Veolia Nuclear Solutions- Federal Services
Environmental Surveillance, Education, and Research Program
ISSN NUMBER 1089-5469

Idaho National Laboratory Site Offsite Environmental Surveillance Program Report: Fourth Quarter 2017

September 2018

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Program conducted for the U.S. Department of Energy, Idaho Operations Office
Under Contract DE-NE0008477

By
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EXECUTIVE SUMMARY

None of the radionuclides detected in samples collected during the fourth quarter of 2017 could be directly linked with INL Site activities. Levels of detected radionuclides were no different than values measured at other locations across the western United States. All detected radionuclide concentrations were well below standards set by the U.S. Department of Energy (DOE) and regulatory standards established by the U.S. Environmental Protection Agency (EPA) for protection of the public.

This report for the fourth quarter of 2017 contains results from the Environmental Surveillance, Education, and Research (ESER) Program's monitoring of the Department of Energy's Idaho National Laboratory (INL) Site's offsite environment, October 1 through December 31, 2017. All sample types (media) and the sampling schedule followed during 2017 are listed in Appendix A. This report contains results for the following sample types:

- Air, including particulate air filters, charcoal cartridges, and atmospheric moisture
- Precipitation
- Drinking and surface water
- Milk
- Potatoes
- Large game animals
- Waterfowl
- Environmental radiation measurements using optically-stimulated luminescence dosimeters

Table E-1 Summary of results for the Fourth Quarter of 2017

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	There were some statistically significant differences in monthly and quarterly gross alpha and gross beta concentrations measured at Distant, Boundary, and INL Site sampling locations. Several differences were noted in weekly results but no pattern was discernible. No result exceeded results for the past ten years or the DCS for gross alpha or gross beta activity in air.
	Quarterly Composite	Gamma-emitting radionuclides, ^{90}Sr, actinides (americium and plutonium)	No human-made gamma-emitting radionuclides, ^{90}Sr, ^{238}Pu, $^{239/249}$Pu or ^{241}Am were detected above 3s uncertainty in any of the fourth quarter composites.
	Charcoal Cartridge	Iodine-131	Iodine-131 was not detected in any of the 26 batches counted during the quarter.
Atmospheric Moisture	Liquid	Tritium	Seven of the 12 sample results showed tritium concentrations greater than the 3s uncertainty during the quarter. No sample result exceeded results for the past ten years or the DCS for tritium in air.
Precipitation	Liquid	Tritium	Twenty samples were collected. Eight of the results were greater than the 3s uncertainty. All results were within the range previously measured in the past ten years and were consistent with those reported across the region by the Environmental Protection Agency.
Drinking and Surface Water	Liquid	Gross alpha, gross beta, and tritium	Gross alpha activity was not detected in any drinking or surface water sample. Gross beta activity was detected in five of the eight drinking water and all four surface water samples. Values were consistent with natural levels of gross beta radioactivity in

			the Snake River Plain Aquifer. Tritium was detected in one drinking water and two surface water samples. Results were similar to previous results and those in precipitation.
Surface Water (Big Lost River)	Liquid	Gross alpha, gross beta, tritium and gamma-emitting radionuclides	Gross alpha and gross beta activity was detected in some samples similar to previous results. Tritium was also detected in some samples. Concentrations were similar to those found in atmospheric moisture and precipitation samples and were consistent with previous years. No gramma-emitting radionuclides were detected.
Milk	Liquid	Iodine-131, other gamma-emitting radionuclides, ^{90}Sr, tritium	Milk was collected at seven locations. No Iodine-131 or other human-made gamma emitting radionuclides were detected. Strontium-90 was detected in two of six samples analyzed. All were approximately the same concentration (including the offsite control sample from Colorado) indicating the INL Site is not the source. Tritium was detected in one sample at levels similar to previous measurements and to precipitation.
Potatoes	Vegetation	Gamma-emitting radionuclides and ^{90}Sr	No human-made gamma-emitting radionuclides were found. Strontium-90 was detected in one sample just above the detection limit.
Large game animals	Tissue	Gamma-emitting radionuclides	No human-made gamma-emitting radionuclides were found in the muscle tissues of a mule deer sampled in the fourth quarter.
Waterfowl	Tissue	Gamma-emitting radionuclides, ^{90}Sr, actinides (americium and plutonium)	Six human-made radionuclides were detected in some ducks at levels suggesting that they were ingested from ATR effluent ponds. The maximum dose from eating a contaminated duck was estimated to be 0.046 mrem/year.

Environmental radiation	Optically Stimulated Luminescent Dosimeters (OSLDs)	Ambient dose	Very similar measurements were observed at Distant locations and Boundary locations. Variation between locations appears to be a function of altitude and geologic composition of soils.

LIST OF ABBREVIATIONS

AEC	Atomic Energy Commission
CFA	Central Facilities Area
DCS	Derived Concentration Standard
DOE	Department of Energy
DOE – ID	Department of Energy Idaho Operations Office
EAL	Environmental Assessment Laboratory
EFS	Experimental Field Station
EPA	Environmental Protection Agency
ERAMS	Environmental Radiation Ambient Monitoring System
ESER	Environmental Surveillance, Education, and Research
ICP	Idaho Cleanup Project
INL	Idaho National Laboratory
INEL	Idaho National Engineering Laboratory
INEEL	Idaho National Engineering and Environmental Laboratory
ISU	Idaho State University
MDC	minimum detectable concentration
NRTS	National Reactor Testing Station
ORAU	Oak Ridge Associated Universities
VNSFS	Veolia Nuclear Solutions – Federal Services
WAI	Wastren Advantage, Inc.

LIST OF UNITS

Bq	becquerel
Ci	curie
g	gram
L	liter
µCi	microcurie
mL	milliliter
mrem	millirem
mR	milliRoentgen
pCi	picocurie

1. ESER PROGRAM DESCRIPTION

Operations at the Idaho National Laboratory (INL) Site are conducted under requirements imposed by the U.S. Department of Energy (DOE) under authority of the Atomic Energy Act and the U.S. Environmental Protection Agency (EPA) under a number of acts (e.g. the Clean Air Act and Safe Drinking Water Act). The requirements imposed by DOE are specified in DOE Orders. These requirements include those to monitor the effects of DOE activities both inside and outside the boundaries of DOE facilities (DOE 2011a, DOE 2015a). During calendar year 2017, environmental monitoring within the INL Site boundaries was primarily the responsibility of the INL and Idaho Cleanup Project (ICP) contractors.

At the beginning of the first quarter of 2018, ESER Program responsibilities were assumed by Veolia Nuclear Solutions-Federal Services (VNSFS), in conjunction with team members Idaho State University and Oak Ridge Associated Universities (ORAU). ORAU ceased operations in April 2018 and was replaced in May by GEL Laboratories.

This report contains monitoring results from the ESER Program for samples collected during the fourth quarter of 2017 (October 1- December 31, 2017).

The surveillance portion of the ESER Program is designed to satisfy the following program objectives:

- Verify compliance with applicable environmental laws, regulations, and DOE Orders
- Characterize and define trends in the physical, chemical, and biological condition of environmental media on and around the INL Site
- Assess the potential radiation dose to members of the public from INL Site effluents
- Present program results clearly and concisely through the use of reports, presentations, newsletter articles and press releases.

The goal of the surveillance program is to monitor different media at a number of potential exposure points within the various exposure pathways, including air, water, agricultural products, wildlife, and soil that could possibly contribute to the radiation dose received by the public.

Environmental samples collected include:

- air at 16 locations on and around the INL Site
- moisture in air at four locations around the INL Site
- precipitation from three locations on and around the INL Site
- drinking water from eight locations and surface water from three locations around the INL Site and five locations along the Big Lost River on the INL Site
- agricultural products, including milk at seven dairies around the INL Site, potatoes from at least six local producers, alfalfa from a local producer, grain (wheat and barley) from approximately 10 local producers, and lettuce from approximately nine home-owned and portable gardens on and around the INL Site
- soil from 13 locations around the INL Site biennially
- environmental dosimeters from 17 locations semi-annually
- various numbers of wildlife including bats, big game (pronghorn, mule deer, and elk) and waterfowl sampled on and near the INL Site.

Table A-1 in Appendix A lists samples, sampling locations, and collection frequency for the ESER Program.

The ESER Program used two laboratories to perform analyses on routine environmental samples collected during the quarter reported here. The ISU Environmental Assessment Laboratory (EAL) performed routine gross alpha, gross beta, tritium, and gamma spectrometry analyses. Analyses requiring radiochemistry including strontium-90 (^{90}Sr), plutonium-238 (^{238}Pu), plutonium-239/240 ($^{239/240}$Pu), and americium-241 (^{241}Am) were performed by Oak Ridge Associated Universities (ORAU). ORAU closed in April and was replaced by GEL Laboratories who completed the analyses of the remaining 2017 samples (i.e., waterfowl and fourth quarter air composites).

In the event of non-routine occurrences, such as suspected releases of radioactive material, the ESER Program may increase the frequency of sampling and/or the number of sampling locations based on the nature of the release and wind distribution patterns. Any data found to be outside historical norms in the ESER Program is thoroughly investigated to determine if an INL Site origin is likely. Investigation may include re-sampling and/or re-analysis of prior samples.

In the event of any suspected worldwide nuclear incidents, like the 1986 Chernobyl accident or the 2011 Fukushima accident, the EPA may request additional sampling be performed through RadNet. RadNet is a nationwide environmental radiation monitoring system that monitors the nation's air, precipitation, and drinking water for radiation. The ESER Program currently operates a high-volume air sampler and collects precipitation and drinking water in Idaho Falls for this national program and routinely sends samples to EPA's Eastern Environmental Radiation Facility for analyses. The RadNet data collected at Idaho Falls are not reported by the ESER Program but are available through the EPA RadNet website (https://www.epa.gov/radnet).

Once samples have been collected and analyzed, the ESER Program has the responsibility for quality control of the data, entry into the ESER database, and reporting in quarterly reports. The quarterly reports are then consolidated into the INL Site Environmental Report for each calendar year. These annual reports also include data collected by other INL Site contractors.

The results reported in the quarterly and annual reports are assessed in terms of data quality and statistical significance with respect to laboratory analytical uncertainties, sample locations, reported INL Site releases, meteorological data, and worldwide events that might conceivably have an effect on the INL Site environment. First, field collection and laboratory information are reviewed to determine identifiable errors that would invalidate or limit use of the data. Examples of such limitations include insufficient sample volume, torn filters, evidence of laboratory cross-contamination or quality control issues. Data that pass initial screening are further evaluated using statistical methods. Statistical tools are necessary for data evaluation particularly since environmental measurements typically involve the determination of minute concentrations, which are difficult to detect and even more difficult to distinguish from other measurements.

Results are presented in this report with an analytical uncertainty term, *s*, where "*s*" is the estimated sample standard deviation (σ), assuming a Gaussian or normal distribution. All results are reported in this document, even those that do not necessarily represent detections. The term "detected", as used for the discussion of results in this report, does not imply any degree of risk to the public or environment, but rather indicates that the radionuclide was measured at a concentration sufficient for the analytical instrument to record a value that is statistically different from background. Laboratory measurements involve the analysis of a target sample and the analysis of a prepared laboratory blank (i.e., a sample which is identical to the sample collected in the environment, except that the radionuclide of interest is absent). In order

to conclude that a radionuclide has been detected, it is essential to consider two fundamental aspects of the problem of detection: (1) the instrument signal for the sample must be greater than that observed for the blank before the decision can be made that the radionuclide has been detected; and (2) an estimate must be made of the minimum radionuclide concentration that will yield a sufficiently large observed signal before the correct decision can be made for detection or non-detection. Each laboratory currently defines a detection of radioactivity in an individual sample if the result exceeds a detection level calculated by the laboratory after the analysis of a background sample (i.e., the *a posteriori* measurement) based on calculations derived by Curie (1984). The MDC is defined as the concentration at which there is a 95 percent confidence that an analyte signal will be distinguishable from an analyte-free sample.

In addition ESER uses a three standard deviation criterion to identify a potentially false positive result. A false positive result is indicated when the range encompassing the result, plus or minus the total uncertainty at three standard deviations, includes zero (e.g., 2.5 +/- 1.0; range of -0.5 to 3.5). Statistically, the probability that a result can exceed the absolute value of its total uncertainty at three standard deviations by chance alone is less than 1 percent. A result that is greater than three times the total uncertainty of the measurement represents a statistically positive detection with over 99 percent confidence (DOE 2015b). The ESER reports measured radionuclide concentrations greater than or equal to their respective 3s uncertainties as being *detected with confidence*.

Concentrations between 2s and 3s are reported as *questionably detected*. That is, the radionuclide may be present in the sample; however, the probability that a result can exceed the absolute value of its total uncertainty at two standard deviations by chance alone may be as high as 5 percent. Measurements made between 2s and 3s are examined further to determine if they are a part of a pattern (temporal or spatial) that might warrant further investigation or recounting. For example, if a particular radionuclide is routinely detected at > 3s at a specific location, a sample result between 2s and 3s might be considered detected.

If a result is less than or equal to 2s there is even less statistical confidence that the radionuclide is present in the sample. Analytical results in this report are presented as the result value ± one standard deviation (1s) for reporting consistency with the annual report. To obtain the 2s or 3s values simply multiply the uncertainty term by 2 or 3.

For more information concerning the ESER Program, contact VNSFS at (208) 525-8250, or visit the Program's web page (http://www.idahoeser.com).

2. THE INL SITE

The INL Site is a nuclear energy and homeland security research and environmental management facility. It is owned and administered by the U.S. Department of Energy, Idaho Operations Office (DOE-ID) and occupies about 890 mi^2 (2,300 km^2) of the upper Snake River Plain in Southeastern Idaho (Figure 1). The history of the INL Site began during World War II when the U.S. Naval Ordnance Station was located in Pocatello, Idaho. This station, one of two such installations in the U.S., retooled large guns from U.S. Navy warships. The retooled guns were tested on the nearby, uninhabited plain, known as the Naval Proving Ground. In the years following the war, as the nation worked to develop nuclear power, the Atomic Energy Commission (AEC), predecessor to the DOE, became interested in the Naval Proving Ground and made plans for a facility to build, test, and perfect nuclear power reactors.

The Naval Proving Ground became the National Reactor Testing Station (NRTS) in 1949, under the AEC. By the end of 1951, a reactor at the NRTS became the first to produce useful amounts of electricity. Over time the site has operated 52 various types of reactors, associated research centers, and waste handling areas. The NRTS was renamed the Idaho National Engineering Laboratory (INEL) in 1974, and the Idaho National Engineering and Environmental Laboratory (INEEL) in January 1997. With renewed interest in nuclear power the DOE announced in 2003 that Argonne National Laboratory and the INEEL would be the lead laboratories for development of the next generation of power reactors. On February 1, 2005 the INEEL and Argonne National Laboratory-West became the INL. The INL is committed to providing international nuclear leadership for the 21st Century, developing and demonstrating compelling national security technologies, and delivering excellence in science and technology as one of the Department of Energy's multiprogram national laboratories.

The Idaho Cleanup Project (ICP) is now a separately managed effort. The ICP is charged with safely and cost-effectively completing the majority of cleanup work from past laboratory missions in an ongoing process.

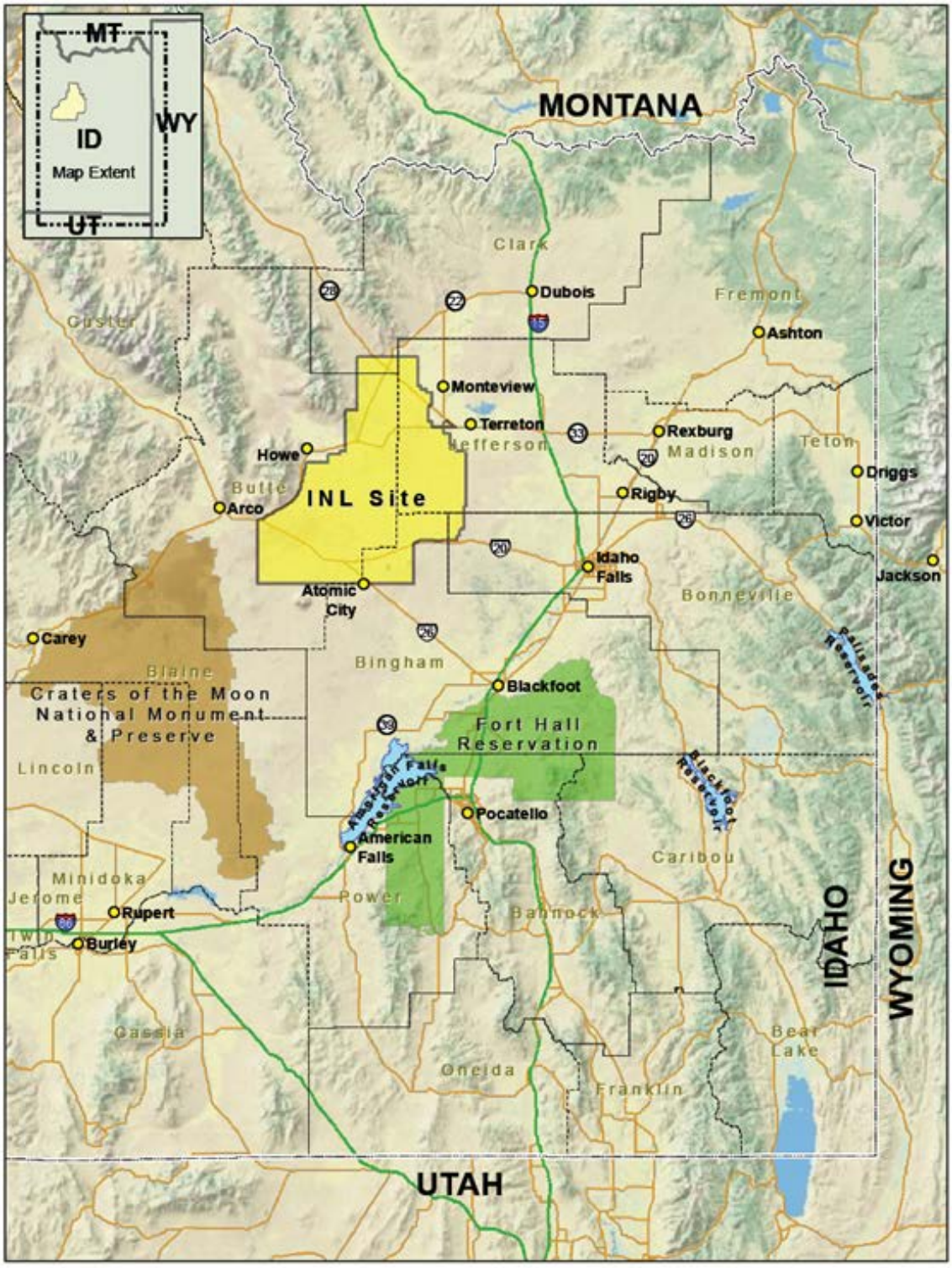

Figure 1. Location of the Idaho National Laboratory Site.

3. AIR SAMPLING

The primary pathway by which radionuclides can move off the INL Site is through the air and for this reason the air pathway is the primary focus of monitoring on and around the INL Site. Samples for particulates and iodine-131 (^{131}I) gas in air were collected weekly for the duration of the quarter at 16 locations using low-volume air samplers. Moisture in the atmosphere was sampled at four locations around the INL Site and analyzed for tritium. Air sampling activities and results for the fourth quarter of 2017 are discussed below. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses and DOE Derived Concentration Standard (DCS) (DOE 2011b) values is provided in Appendix B.

LOW-VOLUME AIR SAMPLING

Radioactivity associated with airborne particulates was monitored continuously by 18 low-volume air samplers (two of which are used as replicate samplers) at 16 locations during the fourth quarter of 2017 (Figure 2). Three of these samplers are located on the INL Site, seven are situated off the INL Site near the boundary, and eight have been placed at locations distant to the INL Site. Samplers are divided into INL Site, Boundary, and Distant groups to determine if there is a gradient of radionuclide concentrations, increasing towards the INL Site. Each replicate sampler is relocated every other year to a new location. At the start of 2017, one replicate sampler was moved to Blue Dome (a Boundary location) and one was moved to Atomic City (also a Boundary location). An average of 18,598 ft^3 (527 m^3) of air was sampled at each location, each week, at an average flow rate of 1.85 ft^3/min (0.05 m^3/min). Particulates in air were collected on membrane particulate filters (1.2-µm pore size). Gases passing through the filter were collected with an activated charcoal cartridge.

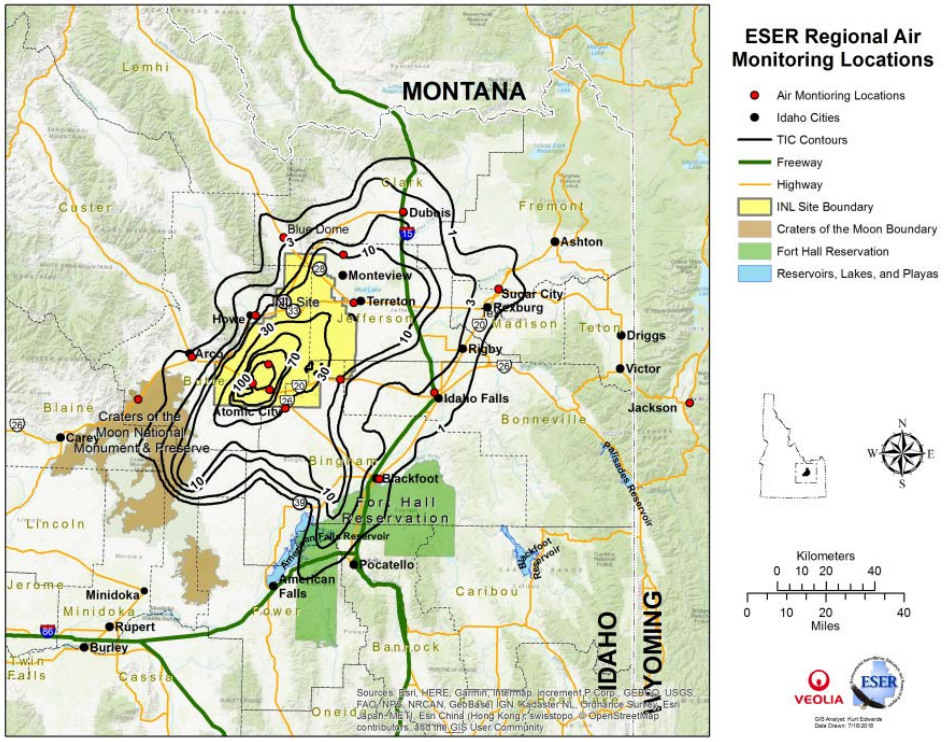

Figure 2. Low-volume air sampler locations. Total Integrated Concentration (TIC) contours were generated by the National Oceanic and Atmospheric Administration Air Resources Laboratory – Field Research Division using the MDIFF air transport and dispersion model and wind data from 35 meteorological stations on and around the INL Site in 2010.

