Constellation.

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RA24-011 10 CFR 50 Appendix I

May 3, 2024

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

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: 2023 Annual Radiological Environmental Operating Report

Enclosed is the Constellation Energy Generation, LLC, 2023 Annual Radiological Environmental Operating Report for LaSalle County Station, submitted in accordance with Technical Specification 5.6.2, "Annual Radiological Environmental Operating Report." The enclosed report contains the results of groundwater monitoring conducted in accordance with Constellation'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 contained within this letter. Should you have any questions concerning this letter, please contact Ms. Laura Ekern, Regulatory Assurance Manager, at (815) 415-2800.

Respectfully,

John Van Fleet
Site Vice President
LaSalle County Station

Enclosures: LaSalle County Station Units 1 and 2 Annual Radiological Environmental Operating Report 1 January through 31 December 2023

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

Docket No: 50-373
50-374

LASALLE COUNTY STATION
UNITS 1 and 2

Annual Radiological Environmental Operating Report

1 January through 31 December 2023

Prepared By
Teledyne Brown Engineering
Environmental Services

LaSalle County Station
Marseilles, IL 61341

May 2024

Table Of Contents

Appendices

I. Summary and Conclusions

In 2023, the LaSalle Generating Station released to the environment through the radioactive effluent gaseous pathways approximately 557 curies of noble gas, fission, and activation products and approximately 58.6 curies of tritium. There were no liquid effluent releases at the site in 2023. The solid and gaseous radioactive effluents from LAS were well below 40 CFR 190 regulatory limits and are summarized below:

Calculated Dose to Members of the Public			
	Whole Body	**Thyroid**	**Max Other Organ**
Gaseous [1,2]	1.27E-02	5.70E-02	4.71E-02
Liquid	0.00E+00	0.00E+00	0.00E+00
Sky Shine	1.95E-01	-	-
Total Site Dose	2.08E-01	5.70E-02	4.71E-02
Total with Other Nearby Facility [3]	**2.08E-01**	**5.70E-02**	**4.71E-02**
Limit	**25 mrem**	**75 mrem**	**25 mrem**
% of Limit	**8.31E-01**	**7.60E-01**	**1.88E-01**

[1] Gaseous dose values include organ dose from Noble Gas, Iodine, Tritium, Carbon-14 and particulates with half-lives > 8 days

[2] Individual groups with the highest dose are used:
Total Body: all age groups for Noble Gas; the Infant & Child for particulates
Individual age group sum is lower

[3] Other fuel cycle sources within 5 miles of the site do not exist

This report on the Radiological Environmental Monitoring Program conducted for the LaSalle County Station (LSCS) by Constellation covers the period 1 January 2023 through 31 December 2023. During that time period, 1,325 analyses were performed on 1,245 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. No fission or activation products were detected.

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.

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. 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 Constellation Energy 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 2023 through 31 December 2023.

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 Constellation by Microbac Laboratories Inc. This section describes the general collection methods used by Microbac Laboratories Inc. to obtain environmental samples for the LSCS REMP in 2023. Sample locations and descriptions can be found in Tables B-1 and B-2, and Figures B-1 through B-3, 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. 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. 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 nine locations (L-01, L-03, L-04, L-05, L-06, L-07, L-08, L-10, 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 an iodine cartridge and a glass fiber particulate filter. 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 food products. Samples were collected during the growing season at four locations: L-42 (control), L-Quad 1, L-Quad 2, L-Quad 3 and L-Quad 4. Various types of samples were collected, 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 (control), L-ESE1, and

L-ESE2. Location L-Veg C is in the lowest deposition sector (ENE sector) surrounding LaSalle. The highest deposition sector surrounding LaSalle is ESE sector. These samples were collected, placed in new unused plastic bags and sent to the laboratory for analysis.

Ambient Gamma Radiation

Beginning in the first quarter of 2012, the type of dosimetry used for the Radiological Environmental Monitoring Program (REMP) was changed. 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 placed approximately six feet above ground level. 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 17 locations (L-201, L-202, L-203, L-204, L-205A, L-205B, 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 eight locations (L-01, L-03, L-04, L-05, L-06, L-07, L-08, 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.

B. Sample Analysis

This section describes the general analytical methodologies used by Microbac Laboratories Inc. and TBE to collect and analyze, respectively, the environmental samples for radioactivity for the LSCS REMP in 2023. The analytical procedures used by the laboratory are listed in Table B-2.

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

1. Concentrations of beta emitters in surface water and air particulates
2. Concentrations of gamma emitters in ground/well and surface water, air particulates, fish, sediment and vegetation
3. Concentrations of tritium in ground/well and surface water
4. 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 and air particulates: 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 2023, the LSCS REMP had a sample recovery rate of >99%. Sample anomalies and missed samples are listed in the following tables:

Table D-1 LISTING OF SAMPLE ANOMALIES

Sample Type	Location Code	Collection Date	Reason
WW	L-28-5	01/11/23	Well #5 that was due for sampling was out of service. Well #4 sampled.
AP/AI	L-08	03/01/23	Timer failure at the station. The filter appears to be similar color to the other ones. Run time calculated & timer exchanged.
AP/AI	L-10	03/01/23	The timer indicated approximately 3.6 hours less than expected, possibly due to a short power outage. NOTE: During the next collection period (3/9), the timer indicated an expected reading of 191.1 hours for an 8-day collection period.
AP/AI	L-06	04/20/23	Pump found not running due to a burned fuse. Fuse replaced & pump restarted.
AP/AI	L-03	08/02/23	The timer indicated approximately 8 hours less than expected, possibly due to a short power outage. NOTE: During the next collection period (8/10), the timer indicated an expected reading of 188.9 hours for an 8-day collection period.
AP/AI	L-03	11/16/23	The timer indicated approximately 10 hours less than expected, possibly due to a short power outage. NOTE: During the next collection period (11/22), the timer indicated an expected reading of 143.9 hours for the collection period.

Table D-2 LISTING OF MISSED SAMPLES

Sample Type	Location Code	Collection Date(s)	Reason
AP/AI	L-03	01/19/23	The sampler could not be reached due to road work. Sample was collected after two-weeks' run.
SW	L-21 L-40	02/01/23	No sample collected - river frozen
AP/AI	L-07	03/16/23	Pump broke down after 91.7 hours; pump exchanged.

Each program exception has been 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

There were no program changes in 2023.

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 24 out of 24 samples with a range of 4.3 to 9.8 pCi/L. (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 5 of 8 samples with a range of 190 - 364 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 2,045 to 3,450 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 one station with a concentration of 1,677 pCi/kg dry. Naturally occurring K-40 was found at all stations and ranged from 9,026 to 20,460 pCi/kg dry. No fission or activation products were found.

B. Atmospheric Environment

1. Airborne

a. Air Particulates

Continuous air particulate samples were collected from nine locations on a weekly basis. The nine 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, 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 5 to 35E-3 pCi/m^3 with a mean of 19E-3 pCi/m^3. The results from the near-site location (Group II) ranged from 8 to 35E-3 pCi/m^3 with a mean of 20E-3 pCi/m^3. The results from the far-field locations (Group III) ranged from 6 to 36E-3

pCi/m^3 with a mean of 20E-3 pCi/m^3. The results from the control location (Group IV) ranged from 10 to 37E-3 pCi/m^3 with a mean of 21E-3 pCi/m^3. Comparison of the 2023 air particulate data with previous years' 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 2023 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 detected in 36 of 36 samples. These values ranged from 57 to 191E-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, and L-11A) and analyzed weekly for I-131 (Table C-VI.1, Appendix C). No I-131 was detected.

2. Terrestrial

a. Food Products

Food product samples were collected at five locations (L42, L-Quad 1, L-Quad 2, L-Quad 3 and L-Quad 4) when available. All locations could be affected by LaSalle's effluent releases. The following analysis was performed:

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.

b. Vegetation

Vegetation samples were collected monthly during the growing season from May through October at three locations (L-Veg C, L-ESE-1, and L-ESE-2). 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.

C. Ambient Gamma Radiation

Ambient gamma radiation levels were measured utilizing Optically Stimulated Luminescence Dosimeters (OSLD). Forty-two OSLD locations were established around the site. Results of OSLD measurements are listed in Tables C-IX.1, Appendix C.

All OSLD measurements were below 22 mrem/std. quarter, with a range of 12.5 to 22.0 mrem/quarter. A comparison of the Normalized Annual Dose to the Baseline Background and Minimum Differential Dose indicates that there is no evidence of dose which could be attributed to facility-related direct radiation.

D. Land Use Census

A Land Use Census conducted August 8, 2023, around the LaSalle County Station (LSCS) was performed by Microbac Laboratories Inc. for Constellation Energy 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 and milk producing animal in each of the sixteen 22 ½ degree sectors around the site within 10 km (6.2 miles). The distance and direction of all locations from the LSCS reactor buildings were positioned using Global Positioning System (GPS) technology. Since there were no milk animals within 10 km of LSCS, beef cows were identified. 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	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	1.7	3.3	-
R	NNW	1.7	4.5	-

E. Errata Data

There was no errata data for 2023.

F. Summary of Results - Inter-Laboratory Comparison Program

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

1. Analytics Evaluation Criteria

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

2. ERA Evaluation Criteria

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

3. DOE Evaluation Criteria

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

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

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

For the TBE laboratory, laboratory, 124 out of 131 analyses performed met the specified acceptance criteria. Seven analyses did not meet the specified acceptance criteria and were addressed through the TBE Corrective Action Program. A summary is found below:

1. The MAPEP February 2023 Soil Ni-63 result was evaluated as *Not Acceptable*. TBE's reported values was 294 Bq/kg and the known result was 1130 Bq/kg (range 791 - 1469). The sample was reprepped by a different (senior) lab technician with results of 1120 & 1250 Bq. It was determined that there was a difference between the two techs during the sample prep (technique) and the procedure was revised to reflect these differences including using a specific aliquot amount. (NCR 23-08)

2. The MAPEP February 2023 vegetation Sr-90 result was evaluated as *Not Acceptable*. The reported value was 0.05 Bq (not detected) and the known result was a "false positive". This was considered to be a statistical failure because TBE's reported result with 3 times the uncertainty resulted in a slightly positive net result (0.03194 Bq/kg). The reported result was significantly below TBE's average detection limit for vegetation samples. (NCR 23-09)

3. The ERA RAD April 2023 water Ba-133 result was evaluated as *Not Acceptable*. The reported value was 26.0 pCi/L and the known was 22.3 (acceptance range 17.1 - 25.8 pCi) or 117% of the known (acceptable for TBE QC). The sample was used as the workgroup duplicate with a result of 25.4 (114%). The sample had also been counted on a different detector with a result of 21.9 (98%). This was TBE's first failure for Ba-133. (NCR 23-10)

4. The MAPEP August 2023 soil Fe-55 result was evaluated as *Not Acceptable*. The reported value was 346 Bq/kg and the known result was 1280 (acceptance range of 896-1664 Bq/kg). This was TBE's initial evaluation for Fe-55 in soils. The result was received at the end of December and the root cause is under investigation. No client samples were associated with this cross-check. (CAR 23-31)

5. The Analytics September 2023 milk Sr-90 result was evaluated as Not Acceptable. The reported result was 7.28 pCi/L and the known result was 12.8 (57% of known). This sample was used as the workgroup duplicate and the carrier yields for both samples were 107% and 75%. The LCS recovery for the workgroup was at 106%. The ERA drinking water Sr-90 cross check that was analyzed around the same time was acceptable at 108%. There was no explanation for the failure. This is the first low biased failure for Sr-90 milk. The last failure (high) was in 2016. (NCR 23-24)

6. The ERA RAD October 2023 water Gross Alpha result was evaluated as *Not Acceptable*. The reported result was 53.2 pCi/L and the known result was 70.6 (acceptable range of 54.0 - 87.2 pCi/L). The reported result was the workgroup duplicate and was within 75% of the known value (within TBE QC range). The original result was 63.3 pCi/L (90% of the known). Because the LCS result was biased slightly high, the decision was made to report the lower value. (NCR 23-20)

7. The ERA RAD October 2023 water I-131 result was evaluated as *Not Acceptable*. The reported value was 23.5 pCi/L and the known result was 29.7 (acceptable range of 25.8 - 33.6) The reported result was 79% of the known, which is within the acceptable TBE QC range. The workgroup was reviewed with no anomalies found. The LCS/LCSD results were 109% and 86.1%. The sample was not processed in a timely manner as per the ERA instructions which stated to analyze shortly after receipt due to the short half-life. Going forward, the QA &/or Lab Mgr. will ensure that this analysis is started sooner. (NCR 23-21)

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

APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT ANNUAL SUMMARY

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR THE LASALLE COUNTY STATION, 2023

NAME OF FACILITY:	**LASALLE COUNTY STATION**			**DOCKET NUMBER:**		**50-373 & 50-374**		
LOCATION OF FACILITY:	**MARSEILLES, IL**			**REPORTING PERIOD:**		**2023**		
				INDICATOR	**CONTROL**	**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)	**LOCATIONS** MEAN (M) (F) *RANGE*	**LOCATION** MEAN (M) (F) *RANGE*	MEAN (M) (F) *RANGE*	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
FISH	**GAMMA**	12						
(PCI/KG WET)	*K-40*		*NA*	2851 (8/8) *2045 - 3450*	3047 (4/4) *2797 - 3438*	3047 (4/4) *2797 - 3438*	L-36 CONTROL ILLINOIS RIVER - UPSTREAM 4.3 MILES NE OF SITE	0
	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)	*K-40*		*NA*	15372 (4/4) *9026 - 20460*	17825 (2/2) *17310 - 18340*	17825 (2/2) *17310 - 18340*	L-21 CONTROL ILLINOIS RIVER - UPSTREAM 4.0 MILES NE OF SITE	0
	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	<LLD	-		0
	BA-140		*NA*	<LLD	<LLD	-		0
	LA-140		*NA*	<LLD	<LLD	-		0
AIR PARTICULATE *(E-3 PCI/CU.METER)*	**GR-B**	475	**10**	19.8 (422/422) *5 - 36*	20.8 (53/53) *10 - 37*	20.8 (53/53) *10 - 37*	L-10 CONTROL STREATOR 13.5 MILES SW 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, 2023

NAME OF FACILITY:	LASALLE COUNTY STATION			DOCKET NUMBER:		50-373 & 50-374		
LOCATION OF FACILITY:	MARSEILLES, IL			REPORTING PERIOD:		2023		
				INDICATOR	CONTROL	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)	LOCATIONS MEAN (M) (F) RANGE	LOCATION MEAN (M) (F) RANGE	MEAN (M) (F) RANGE	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIR PARTICULATE	**GAMMA**	36						
(E-3 PCI/CU.METER)	Be-7		NA	109 (32/32) 57 - 191	111 (4/4) 67 - 152	113 (4/4) 69 - 145	L-11A INDICATOR RANSOM 6.0 MILES S OF SITE	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**	475						
(E-3 PCI/CU.METER)	I-131		70	<LLD	<LLD	-		0
FOOD PRODUCTS	**GAMMA**	29						
(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

(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, 2023

NAME OF FACILITY:	**LASALLE COUNTY STATION**			**DOCKET NUMBER:**		**50-373 & 50-374**		
LOCATION OF FACILITY:	**MARSEILLES, IL**			**REPORTING PERIOD:**		**2023**		
				INDICATOR	**CONTROL**	**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)	**LOCATIONS** MEAN (M) (F) *RANGE*	**LOCATION** MEAN (M) (F) *RANGE*	MEAN (M) (F) *RANGE*	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
VEGETATION	**GAMMA**	44						
(PCI/KG WET)	*MN-54*		*NA*	<LLD	<LLD	-		0
	CO-58		*NA*	<LLD	<LLD	-		0
	FE-59		*NA*	<LLD	<LLD	-		0
	CO-60		*NA*	<LLD	<LLD	-		0
	ZN-65		*NA*	<LLD	<LLD	-		0
	NB-95		*NA*	<LLD	<LLD	-		0
	ZR-95		*NA*	<LLD	<LLD	-		0
	I-131		**60**	<LLD	<LLD	-		0
	CS-134		**60**	<LLD	<LLD	-		0
	CS-137		**80**	<LLD	<LLD	-		0
	BA-140		*NA*	<LLD	<LLD	-		0
	LA-140		*NA*	<LLD	<LLD	-		0
DIRECT RADIATION	**OSLD-QUARTERLY**	168	*NA*	18.0	14.2	19.9	L-112 INDICATOR	0
(MILLI-ROENTGEN/QTR.)				(164/164)	(4/4)	(4/4)		
				13.8 - 22.0	*12.5 - 15.1*	*18.9 - 21.1*	0.9 MILES WSW	

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

APPENDIX B

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

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TABLE B-1: Radiological Environmental Monitoring Program - Sampling Locations, Distance and Direction, LaSalle County Station, 2023

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. 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-11A	Ransom (indicator)	6.0 miles S
D. 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
E. 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
F. Food Products		
Quadrant 1	171 Valley View, Seneca IL	5.2 miles NE
Quadrant 2	106 W. Thomas, Ransom, IL	6.0 miles S
Quadrant 3	2260 N 21st Road, Marseilles IL	3.2 miles WSW
Quadrant 4	2507 N. 2553 Rd., Marseilles IL	4.3 miles NNW
Control	Biros Farm	14.2 miles E
G. 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, 2023

Location	Location Description	Distance & Direction From Site
H. 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-205A-1 and -2		3.2 miles ESE
L-205B-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-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, 2023

