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Idaho National Laboratory Site Offsite Environmental Surveillance Program Report:

Second Quarter 2019

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By
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EXECUTIVE SUMMARY

None of the radionuclides detected in samples collected during the second quarter of 2019 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 second quarter of 2019 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, April 1 through June 30, 2019. All sample types (media) and the sampling schedule followed during 2019 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
- Surface and drinking water
- Milk
- Alfalfa
- OSLDs

Table ES-1. Summary of Results for the Second Quarter of 2019.

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	There were no 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 second quarter gross alpha results categorized by location, with Idaho Falls being statistically higher than all locations except Howe, Monteview and Sugar City. No result exceeded the 99%/95% upper tolerance limit (UTL) or the Derived Concentration Standard (DCS) for gross alpha or gross beta activity in air.
	Quarterly Composite	Gamma-emitting radionuclides, strontium-90, actinides (americium and plutonium)	No human-made gamma-emitters or ^{90}Sr, ^{241}Am, ^{238}Pu, and $^{239/240}Pu$ were measured in any composite.
	Charcoal Cartridge	Iodine-131	Iodine-131 was not detected in any of the batches of charcoal cartridges counted during the quarter.
Atmospheric Moisture	Liquid	Tritium	Thirteen of the seventeen results showed tritium concentrations greater than the 3s uncertainty during the quarter. One sample result from Howe exceeded the 99%/95% UTL but is still within the range of values observed for the past 10 years. No result exceeded the DCS for tritium in air.
Precipitation	Liquid	Tritium	Eight of the twenty-four results were greater than the 3s uncertainty. All results were below the 99%/95% UTL and were consistent with those reported across the region by the Environmental Protection Agency.

Media	Sample Type	Analysis	Results
Drinking/ Surface Water	Liquid	Gross alpha, gross beta, tritium	Gross alpha was detected in two of ten drinking water samples and in none of the surface water samples. Gross beta was detected in nine of ten drinking water samples and in all three surface water samples. All concentrations were generally similar from previous results. Tritium was detected in seven drinking water and two surface water samples. Concentrations were similar to those measured historically in drinking and surface water and well below the DCS for tritium in drinking water.
Big Lost River (BLR)	Liquid	Gross alpha, gross beta, gamma-emitting radionuclides, tritium	The BLR was sampled three times in the second quarter. Gross alpha activity was detected in all of the samples (including the control). Gross beta activity was detected in all of the samples (including the control). The concentrations were generally similar to previous results. Tritium was also detected in five samples. Concentrations were similar to those found in atmospheric moisture and precipitation samples and were consistent with previous years. The tritium results were below the DCS for drinking water. No human-made gamma emitters were detected in the samples.
Milk	Liquid	Iodine-131, other gamma-emitting radionuclides, strontium-90, tritium	Forty-four milk samples were collected at seven locations (including duplicate samples and the offsite control sample from Colorado). No sample result exceeded 3s.

Media	Sample Type	Analysis	Results
Alfalfa	Vegetation	Gamma-emitting radionuclides, strontium-90	No human-made gamma-emitting radionuclides were measured in any of the samples (including a duplicate) collected this year. No strontium-90 was detected in the three samples analyzed.
Environmental Dosimeters (optically stimulated luminescent dosimeters)	Environmental radiation	Ionizing radiation exposure	The average measurements over the six-month period were 0.31 mrem/day at Boundary and 0.31 mrem/day at Distant locations. The results are consistent with past results.

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
VNSFS	Veolia Nuclear Solutions – Federal Services

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 several 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 2019, environmental monitoring within the INL Site boundaries is primarily the responsibility of the INL and Idaho Cleanup Project (ICP) contractors. The ESER Program focuses on surveillance off the INL Site and is managed by Veolia Nuclear Solutions-Federal Services (VNSFS).

This report contains monitoring results from the ESER Program for samples collected during the second quarter of 2019 (April 1- June 30, 2019).

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 using reports, presentations, newsletter articles and press releases.

The goal of the surveillance program is to monitor different media at several 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
- atmospheric moisture at one INL Site location and at three locations off the INL Site
- precipitation collected at the same four locations sampled for atmospheric moisture
- drinking water collected from eight locations off the INL Site
- surface water collected from three springs located downgradient of the INL Site and from five locations along the Big Lost River, when it is flowing, on the INL Site
- agricultural products, including milk at six dairies around the INL Site, potatoes from at least eight local producers, alfalfa from three locations off the INL Site, grain (wheat and barley) from approximately 9 local producers, and lettuce from approximately seven home-owned and portable gardens on and around the INL Site
- soil from 12 locations around the INL Site biennially
- environmental dosimeters from 16 locations semi-annually
- various numbers of wildlife including bats, big game (pronghorn, mule deer, and elk) and waterfowl sampled from 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 GEL Laboratories.

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, as well as additional analyses of 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 affect 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, based on calculations derived by Curie (1984). The minimum detectable concentration (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 minimize the chance that a potentially false positive result is included in the data set. 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, NBS 1961). 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 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-West 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. Battelle Energy Alliance, LLC, is responsible for the management and operations of the INL.

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

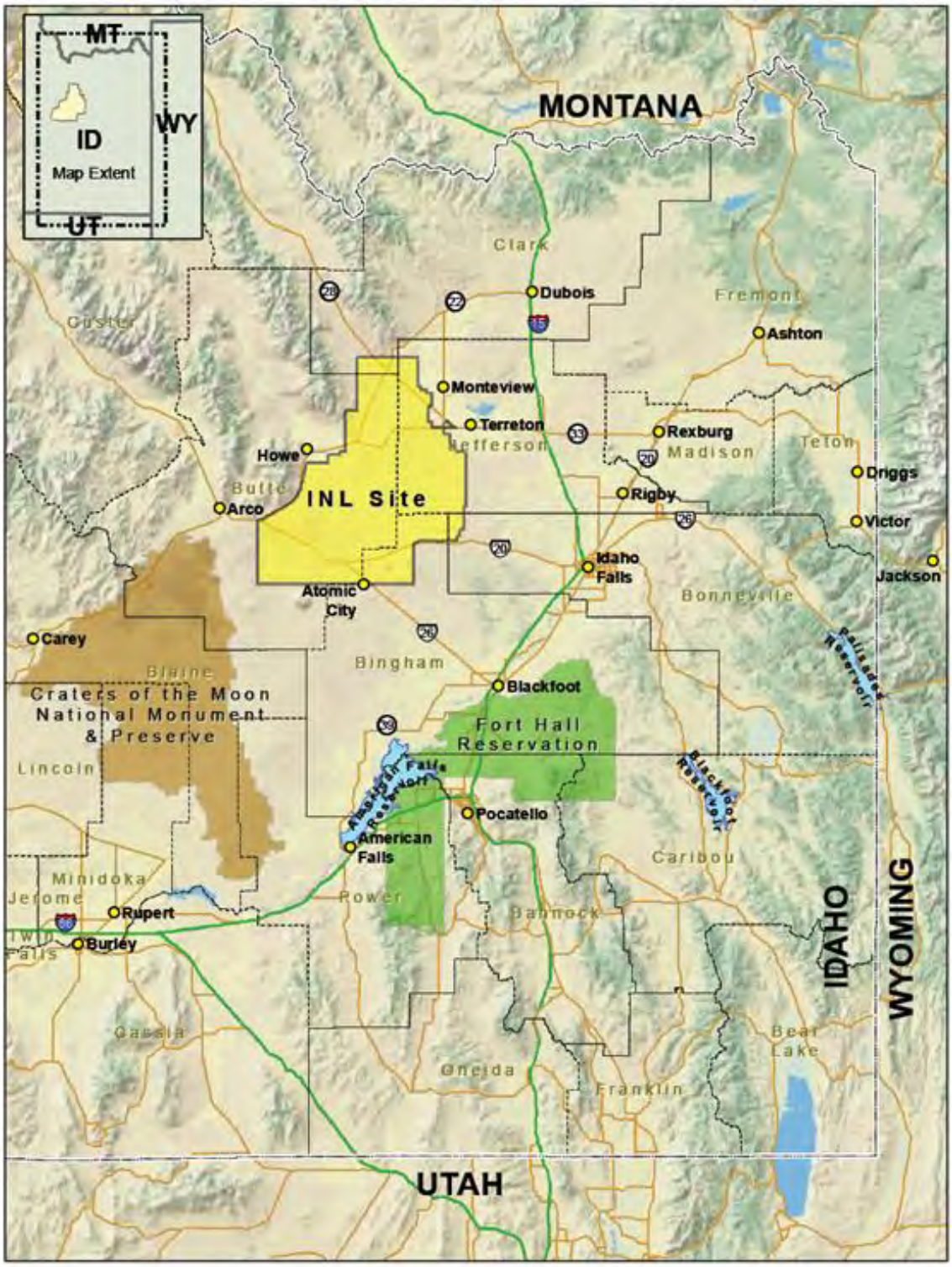

Figure 1. Location of the Idaho National Laboratory Site.

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 second quarter of 2019 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 second quarter of 2019 (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 2018, 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 20,215 ft^3 (572 m^3) of air was sampled at each location, each week, at an average flow rate of 2.02 ft^3/min (0.06 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.

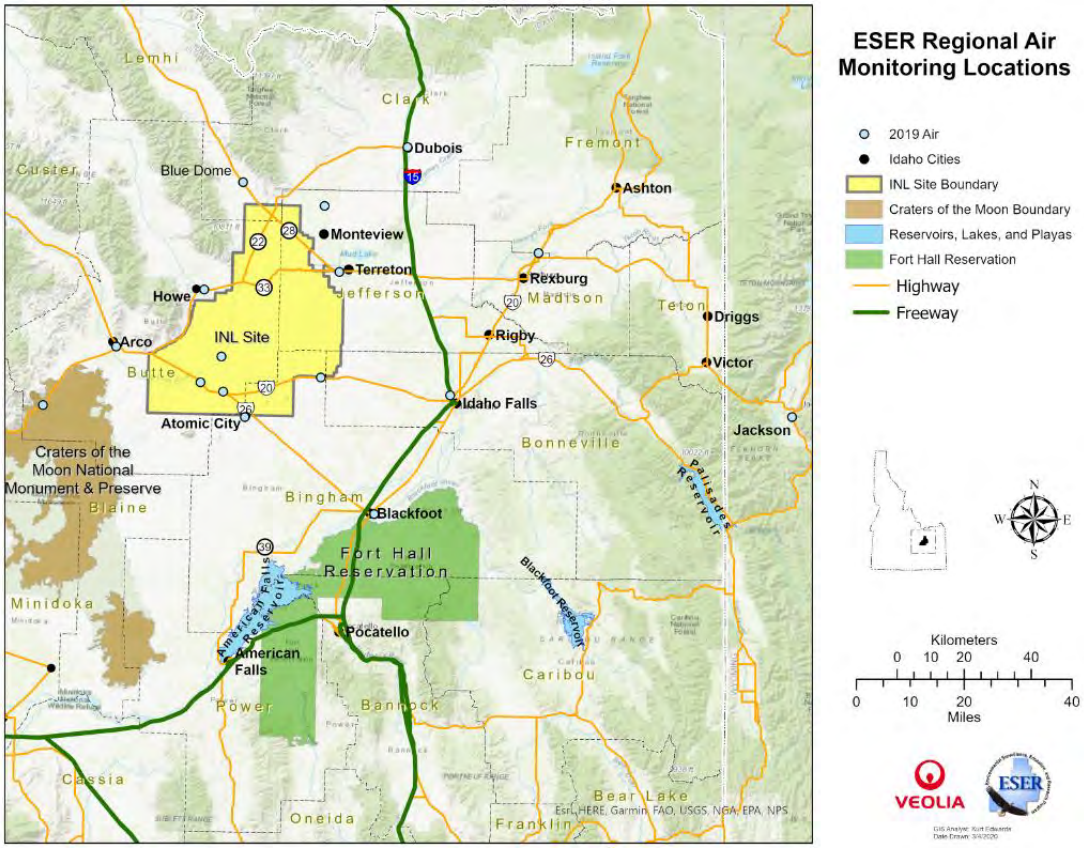

Figure 2. ESER air monitoring locations.