Filters and charcoal cartridges were changed weekly at each station during the quarter. Each particulate filter was analyzed for gross alpha and gross beta radioactivity using thin-window gas flow proportional counting systems after waiting about four days for naturally-occurring daughter products of radon and thorium to decay.

The weekly particulate filters collected during the quarter for each location were composited and analyzed for gamma-emitting radionuclides. Selected composites were also analyzed by location for ^{90}Sr, ^{238}Pu, $^{239/240}Pu$, and ^{241}Am as determined by a rotating quarterly schedule.

Charcoal cartridges were analyzed for gamma-emitting radionuclides, specifically for iodine-131 (^{131}I). Iodine-131 is of particular interest because it is produced in relatively large quantities by nuclear fission, is readily accumulated in human and animal thyroids, and has a half-life of eight days. This means that any elevated level of ^{131}I in the environment could be from a recent release of fission products.

Gross alpha results are reported in Table C-1 and shown in Figures 3 through 6. Gross alpha data are tested for normality prior to statistical analyses, and generally show no consistent discernible distribution. Because there is no discernible distribution of the data, the nonparametric Kruskal-Wallis test of multiple independent groups was used to test for statistical differences between INL Site, Boundary, and Distant locations. The use of nonparametric tests, such as Kruskal-Wallis, gives less weight to outlier and extreme values thus allowing a more appropriate comparison of data groups. A statistically significant difference exists between data groups if the (p) value is less than 0.05. Values greater than 0.05 translate into a 95 percent confidence that the medians are statistically the same. The p-value for each comparison is shown in Table D-1. There was a statistically significant difference in the data by group by locations for the quarter as a whole and for the month of November. In both cases, the boundary group had the highest median concentration and the highest mean rank score. The differences between the groups was very small, however, as shown in Figure 3.

As an additional check, comparisons between gross alpha concentrations measured at Boundary and Distant locations were made on a weekly basis. The Mann-Whitney U test was used to compare the Boundary and Distant data because it is the most powerful nonparametric alternative to the t-test for independent samples. INL Site sample results were not included in this analysis because the onsite data, collected at only three locations, are not representative of the entire INL Site and would not aid in determining offsite impacts. There were three weeks where a statistically significant difference existed between the two sample groups (Table D-2). These were the weeks of November 8, December 13 and December 19; the Boundary stations were statistically higher than the Distant and INL Site stations. Nothing unusual was noted in the data, however, and all were well within measurements taken within the last ten years (2007-2016). All results were well below the DCS for $^{239/240}Pu$, the most conservative value for a human-made alpha-emitting radionuclide that might be detected at the INL Site.

Gross beta results are presented in Table C-1 and displayed in Figures 7 through 10. The data are tested quarterly and generally are found to be neither normally nor log-normally distributed. Box and whiskers plots were used to present the non-parametric data. Outliers and extreme values were retained in subsequent statistical analyses because they are within the range of measurements made in the past ten years, and because these values could not be attributed to mistakes in collection, analysis, or reporting procedures. There was a statistically significant difference in the data between groups for the quarter as a whole and for the month of November, using the Kruskal-Wallace ANOVA by ranks test (Table D-1). In each case, the INL Site group showed the highest median concentration and the highest mean rank score. The differences between the groups was very small, however, as shown in Figure 3.

Weekly comparisons were also made using the same methodology as for the gross alpha data and statistically significant differences were found during several weeks of the quarter (Table D-2). These included October 25, November 1 and 8, and December 13 and December 28. In all the weeks the Boundary locations were higher than the Distant locations. No particular pattern was found when looking at individual location concentrations. All of the weeks with statistical differences were weeks when overall gross beta concentrations were fairly low. There seems to be more variability between locations (and between weeks) during the winter months, when some locations have more persistent inversion conditions. An inversion can lead to natural radionuclides being trapped close to the ground.

Iodine-131 was not detected in any of the 26 sets of charcoal cartridges measured during the fourth quarter. Weekly ^{131}I results for each location are listed in Table C-2 of Appendix C.

No ^{137}Cs or other human-made gamma-emitting radionuclides were found in quarterly composites. No ^{90}Sr, ^{238}Pu, $^{239/240}$Pu, or ^{241}Am were detected either. Results for these analyses are found in Table C-3 of Appendix C.

ATMOSPHERIC MOISTURE SAMPLING

Atmospheric moisture is collected by pulling air through a column of absorbent material (molecular sieve material) to absorb water vapor. The water is then extracted from the absorbent material by heat distillation. The resulting water samples are then analyzed for tritium using liquid scintillation.

Results were available for 11 atmospheric moisture samples collected at the INL Site, Boundary and Distant locations during the fourth quarter of 2017. Seven of the results exceeded the 3s uncertainty level for tritium, with similar results to those reported during the past ten years (2007-2016). Results also remain similar between the four sampling locations. All samples were significantly below the DOE DCS for tritium in air of 1.4×10^{-8} $\mu Ci/mL_{air}$ with a maximum reported value of 6.54×10^{-13} $\mu Ci/mL_{air}$ at EFS. Results are shown in Table C-4, Appendix C.

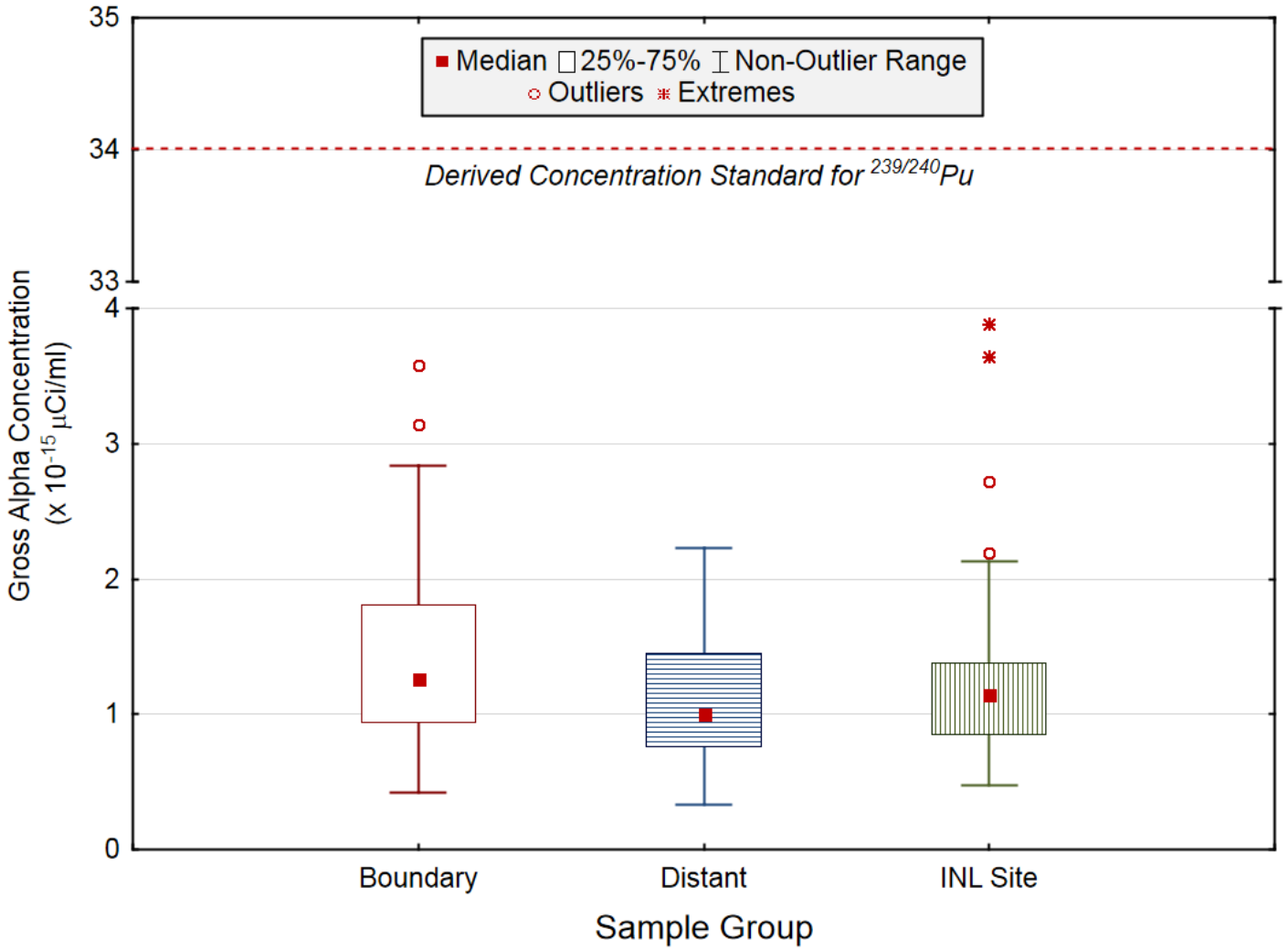

Figure 3. Gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations for the fourth quarter of 2017. The DOE Derived Concentration Standard (DCS) is the concentration of plutonium-239/240 ($^{239/240}$Pu) in air which, if inhaled for a year, would result in a dose of 100 mrem/yr. Because the measurements include naturally occurring radionuclides (such as ^{238}U, ^{234}U, ^{232}Th, ^{226}Ra and ^{210}Po) in uncertain proportions, a meaningful DCS cannot be constructed for gross alpha concentrations. The DCS for $^{239/240}$Pu is shown because it is the most restrictive human-made alpha emitter.

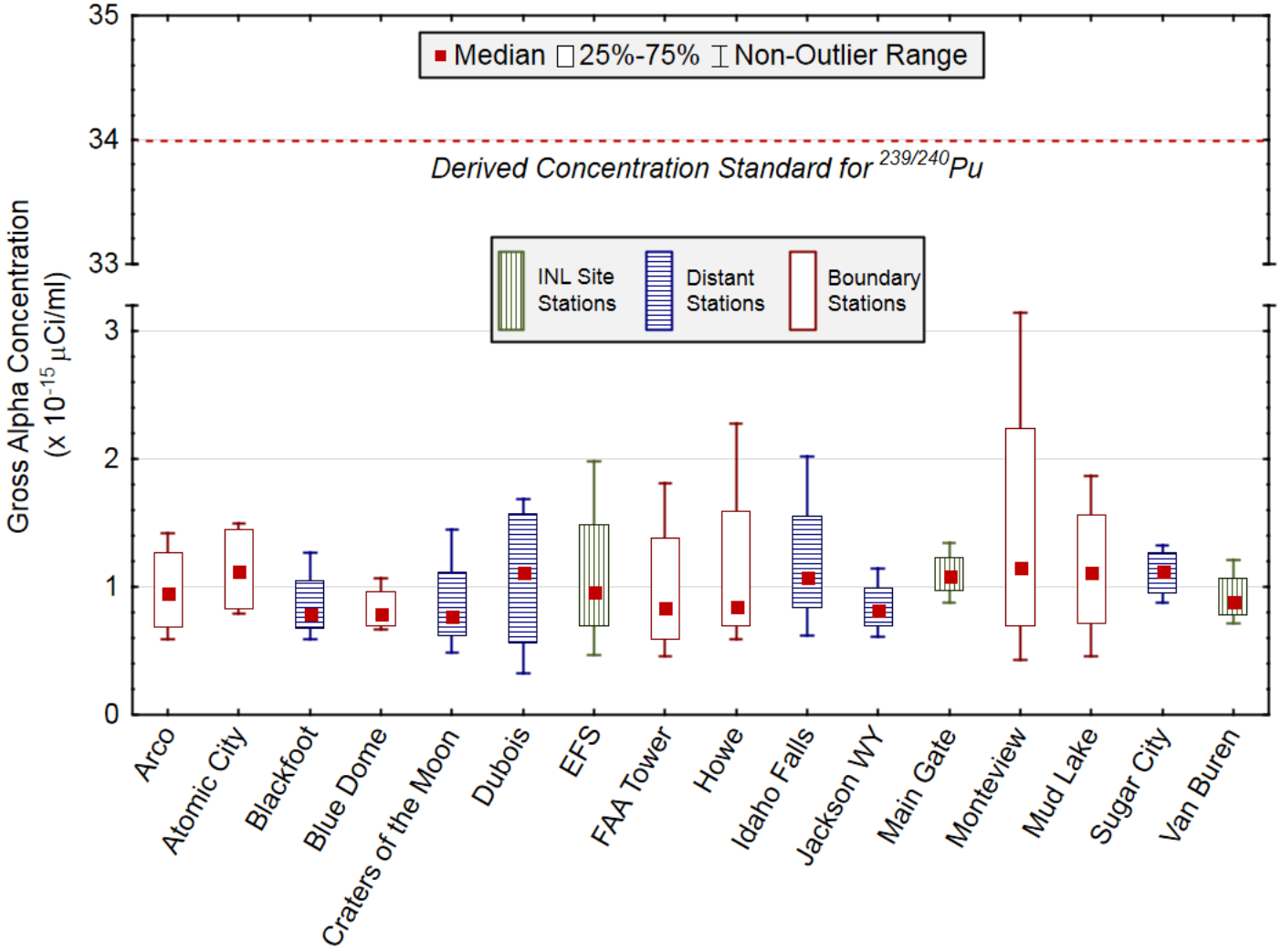

Figure 4. October gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location. The Derived Concentration Standard (DCS) is the concentration of plutonium-239/240 ($^{239/240}$Pu) in air which, if inhaled for a year, would result in a dose of 100 mrem/yr. Because the measurements include naturally occurring radionuclides (such as ^{238}U, ^{234}U, ^{232}Th, ^{226}Ra and ^{210}Po) in uncertain proportions, a meaningful DCS cannot be constructed for gross alpha concentrations. The DCS for $^{239/240}$Pu is shown because it is the most restrictive human-made alpha emitter.

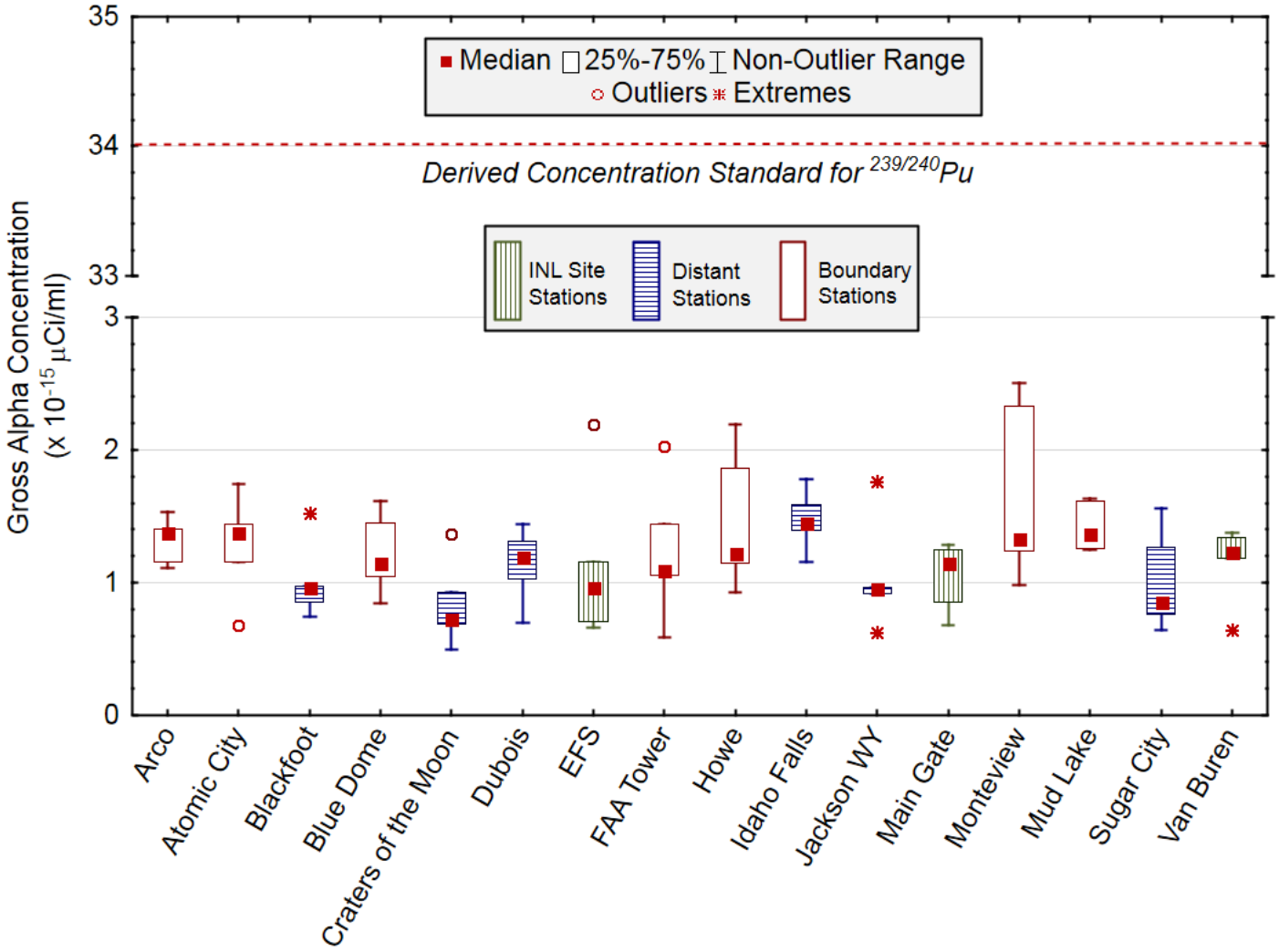

Figure 5. November gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location. The Derived Concentration Standard (DCS) is the concentration of plutonium-239/240 ($^{239/240}$Pu) in air which, if inhaled for a year, would result in a dose of 100 mrem/yr. Because the measurements include naturally occurring radionuclides (such as ^{238}U, ^{234}U, ^{232}Th, ^{226}Ra and ^{210}Po) in uncertain proportions, a meaningful DCS cannot be constructed for gross alpha concentrations. The DCS for $^{239/240}$Pu is shown because it is the most restrictive human-made alpha emitter.

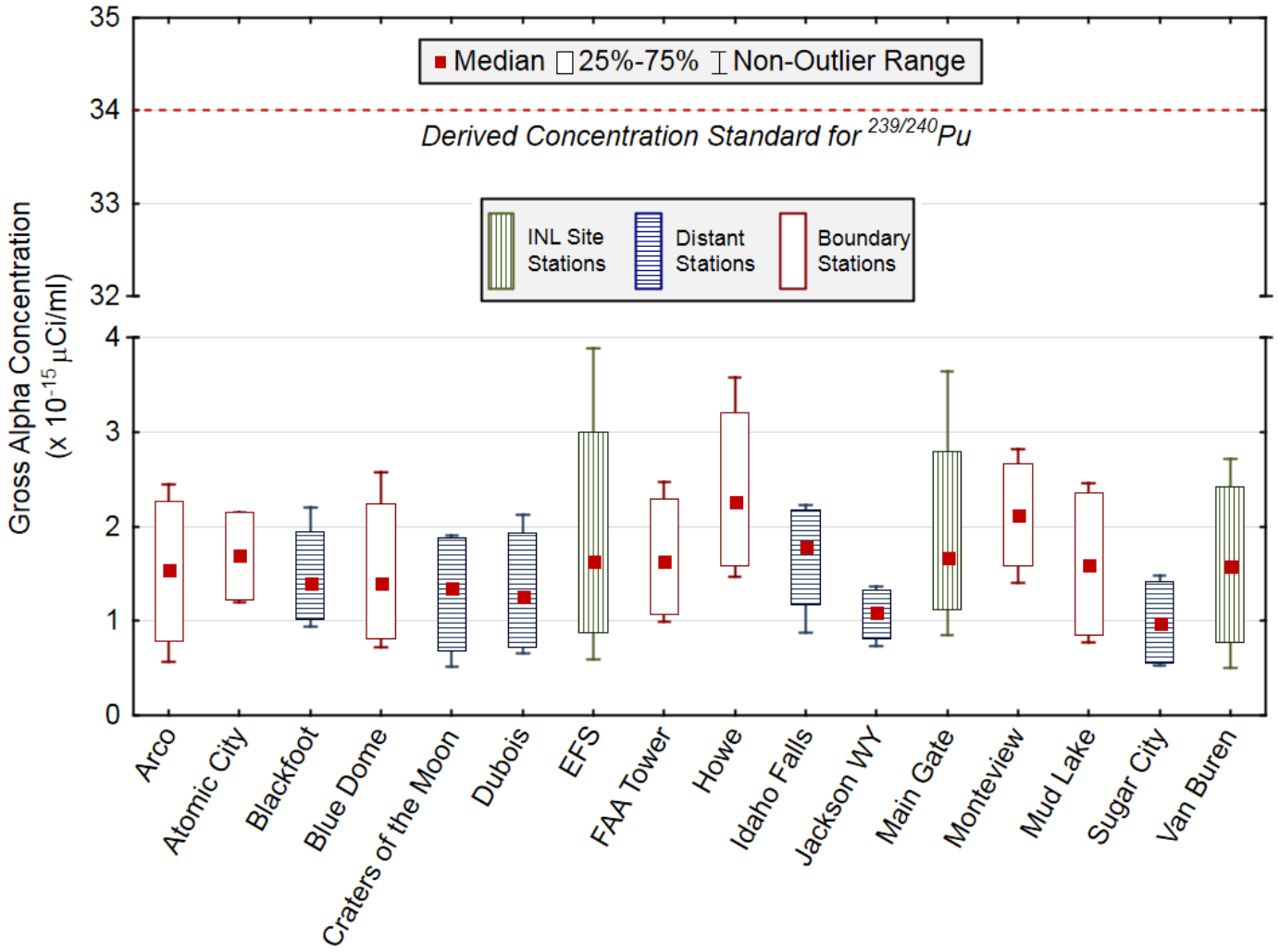

Figure 6. December gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location. The Derived Concentration Standard (DCS) is the concentration of plutonium-239/240 ($^{239/240}$Pu) in air which, if inhaled for a year, would result in a dose of 100 mrem/yr. Because the measurements include naturally occurring radionuclides (such as ^{238}U, ^{234}U, ^{232}Th, ^{226}Ra and ^{210}Po) in uncertain proportions, a meaningful DCS cannot be constructed for gross alpha concentrations. The DCS for $^{239/240}$Pu is shown because it is the most restrictive human-made alpha emitter.

