will County, Illinois, fifteen (15) miles south-southwest of Joliet, Illinois. Each reactor is designed to have a capacity of 3,587 thermal megawatts. Units No. 1 went critical on May 29, 1987 and Unit No. 2 went critical on March 8, 1988. The station has been designed to keep releases to the environment at levels below those specified in the regulations.

This report covers those analyses performed by Teledyne Brown Engineering (TBE) and Environmental Inc. Midwest Labs (EIML) on samples collected in 2013.

### A. Objective of the 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-3, Appendix A.

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 2013.

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 ( $\pm$ ) 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 (pre-operational 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 strontium-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 world wide from 1960 to 2013.

RadNet provides tritium precipitation concentration data for samples collected at stations through out the U.S. from 1960 up to and including 2013. 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  $\pm 70$  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  $\pm 70$  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  $140 \pm 100$  pCi/L. Clearly, these sample results cannot be distinguished as different from background at this concentration.

IV. Results and Discussion

A. Missed Sample

Exelon maintains a Radiological Groundwater Protection Program (RGPP) as part of the nuclear industry's voluntary

groundwater protection initiative as described in NEI 07-07. As part of this program, samples are obtained routinely from monitoring wells and surface waters at Braidwood based on the frequencies outlined in station procedures.

According to the Station RGPP, MW-103, MW-110, VB-10-1, VB1-1, MW-5, MW-6, MW-11, MW-BW-201S, SG-BW-102, and OWM31P are detection wells. The station RGPP requires the wells designated as detection wells to be sampled and analyzed for tritium on a quarterly basis. The aforementioned wells were not sampled during one or more of the quarters in 2013. Reasons for lack of sampling include well condition deficiencies, low well production, frozen water preventing sampling, and remediation pumps not running.

The Station RGPP also requires designated detection wells be analyzed for gamma-radionuclides, gross-alpha and beta, and strontium 89/90 on an annual basis. OWM31P, MW-103, RW-7, RW-9, RW-10, and RW-5 did not have these analyses performed during 2013. The sample is pulled on an annual periodicity and the sample was not able to be obtained for the requisite analyses.

## B. Groundwater Results

### Groundwater

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 3,200 pCi/l. These wells are located onsite and are not available as a drinking water source. Some contamination still exists and monitoring is ongoing (Table B-I.1, Appendix B).

#### Strontium

Strontium-89 and Strontium-90 were analyzed for in 38 samples. Strontium-89 was less than the required detection limit of 10.0 pCi/liter. Strontium-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 2013. Gross Alpha (dissolved) was detected in ten groundwater and surface water samples. The concentrations ranged from 0.6 to 10.0 pCi/L. Gross Alpha (suspended) was detected in three groundwater samples. The concentrations ranged from 3.2 to 5.9 pCi/L. Gross Beta (dissolved) was detected in 53 groundwater and surface water samples. The concentrations ranged from 1.1 to 86.3 pCi/L. Gross Beta (suspended) was detected in three groundwater samples. The concentrations ranged from 6.1 to 9.6 pCi/L. Gross alpha and gross beta are routinely seen in environmental samples and are not necessarily attributable to Station's effluents (Table B-I.1, Appendix B).

### Hard-To-Detect

Hard-To-Detect analyses were not performed in 2013 (Table B-I.3, Appendix B).

### Gamma Emitters

Naturally occurring K-40 was detected in seven samples. The concentrations ranged from 40 to 117 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

### Surface Water

Samples were collected from ten 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 (Table B-II.1, Appendix B). Tritium values ranged from the minimum detection limit to 615 pCi/l.

## Strontium

Strontium-89 and strontium-90 were not analyzed in 2013 (Table B-II.1, Appendix B).

## Gamma Emitters

Naturally occurring K-40 was detected in two samples. The concentrations ranged from 45 to 55 pCi/L. No other gamma emitting nuclides were detected in any of the samples analyzed (Table B-II.2, Appendix B).

### D. Drinking Water Well Survey

Requested drinking water wells near Braidwood Station were sampled on a quarterly basis in 2013.

### E. Summary of Results – Inter-Laboratory Comparison Program

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

### F. Leaks, Spills, and Releases

Previously identified contaminated groundwater plumes are being addressed by the Braidwood Station tritium remediation activities. There were no liquid leaks, spills, or releases in 2013 that affected groundwater.

### G. Trends and Analyses

Monitoring of remediation activities indicate that tritium concentrations in affected areas are trending down.

### H. Investigations

Investigation of historic spills and the groundwater contamination has resulted in groundwater remediation activities at Braidwood Station.

### I. Actions Taken

#### 1. Compensatory Actions

All Circulating Water Blowdown valve vaults were lined to prevent any leakage of water from the vaults to the groundwater. A remote leakage detection system has been installed which provides continuous monitoring of the vaults. Operations procedures are in

place for actions to take in the event the leak detection system alarms. Walkdowns of the Circulating Water Blowdown pipeline and vaults were performed weekly.

## 2. Installation of Monitoring Wells

Exelon has installed a permanent monitoring well network that ensures that ground water will be appropriately monitored around the plant and at the various remediation sites. Monitoring well locations were based on contamination source, ground flow direction, and source concentration. Some monitoring points are not primarily used for sampling but rather to measure ground water elevation. Water elevation is used extensively around active remediation sites to verify that ground water is still flowing toward remediation wells. The Station's RGPP was modified between second and third quarter 2013 to reduce the number of surface water and groundwater sample points due to the completion of remedial efforts that were ongoing up through the second quarter of 2013.

## 3. Actions to Recover/Reverse Plumes

Vacuum Breaker 1 area: Three remediation wells have been installed in this area to remove contaminated ground water. Monitoring of this activity indicates the remediation is proceeding acceptably.

Vacuum Breaker 2 & 3 area: Remediation at vacuum breaker 2 and 3 are complete. Remediation efforts have been satisfied as communicated by the IEPA completion report dated March 28, 2013.

Vacuum Breaker 4: Remediation at vacuum breaker 4 is complete. Remediation efforts have been satisfied as communicated by the IEPA completion report dated December 19, 2011.

Vacuum Breaker 6 & 7: Monitoring wells have been installed within and down gradient of these plumes which originated from vacuum breaker valves along the blowdown line. These sites are being remediated by monitored natural attenuation.