Sample Medium	Analysis	Sampling Method	Analytical Procedure Number
Surface Water	Gamma Spectroscopy	Monthly composite from weekly grab samples.	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
Surface Water	Gross Beta	Monthly composite from weekly grab samples.	TBE, TBE-2008 Gross Alpha and/or Gross Beta Activity in Various Matrices
Surface Water	Tritium	Quarterly composite from weekly grab samples.	TBE, TBE-2011 Tritium Analysis in Drinking Water by Liquid Scintillation
Ground/Well Water	Gamma Spectroscopy	Quarterly grab samples.	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
Ground/Well Water	Tritium	Quarterly grab samples.	TBE, TBE-2011 Tritium Analysis in Drinking Water by Liquid Scintillation
Fish	Gamma Spectroscopy	Semi-annual samples collected via electroshocking or other techniques	TBE-2007 Gamma-Emitting Radioisotope Analysis
Sediment	Gamma Spectroscopy	Semi-annual grab samples	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
Air Particulates	Gross Beta	One-week composite of continuous air sampling through glass fiber filter paper	TBE, TBE-2008 Gross Alpha and/or Gross Beta Activity in Various Matrices
Air Particulates	Gamma Spectroscopy	Quarterly composite of each station	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
Air Iodine	Gamma Spectroscopy	Bi-weekly composite of continuous air sampling through charcoal filter	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
Food Products	Gamma Spectroscopy	Annual grab samples.	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
Vegetation	Gamma Spectroscopy	Monthly grab samples during growing season	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis
OSLD	Optically Stimulated Luminescence Dosimetry	Quarterly OSLDs comprised of two Al_2O_3:C Landauer Incorporated elements.	Landauer Incorporated

Figure B-1
Inner Ring OSLD Locations
of the LaSalle County Station, 2023

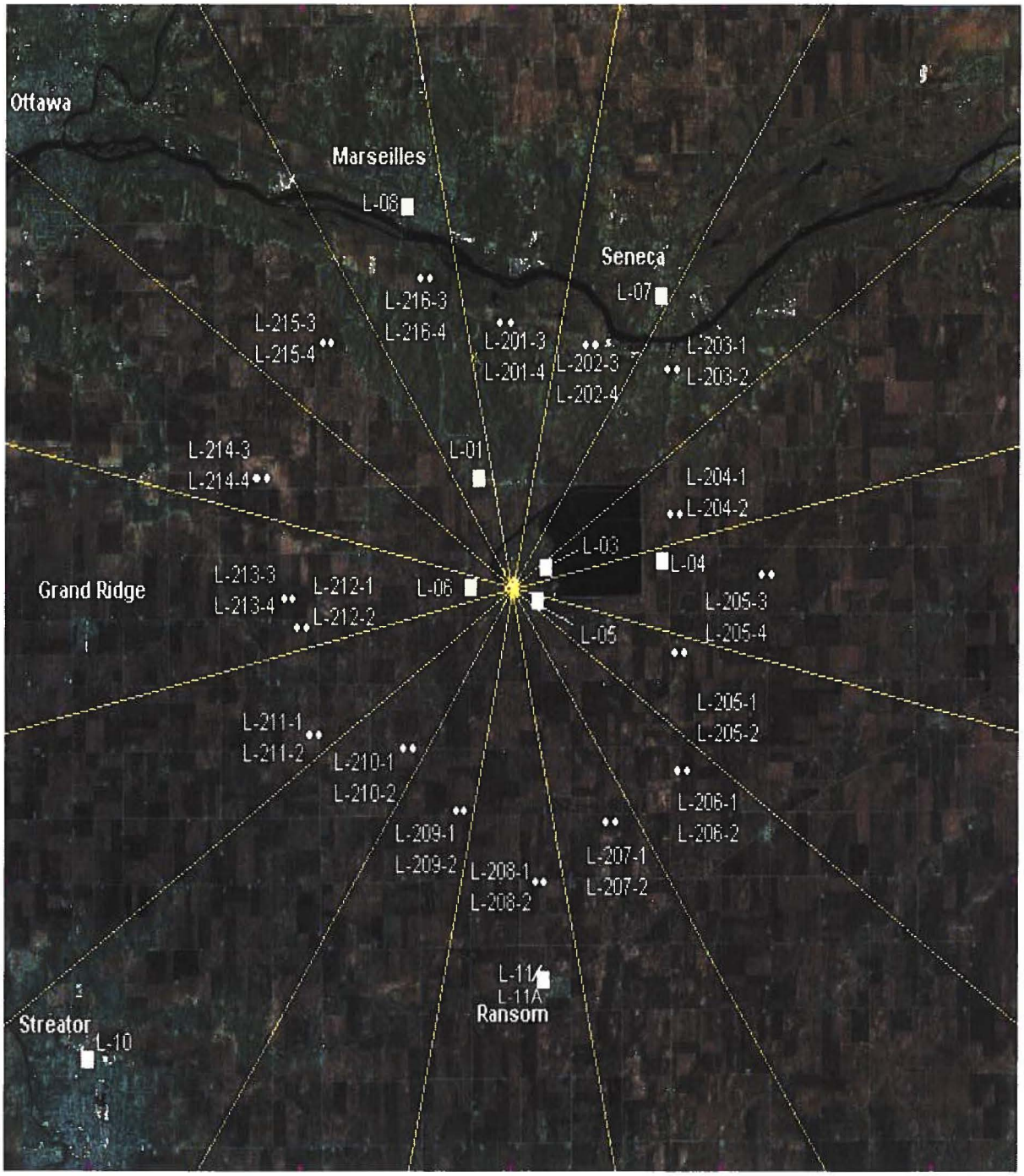

Figure B-2
Outer Ring OSLD Locations and Fixed Air Sampling Locations
of the LaSalle County Station, 2023

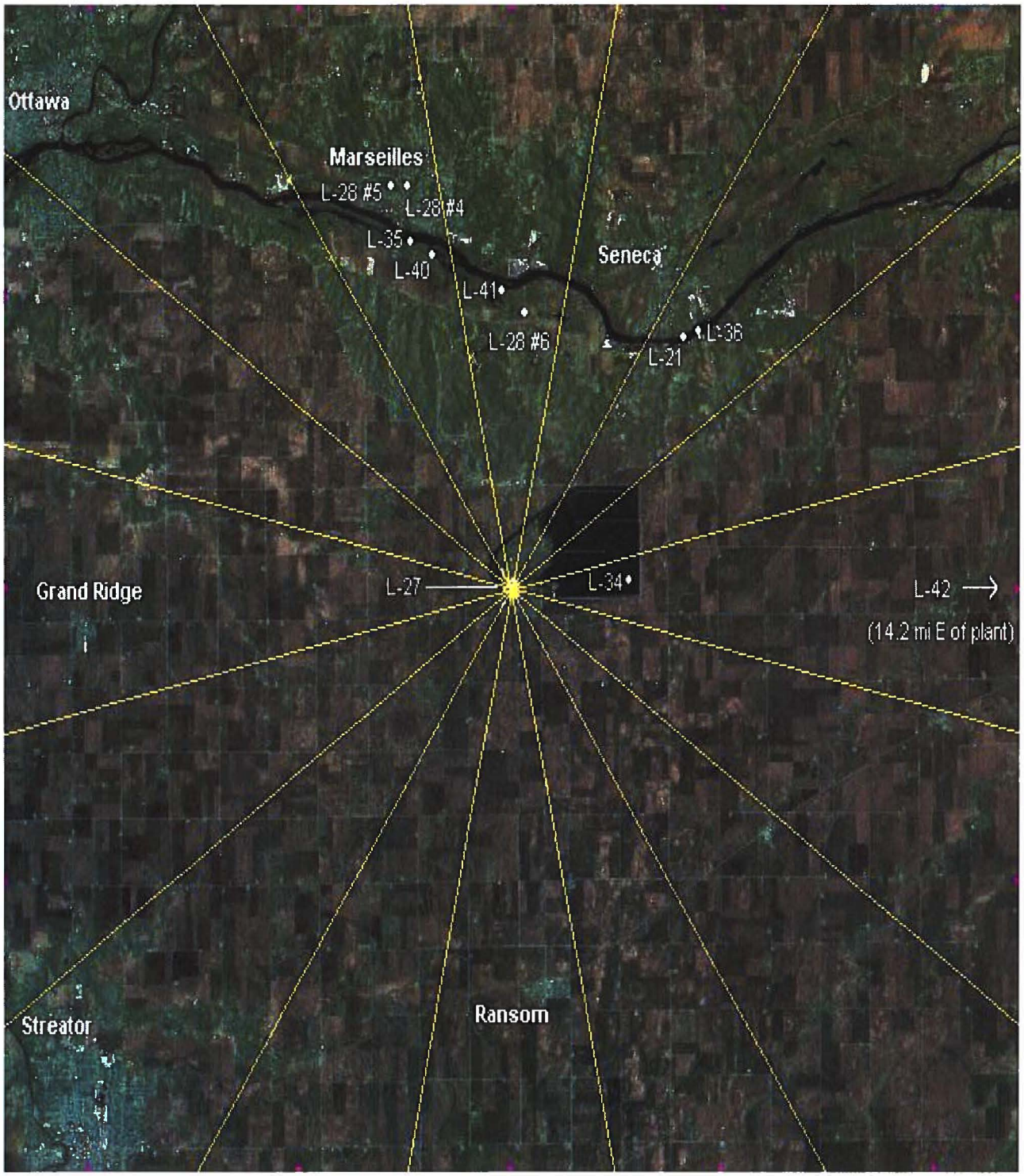

Figure B-3
Ingestion and Waterborne Exposure Pathway Sample Locations
of the LaSalle County Station, 2023

APPENDIX C

DATA TABLES AND FIGURES

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Table C-I.1 CONCENTRATIONS OF GROSS BETA IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	L-21	L-40
01/05/23 - 01/26/23	7.8 ± 2.5	9.8 ± 2.7
02/09/23 - 02/23/23	9.0 ± 2.6	8.1 ± 2.6
03/01/23 - 03/29/23	4.3 ± 2.2	5.9 ± 2.3
04/06/23 - 04/28/23	6.1 ± 2.3	7.0 ± 2.4
05/04/23 - 05/31/23	8.6 ± 2.3	8.9 ± 2.3
06/08/23 - 06/28/23	8.6 ± 2.5	8.9 ± 2.4
07/06/23 - 07/27/23	6.9 ± 2.5	6.8 ± 2.5
08/02/23 - 08/31/23	5.7 ± 2.2	5.8 ± 2.3
09/06/23 - 09/27/23	7.1 ± 2.2	9.8 ± 2.4
10/04/23 - 10/26/23	9.2 ± 2.4	7.6 ± 2.3
11/01/23 - 11/30/23	8.1 ± 2.9	7.7 ± 2.8
12/06/23 - 12/27/23	8.0 ± 2.7	9.6 ± 2.8
(1) MEAN ± 2 STD DEV	7.4 ± 3.0	8.0 ± 2.9

Table C-I.2 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD		L-21	L-40
01/05/23 - 03/29/23		325 ± 133	305 ± 128
01/05/23 - 03/29/23	*Recount*	364 ± 136	340 ± 133
01/05/23 - 03/29/23	*Reanalysis*	339 ± 134	364 ± 131
04/06/23 - 06/28/23		302 ± 123	270 ± 121
04/06/23 - 06/28/23	*Recount*	< 185	307 ± 129
04/06/23 - 06/28/23	*Reanalysis*	190 ± 120	324 ± 125
07/06/23 - 09/27/23		< 197	197 ± 127
10/04/23 - 12/27/23		< 197	< 199
(1) MEAN ± 2 STD DEV		304 ± 135	301 ± 109

(1) 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, 2023

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	01/05/23 - 01/26/23	< 2	< 3	< 6	< 3	< 5	< 3	< 5	< 9	< 3	< 2	< 21	< 7
	02/09/23 - 02/23/23	< 3	< 3	< 7	< 4	< 6	< 3	< 6	< 10	< 3	< 3	< 21	< 7
	03/01/23 - 03/29/23	< 1	< 1	< 3	< 2	< 3	< 1	< 3	< 7	< 1	< 1	< 13	< 4
	04/06/23 - 04/28/23	< 4	< 4	< 10	< 4	< 6	< 4	< 7	< 12	< 3	< 4	< 28	< 11
	05/04/23 - 05/31/23	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 12	< 2	< 2	< 22	< 6
	06/08/23 - 06/28/23	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 14	< 2	< 2	< 21	< 7
	07/06/23 - 07/27/23	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 9	< 2	< 2	< 18	< 5
	08/02/23 - 08/31/23	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 11	< 2	< 2	< 18	< 7
	09/06/23 - 09/27/23	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 8	< 2	< 2	< 15	< 6
	10/04/23 - 10/26/23	< 4	< 4	< 9	< 3	< 7	< 4	< 6	< 14	< 4	< 4	< 31	< 11
	11/01/23 - 11/30/23	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 10	< 2	< 2	< 20	< 6
	12/06/23 - 12/27/23	< 1	< 1	< 3	< 1	< 3	< 1	< 2	< 6	< 1	< 1	< 11	< 4
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
L-40	01/05/23 - 01/26/23	< 2	< 2	< 5	< 2	< 5	< 2	< 4	< 8	< 2	< 2	< 18	< 5
	02/09/23 - 02/23/23	< 4	< 4	< 9	< 5	< 7	< 4	< 7	< 9	< 4	< 4	< 24	< 8
	03/01/23 - 03/29/23	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 9	< 2	< 2	< 16	< 6
	04/06/23 - 04/28/23	< 4	< 4	< 9	< 4	< 8	< 4	< 8	< 14	< 3	< 4	< 26	< 10
	05/04/23 - 05/31/23	< 1	< 2	< 4	< 2	< 3	< 2	< 3	< 9	< 2	< 2	< 16	< 5
	06/08/23 - 06/28/23	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 13	< 2	< 2	< 20	< 7
	07/06/23 - 07/27/23	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 8	< 2	< 2	< 15	< 5
	08/02/23 - 08/31/23	< 1	< 2	< 4	< 2	< 3	< 2	< 3	< 10	< 2	< 2	< 17	< 6
	09/06/23 - 09/27/23	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 8	< 2	< 2	< 15	< 6
	10/04/23 - 10/26/23	< 3	< 4	< 8	< 4	< 8	< 4	< 6	< 14	< 4	< 2	< 29	< 10
	11/01/23 - 11/30/23	< 2	< 2	< 5	< 3	< 5	< 2	< 5	< 11	< 2	< 2	< 22	< 8
	12/06/23 - 12/27/23	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 8	< 2	< 2	< 16	< 5
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-II.1 CONCENTRATIONS OF TRITIUM IN GROUND/WELL WATER SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	L-27	L-28-W4	L-28-W5	L-28-W6
01/11/23 - 01/11/23	< 176	< 181		< 194
04/13/23 - 04/13/23	< 186		< 172	< 176
07/12/23 - 07/12/23	< 193	< 196		< 192
10/11/23 - 10/11/23	< 187		< 191	< 190
MEAN	-	-	-	-

Table C-II.2 **CONCENTRATIONS OF GAMMA EMITTERS IN GROUND/WELL WATER SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023**

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	01/11/23 - 01/11/23	< 7	< 5	< 11	< 6	< 15	< 6	< 11	< 7	< 8	< 28	< 11
	04/13/23 - 04/13/23	< 5	< 7	< 15	< 10	< 16	< 8	< 14	< 9	< 10	< 33	< 8
	07/12/23 - 07/12/23	< 6	< 5	< 12	< 6	< 13	< 8	< 10	< 6	< 6	< 26	< 14
	10/11/23 - 10/11/23	< 7	< 7	< 16	< 9	< 16	< 9	< 12	< 7	< 7	< 34	< 14
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-28-W4	01/11/23 - 01/11/23	< 7	< 9	< 16	< 6	< 16	< 5	< 10	< 7	< 6	< 34	< 7
	07/12/23 - 07/12/23	< 7	< 7	< 12	< 6	< 5	< 8	< 13	< 8	< 7	< 30	< 8
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-28-W5	04/13/23 - 04/13/23	< 6	< 6	< 12	< 10	< 16	< 7	< 11	< 7	< 7	< 35	< 11
	10/11/23 - 10/11/23	< 7	< 7	< 11	< 7	< 18	< 10	< 8	< 8	< 7	< 34	< 12
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-28-W6	01/11/23 - 01/11/23	< 8	< 7	< 13	< 9	< 10	< 4	< 11	< 8	< 5	< 37	< 12
	04/13/23 - 04/13/23	< 7	< 7	< 14	< 7	< 14	< 8	< 11	< 7	< 7	< 33	< 6
	07/12/23 - 07/12/23	< 6	< 7	< 13	< 7	< 11	< 8	< 14	< 6	< 8	< 28	< 10
	10/11/23 - 10/11/23	< 7	< 7	< 14	< 8	< 15	< 8	< 13	< 7	< 7	< 38	< 4
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-III.1

CONCENTRATIONS OF GAMMA EMITTERS IN FISH SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023

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	Cs-134	Cs-137	Ba-140	La-140
L-34												
Largemouth Bass	05/08/23	< 50	< 43	< 134	< 102	< 122	< 59	< 112	< 65	< 57	< 356	< 149
Channel Catfish	05/08/23	< 64	< 54	< 107	< 71	< 115	< 57	< 99	< 51	< 59	< 392	< 147
Largemouth Bass	10/05/23	< 31	< 39	< 93	< 31	< 63	< 37	< 64	< 32	< 36	< 233	< 85
Bluegill	10/05/23	< 33	< 36	< 70	< 38	< 69	< 33	< 58	< 37	< 31	< 205	< 69
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-35												
Channel Catfish	05/09/23	< 61	< 92	< 162	< 96	< 174	< 83	< 151	< 77	< 75	< 632	< 160
Smallmouth Bass	05/09/23	< 78	< 76	< 187	< 90	< 138	< 77	< 150	< 82	< 71	< 628	< 188
Channel Catfish	10/05/23	< 46	< 44	< 96	< 45	< 96	< 49	< 74	< 50	< 46	< 315	< 97
Smallmouth Bass	10/05/23	< 33	< 33	< 89	< 37	< 68	< 35	< 58	< 38	< 29	< 200	< 67
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-36												
Smallmouth Buffalo	05/09/23	< 42	< 53	< 159	< 52	< 117	< 64	< 118	< 63	< 49	< 438	< 131
Channel Catfish	05/09/23	< 57	< 65	< 157	< 56	< 151	< 60	< 122	< 70	< 63	< 431	< 171
Smallmouth Bass	10/05/23	< 44	< 41	< 96.7	< 49	< 103	< 50	< 84	< 44	< 43	< 305	< 92
Channel Catfish	10/05/23	< 32	< 33	< 73.5	< 37	< 68	< 35	< 50	< 34	< 30	< 203	< 71
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-IV.1

CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023

RESULTS IN UNITS OF PCI/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	05/17/23	< 97	< 93	< 170	< 104	< 244	< 91	< 174	< 116	< 124	< 428	< 152
	10/28/23	< 96	< 65	< 207	< 132	< 213	< 108	< 195	< 117	< 129	< 453	< 160
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-40	05/17/23	< 78	< 100	< 202	< 97	< 223	< 88	< 160	< 104	< 111	< 420	< 114
	10/28/23	< 78	< 77	< 181	< 84	< 163	< 79	< 145	< 76	< 94	< 286	< 127
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-41	05/09/23	< 49	< 42	< 131	< 61	< 137	< 60	< 93	< 68	< 54	< 342	< 159
	10/05/23	< 88	< 71	< 184	< 81	< 174	< 109	< 116	< 93	< 72	< 505	< 156
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-V.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023**

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-11A	L-10
12/28/22 - 01/05/23	27 ± 4	29 ± 5	32 ± 5	26 ± 4	30 ± 5	32 ± 5	32 ± 5	26 ± 4	32 ± 5
01/05/23 - 01/11/23	29 ± 5	29 ± 5	33 ± 5	27 ± 5	32 ± 5	26 ± 5	32 ± 5	28 ± 5	30 ± 5
01/11/23 - 01/19/23	*(1)*	21 ± 4	24 ± 4	13 ± 3	22 ± 4	24 ± 4	25 ± 4	23 ± 4	21 ± 4
01/19/23 - 01/26/23	18 ± 3	13 ± 4	14 ± 4	17 ± 4	19 ± 4	19 ± 5	18 ± 4	18 ± 4	17 ± 4
01/26/23 - 02/01/23	22 ± 5	21 ± 5	24 ± 6	25 ± 6	19 ± 5	25 ± 6	21 ± 5	20 ± 5	18 ± 5
02/01/23 - 02/09/23	26 ± 5	22 ± 5	29 ± 5	25 ± 5	25 ± 5	24 ± 5	20 ± 4	27 ± 5	24 ± 5
02/09/23 - 02/16/23	16 ± 4	13 ± 4	15 ± 4	15 ± 4	16 ± 4	14 ± 4	14 ± 4	19 ± 5	14 ± 4
02/16/23 - 02/23/23	12 ± 4	15 ± 4	20 ± 4	13 ± 4	18 ± 4	19 ± 4	10 ± 4	15 ± 4	11 ± 4
02/23/23 - 03/01/23	20 ± 5	16 ± 4	15 ± 4	15 ± 5	16 ± 5	15 ± 5	19 ± 5	16 ± 5	19 ± 5
03/01/23 - 03/09/23	11 ± 3	21 ± 4	17 ± 4	11 ± 3	14 ± 4	12 ± 4	10 ± 3	14 ± 4	15 ± 4
03/09/23 - 03/16/23	12 ± 4	14 ± 4	14 ± 4	16 ± 4	12 ± 4	*(1)*	11 ± 4	15 ± 4	12 ± 4
03/16/23 - 03/23/23	20 ± 4	23 ± 5	9 ± 4	22 ± 5	22 ± 5	15 ± 4	18 ± 4	10 ± 4	21 ± 4
03/23/23 - 03/29/23	20 ± 5	23 ± 5	24 ± 5	11 ± 4	10 ± 4	20 ± 5	22 ± 5	14 ± 5	27 ± 5
03/29/23 - 04/06/23	17 ± 4	14 ± 4	19 ± 4	15 ± 4	17 ± 4	19 ± 4	20 ± 4	21 ± 4	20 ± 4
04/06/23 - 04/13/23	22 ± 5	29 ± 5	30 ± 5	26 ± 5	26 ± 5	24 ± 5	24 ± 5	26 ± 5	27 ± 5
04/13/23 - 04/20/23	15 ± 4	13 ± 4	16 ± 4	14 ± 8	18 ± 4	16 ± 4	17 ± 4	18 ± 4	13 ± 4
04/20/23 - 04/28/23	9 ± 3	15 ± 4	13 ± 3	11 ± 3	13 ± 3	13 ± 3	12 ± 3	12 ± 4	13 ± 3
04/28/23 - 05/04/23	5 ± 4	8 ± 4	9 ± 4	9 ± 4	11 ± 4	6 ± 4	8 ± 4	9 ± 4	10 ± 4
05/04/23 - 05/11/23	17 ± 4	16 ± 4	15 ± 4	21 ± 4	15 ± 4	20 ± 4	19 ± 4	22 ± 4	18 ± 4
05/11/23 - 05/18/23	15 ± 4	16 ± 4	18 ± 4	14 ± 4	15 ± 4	14 ± 4	18 ± 4	15 ± 4	19 ± 4
05/18/23 - 05/25/23	15 ± 4	18 ± 4	16 ± 4	21 ± 4	19 ± 4	17 ± 4	14 ± 4	16 ± 4	18 ± 4
05/25/23 - 05/31/23	12 ± 4	16 ± 4	17 ± 5	21 ± 5	18 ± 5	22 ± 5	22 ± 5	15 ± 5	19 ± 5
05/31/23 - 06/08/23	17 ± 4	20 ± 4	22 ± 4	22 ± 4	26 ± 4	24 ± 4	22 ± 4	20 ± 4	22 ± 4
06/08/23 - 06/15/23	14 ± 4	15 ± 4	15 ± 4	11 ± 4	16 ± 4	7 ± 4	15 ± 4	13 ± 4	16 ± 4
06/15/23 - 06/22/23	16 ± 4	21 ± 4	17 ± 4	18 ± 4	19 ± 4	21 ± 4	18 ± 4	22 ± 5	26 ± 5
06/22/23 - 06/28/23	20 ± 5	19 ± 4	15 ± 4	19 ± 5	18 ± 4	20 ± 5	16 ± 4	17 ± 4	18 ± 4
06/28/23 - 07/06/23	24 ± 4	24 ± 4	28 ± 4	25 ± 4	23 ± 4	24 ± 4	25 ± 4	22 ± 4	22 ± 4
07/06/23 - 07/12/23	17 ± 5	14 ± 5	8 ± 4	19 ± 5	7 ± 4	21 ± 5	14 ± 5	13 ± 5	21 ± 5
07/12/23 - 07/20/23	18 ± 4	21 ± 4	16 ± 4	16 ± 4	14 ± 4	16 ± 4	16 ± 4	17 ± 4	13 ± 3
07/20/23 - 07/27/23	22 ± 4	21 ± 4	23 ± 4	27 ± 5	23 ± 4	24 ± 4	25 ± 5	24 ± 5	25 ± 5
07/27/23 - 08/02/23	11 ± 5	14 ± 5	12 ± 5	16 ± 5	17 ± 5	15 ± 5	16 ± 5	16 ± 5	15 ± 5
08/02/23 - 08/10/23	18 ± 4	21 ± 4	19 ± 4	21 ± 4	21 ± 4	22 ± 4	26 ± 4	20 ± 4	21 ± 4
08/10/23 - 08/17/23	17 ± 4	16 ± 4	14 ± 4	19 ± 4	22 ± 4	18 ± 4	16 ± 4	16 ± 4	16 ± 4
08/17/23 - 08/24/23	27 ± 5	30 ± 5	26 ± 5	31 ± 5	30 ± 5	27 ± 5	28 ± 5	30 ± 5	24 ± 5
08/24/23 - 08/31/23	18 ± 4	18 ± 4	18 ± 4	20 ± 5	16 ± 4	17 ± 4	15 ± 4	17 ± 5	16 ± 4
08/31/23 - 09/06/23	19 ± 5	16 ± 5	17 ± 5	18 ± 5	20 ± 5	15 ± 5	20 ± 5	17 ± 5	23 ± 5
09/06/23 - 09/14/23	15 ± 4	13 ± 4	18 ± 4	16 ± 4	12 ± 3	15 ± 4	14 ± 4	15 ± 4	17 ± 4
09/14/23 - 09/21/23	23 ± 5	22 ± 5	22 ± 5	22 ± 5	25 ± 5	27 ± 5	21 ± 5	22 ± 5	19 ± 5
09/21/23 - 09/27/23	30 ± 5	35 ± 6	31 ± 6	30 ± 6	32 ± 6	35 ± 6	31 ± 5	29 ± 6	35 ± 6
09/27/23 - 10/04/23	33 ± 5	33 ± 5	35 ± 5	33 ± 5	33 ± 5	36 ± 5	34 ± 5	36 ± 5	36 ± 5
10/04/23 - 10/11/23	14 ± 4	17 ± 4	20 ± 4	16 ± 4	13 ± 4	16 ± 4	16 ± 4	17 ± 4	15 ± 4
10/11/23 - 10/19/23	21 ± 4	19 ± 4	22 ± 4	25 ± 4	21 ± 4	24 ± 4	25 ± 4	22 ± 4	23 ± 4
10/19/23 - 10/26/23	28 ± 5	24 ± 5	22 ± 5	28 ± 5	24 ± 5	27 ± 5	26 ± 5	22 ± 5	29 ± 5
10/26/23 - 11/01/23	22 ± 5	16 ± 4	17 ± 4	19 ± 5	18 ± 5	18 ± 4	17 ± 4	22 ± 5	19 ± 5
11/01/23 - 11/09/23	31 ± 5	32 ± 5	32 ± 5	32 ± 5	31 ± 5	29 ± 5	32 ± 5	35 ± 5	37 ± 5
11/09/23 - 11/16/23	20 ± 5	18 ± 4	17 ± 4	22 ± 5	23 ± 5	25 ± 5	22 ± 5	17 ± 4	23 ± 5
11/16/23 - 11/22/23	12 ± 4	12 ± 4	10 ± 4	15 ± 5	18 ± 5	13 ± 5	16 ± 5	17 ± 5	15 ± 5
11/22/23 - 11/30/23	24 ± 4	26 ± 4	26 ± 4	21 ± 4	21 ± 4	21 ± 4	21 ± 4	24 ± 4	25 ± 4
11/30/23 - 12/06/23	21 ± 5	21 ± 5	20 ± 5	17 ± 4	18 ± 4	18 ± 4	20 ± 5	17 ± 5	21 ± 5
12/06/23 - 12/14/23	23 ± 4	22 ± 4	19 ± 4	22 ± 4	21 ± 4	22 ± 4	19 ± 4	22 ± 4	26 ± 4
12/14/23 - 12/21/23	23 ± 5	25 ± 5	26 ± 5	24 ± 5	22 ± 4	24 ± 5	26 ± 5	24 ± 5	26 ± 5
12/21/23 - 12/27/23	20 ± 5	25 ± 5	21 ± 5	23 ± 5	21 ± 5	27 ± 5	28 ± 5	23 ± 5	24 ± 5
12/27/23 - 01/04/24	16 ± 4	17 ± 4	15 ± 4	17 ± 4	19 ± 4	18 ± 4	18 ± 4	19 ± 4	19 ± 4
(2) MEAN ± 2 STD DEV	19 ± 12	20 ± 12	20 ± 13	20 ± 12	20 ± 12	20 ± 12	20 ± 12	20 ± 11	21 ± 12

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

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

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, 2023

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
12/28/22 - 02/01/23	13	29	23 ± 11	12/28/22 - 02/01/23	13	33	24 ± 14	12/28/22 - 02/01/23	18	32	24 ± 10	12/28/22 - 02/01/23	17	32	24 ± 14
02/01/23 - 03/01/23	12	26	18 ± 9	02/01/23 - 03/01/23	13	29	18 ± 11	02/01/23 - 03/01/23	10	27	18 ± 9	02/01/23 - 03/01/23	11	24	17 ± 11
03/01/23 - 03/29/23	11	23	18 ± 9	03/01/23 - 03/29/23	9	24	16 ± 11	03/01/23 - 03/29/23	10	22	15 ± 8	03/01/23 - 03/29/23	12	27	19 ± 13
03/29/23 - 04/28/23	9	29	17 ± 12	03/29/23 - 04/28/23	11	30	18 ± 13	03/29/23 - 04/28/23	12	26	19 ± 10	03/29/23 - 04/28/23	13	27	18 ± 14
04/28/23 - 05/31/23	5	18	14 ± 8	04/28/23 - 05/31/23	9	21	16 ± 9	04/28/23 - 05/31/23	6	22	16 ± 9	04/28/23 - 05/31/23	10	19	17 ± 8
05/31/23 - 06/28/23	14	21	18 ± 5	05/31/23 - 06/28/23	11	22	17 ± 7	05/31/23 - 06/28/23	7	26	18 ± 9	05/31/23 - 06/28/23	16	26	20 ± 9
06/28/23 - 08/02/23	11	24	19 ± 9	06/28/23 - 08/02/23	8	28	19 ± 13	06/28/23 - 08/02/23	7	25	18 ± 10	06/28/23 - 08/02/23	13	25	19 ± 10
08/02/23 - 08/31/23	16	30	20 ± 10	08/02/23 - 08/31/23	14	31	21 ± 11	08/02/23 - 08/31/23	15	30	21 ± 11	08/02/23 - 08/31/23	16	24	19 ± 8
08/31/23 - 10/04/23	13	35	24 ± 17	08/31/23 - 10/04/23	16	35	24 ± 15	08/31/23 - 10/04/23	12	36	24 ± 17	08/31/23 - 10/04/23	17	36	26 ± 18
10/04/23 - 11/01/23	14	28	20 ± 9	10/04/23 - 11/01/23	16	28	21 ± 8	10/04/23 - 11/01/23	13	27	20 ± 8	10/04/23 - 11/01/23	15	29	21 ± 12
11/01/23 - 11/30/23	12	32	22 ± 15	11/01/23 - 11/30/23	10	32	22 ± 16	11/01/23 - 11/30/23	13	35	23 ± 13	11/01/23 - 11/30/23	15	37	25 ± 18
11/30/23 - 01/04/24	16	25	21 ± 6	11/30/23 - 01/04/24	15	26	20 ± 7	11/30/23 - 01/04/24	17	28	21 ± 7	11/30/23 - 01/04/24	19	26	23 ± 6
12/28/22 - 01/04/24	5	35	19 ± 12	12/28/22 - 01/04/24	8	35	20 ± 12	12/28/22 - 01/04/24	6	36	20 ± 12	12/28/22 - 01/04/24	10	37	21 ± 12

Table C-V.3

CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023

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	12/28/22 - 03/29/23	< 3	< 5	< 16	< 4	< 8	< 6	< 10	< 3	< 4	< 660	< 276
	03/29/23 - 06/28/23	< 4	< 6	< 21	< 3	< 10	< 7	< 10	< 4	< 3	< 374	< 150
	06/28/23 - 10/04/23	< 2	< 2	< 10	< 2	< 5	< 4	< 6	< 2	< 2	< 140	< 88
	10/04/23 - 01/04/24	< 3	< 5	< 14	< 2	< 6	< 5	< 7	< 3	< 2	< 211	< 85
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-03	12/28/22 - 03/29/23	< 2	< 3	< 12	< 2	< 5	< 3	< 7	< 2	< 2	< 362	< 154
	03/29/23 - 06/28/23	< 2	< 4	< 8	< 2	< 7	< 3	< 6	< 2	< 2	< 251	< 120
	06/28/23 - 10/04/23	< 3	< 2	< 7	< 3	< 4	< 3	< 5	< 2	< 2	< 172	< 92
	10/04/23 - 01/04/24	< 3	< 3	< 10	< 3	< 7	< 4	< 6	< 2	< 2	< 170	< 71
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-04	12/28/22 - 03/29/23	< 3	< 3	< 15	< 1	< 3	< 4	< 7	< 2	< 2	< 429	< 205
	03/29/23 - 06/28/23	< 2	< 3	< 11	< 3	< 4	< 4	< 4	< 2	< 2	< 185	< 144
	06/28/23 - 10/04/23	< 3	< 5	< 10	< 4	< 6	< 4	< 7	< 3	< 2	< 208	< 98
	10/04/23 - 01/04/24	< 2	< 3	< 10	< 2	< 6	< 4	< 5	< 2	< 1	< 158	< 92
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-05	12/28/22 - 03/29/23	< 2	< 5	< 9	< 3	< 6	< 4	< 7	< 2	< 2	< 393	< 153
	03/29/23 - 06/28/23	< 3	< 5	< 10	< 4	< 8	< 5	< 9	< 3	< 3	< 404	< 175
	06/28/23 - 10/04/23	< 2	< 3	< 8	< 1	< 6	< 4	< 6	< 2	< 1	< 135	< 51
	10/04/23 - 01/04/24	< 3	< 4	< 9	< 2	< 6	< 4	< 8	< 2	< 2	< 180	< 37
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-06	12/28/22 - 03/29/23	< 2	< 4	< 12	< 2	< 5	< 4	< 7	< 2	< 2	< 416	< 156
	03/29/23 - 06/28/23	< 2	< 4	< 10	< 3	< 5	< 3	< 6	< 2	< 2	< 316	< 109
	06/28/23 - 10/04/23	< 3	< 4	< 11	< 3	< 7	< 4	< 9	< 3	< 3	< 238	< 79
	10/04/23 - 01/04/24	< 4	< 5	< 16	< 3	< 8	< 6	< 10	< 4	< 3	< 295	< 123
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-V.3

CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023

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	12/28/22 - 03/29/23	< 3	< 3	< 15	< 3	< 7	< 5	< 7	< 3	< 2	< 400	< 195
	03/29/23 - 06/28/23	< 2	< 3	< 8	< 2	< 6	< 4	< 8	< 3	< 2	< 293	< 169
	06/28/23 - 10/04/23	< 2	< 3	< 10	< 2	< 6	< 4	< 6	< 2	< 1	< 150	< 84
	10/04/23 - 01/04/24	< 2	< 4	< 12	< 2	< 5	< 5	< 5	< 3	< 2	< 161	< 57
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-08	12/28/22 - 03/29/23	< 4	< 5	< 25	< 5	< 7	< 5	< 13	< 3	< 2	< 645	< 267
	03/29/23 - 06/28/23	< 3	< 4	< 13	< 3	< 8	< 5	< 8	< 3	< 2	< 400	< 195
	06/28/23 - 10/04/23	< 2	< 4	< 8	< 2	< 6	< 3	< 5	< 2	< 2	< 227	< 105
	10/04/23 - 01/04/24	< 2	< 3	< 9	< 2	< 5	< 3	< 5	< 2	< 2	< 161	< 46
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-10	12/28/22 - 03/29/23	< 2	< 2	< 14	< 2	< 5	< 4	< 8	< 2	< 1	< 378	< 198
	03/29/23 - 06/28/23	< 2	< 3	< 7	< 2	< 6	< 3	< 8	< 2	< 2	< 222	< 56
	06/28/23 - 10/04/23	< 4	< 7	< 15	< 4	< 8	< 6	< 8	< 3	< 3	< 227	< 115
	10/04/23 - 01/04/24	< 1	< 3	< 8	< 2	< 5	< 4	< 6	< 2	< 1	< 159	< 82
	MEAN	-	-	-	-	-	-	-	-	-	-	-
L-11A	12/28/22 - 03/29/23	< 2	< 4	< 8	< 2	< 3	< 4	< 9	< 2	< 2	< 406	< 150
	03/29/23 - 06/28/23	< 3	< 4	< 10	< 2	< 8	< 4	< 8	< 2	< 2	< 307	< 59
	06/28/23 - 10/04/23	< 1	< 4	< 13	< 2	< 6	< 3	< 5	< 2	< 2	< 210	< 103
	10/04/23 - 01/04/24	< 3	< 4	< 11	< 3	< 8	< 5	< 9	< 3	< 3	< 244	< 95
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-VI.1

CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023

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

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VII.1

CONCENTRATIONS OF GAMMA EMITTERS IN FOOD PRODUCT SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023

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-42													
Pasturage	01/05/23	< 43	< 38	< 74	< 48	< 95	< 43	< 76	< 53	< 53	< 43	< 164	< 53
Pasturage	02/01/23	< 21	< 21	< 45	< 23	< 49	< 23	< 38	< 39	< 28	< 23	< 104	< 35
Pasturage	03/01/23	< 32	< 28	< 70	< 34	< 63	< 33	< 48	< 56	< 32	< 33	< 145	< 43
Pasturage	04/06/23	< 31	< 31	< 80	< 38	< 77	< 26	< 49	< 37	< 37	< 30	< 110	< 25
Pasturage	05/04/23	< 31	< 33	< 57	< 36	< 68	< 25	< 52	< 43	< 32	< 30	< 143	< 28
Pasturage	05/18/23	< 31	< 27	< 67	< 49	< 72	< 42	< 56	< 55	< 30	< 38	< 188	< 44
Pasturage	06/01/23	< 36	< 30	< 90	< 42	< 89	< 34	< 59	< 55	< 44	< 41	< 159	< 27
Pasturage	06/15/23	< 41	< 42	< 79	< 42	< 66	< 37	< 58	< 52	< 39	< 38	< 134	< 40
Pasturage	06/29/23	< 31	< 33	< 72	< 37	< 66	< 29	< 51	< 52	< 34	< 34	< 138	< 38
Pasturage	07/13/23	< 26	< 25	< 55	< 25	< 56	< 25	< 41	< 50	< 23	< 21	< 121	< 39
Pasturage	07/28/23	< 21	< 21	< 43	< 22	< 49	< 18	< 36	< 32	< 26	< 19	< 94	< 27
Pasturage	08/10/23	< 30	< 27	< 83	< 29	< 73	< 33	< 42	< 44	< 33	< 28	< 127	< 38
Pasturage	08/24/23	< 36	< 33	< 98	< 44	< 94	< 45	< 73	< 51	< 42	< 43	< 173	< 45
Pasturage	09/07/23	< 24	< 30	< 75	< 30	< 99	< 38	< 38	< 40	< 36	< 36	< 168	< 38
Pasturage	09/21/23	< 43	< 38	< 82	< 41	< 81	< 43	< 69	< 53	< 46	< 37	< 144	< 42
Pasturage	10/04/23	< 23	< 28	< 64	< 31	< 68	< 35	< 52	< 48	< 28	< 35	< 143	< 32
Pasturage	10/19/23	< 25	< 28	< 58	< 26	< 64	< 35	< 47	< 40	< 29	< 24	< 104	< 31
Pasturage	11/01/23	< 33	< 27	< 61	< 36	< 74	< 29	< 48	< 46	< 29	< 30	< 126	< 45
Pasturage	12/06/23	< 25	< 28	< 51	< 13	< 67	< 33	< 52	< 48	< 33	< 31	< 130	< 40
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
L-QUAD 1													
Cabbage	07/27/23	< 23	< 30	< 56	< 29	< 65	< 25	< 50	< 39	< 27	< 29	< 114	< 47
Potato	07/27/23	< 28	< 19	< 61	< 28	< 63	< 29	< 42	< 35	< 25	< 23	< 109	< 30
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
L-QUAD 2													
Horseradish	07/27/23	< 28	< 28	< 56	< 35	< 64	< 32	< 50	< 46	< 34	< 37	< 110	< 50
Cabbage	07/27/23	< 29	< 29	< 49	< 31	< 51	< 31	< 55	< 37	< 26	< 20	< 116	< 46
Brussels sprouts	07/27/23	< 24	< 26	< 47	< 26	< 62	< 24	< 42	< 40	< 30	< 29	< 110	< 39
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
L-QUAD 3													
Turnip	07/27/23	< 18	< 15	< 37	< 18	< 40	< 17	< 23	< 32	< 17	< 17	< 75	< 20
Lettuce	07/27/23	< 30	< 26	< 62	< 33	< 68	< 34	< 55	< 47	< 33	< 34	< 133	< 43
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
L-QUAD 4													
Kohlrabi	07/27/23	< 16	< 22	< 49	< 20	< 42	< 21	< 41	< 35	< 16	< 20	< 86	< 30
Red beets	07/27/23	< 31	< 30	< 61	< 26	< 70	< 26	< 49	< 51	< 28	< 29	< 139	< 31
Red beet leaves	07/27/23	< 25	< 23	< 61	< 46	< 73	< 31	< 59	< 42	< 35	< 30	< 142	< 28
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-VII.2

CONCENTRATIONS OF GAMMA EMITTERS IN VEGETATION SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023

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													
Dandelion	05/18/23	< 36	< 40	< 79	< 40	< 103	< 37	< 59	< 51	< 42	< 41	< 169	< 56
Clover	05/18/23	< 50	< 40	< 80	< 46	< 74	< 35	< 60	< 56	< 42	< 41	< 174	< 49
Milkweed	06/15/23	< 38	< 31	< 57	< 38	< 75	< 29	< 63	< 41	< 41	< 36	< 132	< 42
Clover	06/15/23	< 28	< 24	< 60	< 35	< 73	< 27	< 41	< 30	< 30	< 28	< 99	< 37
Collard	07/13/23	< 28	< 24	< 65	< 33	< 70	< 29	< 36	< 37	< 27	< 22	< 116	< 39
Mustard green	07/13/23	< 34	< 39	< 94	< 45	< 101	< 33	< 63	< 53	< 37	< 39	< 169	< 30
Swiss chard	07/13/23	< 21	< 21	< 50	< 30	< 51	< 26	< 33	< 30	< 26	< 19	< 76	< 29
Birds-foot trefoil	07/20/23	< 10	< 11	< 28	< 12	< 25	< 11	< 21	< 30	< 11	< 11	< 74	< 18
Clover	07/20/23	< 13	< 13	< 29	< 14	< 26	< 13	< 23	< 35	< 13	< 12	< 80	< 23
Radish	07/27/23	< 24	< 25	< 52	< 30	< 55	< 27	< 40	< 45	< 27	< 26	< 107	< 50
Radish leaves	07/27/23	< 18	< 17	< 37	< 15	< 33	< 16	< 27	< 24	< 17	< 17	< 71	< 26
Birds-foot trefoil	08/17/23	< 20	< 18	< 45	< 22	< 48	< 20	< 32	< 27	< 21	< 21	< 86	< 24
Clover	08/17/23	< 31	< 33	< 66	< 32	< 63	< 34	< 56	< 50	< 33	< 34	< 144	< 43
Milkweed	08/17/23	< 32	< 27	< 71	< 41	< 80	< 39	< 53	< 48	< 29	< 30	< 164	< 42
Birds-foot trefoil	09/21/23	< 17	< 17	< 34	< 18	< 36	< 17	< 27	< 26	< 19	< 18	< 76	< 23
Clover	09/21/23	< 27	< 36	< 60	< 52	< 83	< 29	< 48	< 40	< 33	< 34	< 145	< 27
Grass	09/21/23	< 17	< 17	< 37	< 20	< 39	< 17	< 32	< 25	< 20	< 19	< 79	< 22
Dandelion	10/11/23	< 27	< 28	< 58	< 34	< 63	< 33	< 53	< 43	< 31	< 32	< 110	< 41
Grass	10/11/23	< 19	< 19	< 38	< 22	< 40	< 22	< 32	< 29	< 23	< 19	< 85	< 26
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
L-ESE-1													
Clover	05/18/23	< 21	< 20	< 40	< 28	< 45	< 22	< 39	< 33	< 26	< 22	< 99	< 27
Dandelion	05/18/23	< 24	< 24	< 48	< 29	< 51	< 24	< 44	< 38	< 26	< 26	< 109	< 30
Clover	06/15/23	< 21	< 25	< 68	< 30	< 72	< 41	< 45	< 44	< 38	< 34	< 107	< 32
Dandelion	06/15/23	< 35	< 37	< 71	< 43	< 74	< 35	< 62	< 50	< 38	< 38	< 148	< 41
Clover	07/20/23	< 11	< 12	< 28	< 12	< 25	< 11	< 18	< 28	< 12	< 11	< 66	< 20
Dandelion	07/20/23	< 17	< 19	< 41	< 18	< 42	< 20	< 32	< 52	< 19	< 19	< 118	< 28
Clover	08/17/23	< 22	< 27	< 50	< 28	< 50	< 28	< 41	< 39	< 30	< 25	< 107	< 36
Dandelion	08/17/23	< 29	< 29	< 64	< 33	< 79	< 29	< 55	< 39	< 39	< 28	< 132	< 42
Clover	09/21/23	< 30	< 31	< 64	< 41	< 72	< 40	< 61	< 46	< 39	< 34	< 137	< 36
Dandelion	09/21/23	< 35	< 36	< 79	< 26	< 89	< 43	< 49	< 48	< 37	< 37	< 156	< 56
Clover	10/11/23	< 18	< 17	< 39	< 19	< 43	< 18	< 32	< 30	< 19	< 19	< 85	< 21
Dandelion	10/11/23	< 30	< 27	< 62	< 41	< 72	< 28	< 40	< 44	< 30	< 30	< 127	< 39
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-
L-ESE-2													
Dandelion	05/18/23	< 41	< 42	< 84	< 39	< 94	< 44	< 82	< 49	< 50	< 45	< 153	< 50
Clover	05/18/23	< 27	< 29	< 65	< 43	< 89	< 32	< 68	< 54	< 38	< 35	< 167	< 45
Plantain	06/15/23	< 31	< 30	< 63	< 30	< 65	< 27	< 61	< 47	< 36	< 35	< 148	< 32
Clover	06/15/23	< 36	< 31	< 68	< 39	< 78	< 36	< 53	< 40	< 35	< 35	< 149	< 51
Milkweed	07/20/23	< 24	< 22	< 54	< 29	< 53	< 25	< 41	< 54	< 21	< 23	< 133	< 39
Clover	07/20/23	< 20	< 20	< 45	< 23	< 45	< 21	< 33	< 53	< 20	< 19	< 107	< 26
Velvetleaf	08/17/23	< 28	< 30	< 59	< 28	< 59	< 25	< 48	< 39	< 29	< 29	< 117	< 30
Grass	08/17/23	< 30	< 33	< 69	< 31	< 80	< 29	< 47	< 41	< 37	< 30	< 132	< 41
Dandelion	09/21/23	< 33	< 30	< 67	< 41	< 74	< 37	< 54	< 48	< 35	< 33	< 144	< 47
Dandelion	09/21/23	< 32	< 34	< 69	< 39	< 76	< 29	< 63	< 48	< 40	< 30	< 128	< 22
Grass	09/27/23	< 22	< 21	< 64	< 34	< 70	< 34	< 52	< 44	< 30	< 28	< 134	< 43
Clover	10/11/23	< 16	< 15	< 37	< 18	< 36	< 17	< 28	< 24	< 18	< 17	< 70	< 19
Dandelion	10/11/23	< 31	< 42	< 73	< 34	< 82	< 40	< 56	< 49	< 34	< 35	< 141	< 58
	MEAN	-	-	-	-	-	-	-	-	-	-	-	-

Table C-VIII.1 QUARTERLY DLR RESULTS FOR LASALLE COUNTY STATION, 2023

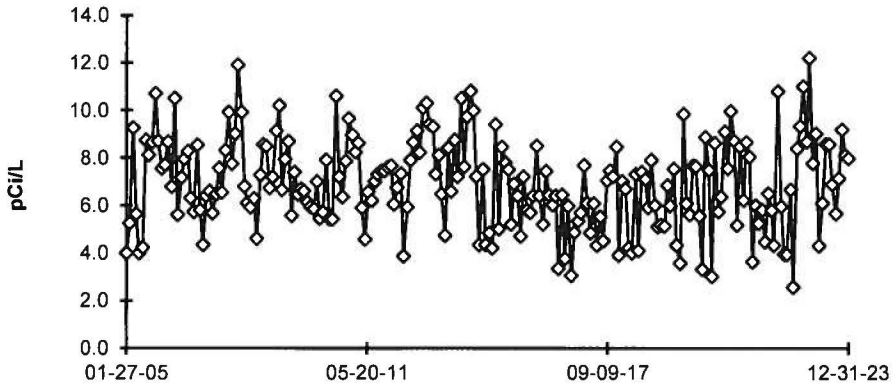
Location	Location Qtrly Baseline, B_Q (mrem)	B_Q + MDD_Q (mrem)	2023 Normalized Net Dose, MQ_X (mrem/std. Qtr.)				Annual Baseline B_A[1]	B_A + MDD_A[2] (mrem)	Normalized Annual Dose, M_A (mrem/yr)	Annual Facility Dose, F_A
			1	2	3	4				
L-01	18.2	22.9	18.8	19.2	20.7	17.5	72.8	85.9	76.2	ND
L-03	17.8	22.4	17.6	18.4	18.4	16.9	71.0	84.1	71.3	ND
L-04	16.9	21.6	16.4	17.6	17.9	15.4	67.6	80.7	67.3	ND
L-05	17.1	21.8	17.1	18.6	18.5	17.2	68.5	81.6	71.4	ND
L-06	17.9	22.6	18.7	18.2	21.1	16.2	71.8	84.9	74.0	ND
L-07	17.7	22.3	17.2	18.0	17.3	17.6	70.7	83.8	70.0	ND
L-08	16.4	21.1	15.9	15.7	15.7	15.0	65.7	78.7	62.3	ND
L-10	15.1	19.8	15.1	14.7	14.5	12.5	60.5	73.5	56.8	ND
L-101	18.2	22.9	18.2	17.4	20.2	18.7	72.9	86.0	74.6	ND
L-102	19.8	24.4	20.1	18.1	20.9	17.6	79.0	92.1	76.7	ND
L-103	17.5	22.2	18.7	19.1	18.7	17.5	70.0	83.1	73.9	ND
L-104	17.4	22.1	17.3	16.6	18.5	15.9	69.7	82.8	68.3	ND
L-105	19.0	23.7	18.7	18.0	20.1	18.3	76.1	89.2	75.1	ND
L-106	17.5	22.1	18.3	19.7	17.9	16.4	69.8	82.9	72.3	ND
L-107	18.5	23.1	19.2	18.7	19.5	17.1	74.0	87.1	74.3	ND
L-108	18.8	23.4	18.3	18.5	19.6	17.8	75.1	88.2	74.1	ND
L-109	17.4	22.0	18.1	19.1	19.2	18.5	69.4	82.5	74.8	ND
L-110	18.2	22.8	18.6	18.4	18.0	15.8	72.6	85.7	70.7	ND
L-111B	19.0	23.7	18.5	18.9	19.4	17.4	76.1	89.2	74.2	ND
L-112	17.8	22.4	16.0	16.7	18.7	16.5	71.0	84.1	67.7	ND
L-113A	19.3	24.0	19.6	18.9	21.1	20.2	77.2	90.3	79.8	ND
L-114	18.2	22.9	19.5	18.6	18.9	16.6	73.0	86.0	73.6	ND
L-115	17.5	22.1	17.2	15.9	16.5	16.3	69.9	83.0	65.8	ND
L-116	17.1	21.7	16.7	18.9	18.0	16.3	68.4	81.5	69.8	ND
L-11A	16.9	21.6	17.0	17.7	17.8	15.9	67.7	80.8	68.5	ND
L-201	14.4	19.1	14.3	14.6	15.7	15.3	57.7	70.8	59.8	ND
L-202	15.6	20.3	14.8	17.1	16.0	13.8	62.6	75.7	61.7	ND
L-203	17.6	22.2	18.1	18.5	18.1	16.7	70.2	83.3	71.5	ND
L-204	18.7	23.4	18.6	22.0	20.5	16.7	75.0	88.1	77.8	ND
L-205A	18.3	23.0	17.7	19.7	17.4	17.6	73.3	86.4	72.4	ND
L-205B	16.8	21.4	19.7	19.0	18.6	16.0	67.2	80.3	73.4	ND
L-206	18.3	22.9	19.1	20.1	19.0	15.9	73.1	86.2	74.1	ND
L-207	17.6	22.3	19.2	20.2	19.0	17.6	70.6	83.7	76.0	ND
L-208	18.5	23.1	19.8	19.6	20.5	17.8	73.9	87.0	77.5	ND
L-209	17.9	22.6	17.9	17.8	19.1	15.9	71.6	84.7	70.7	ND
L-210	19.4	24.0	18.8	20.1	20.7	19.7	77.5	90.6	79.4	ND
L-211	18.3	23.0	18.3	21.1	19.2	16.8	73.4	86.4	75.4	ND
L-212	18.9	23.5	19.0	21.0	20.1	17.1	75.4	88.5	77.1	ND
L-213	17.4	22.1	16.8	17.1	18.6	15.1	69.7	82.8	67.5	ND
L-214	17.5	22.2	17.6	17.9	18.4	15.9	70.1	83.1	69.7	ND
L-215	18.7	23.4	17.7	19.9	19.2	17.2	74.8	87.9	74.0	ND
L-216	18.1	22.7	18.4	17.5	19.2	17.2	72.2	85.3	72.2	ND