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, with one exception. The Van Buren composite is now, as of the first quarter 2019, analyzed routinely for ^{238}Pu, $^{239/240}Pu$, and ^{241}Am because it is downwind of a potential source of these radionuclides (i.e., the Radioactive Waste Management Complex).

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 concentrations measured in individual samples ranged from a low of $(1.9 \pm 0.10) \times 10^{-16}$ µCi/ml (undetected) collected at Jackson Hole on April 17, 2019, to a high of $(2.6 \pm 0.24) \times 10^{-15}$ µCi/ml collected at Idaho Falls on May 15, 2019. All results were less than the Derived Concentration Standard (DCS) of 3.4×10^{-14} µCi/ml for $^{239/240}Pu$ (see Table B-1 of Appendix B). In addition, the results were consistent with historical data, as represented by the 99%/95% upper tolerance limit (UTL) for gross alpha activity (4×10^{-15} µCi/ml). The UTL was determined using ten years of historical data (measured from 2009 through 2018) and the ProUCL statistical software (https://www.epa.gov/land-research/proucl-software).The 99%/95% UTL is a value such that 99% of the population (all possible air measurements) is less than the UTL with 95% confidence. With a 99%/95% UTL it is expected that approximately 1% of the measurements will exceed the UTL if the concentration of gross alpha is within the normal range. This means that if a concentration exceeds the UTL it does not necessarily indicate that the result is outside of the normal range. Rather, it indicates that the measurement should be closely examined to determine if it is unusually high. None of the gross alpha measurements during the second quarter exceeded the UTL.

Gross alpha data have been tested for distribution (normally or lognormally distributed) and generally show no consistent discernible distribution. Because there is no discernible distribution of the data, a parametric test of significance cannot be used. The nonparametric Kruskal-Wallis analysis of variance by ranks test of multiple independent groups was used to determine statistical differences between INL Site, Boundary, and Distant locations. The test assesses the hypothesis that the different samples in the comparison were drawn from the same distribution or from distributions with the same median. In the computation of the Kruskal-Wallis test, each of the N observations is replaced by a rank. That is, all the results from all the locations are combined and ranked in a single series with the smallest result replaced by rank 1 and the largest result replaced by rank N (i.e., the total number of results). The sum of the ranks in each location group (i.e., INL Site, Boundary, and Distant) is found and then averaged for each group. If the samples are from the same populations, the average ranks should be about the same, whereas if the samples are from populations with different medians, the average ranks should differ. Statistically significant difference exists between data groups if the p-value (or probability 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 no statistically significant difference among groups for the quarter or for any specific month in the quarter.

To determine if there were any differences between stations and where the differences occur, the Kruskal-Wallis analysis of variance by ranks test was used again. Results measured at Idaho Falls differed statistically from all locations except for those measured at Howe, Monteview, and Sugar City during the second quarter (Table D-2). Idaho Falls was also different from the Main Gate during the month of May. The highest mean rank was calculated for Idaho Falls and the lowest mean rank was calculated for Main Gate. These differences may be visually observed in Figure D-1, where the Idaho Falls median and upper box values are higher than the other locations. The differences between locations may be due to variations in local meteorology, geology, or other natural factors. The Idaho Falls station is also located in in a disturbed, populated area.

Gross beta results are presented in Table C-1 and displayed in Figures 7 through 10.Gross beta concentrations measured in individual samples ranged from a low of (9.3 ± 0.46) x 10^{-15} µCi/ml (undetected) collected at Jackson Hole on April 17, 2019, to a high of (3.3 ± 0.074) × 10^{-14} µCi/ml collected at Van Buren Gate on May 15, 2019. All results were less than the Derived Concentration Standard (DCS) of 2.5 × 10^{-1} ^{1}µCi/ml for ^{90}Sr (see Table B-1 of Appendix B). In addition, the results were consistent with historical data, as represented by the 99%/95% upper tolerance limit (UTL) for gross beta activity (7.2 × 10^{-14} µCi/ml). The data were 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 were no statistically significant differences in the gross beta data between groups for the quarter or for any month, using the Kruskal-Wallis analysis of variance by ranks test (Table D-1). To determine if there were any differences between stations and where the differences occur, multiple comparisons were also made using the Kruskal-Wallis analysis of variance by ranks test between gross beta concentrations measured at all locations. No differences were determined (Table D-3).

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

No ^{137}Cs or other human-made gamma-emitting radionuclides were found in quarterly air composites. No ^{90}Sr, ^{238}Pu, $^{239/240}$Pu, or ^{241}Am were detected either (Table C-3).

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 seventeen atmospheric moisture samples collected at the INL Site, Boundary, and Distant locations during the second quarter of 2019 (Figure 11). Thirteen of the concentrations exceeded the 3s uncertainty level for tritium, with a maximum reported value of (1.05 ± 0.18) x 10^{-12} $\mu Ci/ml_{air}$ at Howe. The maximum result exceeded the 99%/95% UTL of 7.0 x 10^{-13} $\mu Ci/ml_{air}$ but is within the range of values observed for the past 10 years. All samples were significantly below the DOE DCS for tritium in air (as water vapor) of 2.1 × 10^{-7} $\mu Ci/ml_{air}$. Results are shown in Table C-4.

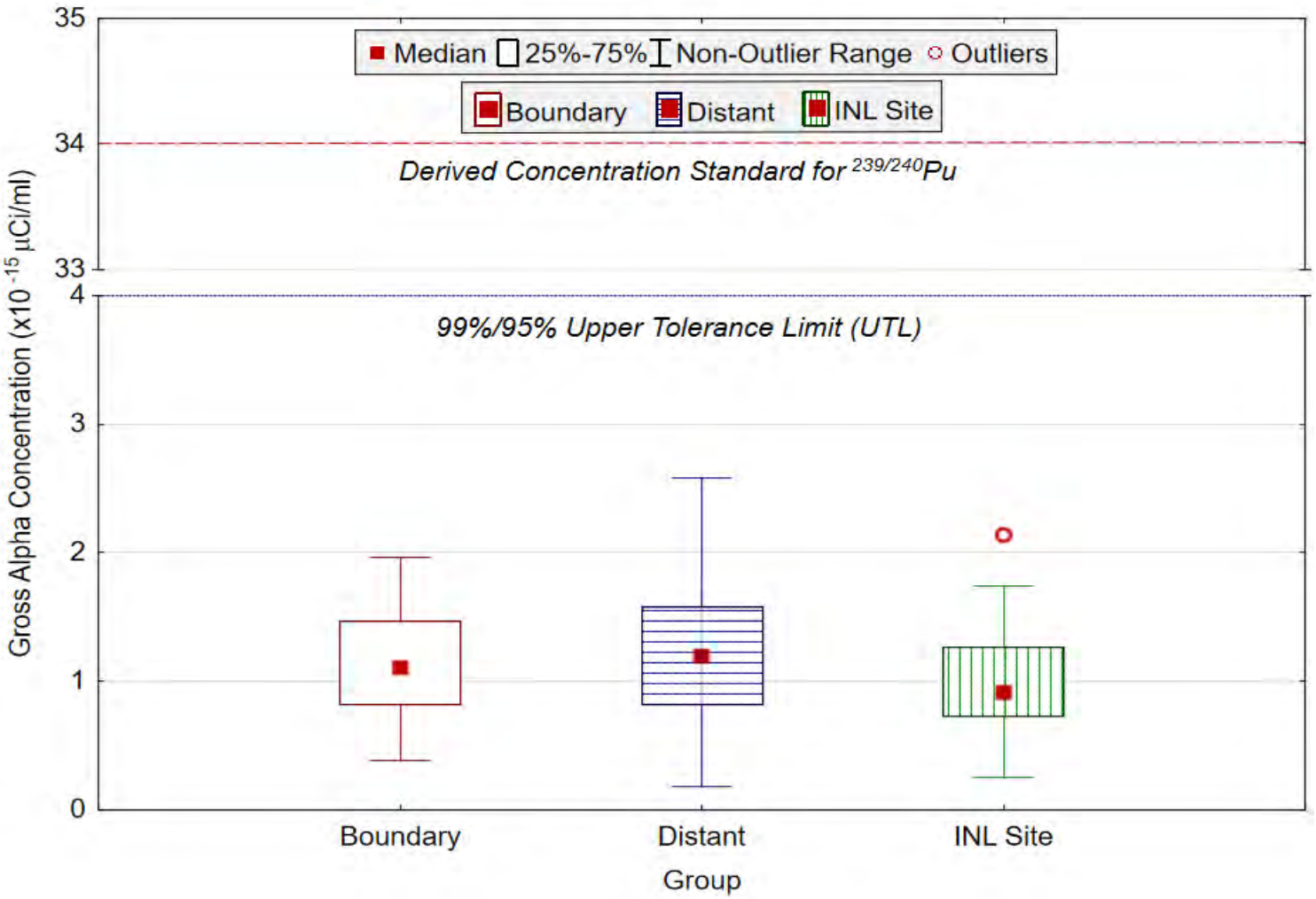

Figure 3. Gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations for the second quarter of 2019. The DOE Derived Concentration Standard (DCS) is the concentration of plutonium-239/240 ($^{239/240}$Pu) in air which, if inhaled for a year, would result in a dose of 100 mrem/yr. 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. The UTL represents the value below which 99% of the population values are expected to fall with 95% confidence.