Exelon Pond area: The combination of groundwater sample monitoring and water level monitoring ensures that the active remedial pumping of Exelon Pond continues to capture the tritium that spilled from vacuum breakers 2 and 3 almost ten years ago. Monitoring to date has shown marked reduction in the most contaminated area and the station continues to monitor plume capture to determine whether adjustments are needed in the pumping rate.

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**APPENDIX A**

**LOCATION DESIGNATION**

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TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations, Braidwood Station, 2013

Station Code	Sample Description
BL-03	Monitoring Well
BL-06	Monitoring Well
BL-06D	Monitoring Well
BL-09D	Monitoring Well
BL-10D	Monitoring Well
BL-11	Monitoring Well
BL-11D	Monitoring Well
BL-12D	Monitoring Well
BL-13D	Monitoring Well
BL-14D	Monitoring Well
BL-15D	Monitoring Well
BL-16D	Monitoring Well
BL-17D	Monitoring Well
BL-18D	Monitoring Well
BL-21	Monitoring Well
BL-22	Monitoring Well
BL-23	Monitoring Well
BL-24	Monitoring Well
BL-25	Monitoring Well
BL-26	Monitoring Well
BL-27	Monitoring Well
D-2D	Surface Water
D-3D	Surface water
DITCH (DS-2)	Surface Water
EXELON POND	Surface Water
F-1D	Monitoring Well
F-3D	Monitoring Well
F-3DR	Monitoring Well
F-4D	Monitoring Well
F-5D	Monitoring Well
F-6D	Monitoring Well
F-8D	Monitoring Well
F-9D	Monitoring Well
MW-102R	Monitoring Well
MW-103	Monitoring Well
MW-105	Monitoring Well
MW-105D	Monitoring Well
MW-106D	Monitoring Well
MW-107	Monitoring Well
MW-109D	Monitoring Well
MW-11	Monitoring Well
MW-110	Monitoring Well
MW-111	Monitoring Well
MW-111DR	Monitoring Well
MW-112D	Monitoring Well
MW-113	Monitoring Well
MW-113DR	Monitoring Well
MW-13	Monitoring Well
MW-130D	Monitoring Well
MW-131D	Monitoring Well
MW-132D	Monitoring Well

TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations, Braidwood Station, 2013

Station Code	Sample Description
MW-133D	Monitoring Well
MW-134D	Monitoring Well
MW-135D	Monitoring Well
MW-136D	Monitoring Well
MW-137D	Monitoring Well
MW-138D	Monitoring Well
MW-139D	Monitoring Well
MW-14	Monitoring Well
MW-140D	Monitoring Well
MW-141D	Monitoring Well
MW-142D	Monitoring Well
MW-143D	Monitoring Well
MW-144D	Monitoring Well
MW-145D	Monitoring Well
MW-154	Monitoring Well
MW-155	Monitoring Well
MW-156	Monitoring Well
MW-158D	Monitoring Well
MW-159D	Monitoring Well
MW-160D	Monitoring Well
MW-161D	Monitoring Well
MW-162D	Monitoring Well
MW-2	Monitoring Well
MW-22	Monitoring Well
MW-4	Monitoring Well
MW-5	Monitoring Well
MW-6	Monitoring Well
MW-7	Monitoring Well
MW-9	Monitoring Well
MW-BW-201BD	Monitoring Well
MW-BW-201I	Monitoring Well
MW-BW-201S	Monitoring Well
MW-BW-202I	Monitoring Well
MW-BW-202S	Monitoring Well
MW-BW-203I	Monitoring Well
MW-BW-203S	Monitoring Well
MW-BW-204I	Monitoring Well
MW-BW-205I	Monitoring Well
MW-BW-206I	Monitoring Well
MW-BW-207I	Monitoring Well
MW-BW-208BD	Monitoring Well
P-2D	Monitoring Well
P-4D	Monitoring Well
P-5D	Monitoring Well
P-13D	Monitoring Well
P-14D	Monitoring Well
RW-10	Monitoring Well
RW-5	Monitoring Well
RW-6	Monitoring Well

TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations, Braidwood Station, 2013

Station Code	Sample Description
RW-7	Monitoring Well
RW-8	Monitoring Well
RW-9	Monitoring Well
S-1D	Monitoring Well
S-2D	Monitoring Well
S-4	Monitoring Well
S-4D	Monitoring Well
S-5	Monitoring Well
S-6	Monitoring Well
S-7D	Monitoring Well
S-8	Monitoring Well
S-8DR	Monitoring Well
SG-BW-105	Surface Water
SG-BW-106	Surface Water
SW-101	Surface Water
SW-102 POINT C	Surface Water
SW-103	Surface Water
SW-104 A DITCH	Surface Water
TB-20	Monitoring Well
TB-20D	Monitoring Well
TB-21	Monitoring Well
TB-21D	Monitoring Well
TB-22	Monitoring Well
TB-22D	Monitoring Well
TB-23	Monitoring Well
TB-23D	Monitoring Well
TB-24	Monitoring Well
TB-24D	Monitoring Well
TB-25	Monitoring Well
TB-25D	Monitoring Well
TB-26D	Monitoring Well
VB10-1	Monitoring Well
VB10-1R	Monitoring Well
VB1-1	Monitoring Well
VB1-10	Monitoring Well
VB1-10D	Monitoring Well
VB11-1	Monitoring Well
VB1-11	Monitoring Well
VB1-11D	Monitoring Well
VB1-12D	Monitoring Well
VB1-2	Monitoring Well
VB1-2D	Monitoring Well
VB1-3	Monitoring Well
VB1-3D	Monitoring Well
VB1-4	Monitoring Well
VB1-4D	Monitoring Well
VB1-5	Monitoring Well
VB1-5D	Monitoring Well
VB1-6	Monitoring Well

TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations, Braidwood Station, 2013