[1] **Baseline background dose (B_A):** The estimated mean background radiation dose at each field monitoring location annually based on historical measurements, excluding any dose contribution from the monitored facility

[2] **Minimum differential dose (MDD_A):** The smallest amount of facility related dose at each monitored location annually above the baseline background dose that can be reliably detected by an environmental dosimetry system

FIGURE C-1
Surface Water - Gross Beta - Stations L-21 (C) and L-40 Collected in the Vicinity of LSCS, 2005 - 2023

L-21 (C) Illinois River at Seneca



L-40 Illinois River Downstream

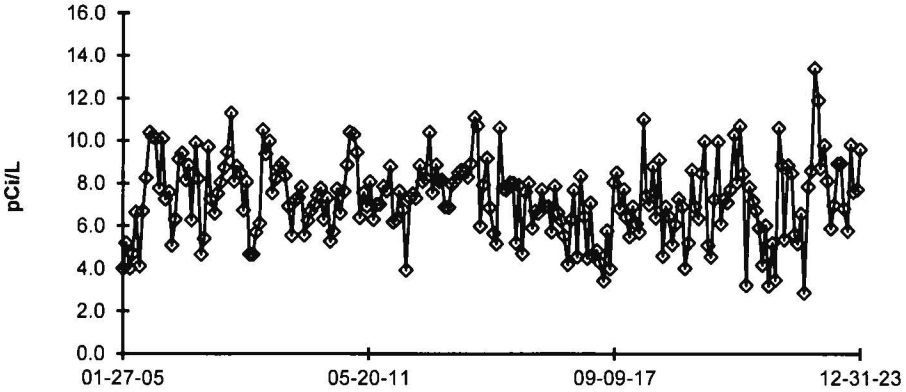
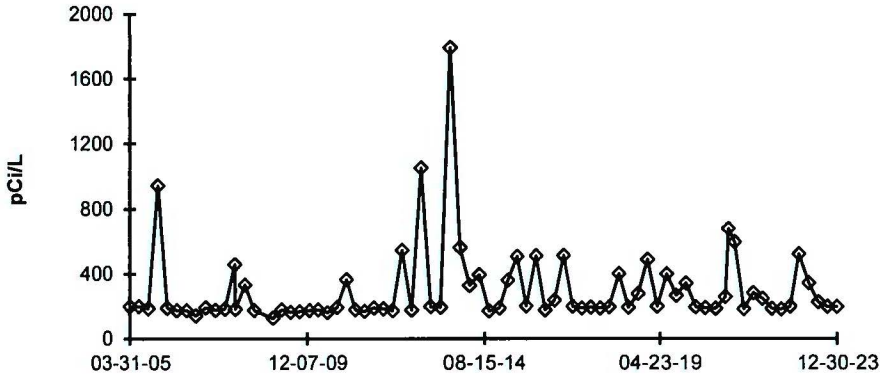


FIGURE C-2
Surface Water - Tritium - Stations L-21 (C) and L-40 Collected in the Vicinity of LSCS, 2005 - 2023

L-21 Illinois River at Seneca



L-40 Illinois River Downstream

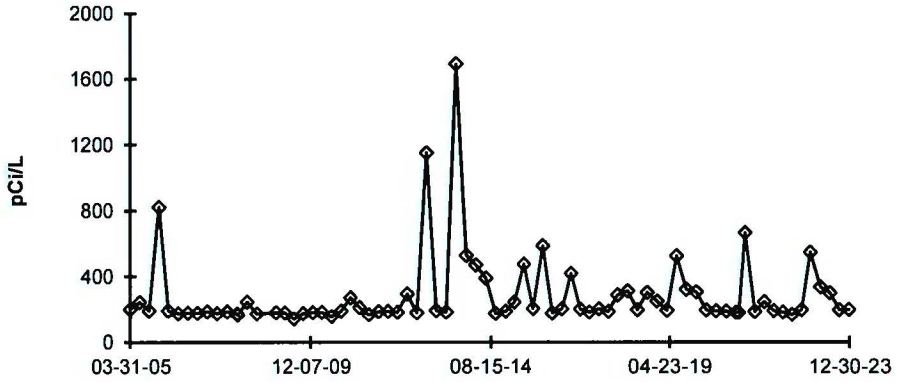
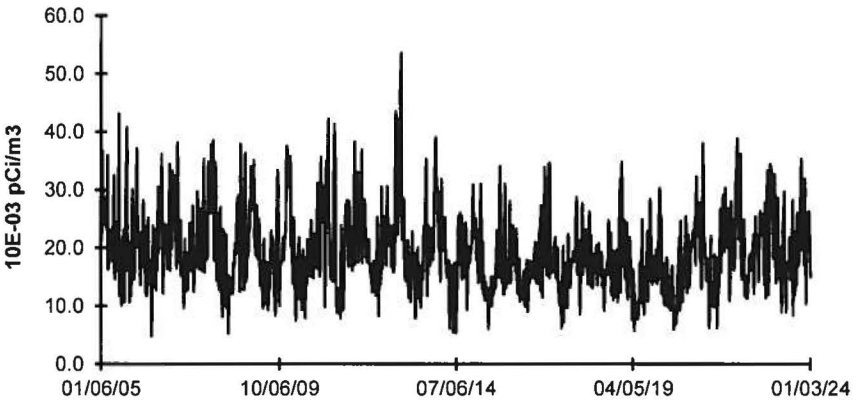


FIGURE C-3
Air Particulate - Gross Beta - Stations L-01 and L-03 Collected in the Vicinity of LSCS, 2005 - 2023

L-01 Nearsite No. 1



L-03 Onsite No. 3

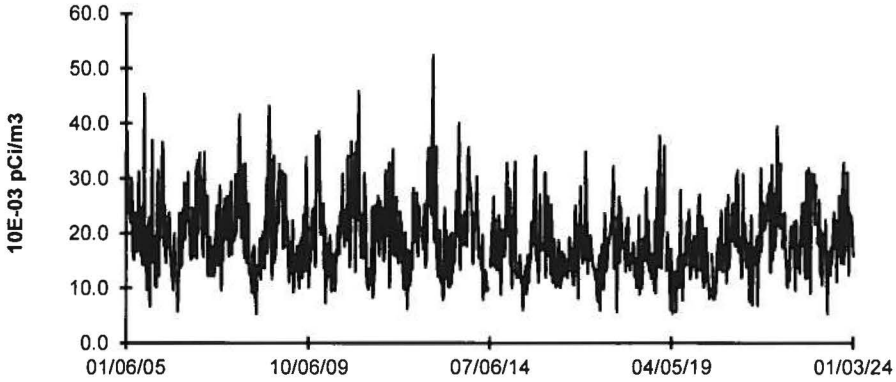
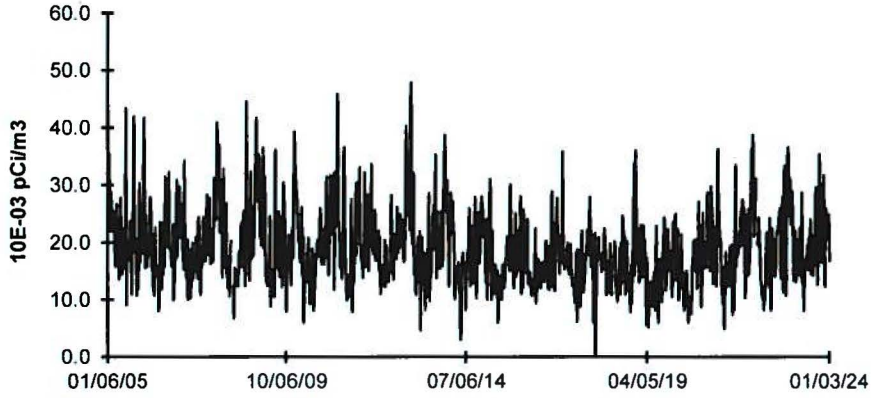


FIGURE C-4
Air Particulate - Gross Beta - Stations L-05 and L-06 Collected in the Vicinity of LSCS, 2005 - 2023

L-05 Onsite No. 5



L-06 Nearsite No. 6

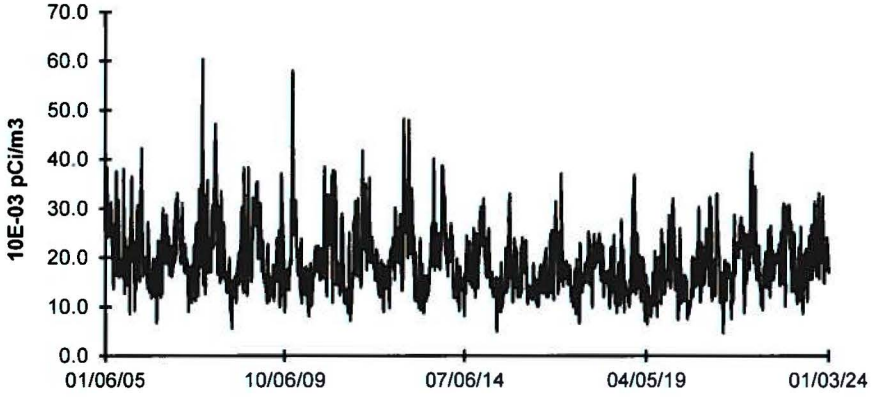


FIGURE C-5
Air Particulate - Gross Beta - Station L-10 (C)
Collected in the Vicinity of LSCS, 2005 - 2023

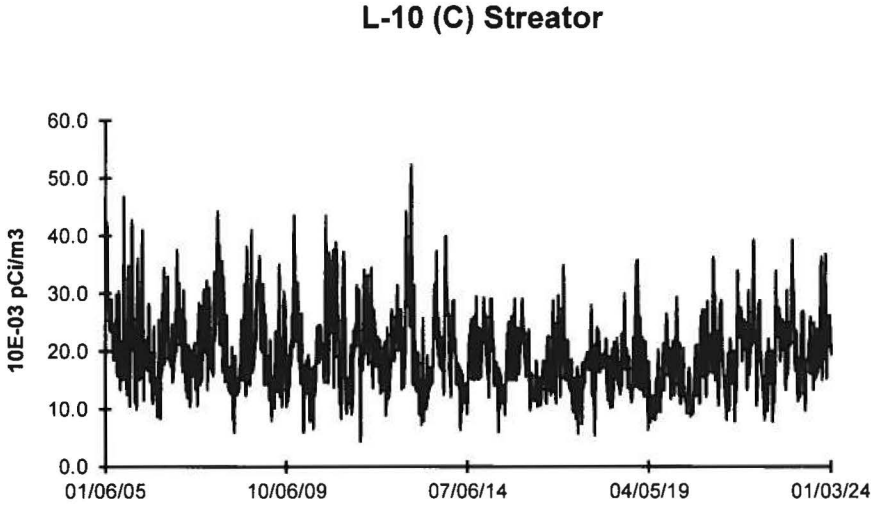
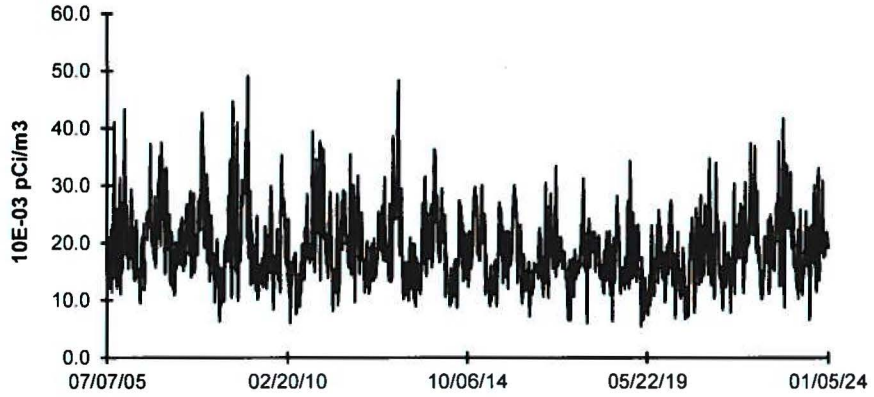


FIGURE C-6
Air Particulate - Gross Beta - Stations L-04 and L-07 Collected in the Vicinity of LSCS, 2005 - 2023

L-04 Rte. 170



L-07 Seneca

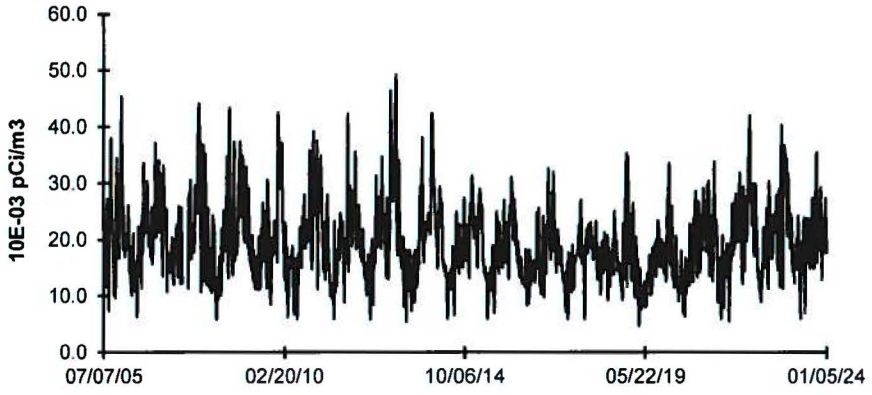
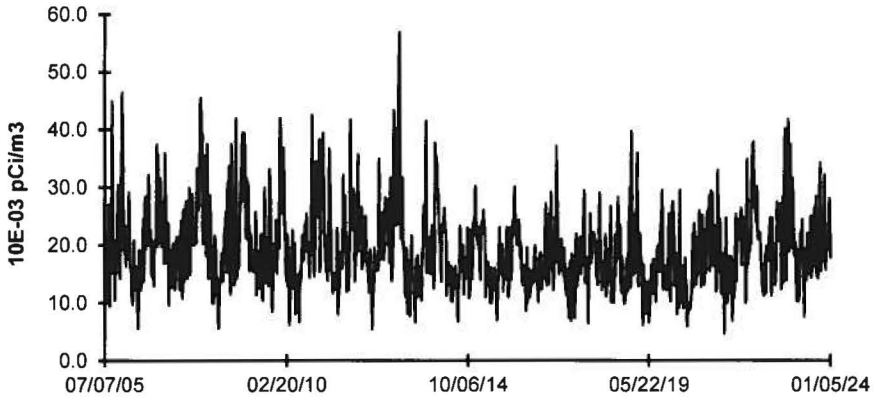
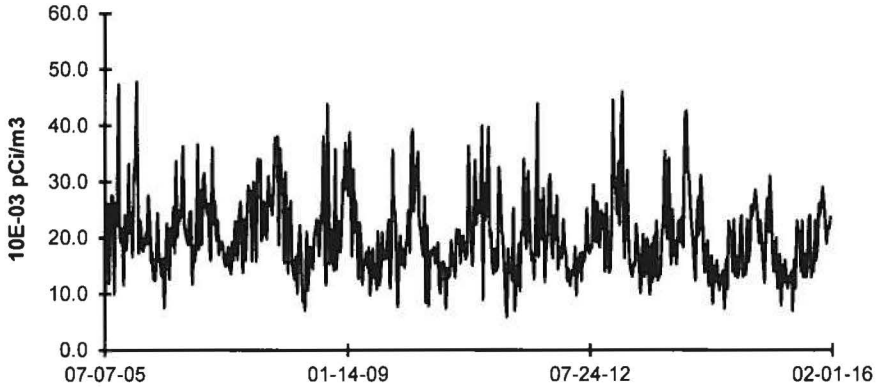


FIGURE C-7
Air Particulate - Gross Beta - Stations L-08 and L-11 Collected in the Vicinity of LSCS, 2005 - 2023

