Exelon Generation®

Byron Generating Station

4450 North German Church Rd
Byron, IL 61010-9794

www.exeloncorp.com

May 12, 2016

LTR: BYRON 2016-0045
File: 1.10.0101 (1D.101)
2.12.1523 (2C.111)

United States Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Subject: 2015 Annual Radiological Environmental Operating Report (AREOR)

In accordance with Technical Specification 5.6.2, "Annual Radiological Environmental Operating Report," we are submitting the Annual Radiological Environmental Operating Report (AREOR) for Byron Station. This report is required to be submitted to the NRC by May 15th of each year and contains the results of the radiological environmental and meteorological monitoring programs. The Radioactive Effluent Release Report was submitted under separate cover. Also included are the results of groundwater monitoring conducted in accordance with Exelon's Radiological Groundwater Protection Program (RGPP), which is a voluntary program implemented in 2006. This information is being reported in accordance with a nuclear industry initiative.

If you have any questions regarding this information, please contact Mr. Douglas Spitzer, Regulatory Assurance Manager, at (815) 406-2800.

Respectfully,

Mark E. Kanavos
Site Vice President
Byron Generating Station

MEK/JG/AC/sg

Attachment: AREOR Report

cc: Regional Administrator – NRC Region III

Docket No: 50-454
50-455

BYRON NUCLEAR GENERATING STATION
UNITS 1 and 2

Annual Radiological
Environmental Operating Report

1 January Through 31 December 2015

Prepared By

Teledyne Brown Engineering
Environmental Services

Byron Nuclear Generating Station
Byron, IL 61010

May 2016

Intentionally left blank

Table Of Contents

Appendices

Intentionally left blank

I. Summary and Conclusions

This report on the Radiological Environmental Monitoring Program conducted for the Byron Nuclear Generating Station by Exelon covers the period 1 January 2015 through 31 December 2015. During that time period, 1,450 analyses were performed on 1,298 samples. In assessing all the data gathered for this report and comparing these results with preoperational data, it was concluded that the operation of BNGS had no adverse radiological impact on the environment.

Surface water samples were analyzed for concentrations of gross beta, tritium, Nickel-63 (Ni-63), and gamma emitting nuclides. Ground water samples were analyzed for concentrations of tritium and gamma emitting nuclides. Gross beta activities detected were consistent with those detected in previous years. All surface water samples analyzed for Ni-63 were less than the minimum detectable concentration. Tritium detected in downstream surface water was well below reportable limits and consistent with expected levels as a result of permitted liquid discharges.

Fish (commercially and/or recreationally important species) and sediment samples were analyzed for concentrations of Ni-63 and gamma emitting nuclides. Non-plant produced Cesium-137 activity was detected at one sediment location. Low levels of Cs-137 are detected occasionally and are consistent with data from previous years and are not a result of plant effluents.

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. All I-131 results were below the minimum detectable activity. No fission or activation products were found.

Food Product samples were analyzed for concentrations of gamma emitting nuclides. No 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 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).

Intentionally left blank

II. Introduction

Byron Station, a two-unit PWR station, is located about two miles east of the Rock River and approximately three miles southwest of Byron in Ogle County, Illinois. The reactors are designed to have capacities of 1,268 and 1,241 MW gross, respectively. Unit One loaded fuel in November 1984 and went on line February 2, 1985. Unit Two went on line January 9, 1987. The station has been designed to keep releases to the environment at levels below those specified in the codes of federal regulations.

This report covers those analyses performed by Teledyne Brown Engineering (TBE) and Landauer on samples collected during the period 1 January 2015 through 31 December 2015.

A. Objectives of the REMP

The objectives of the REMP are to:

1. Provide data on measurable levels of radiation and radioactive materials in the site environs.

2. Evaluate the relationship between quantities of radioactive material released from the plant and resultant radiation doses to individuals from principal pathways of exposure.

B. Implementation of the Objectives

The implementation of the objectives is accomplished by:

1. Identifying significant exposure pathways.

2. Establishing baseline radiological data of media within those pathways.

3. Continuously monitoring those media before and during Station operation to assess Station radiological effects (if any) on man and the environment.

III. Program Description

A. Sample Collection

Samples for the BNGS REMP were collected for Exelon Nuclear by Environmental Inc. (Midwest Labs). This section describes the general collection methods used by Environmental Inc. to obtain environmental

samples for the BNGS REMP in 2015. Sample locations and descriptions can be found in Table B–1 and Figures B–1 through B–5, Appendix B.

Aquatic Environment

The aquatic environment was evaluated by performing radiological analyses on samples of surface water, ground water, fish and sediment. Two gallon water samples were collected weekly from two surface water locations (BY-12 and BY-29 [Control location]) and quarterly from seven ground water locations (BY-14-1, BY-18-1, BY-32, BY-35, BY-36, BY-37 and BY-38). All samples were collected in new unused plastic bottles, which were rinsed with source water prior to collection. Fish samples comprising the flesh of freshwater drum, silver redhorse, shorthead redhorse, golden redhorse, quillback and river carpsucker were collected semiannually at two locations, BY-29 (control) and BY-31. Sediment samples composed of recently deposited substrate were collected at two locations semiannually, BY-12 and BY-34 (control).

Atmospheric Environment

The atmospheric environment was evaluated by performing radiological analyses on samples of air particulate, and airborne iodine. Airborne iodine and particulate samples were collected and analyzed weekly at eight locations (BY-01, BY-04, BY-06, BY-08, BY-21, BY-22, BY-23 and BY-24). The control location was BY-08. 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 samples of milk and food products. Milk samples were collected monthly from January through April and November through December, and biweekly May through October. The control location was BY-26-2 and the indicator location was BY-20-1. All samples were collected in new unused two gallon plastic bottles from the bulk tank at each location, preserved with sodium bisulfate and shipped promptly to the laboratory.

Food products were collected annually in August at five locations (BY-Control, BY-Quad 1, BY-Quad 2, BY-Quad 3 and BY-Quad 4). Various types of samples were collected and placed in new unused plastic bags, and sent to the laboratory for analysis.

Ambient Gamma Radiation

Beginning in 2012, Exelon changed the type of dosimetry used for the Radiological Environmental Monitoring Program (REMP). Optically Stimulated Luminescent Dosimetry (OSLD) were deployed and 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 OSLD sets. The OSLDs were exchanged quarterly and sent to Landauer for analysis. The OSLDs were placed at locations on and around the BNGS Station site as follows:

An inner ring consisting of 16 locations (BY-101, BY-102, BY-103, BY-104, BY-105, BY-106, BY-107, BY-108, BY-109, BY-110, BY-111, BY-112, BY-113, BY-114, BY-115 and BY-116) near and within the site perimeter representing fence post doses (i.e., at locations where the doses will be potentially greater than maximum annual off–site doses) from BNGS releases.

An outer ring consisting of 16 locations (BY-201, BY-202, BY-203, BY-204, BY-205, BY-206, BY-207, BY-208, BY-209, BY-210, BY-211, BY-212, BY-213, BY-214, BY-215 and BY-216) extending to approximately 5 miles from the site designed to measure possible exposures to close-in population.

A special interest set consisting of nine locations (BY-301-1, BY-301-2, BY-302-1, BY-309-1, BY-309-2, BY-309-3, BY-309-4, BY-314-1 and BY-314-2) to measure possible exposures from on-site storage facilities.

An other set consisting of seven locations (BY-01, BY-04, BY-06, BY-21, BY-22, BY-23 and BY-24) at locations where air samplers are present.

The balance of one location (BY-08) representing 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 BNGS, if any, would be most significant;

3. On hills free from local obstructions and within sight of the vents (where practical);

4. And near the closest dwelling to the vents in the prevailing downwind direction.

Two OSLDs were placed at each location located at a minimum of five feet above ground level. The OSLDs were exchanged quarterly and sent to Landauer for analysis.

B. Sample Analysis

This section describes the general analytical methodologies used by TBE to analyze the environmental samples for radioactivity for the BNGS REMP in 2015. The analytical procedures used by the laboratory 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 surface water and air particulates.

2. Concentrations of gamma emitters in ground and surface water, air particulates, milk, fish, sediment and vegetation.

3. Concentrations of tritium in ground and surface water.

4. Concentrations of I-131 in air and milk.

5. Concentrations of Nickel-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 Byron Nuclear Generating Station becoming operational were used as a baseline with which these operational data were compared. For the purpose of this report, Byron Nuclear Generating Station was considered operational at initial criticality. In addition, data were 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 BNGS detection capabilities for environmental sample analysis. The minimum detectable concentration (MDC) is defined above with the exception that the measurement is an after-the-fact estimate of the presence of activity.

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 effecting a negative number. An MDC was reported in all cases where positive activity was not detected.

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

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

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

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

D. Program Exceptions

For 2015 the BNGS REMP had a sample recovery rate in excess of 98%. Sample anomalies and missed samples are listed in the tables below:

Table D-1 LISTING OF SAMPLE ANOMALIES

Sample Type	Location Code	Collection Date	Reason
A/I	All	02/17/15	Unable to field check pumps; rotameter not returned from quarterly calibration. Performed on 02/24/15.
A/I	BY-24	03/10/15	Collector found hand broken off vacuum gauge; replaced gauge.
A/I	BY-01	07/21/15	Timer meter stuck; collector estimated time at 168.3 hours.
A/I	BY-04	09/01/15	Low reading of 154.1 hours due to power outage; maintenance changing position of sampler housing.
A/I	BY-21	09/01/15	Low reading of 160.7 hours due to power outage.
A/I	BY-06	09/01/15	Low reading of 166.9 hours due to power outage from storms.
A/I	BY-04	12/29/15	Low reading of 188.5 hours (8-day runtime) due to short power outage.

Table D-2 LISTING OF MISSED SAMPLES

Sample Type	Location Code	Collection Date	Reason
SW	BY-12, BY-29	01/05/15	No sample; water frozen.
SW	BY-12, BY-29	01/13/15	No sample; water frozen.
SW	BY-12, BY-29	01/20/15	No sample; water frozen.
SW	BY-12, BY-29	01/27/15	No sample; water frozen.
SW	BY-12, BY-29	02/03/15	No sample; water frozen.
SW	BY-12, BY-29	02/10/15	No sample; water frozen.
SW	BY-12, BY-29	02/17/15	No sample; water frozen.

Table D-2 LISTING OF MISSED SAMPLES (continued)

Sample Type	Location Code	Collection Date	Reason
SW	BY-12, BY-29	02/24/15	No sample; water frozen.
SW	BY-12, BY-29	03/04/15	No sample; water frozen.
SW	BY-12, BY-29	03/10/15	No sample; water frozen.
WW	BY-36	03/31/15	Water unable to be collected during 1st quarter 2015 after repeated attempts. Homeowners absent and water shut off.
WW	BY-36	06/29/15	Water unable to be collected during 2nd quarter 2015 after repeated attempts. Homeowners absent and water shut off.
OSLD	BY-215-4	09/01/15	OSLD found missing during monthly visual check; collector replaced Spare #2 (EX00056503V).

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

In April 2015 (2015 2nd Quarter), Direct Radiation Special Interest dosimeters BY-302-1, BY-314-1 were removed and BY-301-2, BY-314-2 were added. The existing dosimeters, located within the Security exclusion zone, were relocated (and renamed) to areas in the same general location but outside the exclusion zone to allow the sample collector easier access and to more accurately reflect non-occupational dose to a member of the public.

In July 2015, groundwater sample location BY-36 was replaced with nearby BY-38 after repeated attempts to obtain a sample at BY-36 were unsuccessful.

IV. Results and Discussion

A. Aquatic Environment

1. Surface Water

Samples were taken weekly and composited monthly at two locations (BY-12 and BY-29). Of these locations only BY-12 located downstream, could be affected by Byron Nuclear Generating Station's effluent releases. The following analyses were performed.

Gross Beta

Samples from both locations were analyzed for concentrations of gross beta (Table C–I.1, Appendix C). The values ranged from 2.9 to 6.6 pCi/l. Concentrations detected were consistent with those detected in previous years (Figure C–1, Appendix C).

Tritium

Quarterly composites of weekly collections were analyzed for tritium activity (Table C–I.2, Appendix C). Tritium was detected in two samples. The concentrations ranged from 490 – 748 pCi/L (Figure C–2, Appendix C). Tritium detected in downstream surface water was well below reportable limits and consistent with expected levels as a result of permitted liquid discharges.

Nickel

Samples from both locations were analyzed for concentration of Ni-63 (Table C–I.3, Appendix C). All results were less than the minimum detectable concentration.

Gamma Spectrometry

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

2. Ground Water

Quarterly grab samples were collected at seven locations (BY-14-1, BY-18-1, BY-32, BY-35, BY-36, BY-37 and BY-38). These locations could be affected by Byron Nuclear Generating Station's effluent releases. The following analyses were performed:

Tritium

Quarterly grab samples from the locations were analyzed for tritium activity (Table C–II.1, Appendix C). No tritium was detected, and the required LLD was met (Figures C–3 through C–7, Appendix C).

Gamma Spectrometry

Samples from all locations were analyzed for gamma emitting nuclides (Table C–II.2 Appendix C). No nuclides were detected, and all required LLDs were met.

3. Fish

Fish samples comprised of freshwater drum, silver redhorse, shorthead redhorse, golden redhorse, quillback and river carpsucker were collected at two locations (BY-29 and BY-31) semiannually. Location BY-31 could be affected by Byron Nuclear Generating Station's effluent releases. The following analyses were performed:

Nickel

The edible portion of fish samples from both locations was analyzed for Nickel-63 (Table C–III.1, Appendix C). Nickel-63 was not detected and the required LLD was met.

Gamma Spectrometry

The edible portion of fish samples from both locations was analyzed for gamma emitting nuclides (Table C–III.1, Appendix C). No nuclides were detected, and all required LLDs were met.

4. Sediment

Aquatic sediment samples were collected at two locations (BY-12 and BY-34) semiannually. BY-12, located downstream, could be affected by Byron Nuclear Generating Station's effluent releases. The following analyses were performed:

Nickel

Sediment samples from both locations were analyzed for Nickel-63 (Table C–IV.1, Appendix C). Nickel-63 was not detected and the required LLD was met.

Gamma Spectrometry

Sediment samples from both locations were analyzed for gamma emitting nuclides (Table C–IV.1, Appendix C). Cesium-137 was detected in one sample. The concentration was 109 pCi/kg dry. The concentrations detected was consistent with those detected in previous years and is not a result of plant effluents. No other nuclides were detected, 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: Nearsite samplers within 4 km of the site (BY-21, BY-22, BY-23 and BY-24), Far Field samplers between 4 and 10 km of the site (BY-01, BY-04 and BY-06) and the Control sampler between 10 and 30 km from the site (BY-08). The following analyses were performed:

Gross Beta

Weekly samples were analyzed for concentrations of beta emitters (Table C–V.1 and C–V.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 BNGS. The results from the Nearsite locations (Group I) ranged from 5 to 52 E–3 pCi/m^3 with a mean of 18 E–3 pCi/m^3. The results from the Far Field locations (Group II) ranged from 6 to 41 E–3 pCi/m^3 with a mean of 17 E–3 pCi/m^3. The results from the Control location (Group III) ranged from 9 to 37 E–3 pCi/m^3 with a mean of 17 E–3 pCi/m^3. Comparison of the 2015 air particulate data with previous years data indicate no effects from the operation of BNGS. In addition a comparison of the weekly mean values for 2015 indicate no notable differences among the three groups (Figures C–8 through C-12, Appendix C).

Gamma Spectrometry

Weekly samples were composited quarterly and analyzed

for gamma emitting nuclides (Table C–V.3, Appendix C). No nuclides were detected, and all required LLDs were met.

b. Airborne Iodine

Continuous air samples were collected from eight locations (BY-01, BY-04, BY-06, BY-08, BY-21, BY-22, BY-23 and BY-24) and analyzed weekly for I-131 (Table C–VI.1, Appendix C). All results were less than the minimum detectable concentration for I-131.

2. Terrestrial

a. Milk

Samples were collected from two locations (BY-20-1 and BY-26-2) monthly from January to April and November through December, and biweekly May through October. The following analyses were performed:

Iodine-131

Milk samples from all locations were analyzed for concentrations of I-131 (Table C–VII.1, Appendix C). No nuclides were detected, and all required LLDs were met.

Gamma Spectrometry

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

b. Vegetation

Vegetation samples were collected at five locations (BY-Control, BY-Quad 1, BY-Quad 2, BY-Quad 3 and BY-Quad 4) when available. Four locations (BY-Quad 1, BY-Quad 2, BY-Quad 3 and BY-Quad 4) could be affected by Byron Nuclear Generating Station's effluent releases. The following analysis was performed:

Gamma Spectrometry

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

C. Ambient Gamma Radiation

Ambient gamma radiation levels were measured utilizing OSLDs.

Ninety-one OSLD locations were established around the site. Results of OSLD measurements are listed in Tables C–IX.1 to C–IX.3, Appendix C.

All OSLD measurements were below 30 mR/standard quarter, with a range of 15.9 to 28.9 mR/standard quarter. A comparison of the Inner Ring, Outer Ring, Special Interest, Other and Control Location data indicate that the ambient gamma radiation levels were comparable among the groups.

D. Land Use Survey

A Land Use Survey conducted during August 2015 around the Byron Nuclear Generating Station (BNGS) was performed by Environmental Inc. (Midwest Labs) for Exelon Nuclear to comply with the Byron Nuclear Generating Station's Offsite Dose Calculation Manual. The purpose of the survey was to document the nearest resident, livestock, and milk producing animals in each of the sixteen 22 ½ degree sectors and garden in each of the four 90 degree quadrants around the site. The results of this survey are summarized below.

Distance in Miles from the BNGS Vent Stacks				
Sector		Residence Miles	Livestock Miles	Milk Farm Miles
A	N	1.2	5.9	-
B	NNE	1.6	6.1	-
C	NE	1.1	4.5	-
D	ENE*	1.4	3.5	-
E	E	1.2	4.0	-
F	ESE	1.5	1.5	-
G	SE	1.7	4.3	-
H	SSE	0.7	3.5	-
J	S	0.6	0.7	-
K	SSW	0.7	1.9	-
L	SW	0.8	1.5	-
M	WSW	1.6	1.6	4.5
N	W	1.8	3.4	-
P	WNW	1.6	5.3	11.5
Q	NW	0.9	3.8	-
R	NNW	0.9	1.4	-

* Denotes the nearest industrial facility located at 1.0 miles.

E. Errata Data

There was no errata data for 2015.

F. Summary of Results – Inter-Laboratory Comparison Program

The primary laboratory analyzed Performance Evaluation (PE) samples of air particulate, air iodine (charcoal), milk, soil, vegetation and water (including fish) matrices (Appendix D). The PE sample matrices were chosen based on the types of samples submitted to the primary laboratory for analysis. The selected parameters for the PE samples are based on the appropriate matrices, methodologies and geometries, which include geometries that are comparable. The PE samples, supplied by Analytics Inc., Environmental Resource Associates (ERA) and DOE's Mixed Analyte Performance 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 ± 20% of the reference value. Performance is acceptable with warning when a mean result falls in the range from ±20% to ±30% of the reference

value (i.e., 20% < bias < 30%). If the bias is greater than 30%, the results are deemed not acceptable.

For the TBE laboratory, 129 out of 139 analyses performed met the specified acceptance criteria. Ten analyses (AP - Cr-51, U-234/233, Gr A, Sr-90; Soil Sr-90; Water - Ni-3, Sr-89/90, U natural; Vegetation Sr-90 samples) did not meet the specified acceptance criteria for the following reasons:

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

1. Teledyne Brown Engineering's Analytics' June 2015 air particulate Cr-51 result of 323 ± 45.5 pCi was higher than the known value of 233 pCi with a ratio of 1.39. The upper ratio of 1.30 (acceptable with warning) was exceeded. The air particulate sample is counted at a distance above the surface of the detector to avoid detector summing which could alter the results. Chromium-51 has the shortest half-life (27.7 days) and the lowest gamma energy (320.08 keV) of this mixed nuclide sample. Additionally, Cr-51 has only one gamma energy and also has a low intensity (9.38 gamma photons produced per 100 disintegrations). This geometry produces a larger error for the Cr-51 and other gamma emitters as any distance from the detector decreases the counting rate and the probability of accurately detecting the nuclide energy. Taking into consideration the uncertainty, the activity of Cr-51 overlaps with the known value at a ratio of 1.19, which would statistically be considered acceptable. NCR 15-18

2. Teledyne Brown Engineering's MAPEP March 2015 soil Sr-90 result of 286 Total Bq/kg was lower than the known value of 653 Bq/kg, exceeding the lower acceptance range of 487 Bq/kg. The failure was due to incomplete digestion of the sample. Incomplete digestion of samples causes some of the sample to be left behind and is not present in the digested sample utilized for analysis. The procedure has been updated to include a more robust digestion using stirring during the heating phase. The MAPEP September 2014 soil Sr-90 series prior to this study was evaluated as acceptable with a result of 694 and an acceptance range of 601 – 1115 Bq/kg. The MAPEP September 2015 series soil Sr-90 after this study was evaluated as acceptable with a result of 429 and an acceptance range of 298 – 553 Bq/kg. We feel the issue is specific to the March 2015 MAPEP sample. NCR 15-13

3. Teledyne Brown Engineering's MAPEP March 2015 air particulate U-234/233 result of 0.0211 ± 0.0120 Bq/sample was higher than the known value of 0.0155 Bq/sample, exceeding the upper acceptance range of 0.0202 Bq/sample. Although evaluated as a failure, taking into consideration the uncertainty, TBE's result would overlap with the known value, which is statistically considered acceptable. MAPEP spiked the sample with significantly more U-238 activity (a found to known ratio of 0.96) than the normal U-234/233. Due to the extremely low activity, it was difficult to quantify the U-234/233. NCR 15-13

4. Teledyne Brown Engineering's MAPEP March 2015 air particulate gross alpha result of 0.448 Bq/sample was lower than the known value of 1.77 Bq/sample, exceeding the lower acceptance range of 0.53 Bq/sample. The instrument efficiency used for gross alpha is determined using a non-attenuated alpha standard. The MAPEP filter has the alphas embedded in the filter, requiring an attenuated efficiency. When samples contain alpha particles that are embedded in the sample media, due to the size of the alpha particle, some of the alpha particles are absorbed by the media and cannot escape to be counted. When the sample media absorbs the alpha particles this is known as self-absorption or attenuation. The calibration must include a similar configuration/media to correct for the attenuation. In order to correct the low bias, TBE will create an attenuated efficiency for MAPEP air particulate filters. The MAPEP September series air particulate gross alpha result of 0.47 Bq/sample was evaluated as acceptable with a range of 0.24 – 1.53 Bq/sample. Unlike the MAPEP samples, air particulate Gross alpha analyses for power plants are not evaluated as a direct count sample. Power plant air particulate filters for gross alpha go through an acid digestion process prior to counting and the digested material is analyzed. NCR 15-13

5. Teledyne Brown Engineering's MAPEP September water Ni-63 result of 11.8 ± 10.8 Bq/L was higher than the known value of 8.55 Bq/L, exceeding the upper acceptance range of 11.12 Bq/L. The Ni-63 half-life is approximately 100 years. Nickel-63 is considered to be a "soft" or low energy beta emitter, which means that the beta energy is very low. The maximum beta energy for Ni-63 is approximately 65 keV, much lower than other more common nuclides such as Co-60 (maximum beta energy of 1549 keV). The original sample was run with a 10 mL aliquot which was not sufficient for the low level of Ni-63 in the sample. The rerun aliquot of 30 mL produced an acceptable result of 8.81 Bq/L. NCR 15-21

6. Teledyne Brown Engineering's MAPEP September air particulate Sr-90 result of 1.48 Bq/sample was lower than the known value of 2.18 Bq/sample, exceeding the lower acceptance range of 1.53 Bq/sample. In the past, MAPEP has added substances (unusual compounds found in DOE complexes) to various matrices that have resulted in incomplete removal of the isotope of interest for the laboratories analyzing the cross checks. TBE suspects that this may be the cause of this error. Many compounds, if not properly accounted for or removed in the sample matrix, can cause interferences to either indicate lower activity or higher activity. TBE will no longer analyze the air particulate Sr-90 through MAPEP but will participate in the Analytics cross check program to perform both Sr-89 and Sr-90 in the air particulate matrix. NCR 15-21

7. Teledyne Brown Engineering's MAPEP September vegetation Sr-90 result of 0.386 Bq/sample was lower than the known value of 1.30 Bq/sample, exceeding the lower acceptance range of 0.91 Bq/sample. In the past, MAPEP has added substances (unusual compounds found in DOE complexes) to various matrices that have resulted in incomplete removal of the isotope of interest for the laboratories analyzing the cross checks. TBE suspects that this maybe the cause of this error. Many compounds, if not properly accounted for or removed in the sample matrix, can cause interferences to either indicate lower activity or higher activity. Results from previous performance evaluations were reviewed and shown to be acceptable. NCR 15-21

8. & 9. Teledyne Brown Engineering's ERA May water Sr-89/90 results of 45.2 and 28.0 pCi/L, respectively were lower than the known values of 63.2 and 41.9 pCi/L, respectively, exceeding the lower acceptance limits of 51.1 and 30.8 pCi/L, respectively. The yields were on the high side of the TBE acceptance range, which indicates the present of excess calcium contributed to the yield, resulting in low results. NCR 15-09

10. Teledyne Brown Engineering's ERA November water Uranium natural result of 146.9 pCi/L was higher than the known value of 56.2 pCi/L, exceeding the upper acceptance limit of 62.4 pCi/L. The technician failed to dilute the original sample, but used the entire 12 mL sample. When the results were recalculated without the dilution and using the 12 mL aliquot, the result of 57.16 agreed with the assigned value of 56.2. NCR 15-19

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

Intentionally left blank

APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT SUMMARY

Intentionally left blank

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (PCI/LITER)	GR-B	20	4	4.3 (9/10) (2.9/6.3)	4.4 (9/10) (3.3/6.6)	4.4 (9/10) (3.3/6.6)	BY-29 CONTROL BYRON - UPSTREAM 3.0 MILES N OF SITE	0
	H-3	8	200	619 (2/4) (490/748)	<LLD	619 (2/4) (490/748)	BY-12 INDICATOR OREGON POOL OF ROCK RIVER - DOWNSTREAM 4.5 MILES SSW OF SITE	0
	NI-63	20	30	<LLD	<LLD	-		0
	GAMMA	20						
	MN-54		15	<LLD	<LLD	-		0
	CO-58		15	<LLD	<LLD	-		0
	FE-59		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)

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (PCI/LITER)	CO-60		15	<LLD	<LLD	-		0
	ZN-65		30	<LLD	<LLD	-		0
	NB-95		15	<LLD	<LLD	-		0
	ZR-95		30	<LLD	<LLD	-		0
	I-131		15	<LLD	<LLD	-		0
	CS-134		15	<LLD	<LLD	-		0
	CS-137		18	<LLD	<LLD	-		0

* 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 BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (PCI/LITER)	BA-140		60	<LLD	<LLD	-		0
	LA-140		15	<LLD	<LLD	-		0
GROUND WATER (PCI/LITER)	H-3	22	200	<LLD	NA	-		0
	GAMMA	22						
	MN-54		15	<LLD	NA	-		0
	CO-58		15	<LLD	NA	-		0
	FE-59		30	<LLD	NA	-		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 BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROUND WATER (PCI/LITER)	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