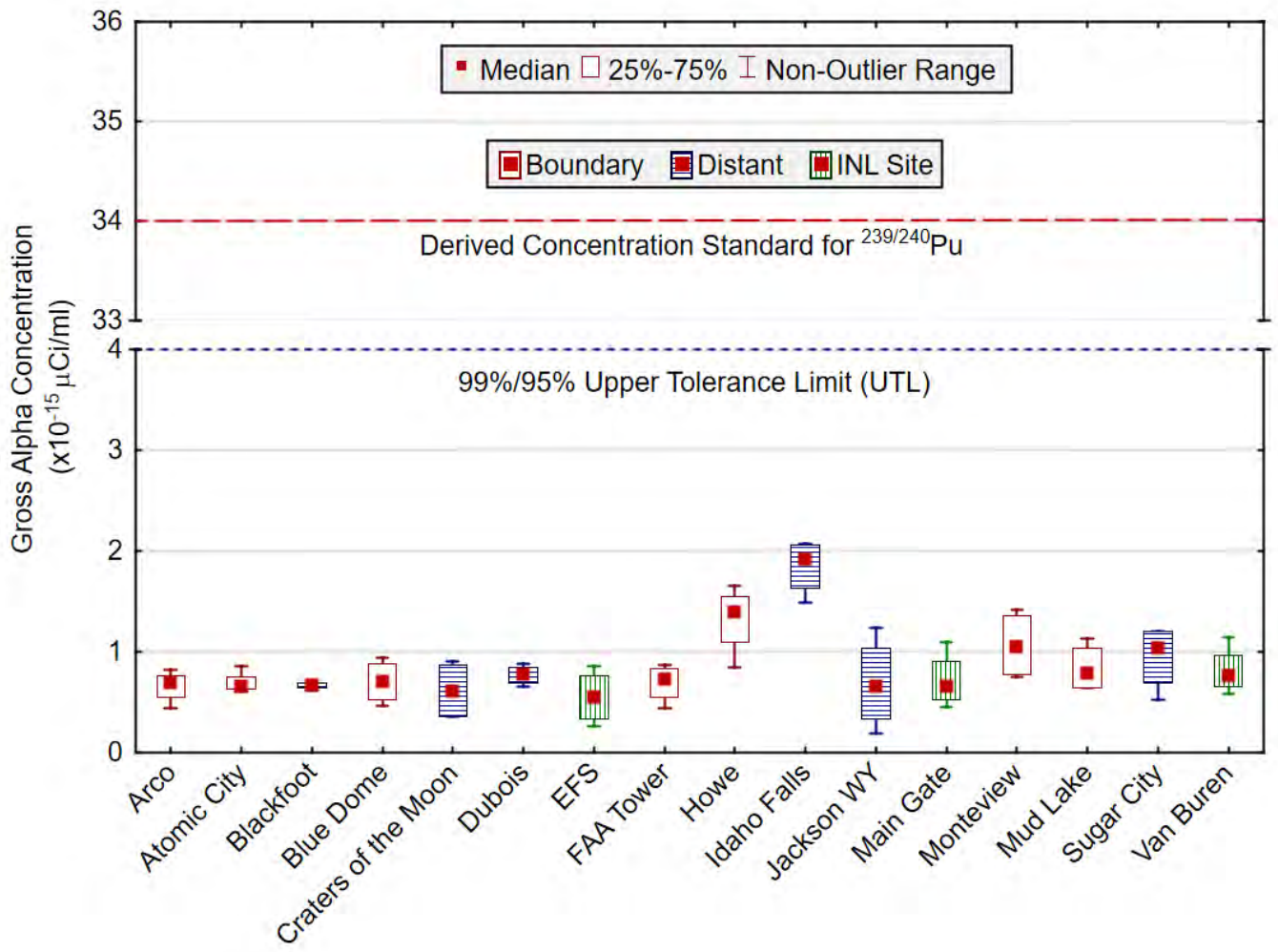

Figure 4. April 2019 gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location. The Derived Concentration Standard (DCS) is the concentration of plutonium-239/240 ($^{239/240}$Pu) in air which, if inhaled for a year, would result in 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. The UTL represents the value below which 99% of the population values are expected to fall with 95% confidence.

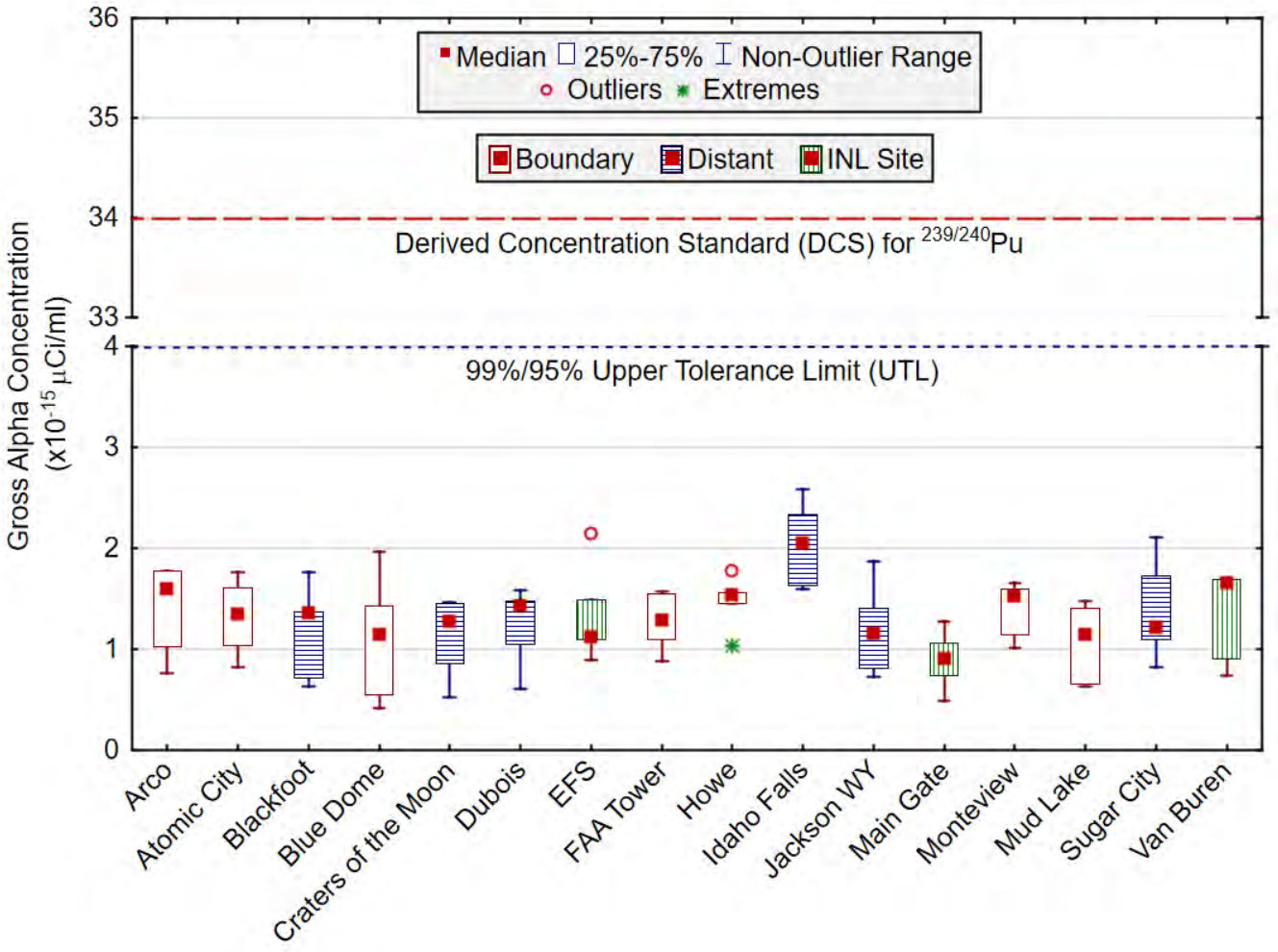

Figure 5. May 2019 gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location. The Derived Concentration Standard (DCS) is the concentration of plutonium-239/240 ($^{239/240}$Pu) in air which, if inhaled for a year, would result in 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. The UTL represents the value below which 99% of the population values are expected to fall with 95% confidence.

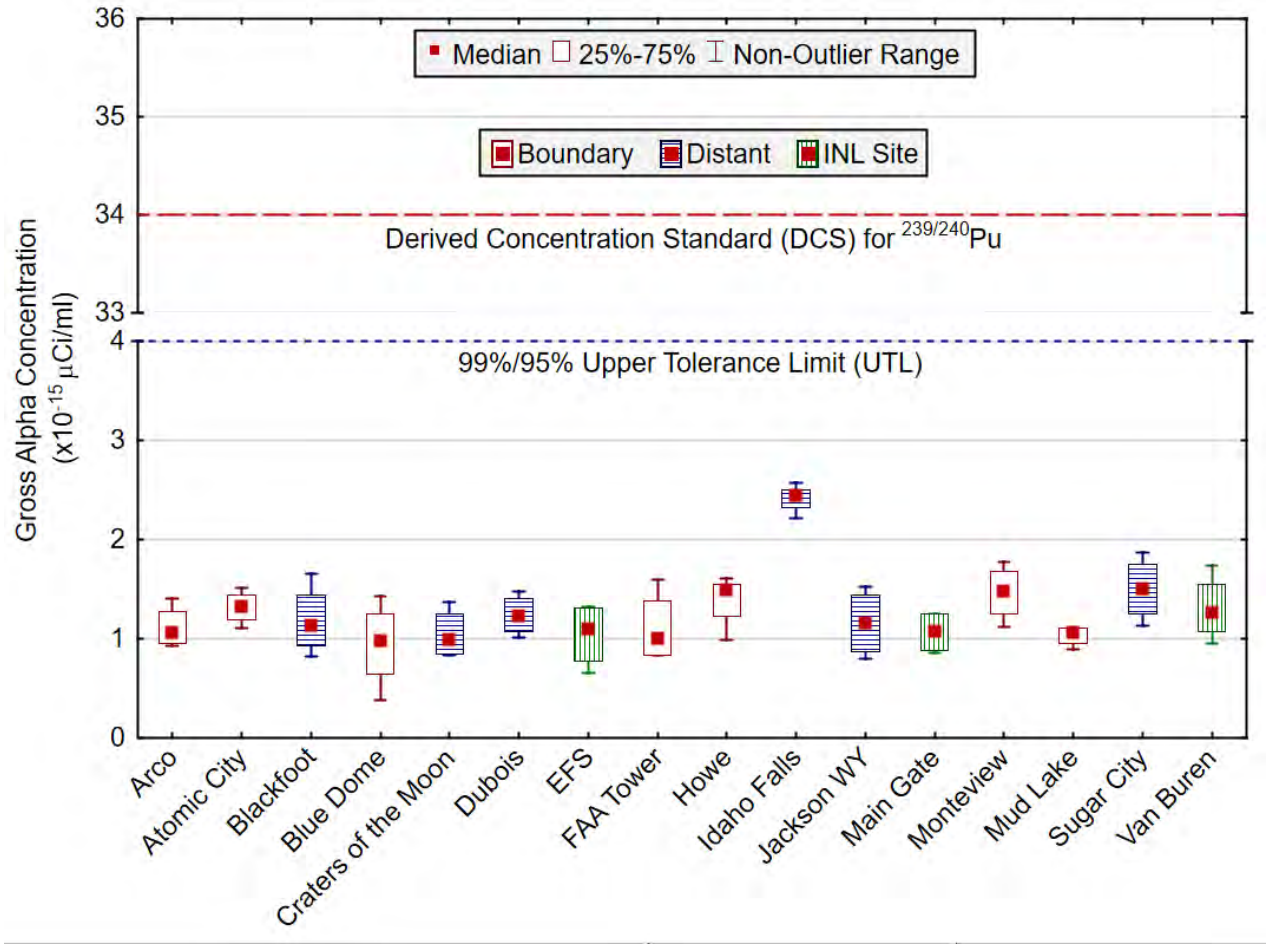

Figure 6. June 2019 gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location. The Derived Concentration Standard (DCS) is the concentration of plutonium-239/240 ($^{239/240}$Pu) in air which, if inhaled for a year, would result in 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. The UTL represents the value below which 99% of the population values are expected to fall with 95% confidence.