L-08 Marseilles

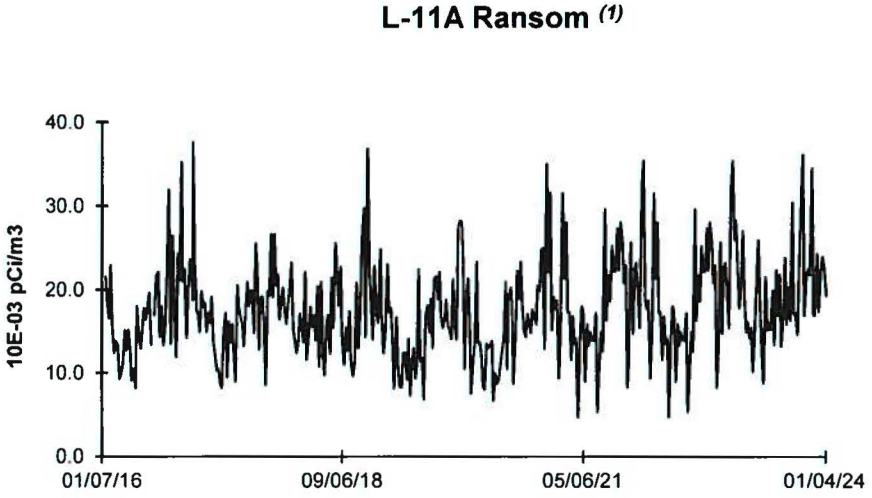


L-11 Ransom *(1)*



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

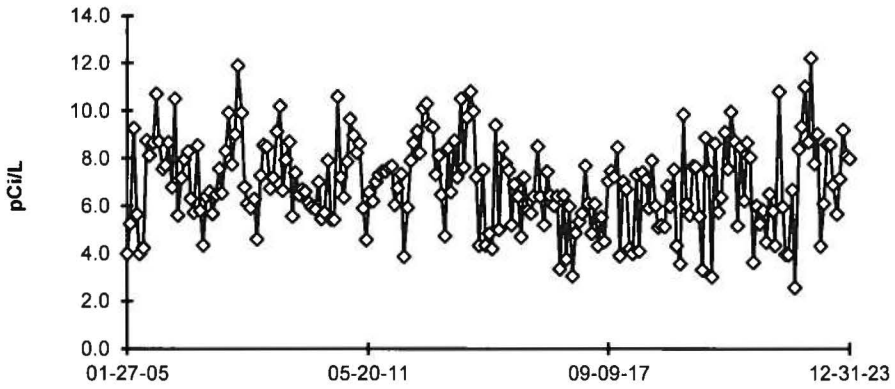
FIGURE C-8
Air Particulate - Gross Beta - Station L-11A
Collected in the Vicinity of LSCS, 2016 - 2023



(1) Air monitoring station L-11A was placed in service on 01/14/16

FIGURE C-1
Surface Water - Gross Beta - Stations L-21 (C) and L-40 Collected in the Vicinity of LSCS, 2005 - 2023

L-21 (C) Illinois River at Seneca



L-40 Illinois River Downstream

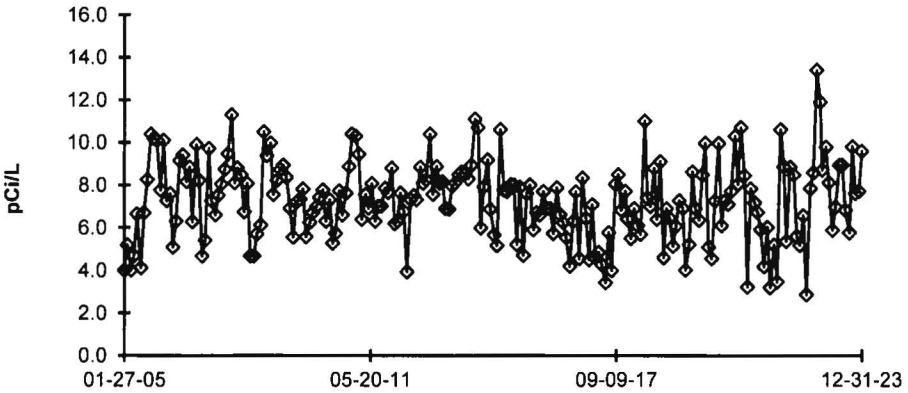
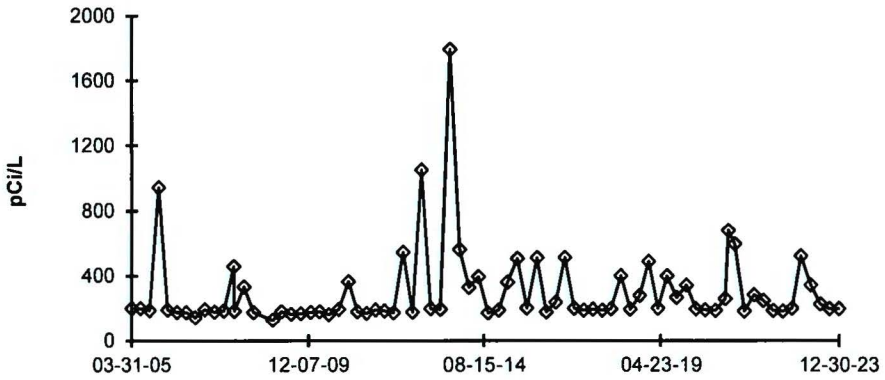
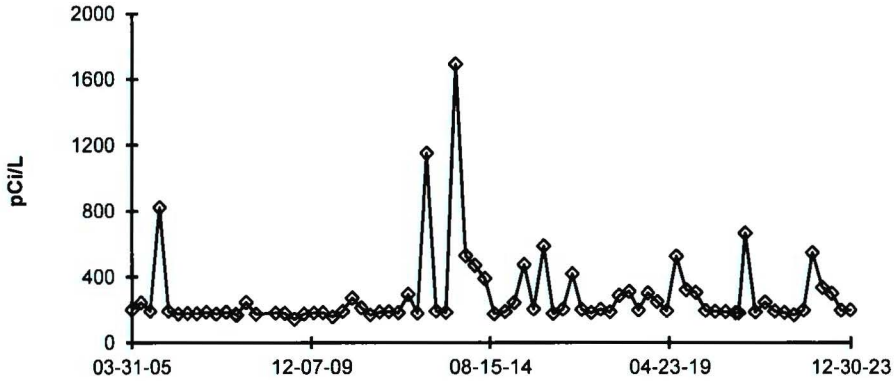


FIGURE C-2
Surface Water - Tritium - Stations L-21 (C) and L-40 Collected in the Vicinity of LSCS, 2005 - 2023

L-21 Illinois River at Seneca



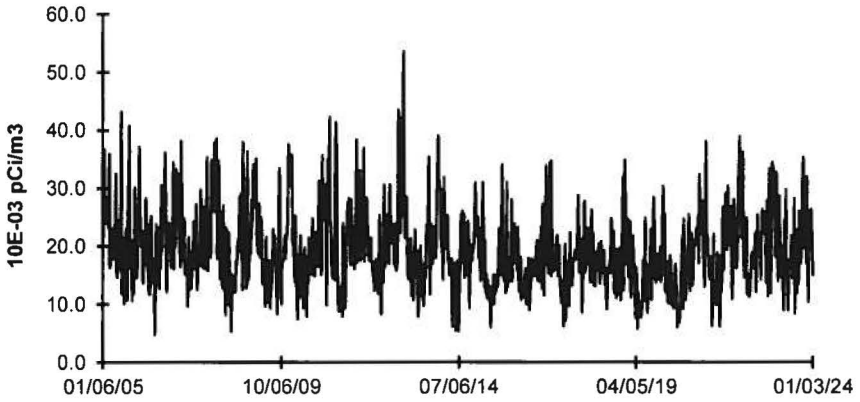
L-40 Illinois River Downstream



NOTE: Any increases in tritium at the indicator location wre also observed at the control location. Therefore, a source upstream of LaSalle to the Illinois River is determined to be the cause of the elevated tritium results.

FIGURE C-3
Air Particulate - Gross Beta - Stations L-01 and L-03 Collected in the Vicinity of LSCS, 2005 - 2023

L-01 Nearsite No. 1



L-03 Onsite No. 3

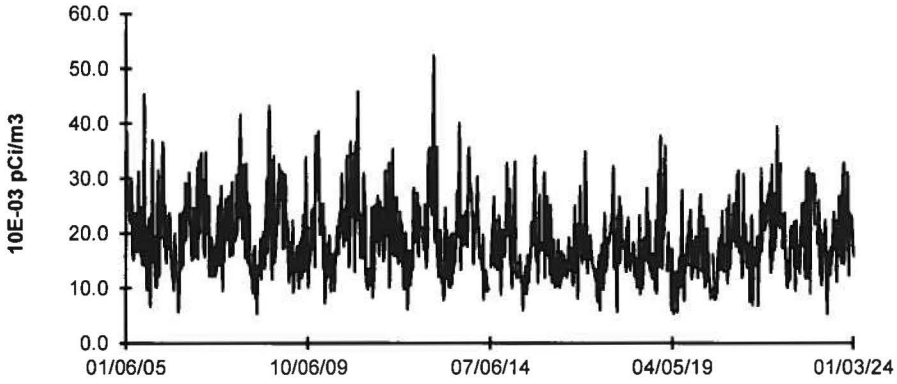
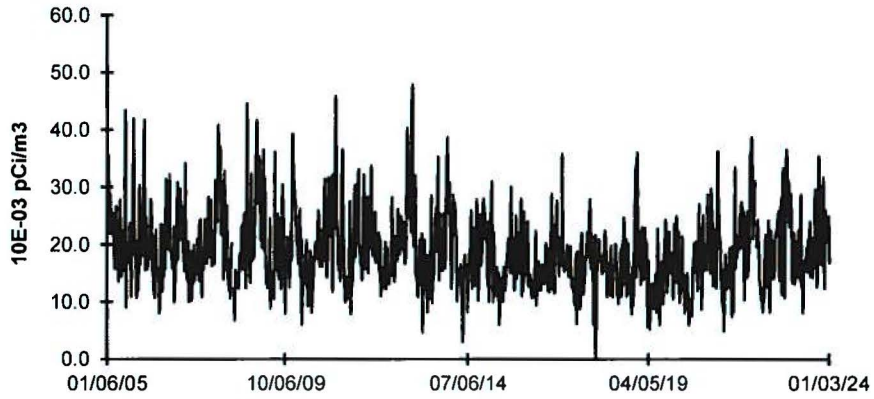


FIGURE C-4
Air Particulate - Gross Beta - Stations L-05 and L-06 Collected in the Vicinity of LSCS, 2005 - 2023

L-05 Onsite No. 5



L-06 Nearsite No. 6

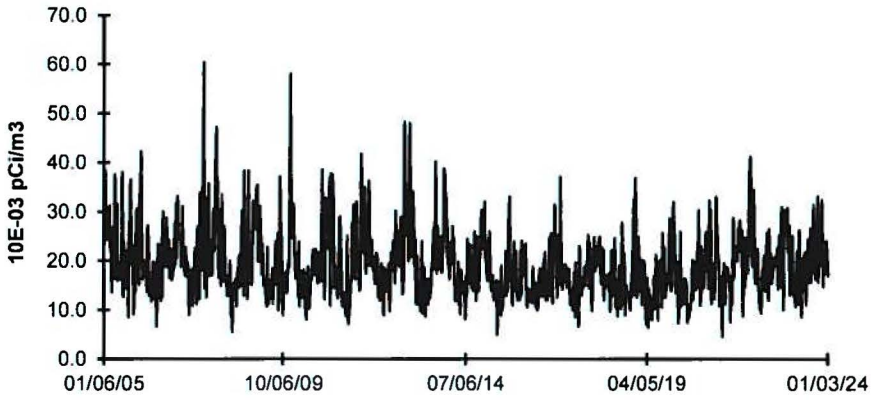


FIGURE C-5
Air Particulate - Gross Beta - Station L-10 (C) Collected in the Vicinity of LSCS, 2005 - 2023

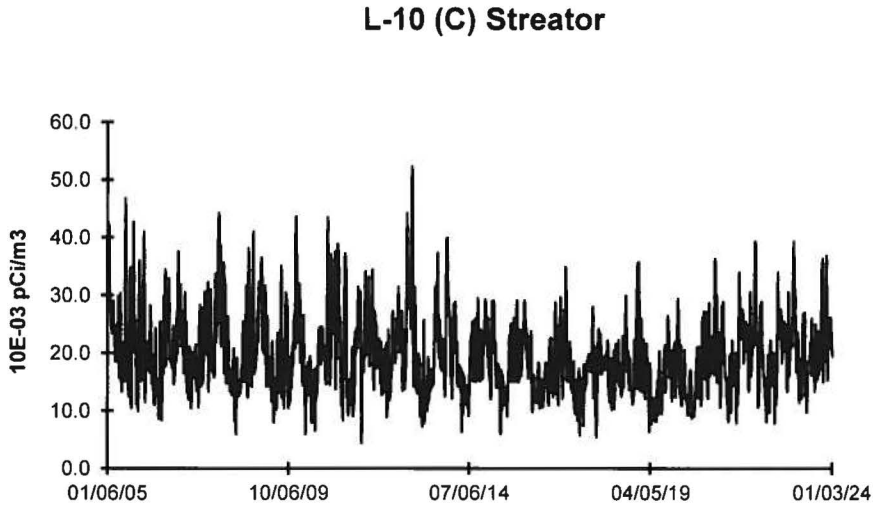
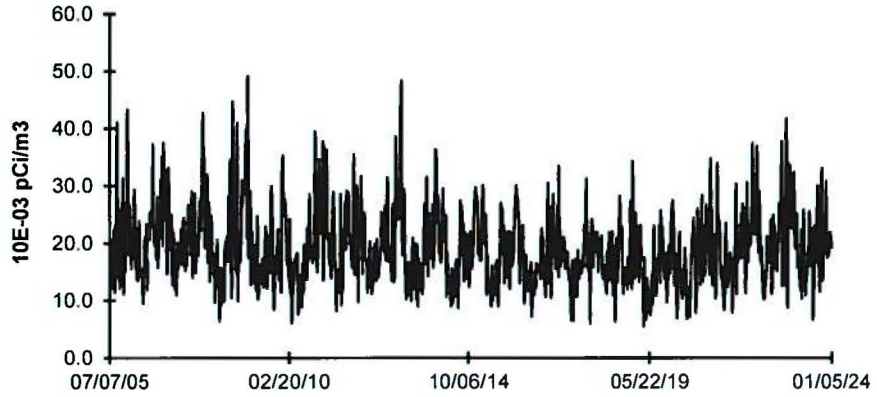


FIGURE C-6
Air Particulate - Gross Beta - Stations L-04 and L-07 Collected in the Vicinity of LSCS, 2005 - 2023

L-04 Rte. 170



L-07 Seneca

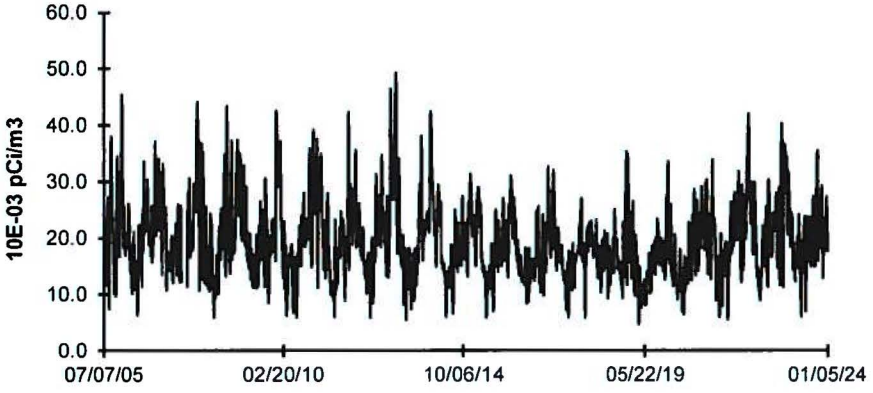
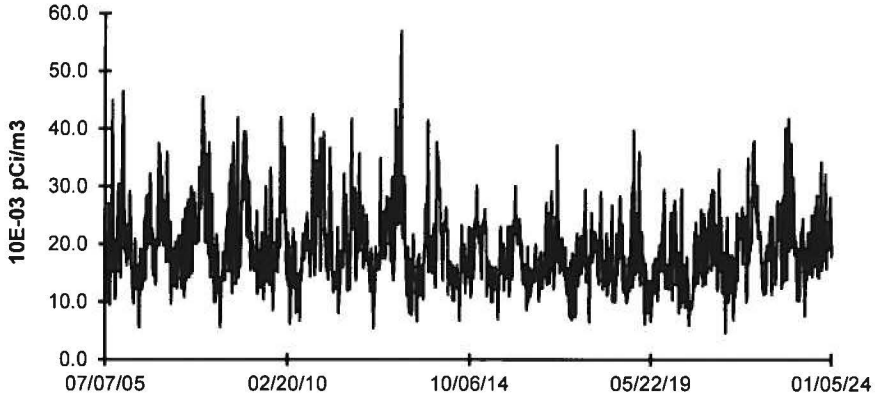
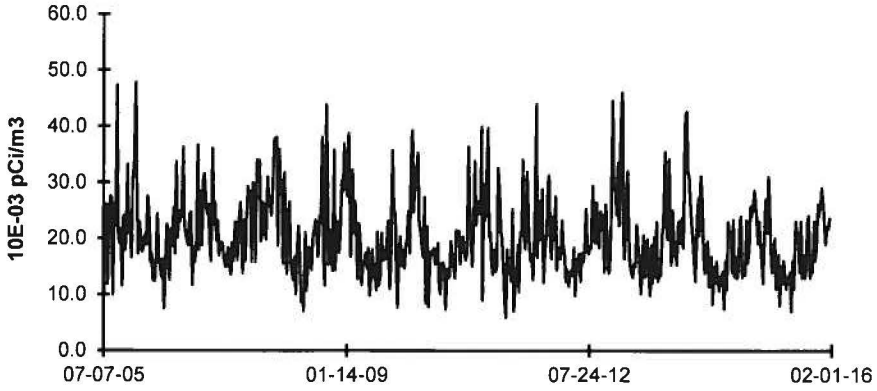


FIGURE C-7
Air Particulate - Gross Beta - Stations L-08 and L-11 Collected in the Vicinity of LSCS, 2005 - 2023

L-08 Marseilles

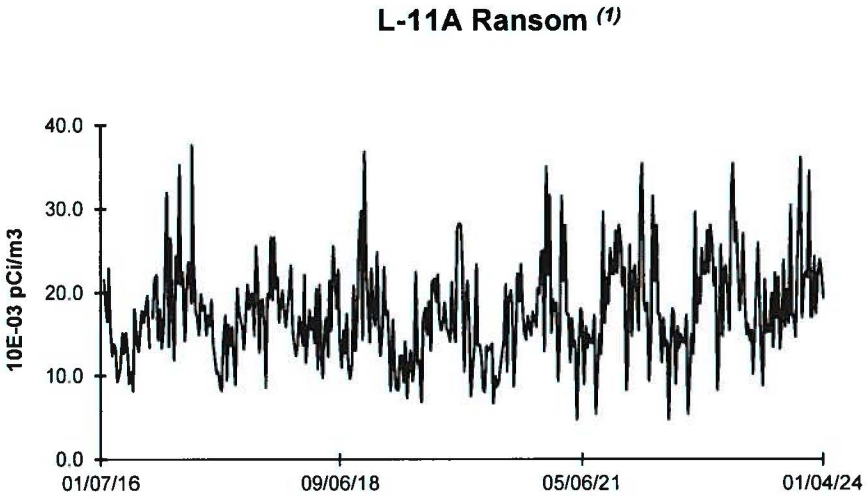


L-11 Ransom (1)