Station Code	Sample Description
VB1-6D	Monitoring Well
VB1-7	Monitoring Well
VB1-7D	Monitoring Well
VB1-8	Monitoring Well
VB1-8D	Monitoring Well
VB1-9	Monitoring Well
VB1-9D	Monitoring Well
VB2-10	Monitoring Well
VB2-10D	Monitoring Well
VB2-11	Monitoring Well
VB2-11D	Monitoring Well
VB2-12	Monitoring Well
VB2-12D	Monitoring Well
VB2-13	Monitoring Well
VB2-13D	Monitoring Well
VB2-14	Monitoring Well
VB2-14D	Monitoring Well
VB2-15D	Monitoring Well
VB2-16	Monitoring Well
VB2-16D	Monitoring Well
VB2-17	Monitoring Well
VB2-17D	Monitoring Well
VB2-2D	Monitoring Well
VB2-5D	Monitoring Well
VB2-6D	Monitoring Well
VB2-7D	Monitoring Well
VB2-9D	Monitoring Well
VB3-10D	Monitoring Well
VB3-2	Monitoring Well
VB3-4D	Monitoring Well
VB3-7D	Monitoring Well
VB3-9D	Monitoring Well
VB4-1	Monitoring Well
VB4-5D	Monitoring Well
VB4-6D	Monitoring Well
VB5-2	Monitoring Well
VB6-1	Monitoring Well
VB7-1	Monitoring Well
VB8-2R	Monitoring Well
VB9-1	Monitoring Well
OWM31P	Monitoring Well



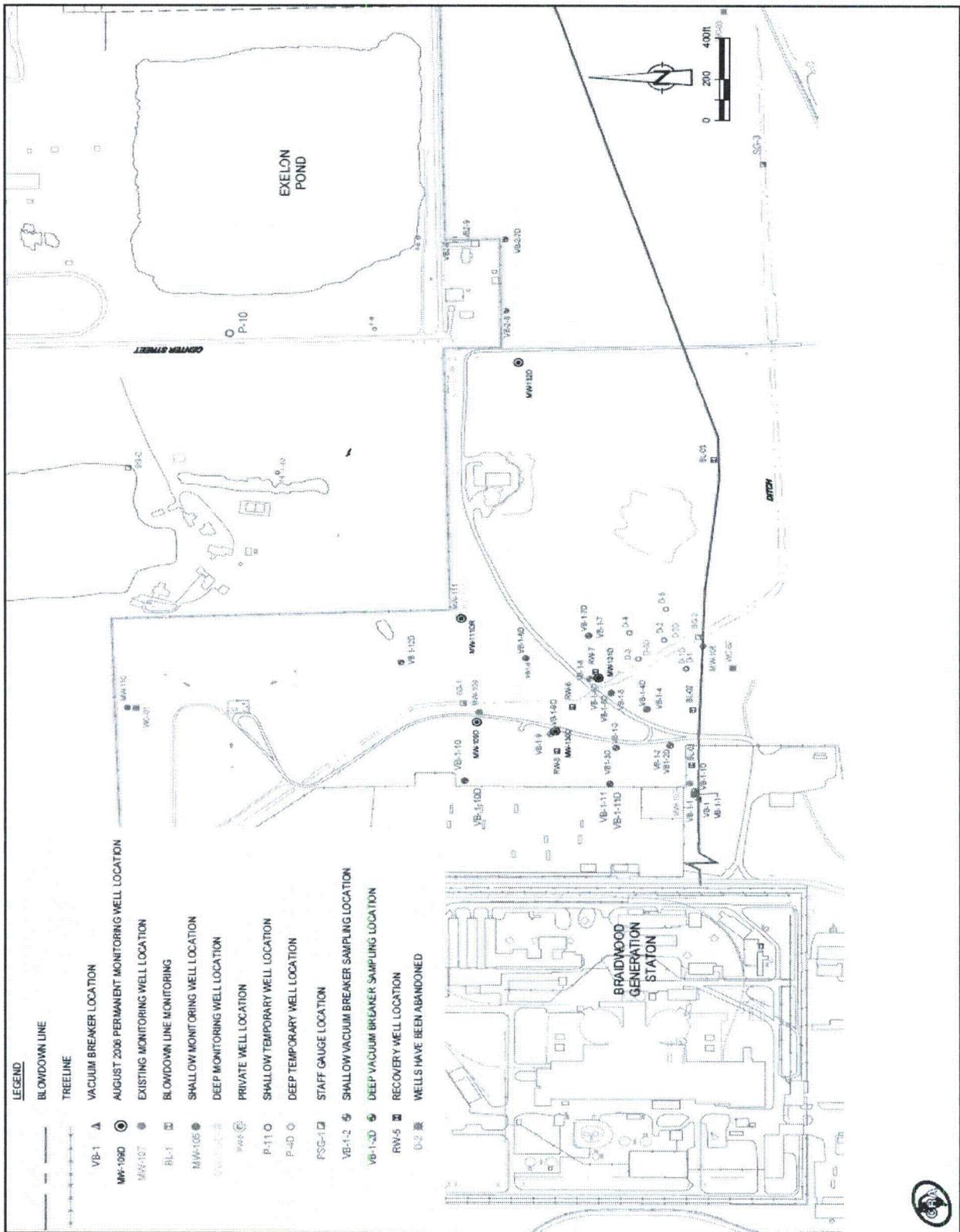


Figure A-2  
Sampling Locations near the Site Boundary of Braidwood Station, 2013

