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RA17-048

10 CFR 50 Appendix I

May 12, 2017

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

LaSalle County Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Subject: 2016 Annual Radiological Environmental Operating Report

Enclosed is the Exelon Generation Company, LLC, 2016 Annual Radiological Environmental Operating Report for LaSalle County Station, submitted in accordance with Technical Specifications 5.6.2, "Annual Radiological Environmental Operating Report." The enclosed report contains the results of groundwater monitoring conducted in accordance with Exelon's Radiological Groundwater Protection Program, which is a voluntary program implemented in 2006. This information is being reported in accordance with a nuclear industry initiative.

There are no regulatory commitments in this letter. Should you have any questions concerning this report, please contact Mr. Guy V. Ford, Jr., Regulatory Assurance Manager, at (815) 415-2800.

Respectfully,

William J. Trafton
Site Vice President
LaSalle County Station

Enclosure: LaSalle County Station Units 1 and 2 Annual Radiological Environmental Operating Report 1 January through 21 December 2016

cc: Regional Administrator - NRC Region III
NRC Senior Resident Inspector - LaSalle County Station

NRC RA17-048

2016 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

PART 1

Docket No: 50-373
50-374

LASALLE COUNTY STATION
UNITS 1 and 2

Annual Radiological
Environmental Operating Report

1 January through 31 December 2016

Prepared By
Teledyne Brown Engineering
Environmental Services

Exelon Generation.

LaSalle County Station
Marseilles, IL 61341

May 2017

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Appendices

I. Summary and Conclusions

This report on the Radiological Environmental Monitoring Program conducted for the LaSalle County Station (LSCS) by Exelon covers the period 1 January 2016 through 31 December 2016. During that time period, 1,533 analyses were performed on 1,431 samples. In assessing all the data gathered for this report and comparing these results with preoperational data, it was concluded that the operation of LSCS had no adverse radiological impact on the environment.

Surface water samples were analyzed for concentrations of gross beta, tritium and gamma-emitting nuclides. Ground/well water samples were analyzed for concentrations of tritium and gamma-emitting nuclides. No fission or activation products were detected. Gross beta and tritium activities detected were consistent with those detected in previous years.

Commercially and recreationally important fish species were sampled and analyzed for concentrations of gamma-emitting nuclides. No fission or activation products were detected in fish.

Sediment samples were analyzed for concentrations of gamma-emitting nuclides. One sediment sample from the control location contained Cesium-137 (Cs-137) at a level below the required lower limit of detection (LLD). The Cs-137 concentration was consistent with concentrations observed in previous years. Cs-137 is often found in environmental media, such as sediment, from nuclear weapons testing. No other fission or activation products were identified in sediment.

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

High sensitivity Iodine-131 (I-131) analyses were performed on weekly air samples. All results were less than the minimum detectable activity 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. Concentrations of naturally occurring Potassium-40 (K-40) were consistent with those detected in previous years. 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.

Vegetation samples were analyzed for concentrations of gamma-emitting nuclides. Three of those samples were analyzed for naturally occurring Carbon-14 (C-14), also. Naturally occurring C-14 was found in 1 of the 3 samples. No fission or activation products were detected.

Environmental gamma radiation measurements were performed quarterly using Optically Stimulated Luminescence Dosimeters (OSLD) for the Radiological Environmental Monitoring Program (REMP). The results from the environmental gamma radiation monitoring program were consistent with those detected in previous years.

II. Introduction

The LaSalle County Station (LSCS), consists of two boiling water reactors, each rated for 3,546 MWt. Both units are owned and operated by Exelon Corporation and are located in LaSalle County, Illinois. Unit 1 went critical on 16 March 1982. Unit 2 went critical on 02 December 1983. The site is located in northern Illinois, approximately 75 miles southwest of Chicago, Illinois.

A Radiological Environmental Monitoring Program (REMP) for LSCS was initiated in 1982 (the preoperational period for most media covers the periods 1 January 1979 through 26 December 1981 and was summarized in a separate report.). This report covers those analyses performed by Teledyne Brown Engineering (TBE) and Landauer on samples collected during the period 1 January 2016 through 31 December 2016.

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

environmental samples for the LSCS REMP in 2016. Sample locations and descriptions can be found in Tables B–1 and B–2, and Figures B–1 through B–4, Appendix B.

Aquatic Environment

The aquatic environment was evaluated by performing radiological analyses on samples of surface water, ground/well water, fish, and sediment. Two gallon water samples were collected weekly from two surface water locations (L-21 and L-40) and composited for monthly and quarterly required analyses. Control location was L-21. Two ground/well water locations (L-27 and L-28) were also grab sampled quarterly. All samples were collected via grab sample. The samples were then transferred to new unused plastic containers. Both the grab container and the sample containers were rinsed with source water prior to actual sample collection. Fish samples were collected semiannually at three locations, L-34, L-35 and L-36 (Control). Sediment samples composed of recently deposited substrate were collected at three locations semiannually, L-21 (Control), L-40 and L-41.

Atmospheric Environment

The atmospheric environment was evaluated by performing radiological analyses on samples of airborne particulate and iodine. Airborne particulate and iodine samples were collected and analyzed weekly at ten locations (L-01, L-03, L-04, L-05, L-06, L-07, L-08, L-10, L-11 and L-11A). The control location was L-10. Airborne particulate and iodine samples were obtained at each location, using a vacuum pump to pull air through a glass fiber particulate filter and iodine cartridge. The pumps were run continuously and sampled air at the rate of approximately one cubic foot per minute. The particulate filters and iodine cartridges 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 product. Samples are typically collected biweekly at one milk location (L-42) from May through October, and monthly from November through April. The control location was L-42. All samples, when available, were collected in new unused two gallon plastic bottles from the bulk tank at each location, preserved with sodium bisulfite, and shipped promptly to the laboratory.

Food products were collected during the growing season at five locations (L-Quad Control, L-Quad 1, L-Quad 2, L-Quad 3 and L-Quad 4). The control location was L-Quad Control. Various types of samples were

collected and placed in new unused plastic bags, and sent to the laboratory for analysis.

Vegetation samples were collected monthly during the growing season from May through October at three locations (L-Veg C, L-ESE1, and L-ESE2). The control location was L-Veg C and was located in the lowest deposition sector (ENE sector) surrounding LaSalle. Various vegetation samples were also collected in the highest deposition sector (ESE sector) surrounding LaSalle. The samples were collected and placed in new unused plastic bags and sent to the laboratory for analysis.

Ambient Gamma Radiation

Beginning in the first quarter of 2012, Exelon changed the type of dosimetry used for the Radiological Environmental Monitoring Program (REMP). Optically Stimulated Luminescent Dosimetry (OSLD) were deployed and Thermo-luminescent Dosimetry (TLD) were discontinued. This change may cause step changes in readings, up or down, depending on site characteristics. However, 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 OSLD locations were placed on and around the LSCS site as follows:

An inner ring consisting of 16 locations (L-101, L-102, L-103, L-104, L-105, L-106, L-107, L-108, L-109, L-110, L-111B, L-112, L-113A, L-114, L-115 and L-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 LSCS releases).

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

An other set consisting of nine locations (L-01, L-03, L-04, L-05, L-06, L-07, L-08, L-11 and L-11A).

The balance of one location (L-10) 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 ½ degree sectors around the site, where estimated annual dose from LSCS, 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 approximately six feet above ground level.)

B. Sample Analysis

This section describes the general analytical methodologies used by Environmental Inc. (Midwest Labs) and TBE to collect and analyze, respectively, the environmental samples for radioactivity for the LSCS REMP in 2016. The analytical procedures used by the laboratories are listed in Table B-2.

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

1. Concentrations of beta emitters in surface water and air particulates

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

3. Concentrations of tritium in ground/well and surface water

4. Concentrations of I-131 in air and milk

5. Ambient gamma radiation levels at various site environs

C. Data Interpretation

The radiological and direct radiation data collected prior to LaSalle County Station becoming operational were used as a baseline with which these operational data were compared. For the purpose of this report, LaSalle County 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) is 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 is intended as a before the fact (a priori) estimate of a system (including instrumentation, procedure and sample type) and not as an after the fact (a posteriori) criteria for the presence of activity. All analyses were designed to achieve the required LSCS 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, food products, and vegetation; 12 nuclides including Mn-54, Co-58, Fe-59, Co-60, Zn-65, Zr-95, Nb-95, I-131, Cs-134, Cs-137, Ba-140, and La-140 were reported.

   For ground/well water, fish, sediment, air particulate and milk; 11 nuclides including Mn-54, Co-58, Fe-59, Co-60, Zn-65, Zr-95, Nb-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 2016, the LSCS REMP had a sample recovery rate of 99.5%. 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	L-11A	07/21/16	Timer malfunction; timer replaced. Time of 186.4 hours was calculated and is based on previous sample time.
A/I	L-10	07/28/16	Low reading of 26.2 hours due to a pump malfunction; pump replaced.
A/I	L-01	12/22/16	No apparent reason for low reading of 118.0 hours. Low timer readings of this nature are consistent with weather-related power interruptions.

Table D-2 LISTING OF MISSED SAMPLES

Sample Type	Location Code	Collection Date	Reason
M	L-42	01/07/16	Farmer not milking at this time; no sample available.
SW	L-40	01/21/16	No sample; water frozen.
OSLD	L-209-2	02/06/16	OSLD found missing during monthly visual check.
OSLD	L-03-1	03/30/16	OSLD not received at the laboratory for analysis.
OSLD	L-03-2	03/30/16	OSLD not received at the laboratory for analysis.
OSLD	L-212-1	03/30/16	OSLD found missing during quarterly exchange
OSLD	L-213-3	06/29/16	OSLD found missing during quarterly exchange.

Table D-2 LISTING OF MISSED SAMPLES (cont'd)

Sample Type	Location Code	Collection Date	Reason
A/I	L-11A	07/28/16	Pump found not running; breaker tripped; timer damaged; possibly due to storms in area. Timer was replaced and breaker reset.
OSLD	L-213-3	09/28/16	OSLD found missing during quarterly exchange.
SW	L-21	12/15/16	No sample; water frozen.
SW	L-40	12/15/16	No sample; water frozen.
SW	L-21	12/22/16	No sample; water frozen.
SW	L-40	12/22/16	No sample; water frozen.

Each program exception was reviewed to understand the causes of the program exception. 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

A new air monitoring location L-11A became operational 14 January 2016, and air monitoring location L-11 was retired on 21 January 2016. OSLD data for both locations continued to be monitored throughout 2016.

Vegetation samples, other than food products, were added to the REMP. The samples were collected monthly during the growing season from May through October at three (3) separate locations.

IV. Results and Discussion

A. Aquatic Environment

1. Surface Water

Samples were taken weekly and composited monthly at two locations (L-21 and L-40). Of these locations only L-40 located downstream, could be affected by LaSalle's effluent releases. The following analyses were performed:

Gross Beta

Samples from all locations were analyzed for concentrations of gross beta (Table C–I.1, Appendix C). Gross beta was detected in 23 out of 24 samples with a range of 3.4 to 8.3 pCi/L. Concentrations detected were consistent with those detected in previous years (Figure C–1, Appendix C). The required LLD was met for all samples.

Tritium

Quarterly composites of weekly collections were analyzed for tritium activity (Table C–I.2, Appendix C). Tritium was detected in 4 of 8 samples. The concentrations ranged from 203 to 510 pCi/L. Concentrations detected were consistent with those detected in previous years (Figure C–2, Appendix C).

Gamma Spectrometry

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

2. Ground/Well Water

Quarterly grab samples were collected at two locations (L-27 and L-28). Wells 4, 5 and 6 are associated with L-28. L-27 and L-28 Well 6 could be affected by LaSalle'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 contractually-required 200 pCi/L LLDs were met.

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 were collected at three locations (L-34, L-35 and L-36) semiannually. Locations L-34 and L-35 could be affected by LaSalle's effluent releases. The following analysis was performed:

Gamma Spectrometry

The edible portion of fish samples from both locations was analyzed for gamma-emitting nuclides (Table C–III.1, Appendix C). Naturally occurring K-40* was found at all stations and ranged from 1,583 to 4,619 pCi/kg wet. No fission or activation products were found.

4. Sediment

Aquatic sediment samples were collected at three locations (L-21, L-40 and L-41) semiannually. Location L-21 is located upstream and is not affected by LaSalle's liquid effluent releases. Locations L-40 and L-41, located downstream, could be affected by LaSalle's effluent releases. The following analysis was performed:

Gamma Spectrometry

Sediment samples from the three locations were analyzed for gamma-emitting nuclides (Table C–IV.1, Appendix C). Naturally occurring Be-7* was found at two stations with concentrations ranging from 1211 to 1441 pCi/L. Naturally occurring K-40* was found at all stations and ranged from 11,570 to 19,560 pCi/kg dry. Cs-137 was found in 1 control location sample (L-21) with a concentration of 152 pCi/L dry. This concentration is below the required LLD of 180 pCi/L dry. The Cs-137 concentration is consistent with concentrations observed in previous years. Cs-137 is often found in environmental media, such as sediment, from nuclear weapons testing. No additional fission or activation products were found.

**Naturally occurring gamma-emitting radionuclides are not included in the Appendix C Tables.*

B. Atmospheric Environment

1. Airborne

a. Air Particulates

Continuous air particulate samples were collected from ten locations on a weekly basis. The ten locations were separated into four groups: Group I (onsite) represents locations within the LSCS site boundary (L-03 and L-05), Group II (near-site) represents the locations near the LSCS site (L-01 and L-06), Group III (far-field) represents the locations at an intermediate distance from LSCS (L-04, L-07, L-08, L-11 and L-11A) and Group IV (control) represents the control location at a remote distance (L-10). 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 four groups aid in determining the effects, if any, resulting from the operation of LSCS. The results from the onsite locations (Group I) ranged from 8 to 29E–3 pCi/m^3 with a mean of 16E–3 pCi/m^3. The results from the near-site location (Group II) ranged from 9 to 34E–3 pCi/m^3 with a mean of 17E–3 pCi/m^3. The results from the far-field locations (Group III) ranged from 7 to 35E-3 pCi/m^3 with a mean of 17E–3 pCi/m^3. The results from the control location (Group IV) ranged from 10 to 30E–3 pCi/m^3 with a mean of 17E–3 pCi/m^3. Comparison of the 2016 air particulate data with previous year's data indicate no effects from the operation of LSCS (Figures C–3 through C-8, Appendix C). In addition, comparisons of the weekly mean values for 2016 indicate no notable differences among the four groups.

Gamma Spectrometry

Weekly samples were composited quarterly and analyzed for gamma-emitting nuclides (Table C–V.3, Appendix C). Naturally occurring Be-7*, due to cosmic ray activity, was

**Naturally occurring gamma-emitting radionuclides are not included in the Appendix C Tables.*

detected in 36 of 37 samples. These values ranged from 72 to 205 E–3 pCi/m^3. Naturally occurring K-40* was detected in one of 37 samples. The concentration was 36E-3 pCi/m^3. All other nuclides were less than the MDC.

b. Airborne Iodine

Continuous air samples were collected from ten locations (L-01, L-03, L-04, L-05, L-06, L-07, L-08, L-10, L-11, and L-11A) and analyzed weekly for I-131 (Table C–VI.1, Appendix C). No I-131 was detected.

2. Terrestrial

a. Milk

Samples were collected from one location (L-42) biweekly May through October and monthly November through April. The following analyses were performed:

Iodine-131

Milk samples from the location were analyzed for concentrations of I-131 (Table C–VII.1, Appendix C). I-131 was not detected, and the required LLDs were met.

Gamma Spectrometry

Each milk sample was analyzed for concentrations of gamma-emitting nuclides (Table C–VII.2, Appendix C).

Naturally occurring K-40* activity was found in all samples and ranged from 890 to 1,547 pCi/l. No other nuclides were detected, and all required LLDs were met.

b. Food Products

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

**Naturally occurring gamma-emitting radionuclides are not included in the Appendix C Tables.*

Gamma Spectrometry

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

c. Vegetation

Vegetation samples were collected monthly during the growing season from May through October at three locations (L-Veg C, L-ESE1, and L-ESE2). The control location was L-Veg C and was located in the lowest deposition sector (ENE sector) surrounding LaSalle. Various vegetation samples were also collected in the highest deposition sector (ESE sector) surrounding LaSalle. The following analyses were performed:

Gamma Spectrometry

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

Carbon-14

Three of the vegetation samples were analyzed for naturally occurring C-14 (Table C-VIII.3, Appendix C). Naturally occurring C-14 was found in one sample at a concentration of 1890 pCi/kg wet.

C. Ambient Gamma Radiation

Ambient gamma radiation levels were measured utilizing Optically Stimulated Luminescence Dosimeters (OSLD). Forty-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 at or below 35.0 mrem/quarter, with a range of 19.4 to 35.0 mrem/quarter. A comparison of the Inner Ring, Outer Ring, and Other data to the Control Location data, indicate that the ambient gamma radiation levels from the Control Location L-10 were comparable.

D. Land Use Survey

A Land Use Survey conducted during the August 2016 growing season

around the LaSalle County Station (LSCS) was performed by Environmental Inc. (Midwest Labs) for Exelon Nuclear to comply with Radiological Effluent Control 12.5.2 of the LaSalle's Offsite Dose Calculation Manual. The purpose of the survey was to document the nearest resident, milk producing animal and garden of greater than 500 ft^2 in each of the sixteen 22 ½ degree sectors around the site. The distance and direction of all locations from the LSCS reactor buildings were positioned using Global Positioning System (GPS) technology. There were no changes required to the LSCS REMP as a result of this survey. The results of this survey are summarized below:

Distance in Miles from the LSCS Reactor Buildings			
Sector	Residence Miles	Livestock Miles	Milk Farm Miles
A N	3.9	4.0	-
B NNE	1.6	1.7	-
C NE	2.1	3.5	-
D ENE	3.3	3.8	-
E E	3.2	-	14.2
F ESE	1.4	-	-
G SE	1.7	5.1	-
H SSE	1.8	4.7	-
J S	1.5	-	-
K SSW	0.7	-	-
L SW	1.0	5.8	-
M WSW	1.5	-	-
N W	1.7	3.0	-
P WNW	0.9	3.0	-
Q NW	1.8	4.0	-
R NNW	1.7	4.5	-

E. Errata Data

There is no errata data for 2016.

F. Summary of Results – Inter-Laboratory Comparison Program

The primary and secondary laboratories analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, vegetation and water matrices (Appendix D). The PE samples, supplied by Analytics Inc., Environmental Resource Associates (ERA) and DOE's Mixed Analyte Performance Evaluation Program (MAPEP), were evaluated against the following pre-set acceptance criteria:

1. Analytics Evaluation Criteria

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

2. ERA Evaluation Criteria

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

3. DOE Evaluation Criteria

   MAPEP's evaluation report provides an acceptance range with associated flag values.

   The MAPEP defines three levels of performance: Acceptable (flag = "A"), Acceptable with Warning (flag = "W"), and Not Acceptable (flag = "N"). Performance is considered acceptable when a mean result for the specified analyte is ± 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, 156 out of 160 analyses performed met the specified acceptance criteria. Four analyses (Milk - Sr-90, Vegetation - Sr-90, and Water - H-3 samples) did not meet the specified acceptance criteria for the following reasons and were addressed through the TBE Corrective Action Program.

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 MAPEP March 2016 air particulate cross check sample is now being provided to TBE by Analytics.

MAPEP's policy is to evaluate as failed non-reported nuclides that were reported in the previous study. NCR 16-14

1a. Since the Sr-90 was reported in the previous MAPEP study but not in this study MAPEP evaluated the Sr-90 for Soil as failed. No client samples were affected by this failure. NCR 16-14

1b. The MAPEP March 2016 Sr-90 in vegetation was evaluated as failing a false positive test. In reviewing the data that was reported vs the data in LIMS, it was found that the error was incorrectly reported as 0.023 rather than the correct value of 0.230. If the value had been reported with the activity and correct uncertainty of 0.301 ± 0.230, MAPEP would have evaluated the result as acceptable. No client samples were affected by this failure. NCR 16-14

2. Teledyne Brown Engineering's Analytics' March 2016 milk Sr-90 result of 15 ± .125 pCi/L was higher than the known value of 11.4 pCi/L with a ratio of 1.32. The upper ratio of 1.30 (acceptable with warning) was exceeded. After an extensive review of the data it is believed the technician did not rinse the filtering apparatus properly and some cross contamination from one of the internal laboratory spike samples may have been transferred to the Analytics sample. We feel the issue is specific to the March 2016 Analytics sample. No client samples were affected by this failure. NCR 16-26

3. Teledyne Brown Engineering's ERA November 2016 sample for H-3 in water was evaluated as failing. A result of 918 pCi/L was reported incorrectly due to a data entry issue. If the correct value of 9180 had been reported, ERA would have evaluated the result as acceptable. No client samples were affected by this failure. NCR 16-34

4. Teledyne Brown Engineering's Analytics' December 2016 milk Sr-90 sample result of 14.7 ± .26 pCi/L was higher than the known value of 10 pCi/L with a ratio of 1.47. The upper ratio of 1.30 (acceptable with warning) was exceeded. The technician entered the wrong aliquot into the LIMS system. To achieve a lower error term TBE uses a larger aliquot of 1.2L (Normally we use .6L for client samples). If the technician had entered an aliquot of 1.2L into the LIMS system, the result would have been 12.2 pCi/L, which would have been considered acceptable. No client samples were affected by this failure. NCR 16-35

For the EIML laboratory, 198 of 203 analyses met the specified acceptance criteria. Five analyses (Water – Ba-133, Co-57; Soil – Ni-63, U-233/234, U-238) did not meet the specified acceptance criteria for the following reasons:

1. The Environmental Inc., Midwest Laboratory's ERA April 2016 water Ba-133 result of 65.2 pCI/L was higher than the known value of 58.8 pCi/L, exceeding the upper control limit of 64.9 pCi/L. The reanalysis result of 57.8 pCI/L fell within acceptance criteria. There was no impact to client samples as a result of this failure.