* 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 BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
GROUND WATER (PCI/LITER)	BA-140		60	<LLD	NA	-		0
	LA-140		15	<LLD	NA	-		0
FISH (PCI/KG WET)	NI-63	8	260	<LLD	<LLD	-		0
	GAMMA	8						
	MN-54		130	<LLD	<LLD	-		0
	CO-58		130	<LLD	<LLD	-		0
	FE-59		260	<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 BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
FISH (PCI/KG WET)	CO-60		130	<LLD	<LLD	-		0
	ZN-65		260	<LLD	<LLD	-		0
	NB-95		NA	<LLD	<LLD	-		0
	ZR-95		NA	<LLD	<LLD	-		0
	CS-134		130	<LLD	<LLD	-		0
	CS-137		150	<LLD	<LLD	-		0
	BA-140		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 BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
FISH (PCI/KG WET)	LA-140		NA	<LLD	<LLD	-		0
SEDIMENT (PCI/KG DRY)	NI-63	4	260	<LLD	<LLD	-		0
	GAMMA	4						
	MN-54		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 BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**
LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SEDIMENT (PCI/KG DRY)	ZN-65		NA	<LLD	<LLD	-		0
	NB-95		NA	<LLD	<LLD	-		0
	ZR-95		NA	<LLD	<LLD	-		0
	CS-134		150	<LLD	<LLD	-		0
	CS-137		180	104 (1/2)	109 (1/2)		BY-34 CONTROL ROCK RIVER UPSTREAM OF DISCHARGE 2.6 MILES WNW OF SITE	0
	BA-140		NA	<LLD	<LLD	-		0
	LA-140		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 BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIR PARTICULATE (E-3 PCI/CU.METER)	GR-B	416	10	17 (358/364) (5/52)	17 (51/52) (9/37)	19 (51/52) (6/52)	BY-24 INDICATOR BYRON NEARSITE SOUTHWEST 0.7 MILES SW OF SITE	0
	GAMMA	32						
	MN-54		NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0
	FE-59		NA	<LLD	<LLD	-		0
	CO-60		NA	<LLD	<LLD	-		0
	ZN-65		NA	<LLD	<LLD	-		0

* 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 BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIR PARTICULATE (E-3 PCI/CU.METER)	NB-95		NA	<LLD	<LLD	-		0
	ZR-95		NA	<LLD	<LLD	-		0
	CS-134		150	<LLD	<LLD	-		0
	CS-137		180	<LLD	<LLD	-		0
	BA-140		NA	<LLD	<LLD	-		0
	LA-140		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 BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIR IODINE (E-3 PCI/CU.METER)	GAMMA I-131	416	70	<LLD	<LLD	-		0
MILK (PCI/LITER)	I-131	38	1	<LLD	<LLD	-		0
	GAMMA MN-54	38	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 BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
MILK (PCI/LITER)	ZN-65		NA	<LLD	<LLD	-		0
	NB-95		NA	<LLD	<LLD	-		0
	ZR-95		NA	<LLD	<LLD	-		0
	CS-134		15	<LLD	<LLD	-		0
	CS-137		18	<LLD	<LLD	-		0
	BA-140		60	<LLD	<LLD	-		0
	LA-140		15	<LLD	<LLD	-		0

* 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 BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
VEGETATION (PCI/KG WET)	GAMMA	10						
	MN-54		NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0
	FE-59		NA	<LLD	<LLD	-		0
	CO-60		NA	<LLD	<LLD	-		0
	ZN-65		NA	<LLD	<LLD	-		0
	NB-95		NA	<LLD	<LLD	-		0

* 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 BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) RANGE	CONTROL LOCATION MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) MEAN (M) (F) RANGE	LOCATION WITH HIGHEST ANNUAL MEAN (M) STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
VEGETATION (PCI/KG WET)	ZR-95		NA	<LLD	<LLD	-		0
	I-131		60	<LLD	<LLD	-		0
	CS-134		60	<LLD	<LLD	-		0
VEGETATION (PCI/KG WET)	CS-137		80	<LLD	<LLD	-		0
	BA-140		NA	<LLD	<LLD	-		0
	LA-140		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 BYRON NUCLEAR GENERATION STATION, 2015

NAME OF FACILITY: BYRON **DOCKET NUMBER: 50-454 & 50-455**

LOCATION OF FACILITY: BYRON; IL **REPORTING PERIOD: 2015**

MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	**INDICATOR LOCATIONS** MEAN (M) (F) RANGE	**CONTROL LOCATION** MEAN (M) (F) RANGE	**LOCATION WITH HIGHEST ANNUAL MEAN (M)** MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
DIRECT RADIATION (MILLIREM/QTR.)	OSLD-QUARTERLY	364	NA	22.1 (356/356) (15.9/28.9)	19.6 (8/8) (18.1/21.1)	25.6 (4/4) (22.7/27.5)	BY-107-1 INDICATOR 1.4 MILES SE	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)

Intentionally left blank

APPENDIX B

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

Intentionally Left Blank

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Byron Nuclear Generating Station, 2015

Location	Location Description	Distance & Direction From Site
A. Surface Water		
BY-12	Oregon Pool of Rock River, Downstream	4.5 miles SSW
BY-29	Byron, Upstream (control)	3.0 miles N
B. Ground/Well Water		
BY-14-1	3200 North German Church Road	1.0 miles SSE
BY-18-1	Calhoun	0.7 miles SSW
BY-32	Ron Wolford Well	1.9 miles W
BY-35	Vancko Well	1.9 miles WNW
BY-36	Blanchard Well	0.8 miles NW
BY-37	Alexander Well	2.0 miles WNW
BY-38	Steve Storz Well	2.0 miles WNW
C. Milk		
BY-20-1	Ron Snodgrass Farm	4.8 miles WSW
BY-26-2	Joseph Akins Farm (control)	12.2 miles WNW
D. Air Particulates / Air Iodine		
BY-01	Byron	3.0 miles N
BY-04	Paynes Point	5.0 miles SE
BY-06	Oregon	4.7 miles SSW
BY-08	Leaf River (control)	7.0 miles WNW
BY-21	Byron Nearsite North	0.3 miles N
BY-22	Byron Nearsite Southeast	0.4 miles SE
BY-23	Byron Nearsite South	0.6 miles S
BY-24	Byron Nearsite Southwest	0.7 miles SW
E. Fish		
BY-29	Byron, Upstream (control)	3.0 miles N
BY-31	Byron, Discharge	2.6 miles WNW
F. Sediment		
BY-12	Oregon Pool of Rock River, Downstream	4.6 miles SSW
BY-34	Rock River, Upstream of Discharge (control)	2.6 miles WNW
G. Vegetation		
Quadrant 1	5186 N. Cox Road, Stillman Valley	4.8 miles ENE
Quadrant 2	1957 German Church Road, Byron	2.2 miles S
Quadrant 3	2002 Deer Path Road, Oregon	0.9 miles SW
Quadrant 4	6120 Razorville Road, Byron	2.1 miles NNW
Control	16201 Holcomb Road, Lindenwood	12.8 miles E
H. Environmental Dosimetry - OSLD		
Inner Ring		
BY-101-1 and -2		0.3 miles N
BY-102-1		1.0 miles NNE
BY-102-2		1.0 miles NNE

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Byron Nuclear Generating Station, 2015

Location	Location Description	Distance & Direction From Site
H. Environmental Dosimetry – OSLD (continued)		
Inner Ring		
BY-103-1 and -2		1.7 miles NE
BY-103-3		0.4 miles NE
BY-104-1 and -2		1.4 miles ENE
BY-104-3		0.3 miles ENE
BY-105-1 and -2		1.3 miles E
BY-106-1 and -2		1.4 miles ESE
BY-107-1 and -2		1.4 miles SE
BY-107-3		0.4 miles SE
BY-108-1		0.7 miles SSE
BY-108-2		0.6 miles SSE
BY-109-1 and -2		0.6 miles S
BY-110-1 and -2		0.7 miles SSW
BY-111-3		0.8 miles SW
BY-111-4		0.9 miles SW
BY-112-3 and -4		0.8 miles WSW
BY-113-1 and -2		0.7 miles W
BY-114-1 and -2		0.8 miles WNW
BY-115-1 and -2		1.0 miles NW
BY-116-1 and -2		1.4 miles NNW
BY-116-3		0.9 miles NNW
Outer Ring		
BY-201-3		4.4 miles N
BY-201-4		4.4 miles N
BY-202-1		4.4 miles NNE
BY-202-2		4.8 miles NNE
BY-203-1		4.8 miles NE
BY-203-2		4.7 miles NE
BY-204-1		4.1 miles ENE
BY-204-2		4.0 miles ENE
BY-205-1 and -2		3.8 miles E
BY-206-1		4.0 miles ESE
BY-206-2		4.3 miles ESE
BY-207-1		4.2 miles SE
BY-207-2		3.9 miles SE
BY-208-1		4.0 miles SSE
BY-208-2		3.8 miles SSE
BY-209-1 and -4		4.0 miles S
BY-210-3 and -4		3.9 miles SSW
BY-211-1 and -4		4.9 miles SW
BY-212-1 and -4		4.7 miles WSW
BY-213-1		4.7 miles W
BY-213-4		4.7 miles W
BY-214-1		4.7 miles WNW
BY-214-4		4.6 miles WNW
BY-215-1		4.2 miles NW
BY-215-4		4.2 miles NW
BY-216-1		4.5 miles NNW
BY-216-2		4.7 miles NNW

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, Byron Nuclear Generating Station, 2015

Location	Location Description	Distance & Direction From Site
Special Interest		
BY-301-1		0.3 miles N
BY-301-2		0.2 miles N
BY-302-1		0.1 miles NNE
BY-309-1		0.3 miles S
BY-309-2		0.4 miles S
BY-309-3		0.4 miles S
BY-309-4		0.4 miles SSW
BY-314-1		0.3 miles WNW
BY-314-2		0.3 miles WNW
Other		
BY-01-1 and -2		3.0 miles N
BY-04-1 and -2		5.0 miles SE
BY-06-1 and -2		4.7 miles SSW
BY-21-1 and -2		0.3 miles N
BY-22-1 and -2		0.4 miles SE
BY-23-1 and -2		0.6 miles S
BY-24-1 and -2		0.7 miles SW
Control		
BY-08-1 and -2		7.0 miles WNW

TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Byron Nuclear Generating Station, 2015

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	Nickel-63	Monthly composite from weekly grab samples.	TBE, TBE-2013 Radionickel activity in various matrices
Surface Water	Tritium	Quarterly composite from weekly grab samples.	TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation
Ground Water	Gamma Spectroscopy	Quarterly grab samples.	TBE, TBE-2007 Gamma emitting radioisotope analysis
Ground Water	Tritium	Quarterly grab samples.	TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation
Fish	Gamma Spectroscopy	Semi-annual samples collected via electroshocking or other techniques	TBE-2007 Gamma emitting radioisotope analysis
Fish	Nickel-63	Semi-annual samples collected via electroshocking or other techniques	TBE, TBE-2013 Radionickel activity in various matrices
Sediment	Gamma Spectroscopy	Semi-annual grab samples	TBE, TBE-2007 Gamma emitting radioisotope analysis
Sediment	Nickel-63	Semi-annual grab samples	TBE, TBE-2013 Radionickel activity in various matrices
Air Particulates	Gross Beta	One-week composite of continuous air sampling through glass fiber filter paper	TBE, TBE-2008 Gross Alpha and/or gross beta activity in various matrices
Air Particulates	Gamma Spectroscopy	Quarterly composite of each station	TBE, TBE-2007 Gamma emitting radioisotope analysis
Air Iodine	Gamma Spectroscopy	One-week composite of continuous air sampling through charcoal filter	TBE, TBE-2007 Gamma emitting radioisotope analysis
Milk	I-131	Bi-weekly grab sample when cows are on pasture. Monthly all other times	TBE, TBE-2012 Radioiodine in various matrices
Milk	Gamma Spectroscopy	Bi-weekly grab sample when cows are on pasture. Monthly all other times	TBE, TBE-2007 Gamma emitting radioisotope analysis
Vegetation	Gamma Spectroscopy	Annual grab samples.	TBE, TBE-2007 Gamma emitting radioisotope analysis
OSLD	Optically Stimulated Luminescence Dosimetry	Quarterly OSLDs comprised of two Al_2O_3:C Landauer Incorporated elements.	Landauer Incorporated

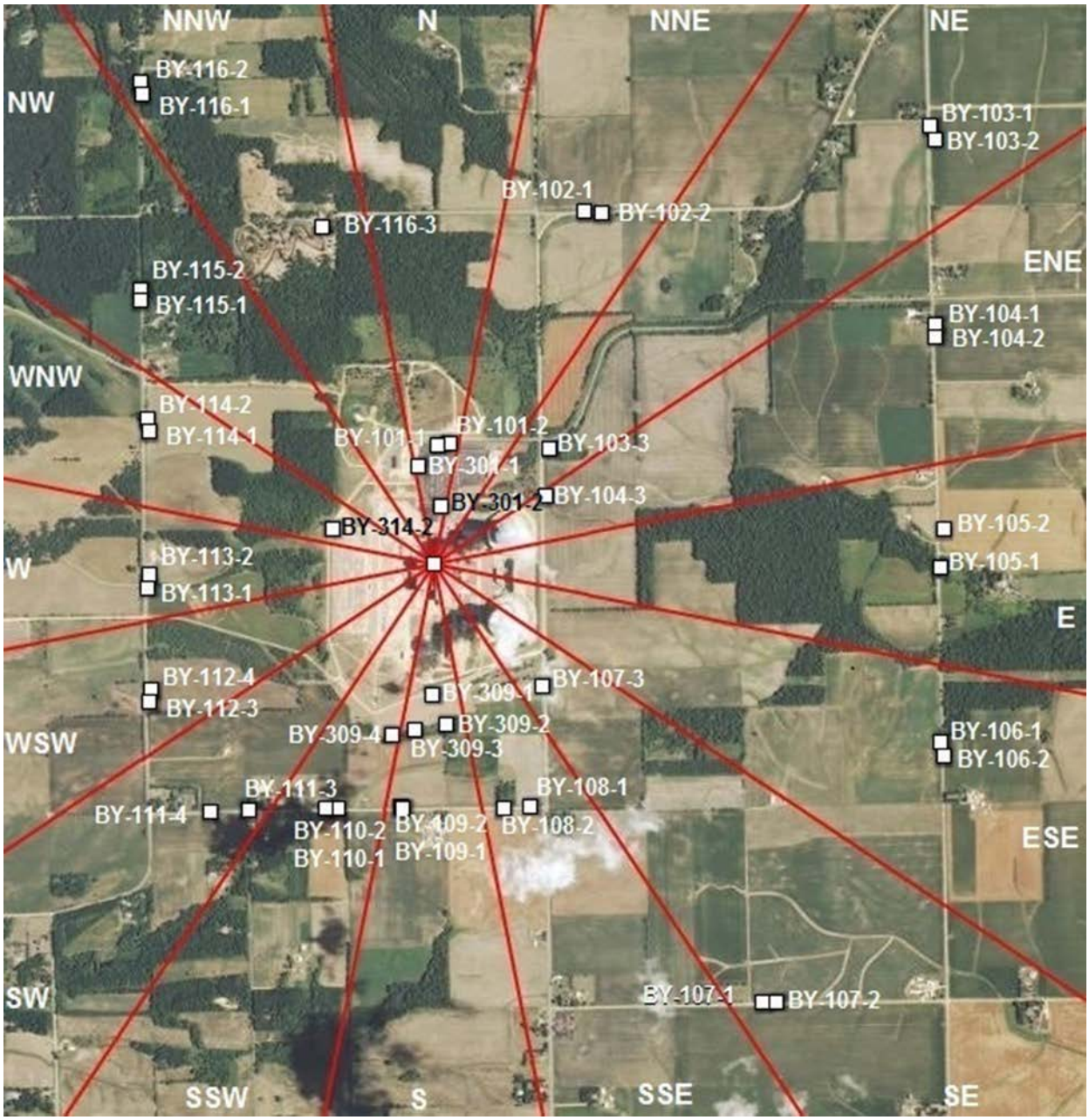


Figure B-1
Inner Ring and Special Interest OSLD Locations of the
Byron Nuclear Generating Station, 2015

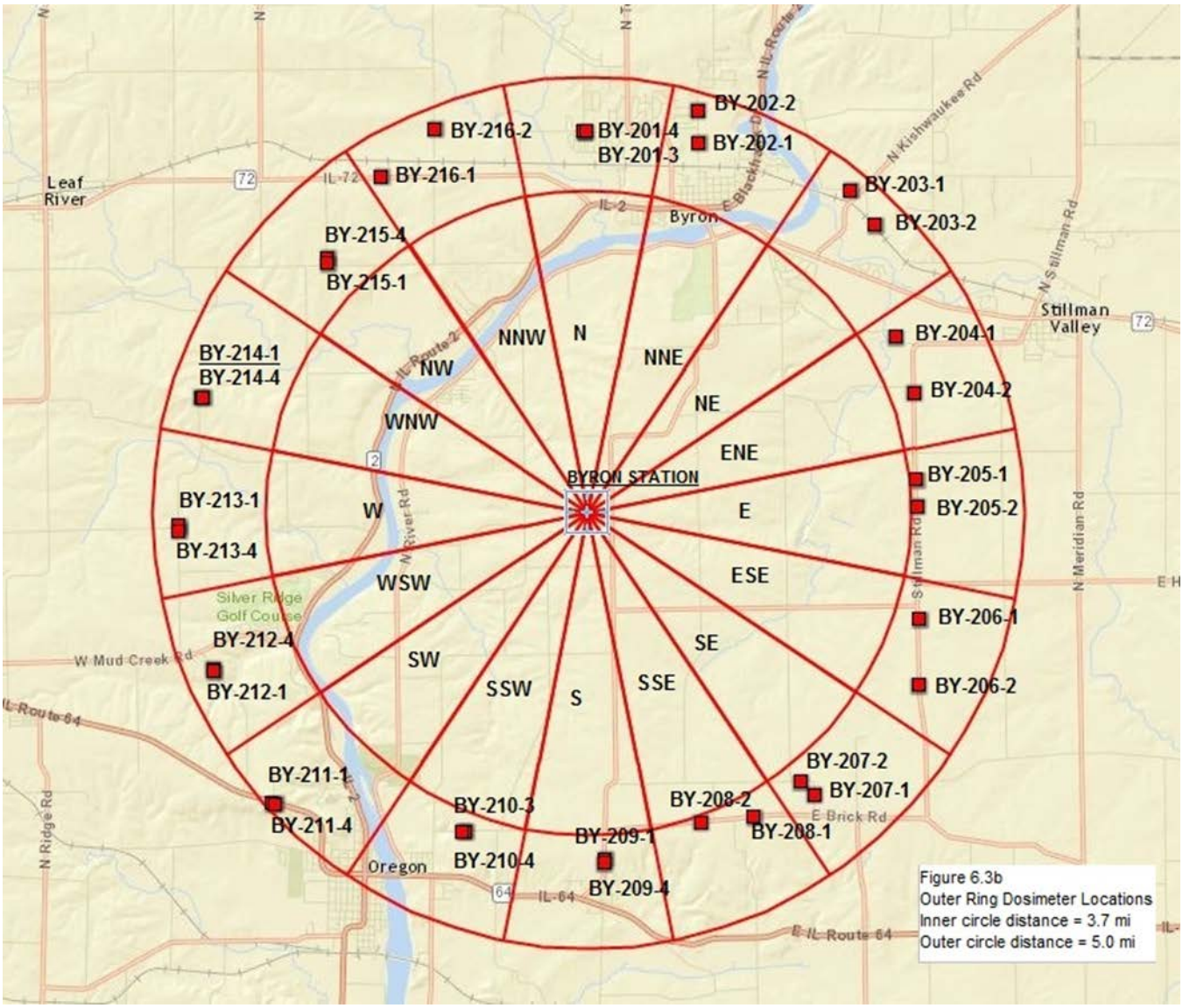


Figure B-2
Outer Ring OSLD Locations of the
Byron Nuclear Generating Station, 2015

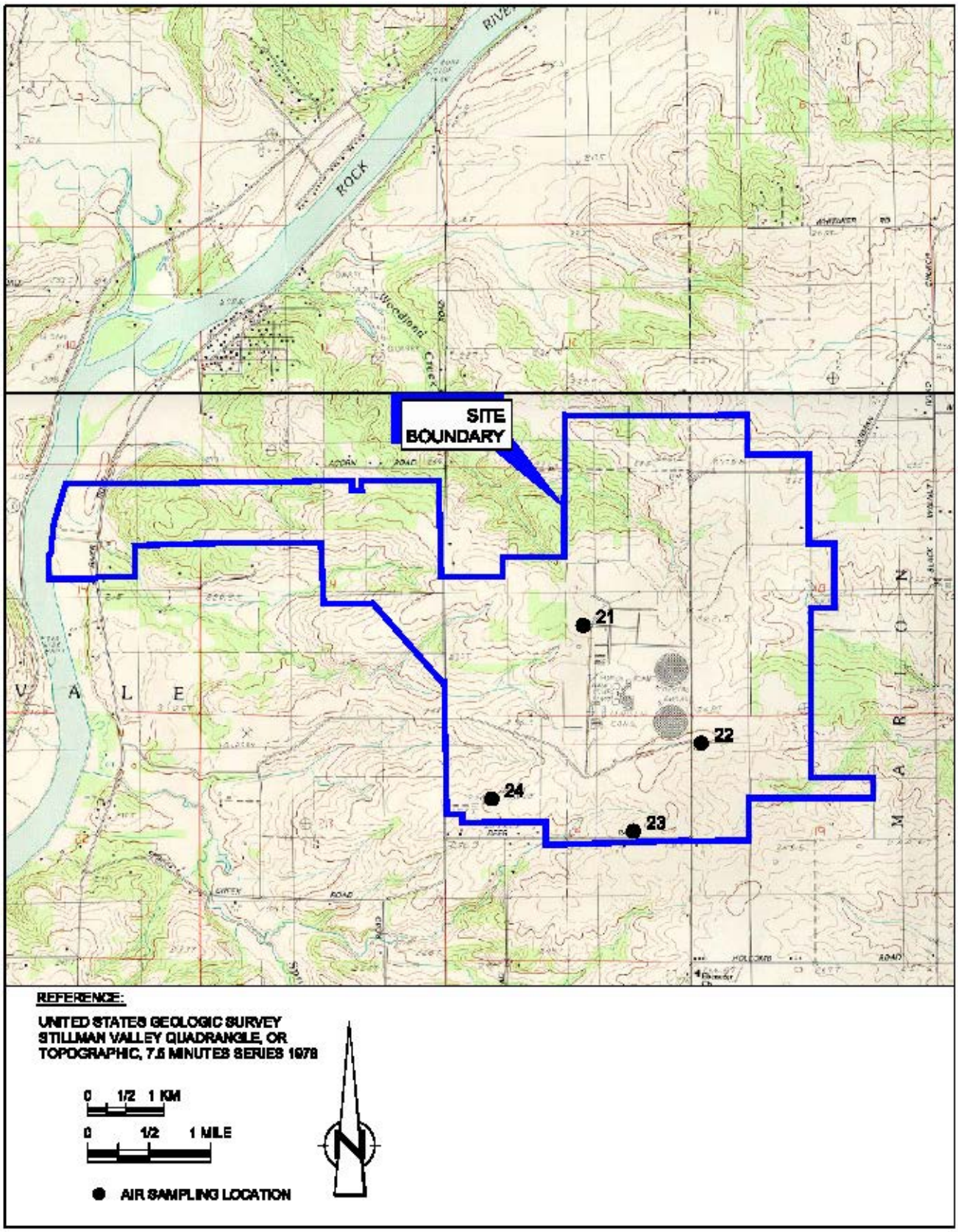
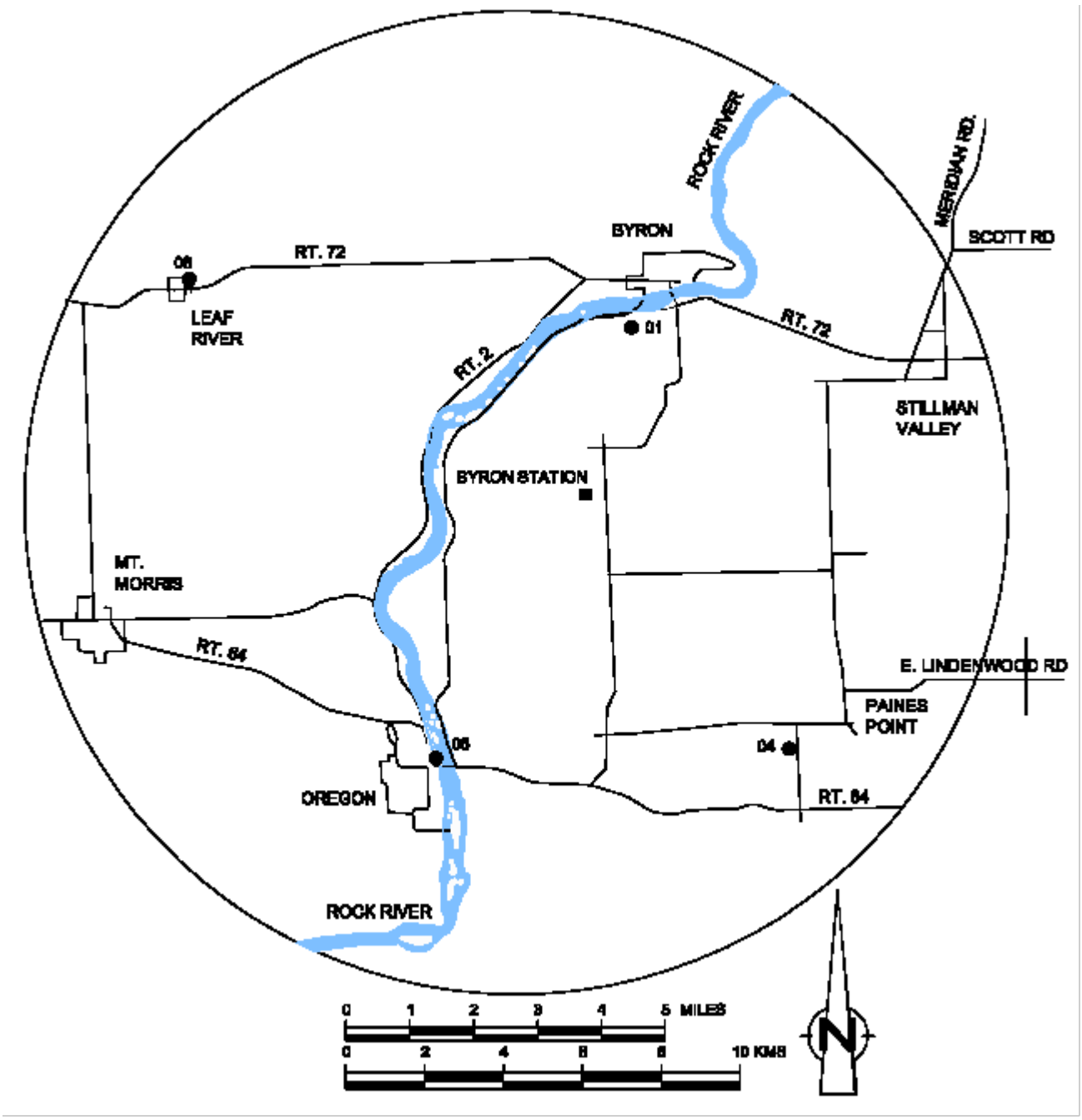


Figure B-3
Onsite Air Sampling Locations of the
Byron Nuclear Generating Station, 2015



- Air Sampling Location

- Byron Station

Figure B-4
Offsite Air Sampling Locations of the
Byron Nuclear Generating Station, 2015