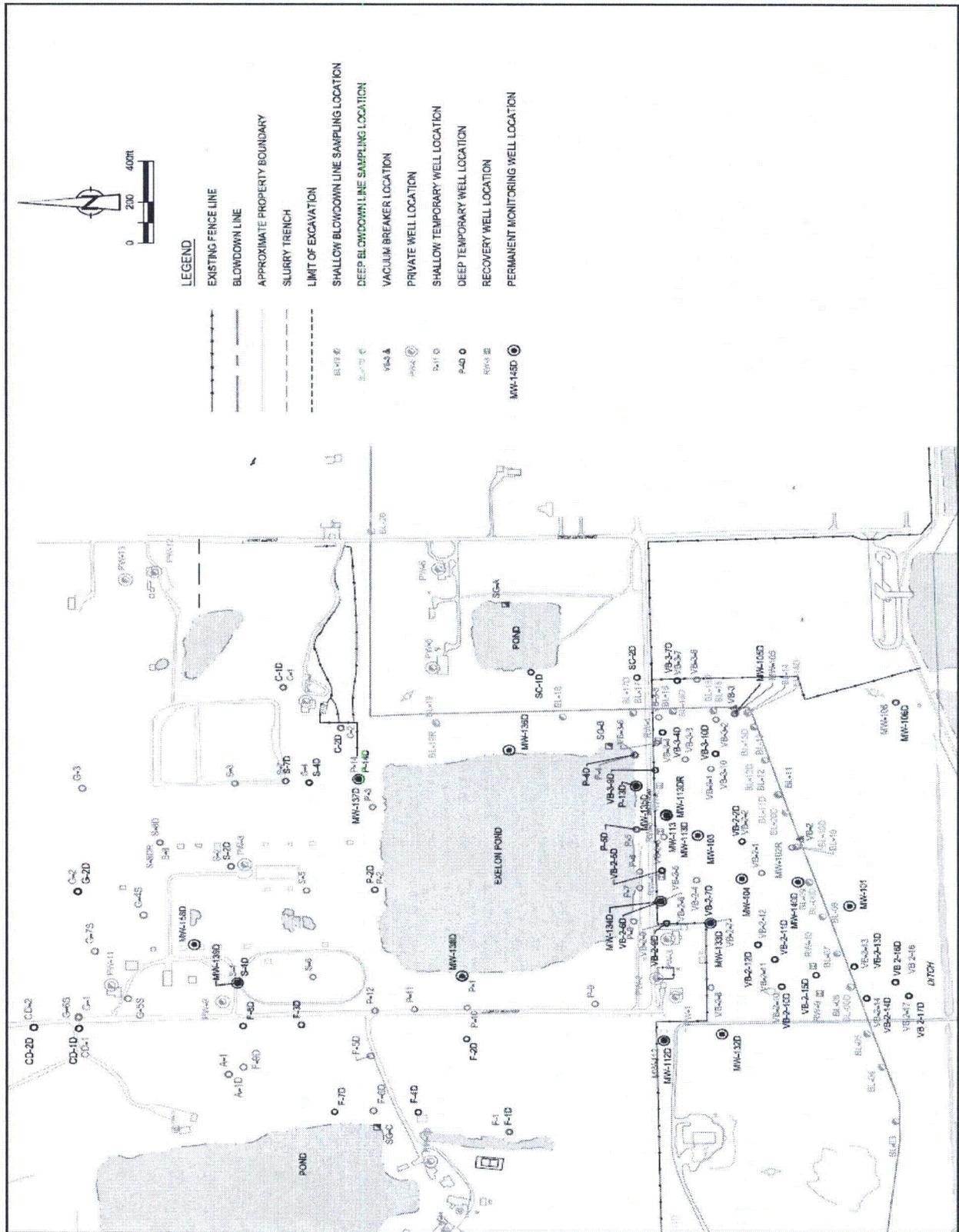


Figure A-3  
Distant Sampling Locations of the Braidwood Station, 2013

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## **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 VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
BL-03	03/29/13	< 181						
BL-03	04/20/13	< 164						
BL-03	09/06/13	< 189						
BL-03	10/15/13	< 197						
BL-11	03/28/13	< 161						
BL-11	04/25/13	< 165						
BL-11	09/28/13	< 182						
BL-11	09/28/13	< 195						
BL-11	10/15/13	< 200						
BL-21	03/19/13	< 169						
BL-21	06/11/13	< 164						
BL-22	03/18/13	< 167						
BL-22	06/12/13	< 162						
BL-23	03/19/13	< 171						
BL-23	06/11/13	< 162						
BL-24	03/18/13	< 166						
BL-24	06/12/13	< 160						
BL-25	03/19/13	< 163						
BL-25	06/11/13	< 163						
BL-26	03/18/13	< 161						
BL-26	06/11/13	< 159						
BL-27	03/19/13	< 166						
BL-27	06/12/13	< 156						
F-1D	03/20/13	< 189						
F-1D	06/13/13	< 182						
F-1D	09/23/13	< 182						
F-1D	12/17/13	< 176						
F-3D	03/20/13	< 188						
F-3D	06/13/13	< 189						
F-3DR	12/18/13	< 167						
F-4D	03/20/13	< 168						
F-4D	06/13/13	< 187						
F-4D	09/24/13	< 178						
F-4D	12/18/13	< 167						
F-5D	03/19/13	< 170						
F-5D	06/13/13	< 186						
F-5D	09/23/13	< 182						
F-5D	12/17/13	< 172						
F-6D	03/20/13	< 170						
F-6D	06/13/13	< 187						
F-6D	09/23/13	< 178						
F-6D	12/18/13	< 166						
F-8D	03/20/13	< 188						
F-8D	06/13/13	< 189						
F-8D	09/24/13	< 188						
F-8D	12/18/13	< 169						
F-9D	03/20/13	< 169						
F-9D	12/18/13	< 168						
MW-102R	03/28/13	< 163						
MW-102R	04/25/13	< 164						
MW-102R	09/06/13	< 193						