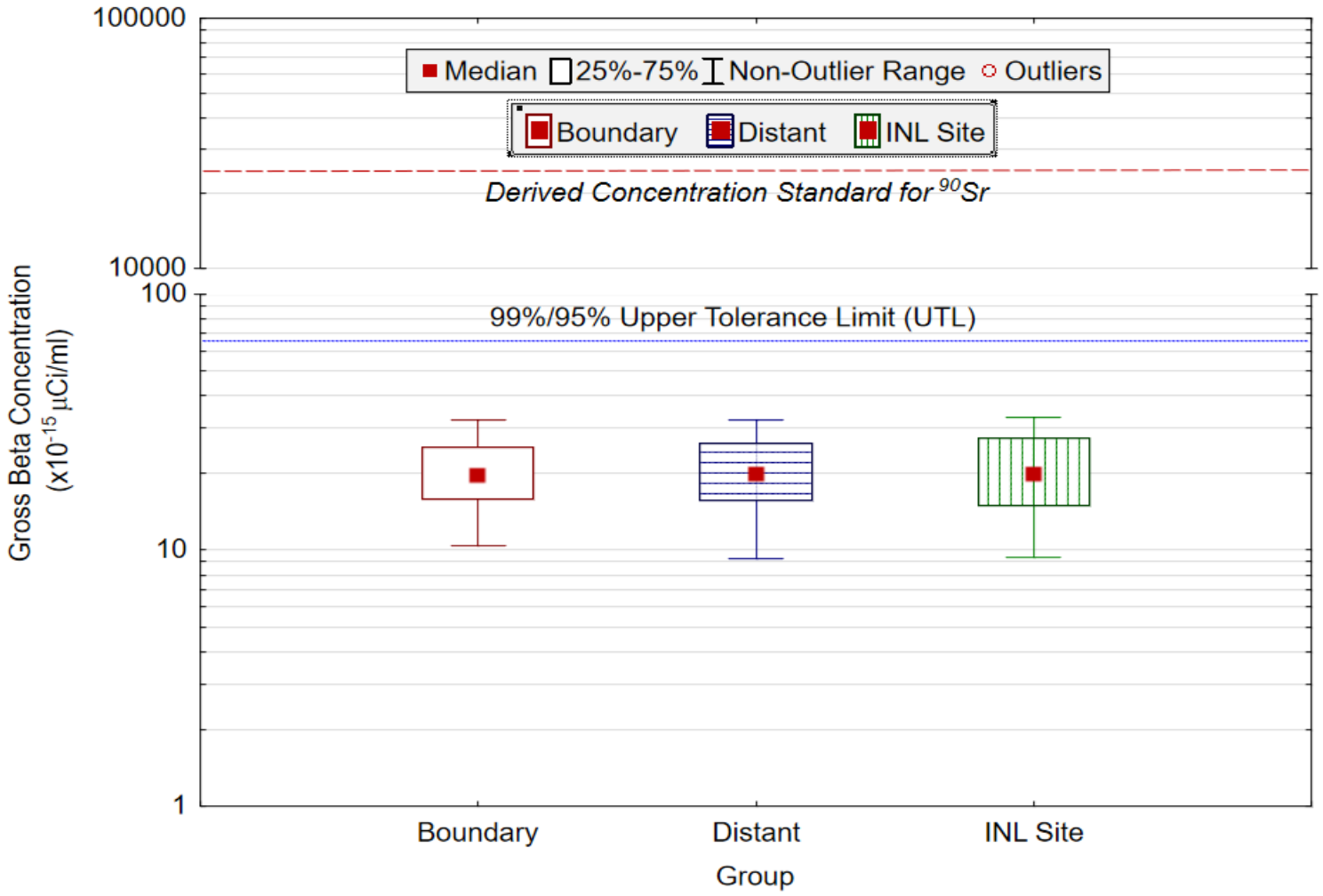

Figure 7. Gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations for the second quarter of 2019. The Derived Concentration Standard (DCS) is the concentration of strontium-90 (^{90}Sr) in air which, if inhaled for a year, would result in a dose of 100 mrem/yr. Because the 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 concentration. The DCS for ^{90}Sr is shown because it is the most restrictive human-made beta emitter. The UTL represents the value below which 99% of the population values are expected to fall with 95% confidence.

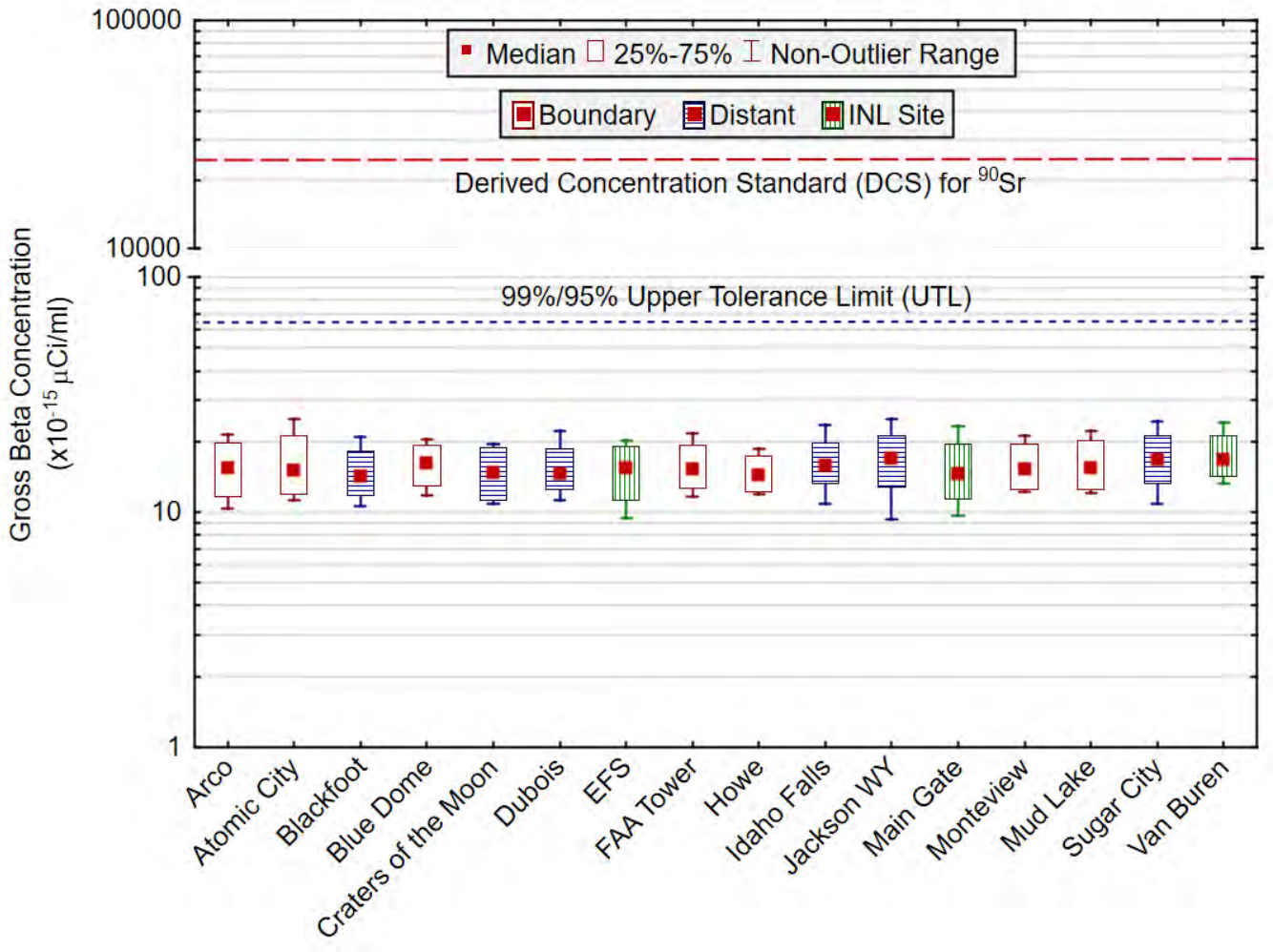

Figure 8. April 2019 gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location. The Derived Concentration Standard (DCS) is the concentration of strontium-90 (^{90}Sr) in air which, if inhaled for a year, would result in a dose of 100 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. The UTL represents the value below which 99% of the population values are expected to fall with 95% confidence.

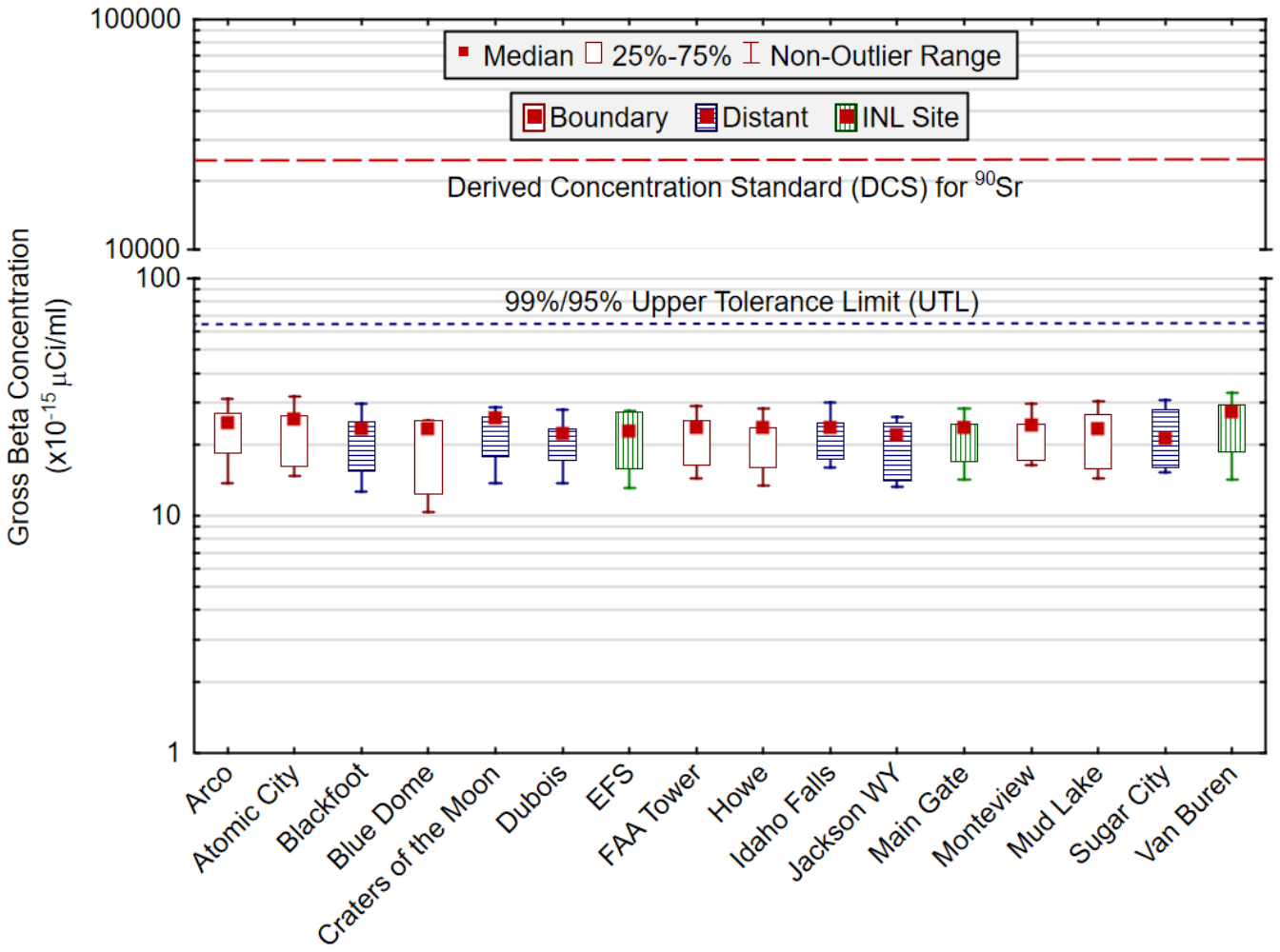

Figure 9. May 2019 gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location. The Derived Concentration Standard (DCS) is the concentration of strontium-90 (^{90}Sr) in air which, if inhaled for a year, would result in a dose of 100 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. The UTL represents the value below which 99% of the population values are expected to fall with 95% confidence.