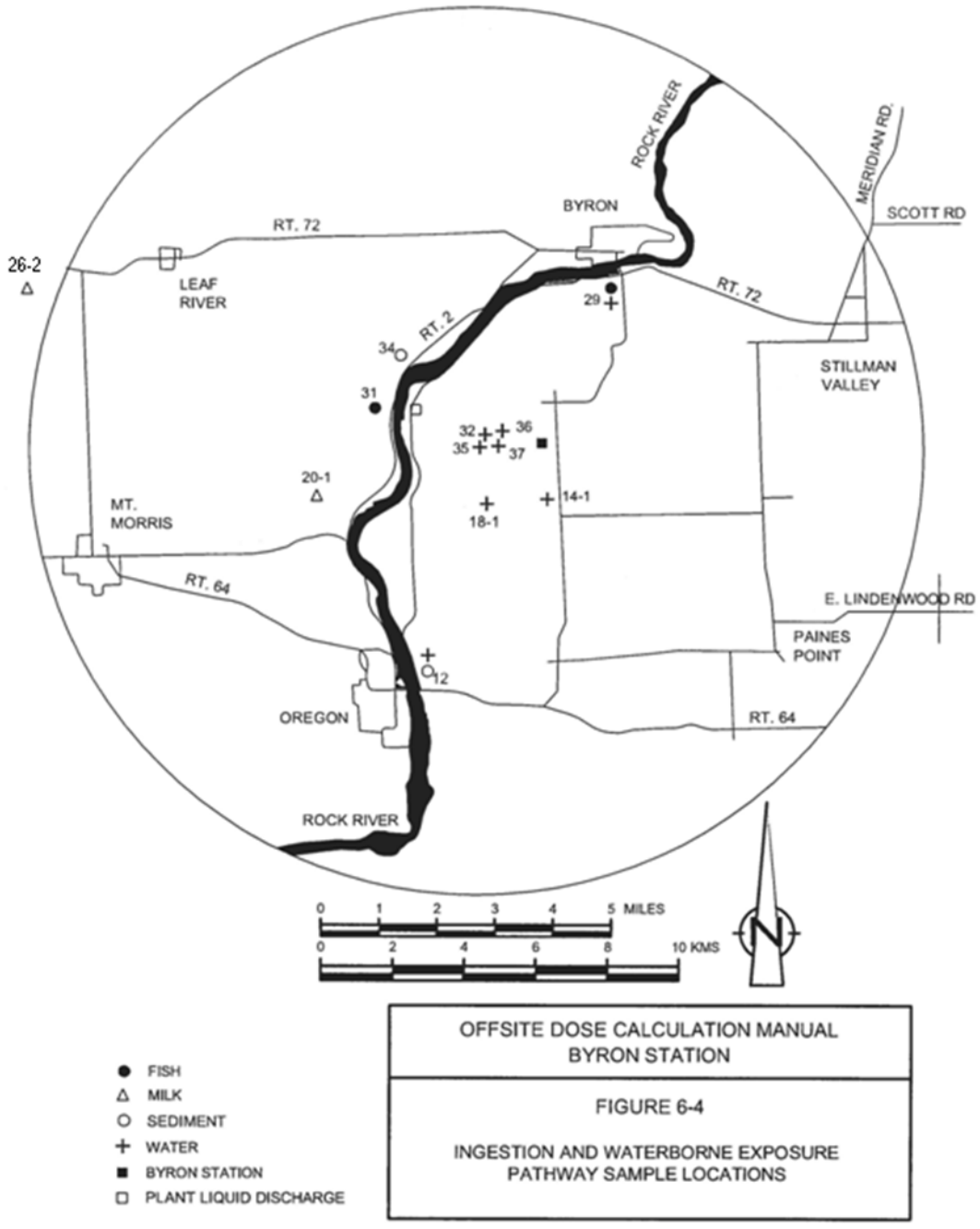


Figure B-5
Ingestion and Waterborne Exposure Pathway Sampling Locations
of the Byron Nuclear Generating Station, 2015

Intentionally left blank

APPENDIX C

DATA TABLES AND FIGURES
PRIMARY LABORATORY

Intentionally left blank

Table C-I.1 CONCENTRATIONS OF GROSS BETA IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	BY-12	BY-29
01/05/15 - 01/27/15	(1)	(1)
02/01/15 - 02/28/15	(1)	(1)
03/17/15 - 03/31/15	5.9 ± 2.3	4.3 ± 2.1
04/07/15 - 04/28/15	3.4 ± 2.1	3.9 ± 2.1
05/05/15 - 05/27/15	2.9 ± 1.9	3.6 ± 1.9
06/02/15 - 06/29/15	3.3 ± 2.0	3.4 ± 1.8
07/07/15 - 07/28/15	4.1 ± 2.1	5.1 ± 2.1
08/04/15 - 08/25/15	5.0 ± 2.4	3.6 ± 2.2
09/01/15 - 09/29/15	4.4 ± 2.1	5.9 ± 2.2
10/06/15 - 10/27/15	6.3 ± 2.4	6.6 ± 2.4
11/03/15 - 11/23/15	< 2.8	3.3 ± 2.0
12/01/15 - 12/29/15	3.7 ± 2.0	< 2.6
MEAN	4.3 ± 2.4	4.4 ± 2.4

Table C-I.2 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	BY-12	BY-29
03/17/15 - 03/31/15	< 200	< 200
04/07/15 - 06/29/15	490 ± 143	< 191
07/07/15 - 09/29/15	748 ± 153	< 190
10/06/15 - 12/29/15	< 197	< 195
MEAN	619 ± 365	-

Table C-I.3 CONCENTRATIONS OF NI-63 IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	BY-12	BY-29
01/05/15 - 01/27/15	(1)	(1)
02/01/15 - 02/28/15	(1)	(1)
03/17/15 - 03/31/15	< 17	< 16
04/07/15 - 04/28/15	< 21	< 21
05/05/15 - 05/27/15	< 17	< 15
06/02/15 - 06/29/15	< 28	< 28
07/07/15 - 07/28/15	< 15	< 15
08/04/15 - 08/25/15	< 16	< 15
09/01/15 - 09/29/15	< 16	< 15
10/06/15 - 10/27/15	< 16	< 15
11/03/15 - 11/23/15	< 18	< 17
12/01/15 - 12/29/15	< 19	< 19
MEAN	-	-

THE MEAN AND TWO STANDARD DEVIATOIN ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-I.4 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

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

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-II.1 **CONCENTRATIONS OF TRITIUM IN GROUND WATER SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	BY-14-1	BY-18-1	BY-32	BY-35	BY-36	BY-37	BY-38
01/13/15 - 01/13/15	< 180			< 192	(1)		
02/21/15 - 02/21/15		< 164	< 163		(1)	< 163	
04/14/15 - 04/14/15	< 184	< 186	< 186	< 186	(1)	< 188	
07/13/15 - 07/13/15	< 181	< 180	< 182	< 180		< 181	< 179
10/13/15 - 10/13/15	< 185	< 184	< 185	< 185		< 185	< 184
MEAN	-	-	-	-	-	-	

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-II.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUND WATER SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

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
BY-14-1	01/13/15 - 01/13/15	< 5	< 5	< 12	< 5	< 9	< 6	< 8	< 10	< 5	< 5	< 26	< 8
	04/14/15 - 04/14/15	< 5	< 6	< 11	< 6	< 12	< 6	< 12	< 14	< 6	< 7	< 39	< 9
	07/13/15 - 07/13/15	< 4	< 4	< 8	< 5	< 8	< 5	< 7	< 8	< 4	< 4	< 21	< 6
	10/13/15 - 10/13/15	< 6	< 6	< 15	< 7	< 12	< 7	< 13	< 14	< 5	< 5	< 29	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BY-18-1	02/21/15 - 02/21/15	< 5	< 6	< 13	< 7	< 10	< 4	< 9	< 14	< 4	< 7	< 36	< 10
	04/14/15 - 04/14/15	< 4	< 4	< 8	< 5	< 10	< 4	< 7	< 9	< 5	< 5	< 26	< 6
	07/13/15 - 07/13/15	< 6	< 7	< 16	< 8	< 13	< 8	< 13	< 11	< 6	< 9	< 35	< 13
	10/13/15 - 10/13/15	< 4	< 5	< 12	< 6	< 10	< 5	< 8	< 14	< 5	< 5	< 33	< 7
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BY-32	02/21/15 - 02/21/15	< 4	< 6	< 11	< 5	< 12	< 5	< 9	< 11	< 5	< 7	< 31	< 10
	04/14/15 - 04/14/15	< 6	< 5	< 11	< 5	< 12	< 6	< 9	< 10	< 5	< 5	< 27	< 9
	07/13/15 - 07/13/15	< 3	< 3	< 8	< 5	< 6	< 3	< 6	< 7	< 4	< 4	< 18	< 6
	10/13/15 - 10/13/15	< 5	< 7	< 12	< 6	< 12	< 7	< 11	< 14	< 6	< 6	< 31	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BY-35	01/13/15 - 01/13/15	< 6	< 6	< 11	< 7	< 10	< 6	< 11	< 11	< 4	< 5	< 28	< 9
	04/14/15 - 04/14/15	< 5	< 5	< 9	< 5	< 9	< 5	< 9	< 10	< 4	< 5	< 24	< 6
	07/13/15 - 07/13/15	< 5	< 6	< 12	< 7	< 13	< 6	< 10	< 11	< 5	< 6	< 32	< 9
	10/13/15 - 10/13/15	< 6	< 6	< 14	< 8	< 13	< 8	< 12	< 15	< 6	< 7	< 36	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BY-36	02/21/15 - 02/21/15	(1)											
	04/14/15 - 04/14/15	(1)											
	07/13/15 - 07/13/15	(1)											
	10/13/15 - 10/13/15	(1)											
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-II.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUND WATER SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

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
BY-37	02/21/15 - 02/21/15	< 6	< 6	< 10	< 6	< 12	< 6	< 10	< 13	< 5	< 6	< 30	< 9
	04/14/15 - 04/14/15	< 4	< 4	< 6	< 4	< 8	< 4	< 7	< 9	< 4	< 4	< 18	< 8
	07/13/15 - 07/13/15	< 5	< 5	< 12	< 5	< 9	< 5	< 9	< 10	< 5	< 5	< 26	< 8
	10/13/15 - 10/13/15	< 6	< 6	< 11	< 5	< 12	< 5	< 10	< 13	< 6	< 6	< 35	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BY-38	02/21/15 - 02/21/15	(2)											
	04/14/15 - 04/14/15	(2)											
	07/13/15 - 07/13/15	< 3	< 4	< 7	< 4	< 7	< 4	< 6	< 6	< 3	< 4	< 20	< 4
	10/13/15 - 10/13/15	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 5	< 2	< 2	< 12	< 3

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION
(2) SEE PROGRAM CHANGES SECTION FOR EXPLANATION

Table C-III.1 **CONCENTRATIONS OF NICKEL-63 AND GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

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	Cs-134	Cs-137	Ba-140	La-140
BY-29													
Freshwater Drum	05/27/15	< 43	< 78	< 105	< 156	< 91	< 139	< 97	< 140	< 73	< 64	< 570	< 139
Silver Redhorse	05/27/15	< 43	< 73	< 72	< 112	< 62	< 118	< 70	< 146	< 54	< 63	< 420	< 138
Shorthead Redhorse	10/14/15	< 37	< 56	< 56	< 116	< 60	< 120	< 57	< 96	< 43	< 59	< 301	< 86
Golden Redhorse	10/14/15	< 44	< 104	< 94	< 202	< 81	< 201	< 122	< 169	< 95	< 84	< 450	< 197
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BY-31													
Quillback	05/27/15	< 49	< 54	< 64	< 154	< 65	< 180	< 73	< 127	< 67	< 71	< 516	< 118
Silver Redhorse	05/27/15	< 44	< 95	< 108	< 217	< 64	< 193	< 88	< 160	< 79	< 98	< 734	< 177
River Carpsucker	10/14/15	< 40	< 90	< 73	< 214	< 105	< 163	< 78	< 122	< 76	< 86	< 407	< 34
Golden Redhorse	10/14/15	< 35	< 71	< 76	< 135	< 73	< 200	< 92	< 149	< 87	< 92	< 379	< 170
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-IV.1 CONCENTRATIONS OF NICKEL-63 AND GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015

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
BY-12	05/12/15	< 246	< 66	< 58	< 174	< 88	< 156	< 85	< 125	< 68	< 93	< 598	< 187
	10/13/15	< 228	< 167	< 137	< 350	< 179	< 434	< 190	< 262	< 147	< 167	< 958	< 281
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BY-34	05/12/15	< 229	< 51	< 49	< 111	< 48	< 107	< 64	< 110	< 47	109 ± 70	< 503	< 141
	10/13/15	< 223	< 118	< 87	< 283	< 89	< 266	< 117	< 219	< 101	< 128	< 674	< 244
	MEAN	-	-	-	-	-	-	-	-	-	109 ± 0	-	-

Table C-V.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

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

COLLECTION	GROUP I				GROUP II			GROUP III
PERIOD	BY-21	BY-22	BY-23	BY-24	BY-01	BY-04	BY-06	BY-08
12/29/14 - 01/05/15	23 ± 5	20 ± 4	21 ± 4	26 ± 5	22 ± 5	19 ± 4	25 ± 5	25 ± 5
01/05/15 - 01/13/15	23 ± 4	25 ± 4	25 ± 4	23 ± 4	22 ± 4	18 ± 4	20 ± 4	22 ± 4
01/13/15 - 01/20/15	26 ± 5	18 ± 4	24 ± 5	26 ± 5	23 ± 4	23 ± 5	24 ± 5	25 ± 5
01/20/15 - 01/27/15	13 ± 4	11 ± 4	9 ± 4	14 ± 4	11 ± 4	14 ± 4	13 ± 4	10 ± 4
01/27/15 - 02/03/15	11 ± 4	10 ± 4	8 ± 4	10 ± 4	7 ± 4	11 ± 4	8 ± 4	11 ± 4
02/03/15 - 02/10/15	21 ± 4	23 ± 5	25 ± 5	24 ± 5	26 ± 5	27 ± 5	23 ± 5	23 ± 4
02/10/15 - 02/17/15	21 ± 4	25 ± 5	19 ± 4	29 ± 5	24 ± 5	19 ± 4	25 ± 5	25 ± 5
02/17/15 - 02/24/15	37 ± 5	40 ± 6	39 ± 6	52 ± 6	41 ± 6	41 ± 6	40 ± 6	36 ± 5
02/24/15 - 03/04/15	14 ± 3	19 ± 4	15 ± 4	19 ± 4	19 ± 4	16 ± 4	19 ± 4	18 ± 4
03/04/15 - 03/10/15	12 ± 4	16 ± 5	16 ± 5	13 ± 5	14 ± 5	13 ± 5	14 ± 5	11 ± 4
03/10/15 - 03/17/15	14 ± 4	16 ± 4	17 ± 4	17 ± 4	14 ± 4	16 ± 4	15 ± 4	13 ± 4
03/17/15 - 03/24/15	14 ± 4	11 ± 4	12 ± 4	11 ± 4	11 ± 4	11 ± 4	11 ± 4	14 ± 4
03/24/15 - 03/31/15	14 ± 4	15 ± 4	13 ± 4	14 ± 4	14 ± 4	15 ± 4	15 ± 4	16 ± 4
03/31/15 - 04/07/15	13 ± 4	14 ± 4	11 ± 4	11 ± 4	10 ± 4	13 ± 4	14 ± 4	13 ± 4
04/07/15 - 04/14/15	15 ± 4	18 ± 4	18 ± 4	17 ± 4	14 ± 4	16 ± 4	18 ± 4	15 ± 4
04/14/15 - 04/21/15	13 ± 4	15 ± 4	16 ± 4	14 ± 4	15 ± 4	12 ± 4	13 ± 4	15 ± 4
04/21/15 - 04/28/15	8 ± 4	7 ± 3	5 ± 3	8 ± 3	10 ± 4	9 ± 4	9 ± 4	10 ± 4
04/28/15 - 05/05/15	15 ± 4	15 ± 4	14 ± 4	14 ± 4	12 ± 4	11 ± 4	13 ± 4	10 ± 4
05/05/15 - 05/12/15	10 ± 4	10 ± 4	11 ± 4	12 ± 4	11 ± 4	10 ± 3	10 ± 3	12 ± 4
05/12/15 - 05/19/15	9 ± 3	8 ± 3	9 ± 3	6 ± 3	6 ± 3	6 ± 3	8 ± 3	9 ± 4
05/19/15 - 05/27/15	12 ± 3	15 ± 4	16 ± 4	16 ± 4	12 ± 3	15 ± 4	12 ± 3	13 ± 3
05/27/15 - 06/02/15	9 ± 4	13 ± 5	10 ± 4	10 ± 4	7 ± 4	12 ± 5	12 ± 5	9 ± 5
06/02/15 - 06/09/15	13 ± 4	11 ± 4	12 ± 4	13 ± 4	11 ± 4	11 ± 4	12 ± 4	10 ± 4
06/09/15 - 06/16/15	11 ± 4	10 ± 4	12 ± 4	11 ± 4	13 ± 4	10 ± 4	11 ± 4	12 ± 4
06/16/15 - 06/23/15	< 6	< 6	< 6	< 6	< 6	< 6	7 ± 4	< 6
06/23/15 - 06/29/15	16 ± 4	17 ± 4	13 ± 4	17 ± 4	10 ± 4	13 ± 4	15 ± 4	14 ± 4
06/29/15 - 07/07/15	11 ± 3	13 ± 4	15 ± 4	16 ± 4	15 ± 4	13 ± 4	14 ± 4	9 ± 3
07/07/15 - 07/14/15	11 ± 4	14 ± 4	9 ± 3	12 ± 4	9 ± 3	8 ± 3	9 ± 3	11 ± 4
07/14/15 - 07/21/15	8 ± 4	12 ± 4	12 ± 4	16 ± 4	13 ± 4	17 ± 4	11 ± 4	14 ± 4
07/21/15 - 07/28/15	19 ± 4	21 ± 4	19 ± 4	24 ± 5	20 ± 4	21 ± 4	25 ± 5	23 ± 5
07/28/15 - 08/04/15	16 ± 4	13 ± 4	15 ± 4	19 ± 4	16 ± 4	13 ± 4	15 ± 4	18 ± 4
08/04/15 - 08/11/15	16 ± 4	14 ± 4	18 ± 4	18 ± 4	15 ± 4	12 ± 4	19 ± 4	22 ± 5
08/11/15 - 08/18/15	23 ± 5	24 ± 5	25 ± 5	27 ± 5	21 ± 5	25 ± 5	24 ± 5	22 ± 4
08/18/15 - 08/25/15	13 ± 4	13 ± 4	13 ± 4	12 ± 4	10 ± 4	8 ± 4	15 ± 4	13 ± 4
08/25/15 - 09/01/15	23 ± 5	26 ± 5	22 ± 5	21 ± 5	25 ± 5	21 ± 5	21 ± 5	23 ± 5
09/01/15 - 09/07/15	35 ± 6	42 ± 6	38 ± 6	40 ± 6	34 ± 6	34 ± 6	41 ± 6	37 ± 6
09/07/15 - 09/15/15	17 ± 4	18 ± 4	17 ± 4	18 ± 4	14 ± 4	18 ± 4	20 ± 4	14 ± 4
09/15/15 - 09/22/15	16 ± 4	16 ± 4	18 ± 4	14 ± 4	13 ± 4	17 ± 4	12 ± 4	12 ± 4
09/22/15 - 09/29/15	21 ± 5	22 ± 5	22 ± 5	26 ± 5	25 ± 5	21 ± 5	20 ± 4	27 ± 5
09/29/15 - 10/06/15	11 ± 4	14 ± 4	13 ± 4	14 ± 4	12 ± 4	11 ± 4	13 ± 4	13 ± 4
10/06/15 - 10/13/15	20 ± 4	22 ± 5	23 ± 5	20 ± 4	26 ± 5	24 ± 5	27 ± 5	29 ± 5
10/13/15 - 10/20/15	16 ± 4	19 ± 4	19 ± 4	18 ± 4	17 ± 4	17 ± 4	16 ± 4	19 ± 4
10/20/15 - 10/27/15	21 ± 5	22 ± 5	20 ± 5	24 ± 5	27 ± 5	25 ± 5	19 ± 5	23 ± 5
10/27/15 - 11/03/15	16 ± 4	18 ± 4	16 ± 4	16 ± 4	20 ± 4	17 ± 4	15 ± 4	17 ± 4
11/03/15 - 11/10/15	21 ± 4	18 ± 4	18 ± 4	16 ± 4	18 ± 4	18 ± 4	19 ± 4	20 ± 4
11/10/15 - 11/16/15	27 ± 5	26 ± 5	27 ± 5	30 ± 6	25 ± 5	28 ± 5	25 ± 5	26 ± 5
11/16/15 - 11/23/15	14 ± 4	14 ± 4	13 ± 4	11 ± 4	14 ± 4	10 ± 4	12 ± 4	11 ± 4
11/23/15 - 12/01/15	16 ± 4	16 ± 4	16 ± 4	18 ± 4	15 ± 4	14 ± 4	17 ± 4	14 ± 4
12/01/15 - 12/08/15	25 ± 5	31 ± 5	31 ± 5	28 ± 5	27 ± 5	31 ± 5	27 ± 5	27 ± 5
12/08/15 - 12/15/15	29 ± 5	24 ± 5	22 ± 5	30 ± 5	27 ± 5	27 ± 5	31 ± 5	26 ± 5
12/15/15 - 12/21/15	13 ± 4	17 ± 5	15 ± 4	22 ± 5	17 ± 4	14 ± 4	15 ± 4	12 ± 4
12/21/15 - 12/29/15	20 ± 4	19 ± 4	20 ± 4	16 ± 4	17 ± 4	20 ± 4	20 ± 4	17 ± 4
MEAN	17 ± 13	18 ± 14	17 ± 14	19 ± 17	17 ± 14	17 ± 14	17 ± 15	17 ± 14

Table C-V.2 **MONTHLY AND YEARLY MEAN VALUES OF GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

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

GROUP I - NEARSITE LOCATIONS				GROUP II - FAR FIELD LOCATIONS				GROUP III - CONTROL LOCATIONS			
COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD
12/29/14 - 02/03/15	8	26	18 ± 14	12/29/14 - 02/03/15	7	25	17 ± 12	12/29/14 - 02/03/15	10	25	19 ± 15
02/03/15 - 03/04/15	14	52	26 ± 21	02/03/15 - 03/04/15	16	41	27 ± 18	02/03/15 - 03/04/15	18	36	25 ± 15
03/04/15 - 03/31/15	11	17	14 ± 4	03/04/15 - 03/31/15	11	16	14 ± 4	03/04/15 - 03/31/15	11	16	14 ± 5
03/31/15 - 04/28/15	5	18	13 ± 8	03/31/15 - 04/28/15	9	18	12 ± 6	03/31/15 - 04/28/15	10	15	13 ± 5
04/28/15 - 06/02/15	6	16	12 ± 6	04/28/15 - 06/02/15	6	15	10 ± 5	04/28/15 - 06/02/15	9	13	11 ± 3
06/02/15 - 06/29/15	10	17	13 ± 5	06/02/15 - 06/29/15	7	15	11 ± 5	06/02/15 - 06/29/15	10	14	12 ± 4
06/29/15 - 08/04/15	8	24	15 ± 8	06/29/15 - 08/04/15	8	25	15 ± 9	06/29/15 - 08/04/15	9	23	15 ± 11
08/04/15 - 09/01/15	12	27	19 ± 11	08/04/15 - 09/01/15	8	25	18 ± 12	08/04/15 - 09/01/15	13	23	20 ± 9
09/01/15 - 09/29/15	14	42	24 ± 19	09/01/15 - 09/29/15	12	41	22 ± 19	09/01/15 - 09/29/15	12	37	22 ± 23
09/29/15 - 11/03/15	11	24	18 ± 7	09/29/15 - 11/03/15	11	27	19 ± 11	09/29/15 - 11/03/15	13	29	20 ± 12
11/03/15 - 12/01/15	11	30	19 ± 12	11/03/15 - 12/01/15	10	28	18 ± 11	11/03/15 - 12/01/15	11	26	18 ± 13
12/01/15 - 12/29/15	13	31	23 ± 12	12/01/15 - 12/29/15	14	31	23 ± 12	12/01/15 - 12/29/15	12	27	20 ± 14
12/29/14 - 12/29/15	5	52	18 ± 14	12/29/14 - 12/29/15	6	41	17 ± 14	12/29/14 - 12/29/15	9	37	17 ± 14

Table C-V.3 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

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
BY-01	12/29/14 - 03/31/15	< 3	< 6	< 17	< 3	< 9	< 8	< 12	< 3	< 2	< 1375	< 630
	03/31/15 - 06/29/15	< 3	< 5	< 14	< 2	< 6	< 4	< 6	< 2	< 1	< 424	< 210
	06/29/15 - 09/29/15	< 3	< 5	< 14	< 3	< 8	< 5	< 8	< 2	< 3	< 464	< 129
	09/29/15 - 12/29/15	< 3	< 5	< 11	< 2	< 6	< 4	< 8	< 2	< 2	< 461	< 143
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BY-04	12/29/14 - 03/31/15	< 4	< 9	< 27	< 3	< 8	< 10	< 15	< 4	< 4	< 2062	< 833
	03/31/15 - 06/29/15	< 3	< 4	< 12	< 2	< 3	< 5	< 5	< 3	< 2	< 356	< 80
	06/29/15 - 09/29/15	< 3	< 4	< 19	< 1	< 6	< 4	< 10	< 3	< 3	< 630	< 317
	09/29/15 - 12/29/15	< 4	< 9	< 22	< 4	< 10	< 9	< 15	< 4	< 4	< 926	< 468
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BY-06	12/29/14 - 03/31/15	< 3	< 4	< 17	< 3	< 6	< 5	< 11	< 2	< 2	< 1372	< 238
	03/31/15 - 06/29/15	< 2	< 5	< 10	< 2	< 7	< 5	< 6	< 2	< 2	< 371	< 100
	06/29/15 - 09/29/15	< 3	< 5	< 16	< 2	< 7	< 6	< 10	< 3	< 2	< 762	< 226
	09/29/15 - 12/29/15	< 2	< 5	< 13	< 3	< 9	< 5	< 6	< 3	< 3	< 503	< 233
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BY-08	12/29/14 - 03/31/15	< 3	< 5	< 20	< 4	< 8	< 6	< 11	< 2	< 2	< 1316	< 497
	03/31/15 - 06/29/15	< 3	< 4	< 7	< 3	< 4	< 5	< 7	< 3	< 3	< 392	< 225
	06/29/15 - 09/29/15	< 2	< 4	< 16	< 2	< 5	< 6	< 8	< 2	< 2	< 1026	< 258
	09/29/15 - 12/29/15	< 3	< 5	< 12	< 2	< 6	< 5	< 10	< 3	< 2	< 484	< 166
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BY-21	12/29/14 - 03/31/15	< 2	< 6	< 16	< 3	< 10	< 7	< 13	< 3	< 3	< 1529	< 571
	03/31/15 - 06/29/15	< 2	< 3	< 9	< 2	< 5	< 4	< 8	< 3	< 2	< 434	< 44
	06/29/15 - 09/29/15	< 3	< 5	< 13	< 2	< 7	< 6	< 10	< 3	< 3	< 782	< 168
	09/29/15 - 12/29/15	< 4	< 6	< 21	< 3	< 9	< 7	< 13	< 3	< 3	< 574	< 198
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-V.3 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

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
BY-22	12/29/14 - 03/31/15	< 3	< 6	< 28	< 5	< 12	< 7	< 13	< 4	< 3	< 1705	< 535
	03/31/15 - 06/29/15	< 3	< 4	< 12	< 3	< 8	< 4	< 6	< 3	< 2	< 325	< 178
	06/29/15 - 09/29/15	< 3	< 5	< 13	< 4	< 6	< 5	< 10	< 3	< 3	< 812	< 224
	09/29/15 - 12/29/15	< 3	< 4	< 12	< 1	< 6	< 5	< 8	< 2	< 2	< 506	< 150
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BY-23	12/29/14 - 03/31/15	< 2	< 6	< 23	< 4	< 8	< 6	< 11	< 2	< 3	< 854	< 519
	03/31/15 - 06/29/15	< 3	< 4	< 7	< 2	< 7	< 4	< 6	< 2	< 2	< 353	< 113
	06/29/15 - 09/29/15	< 2	< 4	< 6	< 2	< 5	< 5	< 9	< 2	< 2	< 586	< 183
	09/29/15 - 12/29/15	< 2	< 3	< 11	< 2	< 6	< 3	< 8	< 2	< 2	< 413	< 183
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BY-24	12/29/14 - 03/31/15	< 3	< 7	< 20	< 4	< 7	< 8	< 13	< 3	< 2	< 1409	< 628
	03/31/15 - 06/29/15	< 3	< 3	< 16	< 2	< 10	< 4	< 9	< 2	< 2	< 433	< 211
	06/29/15 - 09/29/15	< 3	< 5	< 17	< 3	< 7	< 5	< 11	< 3	< 2	< 736	< 225
	09/29/15 - 12/29/15	< 3	< 4	< 18	< 3	< 6	< 4	< 7	< 2	< 2	< 438	< 159
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-VI.1 **CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