TABLE B-1.1

**CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
MW-102R	10/15/13	< 196						
MW-103	04/20/13	< 166			0.7 $\pm$ 0.3	3.2 $\pm$ 1.2	1.1 $\pm$ 0.6	9.6 $\pm$ 1.7
MW-109D	03/28/13	< 163						
MW-109D	04/25/13	< 167			< 0.8	< 0.4	1.9 $\pm$ 1.0	< 1.6
MW-109D	09/22/13	< 177	< 3.8	< 0.5				
MW-109D	09/22/13	< 198						
MW-109D	10/06/13	< 197						
MW-11	03/27/13	249 $\pm$ 116						
MW-11	05/02/13	372 $\pm$ 132			< 1.3	< 0.6	5.1 $\pm$ 1.2	< 1.6
MW-11	09/08/13	497 $\pm$ 146	< 2.7	< 0.6				
MW-110	04/03/13	< 167						
MW-110	04/20/13	< 181			< 1.4	< 0.7	13.2 $\pm$ 1.5	< 1.7
MW-111DR	03/29/13	< 173						
MW-111DR	04/20/13	< 165			< 0.6	5.9 $\pm$ 2.1	< 0.9	8.9 $\pm$ 2.1
MW-111DR	09/28/13	< 195	< 5.5	< 0.6				
MW-111DR	10/06/13	< 194						
MW-112D	03/29/13	< 180						
MW-112D	04/20/13	< 172			< 1.1	< 0.7	1.9 $\pm$ 1.0	< 1.7
MW-112D	09/25/13	< 195	< 6.2	< 0.6				
MW-112D	10/18/13	< 189						
MW-113	03/28/13	< 158						
MW-113	04/20/13	< 165			0.9 $\pm$ 0.4	< 0.7	2.6 $\pm$ 0.7	< 1.7
MW-113	09/28/13	< 189	< 5.2	< 0.5				
MW-113	10/18/13	< 188						
MW-13	03/27/13	956 $\pm$ 154						
MW-13	05/03/13	274 $\pm$ 126			< 0.8	< 0.3	< 1.2	< 1.6
MW-130D	03/28/13	< 156						
MW-130D	04/25/13	< 168			< 1.0	< 0.3	3.8 $\pm$ 1.0	< 1.4
MW-130D	09/22/13	< 190	< 3.2	< 0.5				
MW-130D	10/06/13	< 194						
MW-131D	03/29/13	< 170						
MW-131D	04/20/13	< 167			< 1.3	< 0.7	3.8 $\pm$ 1.1	< 1.7
MW-131D	09/25/13	< 196	< 6.8	< 0.7				
MW-131D	10/06/13	< 197						
MW-134D	03/29/13	< 181						
MW-134D	04/20/13	< 165			0.6 $\pm$ 0.4	< 0.7	2.5 $\pm$ 0.8	< 1.7
MW-134D	09/25/13	< 194	< 5.5	< 0.5				
MW-134D	10/18/13	< 186						
MW-135D	03/19/13	< 164						
MW-135D	06/12/13	< 187						
MW-135D	09/24/13	< 181	< 3.7	< 0.3	< 0.7	< 0.4	1.7 $\pm$ 0.9	< 1.5
MW-135D	12/19/13	< 176	< 6.3	< 0.9	< 1.4	< 0.8	< 3.0	< 1.4
MW-136D	03/19/13	< 167						
MW-136D	06/12/13	< 178						
MW-136D	09/24/13	< 182	< 3.9	< 0.5	< 0.8	< 0.6	3.3 $\pm$ 1.1	< 1.9
MW-136D	12/19/13	< 175	< 5.8	< 0.9	< 1.4	< 0.8	< 2.7	< 1.4
MW-137D	03/19/13	< 165						
MW-137D	06/12/13	< 181						
MW-137D	09/24/13	< 179	< 4.0	< 0.6	< 0.7	< 0.6	2.3 $\pm$ 0.9	< 1.9
MW-137D	12/19/13	< 177	< 6.9	< 0.9	< 1.2	< 0.8	< 2.4	< 1.4
MW-138D	03/19/13	< 167						

TABLE B-1.1

**CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
MW-138D	06/12/13	< 189						
MW-138D	09/24/13	< 173	< 4.4	< 0.5	< 1.0	< 0.4	2.3 $\pm$ 1.1	< 1.5
MW-138D	12/19/13	< 180	< 5.3	< 0.9	< 1.1	< 0.8	< 2.8	< 1.4
MW-139D	03/20/13	< 191						
MW-139D	06/12/13	< 160						
MW-139D	09/24/13	< 177	< 3.8	< 0.5	1.7 $\pm$ 0.8	< 0.6	27.6 $\pm$ 1.8	< 1.9
MW-139D	12/19/13	< 177	< 6.7	< 0.9	< 1.9	< 0.8	< 2.7	< 1.4
MW-14	05/03/13	254 $\pm$ 128			< 0.9	< 0.3	14.8 $\pm$ 1.4	< 1.6
MW-141D	03/28/13	535 $\pm$ 148						
MW-141D	05/01/13	917 $\pm$ 160			< 7.6	< 1.0	86.3 $\pm$ 6.9	< 2.7
MW-141D	10/25/13	705 $\pm$ 143						
MW-142D	03/21/13	1770 $\pm$ 237						
MW-142D	04/30/13	2090 $\pm$ 258			< 7.2	< 1.4	52.4 $\pm$ 7.7	< 2.0
MW-142D	09/21/13	2010 $\pm$ 254	< 4.0	< 0.6				
MW-142D	10/25/13	1460 $\pm$ 208						
MW-143D	03/21/13	< 192						
MW-143D	05/02/13	455 $\pm$ 135			< 1.4	< 0.6	6.2 $\pm$ 1.3	< 1.6
MW-143D	11/13/13	< 181						
MW-144D	03/22/13	2930 $\pm$ 344						
MW-144D	04/25/13	3200 $\pm$ 368			< 0.6	< 0.8	5.3 $\pm$ 0.9	< 1.6
MW-144D	09/08/13	2430 $\pm$ 292	< 2.4	< 0.5				
MW-144D	11/13/13	2970 $\pm$ 351						
MW-145D	03/19/13	< 166	< 5.0	< 1.0	< 0.6	< 0.9	< 1.1	< 1.6
MW-145D	06/13/13	< 187	< 6.3	< 0.6	< 0.7	< 0.4	< 1.1	< 2.1
MW-145D	09/24/13	< 178						
MW-145D	12/18/13	< 180	< 6.2	< 1.0	< 1.1	< 0.7	< 2.5	< 1.9
MW-154	04/25/13	249 $\pm$ 115			< 0.6	< 0.3	2.0 $\pm$ 0.7	< 1.4
MW-154	12/04/13	< 175						
MW-155	04/25/13	266 $\pm$ 118			< 1.1	< 0.3	5.0 $\pm$ 1.1	< 1.4
MW-155	12/04/13	330 $\pm$ 131						
MW-158D	03/20/13	< 189						
MW-158D	06/12/13	< 160						
MW-158D	09/24/13	< 179	< 4.6	< 0.7	1.1 $\pm$ 0.7	< 0.6	29.4 $\pm$ 1.7	< 1.9
MW-158D	12/18/13	< 165	< 5.9	< 0.5	1.0 $\pm$ 0.6	< 0.8	29.7 $\pm$ 1.4	< 1.4
MW-159D	05/01/13	410 $\pm$ 123			< 1.2	< 0.7	6.6 $\pm$ 1.2	< 1.6
MW-159D	12/04/13	< 194						
MW-161D	03/22/13	586 $\pm$ 153						
MW-161D	04/25/13	421 $\pm$ 122			< 1.0	< 0.4	7.3 $\pm$ 1.3	< 1.6
MW-162D	03/27/13	771 $\pm$ 161						
MW-162D	04/25/13	792 $\pm$ 143			< 0.9	< 0.8	5.6 $\pm$ 1.1	< 1.6
MW-162D	09/08/13	716 $\pm$ 158	< 2.2	< 0.6				
MW-162D	11/13/13	724 $\pm$ 146						
MW-2	03/21/13	1590 $\pm$ 212						
MW-2	04/02/13	1450 $\pm$ 197			1.6 $\pm$ 0.8	< 0.7	3.3 $\pm$ 1.0	< 1.7
MW-2	09/08/13	997 $\pm$ 173	< 3.6	< 0.8	< 1.1	< 0.5	14.7 $\pm$ 1.4	< 1.5
MW-2	10/25/13	2690 $\pm$ 323						
MW-22	03/21/13	848 $\pm$ 164						
MW-22	05/02/13	819 $\pm$ 149			< 1.1	< 0.6	3.5 $\pm$ 1.1	< 1.6
MW-4	03/21/13	2440 $\pm$ 295						
MW-4	04/30/13	2190 $\pm$ 269			< 1.9	< 0.7	4.2 $\pm$ 1.3	< 1.6
MW-4	09/14/13	1710 $\pm$ 227	< 4.5	< 0.5	< 1.0	< 0.4	5.5 $\pm$ 1.2	< 1.7