2. The Environmental Inc., Midwest Laboratory's MAPEP February 2016 water Co-57 result of 1.38 Bq/L sample was higher than the known value of 0.00 Bq/L sample. This sample is considered a false positive. There was no impact to client samples as a result of this failure.

3. The Environmental Inc., Midwest Laboratory's MAPEP August 2016 soil Ni-60 result of 648 Bq/kg was lower than the known value of 990 Bq/kg, exceeding the lower control limit of 693 Bq/kg. Reanalysis with a smaller aliquot resulted in acceptable results. An investigation is in process to identify better techniques for analyzing samples with complex matrices. There was no impact to client samples as a result of this failure.

4. The Environmental Inc., Midwest Laboratory's MAPEP August 2016 soil U-233/234 result of 46.8 Bq/kg was lower than the known value of 122 Bq/kg, exceeding the lower control limit of 85 Bq/kg. MAPEP states that samples contain two fractions of Uranium; one that is soluble in concentrated HNO3 and HCL acid and one that is "fundamentally insoluble in these acids". They also state that HF treatment cannot assure complete dissolution. Results are consistent with measuring the soluble form. There was no impact to client samples as a result of this failure.

5. The Environmental Inc., Midwest Laboratory's MAPEP August 2016 soil U-238 result of 46.6 Bq/kg was lower than the known value of 121 Bq/kg, exceeding the lower control limit of 85 Bq/kg. MAPEP states that samples contain two fractions of Uranium; one that is soluble in concentrated HNO3 and HCL acid and one that is "fundamentally insoluble in these acids". They also state that HF treatment cannot assure complete dissolution. Results are consistent with measuring the soluble form. There was no impact to client samples as a result of this failure.

APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT ANNUAL SUMMARY

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LASALLE COUNTY STATION, 2016

NAME OF FACILITY:	**LASALLE COUNTY STATION**			**DOCKET NUMBER:**		**50-373 & 50-374**		
LOCATION OF FACILITY:	**MARSEILLES, IL**			**REPORTING PERIOD:**		**2016**		
MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)*	TYPES OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	**INDICATOR LOCATIONS** MEAN (M) (F) *RANGE*	**CONTROL LOCATION** MEAN (M) (F) *RANGE*	**LOCATION WITH HIGHEST ANNUAL MEAN (M)** MEAN (M) (F) *RANGE*	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER (PCI/LITER)	**GR-B**	24	**4**	6.2 (12/12) *4.2 - 8.3*	5.6 (11/12) *3.4 - 7.4*	6.2 (12/12) *4.2 - 8.3*	L-40 INDICATOR ILLINOIS RIVER - DOWNSTREAM 5.2 MILES NNW OF SITE	0
	H-3	8	**200**	310 (2/4) *203 - 417*	374 (2/4) *237 - 510*	374 (2/4) *237 - 510*	L-21 CONTROL ILLINOIS RIVER AT SENECA - UPSTREAM 4.0 MILES NE OF SITE	0
	GAMMA	24						
	MN-54		**15**	<LLD	<LLD	-		0
	CO-58		**15**	<LLD	<LLD	-		0
	FE-59		**30**	<LLD	<LLD	-		0
	CO-60		**15**	<LLD	<LLD	-		0
	ZN-65		**30**	<LLD	<LLD	-		0
	NB-95		**15**	<LLD	<LLD	-		0
	ZR-95		**30**	<LLD	<LLD	-		0
	I-131		**15**	<LLD	<LLD	-		0
	CS-134		**15**	<LLD	<LLD	-		0
	CS-137		**18**	<LLD	<LLD	-		0
	BA-140		**60**	<LLD	<LLD	-		0
	LA-140		**15**	<LLD	<LLD	-		0
GROUND WATER *(PCI/LITER)*	**H-3**	12	**200**	<LLD	<LLD	-		0
	GAMMA	12						
	MN-54		**15**	<LLD	<LLD	-		0
	CO-58		**15**	<LLD	<LLD	-		0
	FE-59		**30**	<LLD	<LLD	-		0
	CO-60		**15**	<LLD	<LLD	-		0
	ZN-65		**30**	<LLD	<LLD	-		0
	NB-95		**15**	<LLD	<LLD	-		0
	ZR-95		**30**	<LLD	<LLD	-		0
	CS-134		**15**	<LLD	<LLD	-		0
	CS-137		**18**	<LLD	<LLD	-		0
	BA-140		**60**	<LLD	<LLD	-		0
	LA-140		**15**	<LLD	<LLD	-		0

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

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LASALLE COUNTY STATION, 2016

NAME OF FACILITY:	**LASALLE COUNTY STATION**			**DOCKET NUMBER:**		**50-373 & 50-374**		
LOCATION OF FACILITY:	**MARSEILLES, IL**			**REPORTING PERIOD:**		**2016**		
MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)*	TYPES OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	**INDICATOR LOCATIONS** MEAN (M) (F) *RANGE*	**CONTROL LOCATION** MEAN (M) (F) *RANGE*	**LOCATION WITH HIGHEST ANNUAL MEAN (M)** MEAN (M) (F) *RANGE*	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
FISH	**GAMMA**	12						
(PCI/KG WET)	*MN-54*		**130**	<LLD	<LLD	-		0
	CO-58		**130**	<LLD	<LLD	-		0
	FE-59		**260**	<LLD	<LLD	-		0
	CO-60		**130**	<LLD	<LLD	-		0
	ZN-65		**260**	<LLD	<LLD	-		0
	NB-95		*NA*	<LLD	<LLD	-		0
	ZR-95		*NA*	<LLD	<LLD	-		0
	CS-134		**130**	<LLD	<LLD	-		0
	CS-137		**150**	<LLD	<LLD	-		0
	BA-140		*NA*	<LLD	<LLD	-		0
	LA-140		*NA*	<LLD	<LLD	-		0
SEDIMENT	**GAMMA**	6						
(PCI/KG DRY)	*MN-54*		*NA*	<LLD	<LLD	-		0
	CO-58		*NA*	<LLD	<LLD	-		0
	FE-59		*NA*	<LLD	<LLD	-		0
	CO-60		*NA*	<LLD	<LLD	-		0
	ZN-65		*NA*	<LLD	<LLD	-		0
	NB-95		*NA*	<LLD	<LLD	-		0
	ZR-95		*NA*	<LLD	<LLD	-		0
	CS-134		**150**	<LLD	<LLD	-		0
	CS-137		**180**	<LLD	152 (1/2)	152 (1/2)	L-21 CONTROL ILLINOIS RIVER AT SENECA - UPSTREAM 4.0 MILES NE OF SITE	0
	BA-140		*NA*	<LLD	<LLD	-		0
	LA-140		*NA*	<LLD	<LLD	-		0
AIR PARTICULATE *(E-3 PCI/CU.METER)*	**GR-B**	477	**10**	17 (424/425) *7 - 35*	17 (53/53) *10 - 30*	22 (3/3) *22 - 24*	L-11 INDICATOR RANSOM 6.0 MILES S OF SITE	0

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

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LASALLE COUNTY STATION, 2016

NAME OF FACILITY:	LASALLE COUNTY STATION			DOCKET NUMBER:		50-373 & 50-374		
LOCATION OF FACILITY:	MARSEILLES, IL			REPORTING PERIOD:		2016		
						LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)*	TYPES OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) *RANGE*	CONTROL LOCATION MEAN (M) (F) *RANGE*	MEAN (M) (F) *RANGE*	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIR PARTICULATE	**GAMMA**	37						
(E-3 PCI/CU.METER)	*MN-54*		*NA*	<LLD	<LLD	-		0
	CO-58		*NA*	<LLD	<LLD	-		0
	FE-59		*NA*	<LLD	<LLD	-		0
	CO-60		*NA*	<LLD	<LLD	-		0
	ZN-65		*NA*	<LLD	<LLD	-		0
	NB-95		*NA*	<LLD	<LLD	-		0
	ZR-95		*NA*	<LLD	<LLD	-		0
	CS-134		**50**	<LLD	<LLD	-		0
	CS-137		**60**	<LLD	<LLD	-		0
	BA-140		*NA*	<LLD	<LLD	-		0
	LA-140		*NA*	<LLD	<LLD	-		0
AIR IODINE	**GAMMA**	477						
(E-3 PCI/CU.METER)	*I-131*		**70**	<LLD	<LLD	-		0
MILK	**I-131**	18	**1**	NA	<LLD	-		0
(PCI/LITER)								
	GAMMA	18						
	MN-54		*NA*	NA	<LLD	-		0
	CO-58		*NA*	NA	<LLD	-		0
	FE-59		*NA*	NA	<LLD	-		0
	CO-60		*NA*	NA	<LLD	-		0
	ZN-65		*NA*	NA	<LLD	-		0
	NB-95		*NA*	NA	<LLD	-		0
	ZR-95		*NA*	NA	<LLD	-		0
	CS-134		**15**	NA	<LLD	-		0
	CS-137		**18**	NA	<LLD	-		0
	BA-140		**60**	NA	<LLD	-		0
	LA-140		**15**	NA	<LLD	-		0

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

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LASALLE COUNTY STATION, 2016

NAME OF FACILITY:	LASALLE COUNTY STATION			DOCKET NUMBER:		50-373 & 50-374		
LOCATION OF FACILITY:	MARSEILLES, IL			REPORTING PERIOD:		2016		
						LOCATION WITH HIGHEST ANNUAL MEAN (M)		
MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)*	TYPES OF ANALYSES PERFORMED	NUMBER OF ANALYSES PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) *RANGE*	CONTROL LOCATION MEAN (M) (F) *RANGE*	MEAN (M) (F) *RANGE*	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
FOOD PRODUCTS	**GAMMA**	13						
(PCI/KG WET)	*MN-54*		*NA*	<LLD	<LLD	-		0
	CO-58		*NA*	<LLD	<LLD	-		0
	FE-59		*NA*	<LLD	<LLD	-		0
	CO-60		*NA*	<LLD	<LLD	-		0
	ZN-65		*NA*	<LLD	<LLD	-		0
	NB-95		*NA*	<LLD	<LLD	-		0
	ZR-95		*NA*	<LLD	<LLD	-		0
	I-131		**60**	<LLD	<LLD	-		0
	CS-134		**60**	<LLD	<LLD	-		0
	CS-137		**80**	<LLD	<LLD	-		0
	BA-140		*NA*	<LLD	<LLD	-		0
	LA-140		*NA*	<LLD	<LLD	-		0
VEGETATION	**GAMMA**	54						
(PCI/KG WET)	*MN-54*		*NA*	<LLD	<LLD	-		0
	CO-58		*NA*	<LLD	<LLD	-		0
	FE-59		*NA*	<LLD	<LLD	-		0
	CO-60		*NA*	<LLD	<LLD	-		0
	ZN-65		*NA*	<LLD	<LLD	-		0
	NB-95		*NA*	<LLD	<LLD	-		0
	ZR-95		*NA*	<LLD	<LLD	-		0
	I-131		**60**	<LLD	<LLD	-		0
	CS-134		**60**	<LLD	<LLD	-		0
	CS-137		**80**	<LLD	<LLD	-		0
	BA-140		*NA*	<LLD	<LLD	-		0
	LA-140		*NA*	<LLD	<LLD	-		0
	C-14	3	*NA*	1890	<LLD	1890	L-ESE-1 INIDCATOR	0
				(1/2)	<LLD	(1/2)	1.3 MILES ESE	0
DIRECT RADIATION	**OSLD-QUARTERLY**	338	*NA*	26.5	23.5	29.1	L-113A-1 INDICATOR	0
(MILLIREM/QTR.)				(330/330)	(8/8)	(4/4)		
				19.9 - 35	*19.4 - 27.7*	*26.9 - 32.2*	0.8 MILES W	

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

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APPENDIX B

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

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, LaSalle County Station, 2016

Location	Location Description	Distance & Direction From Site
A. Surface Water		
L-21	Illinois River at Seneca, Upstream (control)	4.0 miles NE
L-40	Illinois River, Downstream (indicator)	5.2 miles NNW
B. Ground/Well Water		
L-27	LSCS Onsite Well (indicator)	0 miles at station
L-28-W4	Marseilles Well (control)	7.0 miles NNW
L-28-W5	Marseilles Well (control)	6.7 miles NNW
L-28-W6	Marseilles Well (indicator)	4.1 miles N
C. Milk - bi-weekly / monthly		
L-42	Biros Farm (control)	14.2 miles E
D. Air Particulates / Air Iodine		
L-01	Nearsite 1 (indicator)	1.5 miles NNW
L-03	Onsite 3 (indicator)	1.0 miles ENE
L-04	Rte. 170 (indicator)	3.2 miles E
L-05	Onsite 5 (indicator)	0.3 miles ESE
L-06	Nearsite 6 (indicator)	0.4 miles W
L-07	Seneca (indicator)	5.2 miles NNE
L-08	Marseilles (indicator)	6.0 miles NNW
L-10	Streator (control)	13.5 miles SW
L-11	Ransom (indicator)	6.0 miles S
L-11A	Ransom (indicator)	6.0 miles S
E. Fish		
L-34	LaSalle Cooling Lake (indicator)	2.0 miles E
L-35	Marseilles Pool of Illinois River, Downstream (indicator)	6.5 miles NNW
L-36	Illinois River, Upstream of Discharge (control)	4.3 miles NE
F. Sediment		
L-21	Illinois River at Seneca, Upstream (control)	4.0 miles NE
L-40	Illinois River, Downstream (indicator)	5.2 miles NNW
L-41	Illinois River, Downstream (indicator)	4.6 miles N
G. Food Products		
Quadrant 1	Diane Partridge	4.5 miles NE
Quadrant 2	Mike and Gina Welbourne	3.8 miles ESE
Quadrant 3	Michael Olson	1.5 miles WSW
Quadrant 4	Robert Eisers	4.5 miles NW
Control	Eugene Clements	10.0 miles NW
H. Vegetation		
L-Veg C	Control	9.5 miles ENE
L-ESE 1	Indicator	1.5 miles ESE
L-ESE 2	Indicator	6.0 miles ESE

TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, LaSalle County Station, 2016

Location	Location Description	Distance & Direction From Site
I. Environmental Dosimetry - OSLD		
Inner Ring		
L-101-1 and -2		0.5 miles N
L-102-1 and -2		0.6 miles NNE
L-103-1 and -2		0.7 miles NE
L-104-1 and -2		0.8 miles ENE
L-105-1 and -2		0.7 miles E
L-106-1 and -2		1.4 miles ESE
L-107-1 and -2		0.8 miles SE
L-108-1 and -2		0.5 miles SSE
L-109-1 and -2		0.6 miles S
L-110-1 and -2		0.6 miles SSW
L-111b-1 and -2		0.8 miles SW
L-112-1 and -2		0.9 miles WSW
L-113a-1 and -2		0.8 miles W
L-114-1 and -2		0.9 miles WNW
L-115-1 and -2		0.7 miles NW
L-116-1 and -2		0.6 miles NNW
Outer Ring		
L-201-3 and -4		4.0 miles N
L-202-3 and -4		3.6 miles NNE
L-203-1 and -2		4.0 miles NE
L-204-1 and -2		3.2 miles ENE
L-205-1 and -2		3.2 miles ESE
L-205-3 and -4		5.1 miles E
L-206-1 and -2		4.3 miles SE
L-207-1 and -2		4.5 miles SSE
L-208-1 and -2		4.5 miles S
L-209-1 and -2		4.0 miles SSW
L-210-1 and -2		3.3 miles SW
L-211-1 and -2		4.5 miles WSW
L-212-1 and -2		4.0 miles W
L-213-3 and -4		4.9 miles W
L-214-3 and -4		5.1 miles WNW
L-215-3 and -4		5.0 miles NW
L-216-3 and -4		5.0 miles NNW
Other		
L-01-1 and -2	Nearsite 1 (indicator)	1.5 miles NNW
L-03-1 and -2	Onsite 3 (indicator)	1.0 miles ENE
L-04-1 and -2	Rte. 170 (indicator)	3.2 miles E
L-05-1 and -2	Onsite 5 (indicator)	0.3 miles ESE
L-06-1 and -2	Nearsite 6 (indicator)	0.4 miles W
L-07-1 and -2	Seneca (indicator)	5.2 miles NNE
L-08-1 and -2	Marseilles (indicator)	6.0 miles NNW
L-11-1 and -2	Ransom (indicator)	6.0 miles S
L-11A-1 and -2	Ransom (indicator)	6.0 miles S
Control and Special Interest		
L-10-1 and -2	Streator	13.5 miles SW

TABLE B-2: Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, LaSalle County Station, 2016

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 Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Surface Water	Gross Beta	Monthly composite from weekly grab samples.	TBE, TBE-2008 Gross Alpha and/or gross beta activity in various matrices Env. Inc., W(DS)-01 Determination of gross alpha and/or gross beta in water (dissolved solids or total residue)
Surface Water	Tritium	Quarterly composite from weekly grab samples.	TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation Env. Inc., T-02 Determination of tritium in water (direct method)
Ground/Well Water	Gamma Spectroscopy	Quarterly grab samples.	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Ground/Well Water	Tritium	Quarterly grab samples.	TBE, TBE-2011 Tritium analysis in drinking water by liquid scintillation Env. Inc., T-02 Determination of tritium in water (direct method)
Fish	Gamma Spectroscopy	Semi-annual samples collected via electroshocking or other techniques	TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Sediment	Gamma Spectroscopy	Semi-annual grab samples	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
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 Env. Inc., AP-02 Determination of gross alpha and/or gross beta in air particulate filters
Air Particulates	Gamma Spectroscopy	Quarterly composite of each station	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Air Iodine	Gamma Spectroscopy	Bi-weekly composite of continuous air sampling through charcoal filter	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., I-131-02 Determination of I-131 in charcoal canisters by gamma spectroscopy (batch method)
Milk	I-131	Bi-weekly grab sample when cows are on pasture. Monthly all other times	TBE, TBE-2012 Radioiodine in various matrices Env. Inc., I-131-01 Determination of I-131 in milk by an ion exchange
Milk	Gamma Spectroscopy	Bi-weekly grab sample when cows are on pasture. Monthly all other times	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Food Products	Gamma Spectroscopy	Annual grab samples.	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Vegetation	Gamma Spectroscopy	Monthly grab samples during growing season	TBE, TBE-2007 Gamma emitting radioisotope analysis Env. Inc., GS-01 Determination of gamma emitters by gamma spectroscopy
Vegetation	Carbon-14	Annual grab samples	TBE, TBE-2003 Carbon-14 and Tritium in soils, soldis, and biological samples: Harvey Oxidizer Method
OSLD	Optically Stimulated Luminescence Dosimetry	Quarterly OSLDs comprised of two Al_2O_3:C Landauer Incorporated elements.	Landauer Incorporated