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

COLLECTION	GROUP I				GROUP II			GROUP III
PERIOD	BY-21	BY-22	BY-23	BY-24	BY-01	BY-04	BY-06	BY-08
12/29/14 - 01/05/15	< 20	< 20	< 20	< 8	< 20	< 20	< 20	< 20
01/05/15 - 01/13/15	< 66	< 65	< 66	< 66	< 59	< 58	< 58	< 58
01/13/15 - 01/20/15	< 53	< 53	< 53	< 53	< 20	< 53	< 53	< 54
01/20/15 - 01/27/15	< 38	< 38	< 38	< 38	< 37	< 37	< 37	< 37
01/27/15 - 02/03/15	< 39	< 39	< 39	< 39	< 38	< 38	< 38	< 38
02/03/15 - 02/10/15	< 54	< 50	< 50	< 49	< 53	< 21	< 53	< 53
02/10/15 - 02/17/15	< 67	< 63	< 63	< 62	< 67	< 67	< 30	< 69
02/17/15 - 02/24/15	< 66	< 66	< 66	< 66	< 37	< 38	< 38	< 38
02/24/15 - 03/04/15	< 29	< 23	< 23	< 23	< 28	< 29	< 29	< 12
03/04/15 - 03/10/15	< 67	< 67	< 68	< 68	< 58	< 58	< 58	< 57
03/10/15 - 03/17/15	< 17	< 40	< 40	< 39	< 43	< 43	< 43	< 43
03/17/15 - 03/24/15	< 47	< 18	< 46	< 46	< 41	< 42	< 42	< 48
03/24/15 - 03/31/15	< 68	< 67	< 28	< 66	< 62	< 64	< 64	< 65
03/31/15 - 04/07/15	< 64	< 64	< 64	< 64	< 63	< 62	< 63	< 65
04/07/15 - 04/14/15	< 52	< 53	< 53	< 53	< 64	< 65	< 64	< 63
04/14/15 - 04/21/15	< 50	< 50	< 50	< 50	< 61	< 61	< 61	< 60
04/21/15 - 04/28/15	< 58	< 67	< 67	< 67	< 27	< 58	< 59	< 57
04/28/15 - 05/05/15	< 45	< 45	< 45	< 45	< 48	< 49	< 50	< 51
05/05/15 - 05/12/15	< 62	< 42	< 42	< 43	< 64	< 24	< 61	< 60
05/12/15 - 05/19/15	< 43	< 43	< 43	< 43	< 23	< 24	< 24	< 24
05/19/15 - 05/27/15	< 62	< 62	< 62	< 62	< 63	< 63	< 24	< 61
05/27/15 - 06/02/15	< 68	< 68	< 68	< 67	< 62	< 63	< 64	< 66
06/02/15 - 06/09/15	< 58	< 58	< 59	< 59	< 46	< 44	< 45	< 45
06/09/15 - 06/16/15	< 68	< 68	< 67	< 67	< 55	< 57	< 57	< 57
06/16/15 - 06/23/15	< 67	< 66	< 67	< 68	< 67	< 68	< 68	< 66
06/23/15 - 06/29/15	< 66	< 66	< 65	< 65	< 61	< 59	< 60	< 61
06/29/15 - 07/07/15	< 61	< 60	< 60	< 60	< 53	< 55	< 55	< 53
07/07/15 - 07/14/15	< 68	< 68	< 68	< 68	< 64	< 64	< 65	< 66
07/14/15 - 07/21/15	< 54	< 64	< 64	< 64	< 52	< 53	< 52	< 18
07/21/15 - 07/28/15	< 20	< 20	< 20	< 20	< 21	< 21	< 21	< 22
07/28/15 - 08/04/15	< 64	< 64	< 63	< 63	< 64	< 65	< 65	< 65
08/04/15 - 08/11/15	< 57	< 55	< 55	< 55	< 56	< 57	< 22	< 57
08/11/15 - 08/18/15	< 57	< 56	< 57	< 57	< 67	< 66	< 66	< 64
08/18/15 - 08/25/15	< 66	< 66	< 65	< 65	< 64	< 65	< 66	< 67
08/25/15 - 09/01/15	< 59	< 57	< 57	< 58	< 54	< 59	< 54	< 53
09/01/15 - 09/07/15	< 63	< 64	< 64	< 63	< 66	< 67	< 69	< 69
09/07/15 - 09/15/15	< 39	< 39	< 39	< 39	< 59	< 58	< 57	< 29
09/15/15 - 09/22/15	< 67	< 67	< 67	< 66	< 64	< 65	< 65	< 67
09/22/15 - 09/29/15	< 51	< 21	< 52	< 52	< 63	< 64	< 63	< 52
09/29/15 - 10/06/15	< 40	< 40	< 39	< 39	< 41	< 41	< 42	< 42
10/06/15 - 10/13/15	< 46	< 46	< 46	< 46	< 41	< 40	< 40	< 40
10/13/15 - 10/20/15	< 40	< 40	< 40	< 40	< 53	< 54	< 54	< 55
10/20/15 - 10/27/15	< 49	< 58	< 57	< 57	< 49	< 49	< 49	< 19
10/27/15 - 11/03/15	< 13	< 13	< 13	< 13	< 41	< 41	< 41	< 42
11/03/15 - 11/10/15	< 52	< 52	< 52	< 53	< 32	< 33	< 32	< 32
11/10/15 - 11/16/15	< 33	< 33	< 33	< 34	< 31	< 30	< 31	< 30
11/16/15 - 11/23/15	< 44	< 44	< 44	< 43	< 49	< 49	< 49	< 49
11/23/15 - 12/01/15	< 69	< 69	< 69	< 70	< 65	< 65	< 66	< 67
12/01/15 - 12/08/15	< 44	< 49	< 49	< 49	< 45	< 43	< 43	< 18
12/08/15 - 12/15/15	< 68	< 68	< 68	< 68	< 69	< 69	< 69	< 68
12/15/15 - 12/21/15	< 59	< 59	< 58	< 58	< 26	< 60	< 60	< 61
12/21/15 - 12/29/15	< 30	< 30	< 30	< 30	< 29	< 30	< 29	< 29
MEAN	-	-	-	-	-	-	-	-

Table C-VII.1 **CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CONTROL FARM BY-26-2	INDICATOR FARM BY-20-1
01/05/15	< 0.6	< 0.6
02/03/15	< 0.5	< 0.3
03/04/15	< 0.4	< 0.4
04/07/15	< 0.6	< 0.6
05/05/15	< 0.7	< 0.9
05/19/15	< 0.9	< 0.4
06/02/15	< 0.5	< 0.5
06/16/15	< 0.6	< 0.5
06/29/15	< 0.6	< 0.8
07/14/15	< 0.7	< 0.8
07/28/15	< 0.5	< 0.4
08/11/15	< 0.3	< 0.4
08/25/15	< 0.8	< 0.8
09/07/15	< 0.4	< 0.3
09/22/15	< 0.5	< 0.4
10/06/15	< 0.8	< 0.9
10/20/15	< 0.7	< 0.4
11/03/15	< 0.6	< 0.5
12/01/15	< 0.5	< 0.7
MEAN	-	-

Table C-VII.2 **CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

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
BY-20-1	01/05/15	< 6	< 6	< 14	< 5	< 13	< 6	< 11	< 5	< 6	< 30	< 8
	02/03/15	< 10	< 9	< 26	< 11	< 18	< 9	< 17	< 8	< 9	< 44	< 13
	03/04/15	< 9	< 8	< 16	< 8	< 19	< 9	< 18	< 8	< 9	< 43	< 13
	04/07/15	< 7	< 9	< 17	< 9	< 22	< 10	< 15	< 8	< 9	< 47	< 12
	05/05/15	< 5	< 6	< 13	< 6	< 13	< 6	< 8	< 5	< 5	< 26	< 8
	05/19/15	< 5	< 6	< 14	< 8	< 15	< 7	< 11	< 6	< 7	< 29	< 10
	06/02/15	< 7	< 8	< 16	< 8	< 18	< 8	< 14	< 8	< 8	< 45	< 12
	06/16/15	< 8	< 9	< 19	< 9	< 20	< 9	< 13	< 7	< 9	< 42	< 15
	06/29/15	< 8	< 8	< 21	< 10	< 20	< 9	< 13	< 6	< 9	< 46	< 11
	07/14/15	< 5	< 5	< 12	< 6	< 12	< 6	< 9	< 4	< 5	< 37	< 10
	07/28/15	< 4	< 3	< 9	< 4	< 9	< 4	< 7	< 4	< 5	< 18	< 6
	08/11/15	< 9	< 11	< 21	< 11	< 21	< 9	< 18	< 9	< 10	< 57	< 14
	08/25/15	< 9	< 11	< 21	< 10	< 22	< 9	< 14	< 7	< 11	< 47	< 11
	09/07/15	< 9	< 9	< 19	< 10	< 21	< 9	< 18	< 10	< 10	< 56	< 13
	09/22/15	< 6	< 6	< 13	< 5	< 14	< 6	< 10	< 5	< 6	< 25	< 7
	10/06/15	< 9	< 10	< 24	< 6	< 13	< 11	< 16	< 9	< 10	< 45	< 7
	10/20/15	< 12	< 11	< 24	< 9	< 35	< 11	< 22	< 13	< 16	< 50	< 14
	11/03/15	< 10	< 11	< 24	< 10	< 29	< 14	< 11	< 7	< 10	< 56	< 14
	12/01/15	< 6	< 6	< 14	< 5	< 16	< 7	< 11	< 5	< 6	< 30	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-
BY-26-2	01/05/15	< 8	< 8	< 19	< 8	< 17	< 7	< 14	< 6	< 7	< 36	< 12
	02/03/15	< 7	< 7	< 19	< 8	< 18	< 7	< 13	< 6	< 8	< 37	< 12
	03/04/15	< 9	< 8	< 24	< 9	< 21	< 11	< 15	< 8	< 10	< 41	< 12
	04/07/15	< 6	< 6	< 15	< 6	< 14	< 7	< 12	< 5	< 6	< 36	< 12
	05/05/15	< 6	< 7	< 13	< 7	< 14	< 6	< 13	< 7	< 7	< 36	< 5
	05/19/15	< 4	< 4	< 11	< 5	< 10	< 4	< 8	< 3	< 5	< 22	< 8
	06/02/15	< 6	< 7	< 19	< 6	< 14	< 7	< 13	< 7	< 7	< 42	< 14
	06/16/15	< 7	< 8	< 20	< 9	< 19	< 7	< 13	< 6	< 8	< 45	< 12
	06/29/15	< 9	< 9	< 25	< 12	< 23	< 11	< 17	< 11	< 13	< 59	< 13
	07/14/15	< 4	< 4	< 12	< 5	< 9	< 5	< 7	< 4	< 4	< 25	< 9
	07/28/15	< 6	< 6	< 10	< 7	< 14	< 7	< 10	< 5	< 6	< 27	< 7
	08/11/15	< 9	< 8	< 24	< 11	< 20	< 9	< 18	< 8	< 7	< 34	< 12
	08/25/15	< 8	< 8	< 17	< 6	< 20	< 8	< 15	< 8	< 9	< 38	< 11
	09/07/15	< 13	< 10	< 21	< 10	< 32	< 9	< 24	< 11	< 12	< 49	< 10
	09/22/15	< 8	< 6	< 13	< 7	< 16	< 9	< 11	< 7	< 7	< 36	< 8
	10/06/15	< 13	< 13	< 25	< 12	< 23	< 13	< 18	< 11	< 13	< 51	< 9
	10/20/15	< 6	< 7	< 15	< 7	< 13	< 6	< 12	< 5	< 6	< 30	< 9
	11/03/15	< 6	< 7	< 14	< 6	< 16	< 8	< 12	< 7	< 7	< 39	< 8
	12/01/15	< 7	< 7	< 15	< 10	< 19	< 7	< 13	< 7	< 6	< 34	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-VIII.1 **CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
BY-CONTROL													
Cabbage/Beet greens	08/05/15	< 7	< 8	< 19	< 7	< 17	< 8	< 13	< 25	< 6	< 7	< 53	< 18
Onions/Beets	08/05/15	< 13	< 14	< 36	< 15	< 33	< 14	< 24	< 48	< 13	< 13	< 98	< 24
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BY-QUAD 1													
Beet greens	08/05/15	< 6	< 6	< 16	< 6	< 14	< 7	< 12	< 25	< 5	< 6	< 49	< 13
Beets	08/05/15	< 4	< 5	< 12	< 4	< 11	< 5	< 9	< 21	< 4	< 5	< 40	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BY-QUAD 2													
Lettuce/Cabbage	08/05/15	< 6	< 7	< 16	< 6	< 14	< 7	< 12	< 29	< 6	< 6	< 56	< 13
Potatoes	08/05/15	< 6	< 7	< 16	< 6	< 14	< 7	< 12	< 24	< 5	< 6	< 49	< 13
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BY-QUAD 3													
Lettuce/Cabbage	08/05/15	< 3	< 3	< 8	< 3	< 8	< 3	< 6	< 14	< 3	< 3	< 29	< 7
Turnips/Rutabagas	08/05/15	< 6	< 6	< 17	< 6	< 16	< 6	< 10	< 23	< 5	< 6	< 45	< 12
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
BY-QUAD 4													
Cabbage	08/05/15	< 6	< 7	< 17	< 6	< 14	< 8	< 13	< 34	< 7	< 7	< 64	< 12
Turnips/Potatoes	08/05/15	< 8	< 9	< 21	< 8	< 19	< 9	< 15	< 36	< 8	< 8	< 69	< 20
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-IX.1 QUARTERLY OSLD RESULTS FOR BYRON NUCLEAR GENERATING STATION, 2015

RESULTS IN UNITS OF MREM/QUARTER ± 2 STANDARD DEVIATIONS

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
BY-01-1	19 ± 3	19	19	22	18
BY-01-2	20 ± 3	19	19	22	20
BY-04-1	22 ± 4	21	24	24	21
BY-04-2	23 ± 5	20	24	26	22
BY-06-1	19 ± 2	19	19	21	19
BY-06-2	20 ± 2	19	19	21	21
BY-08-1	20 ± 2	19	20	21	19
BY-08-2	20 ± 2	19	18	20	20
BY-21-1	17 ± 4	16	16	20	17
BY-21-2	18 ± 3	19	16	19	17
BY-22-1	24 ± 3	23	22	26	23
BY-22-2	23 ± 2	23	23	24	23
BY-23-1	23 ± 4	22	24	25	21
BY-23-2	23 ± 5	21	24	26	22
BY-24-1	21 ± 3	20	21	23	20
BY-24-2	21 ± 5	20	20	24	19
BY-101-1	17 ± 3	18	16	19	16
BY-101-2	18 ± 1	17	18	19	18
BY-102-1	23 ± 4	21	22	26	24
BY-102-2	24 ± 5	21	25	26	24
BY-103-1	22 ± 3	20	23	23	23
BY-103-2	23 ± 4	21	22	26	21
BY-103-3	23 ± 2	22	22	24	23
BY-104-1	24 ± 4	21	25	25	23
BY-104-2	25 ± 5	22	27	26	24
BY-104-3	22 ± 2	21	22	23	22
BY-105-1	24 ± 4	22	25	26	24
BY-105-2	24 ± 4	22	26	26	22
BY-106-1	23 ± 4	20	25	24	23
BY-106-2	23 ± 5	22	22	26	22
BY-107-1	26 ± 4	23	26	28	26
BY-107-2	24 ± 2	23	25	25	24
BY-107-3	20 ± 2	19	21	21	20
BY-108-1	24 ± 4	21	23	26	24
BY-108-2	21 ± 4	20	21	24	20
BY-109-1	22 ± 2	21	24	23	21
BY-109-2	22 ± 4	20	22	25	22
BY-110-1	22 ± 3	21	21	24	20
BY-110-2	22 ± 2	21	22	23	22
BY-111-3	23 ± 3	21	25	24	23
BY-111-4	23 ± 4	22	21	25	22
BY-112-3	23 ± 3	21	24	24	22
BY-112-4	22 ± 3	21	22	24	21
BY-113-1	24 ± 2	24	24	25	22
BY-113-2	20 ± 3	19	20	22	19
BY-114-1	19 ± 2	18	19	21	19
BY-114-2	21 ± 4	18	21	23	21

Table C-IX.1 QUARTERLY OSLD RESULTS FOR BYRON NUCLEAR GENERATING STATION, 2015

RESULTS IN UNITS OF MREM/QUARTER ± 2 STANDARD DEVIATIONS

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
BY-115-1	22 ± 3	20	22	24	23
BY-115-2	21 ± 2	20	21	22	21
BY-116-1	21 ± 2	20	21	22	20
BY-116-2	21 ± 3	20	22	23	20
BY-116-3	21 ± 3	20	23	23	21
BY-201-3	24 ± 3	22	25	25	24
BY-201-4	24 ± 5	21	24	27	24
BY-202-1	22 ± 3	21	22	24	21
BY-202-2	25 ± 5	21	25	27	26
BY-203-1	19 ± 4	17	18	21	19
BY-203-2	21 ± 3	19	22	23	21
BY-204-1	20 ± 3	19	20	22	20
BY-204-2	23 ± 5	20	25	25	24
BY-205-1	24 ± 5	21	22	27	24
BY-205-2	22 ± 3	20	22	24	23
BY-206-1	23 ± 6	19	23	26	25
BY-206-2	24 ± 5	21	25	27	26
BY-207-1	24 ± 5	21	26	27	24
BY-207-2	22 ± 3	20	22	24	21
BY-208-1	24 ± 5	21	24	27	26
BY-208-2	23 ± 4	20	25	23	25
BY-209-1	23 ± 5	20	21	26	24
BY-209-4	24 ± 5	21	25	27	24
BY-210-3	23 ± 4	20	22	25	24
BY-210-4	22 ± 3	20	23	23	21
BY-211-1	23 ± 4	21	24	26	23
BY-211-4	23 ± 5	20	24	26	24
BY-212-1	25 ± 3	22	26	26	24
BY-212-4	25 ± 4	22	25	27	24
BY-213-1	23 ± 5	21	24	27	23
BY-213-4	24 ± 5	20	25	25	25
BY-214-1	23 ± 4	20	24	26	23
BY-214-4	24 ± 7	21	24	29	23
BY-215-1	23 ± 4	21	23	26	23
BY-215-4	22 ± 3	20	23	24	22
BY-216-1	23 ± 3	21	23	24	24
BY-216-2	22 ± 3	21	24	23	21
BY-301-1	17 ± 1	17	16	18	17
BY-301-2	20 ± 3	(2)	19	22	20
BY-302-1	21 ± 0	21	(2)	(2)	(2)
BY-309-1	21 ± 5	19	20	25	21
BY-309-2	22 ± 3	20	23	23	22
BY-309-3	21 ± 3	19	21	23	20
BY-309-4	20 ± 3	20	19	22	19
BY-314-1	18 ± 0	18	(2)	(2)	(2)
BY-314-2	19 ± 5	(2)	19	21	16

(2) SEE PROGRAM CHANGES SECTION FOR EXPLANATION

TABLE C-IX.2 MEAN QUARTLY OSLD RESULTS FOR THE INNER RING, OUTER RING, SPECIAL INTEREST, OTHER AND CONTROL LOCATIONS FOR BYRON NUCLEAR GENERATING STATION, 2015

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

COLLECTION PERIOD	INNER RING ± 2 S.D.	OUTER RING	SPECIAL INTEREST	OTHER	CONTROL
JAN-MAR	21 ± 3	20 ± 2	19 ± 2	20 ± 4	19 ± 1
APR-JUN	23 ± 5	23 ± 3	19 ± 4	21 ± 6	19 ± 3
JUL-SEP	24 ± 4	25 ± 4	22 ± 4	23 ± 5	21 ± 1
OCT-DEC	22 ± 4	23 ± 3	19 ± 4	20 ± 4	20 ± 2

TABLE C-IX.3 SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR BYRON NUCLEAR GENERATING STATION, 2015

RESULTS IN UNITS OF MREM/QUARTER

LOCATION	SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN ± 2 S.D.
INNER RING	144	16	28	22 ± 5
OUTER RING	128	17	29	23 ± 5
SPECIAL INTEREST	28	16	25	20 ± 4
OTHER	56	16	26	21 ± 5
CONTROL	8	18	21	20 ± 2

INNER RING STATIONS - BY-101-1, BY-101-2, BY-102-1, BY-102-2, BY-103-1, BY-103-2, BY-103-3, BY-104-1, BY-104-2, BY-104-3, BY-105-1, BY-105-2, BY-106-1, BY-106-2, BY-107-1, BY-107-2, BY-107-3, BY-108-1, BY-108-2, BY-109-1, BY-109-2, BY-110-1, BY-110-2, BY-111-3, BY-111-4, BY-112-3, BY-112-4, BY-113-1, BY-113-2, BY-114-1, BY-114-2, BY-115-1, BY-115-2, BY-116-1, BY-116-2, BY-116-3

OUTER RING STATIONS - BY-201-3, BY-201-4, BY-202-1, BY-202-2, BY-203-1, BY-203-2, BY-204-1, BY-204-2, BY-205-1, BY-205-2, BY-206-1, BY-206-2, BY-207-1, BY-207-2, BY-208-1, BY-208-2, BY-209-1, BY-209-4, BY-210-3, BY-210-4, BY-211-1, BY-211-4, BY-212-1, BY-212-4, BY-213-1, BY-213-4, BY-214-1, BY-214-4, BY-215-1, BY-215-4, BY-216-1, BY-216-2

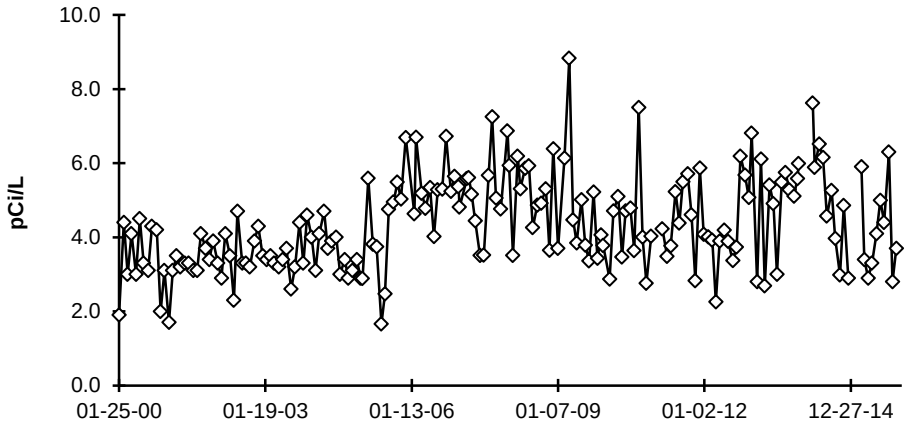
SPECIAL INTEREST STATIONS - BY-301-1,BY-301-2, BY-302-1, BY-309-1, BY-309-2, BY-309-3, BY-309-4, BY-314-1, BY-314-2

OTHER STATIONS - BY-01-1, BY-01-2, BY-04-1, BY-04-2, BY-06-1, BY-06-2, BY-21-1, BY-21-2, BY-22-1, BY-22-2, BY-23-1, BY-23-2, BY-24-1, BY-24-2

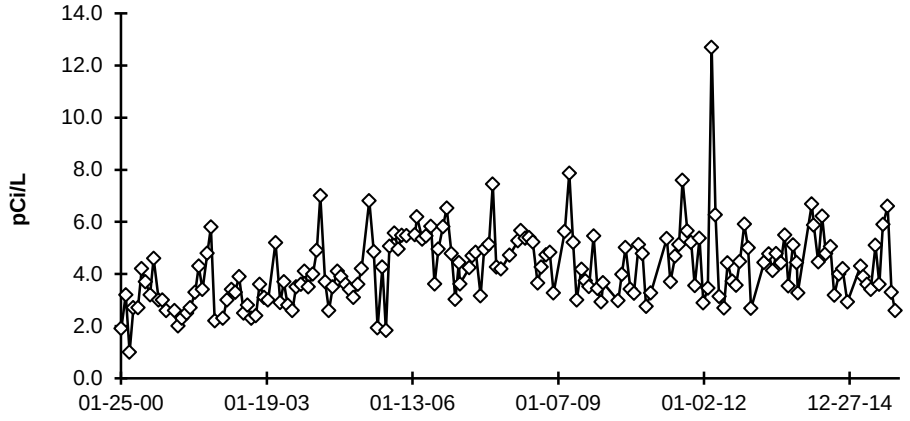
CONTROL STATIONS - BY-08-1, BY-08-2

FIGURE C-1
Surface Water - Gross Beta - Station BY-12 and BY-29 (C) 6Collected in the Vicinity of BNGS, 2000 - 2015

BY-12 Oregon Pool of Rock River, Downstream



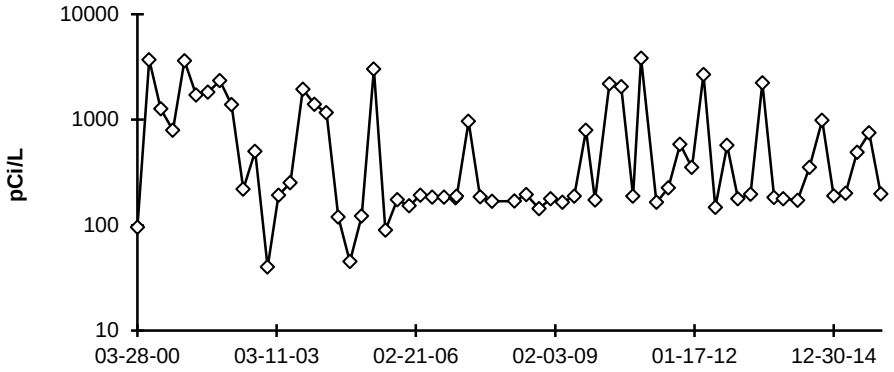
BY-29 (C) Byron, Rock River Upstream



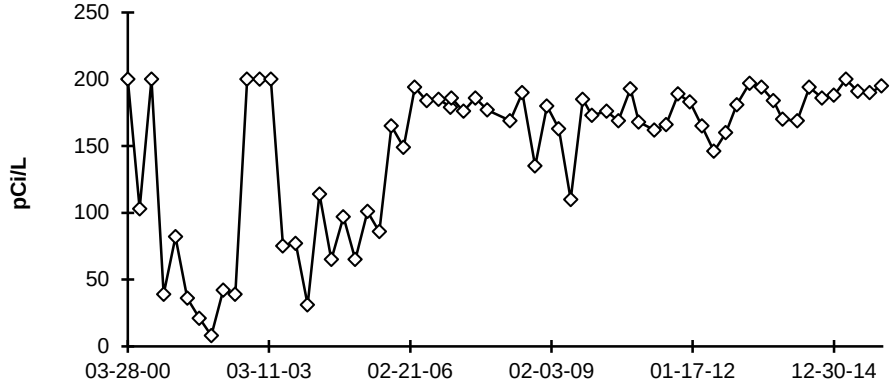
DUE TO VENDOR CHANGE IN 2005, < VALUES ARE LLD VALUES JANUARY THROUGH JUNE 2005 AND MDC VALUES AFTER JUNE 2005

FIGURE C-2
Surface Water - Tritium - Stations BY-12 and BY-29 (C) Collected in the Vicinity of BNGS, 2000 - 2015