TABLE B-I.1

**CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
MW-4	10/25/13	1580 $\pm$ 217						
MW-5	03/22/13	1550 $\pm$ 208						
MW-5	04/25/13	949 $\pm$ 153			0.9 $\pm$ 0.6	< 0.4	2.7 $\pm$ 0.9	< 1.6
MW-5	09/08/13	970 $\pm$ 162	< 2.7	< 0.7	< 1.1	< 0.5	2.2 $\pm$ 0.9	< 1.5
MW-6	03/27/13	1410 $\pm$ 197						
MW-6	04/30/13	1600 $\pm$ 212			< 3.9	< 1.8	5.5 $\pm$ 2.9	< 3.9
MW-6	09/21/13	1460 $\pm$ 202	< 4.1	< 0.5	< 2.9	< 0.6	8.3 $\pm$ 2.2	< 2.8
MW-7	03/22/13	1600 $\pm$ 211						
MW-7	05/02/13	1440 $\pm$ 197			< 2.1	< 1.6	5.2 $\pm$ 2.7	< 3.6
MW-7	09/14/13	1560 $\pm$ 214	< 6.8	< 0.6	< 1.5	4.0 $\pm$ 1.2	4.8 $\pm$ 1.2	6.1 $\pm$ 1.1
MW-7	10/25/13	1020 $\pm$ 167						
MW-9	03/22/13	362 $\pm$ 123						
MW-9	05/02/13	472 $\pm$ 137			< 1.5	< 0.6	7.0 $\pm$ 1.3	< 1.6
MW-BW-141D	09/14/13	618 $\pm$ 157	< 6.7	< 0.5				
MW-BW-143D	09/14/13	235 $\pm$ 133	< 8.2	< 0.5				
MW-BW-201S	03/27/13	201 $\pm$ 129						
MW-BW-201S	05/01/13	453 $\pm$ 137			< 2.5	< 1.3	15.8 $\pm$ 2.8	< 3.0
MW-BW-201S	09/21/13	458 $\pm$ 144	< 3.6	< 0.5				
MW-BW-202S	03/25/13	< 191						
MW-BW-202S	05/01/13	212 $\pm$ 123			< 4.0	< 0.3	10.8 $\pm$ 1.8	< 1.6
MW-BW-202S	09/14/13	218 $\pm$ 133	< 6.5	< 0.4				
MW-BW-202S	11/13/13	208 $\pm$ 122						
MW-BW-203S	03/25/13	< 194						
MW-BW-203S	05/01/13	296 $\pm$ 119			< 0.7	< 0.4	5.9 $\pm$ 1.1	< 1.7
MW-BW-203S	09/14/13	261 $\pm$ 135	< 7.3	< 0.6				
MW-BW-203S	11/13/13	380 $\pm$ 128						
MW-BW-207I	03/21/13	556 $\pm$ 151						
MW-BW-207I	04/30/13	510 $\pm$ 132			< 3.1	< 1.5	14.6 $\pm$ 2.7	< 3.2
MW-BW-207I	10/25/13	341 $\pm$ 126						
OWM31P	03/28/13	< 159						
OWM31P	05/03/13	< 181			10.0 $\pm$ 2.3	< 0.3	51.0 $\pm$ 2.4	< 1.6
P-2D	03/19/13	< 169						
P-2D	06/12/13	< 177						
P-2D	09/24/13	< 178						
P-2D	12/19/13		< 5.4	< 0.9	< 0.9	< 0.8	3.6 $\pm$ 1.7	< 1.4
P-4D	03/19/13	1040 $\pm$ 159						
P-4D	06/12/13	1320 $\pm$ 182						
PW-006	01/08/13	< 193						
PW-006	04/16/13	< 177						
PW-006	07/15/13	< 193						
PW-006	10/22/13	< 176						
PW-006A	07/15/13	< 193						
PW-006A	10/22/13	< 173						
PW-006P	04/16/13	< 178						
PW-006P	07/15/13	< 190						
PW-006P	10/22/13	< 184						
PW-011	01/08/13	< 196						
PW-011	04/16/13	< 181						
PW-011	07/15/13	< 190						
PW-011	10/22/13	< 170						
PW-011	10/22/13	< 179						

TABLE B-I.1

**CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
PW-013	01/08/13	< 195						
PW-013	04/16/13	< 177						
PW-013	07/15/13	< 195						
PW-013	10/22/13	< 172						
PW-015	01/08/13	< 192						
PW-015	04/16/13	< 180						
PW-015	07/15/13	< 193						
PW-015	10/22/13	< 176						
PW-016	01/08/13	< 195						
PW-016	04/16/13	< 183						
PW-016	07/15/13	< 192						
PW-016	10/22/13	< 173						
RW-10	10/15/13	< 193						
RW-5	09/22/13	< 190	< 3.6	< 0.5				
RW-7	10/06/13	< 200						
RW-9	10/15/13	< 189						
VB-10-1	03/18/13	< 164						
VB-10-1	06/11/13	< 162						
VB-10-1	09/23/13	< 180						
VB-10-1R	12/18/13	< 170						
VB1-1	03/28/13	< 188						
VB1-1	04/25/13	Original	327 $\pm$ 116					
VB1-1	04/25/13	Recount	294 $\pm$ 114					
VB1-1	04/25/13	Reanalysis	405 $\pm$ 122					
VB1-1	09/22/13		212 $\pm$ 128					
VB-11-1	03/19/13	< 166						
VB-11-1	06/12/13	< 159						
VB-11-1	09/24/13	< 181						
VB-11-1	12/18/13	< 167						
VB-2-6D	03/29/13	< 179						
VB-2-6D	04/20/13	< 165			< 0.4	< 0.7	2.7 $\pm$ 0.8	< 1.7
VB-3-2	03/28/13	< 161						
VB-3-2	06/05/13	< 176						
VB-3-2	09/06/13	< 189						
VB-4-1	03/18/13	< 180						
VB-4-1	06/12/13	< 162						
VB-4-1	09/23/13	< 180						
VB-4-1	12/18/13	< 176						
VB-5-2	03/20/13	< 189						
VB-5-2	06/11/13	< 162						
VB-5-2	09/23/13	< 178						
VB-5-2	12/18/13	< 167						
VB-6-1	03/18/13	< 167						
VB-6-1	06/11/13	< 159						
VB-6-1	09/23/13	< 175						
VB-6-1	12/17/13	< 166						
VB-7-1	03/18/13	< 191						
VB-7-1	06/11/13	< 163						
VB-7-1	09/23/13	< 177						
VB-7-1	12/17/13	< 168						
VB-8-2R	03/18/13	< 168						