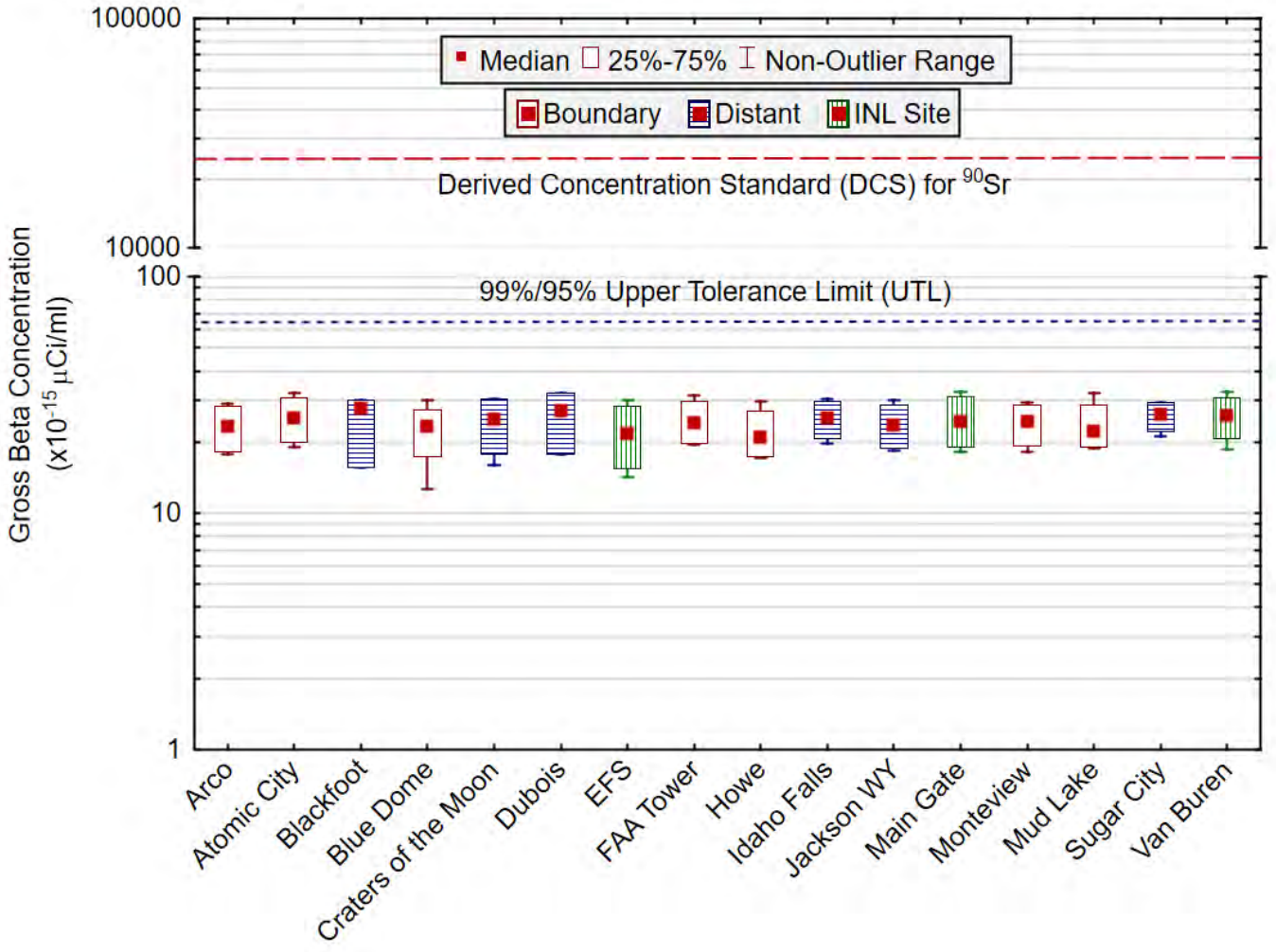

Figure 10. June 2019 gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location. The Derived Concentration Standard (DCS) is the concentration of strontium-90 (^{90}Sr) in air which, if inhaled for a year, would result in a dose of 100 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 The UTL represents the value below which 99% of the population are expected to fall with 95% confidence.

4. PRECIPITATION AND WATER SAMPLING

PRECIPITATION SAMPLING

Precipitation samples are gathered when enough 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 atmospheric moisture samples are collected at. Precipitation samples are analyzed for tritium. Storm events in the second quarter of 2019 produced sufficient precipitation to yield 24 samples.

Tritium was measured above the 3s values in eight of the 24 samples collected during the second quarter (Figure 11). These results are listed in Table C-5 (Appendix C). Low levels of tritium always exist in the environment 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. A search of the RadNet database (https://enviro.epa.gov/enviro/erams_query_v2.simple_query) for tritium in precipitation collected in Idaho for the last ten years of published data (2006 through 2015) yields an average tritium concentration of 11.3 pCi/ml with a range of -84 to 123.0 pCi/ml. The maximum value in the second quarter was (116 ± 24) pCi/L in an EFS sample collected in early June. The result is below the 99%/95% UTL of 322 pCi/ml.

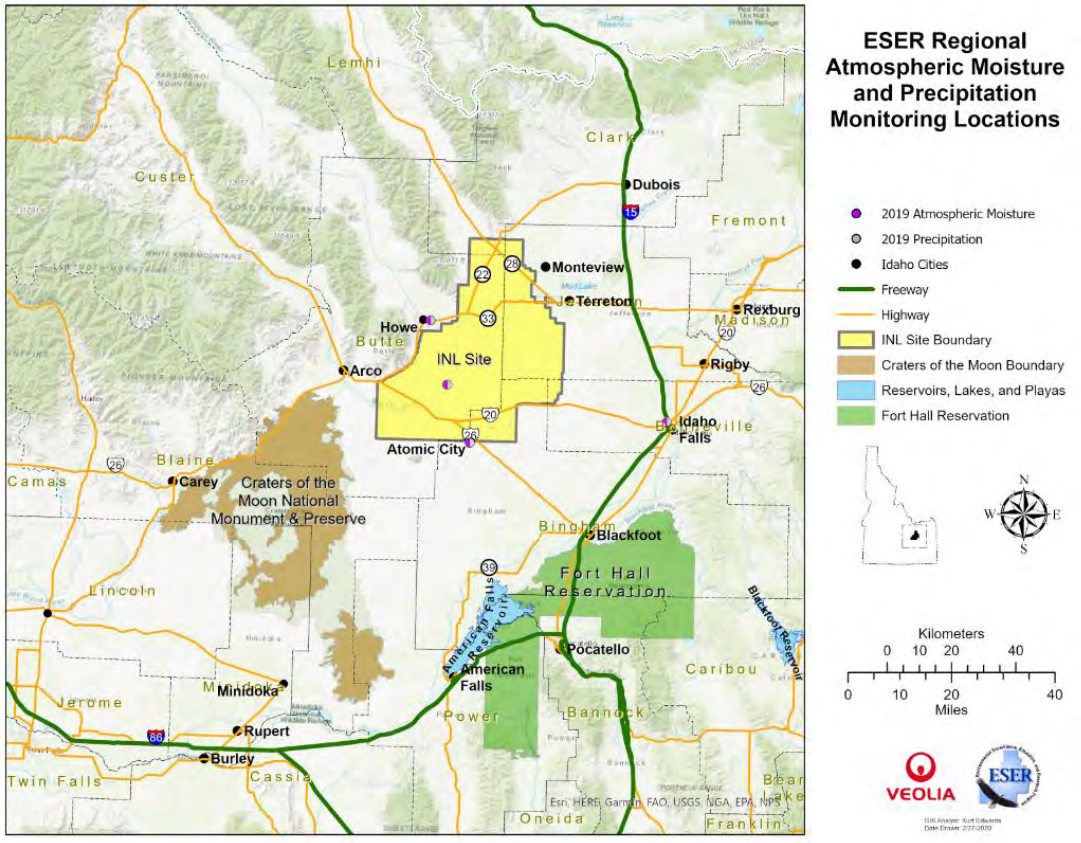

Figure 11. ESER atmospheric moisture and precipitation monitoring locations.

WATER SAMPLING

Drinking water samples were collected at eight locations (plus a duplicate). A control sample of bottled water was also prepared. Surface water samples were collected at three Thousand Springs locations. All samples were analyzed for gross alpha, gross beta, and tritium. Locations are shown in Figure 12 and results are listed in Table C-6 of Appendix C.

Gross alpha activity was detected in two of the ten drinking water samples (Atomic City and Shoshone samples) and in none of the three surface water samples. The highest reported gross alpha value was (1.3 ± 0.39) pCi/L in the sample from Shoshone. Gross beta activity was detected in nine of the 10 drinking water samples (all except the control), and in all three of the surface water samples. All concentrations were generally similar to previous results from drinking and surface water sampling. 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 (7.9 ± 0.50) pCi/L in the surface water sample collected 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 ten drinking water samples and two of the three 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 (120 ± 24) pCi/L in drinking water at Shoshone. 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 second quarter. Samples were collected during April, May, and June at five locations (plus a duplicate). A control sample was collected at an off-site location on 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 and include three collection events, one in April, one in May, and one in June.

Gross alpha activity was detected in all twenty-one samples. The highest reported gross alpha value was (5.9 ± 0.66) pCi/L in a sample from the BLR at the Rest Area on Highway 26. Gross beta activity was detected in all of the samples. The highest reported gross beta value was (14.8 ± 0.51) pCi/L in a sample from BLR at NRF. Concentrations were generally similar to previous results from the BLR sampling. Tritium was detected in five samples from the BLR. The highest reported value was (148 ± 24) pCi/L in the sample collected at the EFS on June 25, however the duplicate sample at EFS resulted in a concentration of (51 ± 24) pCi/L (questionably detected). Concentrations were similar to those found in atmospheric moisture and precipitation samples and were consistent with previous years. No human-made gamma emitters were found in the samples.

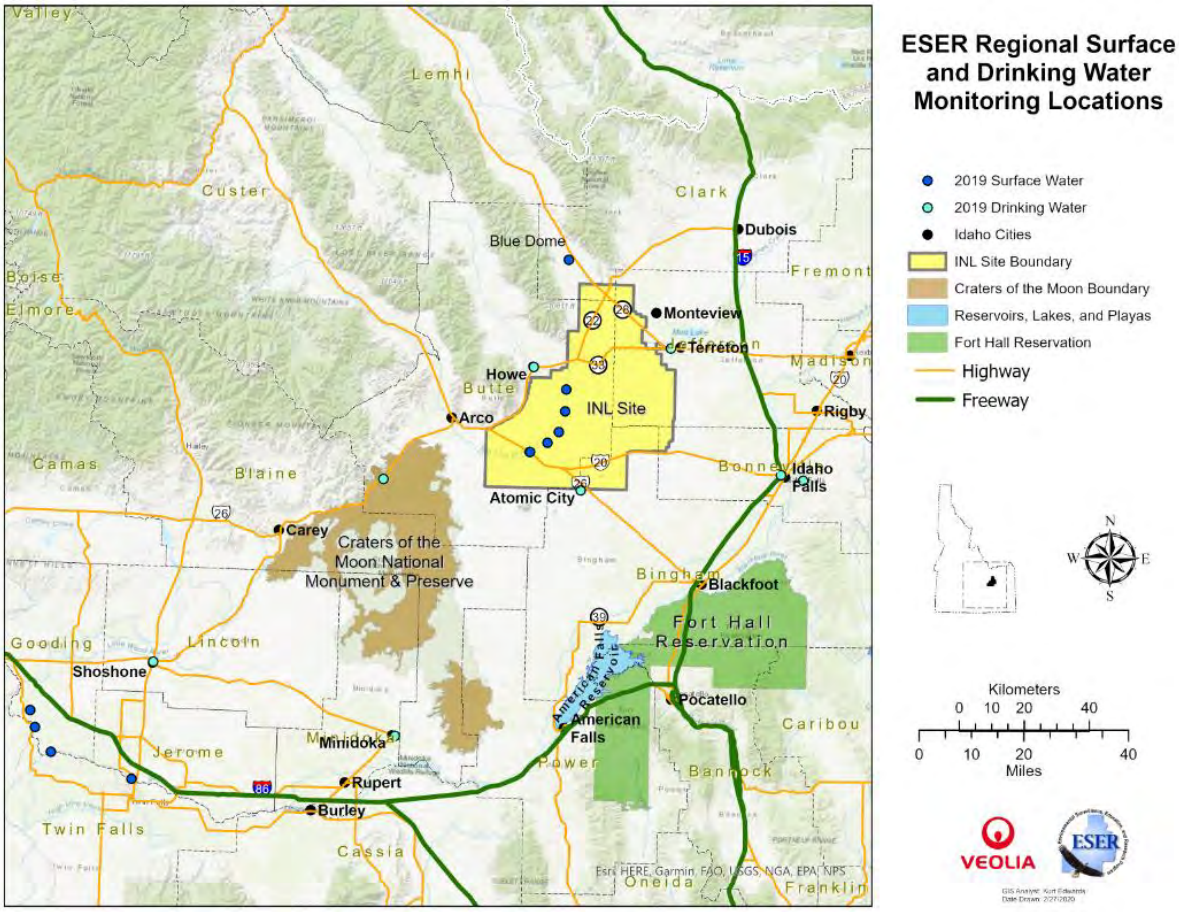

Figure 12. ESER surface and drinking water monitoring locations.