(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 - 2023



(1) Air monitoring station L-11A was placed in service on 01/14/16

APPENDIX D

INTER-LABORATORY COMPARISON PROGRAM

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

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Ratio of TBE to Analytics Result	Evaluation [b]
March 2023	E13826	Milk	Sr-89	pCi/L	70.5	93.1	0.76	W
			Sr-90	pCi/L	12.3	14.7	0.84	A
	E13827	Milk	Ce-141	pCi/L	127	139	0.91	A
			Co-58	pCi/L	119	131	0.91	A
			Co-60	pCi/L	250	279	0.90	A
			Cr-51	pCi/L	246	302	0.82	A
			Cs-134	pCi/L	172	200	0.86	A
			Cs-137	pCi/L	125	140	0.89	A
			Fe-59	pCi/L	122	122	1.00	A
			I-131	pCi/L	70.2	82.0	0.86	A
			Mn-54	pCi/L	165	180	0.92	A
			Zn-65	pCi/L	306	306	1.00	A
	E13828	Charcoal	I-131	pCi	79.0	89.9	0.88	A
	E13829	AP	Ce-141	pCi	91.9	87.8	1.05	A
			Co-58	pCi	87.5	82.5	1.06	A
			Co-60	pCi	199	176	1.13	A
			Cr-51	pCi	218	191	1.14	A
			Cs-134	pCi	119	126	0.94	A
			Cs-137	pCi	92.4	88.7	1.04	A
			Fe-59	pCi	95.5	76.9	1.24	W
			Mn-54	pCi	120	113	1.06	A
			Zn-65	pCi	179	193	0.93	A
	E13830	Soil	Ce-141	pCi/g	0.224	0.220	1.02	A
			Co-58	pCi/g	0.193	0.207	0.93	A
			Co-60	pCi/g	0.406	0.441	0.92	A
			Cr-51	pCi/g	0.464	0.477	0.97	A
			Cs-134	pCi/g	0.334	0.316	1.06	A
			Cs-137	pCi/g	0.270	0.288	0.94	A
			Fe-59	pCi/g	0.183	0.193	0.95	A
			Mn-54	pCi/g	0.263	0.284	0.93	A
			Zn-65	pCi/g	0.475	0.484	0.98	A
	E13831	AP	Sr-89	pCi	99.4	90.8	1.09	A
			Sr-90	pCi	14.6	14.3	1.02	A

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

(b) Analytics evaluation based on TBE internal QC limits:

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

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

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

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

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Ratio of TBE to Analytics Result	Evaluation [b]
September 2023	E13832	Milk	Sr-89	pCi/L	49.8	71.4	0.70	W
			Sr-90	pCi/L	7.28	12.8	0.57	N[1]
	E13833	Milk	Ce-141	pCi/L	93.4	104	0.90	A
			Co-58	pCi/L	58.2	65.8	0.88	A
			Co-60	pCi/L	190	223	0.85	A
			Cr-51	pCi/L	207	205	1.01	A
			Cs-134	pCi/L	96.0	114	0.84	A
			Cs-137	pCi/L	121	141	0.86	A
			Fe-59	pCi/L	78.8	78.8	1.00	A
			I-131	pCi/L	27.9	37.4	0.75	W
			Mn-54	pCi/L	128	146	0.88	A
			Zn-65	pCi/L	185	203	0.91	A
	E13834	Charcoal	I-131	pCi	76.9	78.7	0.98	A
	E13835	AP	Ce-141	pCi	91.9	87.1	1.05	A
			Co-58	pCi	58.7	55.2	1.06	A
			Co-60	pCi	200	187	1.07	A
			Cr-51	pCi	192	172	1.12	A
			Cs-134	pCi	89.6	96	0.94	A
			Cs-137	pCi	109	119	0.92	A
			Fe-59	pCi	68.3	66.1	1.03	A
			Mn-54	pCi	129	123	1.05	A
			Zn-65	pCi	163	171	0.96	A
	E13836	Soil	Ce-141	pCi/g	0.228	0.184	1.24	W
			Co-58	pCi/g	0.103	0.116	0.89	A
			Co-60	pCi/g	0.364	0.394	0.92	A
			Cr-51	pCi/g	0.371	0.362	1.02	A
			Cs-134	pCi/g	0.176	0.202	0.87	A
			Cs-137	pCi/g	0.285	0.315	0.90	A
			Fe-59	pCi/g	0.140	0.139	1.00	A
			Mn-54	pCi/g	0.237	0.259	0.92	A
			Zn-65	pCi/g	0.349	0.359	0.97	A
	E13837	AP	Sr-89	pCi	74.6	80.2	0.93	A
			Sr-90	pCi	13.9	14.4	0.96	A

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

(b) Analytics evaluation based on TBE internal QC limits:
A = Acceptable - reported result falls within ratio limits of 0.80-1.20
W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30
N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

(1) See **NCR 23-24**

DOE's Mixed Analyte Performance Evaluation Program (MAPEP)

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

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Acceptance Range	Evaluation [b]
February 2023	23-MaS48	Soil	Ni-63	Bq/kg	294	1130	791 - 1469	N[3]
	23-MaSU48	Urine	Cs-134	Bq/L	9.92	10	6.7 - 12.4	A
			Cs-137	Bq/L	0.0994		(1)	A
			Co-57	Bq/L	9.35	8.67	6.07 - 11.27	A
			Co-60	Bq/L	9.03	8.13	5.69 - 10.57	A
			Mn-54	Bq/L	11.80	10.0	7.0 - 13.0	A
			U-234	Bq/L	0.01		Not spiked	
			U-238	Bq/L	0.01		Not spiked	
			Zn-65	Bq/L	10.60	9.29	6.50 - 12.08	A
	23-MaW48	Water	Ni-63	Bq/L	23.1	27.3	19.1 - 35.5	A
	23-RdV48	Vegetation	Cs-134	Bq/sample	5.6	7.6	5.32 - 9.88	W
			Cs-137	Bq/sample	0.03		*(1)*	A
			Co-57	Bq/sample	5.9	6.9	4.85 - 9.01	A
			Co-60	Bq/sample	5.00	6.51	4.56 - 8.46	W
			Mn-54	Bq/sample	6.08	8.03	5.62 - 10.44	W
			Sr-90	Bq/sample	0.05		*(1)*	N[4]
			Zn-65	Bq/sample	5.49	7.43	*5.20 - 9.66*	W
August 2023	23-MaS49	Soil	Fe-55	Bq/kg	346	1280	896 - 1664	N[5]
			Ni-63	Bq/kg	1260	1370	959 - 1781	A
	23-MaW49	Water	Ni-63	Bq/L	1.0	1	*(2)*	A
	23-RdV49	Vegetation	Cs-134	Bq/sample	3.860	4.98	3.49 - 6.47	W
			Cs-137	Bq/sample	0.027		*(1)*	A
			Co-57	Bq/sample	3.88	4.24	2.97 - 5.51	A
			Co-60	Bq/sample	2.37	2.79	1.95 - 3.63	A
			Mn-54	Bq/sample	2.04	2.56	1.79 - 3.33	W
			Sr-90	Bq/sample	0.96	1.17	0.82 - 1.52	A
			Zn-65	Bq/sample	-0.514		*(1)*	A

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

(b) DOE/MAPEP evaluation:

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

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

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

(1) False positive test

(2) Sensitivity evaluation

(3) See **NCR 23-08**

(4) See **NCR 23-09**

(5) Initial evaluation - See **CAR 23-31**

ERA Environmental Radioactivity Cross Check Program

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

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Acceptance Limits	Evaluation [b]
March 2023	MRAD-38	Water	Am-241	pCi/L	28.1	32.1	22.0 - 41.0	A
			Fe-55	pCi/L	1180	1380	811 - 2010	A
			Pu-238	pCi/L	65.6	70.7	42.5 - 91.6	A
			Pu-239	pCi/L	82.9	92.4	57.2 - 114	A
		Soil	Sr-90	pCi/kg	2630	2580	803 - 4020	A
		AP	GR-A	pCi/filter	69.6	76.8	40.1 - 127	A
			GR-B	pCi/filter	36.8	32.8	19.9 - 49.6	A
April 2023	RAD-133	Water	Ba-133	pCi/L	26.0	22.3	17.1 - 25.8	N[1]
			Cs-134	pCi/L	72.1	77.6	63.4 - 85.4	A
			Cs-137	pCi/L	62.1	63.1	56.8 - 72.2	A
			Co-60	pCi/L	32.6	30.3	26.7 - 36.1	A
			Zn-65	pCi/L	253	242	218 - 283	A
			GR-A	pCi/L	34.2	29.2	14.9 - 38.2	A
			GR-B	pCi/L	64.3	60.7	41.8 - 67.4	A
			U-Nat	pCi/L	61.75	62.7	51.2 - 69.0	A
			H-3	pCi/L	13,300	12700	11,100 - 14,000	A
			Sr-89	pCi/L	67.0	61.1	49.2 - 69.0	A
			Sr-90	pCi/L	36.5	36.0	26.4 - 41.5	A
			I-131	pCi/L	24.3	28.7	23.9 - 33.6	A
September 2023	MRAD-39	Water	Am-241	pCi/L	54.0	71.0	48.7 - 90.8	A
			Fe-55	pCi/L	2430	2630	1550 - 3830	A
			Pu-238	pCi/L	172	177	106 - 229	A
			Pu-239	pCi/L	171	182	113 - 224	A
		Soil	Sr-90	pCi/kg	9580	6800	2120 - 10,600	A
		AP	GR-A	pCi/filter	82.2	79.8	41.7 - 131	A
			GR-B	pCi/filter	54.3	42.6	25.8 - 64.4	A
October 2023	RAD-135	Water	Ba-133	pCi/L	86.3	92.2	73.8 - 111	A
			Cs-134	pCi/L	38.4	41.2	27.9 - 54.5	A
			Cs-137	pCi/L	194	199	161 - 237	A
			Co-60	pCi/L	49.5	47.8	33.8 - 61.8	A
			Zn-65	pCi/L	59.7	57.0	23.7 - 90.3	A
			GR-A	pCi/L	53.2	70.6	54.0 - 87.2	N[2]
			GR-B	pCi/L	46.9	42.2	30.5 - 53.9	A
			U-Nat	pCi/L	51.26	51.7	45.9- 57.5	A
			H-3	pCi/L	20,100	22,900	19,700 - 26,100	A
			Sr-89	pCi/L	51.1	38.2	25.2 - 51.2	A
			Sr-90	pCi/L	31.7	35.7	30.3 - 41.1	A
			I-131	pCi/L	23.5	29.7	25.8 - 33.6	N[3]

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

(b) ERA evaluation:
A = Acceptable - Reported value falls within the Acceptance Limits
N = Not Acceptable - Reported value falls outside of the Acceptance Limits

*(1) See **NCR 23-10***
*(2) See **NCR 23-20***
*(3) See **NCR 23-21***

APPENDIX E

ERRATA DATA

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There is no errata data for 2023.

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APPENDIX F

ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

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Docket No: 50-373
50-374

LASALLE COUNTY STATION
UNITS 1 and 2

Annual Radiological
Groundwater Protection Program Report

1 January through 31 December 2023

Prepared By
Teledyne Brown Engineering
Environmental Services

Constellation®

LaSalle County Station
Marseilles, IL 61341

May 2024

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Table Of Contents

Appendices

I. Summary and Conclusions

In 2006, Constellation (formerly Exelon) instituted a comprehensive program to evaluate the impact of station operations on groundwater and surface water in the vicinity of LaSalle County Station. This evaluation involved numerous station personnel and contractor support personnel. Following baseline sampling and subsequent recommendations, LaSalle's Radiological Groundwater Protection Program (RGPP) program now consists of the six surface water and twenty-seven groundwater well sampling locations. The results for LaSalle's RGPP sampling efforts in 2023 are included in this report.

This is the seventeenth in a series of annual reports on the status of the RGPP conducted at LaSalle County Station. This report covers groundwater and surface water samples, collected from the environment, both on and off station property in 2023. During that time period, 113 analyses were performed on 48 samples from 17 groundwater locations. The monitoring was conducted by station personnel.

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

Strontium-89 (Sr-89) and strontium-90 (Sr-90) were not detected in any groundwater samples during 2023.

No gamma-emitting radionuclides attributable to licensed plant operations were detected in any of the groundwater or surface water samples.

In the case of tritium, Constellation specified that its laboratories achieve a lower limit of detection (LLD) 100 times lower than that required by federal regulation. The United States Environmental Protection Agency (USEPA) drinking water standard (and the Nuclear Regulatory Commission Reporting Limit) is 20,000 pCi/L.

Tritium levels were detected at concentrations greater than the LLD of 200 pCi/L in 19 of 44 groundwater samples analyzed. The tritium concentrations ranged from <LLD to 3,940 ± 463 pCi/L. The elevated tritium levels (>200 pCi/L) being observed in groundwater are associated with the U1 CY tank leak that occurred in the June/ July 2010 timeframe, as documented in the Station's 10 CFR 50.75(g) report.

Gross alpha analysis in the dissolved and suspended fractions was performed for 8 locations during 2023. Gross alpha (dissolved) was detected in 2 of 8 samples with a concentration range of 2.7 to 7.6 pCi/L. Gross alpha (suspended) was detected in 3 of 8 samples. The concentrations ranged from 2.5 to 10.4 pCi/L. The concentrations of gross alpha analysis are considered to be background and are not the result of plant effluents.

Hard-to-detect analyses Fe-55 and Ni-63 were performed on 8 of the groundwater sampling locations in accordance with the LaSalle RGPP and to aid in establishing background levels. No Fe-55 or Ni-63 was detected in any sample.

II. Introduction

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

This report covers those analyses performed by Teledyne Brown Engineering (TBE) on samples collected in 2023.

A. Objectives of the RGPP

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

1. Identify suitable locations to monitor and evaluate potential impacts from station operations before significant radiological impact to the environment and potential drinking water sources.
2. Understand the local hydrogeologic regime in the vicinity of the station and maintain up-to-date knowledge of flow patterns on the surface and shallow subsurface.
3. Perform routine water sampling and radiological analysis of water from selected locations.
4. Report new leaks, spills, or other detections with potential radiological significance to stakeholders in a timely manner.
5. Regularly assess analytical results to identify adverse trends.
6. Take necessary corrective actions to protect groundwater resources.

B. Implementation of the Objectives

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

1. Constellation and its consultant identified locations as described in the 2006 Phase 1 study. Phase 1 studies were conducted by Conestoga Rovers and Associates (CRA) and the results and conclusions were made available to state and federal regulators.
2. The LaSalle County Station reports describe the local hydrogeologic regime. Periodically, the flow patterns on the surface and shallow subsurface are updated based on ongoing measurements.
3. LaSalle County Station will continue to perform routine sampling and radiological analysis of water from selected locations.
4. LaSalle County Station has implemented procedures to identify and report new leaks, spills, or other detections with potential radiological significance in a timely manner.
5. LaSalle County Station staff and consulting hydrogeologist assess analytical results on an ongoing basis to identify adverse trends.

C. Program Description

Sample Collection

Sample locations can be found in Figure A–1, Appendix A.

Groundwater and Surface Water

Samples of water are collected, managed, transported and analyzed in accordance with approved procedures following EPA methods. Both groundwater and surface samples water are collected. Sample locations, sample collection frequencies and analytical frequencies are controlled in accordance with approved station procedures. Contractor and/or station personnel are trained in the collection, preservation management, and shipment of samples, as well as in documentation of sampling events. Analytical laboratories are subject to internal quality assurance programs, industry cross-check programs, as well as nuclear industry audits. Station personnel review and evaluate all analytical data deliverables as data are received.

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

D. Characteristics of Tritium (H-3)

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

Tritiated water behaves the same as ordinary water in both the environment and the body. Tritium can be taken into the body by drinking water, eating food, breathing air, or absorption through skin. Once tritium enters the body, it disperses quickly and is uniformly distributed throughout the body. Tritium is excreted primarily through urine with a clearance rate characterized by an effective biological half-life of about 14 days. Within one month or so after ingestion, essentially all tritium is cleared. Organically bound tritium (tritium that is incorporated in organic compounds) can remain in the body for a longer period.

Tritium is produced naturally in the upper atmosphere when cosmic rays strike air molecules. Tritium is also produced during nuclear weapons explosions, as a by-product in reactors producing electricity, and in special production reactors, where the isotopes lithium-7 and/or boron-10 are activated to produce tritium. Like normal water, tritiated water is colorless and odorless. Tritiated water behaves chemically and physically like non-tritiated water in the subsurface, and therefore tritiated water will travel at the same velocity as the average groundwater velocity.

Tritium has a half-life of approximately 12.3 years. It decays spontaneously to helium^{-3} (3He). This radioactive decay releases a beta particle (low-energy electron). The radioactive decay of tritium is the source of the health risk from exposure to tritium. Tritium is one of the least dangerous radionuclides because it emits very weak radiation and leaves the body relatively quickly.

Since tritium is almost always found as water, it goes directly into soft tissues and organs. The associated dose to these tissues is generally uniform and is dependent on the water content of the specific tissue.

III. Program Description

A. Sample Analysis

This section describes the general analytical methodologies used by TBE to analyze the environmental samples for radioactivity for the LaSalle County Station RGPP in 2023. Sample and analysis and frequency is based upon well location, assessed risk and site hydrogeology as described in the RGPP.