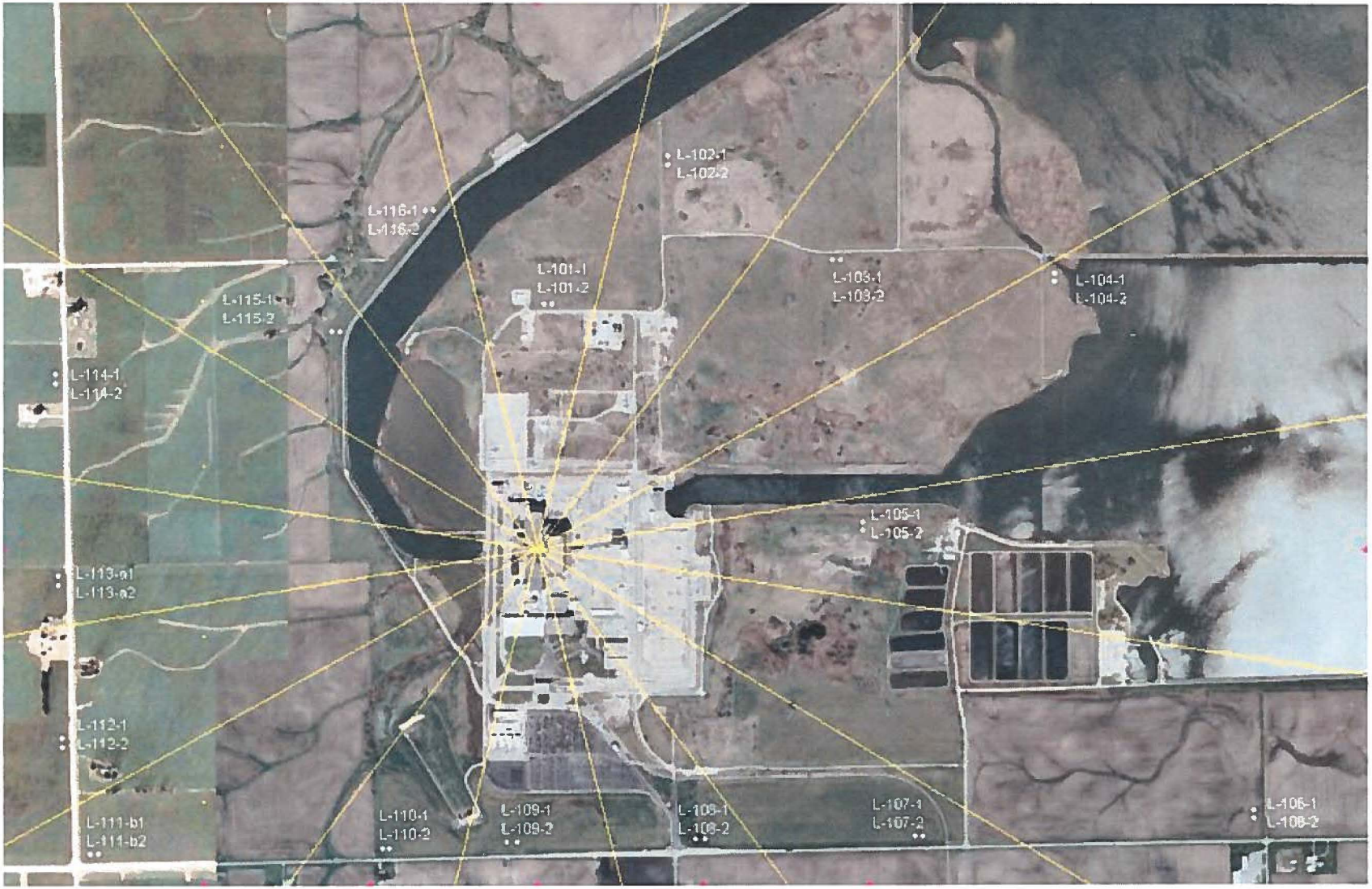

Figure B-1
Inner Ring OSLD Locations
of the LaSalle County Station, 2016

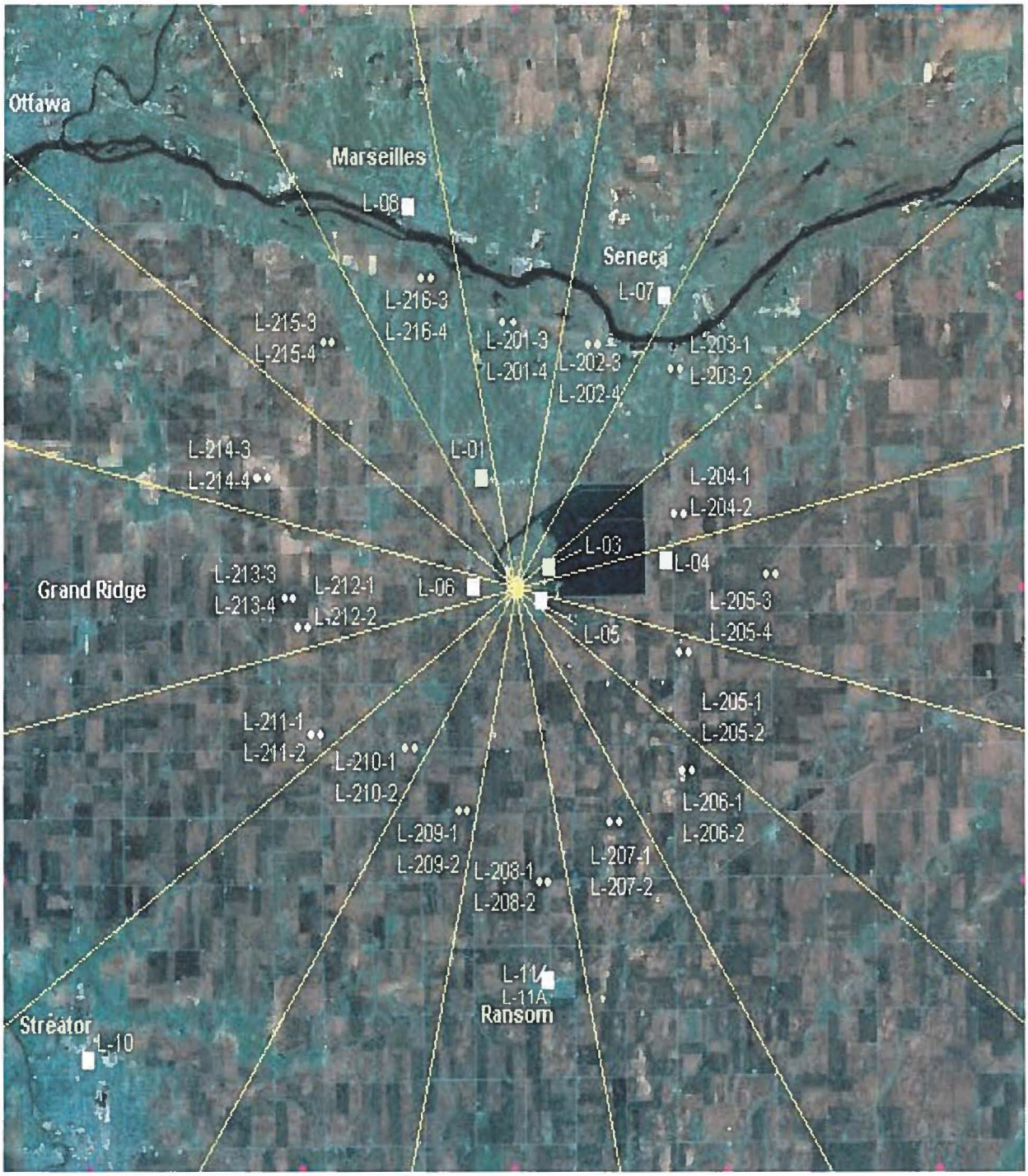

Figure B-2
Outer Ring OSLD Locations and Fixed Air Sampling Locations
of the LaSalle County Station, 2016

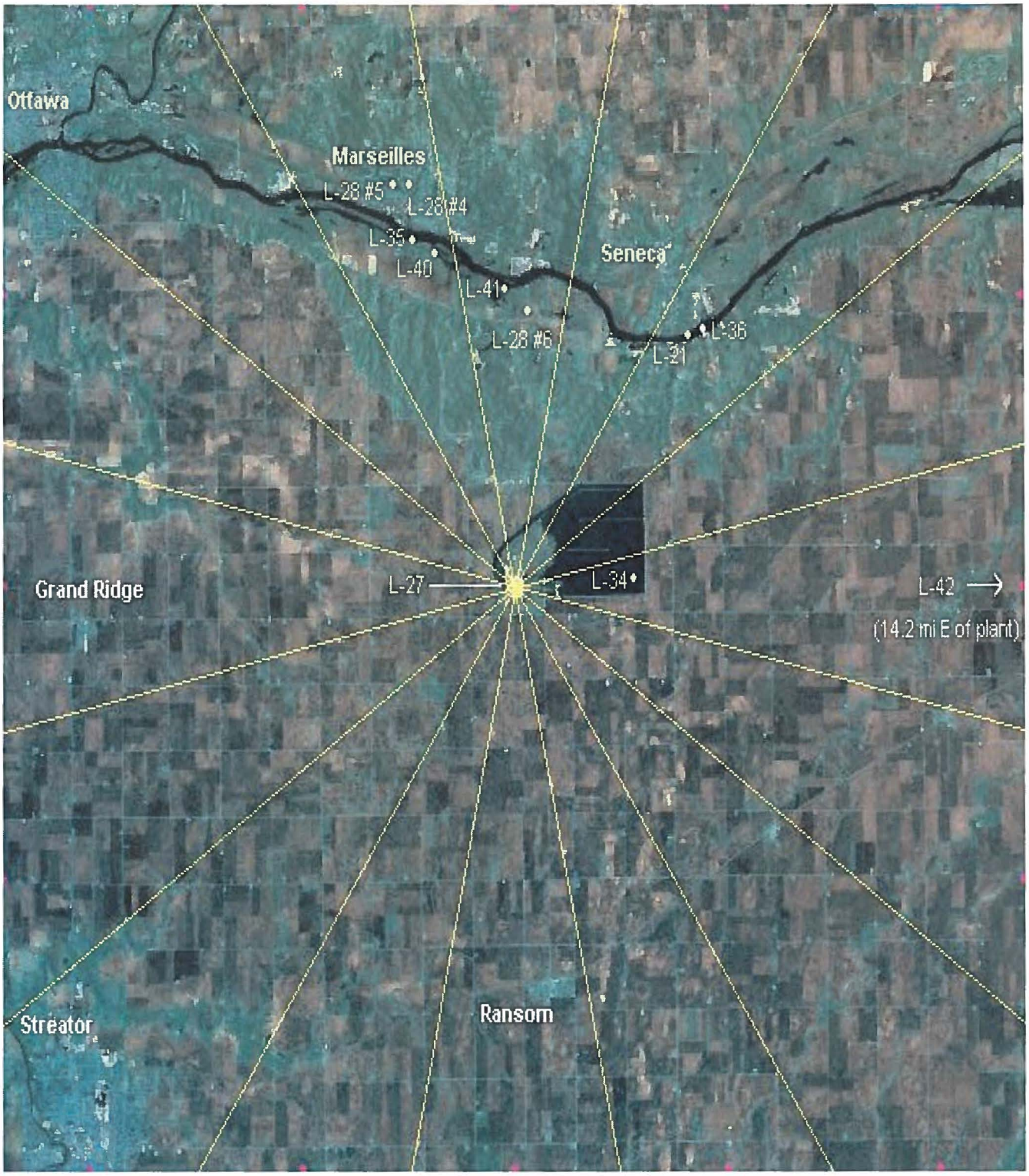

Figure B-3
Ingestion and Waterborne Exposure Pathway Sample Locations
of the LaSalle County Station, 2016

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APPENDIX C

DATA TABLES AND FIGURES – PRIMARY LABORATORY

Table C-I.1 CONCENTRATIONS OF GROSS BETA IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	L-21		L-40	
01/07/16 - 01/27/16	7.4 ± 2.3		5.7 ± 2.2	*(1)*
02/04/16 - 02/25/16	6.4 ± 2.2		7.9 ± 2.2	
03/03/16 - 03/30/16	6.0 ± 2.4		6.6 ± 2.5	
04/07/16 - 04/28/16	6.4 ± 2.3		6.3 ± 2.4	
05/04/16 - 05/25/16	3.4 ± 2.0		5.5 ± 2.2	
06/02/16 - 06/29/16	6.4 ± 2.1		4.2 ± 1.9	
07/07/16 - 07/28/16	3.8 ± 1.9		6.3 ± 2.1	
08/03/16 - 08/24/16	6.0 ± 2.0		7.7 ± 2.1	
08/31/16 - 09/28/16	< 3.1		4.6 ± 2.3	
10/06/16 - 10/27/16	4.9 ± 1.9		8.3 ± 2.3	
11/02/16 - 11/30/16	5.3 ± 2.1		6.4 ± 2.2	
12/08/16 - 12/28/16	5.7 ± 2.2	(1)	4.5 ± 2.1	*(1)*
(2) MEAN ± 2 STD DEV	5.6 ± 2.4		6.2 ± 2.7	

Table C-I.2 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	L-21		L-40	
01/07/16 - 03/30/16	< 177		< 176	*(1)*
04/07/16 - 06/29/16	237 ± 117		203 ± 117	
07/07/16 - 09/28/16	510 ± 145		417 ± 139	
10/06/16 - 12/28/16	< 199	(1)	< 200	*(1)*
(2) MEAN ± 2 STD DEV	374 ± 386		310 ± 303	

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION.

(2) THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES (VALUES ≥ MDC).

Table C-I.3

CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016

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
L-21	01/07/16 - 01/27/16	< 2	< 2	< 5	< 2	< 3	< 2	< 4	< 13	< 2	< 2	< 21	< 7
	02/04/16 - 02/25/16	< 3	< 3	< 7	< 3	< 6	< 3	< 5	< 10	< 2	< 3	< 21	< 7
	03/03/16 - 03/30/16	< 1	< 1	< 2	< 1	< 2	< 1	< 2	< 7	< 1	< 1	< 12	< 4
	04/07/16 - 04/28/16	< 1	< 1	< 3	< 1	< 3	< 1	< 3	< 6	< 1	< 1	< 11	< 4
	05/04/16 - 05/25/16	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 14	< 2	< 2	< 22	< 8
	06/02/16 - 06/29/16	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 15	< 1	< 2	< 21	< 8
	07/07/16 - 07/28/16	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 13	< 2	< 2	< 20	< 7
	08/03/16 - 08/24/16	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 15	< 2	< 2	< 22	< 6
	08/31/16 - 09/28/16	< 2	< 2	< 5	< 2	< 4	< 2	< 3	< 11	< 2	< 2	< 18	< 6
	10/06/16 - 10/27/16	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 13	< 1	< 2	< 20	< 6
	11/02/16 - 11/30/16	< 2	< 3	< 6	< 3	< 5	< 3	< 5	< 15	< 2	< 2	< 27	< 7
	12/08/16 - 12/28/16	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 14	< 2	< 2	< 23	< 7 *(1)*
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
L-40	01/07/16 - 01/27/16	< 2	< 2	< 5	< 2	< 4	< 2	< 3	< 12	< 2	< 2	< 19	< 7 *(1)*
	02/04/16 - 02/25/16	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 8	< 2	< 2	< 15	< 5
	03/03/16 - 03/30/16	< 1	< 2	< 4	< 1	< 3	< 2	< 3	< 10	< 1	< 2	< 17	< 5
	04/07/16 - 04/28/16	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 7	< 2	< 2	< 14	< 4
	05/04/16 - 05/25/16	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 14	< 2	< 2	< 21	< 8
	06/02/16 - 06/29/16	< 2	< 2	< 4	< 1	< 3	< 2	< 3	< 14	< 1	< 1	< 20	< 6
	07/07/16 - 07/28/16	< 2	< 3	< 6	< 2	< 5	< 3	< 4	< 15	< 2	< 2	< 25	< 8
	08/03/16 - 08/24/16	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 14	< 2	< 2	< 20	< 7
	08/31/16 - 09/28/16	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 12	< 2	< 2	< 19	< 6
	10/06/16 - 10/27/16	< 2	< 2	< 5	< 1	< 3	< 2	< 3	< 15	< 1	< 2	< 21	< 7
	11/02/16 - 11/30/16	< 2	< 2	< 5	< 2	< 4	< 3	< 4	< 13	< 2	< 2	< 20	< 7
	12/08/16 - 12/28/16	< 2	< 2	< 5	< 2	< 5	< 2	< 4	< 15	< 2	< 2	< 23	< 7 *(1)*
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-II.1 CONCENTRATIONS OF TRITIUM IN GROUND/WELL WATER SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	L-27	L-28-W4	L-28-W5	L-28-W6
01/19/16 - 01/19/16	< 180		< 181	< 178
04/13/16 - 04/13/16	< 186	< 184		< 190
07/13/16 - 07/13/16	< 166		< 168	< 165
10/12/16 - 10/12/16	< 189	< 191		< 191
MEAN	-	-	-	-

Table C-II.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUND/WELL WATER SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016**

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
L-27	01/19/16 - 01/19/16	< 4	< 4	< 8	< 4	< 8	< 4	< 7	< 4	< 4	< 20	< 7
	04/13/16 - 04/13/16	< 7	< 7	< 15	< 7	< 12	< 7	< 11	< 5	< 8	< 34	< 7
	07/13/16 - 07/13/16	< 6	< 6	< 11	< 6	< 14	< 5	< 11	< 6	< 6	< 27	< 6
	10/12/16 - 10/12/16	< 3	< 3	< 6	< 3	< 5	< 4	< 5	< 3	< 4	< 16	< 4
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-28-W4	04/13/16 - 04/13/16	< 5	< 5	< 9	< 5	< 10	< 5	< 8	< 6	< 5	< 28	< 8
	10/12/16 - 10/12/16	< 3	< 3	< 7	< 3	< 6	< 3	< 6	< 3	< 4	< 17	< 6
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-28-W5	01/19/16 - 01/19/16	< 8	< 8	< 12	< 8	< 9	< 8	< 11	< 8	< 8	< 33	< 11
	07/13/16 - 07/13/16	< 9	< 8	< 18	< 8	< 14	< 5	< 18	< 7	< 7	< 44	< 10
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-28-W6	01/19/16 - 01/19/16	< 5	< 6	< 13	< 6	< 14	< 6	< 11	< 5	< 6	< 26	< 10
	04/13/16 - 04/13/16	< 6	< 5	< 11	< 5	< 10	< 5	< 8	< 5	< 5	< 27	< 9
	07/13/16 - 07/13/16	< 6	< 7	< 14	< 8	< 14	< 8	< 12	< 8	< 8	< 39	< 9
	10/12/16 - 10/12/16	< 4	< 3	< 6	< 3	< 8	< 4	< 7	< 4	< 4	< 18	< 4
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-III.1

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016

RESULTS IN UNITS OF PC/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
L-34												
Largemouth Bass	05/12/16	< 35	< 38	< 72	< 31	< 89	< 40	< 60	< 24	< 37	< 182	< 46
Common Carp	05/12/16	< 55	< 66	< 99	< 53	< 84	< 49	< 92	< 43	< 23	< 351	< 99
Largemouth Bass	10/13/16	< 46	< 51	< 126	< 37	< 101	< 63	< 89	< 58	< 47	< 220	< 81
Bluegill	10/13/16	< 75	< 76	< 150	< 52	< 202	< 73	< 148	< 64	< 64	< 278	< 82
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-35												
Freshwater Drum	05/13/16	< 48	< 35	< 65	< 35	< 103	< 31	< 48	< 26	< 40	< 245	< 67
Smallmouth Buffalo	05/13/16	< 61	< 69	< 138	< 68	< 77	< 56	< 117	< 42	< 49	< 428	< 237
Smallmouth Bass	10/14/16	< 74	< 73	< 148	< 60	< 107	< 61	< 107	< 61	< 79	< 282	< 58
Smallmouth Buffalo	10/14/16	< 60	< 65	< 123	< 51	< 145	< 59	< 109	< 67	< 61	< 237	< 75
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-36												
Channel Catfish	05/13/16	< 43	< 41	< 122	< 51	< 103	< 56	< 82	< 45	< 50	< 323	< 62
Smallmouth Buffalo	05/13/16	< 67	< 72	< 158	< 90	< 131	< 77	< 120	< 68	< 79	< 517	< 121
Channel Catfish	10/14/16	< 33	< 44	< 83	< 67	< 94	< 45	< 87	< 60	< 38	< 197	< 69
Smallmouth Bass	10/14/16	< 50	< 48	< 98	< 55	< 138	< 54	< 105	< 54	< 62	< 213	< 54
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-IV.1

CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016

RESULTS IN UNITS OF PC/KG DRY ± 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
L-21	05/18/16	< 97	< 85	< 169	< 96	< 190	< 102	< 164	< 75	< 117	< 420	< 144
	10/20/16	< 58	< 66	< 146	< 60	< 125	< 71	< 117	< 50	152 ± 71	< 422	< 93
	MEAN ± 2 STD DEV	-	-	-	-	-	-	-	-	152 ± 0	-	-
L-40	05/18/16	< 75	< 71	< 174	< 80	< 167	< 87	< 135	< 69	< 96	< 374	< 106
	10/20/16	< 53	< 44	< 151	< 58	< 103	< 63	< 106	< 44	< 66	< 366	< 96
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-41	05/18/16	< 85	< 124	< 328	< 64	< 177	< 166	< 226	< 66	< 79	< 7109	< 2651
	10/11/16	< 50	< 53	< 126	< 56	< 91	< 56	< 91	< 44	< 55	< 234	< 92
	MEAN	-	-	-	-	-	-	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES (VALUES ≥ MDC)