5. 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, alfalfa and wildlife samples available during the second quarter of 2019.

MILK SAMPLING

Milk samples were collected weekly at Idaho Falls and Terreton. Monthly samples were collected at four other locations around the INL Site (Figure 13) during the second quarter of 2019. 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 were also analyzed for strontium-90 and tritium in May.

Neither ^{131}I nor ^{137}Cs was detected in any weekly or monthly samples during the second 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. Neither Sr-90 nor H-3 were detected in milk samples (Appendix C, Table C-9).

ALFALFA SAMPLING

Four samples of alfalfa (including one duplicate) were obtained from growers in the Howe, Mud Lake, and Idaho Falls areas. All samples were analyzed for gamma-emitting radionuclides and three samples for ^{90}Sr. Data for ^{137}Cs and ^{90}Sr in alfalfa samples are listed in Appendix C, Table C-10.

No human-made gamma-emitting radionuclides were found in any of the samples this year. Strontium-90 was not detected in the samples.

LARGE GAME ANIMAL SAMPLING

No big game animals killed by vehicular collisions were available for sampling during the second quarter of 2019.

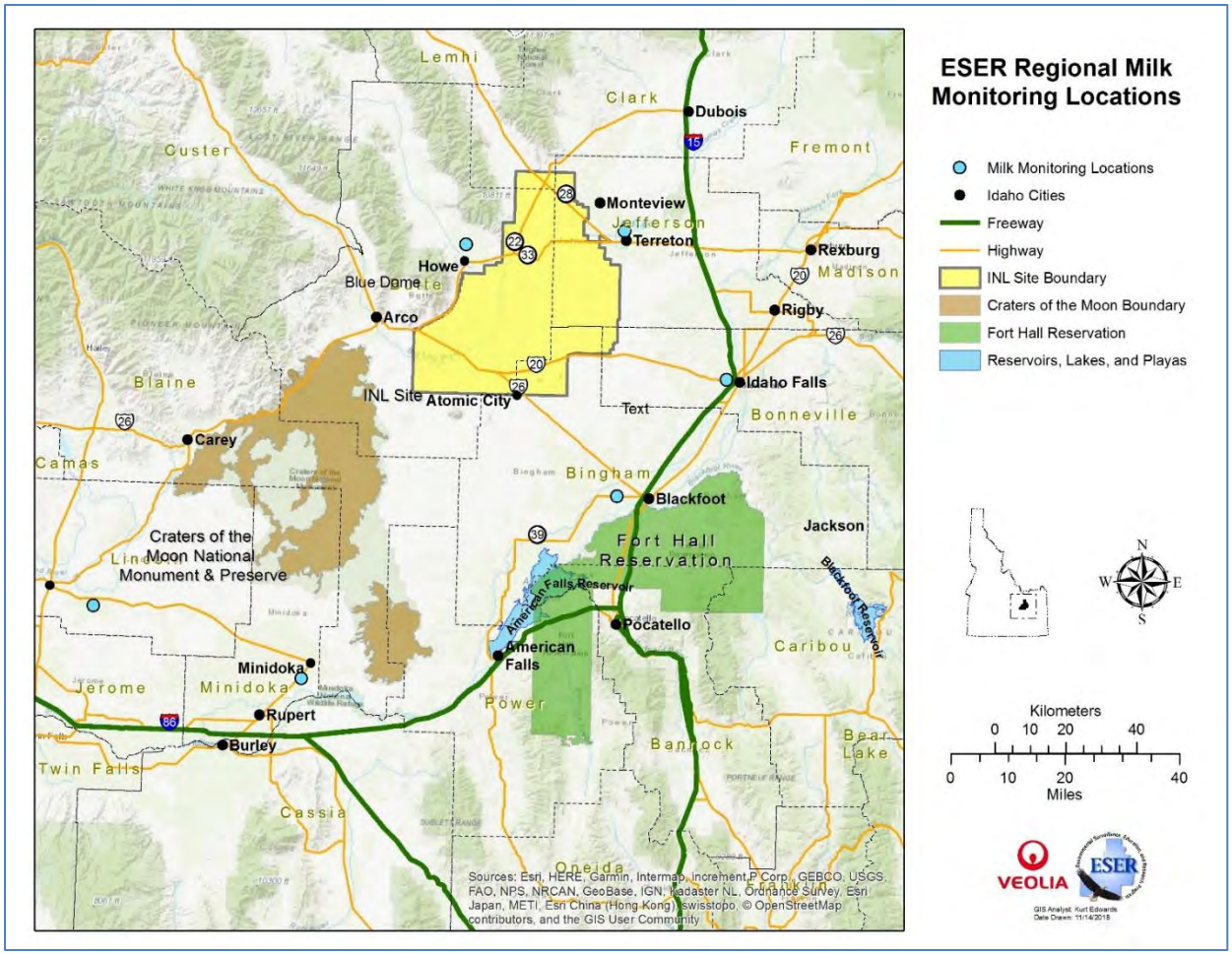

Figure 13. ESER milk sampling locations. Milk is collected at locations identified by blue circles.

6. ENVIRONMENTAL RADIATION

An array of optically stimulated luminescent dosimeters (OSLDs) and thermoluminescent dosimeter (TLD) is distributed throughout the Eastern Snake River Plain to monitor for environmental radiation. Beginning in November 2011, two OSLDs were place in the same locations (Figure 14) as the TLDs to run a side-by-side comparison of the two dosimeter technologies. OSLDs and TLDs are changed out at the beginning of May and again at the beginning of November after six months in the field.

OSLD results from dosimeters collected during the second quarter are displayed in Appendix C, Table C-11. Results are presented in dose units of millirem (mrem). The Boundary OSLD values ranged from 50.65 mrem at Blue Dome to 62.95 mrem at Atomic City, with an overall average of 57.25 mrem. This equates to an average dose of 0.31 mrem per day. Distant results varied from 49.5 mrem at Dubois to 73.95 mrem at Sugar City. The Distant average was 57.42 mrem, which also equates to 0.31 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.

TLD results from the second quarter are still being evaluated and will be reported in the fourth quarter report.

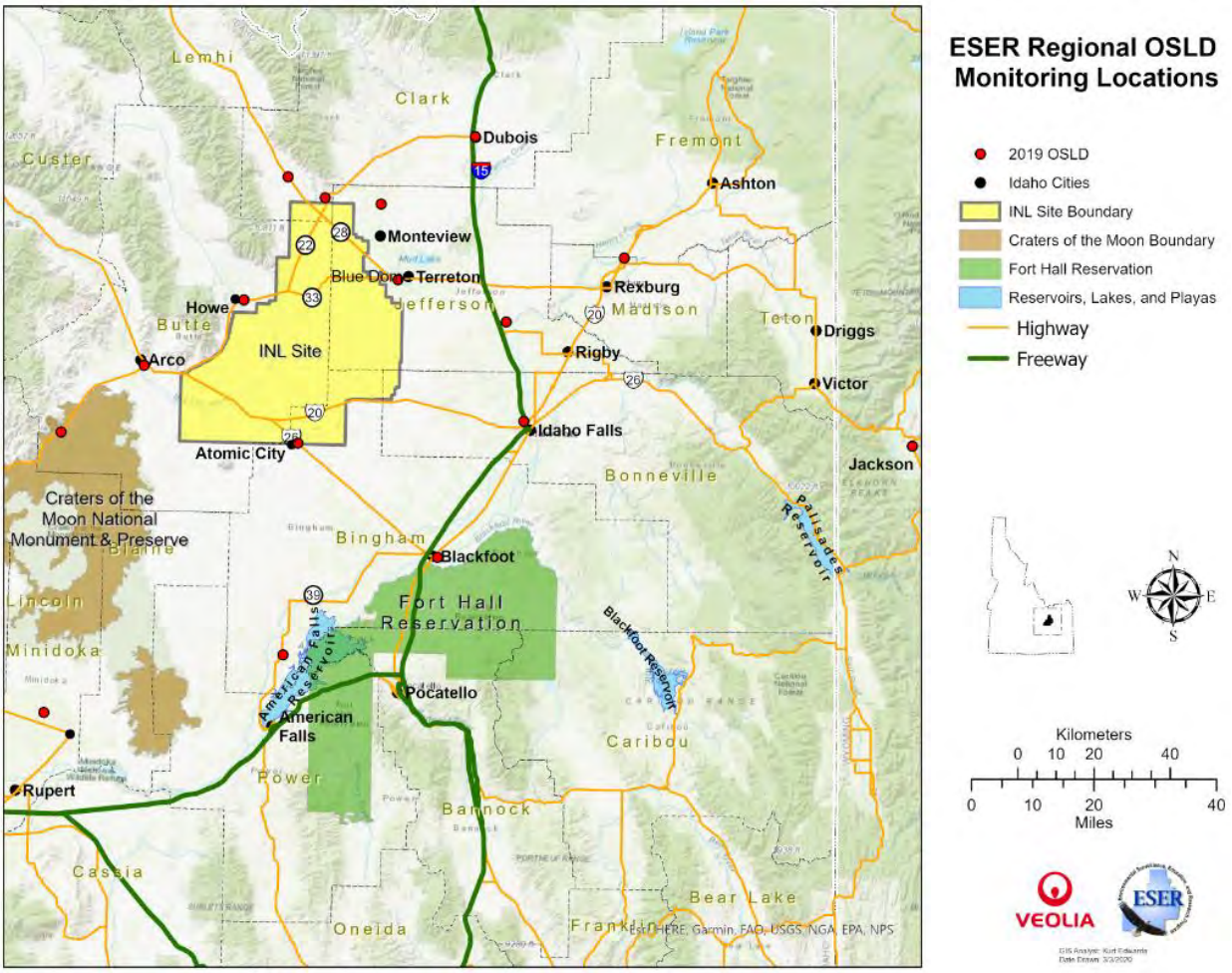

Figure 14. ESER optically stimulated luminescent dosimeter (OSLD) locations.

7. 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 (VNSFS 2019). 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 Report for the Second Quarter of 2019 (VNSFS 2020).

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VNSFS, 2020, *Environmental Quality Assurance Report for the 2nd Quarter 2019,* Environmental Surveillance, Education, and Research Program.