BY-12 Oregon Pool of Rock River, Downstream

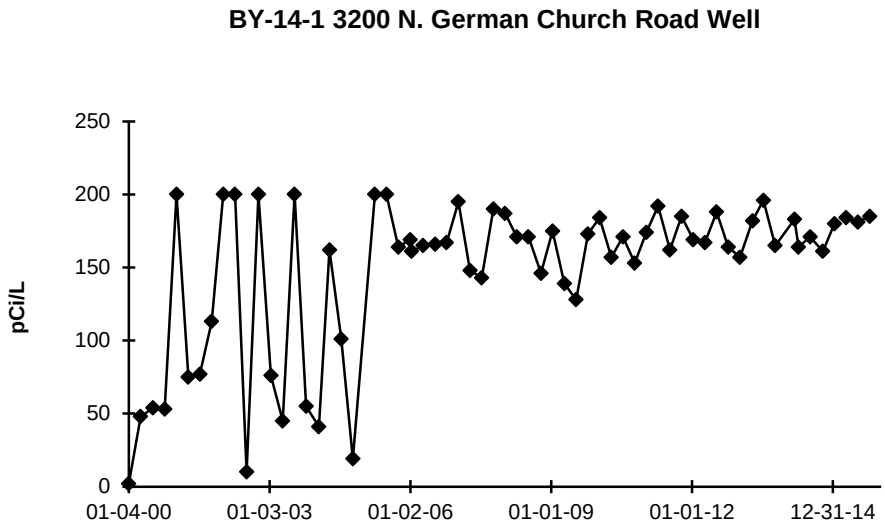


BY-29 (C) Byron, Rock River Upstream



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

FIGURE C-3
Ground Water - Tritium - Station BY-14-1
Collected in the Vicinity of BNGS, 2000 - 2015



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

FIGURE C-4
Ground Water - Tritium - Stations BY-18-1
Collected in the Vicinity of BNGS, 2010 - 2015

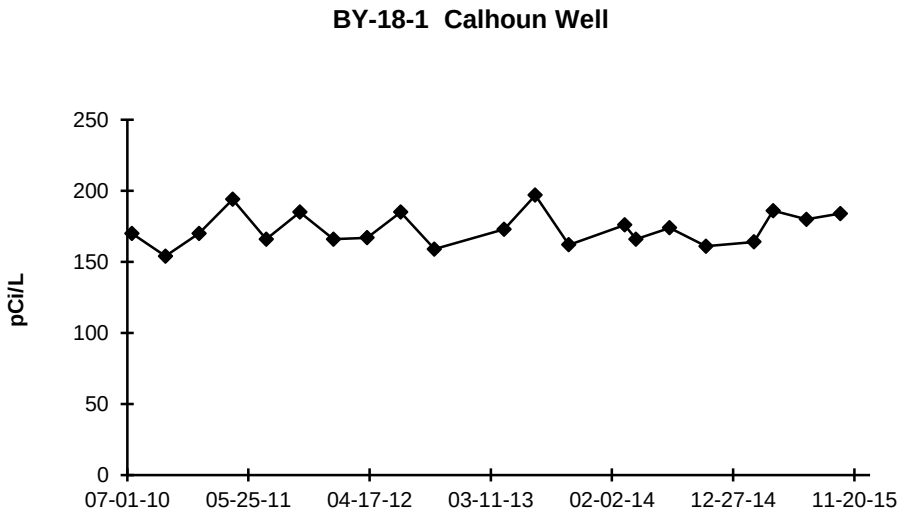
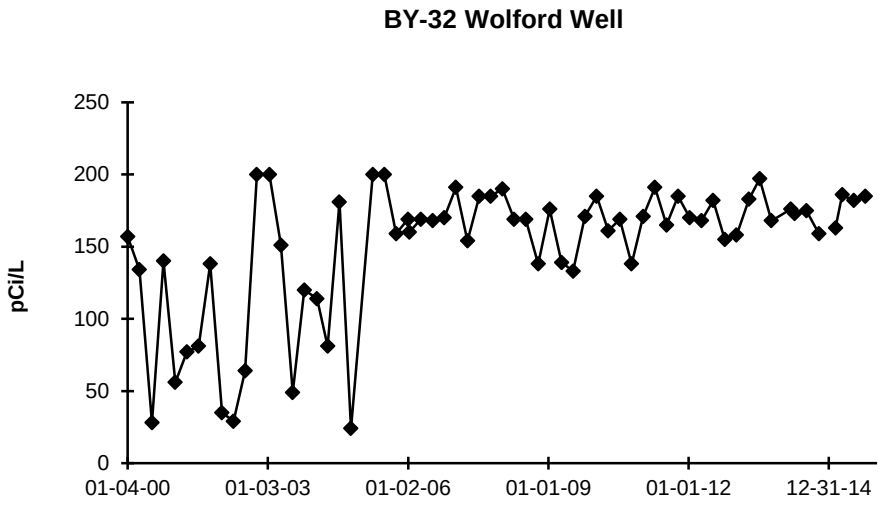


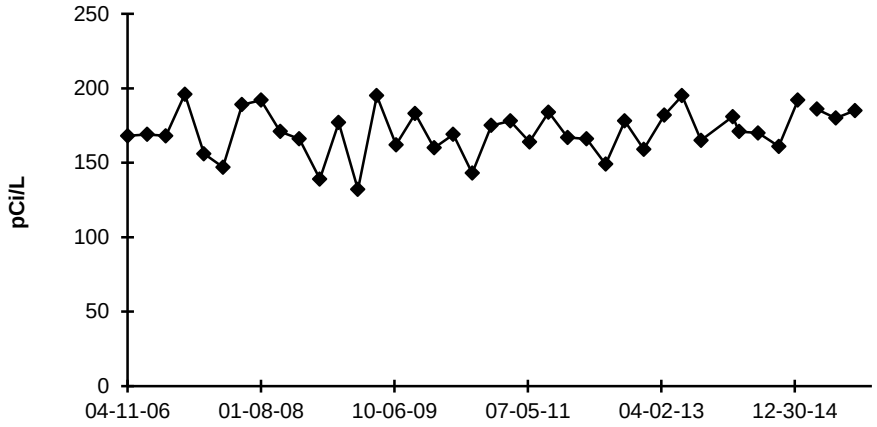
FIGURE C-5
Ground Water - Tritium - Station BY-32
Collected in the Vicinity of BNGS, 2000 - 2015



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

FIGURE C-6
Ground Water - Tritium - Stations BY-35 and BY-36 Collected in the Vicinity of BNGS, 2006 - 2015

BY-35 Vancko Well



BY-36 Blanchard Well

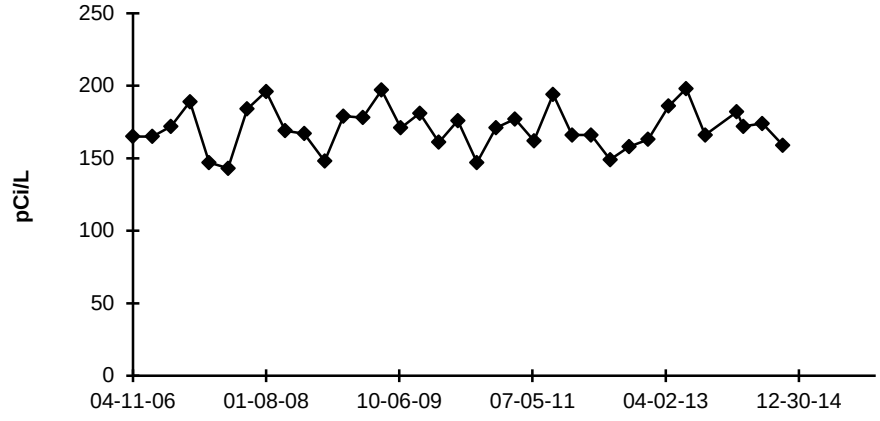
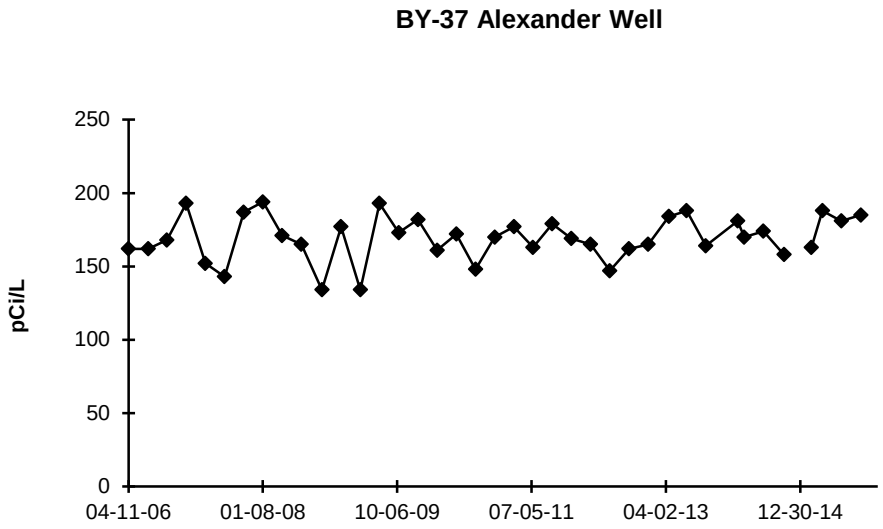


FIGURE C-7
Ground Water - Tritium - Stations BY-37 and BY-38 Collected in the Vicinity of BNGS, 2006 - 2015



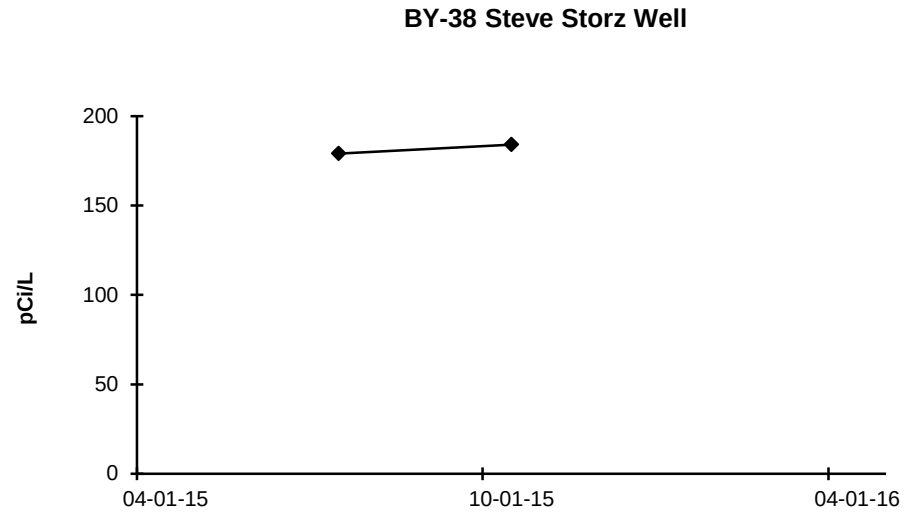
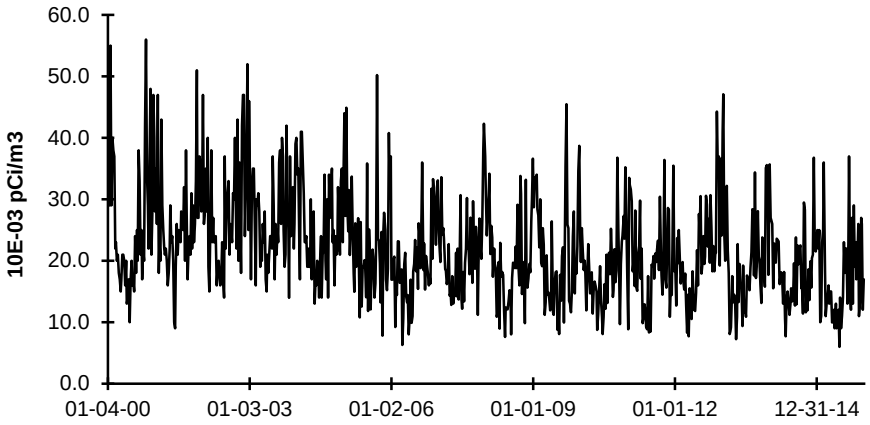


FIGURE C-8
Air Particulates - Gross Beta - Stations BY-08 (C) and BY-21 Collected in the Vicinity of BNGS, 2000 - 2015

BY-08 (C) Leaf River WNW



BY-21 Byron Nearsite N

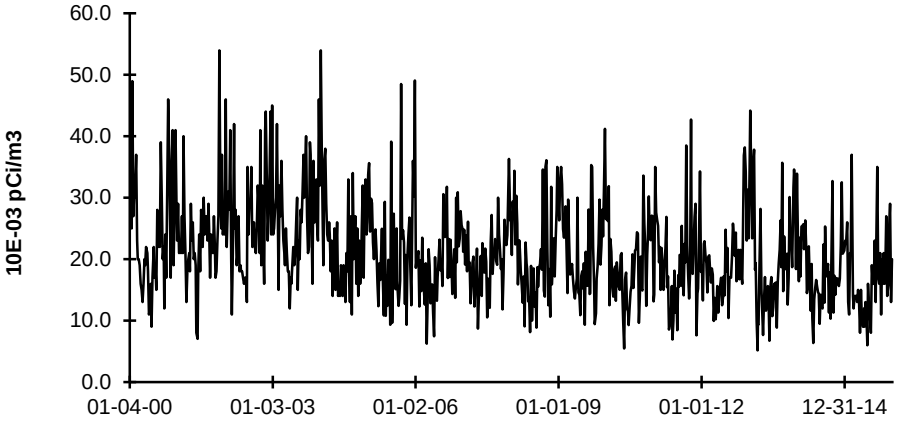
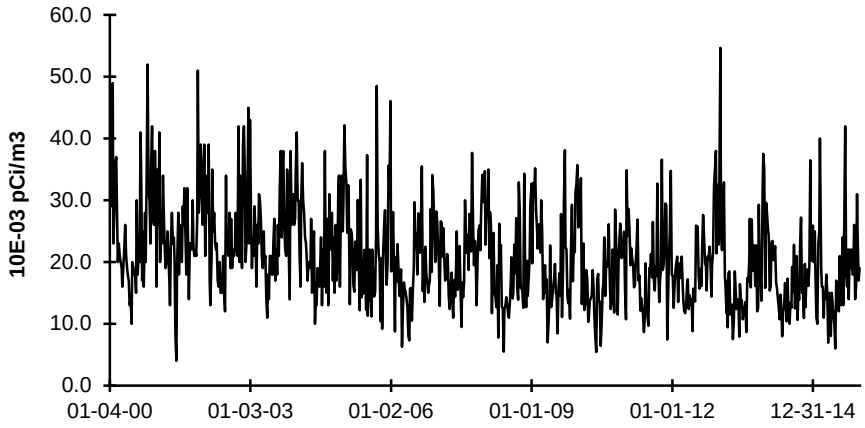


FIGURE C-9
Air Particulates - Gross Beta - Stations BY-22 and BY-23 Collected in the Vicinity of BNGS, 2000 - 2015

BY-22 Byron Nearsite SE



BY-23 Byron Nearsite S

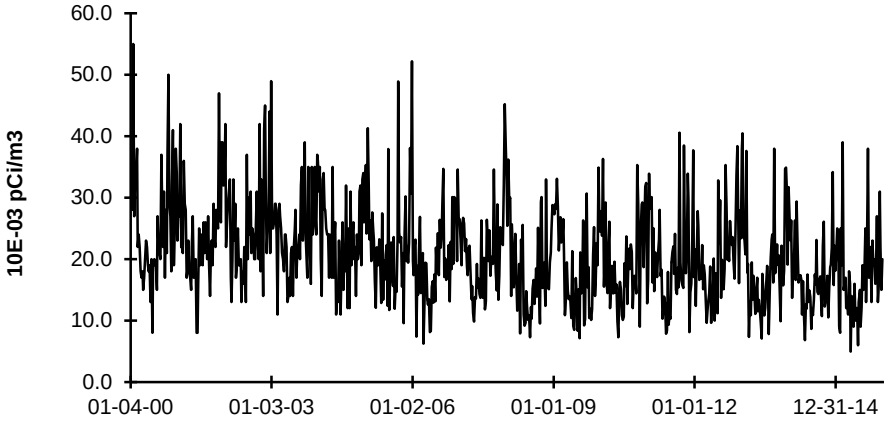


FIGURE C-10
Air Particulates - Gross Beta - Station BY-24
Collected in the Vicinity of BNGS, 2000 - 2015

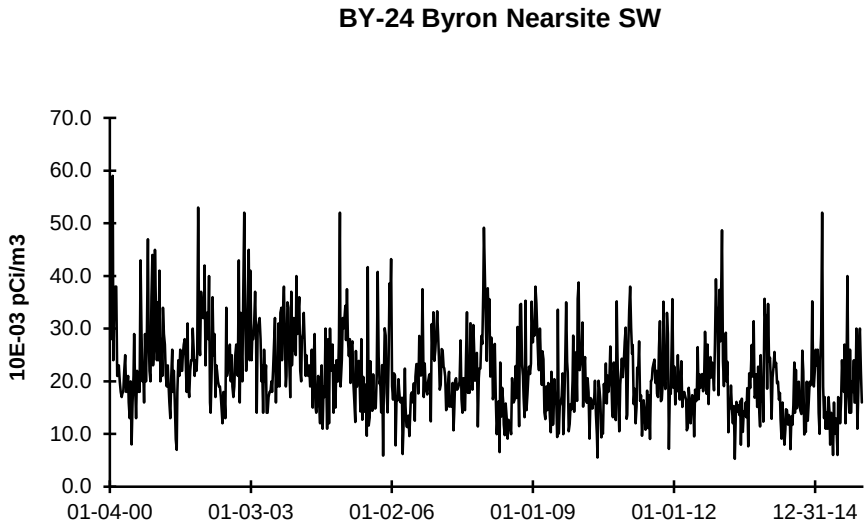
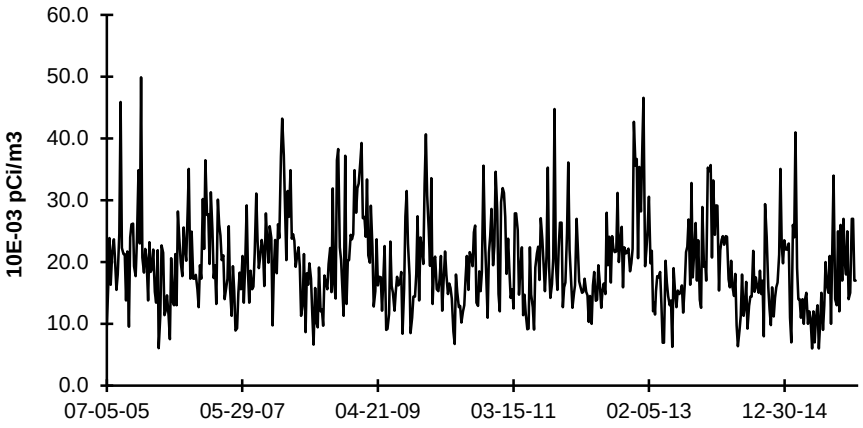
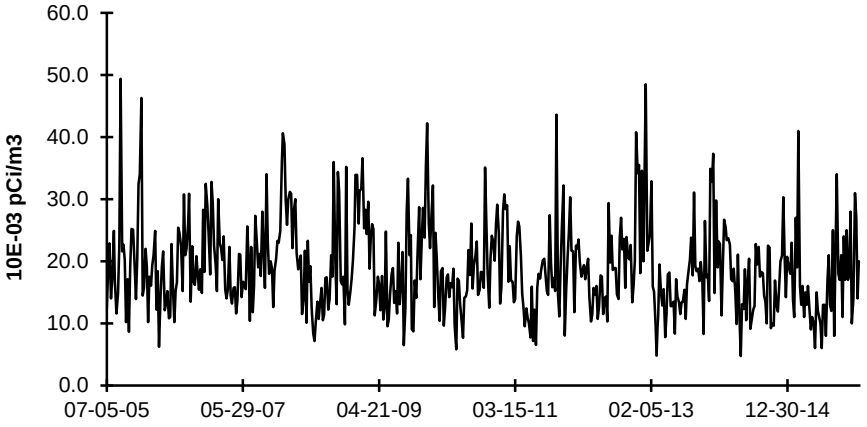


FIGURE C-11
Air Particulates - Gross Beta - Stations BY-01 and BY-04 Collected in the Vicinity of BNGS, 2005 - 2015

BY-01 Byron N

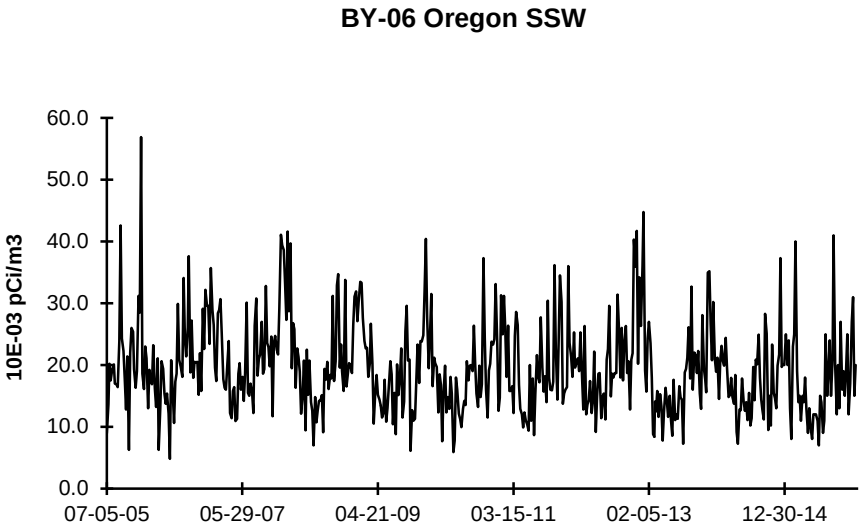


BY-04 Paynes Point SE



Regular analysis of far field air particulate & gross beta did not take place prior to 2005.

FIGURE C-12
Air Particulates - Gross Beta - Station BY-06
Collected in the Vicinity of BNGS, 2005 - 2015



Regular analysis of far field air particulate & gross beta did not take place prior to 2005.

APPENDIX D

INTER-LABORATORY COMPARISON PROGRAM

Intentionally left blank

TABLE D-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2015
(PAGE 1 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2015	E11181	Milk	Sr-89	pCi/L	88.9	97.2	0.91	A
			Sr-90	pCi/L	12.2	17.4	0.70	W
	E11182	Milk	I-131	pCi/L	61.3	65.1	0.94	A
			Ce-141	pCi/L	104	113	0.92	A
			Cr-51	pCi/L	265	276	0.96	A
			Cs-134	pCi/L	138	154	0.90	A
			Cs-137	pCi/L	205	207	0.99	A
			Co-58	pCi/L	178	183	0.97	A
			Mn-54	pCi/L	187	188	0.99	A
			Fe-59	pCi/L	182	177	1.03	A
			Zn-65	pCi/L	345	351	0.98	A
			Co-60	pCi/L	379	405	0.94	A
	E11184	AP	Ce-141	pCi	107	85.0	1.26	W
			Cr-51	pCi	261	224	1.17	A
			Cs-134	pCi	74.6	77.0	0.97	A
			Cs-137	pCi	99.6	102	0.98	A
			Co-58	pCi	99.8	110	0.91	A
			Mn-54	pCi	99.2	96.9	1.02	A
			Fe-59	pCi	109	119	0.92	A
			Zn-65	pCi	188	183	1.03	A
			Co-60	pCi	200	201	1.00	A
	E11183	Charcoal	I-131	pCi	82.9	85.4	0.97	A
	E11185	Water	Fe-55	pCi/L	1950	1900	1.03	A
June 2015	E11234	Milk	Sr-89	pCi/L	94.9	92.6	1.02	A
			Sr-90	pCi/L	14.3	12.7	1.13	A
	E11238	Milk	I-131	pCi/L	93.2	95.9	0.97	A
			Ce-141	pCi/L	Not provided for this study			
			Cr-51	pCi/L	349	276	1.26	W
			Cs-134	pCi/L	165	163	1.01	A
			Cs-137	pCi/L	143	125	1.14	A
			Co-58	pCi/L	82.0	68.4	1.20	A
			Mn-54	pCi/L	113	101	1.12	A
			Fe-59	pCi/L	184	151	1.22	W
			Zn-65	pCi/L	269	248	1.08	A
			Co-60	pCi/L	208	193	1.08	A
	E11237	AP	Ce-141	pCi	Not provided for this study			
			Cr-51	pCi	323	233	1.39	N (1)
			Cs-134	pCi	139	138	1.01	A
			Cs-137	pCi	111	106	1.05	A
			Co-58	pCi	54.0	57.8	0.93	A
			Mn-54	pCi	96.8	84.9	1.14	A
			Fe-59	pCi	162	128	1.27	W
			Zn-65	pCi	198	210	0.94	A
			Co-60	pCi	178	163	1.09	A
	E11236	Charcoal	I-131	pCi	93.9	80	1.17	A

TABLE D-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2015
(PAGE 2 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
June 2015	E11238	Water	Fe-55	pCi/L	1890	1790	1.06	A
September 2015	E11289	Milk	Sr-89	pCi/L	95.7	99.1	0.97	A
			Sr-90	pCi/L	15.4	16.4	0.94	A
	E11290	Milk	I-131	pCi/L	94.9	99.9	0.95	A
			Ce-141	pCi/L	228	213	1.07	A
			Cr-51	pCi/L	499	538	0.93	A
			Cs-134	pCi/L	208	212	0.98	A
			Cs-137	pCi/L	270	255	1.06	A
			Co-58	pCi/L	275	263	1.05	A
			Mn-54	pCi/L	320	290	1.10	A
			Fe-59	pCi/L	255	226	1.13	A
			Zn-65	pCi/L	392	353	1.11	A
			Co-60	pCi/L	350	330	1.06	A
	E11292	AP	Ce-141	pCi	104	85.1	1.22	W
			Cr-51	pCi	262	215	1.22	W
			Cs-134	pCi	86.1	84.6	1.02	A
			Cs-137	pCi	93	102	0.91	A
			Co-58	pCi	106	105	1.01	A
			Mn-54	pCi	117	116	1.01	A
			Fe-59	pCi	94.8	90.2	1.05	A
			Zn-65	pCi	160	141	1.13	A
			Co-60	pCi	146	132	1.11	A
	E11291	Charcoal	I-131	pCi	85.9	81.7	1.05	A
	E11293	Water	Fe-55	pCi/L	2090	1800	1.16	A
	E11294	Soil	Ce-141	pCi/kg	209	222	0.94	A
			Cr-51	pCi/kg	463	560	0.83	A
			Cs-134	pCi/kg	231	221	1.05	A
			Cs-137	pCi/kg	311	344	0.90	A
			Co-58	pCi/kg	245	274	0.89	A
			Mn-54	pCi/kg	297	302	0.98	A
			Fe-59	pCi/kg	248	235	1.06	A
			Zn-65	pCi/kg	347	368	0.94	A
			Co-60	pCi/kg	328	344	0.95	A
December 2015	E11354	Milk	Sr-89	pCi/L	96.2	86.8	1.11	A
			Sr-90	pCi/L	14.8	12.5	1.18	A
	E11355	Milk	I-131	pCi/L	95.1	91.2	1.04	A
			Ce-141	pCi/L	117	129	0.91	A
			Cr-51	pCi/L	265	281	0.94	A
			Cs-134	pCi/L	153	160	0.96	A
			Cs-137	pCi/L	119	115	1.03	A
			Co-58	pCi/L	107	110	0.97	A
			Mn-54	pCi/L	153	145	1.06	A
			Fe-59	pCi/L	117	108	1.08	A
			Zn-65	pCi/L	261	248	1.05	A
			Co-60	pCi/L	212	213	1.00	A

TABLE D-1 ANALYTICS ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2015
(PAGE 3 OF 3)

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2015	E11357	AP	Ce-141	pCi	89.9	84.0	1.07	A
			Cr-51	pCi	215	184	1.17	A
			Cs-134	pCi	103	105	0.98	A
			Cs-137	pCi	76.6	74.8	1.02	A
			Co-58	pCi	76.2	71.9	1.06	A
			Mn-54	pCi	91.4	94.4	0.97	A
			Fe-59	pCi	78.6	70.3	1.12	A
			Zn-65	pCi	173	162	1.07	A
			Co-60	pCi	138	139	0.99	A
	E11422	AP	Sr-89	pCi	98.0	96.9	1.01	A
			Sr-90	pCi	10.0	14.0	0.71	W
	E11356	Charcoal	I-131	pCi	74.9	75.2	1.00	A
	E11358	Water	Fe-55	pCi/L	2160	1710	1.26	W
	E11353	Soil	Ce-141	pCi/kg	252	222	1.14	A
			Cr-51	pCi/kg	485	485	1.00	A
			Cs-134	pCi/kg	319	277	1.15	A
			Cs-137	pCi/kg	292	276	1.06	A
			Co-58	pCi/kg	193	190	1.02	A
			Mn-54	pCi/kg	258	250	1.03	A
			Fe-59	pCi/kg	218	186	1.17	A
			Zn-65	pCi/kg	457	429	1.07	A
			Co-60	pCi/kg	381	368	1.04	A

(1) AP Cr-51 - Cr-51 has the shortest half-life and the weakest gamma energy of the mixed nuclide sample, which produces a large error. Taking into account the error, the lowest value would be 119% of the reference value, which would be considered acceptable. NCR 15-18

(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 DOE'S MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)
TELEDYNE BROWN ENGINEERING, 2015
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide*	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2015	15-MaW32	Water	Am-241	Bq/L	0.632	0.654	0.458 - 0.850	A
			Ni-63	Bq/L	2.5		(1)	A
			Pu-238	Bq/L	0.0204	0.0089	(2)	A
			Pu-239/240	Bq/L	0.9	0.8	0.582 - 1.082	A
	15-MaS32	Soil	Ni-63	Bq/kg	392	448.0	314 - 582	A
			Sr-90	Bq/kg	286	653	487 - 849	N (3)
	15-RdF32	AP	Sr-90	Bq/sample	-0.0991		(1)	A
			U-234/233	Bq/sample	0.0211	0.0155	0.0109 - 0.0202	N (3)
			U-238	Bq/sample	0.095	0.099	0.069 - 0.129	A
	15-GrF32	AP	Gr-A	Bq/sample	0.448	1.77	0.53 - 3.01	N (3)
			Gr-B	Bq/sample	0.7580	0.75	0.38 - 1.13	A
	15-RdV32	Vegetation	Cs-134	Bq/sample	8.08	7.32	5.12 - 9.52	A
			Cs-137	Bq/sample	11.6	9.18	6.43 - 11.93	W
			Co-57	Bq/sample	-0.0096		(1)	A
			Co-60	Bq/sample	6.53	5.55	3.89 - 7.22	A
			Mn-54	Bq/sample	0.0058		(1)	A
			Sr-90	Bq/sample	0.999	1.08	0.76 - 1.40	A
			Zn-65	Bq/sample	-0.108		(1)	A
September 2015	15-MaW33	Water	Am-241	Bq/L	1.012	1.055	0.739 - 1.372	A
			Ni-63	Bq/L	11.8	8.55	5.99 - 11.12	N (4)
			Pu-238	Bq/L	0.727	0.681	0.477 - 0.885	A
			Pu-239/240	Bq/L	0.830	0.900	0.630 - 1.170	A
	15-MaS33	Soil	Ni-63	Bq/kg	635	682	477 - 887	A
			Sr-90	Bq/kg	429	425	298 - 553	A
	15-RdF33	AP	Sr-90	Bq/sample	1.48	2.18	1.53 - 2.83	N (4)
			U-234/233	Bq/sample	0.143	0.143	0.100 - 0.186	A
			U-238	Bq/sample	0.149	0.148	0.104 - 0.192	A
	15-GrF33	AP	Gr-A	Bq/sample	0.497	0.90	0.27 - 1.53	A
			Gr-B	Bq/sample	1.34	1.56	0.78 - 2.34	A
	15-RdV33	Vegetation	Cs-134	Bq/sample	6.10	5.80	4.06 - 7.54	A
			Cs-137	Bq/sample	0.0002		(1)	A
			Co-57	Bq/sample	8.01	6.62	4.63 - 8.61	W
			Co-60	Bq/sample	4.97	4.56	3.19 - 5.93	A
			Mn-54	Bq/sample	8.33	7.68	5.38 - 9.98	A
			Sr-90	Bq/sample	0.386	1.30	0.91 - 1.69	N (4)
			Zn-65	Bq/sample	6.07	5.46	3.82 - 7.10	A

(1) False positive test.