**TABLE B-I.1**

**CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)	Gr-B (Dis)	Gr-B (Sus)
VB-8-2R	06/11/13	< 163						
VB-8-2R	09/23/13	< 179						
VB-8-2R	12/17/13	< 168						
VB-9-1	03/18/13	< 163						
VB-9-1	06/11/13	< 163						
VB-9-1	09/23/13	< 178						
VB-9-1	12/17/13	< 172						

TABLE B-I.2

**CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  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-103	04/20/13	< 22	< 21	< 2	< 3	< 6	< 2	< 4	< 3	< 4	< 11	< 2	< 2	< 20	< 7
MW-109D	04/25/13	< 18	< 34	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 9	< 2	< 2	< 17	< 5
MW-11	05/02/13	< 13	< 10	< 1	< 1	< 3	< 1	< 2	< 1	< 3	< 11	< 1	< 1	< 16	< 5
MW-110	04/20/13	< 24	47 $\pm$ 30	< 2	< 2	< 5	< 2	< 5	< 3	< 5	< 13	< 2	< 2	< 23	< 6
MW-111DR	04/20/13	< 22	< 20	< 2	< 2	< 6	< 2	< 4	< 3	< 4	< 11	< 2	< 2	< 21	< 7
MW-112D	04/20/13	< 22	< 19	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 20	< 6
MW-113	04/20/13	< 22	< 35	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 19	< 6
MW-13	05/03/13	< 14	< 29	< 1	< 1	< 3	< 1	< 3	< 1	< 2	< 10	< 1	< 1	< 16	< 5
MW-130D	04/25/13	< 23	< 44	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 20	< 5
MW-131D	04/20/13	< 19	< 37	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 9	< 2	< 2	< 19	< 7
MW-134D	04/20/13	< 25	57 $\pm$ 31	< 2	< 3	< 6	< 2	< 4	< 3	< 5	< 12	< 2	< 3	< 23	< 6
MW-135D	09/24/13	< 48	< 85	< 4	< 5	< 12	< 4	< 7	< 5	< 10	< 15	< 4	< 4	< 32	< 11
MW-135D	12/19/13	< 41	< 44	< 5	< 5	< 11	< 5	< 10	< 6	< 9	< 12	< 5	< 5	< 29	< 12
MW-136D	09/24/13	< 38	< 44	< 4	< 5	< 9	< 4	< 8	< 4	< 8	< 14	< 4	< 4	< 29	< 11
MW-136D	12/19/13	< 39	< 77	< 4	< 5	< 10	< 4	< 9	< 5	< 8	< 15	< 4	< 4	< 30	< 10
MW-137D	09/24/13	< 37	< 30	< 4	< 4	< 10	< 5	< 9	< 4	< 7	< 13	< 4	< 4	< 27	< 8
MW-137D	12/19/13	< 46	< 34	< 4	< 5	< 11	< 3	< 9	< 5	< 9	< 14	< 3	< 4	< 32	< 10
MW-138D	09/24/13	< 35	< 84	< 4	< 5	< 11	< 5	< 8	< 5	< 7	< 14	< 4	< 4	< 32	< 9
MW-138D	12/19/13	< 41	< 51	< 5	< 5	< 12	< 5	< 10	< 6	< 9	< 15	< 5	< 5	< 34	< 11
MW-139D	09/24/13	< 42	< 39	< 5	< 5	< 11	< 4	< 10	< 6	< 8	< 14	< 4	< 5	< 31	< 11
MW-139D	12/19/13	< 36	< 82	< 4	< 5	< 11	< 6	< 9	< 5	< 8	< 15	< 4	< 5	< 36	< 9
MW-14	05/03/13	< 15	< 13	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 13	< 1	< 1	< 18	< 7
MW-141D	05/01/13	< 16	117 $\pm$ 28	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 15	< 1	< 2	< 21	< 7
MW-142D	04/30/13	< 12	42 $\pm$ 22	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 10	< 1	< 1	< 14	< 5
MW-143D	05/02/13	< 14	< 13	< 1	< 1	< 3	< 1	< 2	< 1	< 3	< 11	< 1	< 1	< 18	< 5
MW-144D	04/25/13	< 23	< 20	< 2	< 2	< 5	< 2	< 4	< 3	< 4	< 11	< 2	< 2	< 20	< 6
MW-145D	03/19/13	< 42	< 42	< 5	< 5	< 11	< 5	< 10	< 5	< 8	< 7	< 5	< 5	< 23	< 8
MW-145D	06/13/13	< 38	< 77	< 4	< 4	< 9	< 5	< 8	< 5	< 8	< 7	< 4	< 5	< 21	< 6
MW-145D	12/18/13	< 36	< 36	< 3	< 4	< 9	< 4	< 9	< 5	< 8	< 12	< 4	< 4	< 24	< 9
MW-154	04/25/13	< 21	< 35	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 18	< 7
MW-155	04/25/13	< 20	< 18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 9	< 2	< 2	< 18	< 5
MW-158D	09/24/13	< 36	< 34	< 4	< 4	< 8	< 5	< 7	< 5	< 9	< 13	< 4	< 4	< 29	< 10
MW-158D	12/18/13	< 51	< 103	< 6	< 6	< 11	< 6	< 13	< 6	< 10	< 14	< 5	< 6	< 37	< 12
MW-159D	05/01/13	< 16	40 $\pm$ 26	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 11	< 1	< 2	< 18	< 6