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
WATER SAMPLING				
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, 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
AGRICULTURAL PRODUCT SAMPLING				
MILK				
Gamma Spec (^{131}I)	weekly	Idaho Falls	Terreton	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
WILDLIFE SAMPLING				
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 Second Quarter 2019

Sample Type	Analysis	Average Minimum Detectable Concentration[a] (MDC)	Derived Concentration Standard[b] (DCS)
Air (particulate filter)[e]	Gross alpha	3.9×10^{-16} µCi/ml	3.4×10^{-14} µCi/ml[c]
	Gross beta	1.3×10^{-15} µCi/ml	2.5×10^{-11} µCi/ml[d]
	^{137}Cs	8.7×10^{-17} µCi/ml	9.8×10^{-11} µCi/ml
	^{90}Sr	3.7×10^{-17} µCi/ml	2.5×10^{-11} µCi/ml
	^{241}Am	7.0×10^{-18} µCi/ml	4.1×10^{-14} µCi/ml
	^{238}Pu	9.2×10^{-18} µCi/ml	3.7×10^{-14} µCi/ml
	$^{239/240}$Pu	8.4×10^{-18} µCi/ml	3.4×10^{-14} µCi/ml
	$^{233/234}$U	7.3×10^{-18} µCi/ml	3.9×10^{-13} µCi/ml
	$^{235/236}$U	5.3×10^{-18} µCi/ml	4.5×10^{-13} µCi/ml
	^{238}U	6.9×10^{-18} µCi/ml	4.7×10^{-13} µCi/ml
Air (charcoal cartridge)[e]	^{131}I	6.8×10^{-16} µCi/ml	4.1×10^{-10} µCi/ml
Air (atmospheric moisture)	^{3}H	89.9 pCi/L_{water} 5.2×10^{-13} $\mu Ci/ml_{air}$	1.9×10^{6} pCi/L_{water} 2.1×10^{-7} $\mu Ci/ml_{air}$
Air (precipitation)	^{3}H	90.6 pCi/L	1.9×10^{6} pCi/L_{water}
Milk	^{131}I	0.5 pCi/L	1.3×10^{3} pCi/L[f]
	^{137}Cs	1.0 pCi/L	3.0×10^{3} pCi/L[f]
Drinking Water/Surface Water	Gross alpha	1.07 pCi/L	1.4×10^{-7} µCi/ml
	Gross beta	1.23 pCi/L	1.1×10^{-6} µCi/ml
	^{3}H	88.7 pCi/L	1.9×10^{6} pCi/L_{water}
	^{137}Cs (BLR[g])	1.03 pCi/L	--[h]
Alfalfa	^{137}Cs	64.9 pCi/kg	--
	^{90}Sr	51.6 pCi/kg	--

Sample Type	Analysis	Average Minimum Detectable Concentration[a] (MDC)	Derived Concentration Standard[b] (DCS)

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.
f. There is no DCS established for radionuclides in milk. However, The DCS shown is for the radionuclide ingested in water.
g. BLR = Big Lost River
h. – No appropriate DCS available