(2) Sensitivity evaluation.

(3) Soil Sr-90 - incomplete digestion of the sample resulted in low results; AP U-234/233 - extremely low activity was difficult to quantify AP Gr-A - the MAPEP filter has the activity embedded in the filter. To corrected the low bias, TBE will create an attenuated efficiency for MAPEP samples. NCR 15-13

(4) Water Ni-63 extremely low activity was difficult to quantify; AP & Vegetation Sr-90 was lost during separation, possible from substance added by MAPEP NCR 15-21.

(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-3 ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING, 2015
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2015	RAD-101	Water	Sr-89	pCi/L	45.2	63.2	51.1 - 71.2	N (1)
			Sr-90	pCi/L	28.0	41.9	30.8 - 48.1	N (1)
			Ba-133	pCi/L	80.6	82.5	63.9 - 90.8	A
			Cs-134	pCi/L	71.7	75.7	61.8 - 83.3	A
			Cs-137	pCi/L	187	189	170 - 210	A
			Co-60	pCi/L	85.7	84.5	76.0 - 95.3	A
			Zn-65	pCi/L	197	203	183 - 238	A
			Gr-A	pCi/L	26.1	42.6	22.1 - 54.0	A
			Gr-B	pCi/L	28.8	32.9	21.3 - 40.6	A
			I-131	pCi/L	23.5	23.8	19.7 - 28.3	A
			U-Nat	pCi/L	6.19	6.59	4.99 - 7.83	A
			H-3	pCi/L	3145	3280	2770 - 3620	A
November 2015	RAD-103	Water	Sr-89	pCi/L	40.9	35.7	26.7 - 42.5	A
			Sr-90	pCi/L	29.3	31.1	22.7 - 36.1	A
			Ba-133	pCi/L	31.5	32.5	25.9 - 36.7	A
			Cs-134	pCi/L	59.65	62.3	50.6 - 68.5	A
			Cs-137	pCi/L	156	157	141 - 175	A
			Co-60	pCi/L	70.6	71.1	64.0 - 80.7	A
			Zn-65	pCi/L	145	126	113 - 149	A
			Gr-A	pCi/L	38.2	51.6	26.9 - 64.7	A
			Gr-B	pCi/L	42.0	36.6	24.1 - 44.2	A
			I-131	pCi/L	24.8	26.3	21.9 - 31.0	A
			U-Nat	pCi/L	146.90	56.2	45.7 - 62.4	N (2)
			H-3	pCi/L	21100	21300	18700 - 23400	A

(1) Yield on the high side of our acceptance range indicates possibility of calcium interference. NCR 15-09

(2) Technician failed to dilute original sample. If dilulted, the result would have been 57.1, which fell within the acceptance limits. NCR 15-19

(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.

Intentionally left blank

APPENDIX E

EFFLUENT REPORT

Intentionally left blank

TABLE OF CONTENTS

Table of Contents (cont.)

SUMMARY

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

The Total Effective Dose Equivalent (TEDE) due to licensed activities at Byron Station calculated for the maximum exposed individual for the period is 2.66E-01 mrem. The annual limit on TEDE is 100 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.

There were no additional operational controls implemented which affected the areas of radiological effluents in 2015.

There were no measurements which exceeded the reporting levels, including any which would not have been attributable to station effluents.

The results of the current radiological environmental monitoring program are approximately the same as those found during the pre-operational studies conducted at Byron Station.

INTRODUCTION

Liquid effluents from Byron Station are released to the Rock 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 weekly grab samples and grab samples of batch releases prior to the release of noble gases as well as continuously collected composite samples of iodine and particulate radioactivity 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 isotopic composition of effluents and meteorological data. C-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 Byron Station to measure changes in radiation or radioactivity levels that may be attributable to station operation. If significant changes attributable to Byron 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 2015 gaseous dose was vegetation. The critical pathway for 2015 liquid dose was freshwater fish.

1.0 EFFLUENTS

1.1 Gaseous Effluents to the Atmosphere

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

A total of 2.12E+01 curies of fission and activation gases were released with a maximum average quarterly release rate of 2.55E+00 µCi/sec.

A total of 4.45E-06 curies of 1-131 were released during the year with a maximum average quarterly release rate of 3.88E-07 µCi/sec.

A total of 1.01E-06 curies were released as airborne particulate matter with a maximum average quarterly release rate of 1.28E-07 µCi/sec.

A total of 8.85E+00 curies of other (C-14) radioisotopes were released with a maximum average quarterly release rate of 3.06E-01 µCi/sec.

A total of 8.05E+01 curies of tritium were released with a maximum average quarterly release rate of 3.99E+00 µCi/sec.

Gross alpha-emitting radionuclides were below detectable limits.

1.2 Liquids Released to Rock River

A total of 2.86E+10 liters of radioactive liquid wastes containing 8.48E-03 curies of fission and activation products were discharged with a maximum quarterly average concentration of 4.71E-10 µCi/ml.

A total of 3.32E+03 curies of tritium were discharged with a maximum quarterly average concentration of 1.56E-04 uCi/ml.

A total of 5.08E-04 curies of dissolved and entrained gases were discharged with a maximum quarterly average concentration of 5.56E-11 uCi/ml.

Gross alpha-emitting radionuclides were below detectable limits.

Quarterly release totals of principal radionuclides in liquid effluents are given in Table 1.2-1.

2.0 SOLID RADIOACTIVE WASTE

Solid radioactive wastes were shipped by truck. For detail, refer to Byron Station 2015 Annual Radiological Effluent Release Report.

3.0 DOSE TO MAN

3.1 Gaseous Effluent Pathways

Table 3.2-1 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 whole body dose rates are shown in Table 3.2-1 and were calculated based on measured release rates, isotopic composition of the noble gases, and average meteorological data for the period. Dose rates based on concurrent meteorological data are shown in Table 3.4-1. Based on measured effluents and average meteorological data, the maximum gamma air dose was 1.76E-02 mrad based on measured effluents and average meteorological data, and 3.19E-03 mrad based on measured effluents and 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 "semi-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^2 and an occupancy factor of 1.0 is used. The skin dose based on measured effluents and average meteorological data was 2.84E-04 mrem, and 2.97E-03 mrem based on measured effluents and concurrent meteorological data.

The maximum offsite beta air dose for the year based on measured effluents and average meteorological data was 8.55E-04 mrad. The beta air dose based on measured effluents and concurrent meteorological data was 6.29E-04 mrad.

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 addition of C-14 to plant effluents, 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 7.22E-01 mrem (child/bone) based on measured effluents and average meteorological data and 6.95E-01 mrem based on measured effluents and concurrent meteorological data. The maximum dose from radioactive iodine and particulate (including C-14) to the whole body was 1.49E-01 mrem (child) based on measured effluents and average meteorological data and 1.46E-01 mrem based on measured effluents and concurrent meteorological data.

3.1.3 Gaseous Total Dose

The maximum total dose from gaseous releases to any organ was 7.22E-01 mrem (child/bone) based on measured effluents and average meteorological data, and 6.95E-01 mrem (child/bone) based on measured effluents and concurrent meteorological data. The maximum total dose from gaseous releases to the whole body was 1.49E-01 mrem (child) based on measured effluents and average meteorological data, and 1.46E-01 mrem (child) based on measured effluents and concurrent meteorological data.

3.2 Liquid Effluent Pathways

The principal pathways through the aquatic environment for potential doses to man from liquid waste are ingestion of potable water and eating aquatic foods. Liquid dose was calculated based on the ingestion of potable water and sport fish. It should be noted, however, there were no communities within 10 km downstream of the plant using the Rock River for drinking water. NRC-developed equations were used to calculate the doses to the whole body, bone, liver, thyroid, kidney, lung, lower GI tract, and skin. Specific parameters for use in the equations are given in the Exelon Offsite Dose Calculation Manual (ODCM). The maximum dose from liquid releases to any organ was 1.58E-01 mrem (adult/gilli). The maximum dose from liquid releases to the whole body was 1.40E-01 mrem (adult).

3.3 Total Dose

The maximum total dose to any organ via both gaseous and liquid effluents to any organ is 7.22E-01 mrem (child/bone). The maximum dose to the whole body via both gaseous and liquid effluents is 2.66E-01 mrem (child).

3.4 Assessment of Dose to Member of Public

Byron Station did not exceed any of the dose limits as shown below based on concurrent or historical meteorological data.

- The RETS limits on dose or dose commitment to a member of the public due to radioactive materials in liquid effluents from each reactor is 1.5 mrem to the whole body or 5 mrem to any organ during any calendar quarter and 3 mrem to the whole body or 10 mrem to any organ during a calendar year.

- The RETS limits on air dose in noble gases released in gaseous effluents to a member of the public from each reactor is 5 mrad for gamma radiation or 10 mrad for beta radiation during any calendar quarter and 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 radioactive iodine & particulate with half-lives greater than eight days in gaseous effluents released from each reactor is 7.5 mrem to any organ during any calendar quarter and 15 mrem during a calendar year.

- The 10CFR20 limit on Total Effective Dose Equivalent to individual members of the public is 100 mrem during a calendar year.

- The 40CFR190 limits on individual members of the public is 25 mrem to the whole body, 25 mrem to any organ (except thyroid), and 75 mrem to the thyroid.

4.0 SITE METEOROLOGY

Detailed records of the site meteorological measurements taken during each calendar quarter of the year are maintained by the meteorological vendor, retained on site, and are available upon request. The data are presented as cumulative joint frequency distributions of the wind direction for the 250' level and wind speed class by atmospheric stability class determined from the temperature difference between the 250' and 30' levels. Data recovery for all measurements on the meteorological tower was 99.7% during 2015.

Intentionally left blank

APPENDIX E-1

DATA TABLES AND FIGURES

Intentionally left blank

Table 1.1-1

RG 1.21 EFFLUENT AND WASTE DISPOSAL REPORT
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES
Unit 1

REPORT FOR 2015	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Gases						
1. Total Release	Ci	4.97E-01	1.46E-01	1.10E-01	2.01E+01	2.08E+01
2. Avg. Release Rate	uCi/sec	6.39E-02	1.86E-02	1.38E-02	2.53E+00	6.60E-01
Iodine-131						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
2. Avg. Release Rate	uCi/sec	(1)	(1)	(1)	(1)	(1)
Particulates Half Life >= 8 days						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
2. Avg. Release Rate	uCi/sec	(1)	(1)	(1)	(1)	(1)
Others						
1. Total Release	Ci	1.12E+00	1.11E+00	9.79E-01	1.04E+00	4.24E+00
2. Avg. Release Rate	uCi/sec	1.44E-01	1.41E-01	1.23E-01	1.31E-01	1.35E-01
Tritium						
1. Total Release	Ci	1.38E+01	8.01E+00	1.49E+00	4.00E+00	2.73E+01
2. Avg. Release Rate	uCi/sec	1.77E+00	1.02E+00	1.87E-01	5.03E-01	8.64E-01
Gross Alpha Radioactivity						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
2. Avg. Release Rate	uCi/sec	(1)	(1)	(1)	(1)	(1)

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

Table 1.1-1 (cont.)

RG 1.21 EFFLUENT AND WASTE DISPOSAL REPORT
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES
Unit 2

REPORT FOR 2015	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Gases						
1. Total Release	Ci	7.09E-02	1.26E-01	7.20E-02	1.42E-01	4.12E-01
2. Avg. Release Rate	uCi/sec	9.12E-03	1.61E-02	9.06E-03	1.79E-02	1.31E-02
Iodine-131						
1. Total Release	Ci	7.01E-07	(1)	3.08E-06	6.64E-07	4.45E-06
2. Avg. Release Rate	uCi/sec	9.01E-08	(1)	3.88E-07	8.36E-08	1.41E-07
Particulates Half Life >= 8 days						
1. Total Release	Ci	(1)	(1)	(1)	1.01E-06	1.01E-06
2. Avg. Release Rate	uCi/sec	(1)	(1)	(1)	1.28E-07	3.21E-08
Others						
1. Total Release	Ci	1.26E+00	1.10E+00	1.20E+00	1.05E+00	4.61E+00
2. Avg. Release Rate	uCi/sec	1.62E-01	1.40E-01	1.51E-01	1.33E-01	1.46E-01
Tritium						
1. Total Release	Ci	1.72E+01	1.71E+01	1.05E+01	8.35E+00	5.32E+01
2. Avg. Release Rate	uCi/sec	2.22E+00	2.17E+00	1.32E+00	1.05E+00	1.69E+00
Gross Alpha Radioactivity						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
2. Avg. Release Rate	uCi/sec	(1)	(1)	(1)	(1)	(1)

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

Table 1.2-1

RG 1.21 EFFLUENT AND WASTE DISPOSAL REPORT
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES
Unit 1

REPORT FOR 2015	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
1. Total Release	Ci	9.90E-04	7.13E-04	1.63E-03	1.33E-03	4.24E-03
2. Avg. Diluted Conc.	uCi/ml	2.89E-10	1.93E-10	4.71E-10	3.56E-10	2.96E-10
Tritium						
1. Total Release	Ci	2.47E+02	3.80E+02	4.48E+02	5.81E+02	1.66E+03
2. Avg. Diluted Conc.	uCi/ml	7.21E-05	1.03E-04	1.29E-04	1.56E-04	1.16E-04
Dissolved and Entrained Gases						
1. Total Release	Ci	5.16E-05	9.32E-06	1.93E-04	(1)	2.54E-04
2. Avg. Diluted Conc.	uCi/ml	1.51E-11	2.52E-12	5.56E-11	(1)	1.77E-11
Gross Alpha Radioactivity						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
Volume of liquid waste	liters	3.42E+09	3.70E+09	3.47E+09	3.73E+09	1.43E+10

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

Table 1.2-1 (cont.)

RG 1.21 EFFLUENT AND WASTE DISPOSAL REPORT
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES
Unit 2

REPORT FOR 2015	Units	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
Fission and Activation Products						
1. Total Release	Ci	9.90E-04	7.13E-04	1.63E-03	1.33E-03	4.24E-03
2. Avg. Diluted Conc.	uCi/ml	2.89E-10	1.93E-10	4.71E-10	3.56E-10	2.96E-10
Tritium						
1. Total Release	Ci	2.47E+02	3.80E+02	4.48E+02	5.81E+02	1.66E+03
2. Avg. Diluted Conc.	uCi/ml	7.21E-05	1.03E-04	1.29E-04	1.56E-04	1.16E-04
Dissolved and Entrained Gases						
1. Total Release	Ci	5.16E-05	9.32E-06	1.93E-04	(1)	2.54E-04
2. Avg. Diluted Conc.	uCi/ml	1.51E-11	2.52E-12	5.56E-11	(1)	1.77E-11
Gross Alpha Radioactivity						
1. Total Release	Ci	(1)	(1)	(1)	(1)	(1)
Volume of liquid waste	liters	3.42E+09	3.70E+09	3.47E+09	3.73E+09	1.43E+10

(1) Less than minimum detectable activity which meets the lower limit of detection (LLD) requirements of TRM Section 3.11

Table 3.1-1

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

LIQUID DOSE SUMMARY

Units 1 & 2

Report for: 2015
Unit Range - From: 1 To: 2
Liquid Receptor

=== PERIOD DOSE BY ORGAN AND AGE GROUP (mrem) ========== ANNUAL 2015 =========

Agegrp	Bone	Liver	Thyroid	Kidney	Lung	GI-LLI	Skin	TB
ADULT	2.44E-05	1.40E-01	1.39E-01	1.39E-01	1.39E-01	1.58E-01	0.00E+00	1.40E-01
TEEN	2.55E-05	1.05E-01	1.04E-01	1.05E-01	1.04E-01	1.17E-01	0.00E+00	1.05E-01
CHILD	3.17E-05	1.17E-01	1.17E-01	1.17E-01	1.16E-01	1.21E-01	0.00E+00	1.17E-01
INFANT	4.03E-07	5.17E-02	5.17E-02	5.17E-02	5.17E-02	5.17E-02	0.00E+00	5.17E-02

=== SITE DOSE LIMIT ANALYSIS ========== ANNUAL 2015 =========

Annual - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
2015 - Admin. Any Organ	ADULT	GILLI	1.58E-01	7.50E+00	2.10E+00
2015 - Admin. Total Body	ADULT	TBODY	1.40E-01	2.25E+00	6.22E+00
2015 - T.Spc. Any Organ	ADULT	GILLI	1.58E-01	1.00E+01	1.58E+00

Critical Pathway: Fresh Water Fish – Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	8.84E+01
CR-51	2.18E-02
MN-54	1.87E-02
FE-59	1.29E-02
CO-58	1.77E+00
CO-60	1.87E+00
ZR-95	5.09E-04
NB-95	7.58E+00
SB-124	2.45E-03
SB-125	1.60E-03
TE-132	3.45E-01
I-132	2.58E-05
I-133	5.56E-05

2015 - T.Spc. Total Body	ADULT	TBODY	1.40E-01	3.00E+00	4.66E+00

Critical Pathway: Fresh Water Fish – Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	9.95E+01
CR-51	9.74E-05
MN-54	1.31E-03
FE-59	1.67E-03
CO-58	2.21E-01

Table 3.1-1 (cont.)

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

Nuclide	Percentage
CO-60	2.47E-01
ZR-95	1.22E-07
NB-95	7.56E-04
SB-124	3.84E-05
SB-125	3.90E-05
TE-132	7.71E-03
I-132	5.41E-05
I-133	2.13E-05

Table 3.2-1

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Units 1 & 2

Report for: 2015
Unit Range - From: 1 To: 2

=== I&P DOSE LIMIT ANALYSIS ========== ANNUAL 2015 =========

Annual - Limit	Age Group	Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
2015 - Admin. Any Organ	CHILD	BONE	7.22E-01	1.13E+01	6.42E+00
2015 - Admin. Total Body	CHILD	TBODY	1.49E-01	1.05E+01	1.42E+00
2015 - T.Spc. Any Organ	CHILD	BONE	7.22E-01	1.50E+01	4.81E+00

Receptor: Composite Crit. Receptor - IP
Distance: 800 meters Compass Point: SSE
Critical Pathway: Vegetation
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	0.00E+00
C-14	1.00E+02
CR-51	7.79E-08
I-131	1.09E-04

2015 - T.Spc. Total Body	CHILD	TBODY	1.49E-01	1.50E+01	9.92E-01

Receptor: Composite Crit. Receptor - IP
Distance: 800 meters Compass Point: SSE
Critical Pathway: Vegetation
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	3.05E+00
C-14	9.69E+01
CR-51	3.98E-07
I-131	3.05E-04

Table 3.2-1 (cont.)

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

GASEOUS DOSE SUMMARY

Units 1 & 2

Report for: 2015
Unit Range - From: 1 To: 2

=== NG DOSE LIMIT ANALYSIS ========== ANNUAL 2015 =========

Annual - Limit	Dose (mrad)	Limit (mrad)	Max % of Limit
2015 - Admin. Gamma	1.76E-02	7.50E+00	2.35E-01
2015 - Admin. Beta	8.55E-04	1.50E+01	5.70E-03
2015 - T.Spc. Gamma	1.76E-02	1.00E+01	1.76E-01

Receptor: Composite Crit. Receptor - NG
Distance: 800 meters Compass Point: SSE

Nuclide	Percentage
AR-41	1.89E-01
KR-85M	1.93E-05
XE-135	2.03E-03
XE-133M	4.04E-05
KR-88	9.97E+01
XE-133	1.44E-01

2015 - T.Spc. Beta	8.55E-04	2.00E+01	4.27E-03

Receptor: Composite Crit. Receptor - NG
Distance: 800 (meters) Compass Point: SSE

Nuclide	Percentage
AR-41	3.39E-01
KR-85M	1.57E-04
XE-135	1.32E-02
XE-133M	9.29E-04
KR-88	9.75E+01
XE-133	2.17E+00

Table 3.3-1

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

Units 1 & 2

Report for: 2015
Unit Range - From: 1 To: 2

=== MAXIMUM DOSE ANALYSIS ========== ANNUAL 2015 =========

Dose Type	Age Group	Organ	Dose (mrem)
Any Organ	CHILD	BONE	7.22E-01

Liquid Receptor: Liquid Receptor
Gaseous Receptor: Composite Crit. Receptor - IP
Distance: 800 meters Compass Point: SSE

Liquid Dose: 3.17E-05 % of Total: 4.39E-03
Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	0.00E+00
CR-51	0.00E+00
MN-54	0.00E+00
FE-59	1.03E+01
CO-58	0.00E+00
CO-60	0.00E+00
ZR-95	3.46E-03
NB-95	1.33E+01
SB-124	7.19E-01
SB-125	1.23E+00
TE-132	7.39E+01
I-132	3.39E-01
I-133	2.49E-01

Gaseous Dose: 7.22E-01 % of Total: 1.00E+02
Critical Pathway: Vegetation (VEG)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	0.00E+00
C-14	1.00E+02
CR-51	7.79E-08
I-131	1.09E-04

=== MAXIMUM DOSE ANALYSIS ========== ANNUAL 2015 =========

Dose Type	Age Group	Organ	Dose (mrem)
Total Body	CHILD	TBODY	2.66E-01

Liquid Receptor: Liquid Receptor
Gaseous Receptor: Composite Crit. Receptor - IP
Distance: 800 meters Compass Point: SSE

Table 3.3-1 (cont.)