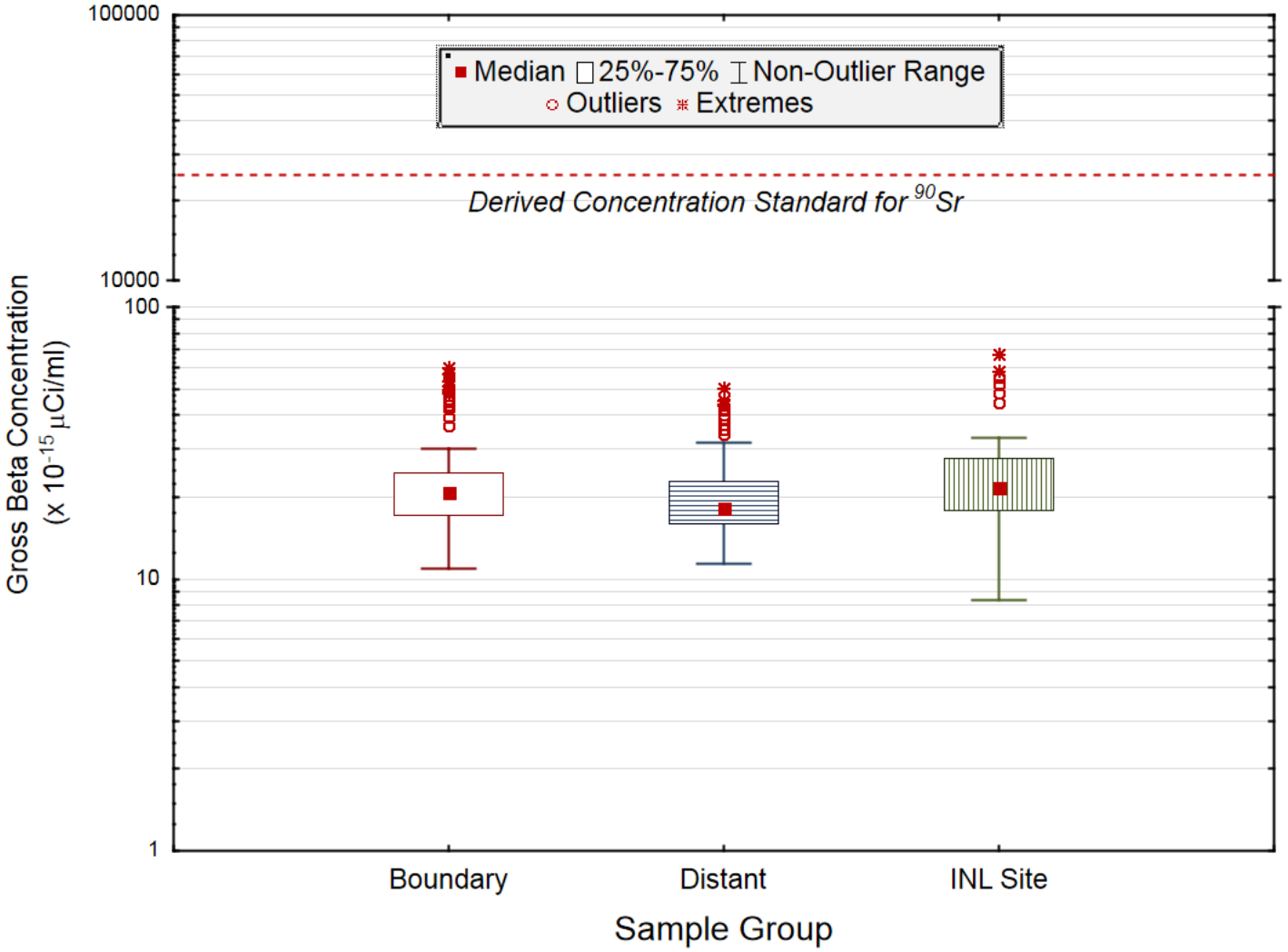

Figure 7. Gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations for the fourth quarter of 2017. The Derived Concentration Standard (DCS) is the concentration of strontium-90 (^{90}Sr) in air which, if inhaled for a year, would result in a dose of 100 mrem/yr. Because the measurements include naturally occurring radionuclides (such as ^{40}K, ^{228}Ra, and ^{210}Pb) in uncertain proportions, a meaningful DCS cannot be constructed for gross beta concentrations. The DCS for ^{90}Sr is shown because it is the most restrictive human-made beta emitter.

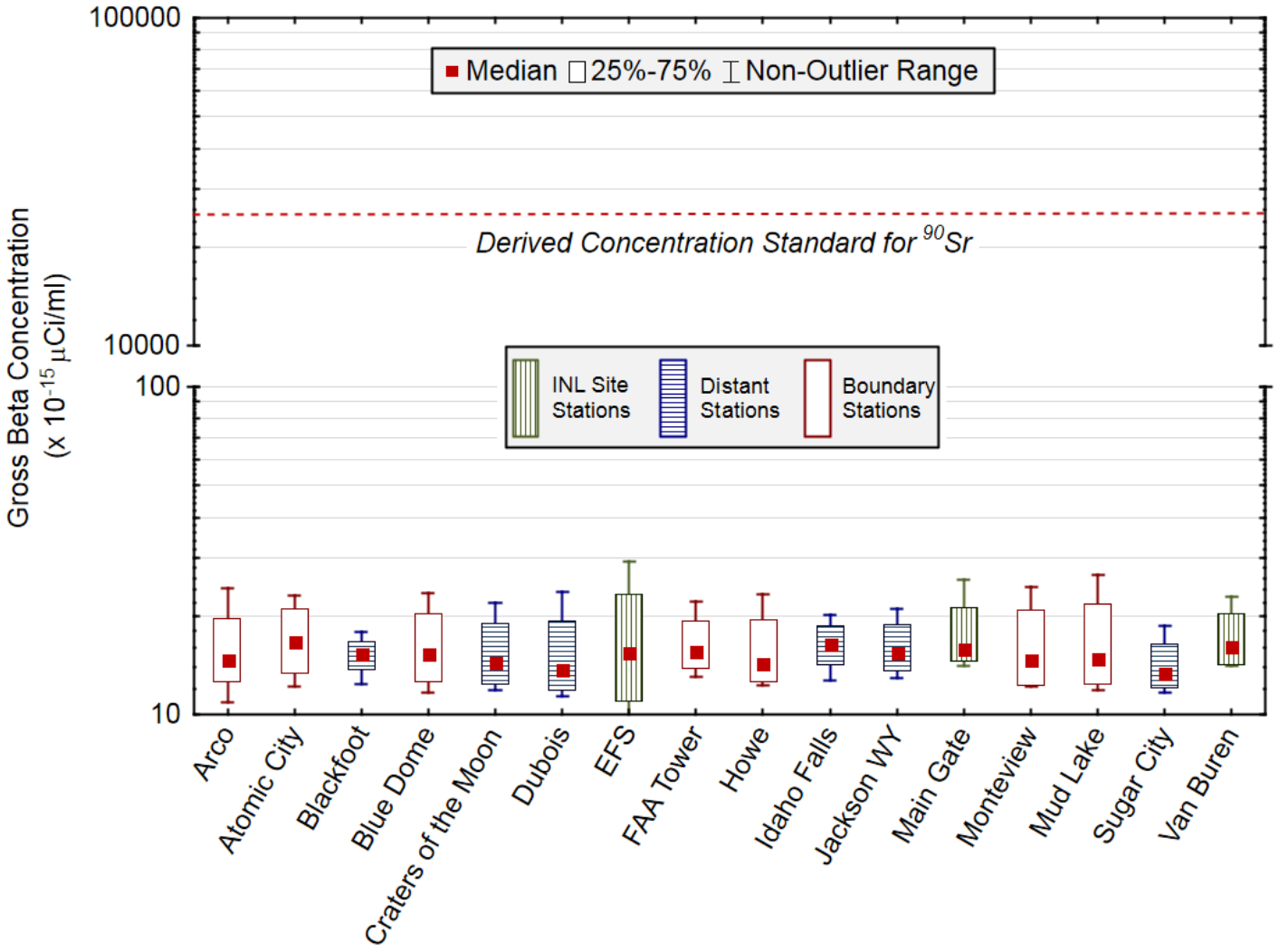

Figure 8. October gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. The Derived Concentration Standard (DCS) is the concentration of strontium-90 (^{90}Sr) in air which, if inhaled for a year, would result in a dose of 100 mrem/yr. Because the measurements include naturally occurring radionuclides (such as ^{40}K, ^{228}Ra, and ^{210}Pb) in uncertain proportions, a meaningful DCS cannot be constructed for gross beta concentrations. The DCS for ^{90}Sr is shown because it is the most restrictive human-made beta emitter.

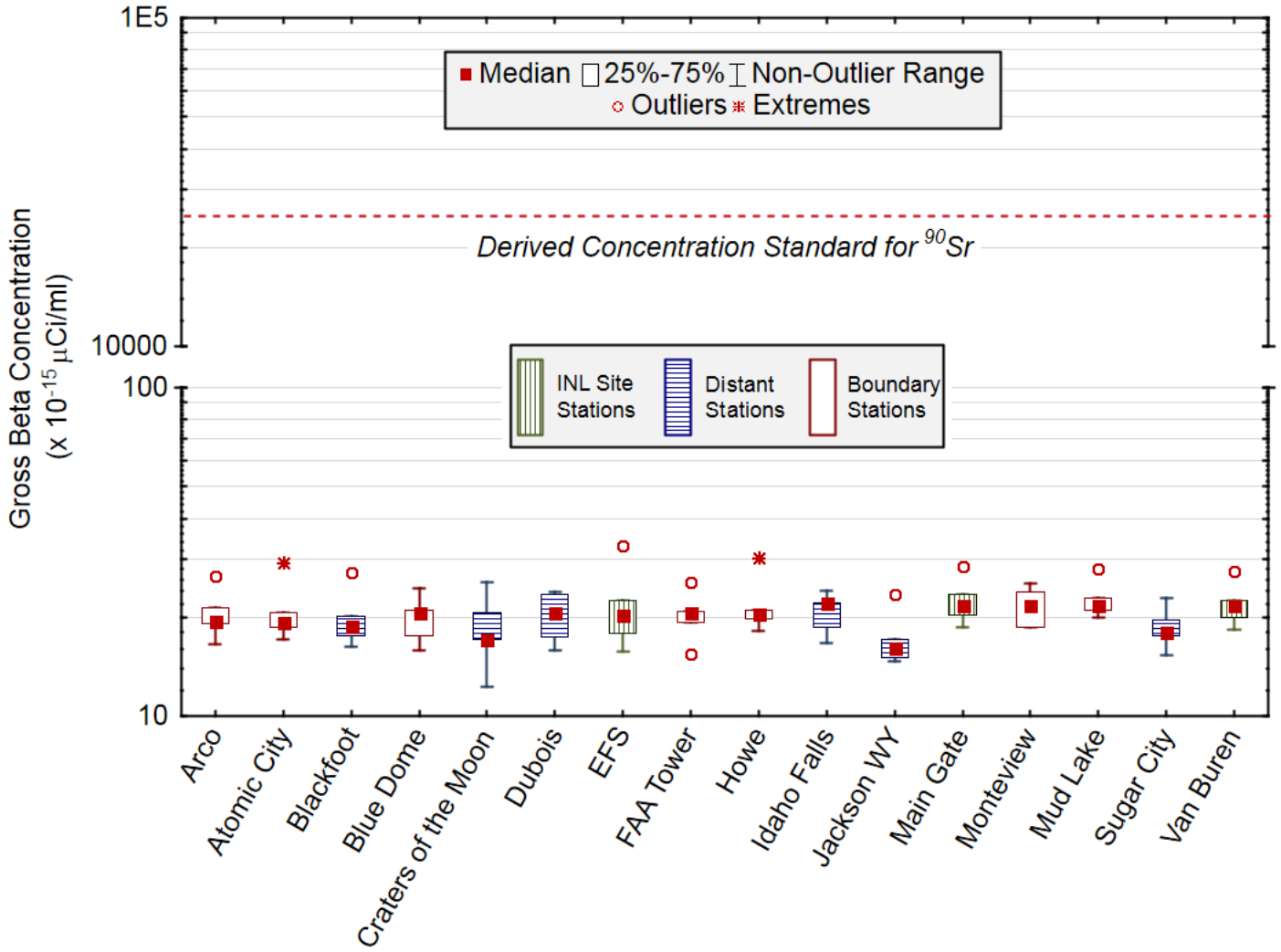

Figure 9. November gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. The Derived Concentration Standard (DCS) is the concentration of strontium-90 (^{90}Sr) in air which, if inhaled for a year, would result in a dose of 100 mrem/yr. Because the measurements include naturally occurring radionuclides (such as ^{40}K, ^{228}Ra, and ^{210}Pb) in uncertain proportions, a meaningful DCS cannot be constructed for gross beta concentrations. The DCS for ^{90}Sr is shown because it is the most restrictive human-made beta emitter.

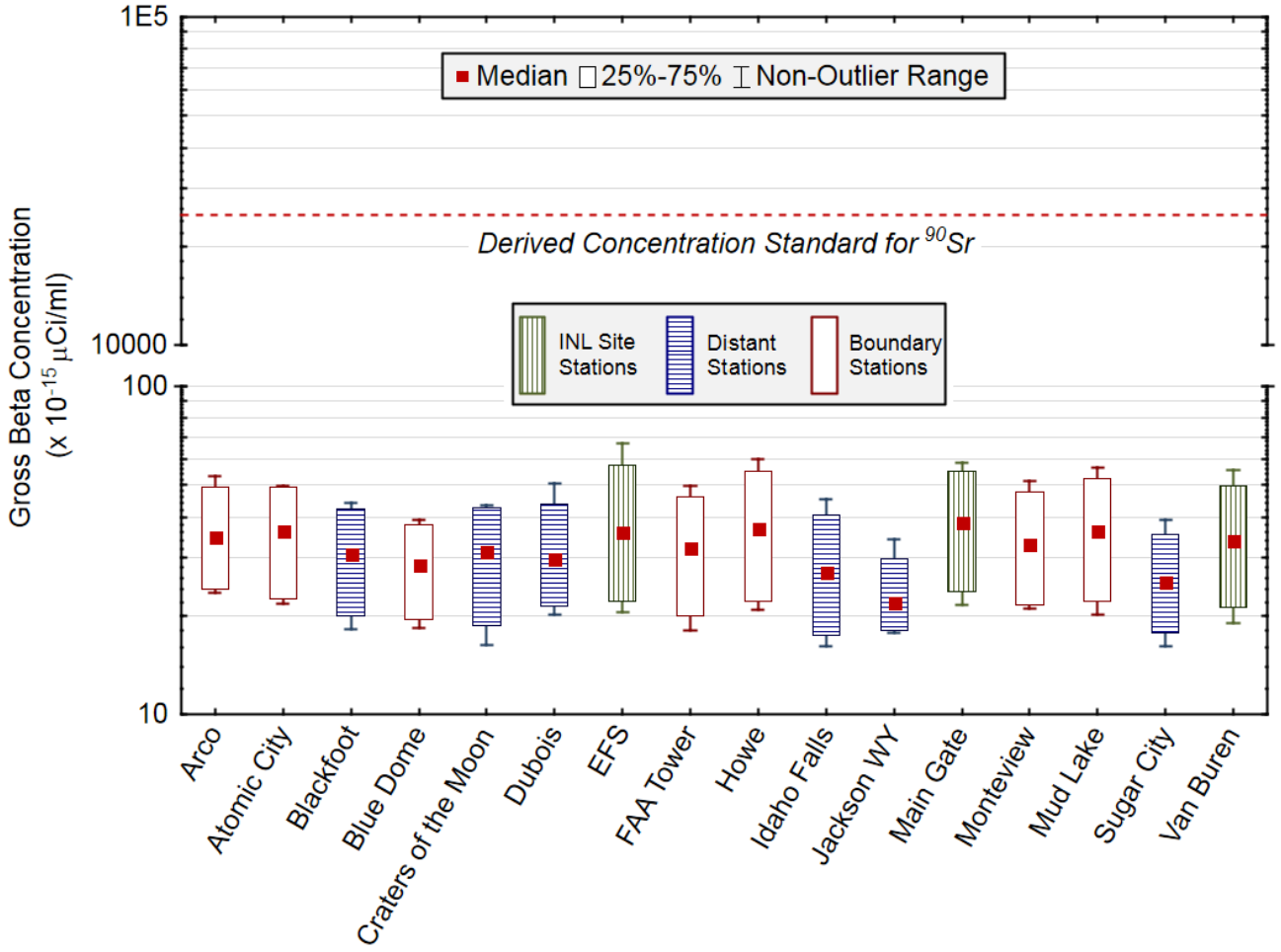

Figure 10. December gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. The Derived Concentration Standard (DCS) is the concentration of strontium-90 (90Sr) in air which, if inhaled for a year, would result in a dose of 100 mrem/yr. Because the measurements include naturally occurring radionuclides (such as ^{40}K, ^{228}Ra, and ^{21}0Pb) in uncertain proportions, a meaningful DCS cannot be constructed for gross beta concentrations. The DCS for 90Sr is shown because it is the most restrictive human-made beta emitter

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PRECIPITATION SAMPLING

Precipitation samples are gathered when sufficient precipitation occurs to allow for the collection of the minimum sample volume of approximately 50 mL. Samples are taken of monthly composites from Idaho Falls, and weekly (when available) from the EFS on the INL Site and Atomic City and Howe on the INL Site boundary. These are the same locations that precipitations are collected at. Precipitation samples are analyzed for tritium. Storm events in the fourth quarter of 2017 produced sufficient precipitation to yield 20 samples.

Tritium was measured above the 3s values in 8 of the 20 samples. These results are listed in Table C-5 (Appendix C). Low levels of tritium exist in the environment at all times as a result of cosmic ray reactions with water molecules in the upper atmosphere. Long-term data collected around the globe since 1961 by the International Atomic Energy Agency suggest that that tritium levels have steadily decreased since the Nuclear Test Ban Treaty in 1963 and are close to their pre-nuclear test values (Cauquoin et al. 2015) and that there are no longer remnants of fallout from nuclear weapons testing. When detected, tritium values have remained well within the historical range and the range measured across the country by the EPA Radnet program (EPA 2015). Most samples have values up to about 150 pCi/L, with occasional values ranging up to about 300-400 pCi/L. The maximum value in the fourth quarter was 207 pCi/L in a December Atomic City sample.

WATER SAMPLING

Drinking water samples were collected at eight locations (Figure 11). A control sample of bottled water was also prepared. Surface water samples were collected at three Thousand Springs locations, plus a duplicate. All samples were analyzed for gross alpha, gross beta, and tritium. Results are listed in Table C-6 of Appendix C.

Gross alpha activity was not detected in any of the surface water samples. Gross alpha activity was detected three drinking water samples: Craters of the Moon, Howe, and the Highway 20/26 Rest Area. The results were well within historical measurements from the past ten years (2007-2016).

Gross beta activity was detected in five of the eight drinking water samples and in all four of the surface water samples. It was not detected in the control sample. All concentrations were generally similar to previous results from drinking and surface water sampling measured during the past ten years (2007-2016). Natural levels of radioactive decay products of thorium and uranium exist in the Snake River Plain Aquifer and are the likely source of the measured concentrations. The highest reported gross beta value was 6.74 pCi/L in the surface water sample from Alpheus Spring near Twin Falls. This location has historically shown the highest levels of natural activity.

Tritium was also detected in seven of the drinking water samples (including the control sample) and in all four surface water samples. The concentrations were similar to those found in atmospheric moisture and precipitation samples and were consistent with previous results. The maximum value was 138 pCi/L at Craters of the Moon. The results are well below the DCS of 1.9×10^6 pCi/L for tritium in drinking water.

The Big Lost River (BLR) flowed on the INL Site during the early part of the fourth quarter. Samples were collected in October at five locations (plus a duplicate) on the INL Site. A control sample was also collected from Birch Creek. All samples were analyzed for gross alpha, gross beta, tritium, and gamma-emitting radionuclides. Results are listed in Table C-7 of Appendix C.