Table C-V.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016**

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

COLLECTION	GROUP I		GROUP II	
PERIOD	L-03	L-05	L-01	L-06
12/31/15 - 01/07/16	27 ± 5	26 ± 5	24 ± 5	24 ± 5
01/07/16 - 01/14/16	17 ± 4	15 ± 4	20 ± 4	17 ± 4
01/14/16 - 01/21/16	23 ± 4	22 ± 4	22 ± 4	23 ± 4
01/21/16 - 01/27/16	16 ± 4	17 ± 5	23 ± 5	21 ± 5
01/27/16 - 02/04/16	13 ± 3	17 ± 4	16 ± 4	17 ± 4
02/04/16 - 02/10/16	25 ± 5	24 ± 5	23 ± 5	24 ± 5
02/10/16 - 02/18/16	15 ± 4	13 ± 3	14 ± 4	14 ± 4
02/18/16 - 02/25/16	11 ± 4	14 ± 4	12 ± 4	11 ± 4
02/25/16 - 03/03/16	15 ± 4	13 ± 4	17 ± 4	14 ± 4
03/03/16 - 03/10/16	19 ± 4	15 ± 4	18 ± 4	14 ± 4
03/10/16 - 03/17/16	12 ± 4	12 ± 4	11 ± 3	12 ± 4
03/17/16 - 03/24/16	10 ± 4	11 ± 4	13 ± 4	12 ± 4
03/24/16 - 03/30/16	12 ± 4	11 ± 4	11 ± 4	13 ± 4
03/30/16 - 04/07/16	15 ± 4	13 ± 3	11 ± 3	14 ± 4
04/07/16 - 04/13/16	11 ± 4	11 ± 4	13 ± 4	12 ± 4
04/13/16 - 04/21/16	19 ± 4	16 ± 4	16 ± 4	19 ± 4
04/21/16 - 04/28/16	15 ± 4	22 ± 5	16 ± 4	16 ± 4
04/28/16 - 05/04/16	10 ± 4	9 ± 4	10 ± 4	14 ± 4
05/04/16 - 05/12/16	11 ± 4	12 ± 4	14 ± 4	12 ± 4
05/12/16 - 05/19/16	12 ± 4	12 ± 4	14 ± 4	11 ± 4
05/19/16 - 05/25/16	17 ± 5	17 ± 5	18 ± 5	16 ± 5
05/25/16 - 06/02/16	15 ± 4	15 ± 4	9 ± 3	10 ± 3
06/02/16 - 06/09/16	12 ± 4	14 ± 4	12 ± 4	10 ± 4
06/09/16 - 06/16/16	16 ± 4	12 ± 4	18 ± 4	15 ± 4
06/16/16 - 06/22/16	13 ± 4	16 ± 4	*(3)*	*(3)*
06/16/16 - 06/23/16	*(4)*	*(4)*	14 ± 3	18 ± 4
06/22/16 - 06/29/16	15 ± 4	15 ± 4	*(5)*	*(5)*
06/23/16 - 06/29/16	*(6)*	*(6)*	18 ± 4	18 ± 4
06/29/16 - 07/07/16	15 ± 4	14 ± 4	17 ± 4	15 ± 4
07/07/16 - 07/13/16	12 ± 4	16 ± 4	17 ± 4	13 ± 4
07/13/16 - 07/21/16	13 ± 4	13 ± 4	15 ± 4	13 ± 4
07/21/16 - 07/28/16	15 ± 4	14 ± 4	16 ± 4	16 ± 4
07/28/16 - 08/03/16	19 ± 4	20 ± 5	17 ± 4	19 ± 5
08/03/16 - 08/10/16	14 ± 4	17 ± 4	19 ± 4	20 ± 4
08/10/16 - 08/18/16	17 ± 3	19 ± 4	21 ± 4	22 ± 4
08/18/16 - 08/24/16	13 ± 4	12 ± 4	14 ± 5	12 ± 5
08/24/16 - 08/31/16	14 ± 4	16 ± 4	14 ± 4	13 ± 4
08/31/16 - 09/08/16	11 ± 3	12 ± 3	14 ± 3	12 ± 3
09/08/16 - 09/15/16	11 ± 3	19 ± 4	20 ± 4	17 ± 4
09/15/16 - 09/22/16	20 ± 4	20 ± 4	21 ± 4	19 ± 4
09/22/16 - 09/28/16	25 ± 5	29 ± 5	23 ± 5	25 ± 5
09/28/16 - 10/06/16	13 ± 4	12 ± 4	13 ± 3	13 ± 4
10/06/16 - 10/12/16	21 ± 5	23 ± 5	27 ± 5	26 ± 5
10/12/16 - 10/20/16	17 ± 4	12 ± 3	16 ± 4	14 ± 3
10/20/16 - 10/27/16	8 ± 4	12 ± 4	12 ± 4	11 ± 4
10/27/16 - 11/02/16	22 ± 5	21 ± 5	24 ± 5	23 ± 5
11/02/16 - 11/10/16	21 ± 4	23 ± 4	22 ± 4	24 ± 4
11/10/16 - 11/17/16	29 ± 5	28 ± 5	34 ± 5	31 ± 5
11/17/16 - 11/23/16	22 ± 5	19 ± 5	17 ± 5	25 ± 5
11/23/16 - 11/30/16	19 ± 4	21 ± 4	23 ± 4	21 ± 4
11/30/16 - 12/08/16	15 ± 3	15 ± 3	15 ± 3	13 ± 3
12/08/16 - 12/15/16	16 ± 4	21 ± 4	17 ± 4	15 ± 4
12/15/16 - 12/22/16	20 ± 5	21 ± 5	34 ± 7 *(1)*	25 ± 5
12/22/16 - 12/28/16	22 ± 5	20 ± 5	20 ± 4	21 ± 5
12/28/16 - 01/04/17	15 ± 4	16 ± 4	15 ± 4	15 ± 4
(2) MEAN ± 2 STD DEV	16 ± 9	17 ± 9	17 ± 11	17 ± 10

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

(2) THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES (VALUES ≥ MDC)

(3) SAMPLED ON 06/23/16

(4) SAMPLED ON 6/22/16

(5) COLLECTION BEGAN ON 06/23/16

(6) COLLECTION BEGAN ON 06/22/16

Table C-V.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016**

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

COLLECTION	GROUP III					GROUP IV
PERIOD	L-04	L-07	L-08	L-11 *(3)*	L-11A *(3)*	L-10
12/31/15 - 01/07/16	24 ± 5	27 ± 5	24 ± 5	22 ± 5		23 ± 5
01/07/16 - 01/14/16	13 ± 4	19 ± 5	23 ± 5	22 ± 5		16 ± 4
01/14/16 - 01/21/16	20 ± 4	23 ± 5	24 ± 4	24 ± 4 *(3)*	22 ± 4 *(3)*	21 ± 4
01/21/16 - 01/27/16	20 ± 5	19 ± 5	22 ± 5		19 ± 5	17 ± 4
01/27/16 - 02/04/16	17 ± 4	16 ± 4	18 ± 4		17 ± 4	18 ± 4
02/04/16 - 02/10/16	23 ± 5	20 ± 5	20 ± 5		23 ± 5	24 ± 5
02/10/16 - 02/18/16	15 ± 4	15 ± 4	15 ± 4		15 ± 4	17 ± 4
02/18/16 - 02/25/16	9 ± 4	13 ± 4	13 ± 4		12 ± 4	10 ± 3
02/25/16 - 03/03/16	13 ± 4	15 ± 4	16 ± 4		14 ± 4	13 ± 4
03/03/16 - 03/10/16	18 ± 4	17 ± 4	15 ± 4		13 ± 4	16 ± 4
03/10/16 - 03/17/16	12 ± 4	12 ± 4	13 ± 4		9 ± 3	12 ± 4
03/17/16 - 03/24/16	13 ± 4	13 ± 4	12 ± 4		10 ± 4	12 ± 4
03/24/16 - 03/30/16	12 ± 4	13 ± 4	9 ± 4		11 ± 4	12 ± 4
03/30/16 - 04/07/16	12 ± 3	13 ± 4	20 ± 4		15 ± 4	11 ± 3
04/07/16 - 04/13/16	15 ± 4	12 ± 4	10 ± 4		13 ± 4	13 ± 4
04/13/16 - 04/21/16	16 ± 4	18 ± 4	16 ± 4		15 ± 4	18 ± 4
04/21/16 - 04/28/16	17 ± 4	18 ± 4	16 ± 4		13 ± 4	18 ± 4
04/28/16 - 05/04/16	7 ± 4	8 ± 4	11 ± 4		9 ± 4	10 ± 4
05/04/16 - 05/12/16	12 ± 4	11 ± 4	13 ± 4		11 ± 4	12 ± 4
05/12/16 - 05/19/16	11 ± 4	9 ± 3	13 ± 4		8 ± 4	13 ± 4
05/19/16 - 05/25/16	11 ± 4	18 ± 5	16 ± 5		18 ± 5	15 ± 4
05/25/16 - 06/02/16	15 ± 4	12 ± 3	15 ± 4		14 ± 4	11 ± 3
06/02/16 - 06/09/16	12 ± 4	13 ± 4	13 ± 4		13 ± 4	12 ± 3
06/09/16 - 06/16/16	16 ± 4	14 ± 4	18 ± 4		16 ± 4	14 ± 4
06/16/16 - 06/22/16	*(4)*	15 ± 4	20 ± 4		18 ± 4	16 ± 4
06/16/16 - 06/23/16	15 ± 4	*(5)*	*(5)*		*(5)*	*(5)*
06/22/16 - 06/29/16	*(6)*	16 ± 4	15 ± 4		16 ± 4	18 ± 4
06/23/16 - 06/29/16	16 ± 4	*(7)*	*(7)*		*(7)*	*(7)*
06/29/16 - 07/07/16	15 ± 4	13 ± 4	16 ± 4		18 ± 4	16 ± 4
07/07/16 - 07/13/16	16 ± 4	12 ± 4	14 ± 4		20 ± 5	17 ± 4
07/13/16 - 07/21/16	14 ± 4	15 ± 4	10 ± 3		13 ± 4 *(1)*	12 ± 3
07/21/16 - 07/28/16	21 ± 4	16 ± 4	17 ± 4		*(1)*	11 ± 6 *(1)*
07/28/16 - 08/03/16	23 ± 5	25 ± 5	18 ± 4		17 ± 4	21 ± 5
08/03/16 - 08/10/16	19 ± 4	21 ± 4	19 ± 4		22 ± 4	22 ± 4
08/10/16 - 08/18/16	21 ± 4	26 ± 4	17 ± 4		22 ± 4	23 ± 4
08/18/16 - 08/24/16	14 ± 5	12 ± 4	12 ± 5		14 ± 5	15 ± 5
08/24/16 - 08/31/16	13 ± 4	14 ± 4	16 ± 4		18 ± 5	13 ± 4
08/31/16 - 09/08/16	11 ± 3	10 ± 3	14 ± 4		13 ± 4	12 ± 3
09/08/16 - 09/15/16	16 ± 4	17 ± 4	16 ± 4		16 ± 4	17 ± 4
09/15/16 - 09/22/16	18 ± 4	18 ± 4	22 ± 5		22 ± 5	22 ± 5
09/22/16 - 09/28/16	30 ± 5	24 ± 5	27 ± 5		32 ± 6	29 ± 5
09/28/16 - 10/06/16	13 ± 3	10 ± 3	13 ± 4		14 ± 4	13 ± 4
10/06/16 - 10/12/16	26 ± 5	23 ± 5	25 ± 5		26 ± 5	25 ± 5
10/12/16 - 10/20/16	18 ± 4	15 ± 3	17 ± 4		18 ± 4	13 ± 3
10/20/16 - 10/27/16	10 ± 4	14 ± 4	13 ± 4		12 ± 4	11 ± 4
10/27/16 - 11/02/16	21 ± 5	22 ± 5	25 ± 5		24 ± 5	22 ± 5
11/02/16 - 11/10/16	25 ± 4	20 ± 4	23 ± 4		21 ± 4	22 ± 4
11/10/16 - 11/17/16	29 ± 5	33 ± 5	29 ± 5		35 ± 5	30 ± 5
11/17/16 - 11/23/16	18 ± 5	21 ± 5	16 ± 5		21 ± 5	23 ± 5
11/23/16 - 11/30/16	22 ± 4	20 ± 4	22 ± 4		22 ± 4	19 ± 4
11/30/16 - 12/08/16	16 ± 3	17 ± 4	12 ± 3		14 ± 3	12 ± 3
12/08/16 - 12/15/16	16 ± 4	19 ± 4	15 ± 4		20 ± 4	16 ± 4
12/15/16 - 12/22/16	24 ± 5	28 ± 5	25 ± 5		24 ± 5	27 ± 5
12/22/16 - 12/28/16	27 ± 5	21 ± 5	24 ± 5		22 ± 5	19 ± 5
12/28/16 - 01/04/17	14 ± 3	18 ± 4	17 ± 4		19 ± 4	18 ± 4
(2) MEAN ± 2 STD DEV	17 ± 10	17 ± 10	17 ± 9	22 ± 2	17 ± 11	17 ± 10

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

(2) THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES (VALUES ≥ MDC)

(3) Air monitoring location L-11A became operational on 01/14/16 and air monitoring location L-11 was retired on 01/21/16

(4) Sampled on 6/23/16

(5) Sampled on 6/22/16

(6) Collection began on 06/23/16

(7) Collection began on 06/22/16

Table C-V.2

MONTHLY AND YEARLY MEAN VALUES OF GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016

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

GROUP I - ONSITE LOCATIONS				GROUP II - NEAR-SITE LOCATIONS				GROUP III - FAR-FIELD LOCATIONS				GROUP IV - CONTROL LOCATION			
COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD	COLLECTION PERIOD	MIN	MAX	MEAN ± 2SD
12/31/15 - 02/04/16	13	27	19 ± 10	12/31/15 - 02/04/16	16	24	21 ± 6	12/31/15 - 02/04/16	13	28	21 ± 7	12/31/15 - 02/04/16	16	23	19 ± 6
02/04/16 - 03/03/16	11	25	16 ± 11	02/04/16 - 03/03/16	11	24	16 ± 10	02/04/16 - 03/03/16	9	23	16 ± 8	02/04/16 - 03/03/16	10	24	16 ± 12
03/03/16 - 03/30/16	10	19	13 ± 6	03/03/16 - 03/30/16	11	18	13 ± 5	03/03/16 - 03/30/16	9	18	13 ± 5	03/03/16 - 03/30/16	12	16	13 ± 4
03/30/16 - 04/28/16	11	22	15 ± 8	03/30/16 - 04/28/16	11	19	15 ± 5	03/30/16 - 04/28/16	10	20	15 ± 5	03/30/16 - 04/28/16	11	18	15 ± 7
04/28/16 - 06/02/16	9	17	13 ± 5	04/28/16 - 06/02/16	9	18	13 ± 6	04/28/16 - 06/02/16	7	18	12 ± 6	04/28/16 - 06/02/16	10	15	12 ± 4
06/02/16 - 06/29/16	12	16	14 ± 3	06/02/16 - 06/29/16	10	18	15 ± 6	06/02/16 - 06/29/16	12	20	15 ± 4	06/02/16 - 06/29/16	12	18	15 ± 6
06/29/16 - 08/03/16	12	20	15 ± 5	06/29/16 - 08/03/16	13	19	16 ± 4	06/29/16 - 08/03/16	10	25	16 ± 7	06/29/16 - 08/03/16	11	21	15 ± 8
08/03/16 - 08/31/16	12	19	15 ± 5	08/03/16 - 08/31/16	12	22	17 ± 8	08/03/16 - 08/31/16	12	26	17 ± 8	08/03/16 - 08/31/16	13	23	18 ± 10
08/31/16 - 09/28/16	11	29	18 ± 14	08/31/16 - 09/28/16	12	25	19 ± 9	08/31/16 - 09/28/16	10	32	19 ± 13	08/31/16 - 09/28/16	12	29	20 ± 14
09/28/16 - 11/02/16	8	23	16 ± 11	09/28/16 - 11/02/16	11	27	18 ± 13	09/28/16 - 11/02/16	10	26	18 ± 11	09/28/16 - 11/02/16	11	25	17 ± 12
11/02/16 - 11/30/16	19	29	23 ± 7	11/02/16 - 11/30/16	17	34	25 ± 11	11/02/16 - 11/30/16	16	35	24 ± 11	11/02/16 - 11/30/16	19	30	23 ± 9
11/30/16 - 01/04/17	15	22	18 ± 6	11/30/16 - 01/04/17	13	34	19 ± 13	11/30/16 - 01/04/17	12	28	20 ± 9	11/30/16 - 01/04/17	12	27	19 ± 11
12/31/15 - 01/04/17	8	29	16 ± 9	12/31/15 - 01/04/17	9	34	17 ± 10	12/31/15 - 01/04/17	7	35	17 ± 10	12/31/15 - 01/04/17	10	30	17 ± 10

Table C-V.3 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016**

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
L-01	12/31/15 - 03/30/16	< 2	< 4	< 21	< 3	< 5	< 5	< 11	< 3	< 2	< 501	< 181
	03/30/16 - 06/29/16	< 2	< 4	< 15	< 3	< 8	< 7	< 6	< 3	< 2	< 389	< 249
	06/29/16 - 09/28/16	< 3	< 4	< 8	< 3	< 6	< 5	< 7	< 2	< 3	< 127	< 62
	09/28/16 - 01/04/17	< 2	< 3	< 7	< 2	< 5	< 2	< 5	< 2	< 2	< 151	< 50 *(1)*
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-03	12/31/15 - 03/30/16	< 4	< 9	< 27	< 3	< 8	< 7	< 14	< 4	< 4	< 842	< 281
	03/30/16 - 06/29/16	< 3	< 5	< 15	< 3	< 8	< 4	< 9	< 2	< 2	< 382	< 160
	06/29/16 - 09/28/16	< 4	< 6	< 17	< 3	< 12	< 7	< 12	< 4	< 4	< 200	< 60
	09/28/16 - 01/04/17	< 2	< 3	< 8	< 3	< 5	< 4	< 6	< 2	< 2	< 138	< 67
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-04	12/31/15 - 03/30/16	< 3	< 5	< 19	< 4	< 7	< 6	< 12	< 3	< 3	< 613	< 173
	03/30/16 - 06/29/16	< 3	< 6	< 21	< 4	< 8	< 6	< 11	< 3	< 3	< 595	< 161
	06/29/16 - 09/28/16	< 3	< 2	< 12	< 3	< 5	< 3	< 5	< 2	< 2	< 117	< 56
	09/28/16 - 01/04/17	< 2	< 3	< 11	< 3	< 5	< 5	< 7	< 2	< 2	< 186	< 48
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-05	12/31/15 - 03/30/16	< 3	< 4	< 13	< 2	< 6	< 4	< 8	< 2	< 2	< 522	< 135
	03/30/16 - 06/29/16	< 2	< 4	< 13	< 2	< 5	< 4	< 6	< 2	< 2	< 261	< 145
	06/29/16 - 09/28/16	< 2	< 4	< 6	< 3	< 7	< 3	< 6	< 2	< 2	< 125	< 49
	09/28/16 - 01/04/17	< 2	< 4	< 10	< 2	< 4	< 3	< 6	< 2	< 2	< 183	< 73
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-06	12/31/15 - 03/30/16	< 3	< 7	< 23	< 4	< 10	< 7	< 12	< 3	< 3	< 1903	< 983
	03/30/16 - 06/29/16	< 3	< 5	< 13	< 2	< 6	< 5	< 8	< 2	< 2	< 368	< 219
	06/29/16 - 09/28/16	< 4	< 5	< 13	< 3	< 10	< 4	< 8	< 4	< 3	< 174	< 82
	09/28/16 - 01/04/17	< 2	< 3	< 12	< 3	< 6	< 3	< 8	< 2	< 2	< 214	< 97
	MEAN	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-V.3 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016**

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
L-07	12/31/15 - 03/30/16	< 3	< 5	< 17	< 2	< 8	< 5	< 9	< 2	< 2	< 457	< 234
	03/30/16 - 06/29/16	< 3	< 6	< 20	< 3	< 10	< 7	< 10	< 3	< 3	< 523	< 214
	06/29/16 - 09/28/16	< 2	< 4	< 5	< 2	< 7	< 4	< 7	< 3	< 2	< 143	< 44
	09/28/16 - 01/04/17	< 3	< 5	< 14	< 3	< 10	< 4	< 10	< 3	< 3	< 188	< 102
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-08	12/31/15 - 03/30/16	< 3	< 4	< 17	< 3	< 7	< 5	< 9	< 2	< 2	< 423	< 221
	03/30/16 - 06/29/16	< 2	< 2	< 11	< 2	< 5	< 4	< 6	< 2	< 2	< 293	< 138
	06/29/16 - 09/28/16	< 2	< 4	< 6	< 3	< 5	< 3	< 5	< 2	< 2	< 136	< 59
	09/28/16 - 01/04/17	< 2	< 3	< 10	< 2	< 4	< 3	< 7	< 2	< 2	< 161	< 63
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-10	12/31/15 - 03/30/16	< 2	< 4	< 11	< 2	< 5	< 5	< 7	< 2	< 2	< 381	< 89
	03/30/16 - 06/29/16	< 3	< 4	< 17	< 3	< 8	< 5	< 9	< 3	< 2	< 437	< 147
	06/29/16 - 09/28/16	< 4	< 5	< 16	< 5	< 14	< 6	< 11	< 4	< 3	< 208	< 86 *(1)*
	09/28/16 - 01/04/17	< 2	< 4	< 11	< 3	< 8	< 4	< 7	< 3	< 2	< 194	< 68
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-11	12/31/15 - 01/21/16	< 14	< 23	< 54	< 6	< 20	< 25	< 33	< 10	< 8	< 16240	< 5444 *(2)*
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-11A	12/31/15 - 03/30/16	< 2	< 4	< 16	< 2	< 7	< 5	< 9	< 2	< 3	< 566	< 164 *(2)*
	03/30/16 - 06/29/16	< 4	< 7	< 20	< 3	< 8	< 6	< 10	< 4	< 3	< 606	< 226
	06/29/16 - 09/28/16	< 3	< 3	< 10	< 2	< 6	< 4	< 6	< 3	< 2	< 136	< 58 *(1)*
	09/28/16 - 01/04/17	< 3	< 4	< 13	< 2	< 6	< 3	< 6	< 2	< 3	< 204	< 60
	MEAN	-	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

(2) Air monitoring location L-11A became operational on 01/14/16 and air monitoring location L-11 was retired on 01/21/16