40CFR190 URANIUM FUEL CYCLE DOSE REPORT

Liquid Dose: 1.17E-01 % of Total: 4.41E+01
Critical Pathway: Fresh Water Fish - Sport (FFSP)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	9.94E+01
CR-51	1.28E-04
MN-54	1.68E-03
FE-59	2.24E-03
CO-58	2.88E-01
CO-60	3.22E-01
ZR-95	1.83E-07
NB-95	9.98E-04
SB-124	6.80E-05
SB-125	6.95E-05
TE-132	1.07E-02
I-132	7.75E-05
I-133	3.14E-05

Gaseous Dose: 1.49E-01 % of Total: 5.60E+01
Critical Pathway: Vegetation (VEG)
Major Contributors (0% or greater to total)

Nuclide	Percentage
H-3	3.05E+00
C-14	9.69E+01
CR-51	3.98E-07
I-131	3.05E-04

Table 3.4-1

The following are the maximum annual calculated cumulative offsite doses resulting from Byron airborne releases in 2015 based on concurrent meteorological data:

Unit 1:

Dose	*Maximum Value*		*Sector Affected*
gamma air [(1)]	3.19×10^{-3}	mrad	North-Northwest
beta air [(2)]	6.24×10^{-4}	mrad	North-Northwest
whole body [(3)]	7.02×10^{-2}	mrem	North-Northwest
skin [(4)]	2.97×10^{-3}	mrem	North-Northwest
organ [(5)] (child-bone)	3.34×10^{-1}	mrem	North-Northwest

Unit 1 Compliance Status

10 CFR 50 Appendix I	**Yearly Objective**		**% of Appendix I**
gamma air	10.0	mrad	0.03
beta air	20.0	mrad	0.00
whole body	5.0	mrem	1.40
skin	15.0	mrem	0.02
organ	15.0	mrem	2.23

Unit 2:

Dose	*Maximum Value*		*Sector Affected*
gamma air [(1)]	2.71×10^{-6}	mrad	North-Northwest
beta air [(2)]	4.94×10^{-6}	mrad	North-Northwest
whole body [(3)]	7.54×10^{-2}	mrem	North-Northwest
skin [(4)]	3.78×10^{-6}	mrem	North-Northwest
organ [(5)] (child-bone)	3.61×10^{-1}	mrem	North-Northwest

Unit 2 Compliance Status

10 CFR 50 Appendix I	**Yearly Objective**		**% of Appendix I**
gamma air	10.0	mrad	0.00
beta air	20.0	mrad	0.00
whole body	5.0	mrem	1.51
skin	15.0	mrem	0.00
organ	15.0	mrem	2.41

---

(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

Data recovery: 99.7%

Intentionally left blank

APPENDIX F

METEOROLOGICAL DATA

Intentionally left blank

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Extremely Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Speed (in mph)

Wind Direction	1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	1	0	0	0	1
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	1	0	0	0	1

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

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Moderately Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	1	0	0	0	0	0	1
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	1	0	0	0	1
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	1	0	1	0	0	0	2

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

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Slightly Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	1	0	0	0	1
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	1	0	0	0	1

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

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Neutral - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	7	15	56	40	3	0	121
NNE	0	7	4	12	1	0	24
NE	4	8	4	9	5	0	30
ENE	1	13	16	4	0	0	34
E	3	26	20	0	0	0	49
ESE	3	12	6	3	0	0	24
SE	2	26	13	13	0	0	54
SSE	1	11	33	20	0	0	65
S	3	15	19	11	0	0	48
SSW	3	23	16	12	3	0	57
SW	2	25	47	20	0	0	94
WSW	1	26	36	27	1	0	91
W	2	20	42	28	3	0	95
WNW	0	19	43	39	2	0	103
NW	6	13	69	31	2	0	121
NNW	2	11	59	15	6	0	93
Variable	0	0	0	0	0	0	0
Total	40	270	483	284	26	0	1103

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

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Slightly Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	2	15	20	6	0	0	43
NNE	2	10	4	1	0	0	17
NE	2	5	1	0	0	0	8
ENE	3	8	5	0	0	0	16
E	8	16	7	0	0	0	31
ESE	9	11	8	1	0	0	29
SE	5	24	20	2	0	0	51
SSE	10	19	17	7	0	0	53
S	8	20	15	4	0	0	47
SSW	7	33	32	8	1	0	81
SW	9	35	22	4	0	0	70
WSW	6	13	25	8	0	0	52
W	12	27	28	9	0	0	76
WNW	7	35	30	7	0	0	79
NW	8	32	16	3	0	0	59
NNW	3	40	23	0	0	0	66
Variable	1	0	0	0	0	0	1
Total	102	343	273	60	1	0	779

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

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Moderately Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	2	0	0	0	2
NNE	1	2	0	0	0	0	3
NE	0	1	0	0	0	0	1
ENE	1	1	1	0	0	0	3
E	5	4	0	0	0	0	9
ESE	2	1	2	0	0	0	5
SE	1	13	7	0	0	0	21
SSE	2	11	9	0	0	0	22
S	6	9	5	0	0	0	20
SSW	7	10	1	0	0	0	18
SW	3	6	0	0	0	0	9
WSW	7	2	0	0	0	0	9
W	13	10	1	0	0	0	24
WNW	9	6	0	0	0	0	15
NW	13	6	0	0	0	0	19
NNW	3	4	0	0	0	0	7
Variable	0	0	0	0	0	0	0
Total	73	86	28	0	0	0	187

Hours of calm in this stability class: 5
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 3

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Extremely Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	1	2	0	0	0	0	3
ESE	0	3	1	0	0	0	4
SE	2	5	1	0	0	0	8
SSE	3	0	3	0	0	0	6
S	6	6	3	0	0	0	15
SSW	4	5	0	0	0	0	9
SW	4	2	0	0	0	0	6
WSW	6	1	0	0	0	0	7
W	5	1	0	0	0	0	6
WNW	6	0	0	0	0	0	6
NW	4	0	0	0	0	0	4
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	41	25	8	0	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

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Extremely Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	1	0	0	0	1
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	1	0	0	0	1

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

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Moderately Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Speed (in mph)

Wind Direction	1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	1	0	0	0	1
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	1	0	0	0	1

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: 3

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Slightly Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Speed (in mph)

Wind Direction	1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	1	0	0	0	1
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	1	0	0	0	1

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

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Neutral - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	1	16	17	61	17	2	114
NNE	2	7	9	15	14	4	51
NE	0	4	5	0	0	8	17
ENE	0	3	4	2	3	1	13
E	0	8	13	31	1	0	53
ESE	0	6	6	4	0	0	16
SE	4	16	13	13	7	2	55
SSE	1	8	17	19	13	0	58
S	0	9	16	18	7	0	50
SSW	0	5	21	16	5	4	51
SW	2	13	18	41	15	10	99
WSW	0	6	30	32	21	0	89
W	0	12	29	29	18	1	89
WNW	1	9	16	25	33	6	90
NW	1	5	13	40	35	3	97
NNW	1	8	14	44	14	6	87
Variable	0	0	0	0	0	0	0
Total	13	135	241	390	203	47	1029

Hours of calm in this stability class: 2
Hours of missing wind measurements in this stability class: 73
Hours of missing stability measurements in all stability classes: 3

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Slightly Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	2	8	15	14	6	0	45
NNE	0	3	3	12	8	0	26
NE	1	6	2	4	0	0	13
ENE	0	6	5	2	0	0	13
E	0	6	13	6	2	0	27
ESE	0	5	11	4	1	0	21
SE	1	7	11	22	5	2	48
SSE	0	5	8	18	8	5	44
S	4	3	11	8	15	2	43
SSW	1	3	13	31	13	6	67
SW	2	8	25	29	20	3	87
WSW	3	9	15	26	7	2	62
W	4	5	11	45	4	0	69
WNW	1	4	16	31	14	0	66
NW	2	2	15	34	8	1	62
NNW	1	5	19	33	2	0	60
Variable	0	0	0	0	0	0	0
Total	22	85	193	319	113	21	753

Hours of calm in this stability class: 2
Hours of missing wind measurements in this stability class: 28
Hours of missing stability measurements in all stability classes: 3

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Moderately Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	3	3	1	0	0	7
NNE	0	1	0	2	0	0	3
NE	0	1	3	1	0	0	5
ENE	0	2	1	0	0	0	3
E	1	2	2	0	0	0	5
ESE	0	2	1	4	2	0	9
SE	0	2	0	2	4	0	8
SSE	0	0	0	6	4	0	10
S	0	1	3	7	5	0	16
SSW	0	0	3	5	5	0	13
SW	0	1	12	8	0	0	21
WSW	0	3	12	5	0	0	20
W	0	4	7	4	1	0	16
WNW	0	2	4	12	0	0	18
NW	0	0	9	15	0	0	24
NNW	0	0	6	8	0	0	14
Variable	0	0	0	0	0	0	0
Total	1	24	66	80	21	0	192

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

Byron Generating Station

Period of Record: January - March 2015
Stability Class - Extremely Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	3	0	0	0	3
NNE	0	2	0	0	0	0	2
NE	0	1	0	0	0	0	1
ENE	1	1	0	0	0	0	2
E	0	4	0	0	0	0	4
ESE	0	0	0	0	1	0	1
SE	0	0	0	5	3	0	8
SSE	1	0	1	0	1	0	3
S	0	1	2	1	2	0	6
SSW	0	1	1	3	3	0	8
SW	0	2	0	2	2	0	6
WSW	0	3	5	5	0	0	13
W	0	0	6	3	0	0	9
WNW	0	0	2	1	0	0	3
NW	0	0	2	0	0	0	2
NNW	0	2	0	1	0	0	3
Variable	0	0	0	0	0	0	0
Total	2	17	22	21	12	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

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Extremely Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	2	0	0	2
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	0	2	0	0	2

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

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Moderately Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	0	2	0	0	2
WSW	0	0	0	0	0	0	0
W	0	0	0	4	0	0	4
WNW	0	0	0	1	0	0	1
NW	0	0	0	1	0	0	1
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	0	8	0	0	8

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

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Slightly Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Speed (in mph)

Wind Direction	1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	0	0	0	0	0
NNE	0	0	0	1	0	0	1
NE	0	0	0	0	0	0	0
ENE	0	0	2	0	0	0	2
E	0	0	3	0	0	0	3
ESE	0	1	0	1	0	0	2
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	2	0	0	2
SSW	0	0	2	1	0	0	3
SW	0	0	1	3	0	0	4
WSW	0	0	2	0	1	0	3
W	0	1	1	2	0	0	4
WNW	0	0	0	1	1	0	2
NW	0	0	0	2	0	0	2
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	2	11	13	2	0	28

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

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Neutral - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Speed (in mph)

Wind Direction	1-3	4-7	8-12	13-18	19-24	> 24	Total
N	1	12	26	5	0	0	44
NNE	3	14	24	12	1	0	54
NE	1	10	31	14	6	0	62
ENE	0	22	43	18	0	0	83
E	2	28	31	0	0	0	61
ESE	4	16	13	9	0	0	42
SE	0	7	14	14	0	0	35
SSE	2	9	24	5	3	0	43
S	1	13	28	22	4	0	68
SSW	0	14	14	13	1	0	42
SW	7	11	36	7	0	0	61
WSW	1	17	19	7	5	0	49
W	1	18	28	19	17	6	89
WNW	2	16	16	32	24	2	92
NW	3	21	23	27	4	0	78
NNW	1	14	17	3	0	0	35
Variable	1	0	0	0	0	0	1
Total	30	242	387	207	65	8	939

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

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Slightly Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	4	26	11	0	0	0	41
NNE	5	23	8	8	0	0	44
NE	1	22	36	0	0	0	59
ENE	2	22	32	14	0	0	70
E	0	60	33	0	0	0	93
ESE	4	19	31	2	0	0	56
SE	2	27	16	5	1	0	51
SSE	5	17	45	8	0	0	75
S	3	27	30	14	1	0	75
SSW	4	34	31	8	0	0	77
SW	6	23	23	2	0	0	54
WSW	6	11	11	11	1	2	42
W	3	18	7	5	0	0	33
WNW	8	18	8	4	0	0	38
NW	7	16	14	2	0	0	39
NNW	5	15	8	0	0	0	28
Variable	0	0	1	0	0	0	1
Total	65	378	345	83	3	2	876

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: 3

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Moderately Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	3	1	1	0	0	0	5
NNE	1	1	1	0	0	0	3
NE	0	0	0	0	0	0	0
ENE	2	2	0	0	0	0	4
E	3	20	0	0	0	0	23
ESE	1	8	3	0	0	0	12
SE	0	14	6	0	0	0	20
SSE	4	18	25	0	0	0	47
S	9	11	7	0	0	0	27
SSW	3	7	2	0	0	0	12
SW	6	9	0	0	0	0	15
WSW	5	2	0	0	0	0	7
W	10	8	0	0	0	0	18
WNW	11	5	0	0	0	0	16
NW	7	4	1	0	0	0	12
NNW	1	1	0	0	0	0	2
Variable	0	1	0	0	0	0	1
Total	66	112	46	0	0	0	224

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: 3

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Extremely Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	5	0	0	0	0	5
ESE	0	0	1	0	0	0	1
SE	0	3	2	0	0	0	5
SSE	3	6	1	0	0	0	10
S	1	10	1	0	0	0	12
SSW	2	6	0	0	0	0	8
SW	3	0	0	0	0	0	3
WSW	13	0	0	0	0	0	13
W	8	1	0	0	0	0	9
WNW	11	1	0	0	0	0	12
NW	12	0	0	0	0	0	12
NNW	7	1	0	0	0	0	8
Variable	0	0	0	0	0	0	0
Total	60	33	5	0	0	0	98

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

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Extremely Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Speed (in mph)

Wind Direction	1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	2	0	2
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	0	0	2	0	2

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

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Moderately Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Speed (in mph)

Wind Direction	1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	0	0	2	0	2
WSW	0	0	0	0	0	0	0
W	0	0	0	0	4	0	4
WNW	0	0	0	1	1	0	2
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	0	1	7	0	8

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

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Slightly Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	0	0	0	0	0
NNE	0	0	0	1	0	0	1
NE	0	0	0	0	0	0	0
ENE	0	0	2	0	0	0	2
E	0	0	1	3	0	0	4
ESE	0	0	0	0	1	0	1
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	2	1	0	3
SSW	0	0	2	0	0	0	2
SW	0	0	2	2	1	0	5
WSW	0	0	1	0	1	0	2
W	0	0	2	0	3	0	5
WNW	0	0	0	1	0	0	1
NW	0	0	0	2	0	0	2
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	10	11	7	0	28

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

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Neutral - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	3	8	20	11	0	0	42
NNE	2	7	17	15	2	1	44
NE	1	6	20	24	6	7	64
ENE	1	6	35	20	15	1	78
E	0	7	39	28	4	0	78
ESE	4	11	13	5	9	0	42
SE	1	9	12	8	9	1	40
SSE	0	1	18	15	3	3	40
S	1	7	19	19	17	3	66
SSW	2	10	11	9	11	2	45
SW	3	8	21	22	4	0	58
WSW	2	6	19	16	6	5	54
W	2	7	26	19	16	22	92
WNW	2	9	15	19	22	20	87
NW	1	11	22	25	14	2	75
NNW	0	9	13	8	3	0	33
Variable	0	1	0	0	0	0	1
Total	25	123	320	263	141	67	939

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

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Slightly Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	2	1	12	14	0	0	29
NNE	0	4	12	18	8	0	42
NE	1	9	25	37	1	0	73
ENE	0	4	21	19	10	2	56
E	1	7	43	43	9	0	103
ESE	0	0	15	23	15	0	53
SE	0	4	14	25	6	1	50
SSE	2	3	13	28	17	2	65
S	1	3	11	27	34	6	82
SSW	0	7	19	29	13	3	71
SW	1	5	14	33	16	0	69
WSW	1	3	11	15	12	3	45
W	0	4	16	4	6	0	30
WNW	0	10	12	19	3	1	45
NW	2	12	8	16	3	0	41
NNW	1	7	9	7	0	0	24
Variable	0	0	0	1	0	0	1
Total	12	83	255	358	153	18	879

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

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Moderately Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	2	3	1	1	0	7
NNE	0	0	2	0	0	0	2
NE	0	0	0	0	1	0	1
ENE	1	2	2	0	0	0	5
E	0	3	15	5	0	0	23
ESE	0	0	3	2	3	0	8
SE	0	2	2	10	4	0	18
SSE	0	3	2	6	6	0	17
S	0	0	3	12	19	0	34
SSW	2	1	8	7	6	0	24
SW	0	2	5	6	1	0	14
WSW	1	3	5	3	0	0	12
W	1	2	7	4	0	0	14
WNW	2	4	6	9	0	0	21
NW	0	2	7	5	1	0	15
NNW	2	1	6	0	0	0	9
Variable	0	0	0	1	0	0	1
Total	9	27	76	71	42	0	225

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

Byron Generating Station

Period of Record: April - June 2015
Stability Class - Extremely Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	1	0	1	0	0	2
NNE	0	1	1	1	0	0	3
NE	0	1	0	0	0	0	1
ENE	0	0	0	0	0	0	0
E	1	0	0	1	1	1	4
ESE	0	0	0	0	0	2	2
SE	0	0	0	0	1	0	1
SSE	2	1	2	0	2	0	7
S	0	1	0	0	1	0	2
SSW	2	0	3	8	1	0	14
SW	0	1	2	5	0	0	8
WSW	1	2	4	1	0	0	8
W	1	6	7	2	0	0	16
WNW	0	4	5	1	0	0	10
NW	0	7	3	2	0	0	12
NNW	1	5	1	2	0	0	9
Variable	0	0	0	0	0	0	0
Total	8	30	28	24	6	3	99

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

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Extremely Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

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

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

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Moderately Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

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

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

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Slightly Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	4	1	0	0	5
NNE	0	0	1	0	0	0	1
NE	0	4	1	0	0	0	5
ENE	0	2	1	0	0	0	3
E	0	4	0	0	0	0	4
ESE	0	3	0	0	0	0	3
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	1	4	1	0	0	6
SSW	0	1	2	1	0	0	4
SW	0	3	0	0	0	0	3
WSW	0	3	0	0	0	0	3
W	0	2	3	3	0	0	8
WNW	0	0	0	0	0	0	0
NW	0	0	2	0	0	0	2
NNW	0	0	1	0	0	0	1
Variable	0	0	0	0	0	0	0
Total	0	23	19	6	0	0	48

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

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Neutral - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	1	33	39	1	0	0	74
NNE	1	9	11	2	0	0	23
NE	1	15	6	1	0	0	23
ENE	1	10	1	0	0	0	12
E	4	17	0	0	0	0	21
ESE	5	29	1	0	0	0	35
SE	2	23	7	0	0	0	32
SSE	2	37	21	0	0	0	60
S	2	39	27	7	0	0	75
SSW	6	32	35	2	0	0	75
SW	1	35	33	6	0	0	75
WSW	3	35	20	3	0	0	61
W	8	23	17	4	0	0	52
WNW	4	20	22	8	0	0	54
NW	1	22	19	9	0	0	51
NNW	3	16	21	5	0	0	45
Variable	1	0	0	0	0	0	1
Total	46	395	280	48	0	0	769

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

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Slightly Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	9	26	11	1	0	0	47
NNE	12	18	8	1	0	0	39
NE	8	12	8	2	0	0	30
ENE	5	26	4	0	0	0	35
E	12	61	2	0	0	0	75
ESE	8	18	1	0	0	0	27
SE	5	17	10	0	0	0	32
SSE	6	22	28	0	0	0	56
S	9	42	25	0	0	0	76
SSW	12	17	17	1	0	0	47
SW	20	40	10	1	0	0	71
WSW	9	25	16	1	0	0	51
W	8	21	7	0	0	0	36
WNW	4	17	3	0	0	0	24
NW	6	17	7	1	0	0	31
NNW	2	34	9	1	0	0	46
Variable	1	0	0	0	0	0	1
Total	136	413	166	9	0	0	724

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

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Moderately Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	5	2	0	0	0	0	7
NNE	1	1	0	0	0	0	2
NE	1	1	0	0	0	0	2
ENE	1	5	0	0	0	0	6
E	5	27	0	0	0	0	32
ESE	7	23	1	0	0	0	31
SE	3	27	4	0	0	0	34
SSE	6	65	19	0	0	0	90
S	8	57	8	0	0	0	73
SSW	14	11	1	0	0	0	26
SW	12	0	0	0	0	0	12
WSW	13	1	0	0	0	0	14
W	8	9	0	0	0	0	17
WNW	15	14	0	0	0	0	29
NW	9	11	0	0	0	0	20
NNW	6	5	0	0	0	0	11
Variable	0	0	0	0	0	0	0
Total	114	259	33	0	0	0	406

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: 2

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Extremely Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	1	0	0	0	0	0	1
NNE	1	0	0	0	0	0	1
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	2	13	0	0	0	0	15
ESE	1	15	0	0	0	0	16
SE	4	19	0	0	0	0	23
SSE	6	16	3	0	0	0	25
S	16	16	0	0	0	0	32
SSW	9	5	0	0	0	0	14
SW	14	0	0	0	0	0	14
WSW	6	0	0	0	0	0	6
W	12	2	0	0	0	0	14
WNW	8	0	0	0	0	0	8
NW	7	0	0	0	0	0	7
NNW	1	0	0	0	0	0	1
Variable	0	0	0	0	0	0	0
Total	88	86	3	0	0	0	177

Hours of calm in this stability class: 33
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 2

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Extremely Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Speed (in mph)

Wind Direction	1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	2	0	0	2
ENE	0	0	1	0	0	0	1
E	0	0	1	0	0	0	1
ESE	0	0	2	0	0	0	2
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	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	2	0	2
WNW	0	0	1	0	0	0	1
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	5	2	2	0	9

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

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Moderately Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	0	1	0	0	1
NNE	0	0	0	0	0	0	0
NE	0	0	0	1	0	0	1
ENE	0	1	2	0	0	0	3
E	0	1	0	0	0	0	1
ESE	0	0	1	0	0	0	1
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	2	2	0	0	4
SSW	0	0	0	3	1	0	4
SW	0	1	1	0	1	0	3
WSW	0	0	0	0	2	0	2
W	0	0	3	1	3	3	10
WNW	0	0	1	0	0	0	1
NW	0	0	1	0	0	0	1
NNW	0	0	0	2	0	0	2
Variable	0	0	0	0	0	0	0
Total	0	3	11	10	7	3	34

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

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Slightly Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	0	5	0	0	5
NNE	0	0	0	0	0	0	0
NE	0	2	2	2	0	0	6
ENE	0	1	1	0	0	0	2
E	0	5	0	0	0	0	5
ESE	0	1	2	0	0	0	3
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	2	4	1	0	7
SSW	0	0	1	1	1	0	3
SW	0	2	3	0	0	0	5
WSW	0	0	1	0	0	0	1
W	0	0	3	2	1	2	8
WNW	0	0	1	1	0	0	2
NW	0	0	0	0	0	0	0
NNW	0	0	0	1	0	0	1
Variable	0	0	0	0	0	0	0
Total	0	11	16	16	3	2	48

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

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Neutral - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	2	19	29	19	0	0	69
NNE	0	6	7	10	4	0	27
NE	1	6	10	3	0	1	21
ENE	1	4	9	0	0	0	14
E	2	14	7	0	0	0	23
ESE	3	20	11	1	0	0	35
SE	2	8	18	5	2	0	35
SSE	1	21	23	12	4	0	61
S	1	21	31	18	6	0	77
SSW	3	14	23	26	2	0	68
SW	0	10	33	23	9	2	77
WSW	1	14	34	14	4	0	67
W	3	13	12	10	8	0	46
WNW	3	9	17	19	5	2	55
NW	1	13	17	10	8	0	49
NNW	0	7	27	10	0	0	44
Variable	1	0	0	0	0	0	1
Total	25	199	308	180	52	5	769

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

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Slightly Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	1	8	15	21	1	0	46
NNE	1	7	12	21	1	0	42
NE	3	9	6	11	7	0	36
ENE	3	10	12	10	1	0	36
E	0	13	36	22	0	0	71
ESE	0	10	15	11	0	0	36
SE	1	5	15	8	3	0	32
SSE	1	3	9	23	10	0	46
S	0	7	12	31	12	0	62
SSW	0	3	20	27	6	1	57
SW	2	3	25	41	6	0	77
WSW	1	7	25	20	7	0	60
W	4	5	8	23	0	0	40
WNW	0	4	11	7	1	0	23
NW	0	5	12	8	1	1	27
NNW	3	1	13	17	2	0	36
Variable	0	0	0	0	0	0	0
Total	20	100	246	301	58	2	727

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

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Moderately Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	5	7	1	0	0	13
NNE	2	2	1	0	0	0	5
NE	2	4	5	1	0	0	12
ENE	2	1	1	2	0	0	6
E	2	4	16	6	1	0	29
ESE	1	0	3	14	4	0	22
SE	0	1	12	12	8	0	33
SSE	1	1	6	10	6	0	24
S	0	0	14	42	33	1	90
SSW	0	3	10	35	7	0	55
SW	0	3	9	19	0	0	31
WSW	1	1	5	1	0	0	8
W	0	3	6	14	0	0	23
WNW	1	1	7	12	0	0	21
NW	1	2	8	5	0	0	16
NNW	1	3	6	9	0	0	19
Variable	1	0	0	0	0	0	1
Total	15	34	116	183	59	1	408

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

Byron Generating Station

Period of Record: July - September 2015
Stability Class - Extremely Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	8	7	0	0	0	15
NNE	0	3	0	0	0	0	3
NE	0	3	0	0	0	0	3
ENE	0	1	0	0	0	0	1
E	1	0	0	1	0	0	2
ESE	0	1	0	6	14	0	21
SE	0	3	1	10	7	0	21
SSE	0	0	4	9	4	0	17
S	0	0	7	6	6	0	19
SSW	0	1	18	10	1	0	30
SW	0	2	1	4	0	0	7
WSW	0	2	6	2	0	0	10
W	0	1	7	6	0	0	14
WNW	0	3	10	11	0	0	24
NW	0	4	7	2	0	0	13
NNW	0	5	5	0	0	0	10
Variable	0	0	0	0	0	0	0
Total	1	37	73	67	32	0	210

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

Byron Generating Station

Period of Record: October - December2015
Stability Class - Extremely Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Speed (in mph)

Wind Direction	1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

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

Byron Generating Station

Period of Record: October - December2015
Stability Class - Moderately Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Speed (in mph)

Wind Direction	1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	2	1	0	0	3
WSW	0	0	1	0	0	0	1
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	3	1	0	0	4

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

Byron Generating Station

Period of Record: October - December2015
Stability Class - Slightly Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	3	0	0	3
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	1	0	0	0	1
SW	0	0	4	1	0	0	5
WSW	0	0	3	0	1	0	4
W	0	0	0	0	0	0	0
WNW	0	0	3	0	0	0	3
NW	0	0	0	1	0	0	1
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	11	5	1	0	17

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

Byron Generating Station

Period of Record: October - December2015
Stability Class - Neutral - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	1	17	28	18	0	0	64
NNE	0	14	21	17	0	0	52
NE	0	15	11	25	0	0	51
ENE	2	3	12	13	4	0	34
E	1	4	16	0	0	0	21
ESE	0	2	6	9	0	0	17
SE	1	1	7	10	0	0	19
SSE	0	4	22	7	1	0	34
S	0	11	17	18	2	0	48
SSW	0	14	32	15	3	0	64
SW	3	15	26	15	6	0	65
WSW	2	22	33	15	11	1	84
W	0	13	57	41	22	9	142
WNW	2	10	29	34	10	1	86
NW	2	6	22	24	2	1	57
NNW	2	9	9	0	0	0	20
Variable	0	0	0	0	0	0	0
Total	16	160	348	261	61	12	858

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

Byron Generating Station

Period of Record: October - December2015
Stability Class - Slightly Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	6	18	8	1	0	0	33
NNE	5	16	7	0	0	0	28
NE	7	13	18	2	0	0	40
ENE	2	6	24	8	3	0	43
E	8	29	14	0	0	0	51
ESE	0	13	14	4	0	0	31
SE	0	5	20	19	10	0	54
SSE	3	16	62	57	13	6	157
S	2	30	94	46	4	0	176
SSW	6	12	40	24	5	0	87
SW	4	33	21	12	1	1	72
WSW	2	21	42	14	0	1	80
W	4	17	18	14	8	2	63
WNW	2	16	13	4	8	0	43
NW	5	23	19	1	1	0	49
NNW	5	16	6	1	0	0	28
Variable	0	0	0	0	0	0	0
Total	61	284	420	207	53	10	1035

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: 0

Byron Generating Station

Period of Record: October - December2015
Stability Class - Moderately Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	0	0	0	0	0
NNE	1	0	1	0	0	0	2
NE	2	0	0	0	0	0	2
ENE	3	0	0	0	0	0	3
E	4	16	0	0	0	0	20
ESE	1	2	2	1	0	0	6
SE	0	8	6	0	0	0	14
SSE	0	11	21	3	0	0	35
S	1	10	13	3	0	0	27
SSW	3	5	3	0	0	0	11
SW	6	5	0	0	0	0	11
WSW	10	5	0	0	0	0	15
W	9	13	0	0	0	0	22
WNW	11	13	0	0	0	0	24
NW	6	6	0	0	0	0	12
NNW	2	4	0	0	0	0	6
Variable	0	0	0	0	0	0	0
Total	59	98	46	7	0	0	210

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

Byron Generating Station

Period of Record: October - December2015
Stability Class - Extremely Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 30 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	0	0	0	0	0
NNE	1	0	0	0	0	0	1
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	3	0	0	0	0	0	3
ESE	3	3	1	0	0	0	7
SE	2	2	0	0	0	0	4
SSE	4	7	0	0	0	0	11
S	4	13	0	0	0	0	17
SSW	4	1	0	0	0	0	5
SW	4	1	0	0	0	0	5
WSW	6	1	0	0	0	0	7
W	8	1	0	0	0	0	9
WNW	1	0	0	0	0	0	1
NW	2	0	0	0	0	0	2
NNW	2	1	0	0	0	0	3
Variable	0	0	0	0	0	0	0
Total	44	30	1	0	0	0	75

Hours of calm in this stability class: 8
Hours of missing wind measurements in this stability class: 0
Hours of missing stability measurements in all stability classes: 0

Byron Generating Station

Period of Record: October - December2015
Stability Class - Extremely Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Speed (in mph)

Wind Direction	1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

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

Byron Generating Station

Period of Record: October - December2015
Stability Class - Moderately Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
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	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	0	0	0	0
SW	0	0	0	4	0	0	4
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	0	4	0	0	4

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

Byron Generating Station

Period of Record: October - December2015
Stability Class - Slightly Unstable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Speed (in mph)

Wind Direction	1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	3	0	3
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
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	0	0	1	0	0	1
SW	0	0	0	4	1	0	5
WSW	0	0	1	2	0	1	4
W	0	0	0	0	0	0	0
WNW	0	0	1	3	0	0	4
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	2	10	4	1	17

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

Byron Generating Station

Period of Record: October - December2015
Stability Class - Neutral - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	13	18	10	16	0	57
NNE	0	7	11	28	14	0	60
NE	0	9	8	11	23	2	53
ENE	1	2	5	8	10	5	31
E	0	5	4	12	5	0	26
ESE	0	2	6	2	8	0	18
SE	0	1	4	5	8	3	21
SSE	1	2	14	11	4	0	32
S	0	10	13	8	14	3	48
SSW	1	6	21	25	11	5	69
SW	1	3	19	19	9	12	63
WSW	0	8	28	18	13	13	80
W	1	10	38	39	32	32	152
WNW	1	5	8	24	24	12	74
NW	0	7	13	24	10	2	56
NNW	2	4	7	4	0	0	17
Variable	0	0	0	0	0	0	0
Total	8	94	217	248	201	89	857

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

Byron Generating Station

Period of Record: October - December2015
Stability Class - Slightly Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	3	8	8	13	0	0	32
NNE	0	14	16	7	1	0	38
NE	2	5	11	14	8	0	40
ENE	4	3	5	21	10	2	45
E	1	5	12	24	6	0	48
ESE	0	3	4	13	12	0	32
SE	0	0	6	12	21	18	57
SSE	2	1	3	25	43	42	116
S	0	2	23	57	83	19	184
SSW	1	1	16	29	43	17	107
SW	0	3	15	21	22	8	69
WSW	0	2	16	42	22	3	85
W	0	2	12	26	12	13	65
WNW	0	1	8	21	2	10	42
NW	0	3	10	29	0	1	43
NNW	3	3	10	15	0	0	31
Variable	0	0	0	0	0	0	0
Total	16	56	175	369	285	133	1034

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

Byron Generating Station

Period of Record: October - December2015
Stability Class - Moderately Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	2	2	0	0	4
NNE	0	0	0	1	0	0	1
NE	1	0	0	1	0	0	2
ENE	0	0	0	0	0	0	0
E	0	4	1	4	1	0	10
ESE	0	2	0	0	3	1	6
SE	0	1	7	7	0	1	16
SSE	0	1	0	5	10	1	17
S	1	0	4	14	19	5	43
SSW	1	0	2	8	8	0	19
SW	0	1	1	5	0	0	7
WSW	0	0	0	7	0	0	7
W	0	1	9	4	0	0	14
WNW	1	0	16	16	0	0	33
NW	0	0	12	6	0	0	18
NNW	0	2	6	5	0	0	13
Variable	0	0	0	0	0	0	0
Total	4	12	60	85	41	8	210

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

Byron Generating Station

Period of Record: October - December2015
Stability Class - Extremely Stable - 250Ft-30Ft Delta-T (F)
Winds Measured at 250 Feet

Wind Direction	Wind Speed (in mph) 1-3	4-7	8-12	13-18	19-24	> 24	Total
N	0	0	1	2	0	0	3
NNE	0	0	1	0	0	0	1
NE	0	0	1	0	0	0	1
ENE	1	0	1	0	0	0	2
E	0	0	0	0	0	0	0
ESE	2	0	0	1	0	0	3
SE	3	2	3	5	1	0	14
SSE	1	2	2	4	0	0	9
S	1	0	1	4	0	0	6
SSW	0	1	3	3	0	0	7
SW	1	0	4	2	0	0	7
WSW	1	1	3	0	0	0	5
W	0	0	5	1	0	0	6
WNW	0	1	6	4	0	0	11
NW	0	0	2	1	0	0	3
NNW	0	0	3	1	0	0	4
Variable	0	0	0	0	0	0	0
Total	10	7	36	28	1	0	82

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: 0

APPENDIX G

ERRATA DATA

Intentionally left blank

There is no errata data for 2015.