Gross alpha activity was detected in four of seven samples. Three of the samples had detectable concentrations of gross beta activity. The highest reported gross alpha value was 2.51 pCi/L in a sample collected from the control location (Birch Creek). The highest reported gross beta value was 2.07 pCi/L in a sample from BLR at INTEC. Concentrations were generally lower than the unfiltered results from the second quarter BLR sampling. The water then was heavily sedimented. Tritium was also detected in five samples from the BLR at the Highway 20/26 Rest Area, INTEC (duplicate), NRF, and BLR Sinks and from the control location (Birch Creek). The highest reported value was 163 pCi/L. Concentrations were similar to those found in atmospheric moisture and precipitation samples and were consistent with previous years.

No manmade gamma-emitting radionuclides were detected during the fourth quarter.

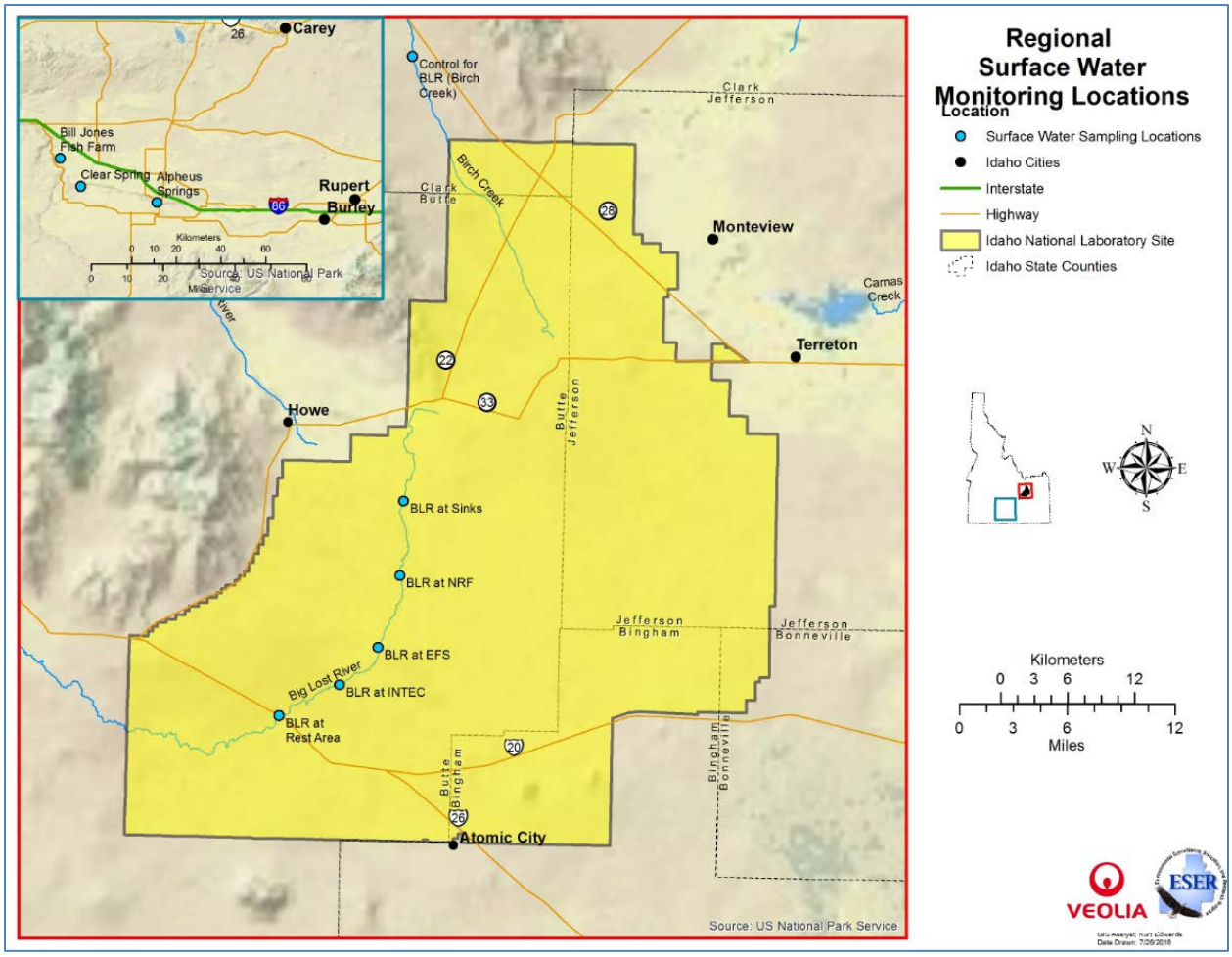

Figure 11. Map of ESER Program Surface Water Monitoring Locations.

4. AGRICULTURAL PRODUCT, WILDLIFE, AND SOIL SAMPLING

Another potential pathway for contaminants to reach humans is through the food chain. The ESER Program samples multiple agricultural products and game animals from around the INL Site and Southeast Idaho. Specifically, milk, alfalfa, grain, potatoes, lettuce, large game animals, and waterfowl are sampled. Milk is sampled throughout the year and large game animals are sampled whenever large game animals are killed onsite from vehicle collisions. Alfalfa is collected during the second quarter, lettuce and grain are sampled during the third quarter, while potatoes are collected during the fourth quarter. Waterfowl are collected in either the third or fourth quarter. See Table A-1, Appendix A, for more details on agricultural product and wildlife sampling. This section discusses results from milk and agricultural products samples available during the fourth quarter of 2017.

MILK SAMPLING

Milk samples were collected weekly at Idaho Falls and Terreton. Monthly samples were collected at five other locations around the INL Site (Figure 12) during the fourth quarter of 2017. In addition to the local locations, commercially-available organic milk (from Colorado) was purchased as a control sample each month. All samples were analyzed for gamma emitting radionuclides, with particular emphasis on Iodine-131. Samples in November were also analyzed for ^{90}Sr and tritium.

Neither ^{131}I nor ^{137}Cs was detected in any weekly or monthly samples during the fourth quarter. No other human-made gamma-emitting radionuclides were found either. Data for ^{131}I and ^{137}Cs in milk samples are listed in Appendix C, Table C-8.

Results for ^{90}Sr and tritium are listed in Appendix C, Table C-9. Strontium-90 was detected in two of the six samples analyzed, including the control sample. A seventh sample from Blackfoot was not analyzed because of insufficient sample. The maximum concentration of 0.38 pCi/L from the Control location and the average concentration of 0.16 pCi/L are in the lower portion of the range for these values over the past several years. The presence of ^{90}Sr at similar levels in samples from near the INL Site and distant from the INL Site (as well as the organic milk from Colorado), indicates that there is no INL Site impact of the results. There is no DCS for ^{90}Sr in milk; however, for comparison the results were well below the drinking water DCS of 1.1×10^3 pCi/L.

Tritium was also detected in one of seven samples analyzed at 86.8 pCi/L in the sample from Terreton. The result similar to those previously measured and similar to those found in other liquid media like precipitation. There is no DCS for tritium in milk, but the results were well below the DCS for tritium in drinking water (1.9×10^6 pCi/L).

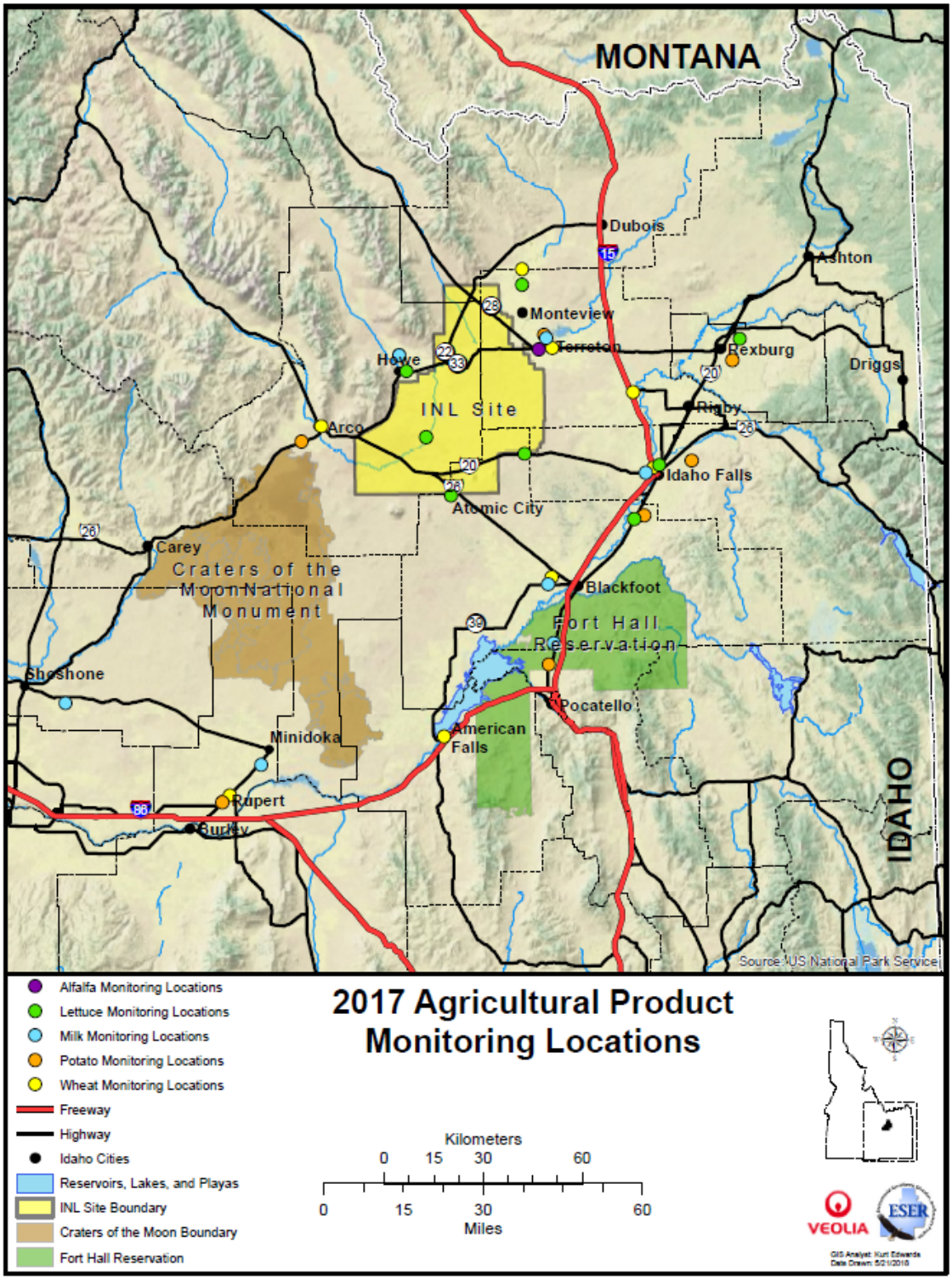

Figure 12. ESER agriculture product sampling locations. Milk is collected at locations identified by blue circles.

POTATO SAMPLING

Locally-grown potatoes from seven southeast Idaho locations (Figure 12) and one duplicate were analyzed for gamma-emitting radionuclides like ^{137}Cs and for ^{90}Sr. A control sample from a local grocery store (grown in Washington state) was also analyzed. No human-made gamma-emitters were found in any sample. Strontium-90 was reported in the sample from Terreton (2.69 pCi/kg) and in the duplicate sample from Arco at 3.3 pCi/kg, but not in the primary sample from the same location. Both ^{137}Cs and ^{90}Sr are present in the soil as a result of worldwide fallout from nuclear weapons testing, but they are only occasionally detected in potato samples. This is because potatoes are generally less efficient at removing radioactive elements from soil than leafy vegetables such as lettuce. Data for potato samples are listed in Appendix C, Table C-10. During the summer of 2020, a review of Appendix C, Table C-10 determined the activity concentration values reported for the media were correct, however, the unit of concentration listed in the column headings were incorrect. Prior to 2010, concentrations were reported in either pCi/g or pCi/kg. In 2010, the concentration unit of pCi/kg was adopted for reporting radionuclide concentrations in soil and biota (vegetation and animals). The reasons for doing this include: 1) the use of one unit (pCi/kg) ensures consistency and comparability in reporting concentrations in various media, 2) the use of one unit (pCi/kg) minimizes mistakes (due to confusion about units) in data entry into the database, and 3) the unit of pCi/kg was selected because it is the unit associated with models that are used for dose calculations and the results tend to be whole numbers (e.g. 14 pCi/kg versus 0.014 pCi/g). The column headings have been updated to the correct units of concentration (pCi/kg and Bq/kg).

LARGE GAME ANIMAL SAMPLING

Muscle tissue was collected from one game animal, an elk, during the fourth quarter. No manmade gamma-emitting radionuclides were detected (Appendix C, Table C-11).

WATERFOWL SAMPLING

Waterfowl are collected each year by the ESER contractor at ponds on the INL Site and at a location off the INL Site. Three waterfowl collected from wastewater ponds located at the Advanced Test Reactor (ATR) Complex plus four control waterfowl collected from American Falls Reservoir were analyzed for gamma-emitting radionuclides, ^{90}Sr, and actinides (americium-241 [^{241}Am], plutonium-238 [^{238}Pu], and plutonium-239/240 [$^{239/240}Pu$]). These radionuclides were selected because they have historically been measured in liquid effluents from some INL Site facilities. Each sample was divided into the following three sub-samples: 1) edible tissue (muscle, gizzard, heart, and liver), 2) external portion (feathers, feet, and head), and 3) all remaining tissue.

A total of six human-made radionuclides were detected in the samples from at least one of the ducks collected at the ATR Complex ponds. These were cobalt-60 (^{60}Co), zinc-65 (^{65}Zn), ^{90}Sr, ^{137}Cs, ^{238}Pu, and $^{239/240}Pu$. The Green-winged Teal, collected from the sewage lagoons at ATR Complex had four of these radionuclides in edible tissue (Appendix C, Table C-12). In the control ducks, ^{90}Sr and $^{239/240}Pu$ were detected in the external and remainder portions of some ducks, but it was not found in the edible tissues. A review of Appendix C, Table C-12 confirmed the activity concentration values reported for the media were correct, however, the Bq/g unit of concentration in the column header was incorrect. The column heading was updated to the correct unit of concentration (Bq/kg).

The maximum potential dose from eating 225 g (8 oz) of duck meat collected in 2017 was calculated. Doses from consuming waterfowl are conservatively based on the assumption that ducks are eaten immediately after leaving the pond and no radioactive decay occurs. The maximum potential dose of 0.046 mrem from these waterfowl samples is much lower than the dose estimated for 2016 (0.49 mrem), the last time waterfowl were collected. This because the hypalon liner was removed from the west disposal pond in 2016 and any associated debris was removed with the liner and was no longer available to waterfowl.

5. ENVIRONMENTAL RADIATION

An array of optically stimulated luminescent dosimeters (OSLDs) is distributed throughout the Eastern Snake River Plain to monitor for environmental radiation. Two OSLDs are in place at each location. OSLDs are changed out at the beginning of May and again at the beginning of November after six months in the field.

OSLD results from the fourth quarter are displayed in Appendix C, Table C-13. Results are presented in dose units of millirem (mrem). Boundary OSLD values ranged from 47.45 mrem at Birch Creek to 62.60 mrem at Atomic City, with an overall average of 56.24 mrem. This equates to an average dose of 0.30 mrem per day. Distant results varied from 48.40 mrem at Dubois to 72.45 mrem at Sugar City. The Distant average was 59.47 mrem equating to an average dose of 0.32 mrem per day. Results vary between sampling locations based on the geologic composition of the soils in the vicinity of the OSLD and the elevation of the station.

6. QUALITY ASSURANCE

The ESER Quality Assurance Program consists of five ongoing tasks which measure:

1. method uncertainty
2. data completeness
3. data accuracy, using spike, performance evaluation and laboratory control samples
4. data precision, using split samples, duplicate samples and recounts
5. presence of contamination in samples, using blanks.

Sample results are compared to criteria described in the Quality Assurance Project Plan for the INL Site Offsite Environmental Surveillance Program (WAI 2016). Criteria established by DOE for Quality Assurance activities include:

- Quality assurance program
- Personnel training and qualification
- Quality improvement process
- Documents and records
- Established work processes
- Established standards for design and verification
- Established procurement requirements
- Inspection and acceptance testing
- Management assessment
- Independent assessment

Assessments of ESER data quality are achieved through analysis of spike, performance evaluation, and duplicate samples; through sample recounts; through analysis of blank samples; and through comparison of sample results to established method quality objectives. These assessments are documented in the ESER Quality Assurance for the Fourth Quarter of 2017 (WAI 2017).

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APPENDIX A

SUMMARY OF SAMPLING SCHEDULE

Table A-1. Summary of the ESER Program's Sampling Schedule

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INL Site
AIR SAMPLING				
LOW-VOLUME AIR				
Gross Alpha, Gross Beta, ^{131}I	weekly	Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Sugar City	Arco, Atomic City, FAA Tower, Howe, Monteview, Mud Lake, Blue Dome	Main Gate, EFS, Van Buren
Gamma Spec	quarterly	Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Sugar City	Arco, Atomic City, FAA Tower, Howe, Monteview, Mud Lake, Blue Dome	Main Gate, EFS, Van Buren
^{90}Sr, Transuranics	quarterly	Rotating schedule	Rotating schedule	Rotating schedule
ATMOSPHERIC MOISTURE				
Tritium	2 to 13 weeks	Idaho Falls	Atomic City, Howe	EFS
PRECIPITATION				
Tritium	monthly	Idaho Falls	None	None
Tritium	weekly	None	Atomic City, Howe	EFS
DRINKING WATER				
Gross Alpha, Gross Beta, Tritium	Semiannually	Craters of the Moon, Idaho Falls, Minidoka, Shoshone	Atomic City, Howe, Mud Lake, Rest Area	None
SURFACE WATER				
Gross Alpha, Gross Beta, Tritium	Semiannually	Buhl, Hagerman, Twin Falls	None	Big Lost River (when flowing)
ENVIRONMENTAL RADIATION SAMPLING				
TLDs/OSLDs				
Gamma Radiation	semiannual	Aberdeen, Blackfoot (2), Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Minidoka, Sugar City, Roberts	Arco, Atomic City, Birch Creek, Blue Dome, Howe, Monteview, Mud Lake	None
SOIL SAMPLING				
SOIL				
Gamma Spec, ^{90}Sr, Transuranics	biennially	Carey, Blackfoot, St. Anthony	Butte City, Monteview, Atomic City, FAA Tower, Howe, Mud Lake (2), Birch Creek, Frenchman's Cabin	None

Table A-1. Summary of the ESER Program's Sampling Schedule (continued)

Sample Type / Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INL Site
FOODSTUFF SAMPLING				
MILK				
Gamma Spec (^{131}I)	weekly	Idaho Falls	None	None
Gamma Spec (^{131}I)	monthly	Blackfoot, Dietrich, Fort Hall, Idaho Falls, Minidoka	Howe, Terreton	None
Tritium, ^{90}Sr	Semi-annually	Blackfoot, Dietrich, Fort Hall, Idaho Falls, Minidoka	Howe, Terreton	None
POTATOES				
Gamma Spec, ^{90}Sr	annually	Varies among Blackfoot, Idaho Falls, Rupert, Shelley, Hamer, Driggs, occasional samples across the U.S.	Varies among Arco, Monteview, Mud Lake, Terreton	None
ALFALFA				
Gamma Spec, ^{90}Sr	annually	Idaho Falls	Mud Lake	None
GRAIN				
Gamma Spec, ^{90}Sr	annually	Varies among American Falls, Blackfoot, Carey, Idaho Falls, Rupert/Minidoka, Roberts	Varies among Arco, Monteview, Mud Lake, Taber, Terreton	None
LETTUCE				
Gamma Spec, ^{90}Sr	annually	Varies among Blackfoot, Carey, Idaho Falls, Rigby, Sugar City	Varies among Arco, Atomic City, FAA Tower, Howe, Monteview	EFS
BIG GAME				
Gamma Spec	varies	Occasional samples across the U.S.	Public Highways	INL Site roads
WATERFOWL				
Gamma Spec, ^{90}Sr, Transuranics	annually	Varies among: Heise, Firth, Fort Hall, Mud Lake, Market Lake, and American Falls	None	INL Site wastewater disposal ponds

APPENDIX B

SUMMARY OF MDCs AND DCSs

Table B-1. Summary of Approximate Minimum Detectable Concentrations for Radiological Analyses Performed during Fourth Quarter 2017

Sample Type	Analysis	Average Minimum Detectable Concentration[a] (MDC)	Derived Concentration Standard[b] (DCS)
Air (particulate filter)[e]	Gross alpha[c]	4.1×10^{-16} µCi/mL	3.4×10^{-14} µCi/mL
	Gross beta[d]	9.2×10^{-16} µCi/mL	2.5×10^{-11} µCi/mL
	^{137}Cs	7.8×10^{-17} µCi/mL	9.8×10^{-11} µCi/mL
	^{90}Sr	1.4×10^{-17} µCi/mL	2.5×10^{-11} µCi/mL
	^{241}Am	2.9×10^{-18} µCi/mL	4.1×10^{-14} µCi/mL
	^{238}Pu	4.4×10^{-18} µCi/mL	3.7×10^{-14} µCi/mL
	$^{239/240}$Pu	5.3×10^{-18} µCi/mL	3.4×10^{-14} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	6.8×10^{-16} µCi/mL	2.3×10^{-19} µCi/mL
Air (atmospheric moisture)	^{3}H	87.3 pCi/L_{water} 4.9×10^{-13} µCi/mL_{air}	2.1×10^{-7} µCi/mL_{air}
Air (precipitation)	^{3}H	87.4 pCi/L	1.9×10^{-3} µCi/mL
Milk	^{131}I	0.5 pCi/L	--
	^{137}Cs	1.0 pCi/L	--
	^{90}Sr	0.2 pCi/L	--
	^{3}H	87.4 pCi/L	--
Potatoes	^{137}Cs	1.2 pCi/kg	--
	^{90}Sr	7.9 pCi/kg	--
Game Animals	^{137}Cs	1.5 pCi/kg	--

a The MDC is an estimate of the concentration of radioactivity in a given sample type that can be identified with a 95 percent level of confidence. MDCs are calculated and reported by the laboratories based on actual ESER sample results following analysis.

b DCSs, set by the DOE, represent reference values for radiation exposure. They are based on a radiation dose of 100 mrem/yr for exposure through a particular exposure mode such as direct exposure, inhalation, or ingestion of water.

c Based on the most restrictive human-made alpha emitter (^{239}Pu).

d Based on the most restrictive human-made beta emitter (^{90}Sr).

e The approximate MDC is based on an average filtered air volume (pressure corrected) of 445 m^3/week.