TABLE B-I.2

CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013

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-161D	04/25/13	< 26	< 25	< 3	< 3	< 7	< 3	< 6	< 3	< 5	< 11	< 2	< 3	< 23	< 8
MW-162D	04/25/13	< 19	< 34	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 9	< 2	< 2	< 17	< 6
MW-2	04/02/13	< 25	< 21	< 2	< 3	< 8	< 2	< 5	< 3	< 5	< 46	< 2	< 2	< 50	< 17
MW-2	09/08/13	< 16	< 14	< 2	< 2	< 4	< 1	< 3	< 2	< 3	< 11	< 1	< 2	< 16	< 5
MW-22	05/02/13	< 16	< 13	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 12	< 1	< 1	< 20	< 6
MW-4	04/30/13	< 14	< 12	< 1	< 2	< 3	< 1	< 3	< 2	< 3	< 14	< 1	< 1	< 19	< 6
MW-4	09/14/13	< 17	49 ± 26	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 14	< 1	< 1	< 20	< 5
MW-5	04/25/13	< 22	< 21	< 2	< 2	< 6	< 2	< 4	< 3	< 5	< 10	< 2	< 2	< 20	< 7
MW-5	09/08/13	< 20	< 17	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 13	< 2	< 2	< 21	< 6
MW-6	04/30/13	< 14	< 28	< 1	< 1	< 3	< 1	< 3	< 1	< 3	< 14	< 1	< 1	< 19	< 6
MW-6	09/21/13	< 21	< 18	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 18	< 5
MW-7	05/02/13	< 14	< 11	< 1	< 1	< 3	< 1	< 3	< 1	< 3	< 12	< 1	< 1	< 17	< 6
MW-9	05/02/13	< 12	< 28	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 9	< 1	< 1	< 15	< 4
MW-BW-201S	05/01/13	< 15	< 12	< 1	< 1	< 3	< 1	< 3	< 1	< 3	< 14	< 1	< 1	< 18	< 6
MW-BW-202S	05/01/13	< 15	< 11	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 15	< 1	< 1	< 18	< 5
MW-BW-203S	05/01/13	< 14	< 29	< 1	< 1	< 3	< 1	< 3	< 1	< 3	< 13	< 1	< 1	< 18	< 6
MW-BW-207I	04/30/13	< 19	40 ± 23	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 14	< 1	< 2	< 20	< 6
OWM31P	05/03/13	< 12	< 10	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 10	< 1	< 1	< 15	< 4
P-2D	06/12/13	< 43	< 53	< 6	< 6	< 8	< 5	< 10	< 6	< 9	< 8	< 5	< 6	< 23	< 5
P-2D	12/19/13	< 41	< 77	< 4	< 4	< 10	< 4	< 8	< 4	< 8	< 15	< 4	< 4	< 32	< 10
VB-2-6D	04/20/13	< 23	< 21	< 2	< 2	< 6	< 2	< 5	< 3	< 4	< 11	< 2	< 2	< 21	< 7

**TABLE B-I.3**

**CONCENTRATIONS OF HARD TO DETECTS IN GROUNDWATER SAMPLES  
COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER  
PROTECTION PROGRAM, BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  2 SIGMA

SITE	COLLECTION DATE	Am-241	Cm-242	Cm-243/244	Pu-238	Pu-239/240	U-234	U-235	U-238	Fe-55	Ni-63
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NONE FOR 2013

TABLE B-II.1

CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA, AND GROSS BETA IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013

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 (DS-2)	03/20/13	< 162						
DITCH (DS-2)	04/20/13	< 171			< 0.6	< 0.4	1.8 ± 0.8	< 1.5
DITCH (DS-2)	09/28/13	< 193						
DITCH (DS-2)	10/06/13	Original	452 ± 146					
DITCH (DS-2)	10/06/13	Recount	615 ± 153					
DITCH (DS-2)	10/06/13	Reanalysis	501 ± 137					
EXELON POND	05/02/13	< 183			< 0.6	< 0.4	1.5 ± 0.9	< 1.7
SG-BW-105	03/18/13	< 168						
SG-BW-105	04/20/13	< 173			1.2 ± 0.8	< 0.4	8.2 ± 1.3	< 1.5
SG-BW-106	03/20/13	< 169						
SG-BW-106	04/20/13	< 170			< 1.0	< 0.4	9.2 ± 1.4	< 1.5
SG-BW-105	04/16/13	< 181						
SG-BW-105	07/15/13	< 191						
SG-BW-105	10/22/13	< 176						
SW-101	03/20/13	231 ± 124						
SW-101	04/20/13	< 165			< 1.2	< 0.7	4.1 ± 1.1	< 1.7
SW-102	03/20/13	< 185						
SW-102	04/20/13	< 172			< 1.2	< 0.7	4.7 ± 1.2	< 1.7
SW-102	09/28/13	Original	341 ± 140					
SW-102	09/28/13	Recount	310 ± 126					
SW-103	03/20/13	< 193						
SW-103	04/20/13	< 167			< 1.7	< 0.7	4.5 ± 1.2	< 1.7
SW-104	03/20/13	196 ± 108						
SW-104	04/20/13	< 170			< 1.1	< 0.4	4.3 ± 1.2	< 1.5

TABLE B-II.2

**CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES  
COLLECTED IN THE VICINITY OF BRAIDWOOD STATION, 2013**

RESULTS IN UNITS OF PCI/LITER  $\pm$  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 (DS-2)	04/20/13	< 22	< 19	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 20	< 7
EXELON POND	05/02/13	< 17	< 45	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 13	< 1	< 1	< 18	< 6
SG-BW-105	04/20/13	< 12	< 10	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 7	< 1	< 1	< 12	< 4
SG-BW-106	04/20/13	< 17	< 14	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 9	< 2	< 2	< 17	< 5
SW-101	04/20/13	< 18	< 15	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 9	< 2	< 2	< 17	< 5
SW-102	04/20/13	< 22	< 44	< 2	< 2	< 6	< 2	< 4	< 2	< 4	< 12	< 2	< 2	< 20	< 7
SW-103	04/20/13	< 19	55 $\pm$ 31	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 18	< 6
SW-104	04/20/13	< 17	45 $\pm$ 23	< 2	< 2	< 4	< 1	< 3	< 2	< 3	< 10	< 2	< 2	< 17	< 5

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