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

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

B. Data Interpretation

The radiological data collected prior to 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. Several factors were important in the interpretation of the data:

1. Lower Limit of Detection and Minimum Detectable Concentration

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

2. Laboratory Measurements Uncertainty

   The estimated uncertainty in measurement of tritium in environmental samples is frequently on the order of 50% of the measurement value. Statistically, the exact value of a measurement is expressed as a range with a stated level of confidence. The convention is to report results with a 95% level of confidence. The uncertainty comes from calibration standards, sample volume or weight measurements, sampling

uncertainty and other factors. Constellation reports the uncertainty of a measurement created by statistical process (counting error) as well as all sources of error (Total Propagated Uncertainty or TPU). Each result has two values calculated. Constellation reports the TPU by following the result with plus or minus ± the estimated sample standard deviation, as TPU, that is obtained by propagating all sources of analytical uncertainty in measurements.

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

C. Background Analysis

A pre-operational radiological environmental monitoring program (REMP) was conducted to establish background radioactivity levels prior to operation of the Station. The environmental media sampled and analyzed during the pre-operational REMP were atmospheric radiation, fall-out, domestic water, surface water, precipitation, marine life, and foodstuffs. The results of the monitoring were detailed in the report entitled *Environmental Radiological Monitoring for LaSalle County Nuclear Power Station, Commonwealth Edison Company, Annual Reports for the years 1979 and 1981.* The pre-operational REMP contained analytical results from samples collected from the surface water and groundwater.

1. Background Concentrations of Tritium

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

a. Tritium Production

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

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

b. Precipitation Data

Precipitation samples are routinely collected at stations around the world for the analysis of tritium and other radionuclides. Two publicly available databases that provide tritium concentrations in precipitation are Global Network of Isotopes in Precipitation (GNIP) and USEPA's RadNet database. GNIP provides tritium precipitation concentration data for samples collected worldwide from 1960 to 2006. RadNet provides tritium precipitation concentration data for samples collected at stations throughout the U.S. from 1960 up to and including 2006. Based on GNIP data for sample stations located in the U.S. Midwest, tritium concentrations peaked around 1963. This peak, which approached 10,000 pCi/L for some stations, coincided with the atmospheric testing of thermonuclear weapons.

Tritium concentrations in surface water showed a sharp decline up until 1975 followed by a gradual decline since that time. Tritium concentrations in Midwest precipitation have typically been below 100 pCi/L since around 1980. LaSalle's 1979 or 1981 pre-operational REMP showed precipitation tritium concentrations >300 pCi/L. Tritium concentrations in wells may still be above the 200 pCi/L detection limit from the external causes described above. Water from previous years and decades is naturally captured in groundwater, so some well water sources today are affected by the surface water from the 1960s that was elevated in tritium.

c. Surface Water Data

Tritium concentrations are routinely measured in large surface water bodies, including Lake Michigan and the Mississippi River. Illinois surface water data were typically less than 100 pCi/L. Illinois River H-3 results have shown >200 pCi/L, as evidenced in LaSalle's REMP program sample results. This is attributable to sources upstream as measured by the control location.

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

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

IV. Results and Discussion

A. Groundwater Results

Samples were collected from onsite wells throughout the year in accordance with the station radiological groundwater protection program. Analytical results and anomalies are discussed below.

Tritium

Samples from 17 locations were analyzed for tritium activity. Tritium values ranged from <LLD to 3,940 pCi/L. The highest tritium activity was found at well TW-LS-118S. The well is located predominantly in clay till. Based on the hydrogeological study conducted at LaSalle, there is no feasible pathway into a drinking water supply. Based on established aquifer flow paths the location most representative of potential offsite release into groundwater was also less than the detection limit. (Table B-I.1, Appendix B)

Strontium

A total of 8 samples from 8 groundwater locations were analyzed for Sr-89 and Sr-90. The results were less than the required detection limit of 10 pCi/L for Sr-89 and less than the required detection limit of 1.0 pCi/L for Sr-90. (Table B-I.1, Appendix B)

Gross Alpha (dissolved and suspended)

Gross alpha in the dissolved and suspended fractions were performed on groundwater samples in 2023. Gross alpha (dissolved) was detected in 2 of 8 samples affecting 2 of 8 groundwater locations analyzed. The concentrations ranged from 2.7 to 7.6 pCi/L. Gross alpha (suspended) was detected in 3 of 8 samples affecting 3 of 8 groundwater locations analyzed. The concentrations ranged from 2.5 to 10.4 pCi/L.

The concentrations of gross alpha which are slightly above detectable levels are considered to be background and are not the result of plant effluents. (Table B-I.1, Appendix B)

Gamma Emitters

No gamma-emitting nuclides were detected in any of the samples analyzed in 2023. (Table B-I.2, Appendix B)

Hard-To-Detect

Hard-to-detect analyses Fe-55 and Ni-63 were performed on 8 of the groundwater sampling locations in accordance with the LaSalle RGPP and to aid in establishing background levels. These nuclides were not detected at concentrations greater than their respective detection limits. (Table B-1.3, Appendix B)

B. Surface Water Results

No surface water samples were collected in 2023.

C. Drinking Water Well Survey

A drinking water well survey was conducted during the summer 2006 by CRA (CRA 2006) around the LaSalle County Station. This survey concluded that no residents in the vicinity of the plant utilize the shallow water aquifer as a drinking water supply. Site hydrological studies of aquifer flow and permeation rates from the shallow aquifer to the deep aquifer concluded that there is no feasible dose receptor via a ground water pathway at LaSalle.

D. Summary of Results – Inter-Laboratory Comparison Program

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

E. Leaks, Spills, and Releases

There were no new leaks identified at LaSalle Station during the reporting period.

F. Trends

Analysis results from samples continue to be trended in order to assess impact to groundwater at LaSalle Station. There were no new leaks identified in the reporting period. Sample data from the plume arising from the historic 2010 U1 CY tank leak is being trended per the LaSalle RGPP. The plume had been dispersing with groundwater flow, and extraction wells have been installed to provide additional control of the plume migration (see Section H.3. below). Currently, no tritium has migrated offsite, and tritium migration offsite is not expected.

G. Investigations

No new investigations were carried out during the reporting period.

H. Actions Taken

1. Compensatory Actions

   No compensatory actions were taken during the reporting period.

2. Installation of Monitoring Wells

   No new monitoring wells have been installed during the reporting period.

3. Actions to Recover/Reverse Plumes

   Two (2) extraction wells (RW-LS-100S and RW-LS-101S) were installed to control the migration of the tritium plume near U1 CY tank. RW-LS-100S became operational in October 2012. RW-LS-101S became operational in April 2014.

APPENDIX A

LOCATION DESIGNATION

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TABLE A-1 LaSalle County Station Groundwater Monitoring Sample Point List, 2023

Site	Site Type
HP-2	Monitoring Well
HP-5	Monitoring Well
HP-7	Monitoring Well
HP-10	Monitoring Well
MW-LS-104S	Monitoring Well
MW-LS-105S	Monitoring Well
MW-LS-106S	Monitoring Well
MW-LS-107S	Monitoring Well
MW-LS-111S	Monitoring Well
RW-LS-100S	Extraction Well
TW-LS-114S	Monitoring Well
TW-LS-116S	Monitoring Well
TW-LS-117S	Monitoring Well
TW-LS-118S	Monitoring Well
TW-LS-119S	Monitoring Well
TW-LS-120S	Monitoring Well
TW-LS-121S	Monitoring Well

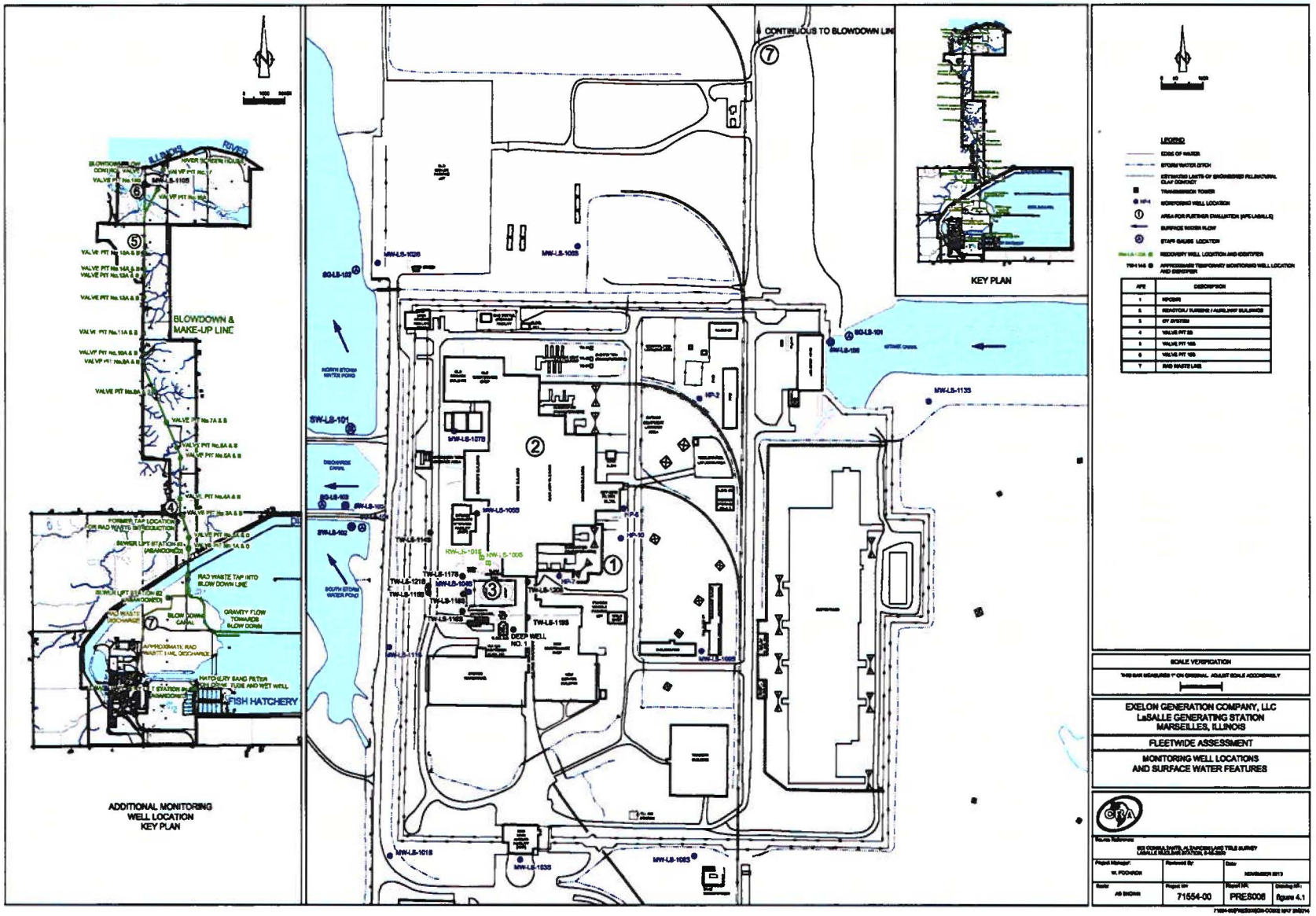

Figure A-1
Ground Water and Surface Water Locations
LaSalle County Station, 2023

APPENDIX B

DATA TABLES

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TABLE B-1.1 CONCENTRATIONS OF TRITIUM AND STRONTIUM IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE		COLLECTION DATE	H-3	Sr-89	Sr-90	Gr-A (Dis)	Gr-A (Sus)
HP-2		06/15/23	< 187				
HP-5		06/15/23	< 194				
HP-7		03/21/23	< 174				
HP-7		06/15/23	< 187	< 9.3	< 0.8	< 1.8	2.5 ± 1.2
HP-7		08/21/23	< 197				
HP-7		10/17/23	< 180				
HP-10		06/15/23	< 184				
MW-LS-104S		03/21/23	458 ± 130	< 8.6	< 0.9	< 2.2	< 1.2
MW-LS-104S		06/16/23	872 ± 173				
MW-LS-104S		08/21/23	653 ± 160				
MW-LS-104S		10/17/23	386 ± 125				
MW-LS-105S		03/21/23	< 179				
MW-LS-105S		06/15/23	< 194	< 3.8	< 0.9	2.7 ± 1.2	2.5 ± 1.3
MW-LS-105S		08/21/23	251 ± 131				
MW-LS-105S		10/17/23	< 175				
MW-LS-106S		06/14/23	< 194				
MW-LS-107S		03/14/23	< 185				
MW-LS-107S		06/16/23	< 188	< 8.1	< 0.9	< 4.8	< 1.0
MW-LS-107S		08/21/23	< 197				
MW-LS-107S		10/17/23	< 196				
MW-LS-111S		06/14/23	< 188				
RW-LS-100S		03/14/23	664 ± 149	< 9.3	< 0.9	< 1.4	< 0.7
RW-LS-100S		06/15/23	220 ± 127				
RW-LS-100S		08/22/23	2710 ± 343				
RW-LS-100S	*Recount*	08/22/23	2680 ± 340				
RW-LS-100S	*Reanalysis*	08/22/23	2470 ± 319				
RW-LS-100S		10/17/23	550 ± 143				
TW-LS-114S		03/21/23	< 173				
TW-LS-114S		08/21/23	< 194				
TW-LS-116S		03/14/23	3700 ± 437	< 9.7	< 0.9	< 1.9	< 0.7
TW-LS-116S		06/16/23	2220 ± 296				
TW-LS-116S		08/21/23	2230 ± 295				
TW-LS-116S		10/17/23	2550 ± 324				
TW-LS-117S		03/21/23	180 ± 116				
TW-LS-117S		06/15/23	< 194	< 8.2	< 0.9	7.6 ± 1.8	< 0.8
TW-LS-117S		08/21/23	< 195				
TW-LS-117S		10/17/23	< 189				
TW-LS-118S		03/14/23	3940 ± 463				
TW-LS-118S		08/21/23	1010 ± 180				
TW-LS-118S	*Recount*	08/21/23	926 ± 176				
TW-LS-118S	*Reanalysis*	08/21/23	1060 ± 187				
TW-LS-119S		06/16/23	< 188				
TW-LS-120S		03/21/23	< 192				
TW-LS-120S		06/16/23	< 196	< 7.7	< 0.8	< 1.1	10.4 ± 3.0
TW-LS-120S		08/21/23	< 197				
TW-LS-120S		10/17/23	< 194				
TW-LS-121S		03/14/23	< 192				
TW-LS-121S		08/21/23	< 197				

TABLE B-I.2

CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED IN THE VICINITY OF LASALLE COUNTY STATION, 2023

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Be-7	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
HP-2	06/15/23	< 15	< 12	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 9	< 2	< 2	< 15	< 5
HP-5	06/15/23	< 16	< 19	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 4	< 2	< 2	< 10	< 4
HP-7	06/15/23	< 15	< 28	< 1	< 2	< 3	< 2	< 3	< 2	< 3	< 9	< 1	< 1	< 15	< 5
HP-10	06/15/23	< 15	< 12	< 1	< 2	< 3	< 2	< 3	< 2	< 3	< 8	< 1	< 1	< 14	< 5
MW-LS-104S	03/21/23	< 20	< 41	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 5	< 2	< 2	< 11	< 4
MW-LS-105S	06/15/23	< 17	< 33	< 2	< 2	< 4	< 2	< 4	< 2	< 3	< 4	< 2	< 2	< 10	< 3
MW-LS-106S	06/14/23	< 14	< 13	< 1	< 1	< 3	< 2	< 3	< 2	< 3	< 3	< 2	< 2	< 9	< 3
MW-LS-107S	06/16/23	< 14	< 21	< 1	< 2	< 3	< 2	< 3	< 2	< 3	< 8	< 2	< 1	< 15	< 5
MW-LS-111S	06/14/23	< 13	< 13	< 1	< 2	< 3	< 1	< 3	< 2	< 3	< 9	< 1	< 1	< 15	< 5
RW-LS-100S	03/14/23	< 11	< 10	< 1	< 1	< 3	< 1	< 2	< 1	< 2	< 4	< 1	< 1	< 8	< 3
TW-LS-114S	03/21/23	< 13	< 26	< 2	< 1	< 3	< 2	< 3	< 2	< 3	< 3	< 2	< 2	< 8	< 3
TW-LS-116S	03/14/23	< 8	< 22	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 3	< 1	< 1	< 6	< 2
TW-LS-117S	06/15/23	< 15	< 34	< 2	< 2	< 4	< 2	< 3	< 2	< 3	< 3	< 2	< 2	< 8	< 3
TW-LS-118S	03/14/23	< 17	< 32	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 6	< 2	< 2	< 13	< 5
TW-LS-119S	06/16/23	< 10	< 9	< 1	< 1	< 2	< 2	< 2	< 1	< 2	< 5	< 1	< 1	< 9	< 3
TW-LS-120S	06/16/23	< 15	< 27	< 2	< 2	< 3	< 2	< 3	< 2	< 3	< 3	< 2	< 2	< 9	< 3
TW-LS-121S	03/14/23	< 13	< 14	< 1	< 1	< 3	< 2	< 3	< 2	< 3	< 5	< 1	< 1	< 11	< 4

B-2

TABLE B-I.3 **CONCENTRATIONS OF HARD-TO-DETECTS IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE GROUNDWATER PROTECTION PROGRAM, LASALLE COUNTY STATION, 2023**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Am-241	Cm-242	Cm-243/244	Pu-238	Pu-239/240	U-234	U-235	U-238	Fe-55	Ni-63
HP-7	06/15/23									< 83	< 4.7
MW-LS-104S	03/21/23									< 156	< 4.9
MW-LS-105S	06/15/23									< 51	< 4.5
MW-LS-107S	06/16/23									< 142	< 4.1
RW-LS-100S	03/14/23									< 143	< 4.7
TW-LS-116S	03/14/23									< 99	< 4.9
TW-LS-117S	06/15/23									< 68	< 4.3
TW-LS-120S	06/16/23									< 127	< 4.6

B-3

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