APPENDIX C

SAMPLE ANALYSIS RESULTS

Table C-1. Weekly Gross Alpha and Gross Beta Concentrations in Air

		GROSS ALPHA							GROSS BETA						
Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY															
ARCO	10/04/17	0.60	±	0.16	2.21	±	0.57	Yes	10.90	±	0.38	40.33	±	1.41	Yes
	10/11/17	0.78	±	0.17	2.89	±	0.62	Yes	14.30	±	0.43	52.91	±	1.59	Yes
	10/18/17	1.12	±	0.21	4.14	±	0.77	Yes	15.00	±	0.48	55.50	±	1.79	Yes
	10/25/17	1.42	±	0.18	5.25	±	0.67	Yes	24.40	±	0.61	90.28	±	2.24	Yes
	11/01/17	1.38	±	0.17	5.11	±	0.64	Yes	26.80	±	0.63	99.16	±	2.31	Yes
	11/08/17	1.40	±	0.18	5.18	±	0.67	Yes	19.20	±	0.57	71.04	±	2.12	Yes
	11/15/17	1.53	±	0.28	5.66	±	1.03	Yes	19.40	±	0.64	71.78	±	2.38	Yes
	11/21/17	1.11	±	0.31	4.11	±	1.14	Yes	16.60	±	0.71	61.42	±	2.63	Yes
	11/29/17	1.16	±	0.21	4.29	±	0.77	Yes	21.40	±	0.55	79.18	±	2.03	Yes
	12/06/17	1.01	±	0.17	3.74	±	0.63	Yes	24.70	±	0.62	91.39	±	2.29	Yes
	12/13/17	2.08	±	0.23	7.70	±	0.83	Yes	45.10	±	0.81	166.87	±	2.99	Yes
	12/19/17	2.45	±	0.26	9.07	±	0.96	Yes	53.30	±	0.96	197.21	±	3.54	Yes
	12/27/17	0.57	±	0.14	2.10	±	0.51	Yes	23.40	±	0.57	86.58	±	2.10	Yes
ATOMIC CITY	10/04/17	0.80	±	0.17	2.94	±	0.63	Yes	14.60	±	0.44	54.02	±	1.61	Yes
	10/11/17	0.86	±	0.16	3.17	±	0.59	Yes	12.20	±	0.39	45.14	±	1.43	Yes
	10/18/17	1.40	±	0.22	5.18	±	0.82	Yes	18.90	±	0.53	69.93	±	1.95	Yes
	10/25/17	1.50	±	0.18	5.55	±	0.68	Yes	23.10	±	0.59	85.47	±	2.17	Yes
	11/01/17	1.74	±	0.20	6.44	±	0.73	Yes	29.30	±	0.68	108.41	±	2.50	Yes
	11/08/17	1.44	±	0.18	5.33	±	0.65	Yes	18.60	±	0.54	68.82	±	2.01	Yes
	11/15/17	0.68	±	0.26	2.53	±	0.95	No	19.30	±	0.67	71.41	±	2.48	Yes
	11/21/17	1.38	±	0.30	5.11	±	1.09	Yes	17.10	±	0.70	63.27	±	2.60	Yes
	11/29/17	1.16	±	0.21	4.29	±	0.78	Yes	20.60	±	0.55	76.22	±	2.04	Yes
	12/06/17	1.20	±	0.18	4.44	±	0.65	Yes	23.40	±	0.61	86.58	±	2.24	Yes
	12/13/17	2.14	±	0.23	7.92	±	0.84	Yes	49.60	±	0.83	183.52	±	3.09	Yes
	12/19/17	2.15	±	0.24	7.96	±	0.88	Yes	49.30	±	0.89	182.41	±	3.29	Yes
	12/27/17	1.26	±	0.17	4.66	±	0.63	Yes	21.80	±	0.56	80.66	±	2.06	Yes
BLUE DOME	10/04/17	0.73	±	0.17	2.69	±	0.62	Yes	11.70	±	0.40	43.29	±	1.49	Yes
	10/11/17	0.86	±	0.18	3.17	±	0.65	Yes	13.50	±	0.43	49.95	±	1.59	Yes
	10/18/17	0.67	±	0.19	2.48	±	0.71	Yes	17.10	±	0.51	63.27	±	1.87	Yes
	10/25/17	1.07	±	0.17	3.96	±	0.62	Yes	23.50	±	0.60	86.95	±	2.22	Yes
	11/01/17	1.61	±	0.19	5.96	±	0.69	Yes	24.60	±	0.62	91.02	±	2.29	Yes
	11/08/17	1.45	±	0.18	5.37	±	0.67	Yes	20.70	±	0.58	76.59	±	2.14	Yes
	11/15/17	0.85	±	0.26	3.13	±	0.97	Yes	21.10	±	0.68	78.07	±	2.52	Yes
	11/21/17	1.15	±	0.30	4.26	±	1.10	Yes	15.90	±	0.68	58.83	±	2.50	Yes
	11/29/17	1.05	±	0.20	3.89	±	0.74	Yes	17.50	±	0.51	64.75	±	1.88	Yes
	12/06/17	0.73	±	0.16	2.69	±	0.58	Yes	20.70	±	0.58	76.59	±	2.15	Yes
	12/13/17	1.90	±	0.22	7.03	±	0.81	Yes	36.70	±	0.74	135.79	±	2.75	Yes
	12/19/17	2.58	±	0.27	9.55	±	0.98	Yes	39.30	±	0.86	145.41	±	3.18	Yes
	12/27/17	0.90	±	0.15	3.32	±	0.57	Yes	18.30	±	0.52	67.71	±	1.94	Yes
FAA TOWER	10/04/17	0.46	±	0.16	1.70	±	0.58	No	14.60	±	0.43	54.02	±	1.60	Yes
	10/11/17	0.72	±	0.17	2.68	±	0.62	Yes	13.10	±	0.42	48.47	±	1.56	Yes
	10/18/17	0.95	±	0.21	3.52	±	0.79	Yes	16.50	±	0.52	61.05	±	1.94	Yes
	10/25/17	1.81	±	0.21	6.70	±	0.76	Yes	22.10	±	0.61	81.77	±	2.24	Yes
	11/01/17	2.03	±	0.20	7.51	±	0.75	Yes	25.70	±	0.63	95.09	±	2.32	Yes
	11/08/17	1.44	±	0.18	5.33	±	0.68	Yes	20.60	±	0.59	76.22	±	2.18	Yes
	11/15/17	1.06	±	0.28	3.92	±	1.02	Yes	20.90	±	0.69	77.33	±	2.56	Yes
	11/21/17	1.09	±	0.30	4.03	±	1.11	Yes	15.50	±	0.68	57.35	±	2.52	Yes
	11/29/17	0.59	±	0.19	2.16	±	0.69	Yes	19.30	±	0.54	71.41	±	1.98	Yes
	12/06/17	1.14	±	0.17	4.22	±	0.64	Yes	22.00	±	0.59	81.40	±	2.18	Yes
	12/13/17	2.12	±	0.24	7.84	±	0.87	Yes	42.30	±	0.82	156.51	±	3.03	Yes
	12/19/17	2.47	±	0.26	9.14	±	0.97	Yes	49.70	±	0.94	183.89	±	3.48	Yes
	12/27/17	0.99	±	0.15	3.66	±	0.57	Yes	18.00	±	0.51	66.60	±	1.87	Yes

Table C-1. Weekly Gross Alpha and Gross Beta Concentrations in Air

		GROSS ALPHA							GROSS BETA						
Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
HOWE	10/04/17	0.60	±	0.16	2.21	±	0.61	Yes	13.00	±	0.42	48.10	±	1.55	Yes
	10/11/17	0.79	±	0.17	2.93	±	0.64	Yes	12.30	±	0.42	45.51	±	1.55	Yes
	10/18/17	0.91	±	0.20	3.36	±	0.73	Yes	15.70	±	0.49	58.09	±	1.80	Yes
	10/25/17	2.28	±	0.21	8.44	±	0.78	Yes	23.30	±	0.58	86.21	±	2.16	Yes
	11/01/17	2.19	±	0.21	8.10	±	0.77	Yes	30.30	±	0.66	112.11	±	2.44	Yes
	11/08/17	1.86	±	0.19	6.88	±	0.71	Yes	19.80	±	0.55	73.26	±	2.04	Yes
	11/15/17	1.22	±	0.28	4.51	±	1.02	Yes	20.50	±	0.68	75.85	±	2.50	Yes
	11/21/17	1.15	±	0.30	4.26	±	1.09	Yes	18.20	±	0.70	67.34	±	2.58	Yes
	11/29/17	0.93	±	0.20	3.43	±	0.74	Yes	21.00	±	0.55	77.70	±	2.03	Yes
	12/06/17	1.47	±	0.19	5.44	±	0.69	Yes	20.80	±	0.58	76.96	±	2.13	Yes
	12/13/17	2.84	±	0.24	10.51	±	0.90	Yes	50.00	±	0.82	185.00	±	3.03	Yes
	12/19/17	3.58	±	0.29	13.25	±	1.06	Yes	60.00	±	0.97	222.00	±	3.57	Yes
	12/27/17	1.69	±	0.19	6.25	±	0.70	Yes	23.60	±	0.58	87.32	±	2.14	Yes
MONTEVIEW	10/04/17	0.43	±	0.16	1.57	±	0.59	No	12.20	±	0.42	45.14	±	1.55	Yes
	10/11/17	0.97	±	0.17	3.57	±	0.63	Yes	12.40	±	0.40	45.88	±	1.48	Yes
	10/18/17	1.34	±	0.22	4.96	±	0.83	Yes	17.10	±	0.52	63.27	±	1.91	Yes
	10/25/17	3.14	±	0.24	11.62	±	0.90	Yes	24.50	±	0.61	90.65	±	2.25	Yes
	11/01/17	2.33	±	0.21	8.62	±	0.79	Yes	25.30	±	0.62	93.61	±	2.29	Yes
	11/08/17	2.50	±	0.23	9.25	±	0.84	Yes	21.70	±	0.61	80.29	±	2.25	Yes
	11/15/17	0.99	±	0.28	3.65	±	1.03	Yes	23.90	±	0.74	88.43	±	2.72	Yes
	11/21/17	1.24	±	0.31	4.59	±	1.14	Yes	18.70	±	0.73	69.19	±	2.68	Yes
	11/29/17	1.33	±	0.22	4.92	±	0.80	Yes	18.70	±	0.54	69.19	±	1.98	Yes
	12/06/17	1.76	±	0.20	6.51	±	0.75	Yes	22.00	±	0.60	81.40	±	2.23	Yes
	12/13/17	2.50	±	0.24	9.25	±	0.87	Yes	43.80	±	0.79	162.06	±	2.92	Yes
	12/19/17	2.82	±	0.26	10.43	±	0.97	Yes	51.40	±	0.92	190.18	±	3.39	Yes
	12/27/17	1.40	±	0.17	5.18	±	0.64	Yes	21.10	±	0.54	78.07	±	2.01	Yes
MUD LAKE	10/04/17	0.46	±	0.15	1.70	±	0.56	Yes	11.90	±	0.40	44.03	±	1.46	Yes
	10/11/17	0.97	±	0.17	3.59	±	0.64	Yes	12.80	±	0.41	47.36	±	1.51	Yes
	10/18/17	1.26	±	0.21	4.66	±	0.79	Yes	16.80	±	0.50	62.16	±	1.85	Yes
	10/25/17	1.87	±	0.20	6.92	±	0.74	Yes	26.70	±	0.63	98.79	±	2.31	Yes
	11/01/17	1.63	±	0.18	6.03	±	0.68	Yes	28.10	±	0.63	103.97	±	2.35	Yes
	11/08/17	1.61	±	0.19	5.96	±	0.71	Yes	21.10	±	0.60	78.07	±	2.20	Yes
	11/15/17	1.26	±	0.28	4.66	±	1.03	Yes	22.90	±	0.70	84.73	±	2.59	Yes
	11/21/17	1.37	±	0.31	5.07	±	1.15	Yes	19.90	±	0.73	73.63	±	2.72	Yes
	11/29/17	1.25	±	0.21	4.63	±	0.78	Yes	21.80	±	0.55	80.66	±	2.04	Yes
	12/06/17	0.94	±	0.16	3.48	±	0.60	Yes	24.20	±	0.61	89.54	±	2.24	Yes
	12/13/17	2.46	±	0.24	9.10	±	0.87	Yes	48.30	±	0.82	178.71	±	3.02	Yes
	12/19/17	2.25	±	0.25	8.33	±	0.93	Yes	56.80	±	0.98	210.16	±	3.61	Yes
	12/27/17	0.77	±	0.14	2.85	±	0.53	Yes	20.20	±	0.52	74.74	±	1.94	Yes
DISTANT															
BLACKFOOT	10/04/17	0.82	±	0.16	3.03	±	0.60	Yes	15.00	±	0.42	55.50	±	1.54	Yes
	10/11/17	0.59	±	0.15	2.18	±	0.56	Yes	12.40	±	0.39	45.88	±	1.46	Yes
	10/18/17	0.76	±	0.18	2.80	±	0.65	Yes	15.60	±	0.46	57.72	±	1.68	Yes
	10/25/17	1.27	±	0.17	4.70	±	0.62	Yes	17.90	±	0.52	66.23	±	1.92	Yes
	11/01/17	1.52	±	0.18	5.62	±	0.67	Yes	27.40	±	0.64	101.38	±	2.37	Yes
	11/08/17	0.97	±	0.15	3.59	±	0.55	Yes	16.30	±	0.50	60.31	±	1.86	Yes
	11/15/17	0.85	±	0.24	3.16	±	0.90	Yes	20.10	±	0.63	74.37	±	2.34	Yes
	11/21/17	0.74	±	0.27	2.74	±	0.99	No	17.50	±	0.67	64.75	±	2.49	Yes
	11/29/17	0.97	±	0.19	3.58	±	0.69	Yes	18.80	±	0.50	69.56	±	1.85	Yes
	12/06/17	0.94	±	0.17	3.47	±	0.62	Yes	21.90	±	0.60	81.03	±	2.21	Yes
	12/13/17	2.20	±	0.22	8.14	±	0.81	Yes	44.30	±	0.77	163.91	±	2.86	Yes
	12/19/17	1.70	±	0.22	6.29	±	0.82	Yes	40.00	±	0.83	148.00	±	3.06	Yes
	12/27/17	1.10	±	0.17	4.07	±	0.62	Yes	18.20	±	0.54	67.34	±	2.00	Yes

Table C-1. Weekly Gross Alpha and Gross Beta Concentrations in Air

		GROSS ALPHA							GROSS BETA						
Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
QA-1	10/04/17	0.96	±	0.17	3.55	±	0.63	Yes	14.40	±	0.42	53.28	±	1.55	Yes
(BLACKFOOT)	10/11/17	0.83	±	0.16	3.07	±	0.60	Yes	12.00	±	0.39	44.40	±	1.44	Yes
	10/18/17	1.05	±	0.19	3.89	±	0.70	Yes	14.90	±	0.45	55.13	±	1.67	Yes
	10/25/17	1.67	±	0.19	6.18	±	0.71	Yes	20.40	±	0.57	75.48	±	2.11	Yes
	11/01/17	1.62	±	0.19	5.99	±	0.70	Yes	27.20	±	0.65	100.64	±	2.41	Yes
	11/08/17	1.21	±	0.16	4.48	±	0.60	Yes	16.00	±	0.51	59.20	±	1.89	Yes
	11/15/17	1.03	±	0.27	3.81	±	1.00	Yes	19.60	±	0.67	72.52	±	2.47	Yes
	11/21/17	0.79	±	0.27	2.93	±	1.01	No	15.90	±	0.66	58.83	±	2.44	Yes
	11/29/17	0.77	±	0.17	2.84	±	0.63	Yes	17.40	±	0.47	64.38	±	1.73	Yes
	12/06/17	0.69	±	0.15	2.54	±	0.57	Yes	19.30	±	0.57	71.41	±	2.11	Yes
	12/13/17	2.20	±	0.23	8.14	±	0.85	Yes	42.40	±	0.79	156.88	±	2.94	Yes
	12/19/17	1.99	±	0.27	7.36	±	0.99	Yes	45.20	±	0.99	167.24	±	3.66	Yes
	12/27/17	0.56	±	0.14	2.08	±	0.50	Yes	16.80	±	0.50	62.16	±	1.86	Yes
CRATERS OF	10/04/17	0.49	±	0.16	1.81	±	0.60	Yes	12.90	±	0.42	47.73	±	1.57	Yes
THE MOON	10/11/17	0.76	±	0.17	2.79	±	0.61	Yes	11.90	±	0.40	44.03	±	1.49	Yes
	10/18/17	0.79	±	0.20	2.90	±	0.74	Yes	15.90	±	0.50	58.83	±	1.86	Yes
	10/25/17	1.45	±	0.19	5.37	±	0.71	Yes	22.00	±	0.60	81.40	±	2.23	Yes
	11/01/17	1.37	±	0.18	5.07	±	0.65	Yes	25.50	±	0.63	94.35	±	2.33	Yes
	11/08/17	0.93	±	0.15	3.44	±	0.57	Yes	17.20	±	0.54	63.64	±	1.98	Yes
	11/15/17	0.69	±	0.27	2.55	±	0.98	No	20.60	±	0.70	76.22	±	2.59	Yes
	11/21/17	0.72	±	0.28	2.67	±	1.03	No	12.30	±	0.63	45.51	±	2.34	Yes
	11/29/17	0.50	±	0.18	1.85	±	0.65	No	17.10	±	0.51	63.27	±	1.87	Yes
	12/06/17	0.85	±	0.16	3.15	±	0.61	Yes	20.90	±	0.59	77.33	±	2.19	Yes
	12/13/17	1.90	±	0.22	7.03	±	0.81	Yes	42.00	±	0.79	155.40	±	2.92	Yes
	12/19/17	1.86	±	0.23	6.88	±	0.84	Yes	43.60	±	0.85	161.32	±	3.14	Yes
	12/27/17	0.51	±	0.13	1.89	±	0.48	Yes	16.30	±	0.49	60.31	±	1.82	Yes
DUBOIS	10/04/17	0.33	±	0.15	1.21	±	0.54	No	11.40	±	0.39	42.18	±	1.44	Yes
	10/11/17	0.79	±	0.18	2.92	±	0.65	Yes	12.30	±	0.42	45.51	±	1.57	Yes
	10/18/17	1.45	±	0.24	5.37	±	0.89	Yes	15.10	±	0.53	55.87	±	1.94	Yes
	10/25/17	1.69	±	0.20	6.25	±	0.72	Yes	23.60	±	0.60	87.32	±	2.23	Yes
	11/01/17	1.44	±	0.18	5.33	±	0.67	Yes	23.90	±	0.61	88.43	±	2.27	Yes
	11/08/17	1.31	±	0.18	4.85	±	0.66	Yes	20.60	±	0.59	76.22	±	2.18	Yes
	11/15/17	1.03	±	0.27	3.81	±	1.00	Yes	23.40	±	0.71	86.58	±	2.63	Yes
	11/21/17	1.19	±	0.30	4.40	±	1.10	Yes	15.90	±	0.67	58.83	±	2.48	Yes
	11/29/17	0.70	±	0.19	2.60	±	0.68	Yes	17.40	±	0.51	64.38	±	1.87	Yes
	12/06/17	0.80	±	0.17	2.95	±	0.61	Yes	22.50	±	0.62	83.25	±	2.29	Yes
	12/13/17	1.72	±	0.21	6.36	±	0.79	Yes	37.20	±	0.76	137.64	±	2.80	Yes
	12/19/17	2.13	±	0.25	7.88	±	0.93	Yes	50.50	±	0.95	186.85	±	3.51	Yes
	12/27/17	0.66	±	0.14	2.42	±	0.53	Yes	20.10	±	0.55	74.37	±	2.02	Yes
IDAHO FALLS	10/04/17	0.62	±	0.16	2.29	±	0.60	Yes	15.60	±	0.44	57.72	±	1.63	Yes
	10/11/17	1.09	±	0.18	4.03	±	0.65	Yes	12.70	±	0.41	46.99	±	1.50	Yes
	10/18/17	1.06	±	0.21	3.92	±	0.78	Yes	17.10	±	0.51	63.27	±	1.89	Yes
	10/25/17	2.02	±	0.21	7.47	±	0.77	Yes	20.10	±	0.57	74.37	±	2.10	Yes
	11/01/17	1.45	±	0.18	5.37	±	0.67	Yes	24.10	±	0.62	89.17	±	2.29	Yes
	11/08/17	1.59	±	0.19	5.88	±	0.69	Yes	18.60	±	0.56	68.82	±	2.06	Yes
	11/15/17	1.78	±	0.31	6.59	±	1.13	Yes	22.20	±	0.71	82.14	±	2.62	Yes
	11/21/17	1.16	±	0.30	4.29	±	1.10	Yes	16.70	±	0.69	61.79	±	2.54	Yes
	11/29/17	1.39	±	0.22	5.14	±	0.80	Yes	22.10	±	0.56	81.77	±	2.06	Yes
	12/06/17	2.12	±	0.22	7.84	±	0.80	Yes	18.70	±	0.57	69.19	±	2.10	Yes
	12/13/17	1.46	±	0.20	5.40	±	0.75	Yes	35.60	±	0.74	131.72	±	2.73	Yes
	12/19/17	2.23	±	0.25	8.25	±	0.93	Yes	45.50	±	0.90	168.35	±	3.33	Yes
	12/27/17	0.88	±	0.15	3.26	±	0.56	Yes	16.20	±	0.50	59.94	±	1.84	Yes
JACKSON	10/04/17	0.79	±	0.16	2.91	±	0.60	Yes	12.90	±	0.40	47.73	±	1.48	Yes