Table C-VI.1

CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016

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

COLLECTION	GROUP I		GROUP II		GROUP III					GROUP IV
PERIOD	L-03	L-05	L-01	L-06	L-04	L-07	L-08	L-11 (2)	L-11A (2)	L-10
12/31/15 - 01/07/16	< 60	< 60	< 27	< 60	< 60	< 38	< 68	< 68		< 66
01/07/16 - 01/14/16	< 34	< 34	< 33	< 33	< 34	< 35	< 34	< 39		< 38
01/14/16 - 01/21/16	< 48	< 50	< 18	< 48	< 48	< 27	< 61	< 62 (2)	< 62 (2)	< 60
01/21/16 - 01/27/16	< 56	< 58	< 21	< 57	< 59	< 54	< 52		< 50	< 50
01/27/16 - 02/04/16	< 13	< 13	< 12	< 5	< 12	< 14	< 13		< 13	< 13
02/04/16 - 02/10/16	< 23	< 53	< 51	< 53	< 53	< 56	< 56		< 56	< 54
02/10/16 - 02/18/16	< 52	< 53	< 51	< 63	< 53	< 67	< 64		< 35	< 62
02/18/16 - 02/25/16	< 59	< 59	< 57	< 52	< 61	< 57	< 53		< 52	< 20
02/25/16 - 03/03/16	< 44	< 43	< 43	< 22	< 44	< 53	< 54		< 52	< 51
03/03/16 - 03/10/16	< 42	< 44	< 41	< 47	< 42	< 49	< 48		< 49	< 26
03/10/16 - 03/17/16	< 17	< 17	< 17	< 18	< 17	< 19	< 8		< 18	< 18
03/17/16 - 03/24/16	< 22	< 22	< 8	< 22	< 22	< 26	< 25		< 26	< 26
03/24/16 - 03/30/16	< 66	< 65	< 67	< 27	< 69	< 53	< 53		< 52	< 51
03/30/16 - 04/07/16	< 60	< 22	< 59	< 62	< 60	< 58	< 60		< 58	< 56
04/07/16 - 04/13/16	< 62	< 64	< 60	< 58	< 62	< 58	< 61		< 60	< 22
04/13/16 - 04/21/16	< 47	< 45	< 45	< 68	< 47	< 28	< 67		< 64	< 64
04/21/16 - 04/28/16	< 36	< 37	< 36	< 36	< 36	< 37	< 37		< 34	< 34
04/28/16 - 05/04/16	< 48	< 47	< 47	< 62	< 47	< 66	< 65		< 67	< 25
05/04/16 - 05/12/16	< 32	< 32	< 31	< 39	< 31	< 40	< 39		< 39	< 14
05/12/16 - 05/19/16	< 45	< 46	< 43	< 65	< 44	< 64	< 67		< 66	< 63
05/19/16 - 05/25/16	< 66	< 65	< 65	< 19	< 65	< 49	< 51		< 50	< 45
05/25/16 - 06/02/16	< 59	< 60	< 57	< 59	< 57	< 58	< 58		< 25	< 20
06/02/16 - 06/09/16	< 56	< 55	< 28	< 28	< 55	< 60	< 63		< 24	< 57
06/09/16 - 06/16/16	< 66	< 68	< 64	< 63	< 66	< 60	< 62		< 62	< 23
06/16/16 - 06/22/16	< 70	< 69	(3)	(3)	(3)	< 68	< 69		< 29	< 64
06/16/16 - 06/23/16	(4)	(4)	< 56	< 55	< 52	(4)	(4)		(4)	(4)
06/22/16 - 06/29/16	< 55	< 56	(5)	(5)	(5)	< 43	< 45		< 43	< 42
06/23/16 - 06/29/16	(6)	(6)	< 62	< 20	< 64	(6)	(6)		(6)	(6)
06/29/16 - 07/07/16	< 65	< 66	< 36	< 70	< 65	< 53	< 53		< 53	< 51
07/07/16 - 07/13/16	< 28	< 29	< 28	< 41	< 29	< 42	< 43		< 21	< 39
07/13/16 - 07/21/16	< 50	< 51	< 50	< 23	< 49	< 53	< 54		< 55 (1)	< 51
07/21/16 - 07/28/16	< 16	< 31	< 30	< 30	< 30	< 28	< 29		(1)	< 69 (1)
07/28/16 - 08/03/16	< 32	< 34	< 33	< 31	< 33	< 31	< 31		< 12	< 32
08/03/16 - 08/10/16	< 46	< 48	< 46	< 15	< 47	< 39	< 40		< 40	< 38
08/10/16 - 08/18/16	< 59	< 64	< 63	< 54	< 61	< 52	< 53		< 21	< 50
08/18/16 - 08/24/16	< 62	< 67	< 28	< 67	< 65	< 56	< 58		< 57	< 57
08/24/16 - 08/31/16	< 23	< 68	< 67	< 69	< 66	< 64	< 64		< 65	< 62
08/31/16 - 09/08/16	< 53	< 55	< 29	< 55	< 53	< 60	< 62		< 62	< 62
09/08/16 - 09/15/16	< 59	< 62	< 60	< 16	< 58	< 41	< 42		< 43	< 43
09/15/16 - 09/22/16	< 53	< 57	< 29	< 55	< 55	< 65	< 67		< 66	< 66
09/22/16 - 09/28/16	< 63	< 67	< 67	< 22	< 66	< 58	< 56		< 58	< 58
09/28/16 - 10/06/16	< 32	< 33	< 31	< 11	< 31	< 27	< 28		< 28	< 29
10/06/16 - 10/12/16	< 31	< 32	< 31	< 41	< 32	< 41	< 41		< 42	< 14
10/12/16 - 10/20/16	< 38	< 40	< 16	< 39	< 39	< 32	< 33		< 33	< 34
10/20/16 - 10/27/16	< 36	< 38	< 37	< 14	< 37	< 36	< 38		< 37	< 38
10/27/16 - 11/02/16	< 64	< 67	< 27	< 68	< 68	< 63	< 64		< 63	< 34
11/02/16 - 11/10/16	< 19	< 46	< 46	< 46	< 45	< 47	< 47		< 47	< 47
11/10/16 - 11/17/16	< 63	< 66	< 65	< 29	< 63	< 65	< 65		< 66	< 66
11/17/16 - 11/23/16	< 58	< 59	< 61	< 25	< 59	< 64	< 66		< 65	< 66
11/23/16 - 11/30/16	< 52	< 54	< 53	< 46	< 55	< 18	< 46		< 46	< 46
11/30/16 - 12/08/16	< 58	< 60	< 24	< 60	< 58	< 47	< 49		< 47	< 47
12/08/16 - 12/15/16	< 59	< 61	< 24	< 60	< 59	< 51	< 52		< 52	< 52
12/15/16 - 12/22/16	< 47	< 49	< 32 (1)	< 50	< 49	< 28	< 55		< 57	< 55
12/22/16 - 12/28/16	< 45	< 51	< 20	< 47	< 47	< 54	< 54		< 57	< 58
12/28/16 - 01/04/17	< 47	< 48	< 48	< 59	< 46	< 60	< 62		< 22	< 59
MEAN	-	-	-	-	-	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

(2) Air monitoring location L-11A became operational on 01/14/16 and air monitoring location L-11 was retired on 01/21/16

(3) Sampled on 06/23/16

(4) Sampled on 06/22/16

(5) Collection began on 06/23/16

(6) Collection began on 06/22/16

Table C-VII.1 CONCENTRATIONS OF I-131 IN MILK SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	CONTROL FARM L-42
01/07/16	*(1)*
02/04/16	< 0.5
03/03/16	< 0.7
04/07/16	< 0.7
05/04/16	< 0.5
05/19/16	< 0.7
06/02/16	< 0.9
06/16/16	< 0.8
06/29/16	< 0.4
07/13/16	< 0.7
07/28/16	< 0.8
08/10/16	< 0.7
08/24/16	< 0.7
09/08/16	< 0.4
09/22/16	< 0.6
10/06/16	< 0.9
10/20/16	< 0.7
11/02/16	< 0.8
11/30/16	< 0.7
MEAN	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VII.2 **CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016**

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
L-42	01/07/16	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*	*(1)*
	02/04/16	< 7	< 6	< 20	< 7	< 18	< 7	< 12	< 6	< 8	< 34	< 11
	03/03/16	< 9	< 9	< 20	< 9	< 18	< 8	< 16	< 7	< 9	< 41	< 14
	04/07/16	< 9	< 9	< 20	< 4	< 21	< 9	< 17	< 9	< 8	< 43	< 13
	05/04/16	< 7	< 8	< 15	< 7	< 16	< 8	< 12	< 7	< 8	< 31	< 6
	05/19/16	< 4	< 5	< 11	< 5	< 9	< 5	< 9	< 3	< 5	< 45	< 12
	06/02/16	< 5	< 7	< 13	< 6	< 14	< 6	< 12	< 6	< 6	< 37	< 10
	06/16/16	< 10	< 12	< 23	< 12	< 26	< 12	< 18	< 10	< 9	< 47	< 15
	06/29/16	< 7	< 9	< 16	< 9	< 13	< 6	< 11	< 7	< 7	< 45	< 13
	07/13/16	< 7	< 8	< 17	< 8	< 18	< 7	< 10	< 8	< 9	< 46	< 12
	07/28/16	< 9	< 9	< 25	< 10	< 28	< 10	< 17	< 8	< 10	< 59	< 14
	08/10/16	< 6	< 8	< 15	< 6	< 16	< 7	< 12	< 7	< 7	< 35	< 9
	08/24/16	< 6	< 7	< 16	< 6	< 14	< 8	< 12	< 7	< 8	< 38	< 11
	09/08/16	< 7	< 8	< 19	< 7	< 16	< 6	< 10	< 6	< 8	< 31	< 10
	09/22/16	< 7	< 9	< 15	< 9	< 18	< 7	< 14	< 6	< 9	< 32	< 10
	10/06/16	< 8	< 7	< 19	< 8	< 20	< 9	< 16	< 8	< 8	< 34	< 10
	10/20/16	< 5	< 6	< 14	< 5	< 12	< 6	< 10	< 5	< 5	< 47	< 15
	11/02/16	< 7	< 8	< 17	< 7	< 14	< 7	< 12	< 7	< 8	< 30	< 11
	11/30/16	< 7	< 5	< 15	< 6	< 15	< 7	< 10	< 5	< 5	< 31	< 9

Table C-VIII.1

CONCENTRATIONS OF GAMMA EMITTERS IN FOOD PRODUCT SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016

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
L-QUAD CONTROL													
Potatoes	08/25/16	< 23	< 22	< 58	< 28	< 57	< 26	< 37	< 56	< 20	< 23	< 140	< 38
Cabbage	08/25/16	< 22	< 23	< 44	< 21	< 47	< 27	< 42	< 57	< 22	< 21	< 139	< 46
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
L-QUAD 1													
Red beets	08/24/16	< 17	< 19	< 46	< 18	< 38	< 20	< 35	< 56	< 17	< 18	< 130	< 39
Cabbage	08/24/16	< 17	< 19	< 42	< 18	< 40	< 20	< 33	< 59	< 16	< 18	< 124	< 39
Potatoes	08/24/16	< 14	< 16	< 38	< 16	< 30	< 18	< 25	< 56	< 15	< 17	< 117	< 26
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
L-QUAD 2													
Rhubarb leaves	07/13/16	< 35	< 35	< 79	< 38	< 84	< 36	< 59	< 57	< 29	< 42	< 161	< 54
Horseradish	07/13/16	< 36	< 34	< 71	< 33	< 69	< 34	< 57	< 40	< 30	< 36	< 142	< 46
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
L-QUAD 3													
Pumpkin	09/08/16	< 14	< 14	< 38	< 15	< 32	< 16	< 19	< 25	< 15	< 16	< 67	< 24
Squash	09/08/16	< 12	< 13	< 34	< 17	< 35	< 15	< 25	< 22	< 14	< 14	< 69	< 12
Beets	08/24/16	< 8	< 8	< 19	< 8	< 18	< 9	< 15	< 27	< 8	< 9	< 56	< 15
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
L-QUAD 4													
Red beets	07/21/16	< 33	< 39	< 93	< 39	< 88	< 36	< 72	< 56	< 37	< 40	< 172	< 46
Cabbage	07/21/16	< 30	< 25	< 66	< 30	< 73	< 34	< 51	< 56	< 31	< 34	< 151	< 32
Onions	07/21/16	< 34	< 35	< 73	< 36	< 59	< 28	< 58	< 48	< 27	< 29	< 125	< 34
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-VIII.2

CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016

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
L-VEG C													
Vegetation	05/24/16	< 20	< 19	< 43	< 17	< 44	< 22	< 33	< 59	< 19	< 21	< 128	< 36
Vegetation	05/24/16	< 8	< 9	< 23	< 8	< 20	< 10	< 16	< 44	< 9	< 8	< 81	< 22
Vegetation	05/24/16	< 8	< 9	< 21	< 8	< 19	< 9	< 16	< 42	< 8	< 8	< 81	< 21
Grass	06/23/16	< 10	< 10	< 24	< 10	< 20	< 12	< 19	< 53	< 10	< 9	< 97	< 27
Field Grass	06/23/16	< 8	< 9	< 21	< 8	< 16	< 9	< 16	< 51	< 7	< 8	< 88	< 22
Carpet Weed	06/23/16	< 9	< 9	< 23	< 8	< 21	< 11	< 17	< 49	< 8	< 10	< 90	< 23
Cardinal Flower Leaves	07/21/16	< 34	< 34	< 73	< 36	< 75	< 34	< 59	< 57	< 34	< 36	< 158	< 49
Meadow Leaves	07/21/16	< 28	< 25	< 51	< 27	< 55	< 26	< 46	< 43	< 26	< 28	< 126	< 32
Tomato Leaves	07/21/16	< 33	< 35	< 57	< 30	< 72	< 37	< 61	< 58	< 38	< 36	< 171	< 42
Field clover	08/18/16	< 22	< 26	< 53	< 24	< 55	< 25	< 48	< 55	< 23	< 25	< 158	< 46
Carpet weed	08/18/16	< 19	< 19	< 45	< 24	< 44	< 18	< 29	< 41	< 16	< 20	< 111	< 33
Ash leaves	08/18/16	< 15	< 15	< 32	< 14	< 31	< 17	< 27	< 39	< 16	< 16	< 90	< 27
Milkweed Sp.	09/15/16	< 11	< 10	< 23	< 11	< 24	< 12	< 19	< 20	< 11	< 11	< 56	< 15
Carpet weed	09/15/16	< 30	< 27	< 58	< 29	< 59	< 30	< 48	< 55	< 28	< 29	< 152	< 42
Dogwood leaves	09/15/16	< 26	< 24	< 53	< 24	< 54	< 27	< 45	< 50	< 26	< 26	< 133	< 36
Dandelion greens	10/12/16	< 15	< 16	< 33	< 16	< 35	< 18	< 28	< 29	< 16	< 18	< 83	< 22
Field clover	10/12/16	< 31	< 31	< 63	< 33	< 65	< 35	< 55	< 56	< 34	< 33	< 153	< 50
Dogwood leaves	10/12/16	< 37	< 37	< 73	< 38	< 77	< 40	< 63	< 59	< 36	< 39	< 186	< 57
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
L-ESE 1													
Vegetation	05/24/16	< 13	< 13	< 31	< 13	< 30	< 14	< 24	< 41	< 13	< 13	< 93	< 24
Vegetation	05/24/16	< 18	< 18	< 40	< 17	< 39	< 19	< 32	< 52	< 17	< 18	< 120	< 32
Vegetation	05/24/16	< 12	< 13	< 32	< 13	< 27	< 14	< 22	< 59	< 11	< 11	< 106	< 24
Dogwood Leaves	06/22/16	< 6	< 8	< 20	< 7	< 18	< 8	< 14	< 55	< 5	< 7	< 86	< 28
Grass	06/22/16	< 2	< 3	< 7	< 7	< 6	< 3	< 5	< 15	< 2	< 2	< 25	< 7
Grass	06/22/16	< 5	< 6	< 13	< 5	< 11	< 6	< 10	< 34	< 5	< 5	< 59	< 17
Purple cornflower leaves	07/21/16	< 34	< 33	< 78	< 37	< 70	< 35	< 58	< 59	< 32	< 36	< 148	< 47
Carpet weed	07/21/16	< 30	< 27	< 58	< 29	< 66	< 30	< 54	< 44	< 29	< 30	< 132	< 44
Dogwood Leaves	07/21/16	< 36	< 39	< 76	< 36	< 76	< 39	< 61	< 56	< 39	< 39	< 168	< 46
Mullein weed	08/18/16	< 25	< 25	< 58	< 28	< 58	< 28	< 47	< 55	< 24	< 25	< 148	< 47
Purple cornflower leaves	08/18/16	< 13	< 14	< 30	< 14	< 30	< 15	< 26	< 33	< 14	< 14	< 86	< 26
Arrowroot aster leaves	08/18/16	< 22	< 23	< 46	< 22	< 44	< 22	< 37	< 55	< 21	< 20	< 126	< 38
Mullein weed	09/15/16	< 29	< 31	< 60	< 31	< 66	< 34	< 56	< 58	< 29	< 31	< 160	< 35
Carpet weed	09/15/16	< 29	< 29	< 62	< 32	< 58	< 30	< 50	< 60	< 29	< 31	< 154	< 42
Looststrife weed	09/15/16	< 31	< 31	< 65	< 33	< 61	< 32	< 52	< 59	< 30	< 32	< 165	< 49
Mullein weed	10/12/16	< 27	< 28	< 57	< 29	< 55	< 30	< 47	< 50	< 29	< 28	< 145	< 35
Hackberry leaves	10/12/16	< 33	< 33	< 66	< 34	< 70	< 35	< 57	< 59	< 30	< 35	< 164	< 52
Elm leaves	10/12/16	< 33	< 32	< 68	< 37	< 67	< 38	< 59	< 59	< 35	< 34	< 153	< 49
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-VIII.2

CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016

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
L-ESE 2													
Vegetation	05/24/16	< 8	< 10	< 26	< 10	< 24	< 10	< 18	< 47	< 8	< 8	< 84	< 22
Vegetation	05/24/16	< 9	< 11	< 28	< 10	< 22	< 11	< 20	< 43	< 8	< 10	< 84	< 22
Vegetation	05/24/16	< 8	< 9	< 23	< 9	< 21	< 11	< 17	< 49	< 8	< 10	< 82	< 23
Grass	06/23/16	< 8	< 10	< 21	< 7	< 13	< 9	< 15	< 58	< 7	< 8	< 101	< 24
Grass	06/23/16	< 7	< 9	< 19	< 7	< 15	< 9	< 15	< 52	< 7	< 8	< 88	< 21
Grass	06/23/16	< 7	< 7	< 18	< 7	< 15	< 8	< 14	< 41	< 6	< 7	< 73	< 23
Dandelion greens	07/21/16	< 12	< 12	< 25	< 13	< 28	< 12	< 21	< 20	< 11	< 13	< 54	< 17
Broadleaf plantain	07/21/16	< 42	< 35	< 64	< 38	< 81	< 37	< 63	< 52	< 34	< 42	< 164	< 42
Field clover	07/21/16	< 22	< 25	< 53	< 24	< 57	< 29	< 48	< 45	< 25	< 25	< 122	< 34
Field clover	08/18/16	< 19	< 21	< 45	< 23	< 44	< 22	< 37	< 54	< 21	< 24	< 127	< 34
Dandelion greens	08/18/16	< 16	< 16	< 37	< 17	< 36	< 18	< 29	< 38	< 15	< 17	< 96	< 29
Soy leaves	08/18/16	< 14	< 14	< 31	< 13	< 30	< 14	< 27	< 33	< 13	< 14	< 81	< 25
Field clover	09/15/16	< 23	< 23	< 47	< 22	< 48	< 24	< 39	< 43	< 23	< 24	< 118	< 38
Milkweed Sp.	09/15/16	< 28	< 28	< 56	< 27	< 62	< 31	< 50	< 52	< 27	< 28	< 141	< 41
Soy leaves	09/15/16	< 21	< 20	< 39	< 18	< 43	< 22	< 38	< 45	< 23	< 22	< 111	< 26
Field clover	10/12/16	< 16	< 15	< 29	< 14	< 33	< 17	< 28	< 31	< 18	< 17	< 84	< 20
Dandelion greens	10/12/16	< 33	< 32	< 64	< 27	< 69	< 34	< 57	< 59	< 32	< 36	< 165	< 46
Curly dock	10/12/16	< 21	< 20	< 43	< 21	< 43	< 22	< 33	< 36	< 20	< 22	< 101	< 29
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-VIII.3 CONCENTRATIONS OF CARBON-14 IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2016

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	C-14
L-VEG-C	10/12/16	< 150
L-ESE-1	10/12/16	1890 ± 223
L-ESE-2	10/12/16	< 877

Table C-IX.1 QUARTERLY OSLD RESULTS FOR LASALLE COUNTY STATION, 2016

RESULTS IN UNITS OF MILLIREM/QUARTER ± 2 STANDARD DEVIATIONS

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
L-01-1	27.0 + 2.9	25.3	27.0	28.8	27.0
L-01-2	27.9 + 5.0	24.3	29.6	29.6	28.0
L-03-1	26.6 + 2.4	*(1)*	25.2	27.2	27.3
L-03-2	26.1 + 6.7	*(1)*	22.3	27.5	28.5
L-04-1	26.2 + 2.5	25.2	25.1	27.0	27.5
L-04-2	26.3 + 6.1	22.9	25.6	26.2	30.3
L-05-1	25.4 + 3.5	23.4	25.2	27.7	25.2
L-05-2	25.5 + 4.4	23.2	24.1	27.4	27.4
L-06-1	26.7 + 2.5	25.2	26.5	28.2	27.0
L-06-2	26.3 + 3.8	24.3	25.1	28.4	27.3
L-07-1	25.8 + 3.6	23.7	25.4	25.8	28.1
L-07-2	26.4 + 3.4	24.1	26.1	27.6	27.8
L-08-1	25.7 + 5.8	22.4	24.3	28.8	27.3
L-08-2	27.3 + 3.6	26.8	25.1	28.0	29.4
L-10-1	24.0 + 6.9	19.4	23.6	27.7	25.1
L-10-2	23.1 + 4.5	20.3	22.4	25.4	24.4
L-11-1	23.1 + 5.8	21.4	19.9	26.1	24.9
L-11-2	24.0 + 5.8	20.6	22.5	26.4	26.3
L-11A-1	24.8 + 5.2	22.7	22.5	27.7	26.3
L-11A-2	25.1 + 3.8	23.1	23.9	27.2	26.1
L-101-1	27.4 + 6.4	25.0	24.4	31.0	29.0
L-101-2	27.6 + 5.4	25.5	25.1	29.0	30.6
L-102-1	27.5 + 3.8	24.9	28.5	27.5	29.2
L-102-2	28.8 + 5.5	26.3	27.2	32.5	29.1
L-103-1	25.3 + 5.3	22.3	23.8	27.1	27.9
L-103-2	26.0 + 3.8	23.5	25.8	28.0	26.8
L-104-1	25.8 + 5.1	22.5	25.2	28.3	27.2
L-104-2	25.4 + 6.4	21.4	24.4	28.7	27.1
L-105-1	26.7 + 6.0	22.5	27.3	27.5	29.6
L-105-2	27.7 + 5.6	24.1	26.9	29.5	30.3
L-106-1	26.6 + 4.0	24.0	26.0	27.8	28.5
L-106-2	26.0 + 5.6	23.0	24.3	28.8	28.0
L-107-1	27.1 + 5.0	25.2	24.9	30.1	28.2
L-107-2	27.9 + 3.9	26.1	26.3	29.4	29.8
L-108-1	25.9 + 5.0	24.1	23.4	28.2	27.9
L-108-2	23.1 + 3.8	21.0	22.5	23.1	25.6
L-109-1	26.1 + 8.6	21.2	23.8	29.6	29.9
L-109-2	26.4 + 1.9	26.0	25.3	26.9	27.5
L-110-1	27.7 + 7.3	23.9	25.2	30.2	31.3
L-110-2	26.5 + 8.7	23.3	23.4	26.6	32.6
L-112-1	26.0 + 5.0	23.8	23.8	27.9	28.3
L-112-2	27.7 + 5.2	25.9	25.2	28.8	30.8
L-114-1	27.0 + 4.1	24.7	26.0	29.3	28.1
L-114-2	27.6 + 8.1	23.3	24.9	30.7	31.3
L-115-1	26.3 + 6.5	23.5	23.4	28.7	29.4
L-115-2	25.3 + 5.9	22.5	24.5	24.6	29.4
L-116-1	25.2 + 3.5	23.7	23.6	26.7	26.6