Intentionally left blank

APPENDIX H

ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

Intentionally left blank

Docket No: 50-454
50-455

BYRON NUCLEAR GENERATING STATION
UNITS 1 and 2

Annual Radiological
Groundwater Protection Program Report

1 January Through 31 December 2015

Prepared By

Teledyne Brown Engineering
Environmental Services

Byron Nuclear Generating Station
Byron, IL 61010

May 2016

Intentionally left blank

Table Of Contents

Appendices

I. Summary and Conclusions

In 2006, Exelon instituted a comprehensive monitoring program to evaluate the impact of station operations on groundwater in the vicinity of Byron Nuclear Generating Station. The monitoring was conducted in two phases. Phase 1 of the monitoring was part of a comprehensive study initiated by Exelon to determine whether groundwater or surface water at and in the vicinity of Byron Nuclear Generating Station had been adversely impacted by any releases of radionuclides. Phase 1 was conducted by Conestoga Rovers and Associates (CRA) and the conclusions were made available to state and federal regulators as well as the public.

Phase 2 of the RGPP was conducted by Exelon corporate and station personnel to initiate follow up of Phase 1 and begin long-term monitoring at groundwater locations selected during Phase 1. This is the eighth in a series of annual reports on the status of the Radiological Groundwater Protection Program (RGPP) conducted at Byron Nuclear Generating Station. This report covers groundwater samples, collected from the environment, both on and off station property in 2015. During that time period, 114 analyses were performed on 54 samples from 16 locations.

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 samples tested. In the case of tritium, Exelon specified that its laboratories achieve a lower limit of detection 10 times lower than that required by federal regulation.

In 2015, fifteen (15) Radiological Groundwater Protection Program (RGPP) monitoring wells were sampled. The samples were obtained throughout the year and analyzed for tritium. In addition, a study of gamma, beta, and alpha radioisotopes was performed in accordance with Nuclear Energy Institute (NEI) 07-07, Groundwater Protection Initiative, for the samples obtained in May. Three wells contained levels of tritium above the lower limit of detection (LLD) of 200 pCi/L. They were: AR-4, with concentrations ranging from 417 – 723 pCi/L; AR-7, with concentrations ranging from 198 – 508 pCi/L; and AR-11, with concentrations ranging from 422 – 1,040 pCi/L. Wells AR-4 and AR-11 are near the Circulating Water Blowdown piping, where historical leakage through vacuum breakers was known to have occurred. Tritium concentrations in these wells have gradually decreased since being first sampled in 2006. Well AR-7 is located on-site, just west of plant structures. Tritium has been measured in this well just above detectable limits on an intermittent basis since the well was first drilled in 2006. The tritium present in this well is at or below tritium levels that have been measured in rainwater as a result of precipitation recapture from permitted gaseous releases and it is not believed to be the result of new leak(s).

In August 2014, a break in the well piping was discovered about six feet below the surface that could have served as the entry point for tritium in the recapture water. Should the water in these aquifers migrate to off-site wells used for drinking, the off-site dose consequence from tritium present in any of these three wells would be negligible. There are no existing or new leaks evident at the site and all groundwater well sample results are well below the drinking water standard of 20,000 pCi/L tritium.

Strontium-89 and strontium-90 were not detected in any samples above their respective LLDs of 10 and 1 pCi/L.

Gross Alpha and Gross Beta analyses in the dissolved and suspended fractions were performed on groundwater samples during the second quarter sampling in 2015.

Gross Alpha (dissolved) was not detected in any of eight groundwater locations.

Gross Alpha (suspended) was detected in one of eight groundwater locations at a concentration of 1.7 pCi/L.

Gross Beta (dissolved) was detected in eight of eight groundwater locations. The concentrations ranged from 2.8 to 24.9 pCi/L.

Gross Beta (suspended) was detected in eight of eight groundwater locations. The concentrations ranged from 4.3 to 5.4 pCi/L.

The concentrations of Gross Alpha and Gross Beta, which are slightly above detectable levels, are considered to be background and are not the result of plant effluents.

Hard-To-Detect analyses were not performed in 2015.

In assessing all the data gathered for this report, it was concluded that the operation of Byron Nuclear Generating Station had no adverse radiological impact on the environment, and there are no known active releases into the groundwater at Byron Nuclear Generating Station.

II. Introduction

The Byron Station, a two-unit PWR station, is located about two miles east of the Rock River and approximately three miles southwest of Byron in Ogle County, Illinois. The reactors are designed to have capacities of 1,268 and 1,241 MW gross, respectively. Unit One loaded fuel in November 1984 and went on line February 2, 1985. Unit Two went on line January 9, 1987.

This report covers those analyses performed by Teledyne Brown Engineering (TBE) on samples collected in 2015.

A. Objectives 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 before significant 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 Byron Nuclear Generating Station as discussed below:

1. Exelon and its consultant identified locations as described in the Phase 1 study. Phase 1 studies were conducted by Conestoga Rovers and Associates (CRA) and the results and conclusions were made available to state and federal regulators as well as the public.

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

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

4. Byron Nuclear Generating Station has implemented new procedures to identify and report new leaks, spills, or other

detections with potential radiological significance in a timely manner.

5. Byron Nuclear Generating 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 Figure A–1, Appendix A.

Groundwater

Samples of water are collected, managed, transported and analyzed in accordance with approved procedures following EPA methods. Only groundwater is collected. Sample locations, sample collection frequencies and analytical frequencies are controlled 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 deliverables as data are received.

Analytical data results are reviewed by both station personnel and an independent hydrogeologist for adverse trends or changes to hydrogeologic conditions.

D. Characteristics of Tritium (H-3)

Tritium (chemical symbol H-3) is a radioactive isotope of hydrogen. The most common form of tritium is tritium oxide, which is also called "tritiated water." The chemical properties of tritium are essentially those of ordinary hydrogen.

Tritiated water behaves the same as ordinary water in both the environment and the body. Tritium can be taken into the body by drinking water, breathing air, eating food, or absorption through skin. Once tritium enters the body, it disperses quickly and is uniformly distributed throughout the body. Tritium is excreted primarily through urine with a

clearance rate characterized by an effective biological half-life of about 14 days. Within one month or so after ingestion, essentially all tritium is cleared. Organically bound tritium (tritium that is incorporated in organic compounds) can remain in the body for a longer period.

Tritium is produced naturally in the upper atmosphere when cosmic rays strike air molecules. Tritium is also produced during nuclear weapons explosions, as a by-product in reactors producing electricity, and in special production reactors, where the isotopes lithium-7 and/or boron-10 are activated to produce tritium. 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 the average groundwater velocity.

Tritium has a half-life of approximately 12.3 years. It decays spontaneously to helium-3 (3He). This radioactive decay releases a beta particle (low-energy electron). The radioactive decay of tritium is the source of the health risk from exposure to tritium. Tritium is one of the least dangerous radionuclides because it emits very weak radiation and leaves the body relatively quickly. Since tritium is almost always found as water, it goes directly into soft tissues and organs. The associated dose to these tissues is generally uniform and is dependent on the water content of the specific tissue.

III. Program Description

A. Sample Analysis

This section describes the general analytical methodologies used by TBE to analyze the environmental samples for radioactivity for the Byron Nuclear Generating Station RGPP in 2015.

In order to achieve the stated objectives, the current program includes the following analyses (as required by procedure):

1. Concentrations of gamma emitters in groundwater.

2. Concentrations of strontium in groundwater.

3. Concentrations of tritium in groundwater.

4. Concentrations of gross alpha and gross beta in groundwater.

B. Data Interpretation

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

1. Lower Limit of Detection and Minimum Detectable Concentration

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

2. Laboratory Measurements Uncertainty

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

Statistically, the exact value of a measurement is expressed as a range with a stated level of confidence. The convention is to report results with a 95% level of confidence. The uncertainty comes from calibration standards, sample volume or weight measurements, sampling uncertainty and other factors. Exelon reports the uncertainty of a measurement created by statistical process (counting error) as well as all sources of error (Total Propagated Uncertainty or TPU). Each result has two values calculated. Exelon reports the TPU by following the result with plus or minus ± the estimated sample standard deviation, as TPU, that is obtained by propagating all sources of analytical uncertainty in measurements.

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

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 Byron Nuclear Generating Nuclear Power Station, Commonwealth Edison Company,

Annual Report 1984, April 1985.

The pre-operational REMP contained analytical results from samples collected from the surface water and groundwater. All groundwater samples listed in the pre-Operational REMP report were <200 pCi/L.

1. Background Concentrations of Tritium

The purpose of the following discussion is to summarize background measurements of tritium in various media performed by others. Additional detail may be found by consulting references (CRA 2006).

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 2006. RadNet provides tritium precipitation concentration data for samples collected at stations through out the U.S. from 1960 up to and including 2006. Based on GNIP data for sample stations located in the U.S. Midwest, tritium concentrations peaked around 1963. This peak, which approached 10,000 pCi/L for some stations, coincided with the atmospheric testing of thermonuclear weapons. Tritium concentrations in surface water showed a sharp decline up until 1975 followed by a gradual decline since that time. Tritium concentrations in Midwest precipitation have typically been below 100 pCi/L since around 1980. Tritium concentrations in wells may still be above the 200 pCi/L detection limit from the external causes described above. Water from previous years and decades is naturally captured in groundwater, so some well water sources today are affected by the surface water from the 1960s that was elevated in tritium.

c. Surface Water Data

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

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

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

IV. Results and Discussion

A. 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 (Table B-I.1, Appendix B). Tritium values ranged from less than the detection limit to 1,040 pCi/L. Outside of the station boundary, tritium concentrations were all less than detection limit (<200 pCi/L). This is based on evaluation of groundwater sample results obtained as part of the Byron Station REMP. In 2015, fifteen (15) Radiological Groundwater Protection Program (RGPP) monitoring wells were sampled. The samples were obtained throughout the year and analyzed for tritium. In addition, a study of gamma, beta and alpha radioisotopes was performed in accordance with Nuclear Energy Institute (NEI) 07-07, Groundwater Protection Initiative, for the samples obtained in May. Three wells contained levels of tritium above the lower limit of detection (LLD) of 200 pCi/L. They were: AR-4, with concentrations ranging from 417 – 723 pCi/L; AR-7, with concentrations ranging from 198 – 508 pCi/L; and AR-11, with concentrations ranging from 422 – 1,040 pCi/L. Wells AR-4 and AR-11 are near the Circulating Water Blowdown piping, where historical leakage through vacuum breakers was known to have occurred. Tritium concentrations in these wells have gradually decreased since being first sampled in 2006. Well AR-7 is located on-site, just west of plant structures. Tritium has been measured in this well just above detectable limits on an intermittent basis since the well was first drilled in 2006. The tritium present in this well is at or below tritium levels that have been measured in rainwater as a result of precipitation recapture from permitted gaseous releases and it is not believed to be the result of new leak(s). In August 2014, a break in the well piping was discovered about six feet below the surface that could have served as the entry point for tritium in the recapture water. There are no existing or new leaks evident at the site and all groundwater well sample results are well below the drinking water standard of 20,000 pCi/L tritium. The tritium detected in groundwater samples has been isolated to the Galena- Platteville aquifer, which is isolated from the deeper regional groundwater aquifer by the semi-confining Glenwood Formation. Groundwater quality data from production wells and monitoring wells at the station located below this aquifer do not indicate concentrations of tritium greater than the LLD of 200 pCi/L. As

such, the tritium impact is limited to the Galena- Platteville aquifer.

Strontium

Strontium-89 and strontium-90 were not detected in any samples above their respective LLDs of 10 and 1 pCi/L.

Gross Alpha and Gross Beta (dissolved and suspended)

Gross Alpha and Gross Beta analyses in the dissolved and suspended fractions were performed on groundwater samples during the second quarter sampling in 2015**.**

Gross Alpha (dissolved) was not detected in any of eight groundwater locations.

Gross Alpha (suspended) was detected in one of eight groundwater locations at a concentration of 1.7 pCi/L.

Gross Beta (dissolved) was detected in eight of eight groundwater locations. The concentrations ranged from 2.8 to 24.9 pCi/L.

Gross Beta (suspended) was detected in two of eight groundwater locations. The concentrations ranged from 4.3 to 5.4 pCi/L.

The concentrations of Gross Alpha and Gross Beta, which are slightly above detectable levels, are considered to be background and are not the result of plant effluents.

Gamma Emitters

Naturally occurring K-40 was detected in three of twelve samples. The concentrations ranged from 71 to 79 pCi/L. All other gamma-emitting radionuclides associated with licensed plant operations were not detected at concentrations greater than their respective LLDs in any of the samples during 2015.

Hard-To-Detect

Hard-To-Detect analyses were not performed in 2015.

B. Drinking Water Well Survey

No drinking water well surveys were conducted in 2015.

C. Summary of Results – Inter-Laboratory Comparison Program

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

D. Leaks, Spills, and Releases

There are no new previously unidentified leaks or plumes at Byron Station. There were no new leaks, spills or releases at Byron Station in 2015.

E. Trends

Wells AR-4 and AR-11 have shown an overall decrease in tritium concentration since first sampled in 2006. Tritium has been measured in Well AR-7 since 2012, however, tritium has been previously measured in this well and it is believed to be the result of precipitation recapture, not the result of a new spill or leak.

F. Investigations

There were no investigations that took place in 2015 as a result of groundwater sample results.

G. Actions Taken

1. Compensatory Actions

   No compensatory actions were initiated in 2015.

2. Installation of Monitoring Wells

   No new monitoring wells were installed in 2015.

3. Actions to Recover/Reverse Plumes

   No actions were undertaken to recover/reverse plumes in 2015.

Intentionally left blank

APPENDIX A

LOCATION DESIGNATION

Intentionally left blank

TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations, Distance and Direction, Byron Nuclear Generating Station, 2015

Site	Site Type	Temporary/Permanent	Distance and Direction
AR-1	Monitoring Well	Permanent	0.36 miles/NNW
AR-10	Monitoring Well	Permanent	0.28 miles/NE
AR-11	Monitoring Well	Permanent	1.36 miles/WNW
AR-2	Monitoring Well	Permanent	0.6 miles/NW
AR-3	Monitoring Well	Permanent	0.8 miles/NW
AR-4	Monitoring Well	Permanent	1.36 miles/WNW
AR-5	Monitoring Well	Permanent	1.92 miles/WNW
AR-6	Monitoring Well	Permanent	2.04 miles/WNW
AR-7	Monitoring Well	Permanent	0.04 miles/W
AR-8	Monitoring Well	Permanent	0.12 miles/S
AR-9	Monitoring Well	Permanent	0.24 miles/E
CAR-1	Monitoring Well	Permanent	2.25 miles/WNW
CAR-2	Monitoring Well	Permanent	1.52 miles/WNW
CAR-3	Monitoring Well	Permanent	0.16 miles/SE
DF-24 (EPA well)	Monitoring Well	Permanent	1.36 miles/WNW
GW-9	Monitoring Well	Permanent	0.9 miles/WNW
MW-1 (EPA well)	Monitoring Well	Permanent	0.6 miles/NW
MW-3 (EPA well)	Monitoring Well	Permanent	0.8 miles/NW
TW-13	Monitoring Well	Permanent	2.3 miles/WNW
TW-14	Monitoring Well	Permanent	2.25 miles/WNW
TW-15	Monitoring Well	Permanent	2.2 miles/WNW
Well 7	Monitoring Well	Permanent	0.4 miles/SE
CROP	Surface Water	Permanent	0.2 miles NE

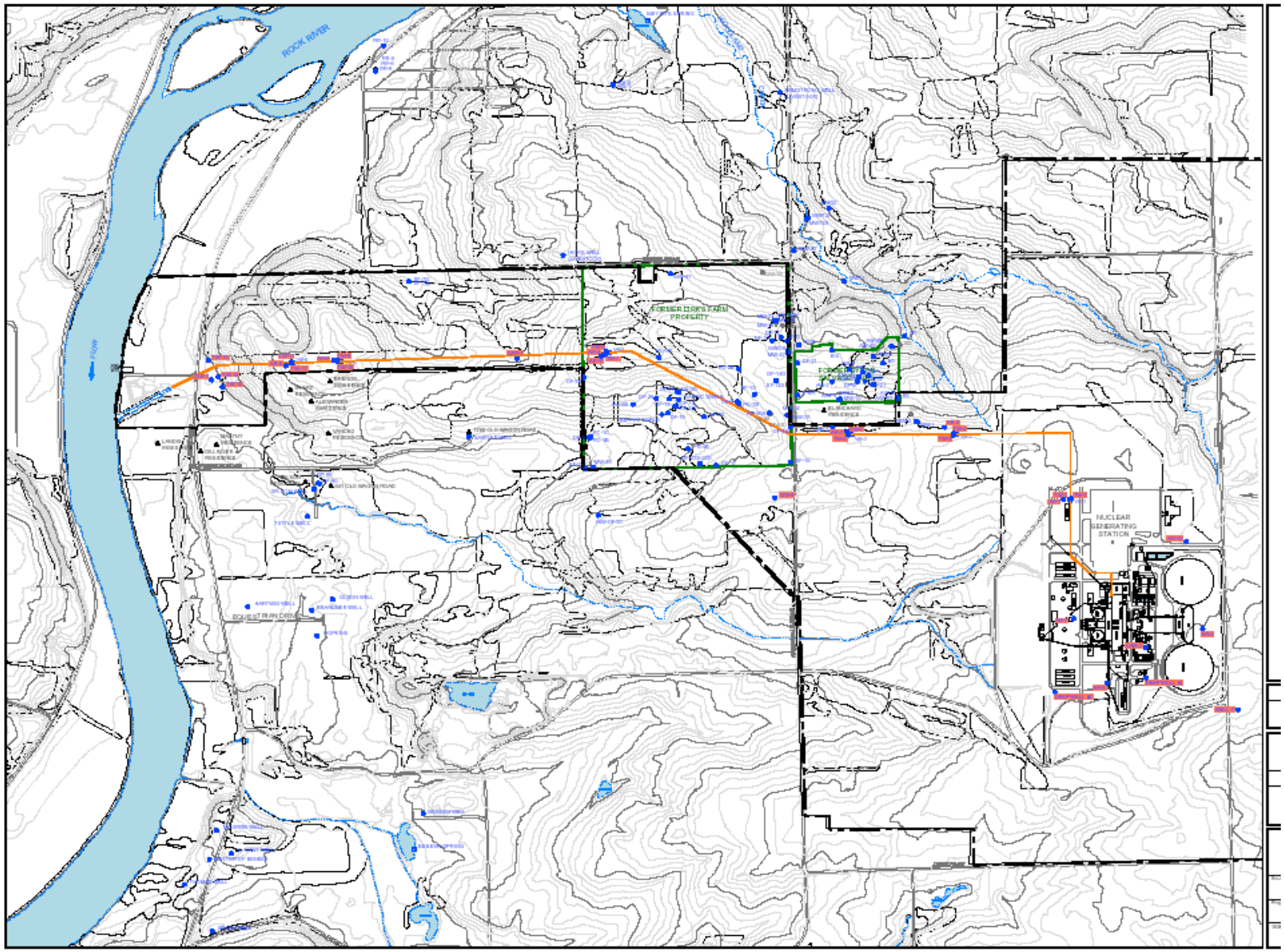


Figure A-1
Monitoring Well Locations, Byron Nuclear Generating Station, 2015

APPENDIX B

DATA TABLES

Intentionally left blank

TABLE B-I.1 **CONCENTRATIONS OF TRITIUM, STRONTIUM, GROSS ALPHA AND GROSS BETA IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATING STATION, 2015**

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)
BY-AR-1	03/10/15		< 152						
BY-AR-1	05/18/15		< 194	< 3.1	< 0.5	< 1.4	< 3.6	3.2 ± 1.0	< 4.0
BY-AR-1	09/11/15		< 182						
BY-AR-1	11/09/15		< 194						
BY-AR-10	03/10/15		< 150						
BY-AR-10	05/18/15		< 191	< 5.0	< 0.6	< 4.1	1.7 ± 0.9	2.8 ± 1.5	< 1.5
BY-AR-10	09/11/15		< 180						
BY-AR-10	11/09/15		< 200						
BY-AR-11	03/11/15		945 ± 161						
BY-AR-11	05/21/15		839 ± 165						
BY-AR-11	08/27/15		422 ± 138						
BY-AR-11	11/11/15		1040 ± 177						
BY-AR-2	05/20/15		< 193						
BY-AR-2	11/11/15		< 191						
BY-AR-3	03/11/15		< 156						
BY-AR-3	05/20/15		< 190	< 3.9	< 0.5	< 1.7	< 0.4	7.4 ± 1.3	< 1.3
BY-AR-3	08/27/15		< 188						
BY-AR-3	11/11/15		< 199						
BY-AR-4	03/11/15		493 ± 137						
BY-AR-4	05/21/15		723 ± 159	< 3.3	< 0.7	< 2.5	< 0.7	4.1 ± 1.3	< 2.1
BY-AR-4	08/27/15		417 ± 137						
BY-AR-4	11/11/15		450 ± 148						
BY-AR-7	01/21/15		422 ± 135						
BY-AR-7	02/26/15		198 ± 119						
BY-AR-7	03/10/15		347 ± 116						
BY-AR-7	04/27/15		303 ± 124						
BY-AR-7	05/18/15		508 ± 146	< 4.0	< 0.8	< 4.0	< 0.7	24.9 ± 2.2	< 2.1
BY-AR-7	09/11/15		474 ± 138						
BY-AR-7	11/09/15		389 ± 143						
BY-AR-8	03/10/15		< 155						
BY-AR-8	05/18/15		< 191	< 5.1	< 0.9	< 1.6	< 4.4	7.9 ± 1.4	4.3 ± 1.3
BY-AR-8	09/11/15		< 181						
BY-AR-8	11/09/15		< 190						
BY-AR-9	03/10/15		< 155						
BY-AR-9	05/18/15		< 191	< 4.5	< 0.5	< 2.2	< 3.9	3.0 ± 1.4	< 2.1
BY-AR-9	09/11/15		< 180						
BY-AR-9	11/09/15		< 200						
BY-CAR-1	05/20/15		< 186						
BY-CAR-1	11/11/15		< 194						
BY-CAR-3	03/10/15		< 175						
BY-CAR-3	05/18/15	Original	< 190	< 3.5	< 0.5	< 3.8	< 4.3	8.0 ± 1.7	5.4 ± 1.4
BY-CAR-3	05/18/15	Recount							4.7 ± 1.3
BY-CAR-3	09/11/15		< 183						
BY-CAR-3	11/09/15		< 200						
BY-CROP	11/25/15		< 190						
BY-DF-24	03/11/15		< 175						
BY-DF-24	05/20/15		< 191						
BY-DF-24	08/27/15		< 191						
BY-DF-24	11/11/15		< 197						
BY-MW-1	05/20/15		< 191						
BY-MW-1	11/11/15		< 196						
BY-MW-3	05/20/15		< 194						
BY-MW-3	11/11/15		< 194						
BY-TW-13	05/20/15		< 190						
BY-TW-13	11/11/15		< 188						

TABLE B-I.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF BYRON NUCLEAR GENERATION STATION, 2015**

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
BY-AR-1	05/18/15	< 19	< 15	< 2	< 2	< 4	< 1	< 3	< 2	< 4	< 13	< 2	< 2	< 21	< 7
BY-AR-10	05/18/15	< 20	< 14	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 15	< 2	< 2	< 23	< 8
BY-AR-11	05/21/15	< 33	< 27	< 3	< 3	< 7	< 3	< 6	< 4	< 6	< 11	< 3	< 4	< 24	< 7
BY-AR-2	05/20/15	< 28	< 29	< 3	< 3	< 7	< 3	< 6	< 4	< 6	< 10	< 3	< 3	< 23	< 7
BY-AR-3	05/20/15	< 32	< 32	< 4	< 4	< 9	< 4	< 8	< 4	< 6	< 12	< 3	< 4	< 29	< 9
BY-AR-4	05/21/15	< 32	< 31	< 3	< 4	< 9	< 4	< 8	< 4	< 7	< 11	< 3	< 3	< 26	< 9
BY-AR-7	05/18/15	< 18	< 20	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 14	< 2	< 2	< 22	< 8
BY-AR-8	05/18/15	< 20	71 ± 37	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 14	< 2	< 2	< 23	< 7
BY-AR-9	05/18/15	< 19	79 ± 29	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 14	< 2	< 2	< 22	< 6
BY-CAR-1	05/20/15	< 30	< 48	< 3	< 3	< 7	< 3	< 5	< 3	< 6	< 10	< 3	< 3	< 23	< 7
BY-CAR-3	05/18/15	< 17	< 33	< 2	< 2	< 5	< 1	< 4	< 2	< 3	< 13	< 1	< 2	< 21	< 7
BY-TW-13	05/20/15	< 32	79 ± 37	< 3	< 4	< 7	< 3	< 6	< 4	< 6	< 12	< 3	< 3	< 26	< 8