Table C-1. Weekly Gross Alpha and Gross Beta Concentrations in Air

		GROSS ALPHA							GROSS BETA						
Sampling Group and Location	**Sampling Date**	**Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)**			**Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)**			**Result > 3s**	**Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)**			**Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)**			**Result > 3s**
	10/11/17	0.84	±	0.18	3.12	±	0.67	**Yes**	14.30	±	0.45	52.91	±	1.67	**Yes**
	10/18/17	0.61	±	0.19	2.25	±	0.68	**Yes**	16.60	±	0.49	61.42	±	1.83	**Yes**
	10/25/17	1.14	±	0.17	4.22	±	0.62	**Yes**	21.00	±	0.57	77.70	±	2.09	**Yes**
	11/01/17	1.76	±	0.19	6.51	±	0.68	**Yes**	23.40	±	0.58	86.58	±	2.15	**Yes**
	11/08/17	0.95	±	0.15	3.53	±	0.57	**Yes**	15.10	±	0.51	55.87	±	1.88	**Yes**
	11/15/17	0.62	±	0.25	2.30	±	0.93	No	17.20	±	0.64	63.64	±	2.36	**Yes**
	11/21/17	0.96	±	0.26	3.56	±	0.95	**Yes**	16.20	±	0.65	59.94	±	2.40	**Yes**
	11/29/17	0.92	±	0.19	3.39	±	0.68	**Yes**	14.70	±	0.46	54.39	±	1.70	**Yes**
	12/06/17	0.74	±	0.15	2.74	±	0.54	**Yes**	18.30	±	0.52	67.71	±	1.94	**Yes**
	12/13/17	1.29	±	0.19	4.77	±	0.70	**Yes**	34.10	±	0.70	126.17	±	2.60	**Yes**
	12/19/17	1.36	±	0.18	5.03	±	0.67	**Yes**	25.50	±	0.62	94.35	±	2.31	**Yes**
	12/27/17	0.90	±	0.16	3.31	±	0.57	**Yes**	17.80	±	0.52	65.86	±	1.93	**Yes**
SUGAR CITY	10/04/17	0.88	±	0.17	3.24	±	0.61	**Yes**	12.40	±	0.39	45.88	±	1.46	**Yes**
	10/11/17	1.03	±	0.17	3.81	±	0.63	**Yes**	11.70	±	0.39	43.29	±	1.43	**Yes**
	10/18/17	1.32	±	0.20	4.88	±	0.75	**Yes**	14.30	±	0.45	52.91	±	1.66	**Yes**
	10/25/17	1.21	±	0.16	4.48	±	0.60	**Yes**	18.60	±	0.52	68.82	±	1.92	**Yes**
	11/01/17	1.56	±	0.18	5.77	±	0.67	**Yes**	22.80	±	0.59	84.36	±	2.18	**Yes**
	11/08/17	1.27	±	0.17	4.70	±	0.64	**Yes**	17.50	±	0.55	64.75	±	2.04	**Yes**
	11/15/17	0.85	±	0.25	3.15	±	0.94	**Yes**	19.70	±	0.65	72.89	±	2.41	**Yes**
	11/21/17	0.76	±	0.27	2.80	±	1.00	No	15.30	±	0.65	56.61	±	2.41	**Yes**
	11/29/17	0.65	±	0.18	2.39	±	0.66	**Yes**	18.10	±	0.50	66.97	±	1.86	**Yes**
	12/06/17	0.53	±	0.13	1.96	±	0.49	**Yes**	16.20	±	0.49	59.94	±	1.83	**Yes**
	12/13/17	1.36	±	0.19	5.03	±	0.71	**Yes**	31.70	±	0.69	117.29	±	2.54	**Yes**
	12/19/17	1.48	±	0.22	5.48	±	0.81	**Yes**	39.10	±	0.84	144.67	±	3.12	**Yes**
	12/27/17	0.59	±	0.13	2.18	±	0.49	**Yes**	19.20	±	0.51	71.04	±	1.89	**Yes**
QA-2	10/04/17	0.88	±	0.17	3.27	±	0.63	**Yes**	13.60	±	0.42	50.32	±	1.54	**Yes**
(SUGAR CITY)	10/11/17	0.61	±	0.15	2.25	±	0.55	**Yes**	12.40	±	0.39	45.88	±	1.42	**Yes**
	10/18/17	1.11	±	0.21	4.11	±	0.78	**Yes**	17.20	±	0.51	63.64	±	1.90	**Yes**
	10/25/17	1.37	±	0.18	5.07	±	0.66	**Yes**	20.70	±	0.56	76.59	±	2.08	**Yes**
	11/01/17	1.46	±	0.18	5.40	±	0.66	**Yes**	24.50	±	0.61	90.65	±	2.25	**Yes**
	11/08/17	1.03	±	0.16	3.81	±	0.58	**Yes**	18.20	±	0.54	67.34	±	2.00	**Yes**
	11/15/17	0.47	±	0.24	1.74	±	0.88	No	20.40	±	0.66	75.48	±	2.44	**Yes**
	11/21/17	0.81	±	0.27	3.00	±	1.01	No	17.00	±	0.67	62.90	±	2.48	**Yes**
	11/29/17	1.37	±	0.20	5.07	±	0.75	**Yes**	17.60	±	0.49	65.12	±	1.82	**Yes**
	12/06/17	0.81	±	0.15	3.00	±	0.54	**Yes**	18.00	±	0.51	66.60	±	1.89	**Yes**
	12/13/17	2.01	±	0.22	7.44	±	0.80	**Yes**	36.80	±	0.72	136.16	±	2.68	**Yes**
	12/19/17	1.72	±	0.23	6.36	±	0.84	**Yes**	40.30	±	0.85	149.11	±	3.13	**Yes**
	12/27/17	0.76	±	0.14	2.82	±	0.52	**Yes**	17.80	±	0.50	65.86	±	1.84	**Yes**
INL SITE															
EFS	10/04/17	0.47	±	0.12	1.74	±	0.45	**Yes**	8.39	±	0.30	31.04	±	1.10	**Yes**
	10/11/17	0.93	±	0.20	3.45	±	0.75	**Yes**	13.60	±	0.48	50.32	±	1.78	**Yes**
	10/18/17	0.98	±	0.25	3.64	±	0.91	**Yes**	17.40	±	0.59	64.38	±	2.19	**Yes**
	10/25/17	1.98	±	0.25	7.33	±	0.92	**Yes**	29.30	±	0.78	108.41	±	2.90	**Yes**
	11/01/17	2.19	±	0.24	8.10	±	0.88	**Yes**	33.10	±	0.79	122.47	±	2.92	**Yes**
	11/08/17	0.96	±	0.15	3.57	±	0.55	**Yes**	15.80	±	0.50	58.46	±	1.83	**Yes**
	11/15/17	0.66	±	0.28	2.43	±	1.04	No	22.60	±	0.76	83.62	±	2.81	**Yes**
	11/21/17	1.16	±	0.28	4.29	±	1.02	**Yes**	17.90	±	0.66	66.23	±	2.43	**Yes**
	11/29/17	0.71	±	0.19	2.63	±	0.71	**Yes**	20.40	±	0.55	75.48	±	2.03	**Yes**
	12/06/17	1.16	±	0.19	4.29	±	0.70	**Yes**	23.70	±	0.65	87.69	±	2.40	**Yes**
	12/13/17	2.12	±	0.24	7.84	±	0.87	**Yes**	48.50	±	0.86	179.45	±	3.19	**Yes**
	12/19/17	3.88	±	0.32	14.36	±	1.20	**Yes**	66.90	±	1.10	247.53	±	4.07	**Yes**
	12/27/17	0.59	±	0.14	2.19	±	0.53	**Yes**	20.50	±	0.55	75.85	±	2.05	**Yes**
MAIN GATE	10/04/17	0.88	±	0.18	3.24	±	0.66	**Yes**	15.00	±	0.45	55.50	±	1.65	**Yes**

Table C-1. Weekly Gross Alpha and Gross Beta Concentrations in Air

		GROSS ALPHA							GROSS BETA						
Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
	10/11/17	1.06	±	0.19	3.92	±	0.70	Yes	14.10	±	0.45	52.17	±	1.65	Yes
	10/18/17	1.12	±	0.21	4.14	±	0.78	Yes	16.70	±	0.50	61.79	±	1.86	Yes
	10/25/17	1.34	±	0.18	4.96	±	0.67	Yes	25.80	±	0.62	95.46	±	2.31	Yes
	11/01/17	1.28	±	0.17	4.74	±	0.64	Yes	28.60	±	0.66	105.82	±	2.45	Yes
	11/08/17	1.15	±	0.17	4.26	±	0.63	Yes	20.40	±	0.59	75.48	±	2.17	Yes
	11/15/17	0.68	±	0.47	2.52	±	1.74	No	23.40	±	1.14	86.58	±	4.22	Yes
	11/21/17	0.86	±	0.36	3.17	±	1.31	No	18.70	±	0.85	69.19	±	3.15	Yes
	11/29/17	1.25	±	0.21	4.63	±	0.78	Yes	21.70	±	0.56	80.29	±	2.06	Yes
	12/06/17	1.39	±	0.19	5.14	±	0.69	Yes	25.60	±	0.63	94.72	±	2.33	Yes
	12/13/17	1.95	±	0.23	7.22	±	0.84	Yes	51.80	±	0.87	191.66	±	3.20	Yes
	12/19/17	3.64	±	0.30	13.47	±	1.11	Yes	58.40	±	1.00	216.08	±	3.69	Yes
	12/27/17	0.85	±	0.14	3.13	±	0.53	Yes	21.60	±	0.53	79.92	±	1.96	Yes
VAN BUREN GATE	10/04/17	0.72	±	0.17	2.66	±	0.61	Yes	14.10	±	0.43	52.17	±	1.57	Yes
	10/11/17	0.84	±	0.17	3.11	±	0.63	Yes	14.40	±	0.43	53.28	±	1.60	Yes
	10/18/17	0.93	±	0.20	3.43	±	0.75	Yes	17.90	±	0.52	66.23	±	1.91	Yes
	10/25/17	1.21	±	0.18	4.48	±	0.65	Yes	22.90	±	0.60	84.73	±	2.22	Yes
	11/01/17	1.38	±	0.17	5.11	±	0.64	Yes	27.70	±	0.64	102.49	±	2.35	Yes
	11/08/17	1.34	±	0.17	4.96	±	0.64	Yes	18.30	±	0.55	67.71	±	2.02	Yes
	11/15/17	0.64	±	0.27	2.37	±	0.99	No	22.60	±	0.73	83.62	±	2.70	Yes
	11/21/17	1.23	±	0.30	4.55	±	1.10	Yes	19.90	±	0.72	73.63	±	2.65	Yes
	11/29/17	1.18	±	0.20	4.37	±	0.74	Yes	21.70	±	0.53	80.29	±	1.97	Yes
	12/06/17	1.03	±	0.17	3.81	±	0.64	Yes	23.50	±	0.61	86.95	±	2.27	Yes
	12/13/17	2.13	±	0.23	7.88	±	0.84	Yes	44.40	±	0.80	164.28	±	2.97	Yes
	12/19/17	2.72	±	0.27	10.06	±	1.00	Yes	55.50	±	0.98	205.35	±	3.62	Yes
	12/27/17	0.51	±	0.13	1.88	±	0.49	Yes	18.90	±	0.52	69.93	±	1.94	Yes

a. Invalid sample result shown in red

Table C-2. Weekly Iodine-131 Activity in Air.

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
ARCO	10/04/17	-1.07	±	0.91	-3.96	±	3.36	No
	10/11/17	-0.57	±	0.94	-2.09	±	3.49	No
	10/18/17	0.30	±	0.91	1.10	±	3.36	No
	10/25/17	0.82	±	0.89	3.02	±	3.29	No
	11/01/17	-0.80	±	1.54	-2.97	±	5.70	No
	11/08/17	-0.61	±	1.56	-2.25	±	5.77	No
	11/15/17	2.12	±	2.04	7.84	±	7.55	No
	11/21/17	-2.29	±	2.06	-8.47	±	7.62	No
	11/29/17	-0.09	±	1.37	-0.32	±	5.07	No
	12/06/17	1.27	±	1.57	4.70	±	5.81	No
	12/13/17	-0.41	±	1.61	-1.51	±	5.96	No
	12/19/17	1.29	±	1.82	4.77	±	6.73	No
	12/27/17	0.92	±	1.35	3.39	±	5.00	No
ATOMIC CITY	10/04/17	-1.12	±	0.95	-4.14	±	3.50	No
	10/11/17	-0.53	±	0.87	-1.94	±	3.23	No
	10/18/17	0.29	±	0.90	1.09	±	3.33	No
	10/25/17	0.80	±	0.88	2.97	±	3.24	No
	11/01/17	-0.86	±	1.65	-3.19	±	6.11	No
	11/08/17	-0.57	±	1.45	-2.09	±	5.37	No
	11/15/17	2.27	±	2.19	8.40	±	8.10	No
	11/21/17	-2.22	±	1.99	-8.21	±	7.36	No
	11/29/17	-0.09	±	1.43	-0.33	±	5.29	No
	12/06/17	1.27	±	1.57	4.70	±	5.81	No
	12/13/17	-0.40	±	1.58	-1.48	±	5.85	No
	12/19/17	1.20	±	1.70	4.44	±	6.29	No
	12/27/17	0.93	±	1.36	3.43	±	5.03	No
BLUE DOME	10/04/17	0.11	±	0.86	0.41	±	3.19	No
	10/11/17	2.03	±	1.01	7.51	±	3.74	No
	10/18/17	0.74	±	0.87	2.73	±	3.23	No
	10/25/17	3.11	±	2.07	11.51	±	7.66	No
	11/01/17	-0.03	±	2.10	-0.13	±	7.77	No
	11/08/17	-0.27	±	1.42	-1.00	±	5.25	No
	11/15/17	-0.75	±	1.47	-2.78	±	5.44	No
	11/21/17	-1.45	±	1.78	-5.37	±	6.59	No
	11/29/17	1.91	±	1.36	7.07	±	5.03	No
	12/06/17	-1.41	±	1.49	-5.22	±	5.51	No
	12/13/17	2.38	±	1.62	8.81	±	5.99	No
	12/19/17	-0.90	±	1.76	-3.34	±	6.51	No
	12/27/17	0.81	±	1.28	2.99	±	4.74	No
FAA TOWER	10/04/17	0.11	±	0.85	0.41	±	3.14	No
	10/11/17	2.00	±	0.99	7.40	±	3.66	No
	10/18/17	0.79	±	0.94	2.93	±	3.47	No
	10/25/17	3.30	±	2.20	12.21	±	8.14	No
	11/01/17	-0.03	±	2.08	-0.13	±	7.70	No
	11/08/17	-0.28	±	1.47	-1.04	±	5.44	No
	11/15/17	-0.77	±	1.50	-2.85	±	5.55	No
	11/21/17	-1.49	±	1.83	-5.51	±	6.77	No
	11/29/17	1.98	±	1.40	7.33	±	5.18	No
	12/06/17	-1.38	±	1.45	-5.11	±	5.37	No
	12/13/17	2.53	±	1.72	9.36	±	6.36	No

Table C-2. Weekly Iodine-131 Activity in Air.

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
	12/19/17	-0.89	±	1.74	-3.30	±	6.44	No
	12/27/17	0.77	±	1.23	2.86	±	4.55	No
HOWE	10/04/17	0.11	±	0.87	0.42	±	3.21	No
	10/11/17	2.05	±	1.02	7.59	±	3.77	No
	10/18/17	0.73	±	0.86	2.70	±	3.19	No
	10/25/17	2.98	±	1.98	11.03	±	7.33	No
	11/01/17	-0.03	±	2.00	-0.12	±	7.40	No
	11/08/17	-0.26	±	1.34	-0.95	±	4.96	No
	11/15/17	-0.75	±	1.47	-2.78	±	5.44	No
	11/21/17	-1.42	±	1.75	-5.25	±	6.48	No
	11/29/17	1.94	±	1.38	7.18	±	5.11	No
	12/06/17	-1.38	±	1.46	-5.11	±	5.40	No
	12/13/17	2.22	±	1.51	8.21	±	5.59	No
	12/19/17	-0.81	±	1.57	-2.98	±	5.81	No
	12/27/17	0.81	±	1.28	2.98	±	4.74	No
MONTEVIEW	10/04/17	0.12	±	0.89	0.43	±	3.31	No
	10/11/17	1.91	±	0.94	7.07	±	3.49	No
	10/18/17	0.76	±	0.90	2.82	±	3.33	No
	10/25/17	3.07	±	2.05	11.36	±	7.59	No
	11/01/17	-0.03	±	2.04	-0.12	±	7.55	No
	11/08/17	-0.28	±	1.48	-1.05	±	5.48	No
	11/15/17	-0.79	±	1.53	-2.91	±	5.66	No
	11/21/17	-1.49	±	1.83	-5.51	±	6.77	No
	11/29/17	2.00	±	1.42	7.40	±	5.25	No
	12/06/17	-1.43	±	1.51	-5.29	±	5.59	No
	12/13/17	2.31	±	1.57	8.55	±	5.81	No
	12/19/17	-0.83	±	1.61	-3.06	±	5.96	No
	12/27/17	0.79	±	1.25	2.91	±	4.63	No
MUD LAKE	10/04/17	0.11	±	0.83	0.40	±	3.06	No
	10/11/17	1.93	±	0.95	7.14	±	3.53	No
	10/18/17	0.73	±	0.86	2.70	±	3.19	No
	10/25/17	3.05	±	2.03	11.29	±	7.51	No
	11/01/17	-0.03	±	1.98	-0.12	±	7.33	No
	11/08/17	-0.28	±	1.46	-1.04	±	5.40	No
	11/15/17	-0.74	±	1.45	-2.75	±	5.37	No
	11/21/17	-1.46	±	1.79	-5.40	±	6.62	No
	11/29/17	1.91	±	1.35	7.07	±	5.00	No
	12/06/17	-1.35	±	1.42	-5.00	±	5.25	No
	12/13/17	2.28	±	1.55	8.44	±	5.74	No
	12/19/17	-0.86	±	1.67	-3.17	±	6.18	No
	12/27/17	0.76	±	1.21	2.83	±	4.48	No
DISTANT								
BLACKFOOT	10/04/17	-1.01	±	0.86	-3.74	±	3.17	No
	10/11/17	-0.54	±	0.90	-1.99	±	3.32	No
	10/18/17	0.26	±	0.81	0.97	±	2.98	No
	10/25/17	0.78	±	0.85	2.87	±	3.14	No
	11/01/17	-0.82	±	1.58	-3.04	±	5.85	No
	11/08/17	-0.55	±	1.40	-2.02	±	5.18	No
	11/15/17	2.02	±	1.95	7.47	±	7.22	No
	11/21/17	-2.05	±	1.84	-7.59	±	6.81	No
	11/29/17	-0.08	±	1.28	-0.30	±	4.74	No

Table C-2. Weekly Iodine-131 Activity in Air.

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
	12/06/17	1.30	±	1.60	4.81	±	5.92	No
	12/13/17	-0.38	±	1.51	-1.41	±	5.59	No
	12/19/17	1.24	±	1.75	4.59	±	6.48	No
	12/27/17	0.99	±	1.45	3.66	±	5.37	No
QA-1	10/04/17	-1.06	±	0.90	-3.92	±	3.32	No
(BLACKFOOT)	10/11/17	-0.53	±	0.89	-1.98	±	3.29	No
	10/18/17	0.27	±	0.81	0.98	±	3.01	No
	10/25/17	0.83	±	0.90	3.06	±	3.34	No
	11/01/17	-0.85	±	1.63	-3.15	±	6.03	No
	11/08/17	-0.56	±	1.44	-2.08	±	5.33	No
	11/15/17	2.24	±	2.16	8.29	±	7.99	No
	11/21/17	-2.09	±	1.88	-7.73	±	6.96	No
	11/29/17	-0.08	±	1.21	-0.28	±	4.48	No
	12/06/17	1.32	±	1.62	4.88	±	5.99	No
	12/13/17	-0.41	±	1.64	-1.53	±	6.07	No
	12/19/17	1.55	±	2.19	5.74	±	8.10	No
	12/27/17	0.93	±	1.36	3.44	±	5.03	No
CRATERS	10/04/17	-1.15	±	0.98	-4.26	±	3.61	No
	10/11/17	-0.57	±	0.95	-2.10	±	3.50	No
	10/18/17	0.31	±	0.94	1.14	±	3.48	No
	10/25/17	0.87	±	0.95	3.23	±	3.53	No
	11/01/17	-0.85	±	1.63	-3.13	±	6.03	No
	11/08/17	-0.58	±	1.50	-2.16	±	5.55	No
	11/15/17	2.35	±	2.26	8.70	±	8.36	No
	11/21/17	-2.22	±	1.99	-8.21	±	7.36	No
	11/29/17	-0.09	±	1.39	-0.32	±	5.14	No
	12/06/17	1.32	±	1.63	4.88	±	6.03	No
	12/13/17	-0.41	±	1.63	-1.52	±	6.03	No
	12/19/17	1.22	±	1.72	4.51	±	6.36	No
	12/27/17	0.91	±	1.34	3.37	±	4.96	No
DUBOIS	10/04/17	0.11	±	0.83	0.40	±	3.07	No
	10/11/17	2.10	±	1.04	7.77	±	3.85	No
	10/18/17	0.84	±	0.99	3.09	±	3.66	No
	10/25/17	3.13	±	2.08	11.58	±	7.70	No
	11/01/17	-0.03	±	2.11	-0.13	±	7.81	No
	11/08/17	-0.28	±	1.47	-1.04	±	5.44	No
	11/15/17	-0.75	±	1.47	-2.79	±	5.44	No
	11/21/17	-1.43	±	1.76	-5.29	±	6.51	No
	11/29/17	1.91	±	1.36	7.07	±	5.03	No
	12/06/17	-1.47	±	1.55	-5.44	±	5.74	No
	12/13/17	2.44	±	1.65	9.03	±	6.11	No
	12/19/17	-0.89	±	1.74	-3.31	±	6.44	No
	12/27/17	0.82	±	1.30	3.03	±	4.81	No
IDAHO FALLS	10/04/17	0.11	±	0.84	0.40	±	3.11	No
	10/11/17	1.91	±	0.94	7.07	±	3.49	No
	10/18/17	0.75	±	0.89	2.78	±	3.28	No
	10/25/17	3.14	±	2.09	11.62	±	7.73	No
	11/01/17	-0.04	±	2.14	-0.13	±	7.92	No
	11/08/17	-0.27	±	1.42	-1.00	±	5.25	No
	11/15/17	-0.77	±	1.50	-2.85	±	5.55	No
	11/21/17	-1.45	±	1.78	-5.37	±	6.59	No

Table C-2. Weekly Iodine-131 Activity in Air.