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-IX.1 QUARTERLY OSLD RESULTS FOR LASALLE COUNTY STATION, 2016

RESULTS IN UNITS OF MILLIREM/QUARTER ± 2 STANDARD DEVIATIONS

STATION CODE	MEAN ± 2 S.D.	JAN - MAR	APR - JUN	JUL - SEP	OCT - DEC
L-116-2	25.0 + 5.8	21.9	23.2	28.2	26.5
L-201-3	23.4 + 5.9	20.1	21.8	25.6	26.2
L-201-4	26.5 + 5.6	23.3	25.1	29.4	28.3
L-202-3	25.4 + 4.1	22.8	27.8	25.8	25.2
L-202-4	23.7 + 4.8	20.7	22.9	25.9	25.4
L-203-1	27.2 + 4.8	24.0	26.7	28.9	29.1
L-203-2	26.0 + 9.0	22.6	21.6	30.0	29.8
L-204-1	26.8 + 3.6	24.9	25.6	28.4	28.2
L-204-2	27.8 + 4.9	25.0	26.8	28.6	30.7
L-205-1	24.4 + 2.3	22.8	24.4	25.4	25.1
L-205-2	27.2 + 7.0	22.7	27.4	31.3	27.4
L-205-3	26.0 + 4.3	23.3	26.6	25.6	28.4
L-205-4	25.9 + 4.8	23.9	23.9	27.2	28.6
L-206-1	26.8 + 5.3	23.5	26.2	29.8	27.5
L-206-2	28.8 + 9.7	24.0	26.0	30.0	35.0
L-207-1	26.3 + 5.9	23.8	23.7	28.5	29.1
L-207-2	25.6 + 4.8	24.4	22.9	27.1	28.1
L-208-1	27.0 + 3.6	25.8	25.9	29.6	26.6
L-208-2	28.1 + 4.4	24.9	28.9	30.0	28.4
L-209-1	26.7 + 4.9	25.0	24.4	29.7	27.6
L-209-2	27.2 + 2.9	*(1)*	25.5	28.1	27.9
L-210-1	29.1 + 3.5	27.6	27.6	31.2	29.8
L-210-2	26.7 + 3.6	25.6	24.7	28.6	27.7
L-211-1	28.1 + 4.8	26.5	25.7	29.3	30.8
L-211-2	27.8 + 4.3	24.6	28.4	29.0	29.1
L-212-1	28.9 + 3.6	*(1)*	26.9	30.4	29.5
L-212-2	27.0 + 4.7	23.8	27.2	27.3	29.5
L-213-3	24.9 + 4.0	23.5	*(1)*	*(1)*	26.3
L-213-4	25.6 + 5.5	23.4	23.0	27.6	28.3
L-214-3	26.3 + 1.2	25.4	26.6	26.8	26.4
L-214-4	27.0 + 9.7	22.7	24.0	33.5	27.6
L-215-3	27.3 + 5.1	24.7	25.6	29.6	29.4
L-215-4	27.1 + 3.6	24.6	26.9	28.3	28.5
L-216-3	27.0 + 4.7	24.6	26.6	30.2	26.7
L-216-4	27.6 + 4.6	24.6	27.3	30.2	28.1
L-111B-1	26.5 + 6.0	24.4	24.0	30.5	27.2
L-111B-2	27.3 + 6.7	23.7	25.3	29.0	31.0
L-113A-1	29.1 + 4.6	26.9	27.8	32.2	29.3
L-113A-2	27.0 + 4.3	24.2	27.9	26.7	29.2

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

TABLE C-IX.2 MEAN QUARTERLY OSLD RESULTS FOR THE INNER RING, OUTER RING, OTHER AND CONTROL LOCATIONS FOR LASALLE COUNTY STATION, 2016

RESULTS IN UNITS OF MILLIREM/QUARTER ± 2 STANDARD DEVIATIONS OF THE STATION DATA

COLLECTION PERIOD	INNER RING ± 2 S.D.	OUTER RING	OTHER	CONTROL
JAN-MAR	23.9 ± 3.0	24.0 ± 3.0	23.7 ± 3.1	19.9 ± 1.3
APR-JUN	25.1 ± 3.1	25.6 ± 3.7	24.7 ± 4.2	23.0 ± 1.7
JUL-SEP	28.5 ± 3.9	28.7 ± 3.7	27.5 ± 2.0	26.6 ± 3.3
OCT-DEC	28.9 ± 3.3	28.2 ± 3.8	27.3 ± 2.7	24.8 ± 1.0

TABLE C-IX.3 SUMMARY OF THE AMBIENT DOSIMETRY PROGRAM FOR LASALLE COUNTY STATION, 2016

RESULTS IN UNITS OF MILLIREM/QUARTER

LOCATION	SAMPLES ANALYZED	PERIOD MINIMUM	PERIOD MAXIMUM	PERIOD MEAN ± 2 S.D.
INNER RING	128	21.0	32.6	26.6 ± 5.4
OUTER RING	132	20.1	35.0	26.7 ± 5.2
OTHER	70	19.9	30.3	25.9 ± 4.5
CONTROL	8	19.4	27.7	23.5 ± 5.5

INNER RING STATIONS - L-101-1, L-101-2, L-102-1, L-102-2, L-103-1, L-103-2, L-104-1, L-104-2, L-105-1, L-105-2, L-106-1, L-106-2, L-107-1, L-107-2, L-108-1, L-108-2, L-109-1, L-109-2, L-110-1, L-110-2, L-111B-1, L-111B-2, L-112-1, L-112-2, L-113A-1, L-113A-2, L-114-1, L-114-2, L-115-1, L-115-2, L-116-1, L-116-2

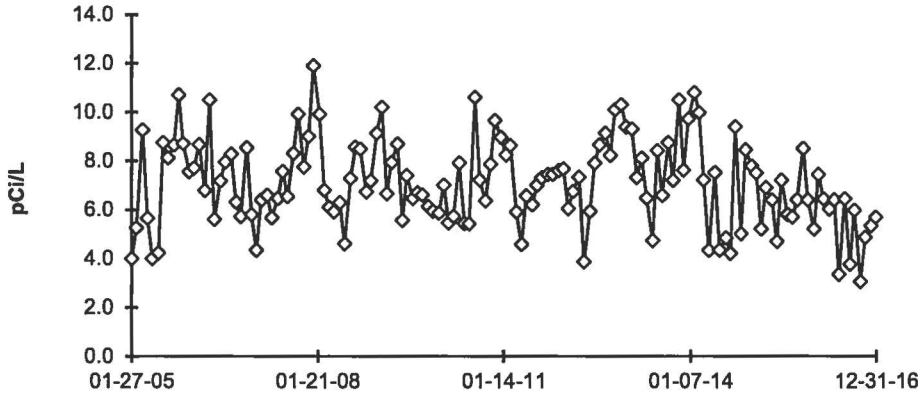
OUTER RING STATIONS - L-201-3, L-201-4, L-202-3, L-202-4, L-203-1, L-203-2, L-204-1, L-204-2, L-205-1, L-205-2, L-205-3, L-205-4, L-206-1, L-206-2, L-207-1, L-207-2, L-208-1, L-208-2, L-209-1, L-209-2, L-210-1, L-210-2, L-211-1, L-211-2, L-212-1, L-212-2, L-213-3, L-213-4, L-214-3, L-214-4, L-215-3,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

OTHER STATIONS - L-01-1, L-01-2, L-03-1, L-03-2, L-04-1, L-04-2, L-05-1, L-05-2, L-06-1, L-06-2, L-07-1, L-07-2, L-08-1, L-08-2, L-11-1, L-11-2, L-11A-1, L-11A-2

CONTROL STATIONS - L-10-1, L-10-2

FIGURE C-1
Surface Water - Gross Beta - Stations L-21 (C) and L-40 Collected in the Vicinity of LSCS, 2005 - 2016

L-21 (C) Illinois River at Seneca



L-40 Illinois River Downstream

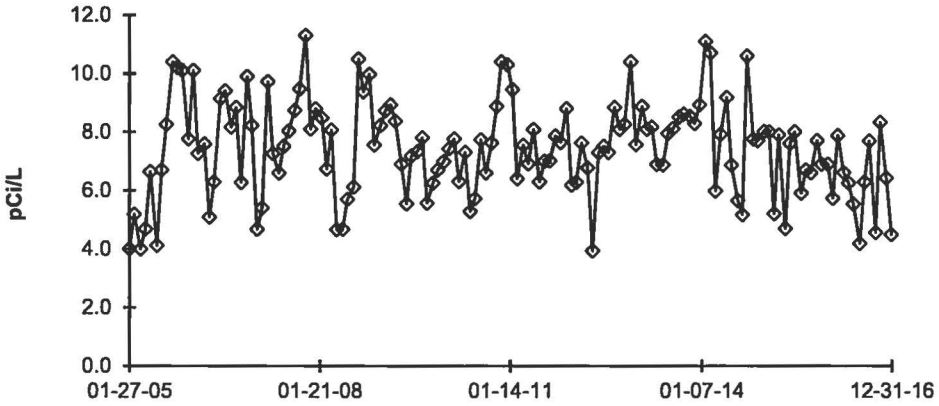
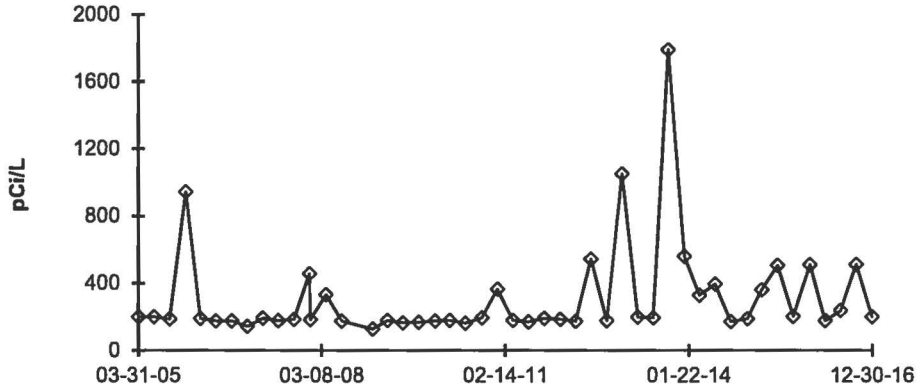


FIGURE C-2
Surface Water - Tritium - Stations L-21 (C) and L-40 Collected in the Vicinity of LSCS, 2005 - 2016

L-21 Illinois River at Seneca



L-40 Illinois River Downstream

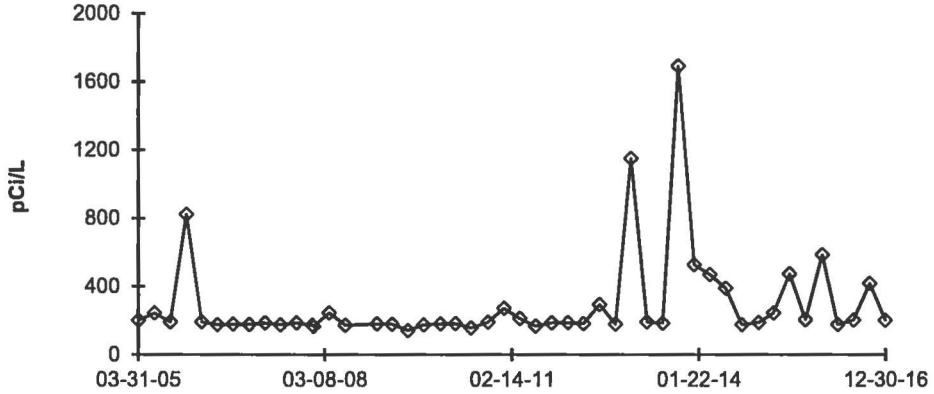
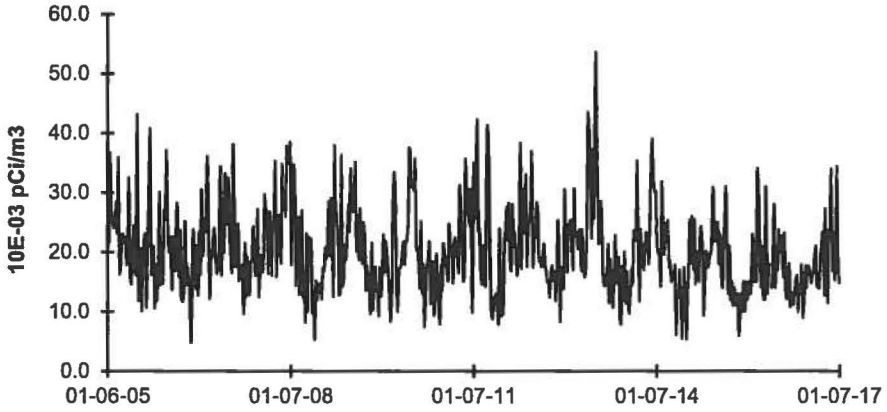


FIGURE C-3
Air Particulate - Gross Beta - Stations L-01 and L-03 Collected in the Vicinity of LSCS, 2005 - 2016

L-01 Nearsite No. 1



L-03 Onsite No. 3

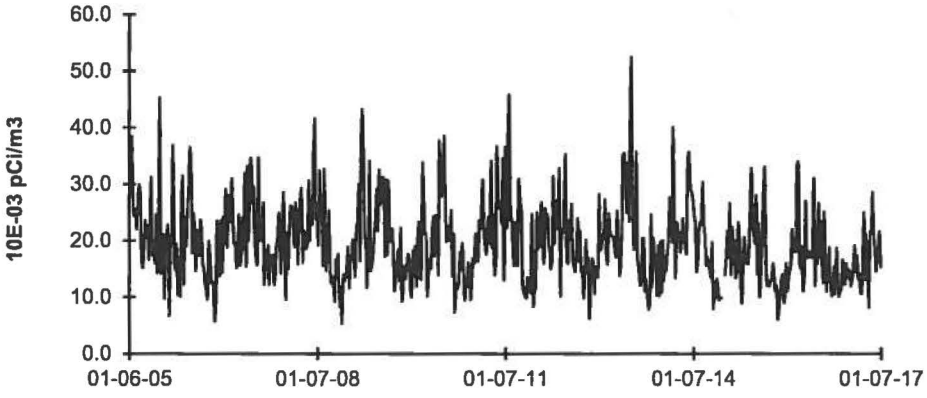
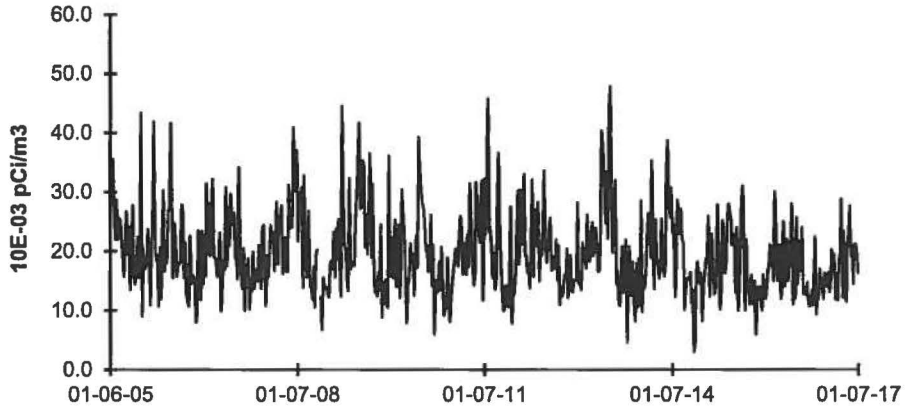


FIGURE C-4
Air Particulate - Gross Beta - Stations L-05 and L-06 Collected in the Vicinity of LSCS, 2005 - 2016

L-05 Onsite No. 5



L-06 Nearsite No. 6

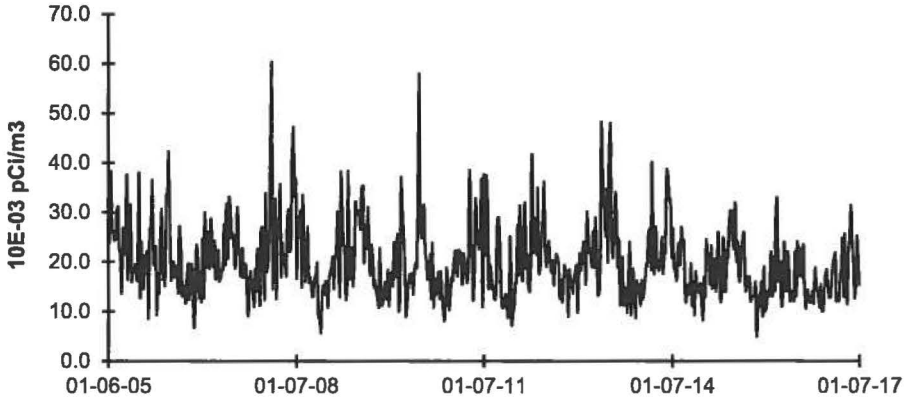


FIGURE C-5
Air Particulate - Gross Beta - Station L-10 (C)
Collected in the Vicinity of LSCS, 2005 - 2016

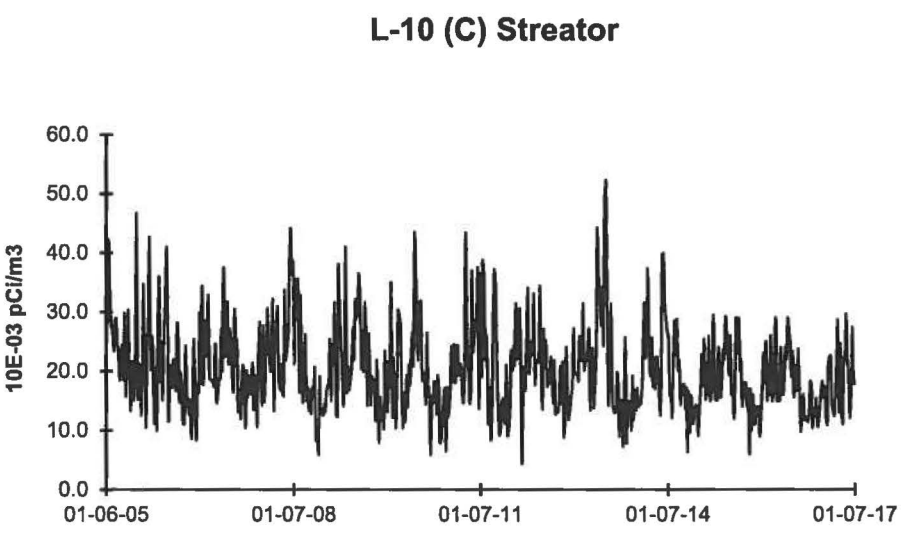
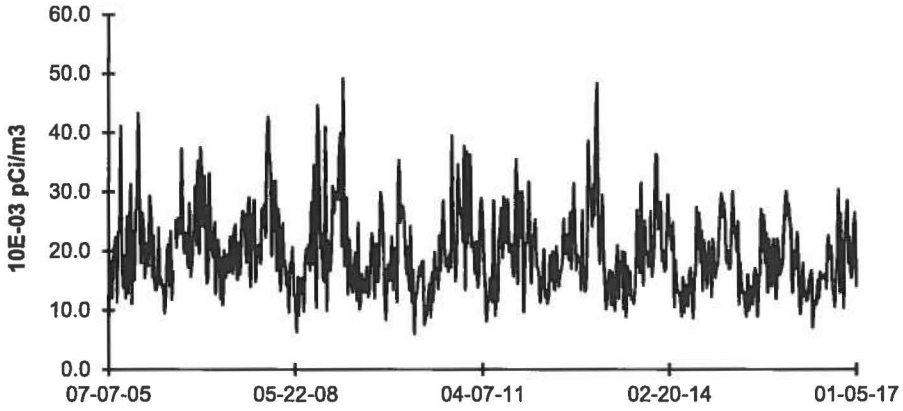


FIGURE C-6
Air Particulate - Gross Beta - Stations L-04 and L-07 Collected in the Vicinity of LSCS, 2005 - 2016

L-04 Rte. 170



L-07 Seneca

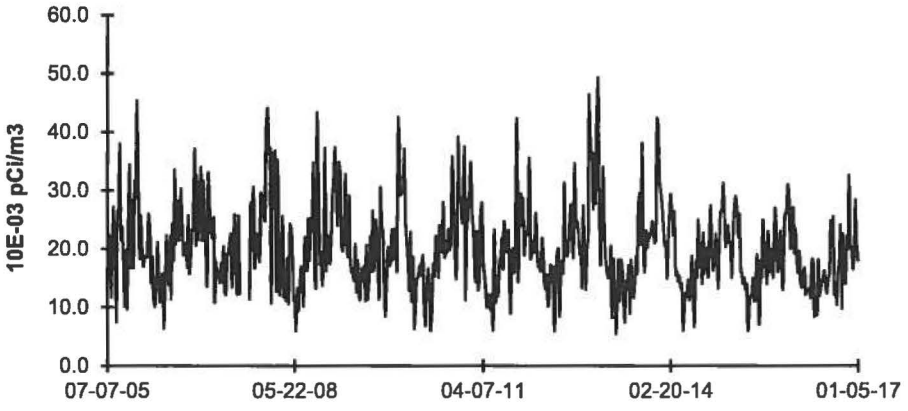
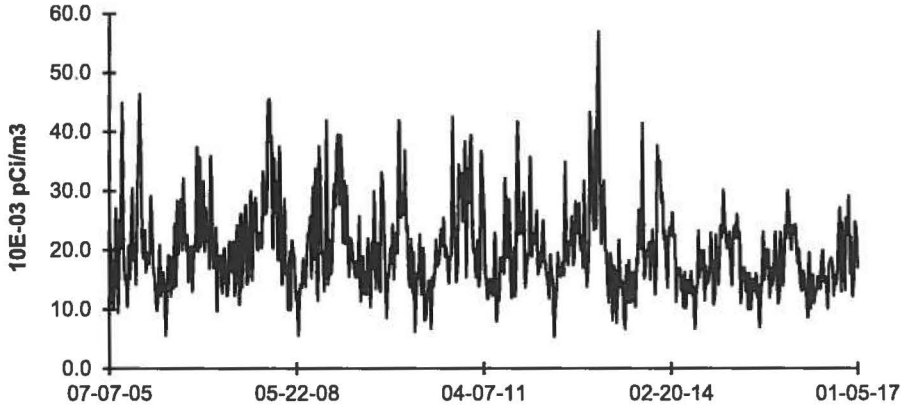
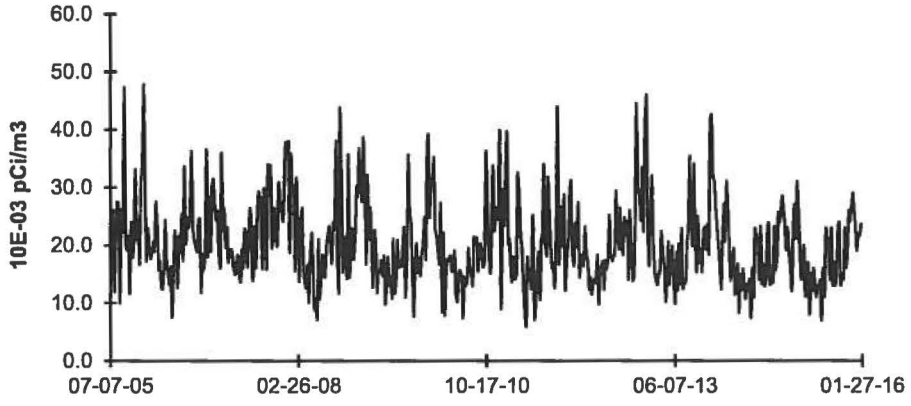


FIGURE C-7
Air Particulate - Gross Beta - Stations L-08 and L-11 Collected in the Vicinity of LSCS, 2005 - 2016

L-08 Marseilles

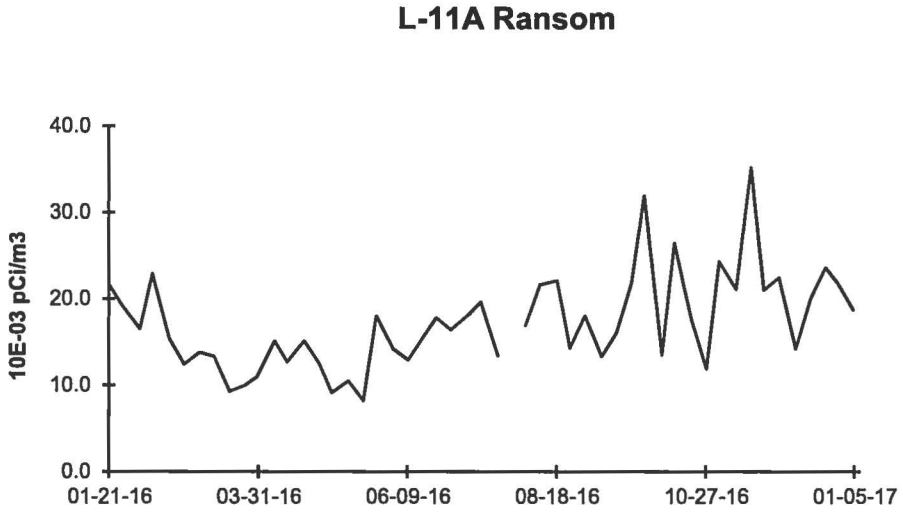


L-11 Ransom *(1)*



(1) Air monitoring station L-11 was retired on 01/21/16

FIGURE C-8
Air Particulate - Gross Beta - Station L-11A
Collected in the Vicinity of LSCS, 2016 - 2017



APPENDIX D

INTER-LABORATORY COMPARISON PROGRAM

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

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
March 2016	E11476	Milk	Sr-89	pCi/L	97	86.7	1.12	A
			Sr-90	pCi/L	15	11.4	1.32	N(2)
	E11477	Milk	I-131	pCi/L	85.9	82.2	1.05	A
			Ce-141	pCi/L	106	98.4	1.08	A
			Cr-51	pCi/L	255	243	1.05	A
			Cs-134	pCi/L	134	130	1.03	A
			Cs-137	pCi/L	174	161	1.08	A
			Co-58	pCi/L	123	117	1.05	A
			Mn-54	pCi/L	141	117	1.21	W
			Fe-59	pCi/L	152	131	1.16	A
			Zn-65	pCi/L	193	179	1.08	A
			Co-60	pCi/L	259	244	1.06	A
	E11479	AP	Ce-141	pCi	69	81.1	0.85	A
			Cr-51	pCi	242	201	1.20	W
			Cs-134	pCi	98.1	107.0	0.92	A
			Cs-137	pCi	136	133	1.02	A
			Co-58	pCi	91.9	97	0.95	A
			Mn-54	pCi	98.6	96.2	1.02	A
			Fe-59	pCi	98.8	108	0.91	A
			Zn-65	pCi	131	147	0.89	A
			Co-60	pCi	209	201	1.04	A
	E11478	Charcoal	I-131	pCi	85.3	88.3	0.97	A
	E11480	Water	Fe-55	pCi/L	1800	1666	1.08	A
June 2016	E11537	Milk	Sr-89	pCi/L	94.4	94.4	1.00	A
			Sr-90	pCi/L	13.4	15.4	0.87	A
	E11538	Milk	I-131	pCi/L	96.8	94.5	1.02	A
			Ce-141	pCi/L	129	139	0.93	A
			Cr-51	pCi/L	240	276	0.87	A
			Cs-134	pCi/L	157	174	0.90	A
			Cs-137	pCi/L	117	120	0.98	A
			Co-58	pCi/L	131	142	0.92	A
			Mn-54	pCi/L	128	125	1.02	A
			Fe-59	pCi/L	132	122	1.08	A
			Zn-65	pCi/L	235	235	1.00	A
			Co-60	pCi/L	169	173	0.98	A
June 2016	E11539	Charcoal	I-131	pCi	86.1	89.4	0.96	A
	E11540	AP	Ce-141	pCi	105	99.8	1.05	A
			Cr-51	pCi	216	198.0	1.09	A
			Cs-134	pCi	113	125	0.90	A
			Cs-137	pCi	94.5	86.6	1.09	A
			Co-58	pCi	101	102	0.99	A
			Mn-54	pCi	88.8	90.2	0.98	A
			Fe-59	pCi	82	87.5	0.94	A
			Zn-65	pCi	174	169	1.03	A
			Co-60	pCi	143	124	1.15	A
	E11541	Water	Fe-55	pCi/L	164	186	0.88	A

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

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
September 2016	E11609	Milk	Sr-89	pCi/L	90	90.9	0.99	A
			Sr-90	pCi/L	13.3	13.7	0.97	A
	E11610	Milk	I-131	pCi/L	80.4	71.9	1.12	A
			Ce-141	pCi/L	81.3	93	0.87	A
			Cr-51	pCi/L	198	236	0.84	A
			Cs-134	pCi/L	122	136	0.90	A
			Cs-137	pCi/L	119	119	1.00	A
			Co-58	pCi/L	92.2	97.4	0.95	A
			Mn-54	pCi/L	156	152	1.03	A
			Fe-59	pCi/L	97.5	90.6	1.08	A
			Zn-65	pCi/L	189	179	1.06	A
			Co-60	pCi/L	131	135	0.97	A
	E11611	Charcoal	I-131	pCi	52.4	59.9	0.87	A
	E11612	AP	Ce-141	pCi	67.5	63.6	1.06	A
			Cr-51	pCi	192	161.0	1.19	A
			Cs-134	pCi	91.4	92.6	0.99	A
			Cs-137	pCi	93.9	80.8	1.16	A
			Co-58	pCi	66	66.4	0.99	A
			Mn-54	pCi	104	104	1.00	A
			Fe-59	pCi	60.5	61.8	0.98	A
			Zn-65	pCi	140	122	1.15	A
			Co-60	pCi	119	91.9	1.29	W
	E11613	Water	Fe-55	pCi/L	1990	1670	1.19	A
	E11614	Soil	Ce-141	pCi/g	0.153	0.175	0.87	A
			Cr-51	pCi/g	0.482	0.441	1.09	A
			Cs-134	pCi/g	0.270	0.254	1.06	A
			Cs-137	pCi/g	0.313	0.299	1.05	A
			Co-58	pCi/g	0.177	0.182	0.97	A
			Mn-54	pCi/g	0.340	0.285	1.19	A
			Fe-59	pCi/g	0.206	0.17	1.21	W
			Zn-65	pCi/g	0.388	0.335	1.16	A
			Co-60	pCi/g	0.284	0.252	1.13	A
December 2016	E11699	Milk	Sr-89	pCi/L	95	74.2	1.28	W
			Sr-90	pCi/L	14.7	10	1.47	N(3)
	E11700	Milk	I-131	pCi/L	97.5	97.4	1.00	A
			Ce-141	pCi/L	136	143	0.95	A
			Cr-51	pCi/L	247	280	0.88	A
			Cs-134	pCi/L	164	178	0.92	A
			Cs-137	pCi/L	120	126	0.95	A
			Co-58	pCi/L	139	146	0.95	A
			Mn-54	pCi/L	126	129	0.98	A
			Fe-59	pCi/L	114	125	0.91	A
			Zn-65	pCi/L	237	244	0.97	A
			Co-60	pCi/L	168	178	0.94	A
	E11701	Charcoal	I-131	pCi	95.6	98	0.98	A

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

Month/Year	Identification Number	Matrix	Nuclide	Units	Reported Value (a)	Known Value (b)	Ratio (c) TBE/Analytics	Evaluation (d)
December 2016	E11702	AP	Ce-141	pCi	91.7	97.7	0.94	A
			Cr-51	pCi	210	192.0	1.09	A
			Cs-134	pCi	122	122	1.00	A
			Cs-137	pCi	93.9	86.4	1.09	A
			Co-58	pCi	92	100	0.92	A
			Mn-54	pCi	93.7	88.5	1.06	A
			Fe-59	pCi	84.9	84.5	1.00	A
			Zn-65	pCi	176	167	1.05	A
			Co-60	pCi	151	122	1.24	W
	E11702	AP	Sr-89	pCi	79.1	92	0.86	A
			Sr-90	pCi	10	12.5	0.80	A
	E11703	Water	Fe-55	pCi/L	2180	1800	1.21	W

(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.

(2) NCR 16-26 was initiated

(3) NCR 16-35 was initiated

TABLE D-2 **DOE's MIXED ANALYTE PERFORMANCE EVALUATION PROGRAM (MAPEP)**
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Range	Evaluation (c)
March 2016	16-MaW34	Water	Am-241	Bq/L	0.008		(1)	A
			Ni-63	Bq/L	12.4	12.3	8.6-16.0	A
			Pu-238	Bq/L	1.4900	1.2440	0.871-1.617	A
			Pu-239/240	Bq/L	0.729	0.641	0.449-0.833	A
	16-MaS34	Soil	Ni-63	Bq/kg	1140	1250.0	875-1625	A
			Sr-90	Bq/kg	8.15		(1)	A
	16-RdF34	AP	U-234/233	Bq/sample	0.1620	0.1650	0.116-0.215	A
			U-238	Bq/sample	0.163	0.172	0.120-0.224	A
	16-GrF34	AP	Gr-A	Bq/sample	0.608	1.20	0.36-2.04	A
			Gr-B	Bq/sample	0.8060	0.79	0.40-1.19	A
	16-RdV34	Vegetation	Cs-134	Bq/sample	10.10	10.62	7.43-13.81	A
			Cs-137	Bq/sample	6.0	5.62	3.93-7.31	A
			Co-57	Bq/sample	13.3000	11.8	8.3-15.3	A
			Co-60	Bq/sample	0.013		(1)	A
			Mn-54	Bq/sample	0.0150		(1)	A
			Sr-90	Bq/sample	0.301		(1)	N(4)
			Zn-65	Bq/sample	10.500	9.6	6.7-12.5	A
September 2016	16-MaW35	Water	Am-241	Bq/L	0.626	0.814	.570-1058	W
			Ni-63	Bq/L	12.4	17.2	12.0-22.4	A
			Pu-238	Bq/L	1.23	1.13	0.79-1.47	W
			Pu-239/240	Bq/L	0.0318	0.013	(1)	A
	16-MaS35	Soil	Ni-63	Bq/kg	724	990	693-1287	A
			Sr-90	Bq/kg	747	894	626-1162	A
	16-RdF35	AP	U-234/233	Bq/sample	0.160	0.15	0.105-0.195	A
			U-238	Bq/sample	0.157	0.156	0.109-0.203	A
	16-RdV35	Vegetation	Cs-134	Bq/sample	-0.103		(1)	A
			Cs-137	Bq/sample	5.64	5.54	3.88-7.20	A
			Co-57	Bq/sample	7.38	6.81	4.77-8.85	A
			Co-60	Bq/sample	4.81	4.86	3.40-6.32	A
			Mn-54	Bq/sample	7.4	7.27	5.09-9.45	A
			Sr-90	Bq/sample	0.774	0.80	0.56-1.04	A
			Zn-65	Bq/sample	5.46	5.4	3.78-7.02	A

(1) False positive test.

(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.

(4)NCR 16-14 was initiated

TABLE D-3

ERA ENVIRONMENTAL RADIOACTIVITY CROSS CHECK PROGRAM
TELEDYNE BROWN ENGINEERING ENVIRONMENTAL SERVICES
(PAGE 1 OF 1)

Month/Year	Identification Number	Media	Nuclide	Units	Reported Value (a)	Known Value (b)	Acceptance Limits	Evaluation (c)
May 2016	RAD-105	Water	Sr-89	pCi/L	48.9	48.2	37.8 - 55.6	A
			Sr-90	pCi/L	25.0	28.5	20.7 - 33.1	A
			Ba-133	pCi/L	53.1	58.8	48.7 - 64.9	A
			Cs-134	pCi/L	40.9	43.3	34.6 - 47.6	A
			Cs-137	pCi/L	84.8	78.4	70.6 - 88.9	A
			Co-60	pCi/L	108	102	91.8 - 114	A
			Zn-65	pCi/L	226	214	193 - 251	A
			Gr-A	pCi/L	38.9	62.7	32.9 - 77.8	A
			Gr-B	pCi/L	41.9	39.2	26.0 - 46.7	A
			I-131	pCi/L	24.1	26.6	22.1 - 31.3	A
			U-Nat	pCi/L	4.68	4.64	3.39 - 5.68	A
			H-3	pCi/L	7720	7840	6790 - 8620	A
November 2016	RAD-107	Water	Sr-89	pCi/L	43.0	43.3	33.4-50.5	A
			Sr-90	pCi/L	30.0	33.6	24.6-38.8	A
			Ba-133	pCi/L	47.8	54.9	45.4-60.7	A
			Cs-134	pCi/L	72.9	81.8	67.0-90.0	A
			Cs-137	pCi/L	189	210	189-233	A
			Co-60	pCi/L	58.4	64.5	58.0-73.4	A
			Zn-65	pCi/L	243	245	220-287	A
			Gr-A	pCi/L	37.2	68.4	35.9-84.5	A
			Gr-B	pCi/L	35.1	33.9	22.1-41.6	A
			I-131	pCi/L	23.5	26.3	21.9-31.0	A
			U-Nat	pCi/L	49.2	51.2	41.6-56.9	A
			H-3	pCi/L	918	9820	8540-10800	N(5)
	MRAD-25	AP	Gr-A	pCi/Filter	56.8	71.2	23.9-111	A

(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. N=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.

(5) NCR 16-34 was initiated

TABLE D-4 **ERA STATISTICAL SUMMARY PROFICIENCY TESTING PROGRAM[a]**

MRAD Study, ENVIRONMENTAL, INC., 2016

			Concentration [a]			
Lab Code [b]	Date	Analysis	Laboratory Result	ERA Result	Control Limits	Acceptance
ERAP-1101	3/14/2016	Am-241	37.3	45.9	28.3 - 62.1	Pass
ERAP-1101	3/14/2016	Co-60	637	623	482 - 778	Pass
ERAP-1101	3/14/2016	Cs-134	251	304	193 - 377	Pass
ERAP-1101	3/14/2016	Cs-137	1,273	1,150	864 - 1,510	Pass
ERAP-1101	3/14/2016	Fe-55	< 162	126	39.1 - 246	Pass
ERAP-1101	3/14/2016	Mn-54	< 2.64	< 50.0	0.00 - 50.0	Pass
ERAP-1101	3/14/2016	Pu-238	68.0	70.5	48.3 - 92.7	Pass
ERAP-1101	3/14/2016	Pu-239/240	54.1	54.8	39.70 - 71.60	Pass
ERAP-1101	3/14/2016	Sr-90	139	150	73.3 - 225.0	Pass
ERAP-1101	3/14/2016	U-233/234	59.3	64.8	40.2 - 97.7	Pass
ERAP-1101	3/14/2016	U-238	55.5	64.2	41.5 - 88.8	Pass
ERAP-1101	3/14/2016	Zn-65	428	356	255 - 492	Pass
ERAP-1101	3/14/2016	Gr. Alpha	98.0	70.1	23.5 - 109	Pass
ERAP-1101	3/14/2016	Gr. Beta	78.6	54.4	34.4 - 79.3	Pass
ERSO-1105	3/14/2016	Am-241	1,030	1,360	796 - 1,770	Pass
ERSO-1105	3/14/2016	Ac-228	1,540	1,240	795 - 1,720	Pass
ERSO-1105	3/14/2016	Bi-212	1,550	1,240	330 - 1,820	Pass
ERSO-1105	3/14/2016	Bi-214	3,100	3,530	2,130 - 5,080	Pass
ERSO-1105	3/14/2016	Co-60	5,600	5,490	3,710 - 7,560	Pass
ERSO-1105	3/14/2016	Cs-134	3,030	3,450	2,260 - 4,140	Pass
ERSO-1105	3/14/2016	Cs-137	4,440	4,310	3,300 - 5,550	Pass
ERSO-1105	3/14/2016	K-40	10,300	10,600	7,740 - 14,200	Pass
ERSO-1105	3/14/2016	Mn-54	< 50.8	< 1000	0.0 - 1,000	Pass
ERSO-1105	3/14/2016	Pb-212	1,140	1,240	812 - 1,730	Pass
ERSO-1105	3/14/2016	Pb-214	3,190	3,710	2,170 - 5,530	Pass
ERSO-1105	3/14/2016	Pu-238	680	658	396 - 908	Pass
ERSO-1105	3/14/2016	Pu-239/240	460	496	324 - 0,685	Pass
ERSO-1105	3/14/2016	Sr-90	7,740	8,560	3,260 - 13,500	Pass
ERSO-1105	3/14/2016	Th-234	3,630	3,430	1,080 - 6,450	Pass
ERSO-1105	3/14/2016	U-233/234	3,090	3,460	2,110 - 4,430	Pass
ERSO-1105	3/14/2016	U-238	3,280	3,430	2,120 - 4,350	Pass
ERSO-1105	3/14/2016	Zn-65	2,940	2,450	1,950 - 3,260	Pass
ERW-1115	3/14/2016	Gr. Alpha	105.0	117.0	41.5 - 181.0	Pass
ERW-1115	3/14/2016	Gr. Beta	76.2	75.5	43.2 - 112.0	Pass
ERW-1117	3/14/2016	H-3	8,870	8,650	5,800 - 12,300	Pass
ERVE-1108	3/14/2016	Am-241	1,930	2,120	1,300 - 2,820	Pass
ERVE-1108	3/14/2016	Cm-244	1,294	1,560	764 - 2,430	Pass
ERVE-1108	3/14/2016	Co-60	1,164	1,100	759 - 1,540	Pass
ERVE-1108	3/14/2016	Cs-134	1,056	1,070	687 - 1,390	Pass
ERVE-1108	3/14/2016	Cs-137	930	838	608 - 1,170	Pass
ERVE-1108	3/14/2016	K-40	32,200	31,000	22,400 - 43,500	Pass
ERVE-1108	3/14/2016	Mn-54	< 24.5	< 300	0.00 - 300	Pass
ERVE-1108	3/14/2016	Zn-65	3,320	2,820	2,030 - 3,960	Pass

TABLE D-4 **ERA STATISTICAL SUMMARY PROFICIENCY TESTING PROGRAM[a]**

MRAD Study, ENVIRONMENTAL, INC., 2016

			Concentration [a]			
Lab Code [b]	Date	Analysis	Laboratory Result	ERA Result	Control Limits	Acceptance
ERVE-1108	3/14/2016	Pu-238	3,410	2,810	1,680 - 3,850	Pass
ERVE-1108	3/14/2016	Pu-239/240	4,120	3,640	2,230 - 5,010	Pass
ERVE-1108	3/14/2016	Sr-90	8,120	8,710	4,960 - 11,500	Pass
ERVE-1108	3/14/2016	U-233/234	4,350	4,160	2,740 - 5,340	Pass
ERVE-1108	3/14/2016	U-238	4,220	4,120	2,750 - 5,230	Pass
ERW-1111	3/14/2016	Am-241	113	121	81.5 - 162	Pass
ERW-1111	3/14/2016	Co-60	1,120	1,050	912 - 1,230	Pass
ERW-1111	3/14/2016	Cs-134	806	842	618 - 968	Pass
ERW-1111	3/14/2016	Cs-137	1,190	1,100	934 - 1,320	Pass
ERW-1111	3/14/2016	Mn-54	< 5.89	< 100	0.00 - 100	Pass
ERW-1111	3/14/2016	Pu-238	159	138	102 - 172	Pass
ERW-1111	3/14/2016	Pu-239/240	113	98.7	76.6 - 124	Pass
ERW-1111	3/14/2016	U-233/234	46.9	52.7	39.6 - 68.0	Pass
ERW-1111	3/14/2016	U-238	50.4	52.3	39.9 - 64.2	Pass
ERW-1111	3/14/2016	Zn-65	1,160	1,010	842 - 1,270	Pass
ERW-1111	3/14/2016	Fe-55	1,600	1,650	984 - 2,240	Pass
ERW-1111	3/14/2016	Sr-90	430	434	283 - 574	Pass

[a] Results obtained by Environmental, Inc., Midwest Laboratory as a participant in the crosscheck program for proficiency testing administered by Environmental Resources Associates, serving as a replacement for studies conducted previously by the Environmental Measurements Laboratory Quality Assessment Program (EML).