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
	11/29/17	1.92	±	1.36	7.10	±	5.03	No
	12/06/17	-1.44	±	1.51	-5.33	±	5.59	No
	12/13/17	2.41	±	1.64	8.92	±	6.07	No
	12/19/17	-0.88	±	1.72	-3.27	±	6.36	No
	12/27/17	0.80	±	1.27	2.95	±	4.70	No
JACKSON	10/04/17	-1.05	±	0.89	-3.89	±	3.27	No
	10/11/17	-0.61	±	1.02	-2.27	±	3.77	No
	10/18/17	0.29	±	0.89	1.07	±	3.27	No
	10/25/17	0.81	±	0.88	2.98	±	3.25	No
	11/01/17	-0.78	±	1.49	-2.88	±	5.51	No
	11/08/17	-0.58	±	1.48	-2.13	±	5.48	No
	11/15/17	2.24	±	2.16	8.29	±	7.99	No
	11/21/17	-2.03	±	1.82	-7.51	±	6.73	No
	11/29/17	-0.08	±	1.31	-0.30	±	4.85	No
	12/06/17	1.18	±	1.46	4.37	±	5.40	No
	12/13/17	-0.40	±	1.56	-1.46	±	5.77	No
	12/19/17	1.05	±	1.48	3.89	±	5.48	No
	12/27/17	0.95	±	1.40	3.52	±	5.18	No
SUGAR CITY	10/04/17	0.11	±	0.81	0.39	±	2.98	No
	10/11/17	1.85	±	0.92	6.85	±	3.39	No
	10/18/17	0.67	±	0.80	2.49	±	2.95	No
	10/25/17	2.86	±	1.90	10.58	±	7.03	No
	11/01/17	-0.03	±	2.04	-0.12	±	7.55	No
	11/08/17	-0.28	±	1.45	-1.02	±	5.37	No
	11/15/17	-0.73	±	1.42	-2.69	±	5.25	No
	11/21/17	-1.40	±	1.72	-5.18	±	6.36	No
	11/29/17	1.86	±	1.32	6.88	±	4.88	No
	12/06/17	-1.26	±	1.33	-4.66	±	4.92	No
	12/13/17	2.30	±	1.57	8.51	±	5.81	No
	12/19/17	-0.88	±	1.72	-3.26	±	6.36	No
	12/27/17	0.76	±	1.21	2.81	±	4.48	No
QA-2 (SUGAR CITY)	10/04/17	0.11	±	0.83	0.40	±	3.06	No
	10/11/17	1.80	±	0.89	6.66	±	3.29	No
	10/18/17	0.75	±	0.89	2.77	±	3.27	No
	10/25/17	3.06	±	2.03	11.32	±	7.51	No
	11/01/17	-0.03	±	2.05	-0.12	±	7.59	No
	11/08/17	-0.26	±	1.38	-0.97	±	5.11	No
	11/15/17	-0.73	±	1.42	-2.69	±	5.25	No
	11/21/17	-1.39	±	1.70	-5.14	±	6.29	No
	11/29/17	1.81	±	1.29	6.70	±	4.77	No
	12/06/17	-1.25	±	1.31	-4.63	±	4.85	No
	12/13/17	2.26	±	1.54	8.36	±	5.70	No
	12/19/17	-0.87	±	1.69	-3.21	±	6.25	No
	12/27/17	0.76	±	1.21	2.81	±	4.48	No
INL SITE								
EFS	10/04/17	-0.84	±	0.71	-3.11	±	2.63	No
	10/11/17	-0.70	±	1.16	-2.58	±	4.29	No
	10/18/17	0.38	±	1.15	1.39	±	4.26	No
	10/25/17	1.11	±	1.21	4.11	±	4.48	No
	11/01/17	-1.03	±	1.97	-3.81	±	7.29	No
	11/08/17	-0.54	±	1.39	-2.01	±	5.14	No

Table C-2. Weekly Iodine-131 Activity in Air.

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
	11/15/17	2.53	±	2.43	9.36	±	8.99	No
	11/21/17	-1.96	±	1.76	-7.25	±	6.51	No
	11/29/17	-0.09	±	1.42	-0.33	±	5.25	No
	12/06/17	1.42	±	1.74	5.25	±	6.44	No
	12/13/17	-0.43	±	1.70	-1.59	±	6.29	No
	12/19/17	1.39	±	1.96	5.14	±	7.25	No
	12/27/17	0.96	±	1.41	3.55	±	5.22	No
MAIN GATE	10/04/17	-1.14	±	0.96	-4.22	±	3.57	No
	10/11/17	-0.61	±	1.01	-2.24	±	3.74	No
	10/18/17	0.30	±	0.91	1.10	±	3.36	No
	10/25/17	0.83	±	0.90	3.06	±	3.34	No
	11/01/17	-0.84	±	1.62	-3.12	±	5.99	No
	11/08/17	-0.61	±	1.56	-2.25	±	5.77	No
	11/15/17	4.59	±	4.42	16.98	±	16.35	No
	11/21/17	-2.83	±	2.54	-10.47	±	9.40	No
	11/29/17	-0.09	±	1.40	-0.32	±	5.18	No
	12/06/17	1.28	±	1.58	4.74	±	5.85	No
	12/13/17	-0.41	±	1.64	-1.53	±	6.07	No
	12/19/17	1.29	±	1.82	4.77	±	6.73	No
	12/27/17	0.86	±	1.27	3.19	±	4.70	No
VAN BUREN GATE	10/04/17	-1.10	±	0.93	-4.07	±	3.43	No
	10/11/17	-0.57	±	0.95	-2.11	±	3.51	No
	10/18/17	0.30	±	0.91	1.10	±	3.35	No
	10/25/17	0.84	±	0.92	3.11	±	3.39	No
	11/01/17	-0.81	±	1.55	-2.99	±	5.74	No
	11/08/17	-0.58	±	1.49	-2.15	±	5.51	No
	11/15/17	2.38	±	2.29	8.81	±	8.47	No
	11/21/17	-2.10	±	1.89	-7.77	±	6.99	No
	11/29/17	-0.08	±	1.30	-0.30	±	4.81	No
	12/06/17	1.30	±	1.60	4.81	±	5.92	No
	12/13/17	-0.41	±	1.61	-1.51	±	5.96	No
	12/19/17	1.30	±	1.83	4.81	±	6.77	No
	12/27/17	0.92	±	1.35	3.40	±	5.00	No

Table C-3. Quarterly Cesium-137, Strontium-90, and Actinide Concentrations in Composite Air Filters.

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-14}$ Bq/mL)			Result > 3s
BOUNDARY									
ARCO	12/27/17	CESIUM-137	-7.65	±	78.90	-28.31	±	291.93	No
ATOMIC CITY	12/27/17	AMERICIUM-241	-0.62	±	2.06	-2.29	±	7.62	No
	12/27/17	CESIUM-137	83.30	±	67.00	308.21	±	247.90	No
	12/27/17	PLUTONIUM-238	6.62	±	3.19	24.49	±	11.80	No
	12/27/17	PLUTONIUM-239/240	-6.60	±	4.65	-24.42	±	17.21	No
BLUE DOME	12/27/17	CESIUM-137	60.40	±	65.00	223.48	±	240.50	No
FAA TOWER	12/27/17	CESIUM-137	-6.29	±	123.00	-23.27	±	455.10	No
HOWE	12/27/17	CESIUM-137	-205.00	±	120.00	-758.50	±	444.00	No
	12/27/17	STRONTIUM-90	-5.31	±	8.96	-19.65	±	33.15	No
MONTEVIEW	12/27/17	AMERICIUM-241	1.77	±	1.39	6.55	±	5.14	No
	12/27/17	CESIUM-137	-76.00	±	111.00	-281.20	±	410.70	No
	12/27/17	PLUTONIUM-238	-0.83	±	2.78	-3.07	±	10.29	No
	12/27/17	PLUTONIUM-239/240	-1.65	±	2.71	-6.11	±	10.03	No
MUD LAKE	12/27/17	CESIUM-137	15.90	±	103.00	58.83	±	381.10	No
	12/27/17	STRONTIUM-90	-1.23	±	6.55	-4.55	±	24.24	No
DISTANT									
BLACKFOOT	12/27/17	CESIUM-137	0.00	±	116.00	0.00	±	429.20	No
	12/27/17	STRONTIUM-90	9.82	±	8.59	36.33	±	31.78	No
QA-1 (BLACKFOOT)	12/27/17	CESIUM-137	54.50	±	111.00	201.65	±	410.70	No
	12/27/17	STRONTIUM-90	-3.19	±	6.91	-11.80	±	25.57	No
CRATERS	12/27/17	CESIUM-137	117.00	±	111.00	432.90	±	410.70	No
DUBOIS	12/27/17	CESIUM-137	-71.20	±	85.40	-263.44	±	315.98	No
IDAHO FALLS	12/27/17	CESIUM-137	56.10	±	100.00	207.57	±	370.00	No
	12/27/17	STRONTIUM-90	-11.70	±	9.94	-43.29	±	36.78	No
JACKSON	12/27/17	AMERICIUM-241	1.37	±	1.52	5.07	±	5.62	No
	12/27/17	CESIUM-137	57.80	±	77.10	213.86	±	285.27	No
	12/27/17	PLUTONIUM-238	3.04	±	2.43	11.25	±	8.99	No
	12/27/17	PLUTONIUM-239/240	4.54	±	2.57	16.80	±	9.51	No
SUGAR CITY	12/27/17	AMERICIUM-241	0.53	±	1.48	1.96	±	5.48	No
	12/27/17	CESIUM-137	30.80	±	78.70	113.96	±	291.19	No
	12/27/17	PLUTONIUM-238	0.00	±	3.88	0.00	±	14.36	No
	12/27/17	PLUTONIUM-239/240	-7.85	±	5.27	-29.05	±	19.50	No
QA-2 (SUGAR CITY)	12/27/17	AMERICIUM-241	-4.51	±	2.34	-16.69	±	8.66	No
	12/27/17	CESIUM-137	-17.70	±	99.20	-65.49	±	367.04	No

Table C-3. Quarterly Cesium-137, Strontium-90, and Actinide Concentrations in Composite Air Filters.

	12/27/17	PLUTONIUM-238	1.71	±	2.86	6.33	±	10.58	No
	12/27/17	PLUTONIUM-239/240	0.85	±	2.98	3.15	±	11.03	No
INL SITE									
EFS	12/27/17	AMERICIUM-241	-5.18	±	108.00	-19.17	±	399.60	No
	12/27/17	CESIUM-137	-27.00	±	3.85	-99.90	±	14.25	No
	12/27/17	PLUTONIUM-238	1.74	±	4.00	6.44	±	14.80	No
	12/27/17	PLUTONIUM-239/240	-2.89	±	123.00	-10.69	±	455.10	No
MAIN GATE	12/27/17	CESIUM-137	-16.00	±	84.20	-59.20	±	311.54	No
	12/27/17	STRONTIUM-90	-15.30	±	7.90	-56.61	±	29.23	No
VAN BUREN GATE	12/27/17	AMERICIUM-241	-1.21	±	1.57	-4.48	±	5.81	No
	12/27/17	CESIUM-137	118.00	±	109.00	436.60	±	403.30	No
	12/27/17	PLUTONIUM-238	8.05	±	3.60	29.79	±	13.32	No
	12/27/17	PLUTONIUM-239/240	0.45	±	3.78	1.67	±	13.99	No

Table C-4. Tritium Concentrations in Atmospheric Moisture

Sampling Group and Location	Start Date	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-13}$ $\mu Ci/mL_{air}$)			Result ± 1s Uncertainty ($\times 10^{-9}$ Bq/mL_{air})			Result > 3s
BOUNDARY									
ATOMIC CITY	09/20/17	10/25/17	5.25	±	1.30	19.43	±	4.81	**Yes**
ATOMIC CITY	10/25/17	11/29/17	5.52	±	1.47	20.42	±	5.44	**Yes**
HOWE	09/20/17	10/11/17	-0.34	±	0.58	-1.24	±	2.15	No
HOWE	10/11/17	11/15/17	2.87	±	0.69	10.62	±	2.55	**Yes**
HOWE	11/15/17	12/27/17	2.16	±	0.47	7.99	±	1.72	**Yes**
DISTANT									
IDAHO FALLS	09/20/17	10/11/17	-4.63	±	1.37	-17.13	±	5.07	No
IDAHO FALLS	10/11/17	11/08/17	5.16	±	1.42	19.09	±	5.25	**Yes**
IDAHO FALLS	11/18/17	12/06/17	4.56	±	1.55	16.87	±	5.74	No
INL SITE									
EFS	09/13/17	10/11/17	1.35	±	1.02	5.00	±	3.77	No
EFS	10/11/17	11/15/17	6.54	±	1.07	24.20	±	3.96	**Yes**
EFS	11/15/17	12/19/17	5.71	±	1.09	21.13	±	4.03	**Yes**

Table C-5. Monthly and Weekly Tritium Concentrations in Precipitation

Location	Start Date	End Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
BOUNDARY									
ATOMIC CITY	09/27/17	10/04/17	78.87	±	23.67	2.92	±	0.88	**Yes**
ATOMIC CITY	10/11/17	10/18/17	-11.36	±	22.84	-0.42	±	0.84	No
ATOMIC CITY	11/15/17	11/21/17	122.85	±	23.91	4.55	±	0.88	**Yes**
ATOMIC CITY	11/21/17	11/29/17	11.68	±	22.42	0.43	±	0.83	No
ATOMIC CITY	11/29/17	12/06/17	41.39	±	23.16	1.53	±	0.86	No
ATOMIC CITY	12/06/17	12/13/17	206.62	±	25.46	7.64	±	0.94	**Yes**
ATOMIC CITY	12/13/17	12/19/17	94.88	±	23.96	3.51	±	0.89	**Yes**
HOWE	09/27/17	10/04/17	58.87	±	23.42	2.18	±	0.87	No
HOWE	11/15/17	11/21/17	17.26	±	22.81	0.64	±	0.84	No
HOWE	11/21/17	11/29/17	55.13	±	23.01	2.04	±	0.85	No
HOWE	12/13/17	12/19/17	-12.93	±	24.63	-0.48	±	0.91	No
DISTANT									
IDAHO FALLS	09/30/17	10/31/17	64.04	±	23.54	2.37	±	0.87	No
IDAHO FALLS	10/31/17	11/30/17	20.54	±	22.88	0.76	±	0.85	No
IDAHO FALLS	11/30/17	12/31/17	-71.98	±	23.88	-2.66	±	0.88	No
INL SITE									
EFS	09/27/17	10/04/17	72.58	±	23.66	2.69	±	0.88	**Yes**
EFS	11/01/17	11/08/17	87.53	±	93.69	3.24	±	3.47	No
EFS	11/15/17	11/21/17	87.53	±	28.82	3.24	±	1.07	**Yes**
EFS	11/21/17	11/29/17	87.53	±	67.96	3.24	±	2.51	No
EFS	12/13/17	12/19/17	90.69	±	-64.71	3.36	±	-2.39	**Yes**
EFS	12/19/17	12/27/17	90.69	±	-41.58	3.36	±	-1.54	**Yes**

Table C-6. Gross Alpha, Gross Beta, and Tritium Concentrations in Surface and Drinking Water

Location	Sampling Date	Analyte	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
SURFACE WATER									
Alpheus Spring	11/13/17	GROSS ALPHA	1.26	±	0.62	0.05	±	0.02	No
	11/13/17	GROSS BETA	6.74	±	0.58	0.25	±	0.02	**Yes**
	11/13/17	TRITIUM	76.70	±	22.90	2.84	±	0.85	**Yes**
Bill Jones, Jr. Trout Farm	11/13/17	GROSS ALPHA	0.94	±	0.47	0.03	±	0.02	No
	11/13/17	GROSS BETA	2.85	±	0.49	0.11	±	0.02	**Yes**
	11/13/17	TRITIUM	79.70	±	23.00	2.95	±	0.85	**Yes**
Clear Springs	11/13/17	GROSS ALPHA	0.24	±	0.52	0.01	±	0.02	No
	11/13/17	GROSS BETA	2.95	±	0.51	0.11	±	0.02	**Yes**
	11/13/17	TRITIUM	89.50	±	23.20	3.31	±	0.86	**Yes**
Clear Springs (Duplicate)	11/13/17	GROSS ALPHA	0.50	±	0.59	0.02	±	0.02	No
	11/13/17	GROSS BETA	3.72	±	0.54	0.14	±	0.02	**Yes**
	11/13/17	TRITIUM	128.80	±	23.50	4.77	±	0.87	**Yes**
DRINKING WATER									
Atomic City	11/15/17	GROSS ALPHA	0.63	±	0.46	0.02	±	0.02	No
	11/15/17	GROSS BETA	2.77	±	0.49	0.10	±	0.02	**Yes**
	11/15/17	TRITIUM	57.40	±	22.80	2.13	±	0.84	No
Control	11/20/17	GROSS ALPHA	0.23	±	0.23	0.01	±	0.01	No
	11/20/17	GROSS BETA	-0.99	±	0.38	-0.04	±	0.01	No
	11/20/17	TRITIUM	92.50	±	23.90	3.43	±	0.89	**Yes**
Craters of the Moon	11/15/17	GROSS ALPHA	2.24	±	0.47	0.08	±	0.02	**Yes**
	11/15/17	GROSS BETA	1.18	±	0.46	0.04	±	0.02	No
	11/15/17	TRITIUM	138.00	±	23.90	5.11	±	0.89	**Yes**
Howe	11/15/17	GROSS ALPHA	1.47	±	0.47	0.05	±	0.02	**Yes**
	11/15/17	GROSS BETA	1.74	±	0.46	0.06	±	0.02	**Yes**
	11/15/17	TRITIUM	91.70	±	23.30	3.40	±	0.86	**Yes**
Idaho Falls	11/20/17	GROSS ALPHA	1.03	±	0.55	0.04	±	0.02	No
	11/20/17	GROSS BETA	1.15	±	0.49	0.04	±	0.02	No
	11/20/17	TRITIUM	90.70	±	23.30	3.36	±	0.86	**Yes**
Minidoka	11/13/17	GROSS ALPHA	0.47	±	0.50	0.02	±	0.02	No
	11/13/17	GROSS BETA	2.72	±	0.51	0.10	±	0.02	**Yes**
	11/13/17	TRITIUM	82.90	±	23.30	3.07	±	0.86	**Yes**
Mud Lake	11/14/17	GROSS ALPHA	0.16	±	0.33	0.01	±	0.01	No
	11/14/17	GROSS BETA	3.31	±	0.47	0.12	±	0.02	**Yes**
	11/14/17	TRITIUM	91.00	±	23.40	3.37	±	0.87	**Yes**
Rest Area	11/15/17	GROSS ALPHA	1.74	±	0.45	0.06	±	0.02	**Yes**
	11/15/17	GROSS BETA	2.58	±	0.48	0.10	±	0.02	**Yes**
	11/15/17	TRITIUM	115.00	±	23.70	4.26	±	0.88	**Yes**

Table C-6. Gross Alpha, Gross Beta, and Tritium Concentrations in Surface and Drinking Water

Shoshone	11/13/17	GROSS ALPHA	1.31	±	0.52	0.05	±	0.02	No
	11/13/17	GROSS BETA	2.49	±	0.49	0.09	±	0.02	**Yes**
	11/13/17	TRITIUM	52.50	±	23.40	1.94	±	0.87	No

Table C-7. Gross Alpha, Gross Beta, Tritium, and Cesium-137 Concentrations in the Big Lost River (BLR)

Location	Sampling Date	Analyte	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
SURFACE WATER									
BLR at Rest Area	10/10/17	GROSS ALPHA	1.19	±	0.44	0.04	±	0.02	No
	10/10/17	GROSS BETA	0.77	±	0.45	0.03	±	0.02	No
	10/10/17	TRITIUM	86.10	±	23.90	3.19	±	0.89	**Yes**
	10/10/17	CESIUM	0.74	±	1.32	0.03	±	0.05	No
BLR at INTEC	10/10/17	GROSS ALPHA	0.88	±	0.40	0.01	±	0.01	No
	10/10/17	GROSS BETA	0.92	±	0.45	0.02	±	0.02	No
	10/10/17	TRITIUM	62.20	±	23.60	2.30	±	0.87	No
	10/10/17	CESIUM	0.09	±	0.77	0.00	±	0.03	No
BLR at INTEC (Duplicate)	10/10/17	GROSS ALPHA	1.56	±	0.40	0.06	±	0.01	**Yes**
	10/10/17	GROSS BETA	2.07	±	0.45	0.08	±	0.02	**Yes**
	10/10/17	TRITIUM	1.56	±	0.44	0.06	±	0.02	**Yes**
	10/10/17	CESIUM	46.30	±	22.90	1.71	±	0.85	No
BLR at EFS	10/10/17	GROSS ALPHA	0.81	±	0.41	0.03	±	0.02	No
	10/10/17	GROSS BETA	1.10	±	0.45	0.04	±	0.02	No
	10/10/17	TRITIUM	-8.15	±	23.20	-0.30	±	0.86	No
	10/10/17	CESIUM	0.09	±	1.00	0.00	±	0.04	No
BLR at NRF	10/10/17	GROSS ALPHA	1.60	±	0.45	0.06	±	0.02	**Yes**
	10/10/17	GROSS BETA	1.71	±	0.46	0.06	±	0.02	**Yes**
	10/10/17	TRITIUM	163.00	±	24.80	6.04	±	0.92	**Yes**
	10/10/17	CESIUM	-0.44	±	1.03	-0.02	±	0.04	No
BLR at Sinks	10/10/17	GROSS ALPHA	1.62	±	0.44	0.06	±	0.02	**Yes**
	10/10/17	GROSS BETA	1.77	±	0.46	0.07	±	0.02	**Yes**
	10/10/17	TRITIUM	65.30	±	0.44	2.42	±	0.02	**Yes**
	10/10/17	CESIUM	-2.41	±	23.00	-0.09	±	0.85	No
BLR Control (Birch Creek)	10/10/17	GROSS ALPHA	2.51	±	0.49	0.09	±	0.02	**Yes**
	10/10/17	GROSS BETA	0.93	±	0.46	0.03	±	0.02	No
	10/10/17	TRITIUM	78.60	±	23.80	2.91	±	0.88	**Yes**
	10/10/17	CESIUM	0.55	±	1.06	0.02	±	0.04	No

Table C-8. Weekly and Monthly Iodine-131 and Cesium-137 Concentrations in Milk

		Iodine-131						Cesium-137					
Location	Sampling Date	Result ± 1s Uncertainty (pCi[†]/L)		Result ± 1s Uncertainty (Bq[‡]/L)			Result > 3s	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
BLACKFOOT	10/10/17	0.88	1.60	0.03	±	0.06	No	-1.23	±	1.64	-0.05	±	0.06	No
	11/06/17	1.14	1.34	0.04	±	0.05	No	-0.11	±	0.90	0.00	±	0.03	No
	12/05/17	-6.64	3.24	-0.25	±	0.12	No	-1.36	±	1.65	-0.05	±	0.06	No
	10/02/17	-1.62	1.44	-0.06	±	0.05	No	0.19	±	1.06	0.01	±	0.04	No
CONTROL	11/07/17	-1.26	1.19	-0.05	±	0.04	No	0.59	±	1.06	0.02	±	0.04	No
	12/05/17	-1.01	1.48	-0.04	±	0.05	No	1.00	±	1.10	0.04	±	0.04	No
	10/02/17	1.05	1.07	0.04	±	0.04	No	-0.12	±	0.82	0.00	±	0.03	No
DIETRICH	11/06/17	-0.79	1.11	-0.03	±	0.04	No	0.20	±	0.88	0.01	±	0.03	No
	12/05/17	-1.41	1.88	-0.05	±	0.07	No	1.88	±	1.36	0.07	±	0.05	No
Duplicate	12/05/17	2.21	1.72	0.08	±	0.06	No	1.80	±	1.44	0.07	±	0.05	No
HOWE	10/02/17	-2.92	1.89	-0.11	±	0.07	No	0.19	±	1.37	0.01	±	0.05	No
	11/07/17	-1.92	1.84	-0.07	±	0.07	No	-1.04	±	1.43	-0.04	±	0.05	No
	12/05/17	0.64	1.96	0.02	±	0.07	No	-0.44	±	1.27	-0.02	±	0.05	No
IDAHO FALLS	10/03/17	-0.37	1.88	-0.01	±	0.07	No	1.26	±	1.37	0.05	±	0.05	No
Duplicate	10/03/17	-0.03	1.07	0.00	±	0.04	No	-0.91	±	0.92	-0.03	±	0.03	No
	10/10/17	-0.51	0.99	-0.02	±	0.04	No	-0.49	±	0.82	-0.02	±	0.03	No
	10/17/17	0.88	0.99	0.03	±	0.04	No	0.10	±	0.85	0.00	±	0.03	No
	10/24/17	-0.27	0.98	-0.01	±	0.04	No	1.58	±	0.86	0.06	±	0.03	No
	10/31/17	0.19	1.01	0.01	±	0.04	No	-1.22	±	0.89	-0.05	±	0.03	No
	11/08/17	-0.60	1.68	-0.02	±	0.06	No	0.64	±	1.40	0.02	±	0.05	No
	11/14/17	-1.46	1.05	-0.05	±	0.04	No	-0.55	±	0.88	-0.02	±	0.03	No
	11/21/17	-0.05	1.57	0.00	±	0.06	No	-0.32	±	1.46	-0.01	±	0.05	No
	11/28/17	-0.44	1.65	-0.02	±	0.06	No	0.69	±	1.43	0.03	±	0.05	No
	12/05/17	-1.84	1.57	-0.07	±	0.06	No	-0.21	±	1.49	-0.01	±	0.06	No
	12/12/17	0.19	1.03	0.01	±	0.04	No	-0.78	±	0.92	-0.03	±	0.03	No
	12/19/17	0.87	1.57	0.03	±	0.06	No	-0.14	±	1.40	-0.01	±	0.05	No
MINIDOKA	12/27/17	-0.18	1.45	-0.01	±	0.05	No	-0.79	±	1.43	-0.03	±	0.05	No
	10/02/17	-1.22	1.78	-0.05	±	0.07	No	-0.13	±	1.46	0.00	±	0.05	No
	11/06/17	0.83	2.03	0.03	±	0.08	No	0.24	±	1.42	0.01	±	0.05	No
TERRETON	12/05/17	-0.45	1.10	-0.02	±	0.04	No	0.23	±	0.90	0.01	±	0.03	No
	10/02/17	0.12	1.26	0.00	±	0.05	No	1.05	±	1.10	0.04	±	0.04	No
	10/11/17	-0.15	0.90	-0.01	±	0.03	No	0.20	±	0.94	0.01	±	0.03	No
	10/18/17	0.81	1.13	0.03	±	0.04	No	-0.43	±	1.11	-0.02	±	0.04	No
	10/25/17	1.82	1.59	0.07	±	0.06	No	-1.24	±	1.48	-0.05	±	0.05	No
	11/01/17	0.44	1.13	0.02	±	0.04	No	0.07	±	1.05	0.00	±	0.04	No
	11/07/17	2.43	2.08	0.09	±	0.08	No	-2.67	±	1.47	-0.10	±	0.05	No
	11/15/17	2.60	1.73	0.10	±	0.06	No	-1.34	±	1.33	-0.05	±	0.05	No
	11/21/17	1.18	1.24	0.04	±	0.05	No	0.66	±	1.09	0.02	±	0.04	No
	11/29/17	0.84	1.70	0.03	±	0.06	No	0.31	±	1.33	0.01	±	0.05	No
	12/05/17	0.86	1.35	0.03	±	0.05	No	0.38	±	1.00	0.01	±	0.04	No
	12/13/17	-1.67	1.18	-0.06	±	0.04	No	1.62	±	1.08	0.06	±	0.04	No
	12/19/17	0.46	1.19	0.02	±	0.04	No	-0.70	±	1.07	-0.03	±	0.04	No
	12/27/17	-1.15	1.10	-0.04	±	0.04	No	0.43	±	1.05	0.02	±	0.04	No

Table C-9. Strontium-90 and Tritium Concentrations in Milk

Location	Sampling Date	Result (pCi/L) ± 1s			Result (Bq/L) ± 1s			Result > 3s
Strontium-90								
CONTROL	11/07/17	0.38	±	0.08	0.014	±	0.003	**Yes**
DIETRICH	11/06/17	0.15	±	0.08	0.005	±	0.003	No
HOWE	11/07/17	-0.06	±	0.09	-0.002	±	0.004	No
IDAHO FALLS	11/08/17	0.30	±	0.08	0.011	±	0.003	**Yes**
MINIDOKA	11/06/17	0.12	±	0.08	0.004	±	0.003	No
TERRETON	11/07/17	0.08	±	0.07	0.003	±	0.003	No
Tritium								
BLACKFOOT	11/06/17	6.63	±	23.50	0.246	±	0.870	No
CONTROL	11/07/17	67.00	±	23.50	2.481	±	0.870	No
DIETRICH	11/06/17	16.20	±	23.60	0.600	±	0.874	No
HOWE	11/07/17	43.80	±	23.10	1.622	±	0.856	No
IDAHO FALLS	11/08/17	11.50	±	23.60	0.426	±	0.874	No
MINIDOKA	11/06/17	29.90	±	23.80	1.107	±	0.881	No
TERRETON	11/07/17	86.80	±	23.70	3.215	±	0.878	**Yes**

Tabel C-10. Cesium-137 and Strontium-90 Concentrations in Potatoes

Location	Sampling Date	Cesium-137 Result ± 1s Uncertainty pCi/kg			Cesium-137 Result ± 1s Uncertainty ($\times 10^{-2}$ Bq/kg)			Result > 3s
ARCO	09/27/17	0.03	±	1.04	0.12	±	3.85	No
ARCO (DUPLICATE)	09/27/17	-3.28	±	2.51	-12.16	±	9.31	No
CONTROL	10/05/17	-1.29	±	1.50	-4.78	±	5.56	No
IDAHO FALLS	10/05/17	-0.73	±	1.13	-2.71	±	4.19	No
POCATELLO	09/23/17	1.50	±	1.56	5.56	±	5.78	No
REXBURG	09/28/17	0.96	±	1.17	3.56	±	4.33	No
RUPERT	10/01/17	-2.70	±	2.45	-10.00	±	9.07	No
SHELLEY	10/08/17	-1.16	±	1.45	-4.30	±	5.37	No
TERRETON	10/01/17	0.06	±	1.15	0.23	±	4.26	No

Location	Sampling Date	Strontium-90 Result ± 1s Uncertainty pCi/kg			Strontium-90 Result ± 1s Uncertainty ($\times 10^{-2}$ Bq/kg)			Result > 3s
ARCO	09/27/17	1.38	±	0.79	5.11	±	2.94	No
ARCO (DUPLICATE)	09/27/17	3.28	±	0.91	12.15	±	3.39	**Yes**
CONTROL	10/05/17	1.75	±	1.27	6.48	±	4.70	No
IDAHO FALLS	10/05/17	0.04	±	0.77	0.14	±	2.85	No
POCATELLO	09/23/17	0.00	±	0.96	0.00	±	3.56	No
REXBURG	09/28/17	1.32	±	1.32	4.89	±	4.89	No
RUPERT	10/01/17	1.83	±	0.86	6.78	±	3.20	No
SHELLEY	10/08/17	0.49	±	0.85	1.81	±	3.13	No
TERRETON	10/01/17	2.69	±	0.85	9.96	±	3.14	**Yes**

NOTE: During the summer of 2020, a review of the table determined the activity concentration values reported for the media were correct, however, the unit of concentration listed in the column headings were incorrect. The column headings have been updated to the correct units of concentration (pCi/kg and Bq/kg). For further discussion see Potato Sampling in Section 4.

Table C-11. Gamma-emitting Radionuclides in Large Game Animals

Species	Collection Date	Tissue	Analyte	Result ± 1s Uncertainty (pCi/kg wet weight)			Result ± 1s Uncertainty (x 10^{-2} Bq/kg wet weight)			Result > 3s
ELK	10/6/2017	Liver	^{131}I	24.90	±	27.60	92.13	±	102.12	No
			^{137}Cs	-4.15	±	2.91	-15.36	±	10.77	No
ELK	10/6/2017	Muscle	^{131}I	-9.59	±	10.10	-35.48	±	37.37	No
			^{137}Cs	-1.44	±	1.45	-5.33	±	5.37	No
ELK	10/6/2017	Thyroid	^{131}I	-165.00	±	230.00	-610.50	±	851.00	No
			^{137}Cs	12.60	±	82.40	46.62	±	304.88	No

Table C-12. Actinide, Gamma-emitting Radionuclide, and Strontium-90 Concentrations in Edible Tissues of Waterfowl

Location	Sampling Date	Analyte	Result ± Uncertainty(1s) pCi/kg			Result ± Uncertainty(1s) (x 10^{-2} Bq/kg)			Result > 3s
ATR Complex	9/8/2017								
		AMERICIUM-241	5.23	±	3.49	19.37	±	12.93	No
		CESIUM-137	3090.00	±	152.00	11444.44	±	562.96	**Yes**
		CHROMIUM-51	-54.20	±	194.00	-200.74	±	718.52	No
		COBALT-60	716.00	±	41.80	2651.85	±	154.81	**Yes**
		PLUTONIUM-238	15.50	±	4.00	57.41	±	14.81	**Yes**
		PLUTONIUM-239/240	0.00	±	2.43	0.00	±	9.00	No
		STRONTIUM-90	248.00	±	4.15	918.52	±	15.37	**Yes**
		ZINC-65	62.30	±	22.30	230.74	±	82.59	No
ATR Complex	9/8/2017								
		AMERICIUM-241	-0.66	±	1.97	-2.43	±	7.30	No
		CESIUM-137	1.00	±	5.70	3.70	±	21.11	No
		CHROMIUM-51	-425.00	±	141.00	-1574.07	±	522.22	No
		COBALT-60	4.59	±	3.86	17.00	±	14.30	No
		PLUTONIUM-238	9.49	±	3.30	35.15	±	12.22	No
		PLUTONIUM-239/240	0.56	±	2.00	2.06	±	7.41	No
		STRONTIUM-90	-2.79	±	1.61	-10.33	±	5.96	No
		ZINC-65	-29.00	±	12.80	-107.41	±	47.41	No
ATR Complex	9/22/2017								
		AMERICIUM-241	-3.49	±	2.01	-12.93	±	7.44	No
		CESIUM-137	-2.58	±	8.39	-9.56	±	31.07	No
		CHROMIUM-51	0.00	±	147.00	0.00	±	544.44	No
		COBALT-60	8.80	±	5.42	32.59	±	20.07	No
		PLUTONIUM-238	2.53	±	2.55	9.37	±	9.44	No
		PLUTONIUM-239/240	-1.42	±	2.05	-5.26	±	7.59	No
		STRONTIUM-90	2.85	±	1.58	10.56	±	5.85	No
		ZINC-65	-28.20	±	17.80	-104.44	±	65.93	No
Control	11/18/2017								
		AMERICIUM-241	3.62	±	2.09	13.41	±	7.74	No
		CESIUM-137	10.20	±	8.24	37.78	±	30.52	No
		CHROMIUM-51	-25.90	±	67.90	-95.93	±	251.48	No
		COBALT-60	5.24	±	4.91	19.41	±	18.19	No
		PLUTONIUM-238	2.07	±	1.91	7.67	±	7.07	No
		PLUTONIUM-239/240	2.00	±	2.93	7.41	±	10.85	No
		STRONTIUM-90	1.04	±	2.52	3.85	±	9.33	No
		ZINC-65	-1.91	±	14.70	-7.07	±	54.44	No
Control	11/18/2017			±		0.00	±	0.00	No
		AMERICIUM-241	4.60	±	2.18	17.04	±	8.07	No
		CESIUM-137	1.70	±	3.24	6.30	±	12.00	No
		CHROMIUM-51	18.10	±	29.20	67.04	±	108.15	No
		COBALT-60	-1.80	±	2.07	-6.67	±	7.67	No
		PLUTONIUM-238	3.31	±	2.01	12.26	±	7.44	No
		PLUTONIUM-239/240	2.21	±	1.63	8.19	±	6.04	No
		STRONTIUM-90	-4.92	±	2.34	-18.22	±	8.67	No
		ZINC-65	-13.20	±	6.47	-48.89	±	23.96	No
Control	11/18/2017								
		AMERICIUM-241	1.68	±	2.17	6.22	±	8.04	No
		CESIUM-137	-3.96	±	5.95	-14.67	±	22.04	No
		CHROMIUM-51	-131.00	±	66.00	-485.19	±	244.44	No
		COBALT-60	8.88	±	3.92	32.89	±	14.52	No
		PLUTONIUM-238	4.24	±	2.79	15.70	±	10.33	No
		PLUTONIUM-239/240	0.77	±	2.31	2.86	±	8.56	No
		STRONTIUM-90	-1.60	±	2.73	-5.93	±	10.11	No
		ZINC-65	-12.50	±	11.70	-46.30	±	43.33	No

NOTE: During the summer of 2020, a review of the table determined the activity concentration values reported for the media were correct, however, the Bq/g unit of concentration listed in the column heading was incorrect. The column heading has been updated to the correct units of concentration (Bq/kg). For further discussion see Waterfowl Sampling in Section 4.

Table C-12. Actinide, Gamma-emitting Radionuclide, and Strontium-90 Concentrations in Edible Tissues of Waterfowl

Location	Sampling Date	Analyte	Result ± Uncertainty(1s) pCi/kg			Result ± Uncertainty(1s) (x 10^{-2} Bq/kg)			Result > 3s
Control	11/18/2017								
		AMERICIUM-241	-1.96	±	2.84	-7.26	±	10.52	No
		CESIUM-137	1.93	±	4.62	7.15	±	17.11	No
		CHROMIUM-51	-58.40	±	61.80	-216.30	±	228.89	No
		COBALT-60	4.07	±	3.15	15.07	±	11.67	No
		PLUTONIUM-238	7.56	±	2.75	28.00	±	10.19	No
		PLUTONIUM-239/240	0.09	±	2.84	0.32	±	10.52	No
		STRONTIUM-90	-2.29	±	2.31	-8.48	±	8.56	No
		ZINC-65	-29.00	±	10.10	-107.41	±	37.41	No

NOTE: During the summer of 2020, a review of the table determined the activity concentration values reported for the media were correct, however, the Bq/g unit of concentration listed in the column heading was incorrect. The column heading has been updated to the correct units of concentration (Bq/kg). For further discussion see Waterfowl Sampling in Section 4.

Table C-13. Environmental Radiation Measurements Using OSLDs

			Radiation Measurement ± 2s Uncertainty	Exposure
Location	**Start Date**	**End Date**	**mrem**	**mrem/day**
BOUNDARY				
ARCO	05/03/17	11/08/17	59.15 ± 5.92	0.31
ATOMIC CITY	05/03/17	11/08/17	62.60 ± 6.26	0.33
BIRCH CREEK	05/03/17	11/08/17	47.45 ± 4.74	0.25
BLUE DOME	05/03/17	11/08/17	48.10 ± 4.81	0.25
HOWE	05/03/17	11/08/17	57.55 ± 5.76	0.30
MONTEVIEW	05/03/17	11/08/17	58.15 ± 5.81	0.31
MUD LAKE	05/03/17	11/08/17	60.65 ± 6.06	0.32
Boundary Average			**56.24**	**0.30**
DISTANT				
ABERDEEN	05/04/17	11/06/17	65.95 ± 6.60	0.35
BLACKFOOT	05/03/17	11/08/17	57.90 ± 5.79	0.31
CRATERS	05/03/17	11/08/17	64.40 ± 6.44	0.34
DUBOIS	05/03/17	11/08/17	48.40 ± 4.84	0.26
IDAHO FALLS	05/03/17	11/08/17	58.70 ± 5.87	0.31
JACKSON	05/05/17	11/09/17	57.50 ± 5.75	0.31
MINIDOKA	05/04/17	11/06/17	53.35 ± 5.33	0.29
MOUNTAIN VIEW	05/03/17	11/08/17	50.65 ± 5.06	0.27
ROBERTS	05/01/17	11/07/17	65.40 ± 6.54	0.34
SUGAR CITY	05/03/17	11/08/17	72.45 ± 7.25	0.38
Distant Average			**59.47**	**0.32**

APPENDIX D

STATISTICAL ANALYSIS RESULTS

Table D-1. Results of the Kruskal-Wallace statistical test between INL Site, Boundary, and Distant sample groups by month.

Parameter	P[a]
Gross Alpha	
Quarter	0.0144
October	0.8647
November	0.0169
December	0.0678
Gross Beta	
Quarter	0.0311
October	0.2386
November	0.0469
December	0.0508

a. A 'p' value greater than 0.05 signifies no statistical difference between data groups. Any values below 0.05 are indicated in red.

Table D-2. Statistical difference in weekly gross alpha and gross beta concentrations measured at Boundary and Distant locations.

		Mann-Whitney U test
Parameter	**Week**	**P[a]**
Gross Alpha		
	October 4	0.35
	October 11	0.94
	October 18	0.62
	October 25	0.28
	November 1	0.07
	November 8	0.02
	November 15	0.43
	November 21	0.07
	November 29	0.22
	December 6	0.17
	December 13	0.02
	December 19	0.01
	December 27	0.13
Gross Beta		
	October 5	0.19
	October 12	0.01
	October 19	0.26
	October 26	1.00
	November 2	0.57
	November 9	0.17
	November 16	0.94
	November 23	0.03
	November 30	0.01
	December 7	0.03
	December 14	0.01
	December 21	0.74
	December 28	0.03

a. A 'p' value greater than 0.05 signifies no statistical difference between data groups (i.e., Boundary and Distant locations). Any values below 0.05 are indicated in red.