[b] Laboratory codes as follows: ERW (water), ERAP (air filter), ERSO (soil), ERVE (vegetation). Results are reported in units of pCi/L, except for air filters (pCi/Filter), vegetation and soil (pCi/kg).

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

TABLE D-5 **DOE's Mixed Analyte Performance Evaluation Program (MAPEP)**
ENVIRONMENTAL, INC., 2016

			Concentration [a]			
Lab Code [b]	Reference Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MASO-1053	2/1/2016	Ni-63	1,206 ± 20	1250	875 - 1625	Pass
MASO-1053	2/1/2016	Sr-90	0.65 ± 1.27	0.00	NA [c]	Pass
MASO-1053	2/1/2016	Tc-99	0.1 ± 5.5	0.0	NA [c]	Pass
MASO-1053	2/1/2016	Cs-134	908 ± 26	1030	721 - 1339	Pass
MASO-1053	2/1/2016	Cs-137	0.10 ± 6.20	0.00	NA [c]	Pass
MASO-1053	2/1/2016	Co-57	1058 ± 26	992	694 - 1290	Pass
MASO-1053	2/1/2016	Co-60	1229 ± 28	1190	833 - 1547	Pass
MASO-1053	2/1/2016	Mn-54	1235 ± 43	1160	812 - 1508	Pass
MASO-1053	2/1/2016	Zn-65	753 ± 64	692	484 - 900	Pass
MASO-1053	2/1/2016	K-40	753 ± 140	607	425 - 789	Pass
MASO-1053	2/1/2016	Am-241	79 ± 6	103	72 - 134	Pass
MASO-1053	2/1/2016	Pu-238	73.9 ± 9.2	63.6	44.5 - 82.7	Pass
MASO-1053	2/1/2016	Pu-239/240	0.76 ± 1.34	0.21	NA [d]	Pass
MASO-1053	2/1/2016	U-234/233	45.0 ± 5.1	45.9	32.1 - 59.7	Pass
MASO-1053	2/1/2016	U-238	129 ± 9	146	102 - 190	Pass
MAW-989	2/1/2016	Am-241	0.018 ± 0.015	0.00	NA [c]	Pass
MAW-989	2/1/2016	H-3	0.2 ± 2.8	0.0	NA [c]	Pass
MAW-989	2/1/2016	Ni-63	12.8 ± 2.7	12.3	8.6 - 16.0	Pass
MAW-989	2/1/2016	Sr-90	8.70 ± 1.20	8.74	6.12 - 11.36	Pass
MAW-989	2/1/2016	Tc-99	-1.1 ± 0.6	0.0	NA [c]	Pass
MAW-989	2/1/2016	Cs-134	15.5 ± 0.3	16.1	11.3 ± 20.9	Pass
MAW-989	2/1/2016	Cs-137	23.7 ± 0.5	21.2	14.8 - 27.6	Pass
MAW-989[e]	2/1/2016	Co-57	1.38 ± 0.12	0.00	NA [c]	Fail
MAW-989	2/1/2016	Co-60	12.5 ± 0.3	11.8	8.3 - 15.3	Pass
MAW-989	2/1/2016	Mn-54	12.2 ± 0.4	11.1	7.8 - 14.4	Pass
MAW-989	2/1/2016	Zn-65	15.7 ± 0.7	13.6	9.5 - 17.7	Pass
MAW-989	2/1/2016	K-40	288 ± 5	251	176 - 326	Pass
MAW-989	2/1/2016	Fe-55	17.3 ± 7.0	16.2	11.3 - 21.1	Pass
MAW-989	2/1/2016	Ra-226	0.710 ± 0.070	0.718	0.503 - 0.933	Pass
MAW-989	2/1/2016	Pu-238	1.280 ± 0.110	1.244	0.871 ± 1.617	Pass
MAW-989	2/1/2016	Pu-239/240	0.640 ± 0.080	0.641	0.449 - 0.833	Pass
MAW-989	2/1/2016	U-234/233	1.39 ± 0.12	1.48	1.04 - 1.92	Pass
MAW-989	2/1/2016	U-238	1.43 ± 0.12	1.53	1.07 - 1.99	Pass
MAW-893	2/1/2016	Gross Alpha	0.600 ± 0.050	0.673	0.202 - 1.144	Pass
MAW-893	2/1/2016	Gross Beta	2.10 ± 0.06	2.15	1.08 - 3.23	Pass
MAW-896	2/1/2016	I-129	3.67 ± 0.20	3.85	2.70 - 5.01	Pass
MAAP-1056	2/1/2016	Gross Alpha	0.39 ± 0.05	1.20	0.36 - 2.04	Pass
MAAP-1056	2/1/2016	Gross Beta	1.03 ± 0.07	0.79	0.40 - 1.19	Pass
MAAP-1057	2/1/2016	Sr-90	1.34 ± 0.15	1.38	0.97 ± 1.79	Pass
MAAP-1057	2/1/2016	Cs-134	-0.01 ± 0.03	0.00	NA [c]	Pass
MAAP-1057	2/1/2016	Cs-137	2.57 ± 0.10	2.30	1.61 - 2.99	Pass

TABLE D-5 **DOE's Mixed Analyte Performance Evaluation Program (MAPEP)**
ENVIRONMENTAL, INC., 2016

			Concentration [a]			
Lab Code [b]	Reference Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MAAP-1057	2/1/2016	Co-57	3.01 ± 0.06	2.94	2.06 - 3.82	Pass
MAAP-1057	2/1/2016	Co-60	4.28 ± 0.10	4.02	2.81 - 5.23	Pass
MAAP-1057	2/1/2016	Mn-54	4.90 ± 0.13	4.53	3.17 - 5.89	Pass
MAAP-1057	2/1/2016	Zn-65	4.09 ± 0.18	3.57	2.50 - 4.64	Pass
MAAP-1057	2/1/2016	Am-241	0.059 ± 0.015	0.0805	0.0564 - 0.1047	Pass
MAAP-1057	2/1/2016	Pu-238	0.066 ± 0.020	0.0637	0.0446 - 0.0828	Pass
MAAP-1057	2/1/2016	Pu-239/240	0.074 ± 0.020	0.099	NA [d]	Pass
MAAP-1057	2/1/2016	U-234/233	0.151 ± 0.026	0.165	0.116 - 0.215	Pass
MAAP-1057	2/1/2016	U-238	0.160 ± 0.026	0.172	0.120 - 0.224	Pass
MAVE-1050	2/1/2016	Cs-134	9.83 ± 0.19	10.62	7.43 - 13.81	Pass
MAVE-1050	2/1/2016	Cs-137	6.06 ± 0.19	5.62	3.93 - 7.31	Pass
MAVE-1050	2/1/2016	Co-57	13.8 ± 0.2	11.8	8.3 - 15.3	Pass
MAVE-1050	2/1/2016	Co-60	0.022 ± 0.040	0.00	NA [c]	Pass
MAVE-1050	2/1/2016	Mn-54	0.009 ± 0.044	0.000	NA [c]	Pass
MAVE-1050	2/1/2016	Zn-65	10.67 ± 0.39	9.60	6.70 - 12.50	Pass
MASO-4780[f]	8/1/2016	Ni-63	648 ± 14	990	693 - 1287	Fail
MASO-4780[g]	8/1/2016	Ni-63	902 ± 46	990	693 - 1287	Pass
MASO-4780	8/1/2016	Sr-90	757 ± 16	894	626 - 1162	Pass
MASO-4780	8/1/2016	Tc-99	559 ± 12	556	389 - 723	Pass
MASO-4780	8/1/2016	Cs-134	0.93 ± 2.92	0.00	NA [c]	Pass
MASO-4780	8/1/2016	Cs-137	1061 ± 12	1067	747 - 1387	Pass
MASO-4780	8/1/2016	Co-57	1178 ± 8	1190	833 - 1547	Pass
MASO-4780	8/1/2016	Co-60	841 ± 9	851	596 - 1106	Pass
MASO-4780	8/1/2016	Mn-54	0.69 ± 2.53	0.00	NA [c]	Pass
MASO-4780	8/1/2016	Zn-65	724 ± 19	695	487 - 904	Pass
MASO-4780	8/1/2016	K-40	566 ± 52	588	412 - 764	Pass
MASO-4780	8/1/2016	Am-241	0.494 ± 0.698	0.000	NA [c]	Pass
MASO-4780	8/1/2016	Pu-238	69.7 ± 7.4	70.4	49.3 - 91.5	Pass
MASO-4780	8/1/2016	Pu-239/240	53.9 ± 6.3	53.8	37.7 - 69.9	Pass
MASO-4780[h]	8/1/2016	U-233/234	46.8 ± 3.9	122	85 - 159	Fail
MASO-4780[h]	8/1/2016	U-238	46.6 ± 3.9	121	85 - 157	Fail
MAW-4776	8/1/2016	I-129	4.40 ± 0.20	4.54	3.18 - 5.90	Pass
MAVE-4782	8/1/2016	Cs-134	-0.01 ± 0.05	0.00	NA [c]	Pass
MAVE-4782	8/1/2016	Cs-137	6.18 ± 0.20	5.54	3.88 - 7.20	Pass
MAVE-4782	8/1/2016	Co-57	8.13 ± 0.16	6.81	4.77 - 8.85	Pass
MAVE-4782	8/1/2016	Co-60	5.30 ± 0.15	4.86	3.40 - 6.32	Pass
MAVE-4782	8/1/2016	Mn-54	8.08 ± 0.24	7.27	5.09 - 9.45	Pass
MAVE-4782	8/1/2016	Zn-65	6.24 ± 0.36	5.40	3.78 - 7.02	Pass
MAAP-4784	8/1/2016	Sr-90	1.18 ± 0.10	1.03	0.72 - 1.34	Pass
MAAP-4784	8/1/2016	Cs-134	1.58 ± 0.08	2.04	1.43 - 2.65	Pass

TABLE D-5 **DOE's Mixed Analyte Performance Evaluation Program (MAPEP)**
ENVIRONMENTAL, INC., 2016

			Concentration [a]			
Lab Code [b]	Reference Date	Analysis	Laboratory result	Known Activity	Control Limits [c]	Acceptance
MAAP-4784	8/1/2016	Cs-137	1.85 ± 0.09	1.78	1.25 - 2.31	Pass
MAAP-4784	8/1/2016	Co-57	2.39 ± 0.52	2.48	1.74 - 3.22	Pass
MAAP-4784	8/1/2016	Co-60	3.22 ± 0.08	3.26	2.28 - 4.24	Pass
MAAP-4784	8/1/2016	Mn-54	2.82 ± 0.12	2.75	1.93 - 3.58	Pass
MAAP-4784	8/1/2016	Zn-65	-0.015 ± 0.062	0.00	NA [c]	Pass
MAAP-4784	8/1/2016	Am-241	-0.001 ± 0.006	0.00	NA [c]	Pass
MAAP-4784	8/1/2016	Pu-238	0.075 ± 0.022	0.069	0.049 - 0.090	Pass
MAAP-4784	8/1/2016	Pu-239/240	0.048 ± 0.015	0.054	0.038 - 0.070	Pass
MAAP-4784	8/1/2016	U-234/233	0.151 ± 0.036	0.150	0.105 - 0.195	Pass
MAAP-4784	8/1/2016	U-238	0.147 ± 0.034	0.156	0.109 - 0.203	Pass
MAW-4778	8/1/2016	H-3	365 ± 11	334	234 - 434	Pass
MAW-4778	8/1/2016	Fe-55	23.6 ± 16.3	21.5	15.1 ± 28.0	Pass
MAW-4778	8/1/2016	Ni-63	17.0 ± 2.8	17.2	12.0 ± 22.4	Pass
MAW-4778	8/1/2016	Sr-90	0.17 ± 0.28	0.00	NA [c]	Pass
MAW-4778	8/1/2016	Tc-99	9.50 ± 0.41	11.60	8.10 - 15.10	Pass
MAW-4778	8/1/2016	Cs-134	22.6 ± 0.4	23.9	16.7 - 31.1	Pass
MAW-4778	8/1/2016	Cs-137	0.018 ± 0.117	0.00	NA [c]	Pass
MAW-4778	8/1/2016	Co-57	27.6 ± 0.2	27.3	19.1 ± 35.5	Pass
MAW-4778	8/1/2016	Co-60	0.018 ± 0.090	0.00	NA [c]	Pass
MAW-4778	8/1/2016	Mn-54	16.2 ± 0.4	14.8	10.4 - 19.2	Pass
MAW-4778	8/1/2016	Zn-65	19.3 ± 0.7	17.4	12.2 - 22.6	Pass
MAW-4778	8/1/2016	K-40	286 ± 6	252	176 - 328	Pass
MAW-4778	8/1/2016	Ra-226	1.48 ± 0.09	1.33	0.93 - 1.73	Pass
MAW-4778	8/1/2016	Pu-238	1.09 ± 0.13	1.13	0.79 - 1.47	Pass
MAW-4778	8/1/2016	Pu-239/240	0.003 ± 0.011	0.016	NA [d]	Pass
MAW-4778	8/1/2016	U-234/233	1.80 ± 0.13	1.86	1.30 - 2.42	Pass
MAW-4778	8/1/2016	U-238	1.77 ± 0.13	1.92	1.34 - 2.50	Pass
MAW-4778	8/1/2016	Am-241	0.678 ± 0.086	0.814	0.570 ± 1.058	Pass

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

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

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

[d] Provided in the series for "sensitivity evaluation". MAPEP does not provide control limits.

[e] The laboratory properly identified the Sn-75 interfering peak in the vicinity of Co-57 and stated so in the comment field. MAPEP requires results to be reported as an activity with an uncertainty. Since the calculated uncertainty was less than the activity MAPEP interpreted the submitted result as a "false positive" resulting in a failure.

[f] Original analysis for Ni-63 failed.

[g] Reanalysis with a smaller aliquot resulted in acceptable results. An investigation is in process to identify better techniques for analyzing samples with complex matrices.

[h] MAPEP states that samples contain two fractions of Uranium; one that is soluble in concentrated HNO^3 and HCl acid and one that is "fundamentally insoluble in these acids". They also state that HF treatment can not assure complete dissolution. Results are consistent with measuring the soluble form.

TABLE D-6 Interlaboratory Comparison Crosscheck Program, Environmental Resource Associates (ERA)[a]
RAD Study, ENVIRONMENTAL, INC., 2016

Lab Code	Date	Analysis	Concentration (pCi/L) Laboratory Result	ERA Result	Control Limits	Acceptance
ERW-1392	4/4/2016	Sr-89	43.5 ± 4.3	48.2	37.8 - 55.6	Pass
ERW-1392	4/4/2016	Sr-90	27.5 ± 1.9	28.5	20.7 - 33.1	Pass
ERW-1394 [b]	4/4/2016	Ba-133	65.2 ± 3.8	58.8	48.7 - 64.9	Fail
ERW-1394 [c]	4/4/2016	Ba-133	57.8 ± 5.3	58.8	48.7 - 64.9	Pass
ERW-1394	4/4/2016	Cs-134	43.7 ± 3.0	43.3	34.6 - 47.6	Pass
ERW-1394	4/4/2016	Cs-137	86.1 ± 5.3	78.4	70.6 - 88.9	Pass
ERW-1394	4/4/2016	Co-60	108 ± 44	102	91.8 - 114	Pass
ERW-1394	4/4/2016	Zn-65	240 ± 13	214	193 - 251	Pass
ERW-1397	4/4/2016	Gr. Alpha	52.0 ± 2.2	62.7	32.9 - 77.8	Pass
ERW-1397	4/4/2016	Gr. Beta	33.9 ± 1.2	39.2	26.0 - 46.7	Pass
ERW-1400	4/4/2016	I-131	24.7 ± 0.6	26.6	22.1 - 31.3	Pass
ERW-1402	4/4/2016	Ra-226	15.6 ± 0.5	15.2	11.3 - 17.4	Pass
ERW-1402	4/4/2016	Ra-228	5.28 ± 0.76	5.19	3.12 - 6.93	Pass
ERW-1403	4/4/2016	Uranium	4.02 ± 0.42	4.64	3.39 - 5.68	Pass
ERW-1405	4/4/2016	H-3	8,150 ± 270	7,840	6,790 - 8,620	Pass
SPW-2845	7/7/2015	Ba-133	60.3 ± 5.7	64.7	53.9 - 71.2	Pass
SPW-2845	7/7/2015	Cs-134	48.8 ± 9.3	50.1	40.3 - 55.1	Pass
SPW-2845	7/7/2015	Cs-137	101 ± 8	89.8	80.8 - 101	Pass
SPW-2845	7/7/2015	Co-60	65.1 ± 5.8	59.9	53.9 - 68.4	Pass
SPW-2845	7/7/2015	Zn-65	288 ± 29	265	238 - 310	Pass
ERW-3485	7/11/2016	Sr-89	43.3 ± 6.5	53.3	42.3 - 60.9	Pass
ERW-3485	7/11/2016	Sr-90	39.0 ± 2.8	39.2	28.8 - 45.1	Pass
ERW-3487	7/11/2016	Ba-133	83.3 ± 4.9	82.9	69.7 - 91.2	Pass
ERW-3487	7/11/2016	Cs-134	62.5 ± 4.4	65.3	53.1 - 71.8	Pass
ERW-3487	7/11/2016	Cs-137	98.1 ± 5.6	95.2	85.7 - 107	Pass
ERW-3487	7/11/2016	Co-60	122 ± 5	117	105 - 131	Pass
ERW-3487	7/11/2016	Zn-65	124 ± 9	113	102 - 134	Pass
ERW-3490	7/11/2016	Gr. Alpha	46.6 ± 2.2	48.1	25.0 - 60.5	Pass
ERW-3490	7/11/2016	Gr. Beta	26.8 ± 1.1	28.6	18.2 - 36.4	Pass
ERW-3492	7/11/2016	I-131	23.7 ± 1.0	24.9	20.7 - 29.5	Pass
ERW-3493	7/11/2016	Ra-226	12.9 ± 0.4	12.3	9.2 - 14.2	Pass
ERW-3493	7/11/2016	Ra-228	5.8 ± 0.8	5.8	3.5 - 7.6	Pass
ERW-3493	7/11/2016	Uranium	32.8 ± 0.8	25.2	28.4 - 39.3	Pass
ERW-3495	7/11/2016	H-3	12,400 ± 334	12,400	10,800 - 13,600	Pass

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

[b] No reason determined for failure of Ba-133 result.

[c] The result of reanalysis (Compare to original result, footnoted "b" above).