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	04/03/19	0.66	±	0.14	2.43	±	0.53	Yes	21.50	±	0.62	79.55	±	2.29	Yes
	04/10/19	0.72	±	0.14	2.65	±	0.51	Yes	12.90	±	0.53	47.73	±	1.95	Yes
	04/17/19	0.44	±	0.12	1.62	±	0.45	Yes	10.40	±	0.49	38.48	±	1.81	Yes
	04/24/19	0.82	±	0.16	3.03	±	0.58	Yes	18.00	±	0.60	66.60	±	2.22	Yes
	05/01/19	1.78	±	0.19	6.59	±	0.72	Yes	26.90	±	0.67	99.53	±	2.48	Yes
	05/08/19	1.59	±	0.26	5.88	±	0.95	Yes	24.50	±	0.69	90.65	±	2.55	Yes
	05/15/19	1.78	±	0.21	6.59	±	0.76	Yes	31.00	±	0.73	114.70	±	2.68	Yes
	05/22/19	0.76	±	0.14	2.80	±	0.51	Yes	13.70	±	0.52	50.69	±	1.91	Yes
	05/29/19	1.02	±	0.15	3.77	±	0.57	Yes	18.30	±	0.57	67.71	±	2.11	Yes
	06/05/19	0.93	±	0.16	3.44	±	0.58	Yes	29.00	±	0.69	107.30	±	2.57	Yes
	06/12/19	0.99	±	0.16	3.66	±	0.58	Yes	17.70	±	0.56	65.49	±	2.07	Yes
	06/19/19	1.41	±	0.18	5.22	±	0.67	Yes	28.00	±	0.68	103.60	±	2.52	Yes
	06/26/19	1.14	±	0.16	4.20	±	0.58	Yes	18.72	±	0.56	69.28	±	2.09	Yes
ATOMIC CITY	04/03/19	0.86	±	0.15	3.16	±	0.55	Yes	25.00	±	0.63	92.50	±	2.35	Yes
	04/10/19	0.60	±	0.12	2.23	±	0.46	Yes	12.80	±	0.50	47.36	±	1.86	Yes
	04/17/19	0.66	±	0.13	2.43	±	0.50	Yes	11.20	±	0.50	41.44	±	1.83	Yes
	04/24/19	0.65	±	0.15	2.41	±	0.54	Yes	17.50	±	0.58	64.75	±	2.15	Yes
	05/01/19	1.35	±	0.18	5.00	±	0.65	Yes	26.30	±	0.66	97.31	±	2.46	Yes
	05/08/19	1.61	±	0.24	5.96	±	0.90	Yes	25.60	±	0.66	94.72	±	2.45	Yes
	05/15/19	1.76	±	0.20	6.51	±	0.74	Yes	32.00	±	0.72	118.40	±	2.65	Yes
	05/22/19	0.82	±	0.14	3.05	±	0.51	Yes	14.70	±	0.52	54.39	±	1.91	Yes
	05/29/19	1.03	±	0.15	3.81	±	0.57	Yes	16.10	±	0.54	59.57	±	2.01	Yes
	06/05/19	1.51	±	0.18	5.59	±	0.66	Yes	32.40	±	0.71	119.88	±	2.61	Yes
	06/12/19	1.27	±	0.17	4.70	±	0.63	Yes	19.00	±	0.57	70.30	±	2.11	Yes
	06/19/19	1.37	±	0.18	5.07	±	0.65	Yes	29.20	±	0.68	108.04	±	2.53	Yes
	06/26/19	1.11	±	0.16	4.10	±	0.59	Yes	20.97	±	0.60	77.60	±	2.22	Yes
QA-1	04/03/19	0.98	±	0.15	3.62	±	0.56	Yes	22.20	±	0.60	82.14	±	2.22	Yes
(ATOMIC CITY)	04/10/19	0.47	±	0.12	1.75	±	0.44	Yes	13.50	±	0.52	49.95	±	1.93	Yes
	04/17/19	0.41	±	0.11	1.51	±	0.42	Yes	11.50	±	0.48	42.55	±	1.78	Yes
	04/24/19	0.70	±	0.14	2.60	±	0.53	Yes	16.60	±	0.55	61.42	±	2.05	Yes
	05/01/19	1.39	±	0.17	5.14	±	0.64	Yes	23.50	±	0.63	86.95	±	2.31	Yes
	05/08/19	1.66	±	0.25	6.14	±	0.93	Yes	25.80	±	0.68	95.46	±	2.51	Yes
	05/15/19	1.31	±	0.18	4.85	±	0.66	Yes	30.10	±	0.69	111.37	±	2.56	Yes
	05/22/19	0.43	±	0.11	1.60	±	0.42	Yes	13.70	±	0.49	50.69	±	1.83	Yes
	05/29/19	0.75	±	0.14	2.78	±	0.50	Yes	16.00	±	0.53	59.20	±	1.96	Yes
	06/05/19	1.16	±	0.16	4.29	±	0.60	Yes	30.60	±	0.68	113.22	±	2.52	Yes
	06/12/19	1.35	±	0.17	5.00	±	0.62	Yes	18.40	±	0.55	68.08	±	2.03	Yes
	06/19/19	1.15	±	0.16	4.26	±	0.60	Yes	27.00	±	0.65	99.90	±	2.41	Yes
	06/26/19	1.09	±	0.15	4.03	±	0.56	Yes	19.00	±	0.55	70.30	±	2.04	Yes
BLUE DOME	04/03/19	0.82	±	0.15	3.05	±	0.56	Yes	20.30	±	0.61	75.11	±	2.26	Yes
	04/10/19	0.59	±	0.13	2.16	±	0.48	Yes	14.20	±	0.54	52.54	±	2.01	Yes
	04/17/19	0.46	±	0.12	1.71	±	0.45	Yes	11.80	±	0.50	43.66	±	1.86	Yes
	04/24/19	0.94	±	0.16	3.47	±	0.60	Yes	18.20	±	0.59	67.34	±	2.18	Yes
	05/01/19	1.14	±	0.15	4.22	±	0.57	Yes	23.10	±	0.58	85.47	±	2.16	Yes
	05/08/19	1.96	±	0.35	7.25	±	1.28	Yes	25.30	±	0.87	93.61	±	3.21	Yes
	05/15/19	1.43	±	0.19	5.29	±	0.70	Yes	25.30	±	0.68	93.61	±	2.50	Yes
	05/22/19	0.42	±	0.12	1.55	±	0.43	Yes	10.40	±	0.48	38.48	±	1.77	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
	05/29/19	0.55	±	0.12	2.05	±	0.46	Yes	12.30	±	0.50	45.51	±	1.84	Yes
	06/05/19	1.06	±	0.16	3.92	±	0.60	Yes	24.60	±	0.65	91.02	±	2.42	Yes
	06/12/19	0.39	±	0.12	1.44	±	0.45	Yes	12.70	±	0.50	46.99	±	1.86	Yes
	06/19/19	1.43	±	0.22	5.29	±	0.81	Yes	30.20	±	0.85	111.74	±	3.14	Yes
	06/26/19	0.89	±	0.15	3.31	±	0.55	Yes	21.88	±	0.60	80.94	±	2.24	Yes
QA-2	04/03/19	0.93	±	0.16	3.43	±	0.58	Yes	19.70	±	0.61	72.89	±	2.24	Yes
(BLUE DOME)	04/10/19	0.46	±	0.12	1.71	±	0.44	Yes	13.20	±	0.52	48.84	±	1.92	Yes
	04/17/19	0.23	±	0.11	0.85	±	0.39	No	11.30	±	0.50	41.81	±	1.84	Yes
	04/24/19	0.64	±	0.14	2.37	±	0.53	Yes	15.60	±	0.55	57.72	±	2.05	Yes
	05/01/19	1.16	±	0.16	4.29	±	0.60	Yes	21.60	±	0.60	79.92	±	2.21	Yes
	05/08/19	1.25	±	0.23	4.63	±	0.86	Yes	25.80	±	0.67	95.46	±	2.49	Yes
	05/15/19	1.44	±	0.18	5.33	±	0.67	Yes	28.70	±	0.67	106.19	±	2.47	Yes
	05/22/19	0.75	±	0.14	2.78	±	0.50	Yes	13.70	±	0.51	50.69	±	1.87	Yes
	05/29/19	0.88	±	0.14	3.26	±	0.53	Yes	16.60	±	0.54	61.42	±	1.98	Yes
	06/05/19	1.07	±	0.16	3.96	±	0.60	Yes	28.50	±	0.69	105.45	±	2.54	Yes
	06/12/19	0.91	±	0.15	3.35	±	0.57	Yes	17.30	±	0.56	64.01	±	2.06	Yes
	06/19/19	1.10	±	0.17	4.07	±	0.61	Yes	27.20	±	0.68	100.64	±	2.50	Yes
	06/26/19	0.90	±	0.15	3.33	±	0.56	Yes	20.60	±	0.59	76.22	±	2.18	Yes
FAA TOWER	04/03/19	0.80	±	0.15	2.95	±	0.54	Yes	21.70	±	0.61	80.29	±	2.25	Yes
	04/10/19	0.44	±	0.11	1.62	±	0.41	Yes	13.70	±	0.50	50.69	±	1.86	Yes
	04/17/19	0.67	±	0.13	2.46	±	0.49	Yes	11.70	±	0.49	43.29	±	1.82	Yes
	04/24/19	0.87	±	0.15	3.23	±	0.56	Yes	16.90	±	0.56	62.53	±	2.07	Yes
	05/01/19	1.29	±	0.17	4.77	±	0.63	Yes	23.40	±	0.62	86.58	±	2.29	Yes
	05/08/19	1.55	±	0.25	5.74	±	0.92	Yes	25.10	±	0.68	92.87	±	2.51	Yes
	05/15/19	1.57	±	0.20	5.81	±	0.73	Yes	29.10	±	0.71	107.67	±	2.62	Yes
	05/22/19	0.89	±	0.15	3.27	±	0.54	Yes	14.40	±	0.53	53.28	±	1.94	Yes
	05/29/19	1.10	±	0.16	4.07	±	0.58	Yes	16.30	±	0.55	60.31	±	2.03	Yes
	06/05/19	1.16	±	0.17	4.29	±	0.64	Yes	31.50	±	0.74	116.55	±	2.74	Yes
	06/12/19	0.84	±	0.15	3.10	±	0.56	Yes	19.60	±	0.58	72.52	±	2.16	Yes
	06/19/19	1.60	±	0.19	5.92	±	0.69	Yes	28.00	±	0.68	103.60	±	2.50	Yes
	06/26/19	0.83	±	0.14	3.09	±	0.54	Yes	20.01	±	0.58	74.03	±	2.16	Yes
HOWE	04/03/19	1.35	±	0.17	5.00	±	0.64	Yes	18.50	±	0.57	68.45	±	2.12	Yes
	04/10/19	0.85	±	0.14	3.13	±	0.51	Yes	12.40	±	0.50	45.88	±	1.85	Yes
	04/17/19	1.44	±	0.18	5.33	±	0.66	Yes	12.00	±	0.52	44.40	±	1.94	Yes
	04/24/19	1.66	±	0.19	6.14	±	0.72	Yes	16.30	±	0.57	60.31	±	2.11	Yes
	05/01/19	1.56	±	0.18	5.77	±	0.66	Yes	23.60	±	0.62	87.32	±	2.28	Yes
	05/08/19	1.54	±	0.24	5.70	±	0.88	Yes	23.60	±	0.64	87.32	±	2.37	Yes
	05/15/19	1.77	±	0.20	6.55	±	0.74	Yes	28.30	±	0.68	104.71	±	2.52	Yes
	05/22/19	1.45	±	0.17	5.37	±	0.64	Yes	13.40	±	0.51	49.58	±	1.88	Yes
	05/29/19	1.04	±	0.15	3.85	±	0.56	Yes	16.00	±	0.53	59.20	±	1.97	Yes
	06/05/19	1.50	±	0.18	5.55	±	0.67	Yes	29.80	±	0.69	110.26	±	2.57	Yes
	06/12/19	0.99	±	0.16	3.66	±	0.58	Yes	17.10	±	0.55	63.27	±	2.04	Yes
	06/19/19	1.47	±	0.18	5.44	±	0.67	Yes	24.30	±	0.64	89.91	±	2.36	Yes
	06/26/19	1.60	±	0.18	5.93	±	0.68	Yes	17.74	±	0.57	65.65	±	2.09	Yes
MONTEVIEW	04/03/19	1.42	±	0.18	5.25	±	0.65	Yes	21.20	±	0.61	78.44	±	2.25	Yes
	04/10/19	0.76	±	0.13	2.79	±	0.49	Yes	12.70	±	0.50	46.99	±	1.85	Yes
	04/17/19	0.79	±	0.14	2.90	±	0.52	Yes	12.20	±	0.51	45.14	±	1.87	Yes
	04/24/19	1.30	±	0.18	4.81	±	0.65	Yes	17.70	±	0.57	65.49	±	2.12	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
	05/01/19	1.66	±	0.19	6.14	±	0.69	Yes	24.40	±	0.64	90.28	±	2.35	Yes
	05/08/19	1.60	±	0.25	5.92	±	0.91	Yes	24.10	±	0.66	89.17	±	2.44	Yes
	05/15/19	1.53	±	0.19	5.66	±	0.69	Yes	29.80	±	0.69	110.26	±	2.55	Yes
	05/22/19	1.01	±	0.17	3.74	±	0.64	Yes	16.30	±	0.62	60.31	±	2.31	Yes
	05/29/19	1.14	±	0.17	4.22	±	0.63	Yes	17.20	±	0.59	63.64	±	2.19	Yes
	06/05/19	1.77	±	0.19	6.55	±	0.70	Yes	29.40	±	0.68	108.78	±	2.52	Yes
	06/12/19	1.12	±	0.16	4.14	±	0.60	Yes	18.20	±	0.56	67.34	±	2.08	Yes
	06/19/19	1.37	±	0.18	5.07	±	0.66	Yes	28.20	±	0.69	104.34	±	2.53	Yes
	06/26/19	1.58	±	0.18	5.84	±	0.66	Yes	20.36	±	0.58	75.33	±	2.15	Yes
MUD LAKE	04/03/19	1.13	±	0.16	4.18	±	0.61	Yes	22.10	±	0.62	81.77	±	2.28	Yes
	04/10/19	0.64	±	0.13	2.37	±	0.47	Yes	12.90	±	0.51	47.73	±	1.88	Yes
	04/17/19	0.64	±	0.13	2.36	±	0.48	Yes	12.10	±	0.50	44.77	±	1.83	Yes
	04/24/19	0.93	±	0.16	3.44	±	0.58	Yes	18.10	±	0.58	66.97	±	2.13	Yes
	05/01/19	1.14	±	0.16	4.22	±	0.61	Yes	23.30	±	0.63	86.21	±	2.32	Yes
	05/08/19	1.41	±	0.24	5.22	±	0.90	Yes	26.60	±	0.69	98.42	±	2.54	Yes
	05/15/19	1.48	±	0.19	5.48	±	0.69	Yes	30.30	±	0.70	112.11	±	2.58	Yes
	05/22/19	0.65	±	0.13	2.42	±	0.49	Yes	14.40	±	0.52	53.28	±	1.93	Yes
	05/29/19	0.63	±	0.13	2.32	±	0.48	Yes	15.80	±	0.53	58.46	±	1.97	Yes
	06/05/19	1.02	±	0.16	3.77	±	0.60	Yes	32.30	±	0.73	119.51	±	2.69	Yes
	06/12/19	0.89	±	0.15	3.30	±	0.55	Yes	18.80	±	0.56	69.56	±	2.07	Yes
	06/19/19	1.10	±	0.17	4.07	±	0.61	Yes	25.20	±	0.66	93.24	±	2.45	Yes
	06/26/19	1.11	±	0.16	4.11	±	0.58	Yes	19.13	±	0.57	70.79	±	2.11	Yes
DISTANT															
BLACKFOOT	04/03/19	0.67	±	0.14	2.49	±	0.50	Yes	20.80	±	0.58	76.96	±	2.15	Yes
	04/10/19	0.70	±	0.13	2.58	±	0.47	Yes	12.90	±	0.49	47.73	±	1.80	Yes
	04/17/19	0.67	±	0.13	2.47	±	0.49	Yes	10.60	±	0.48	39.22	±	1.78	Yes
	04/24/19	0.62	±	0.14	2.30	±	0.52	Yes	15.60	±	0.55	57.72	±	2.04	Yes
	05/01/19	1.37	±	0.18	5.07	±	0.65	Yes	23.30	±	0.63	86.21	±	2.33	Yes
	05/08/19	1.36	±	0.24	5.03	±	0.88	Yes	25.00	±	0.67	92.50	±	2.48	Yes
	05/15/19	1.76	±	0.20	6.51	±	0.73	Yes	29.60	±	0.69	109.52	±	2.53	Yes
	05/22/19	0.64	±	0.13	2.35	±	0.46	Yes	12.70	±	0.48	46.99	±	1.77	Yes
	05/29/19	0.72	±	0.13	2.65	±	0.49	Yes	15.50	±	0.52	57.35	±	1.92	Yes
	06/05/19	1.66	±	0.18	6.14	±	0.67	Yes	30.20	±	0.68	111.74	±	2.50	Yes
	06/12/19	0.82	±	0.14	3.03	±	0.52	Yes	15.60	±	0.51	57.72	±	1.90	Yes
	06/19/19	1.23	±	0.17	4.55	±	0.62	Yes	27.60	±	0.66	102.12	±	2.43	Yes
	06/26/19	1.03	±	0.15	3.81	±	0.56	Yes	19.60	±	0.56	72.52	±	2.07	Yes
CRATERS OF	04/03/19	0.84	±	0.15	3.11	±	0.55	Yes	19.60	±	0.59	72.52	±	2.18	Yes
THE MOON	04/10/19	0.37	±	0.11	1.35	±	0.41	Yes	11.60	±	0.50	42.92	±	1.85	Yes
	04/17/19	0.35	±	0.12	1.31	±	0.43	Yes	10.90	±	0.50	40.33	±	1.84	Yes
	04/24/19	0.91	±	0.16	3.36	±	0.60	Yes	18.00	±	0.60	66.60	±	2.22	Yes
	05/01/19	1.27	±	0.17	4.70	±	0.64	Yes	26.00	±	0.66	96.20	±	2.45	Yes
	05/08/19	1.46	±	0.25	5.40	±	0.93	Yes	25.70	±	0.70	95.09	±	2.58	Yes
	05/15/19	1.45	±	0.18	5.37	±	0.68	Yes	28.60	±	0.68	105.82	±	2.51	Yes
	05/22/19	0.52	±	0.12	1.94	±	0.46	Yes	13.80	±	0.52	51.06	±	1.92	Yes
	05/29/19	0.85	±	0.14	3.16	±	0.53	Yes	17.80	±	0.56	65.86	±	2.07	Yes
	06/05/19	1.12	±	0.17	4.14	±	0.61	Yes	30.50	±	0.71	112.85	±	2.62	Yes
	06/12/19	0.83	±	0.15	3.07	±	0.55	Yes	15.90	±	0.54	58.83	±	2.01	Yes
	06/19/19	1.37	±	0.18	5.07	±	0.67	Yes	30.00	±	0.71	111.00	±	2.64	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
	06/26/19	0.86	±	0.15	3.16	±	0.55	Yes	19.53	±	0.59	72.26	±	2.18	Yes
DUBOIS	04/03/19	0.74	±	0.14	2.73	±	0.53	Yes	22.10	±	0.61	81.77	±	2.25	Yes
	04/10/19	0.81	±	0.14	2.99	±	0.51	Yes	13.70	±	0.51	50.69	±	1.90	Yes
	04/17/19	0.65	±	0.13	2.41	±	0.50	Yes	11.20	±	0.50	41.44	±	1.84	Yes
	04/24/19	0.88	±	0.15	3.26	±	0.56	Yes	15.30	±	0.53	56.61	±	1.97	Yes
	05/01/19	1.43	±	0.17	5.29	±	0.64	Yes	22.10	±	0.60	81.77	±	2.23	Yes
	05/08/19	1.48	±	0.25	5.48	±	0.93	Yes	23.20	±	0.67	85.84	±	2.48	Yes
	05/15/19	1.58	±	0.19	5.85	±	0.70	Yes	28.00	±	0.68	103.60	±	2.50	Yes
	05/22/19	0.61	±	0.13	2.24	±	0.49	Yes	13.70	±	0.53	50.69	±	1.94	Yes
	05/29/19	1.05	±	0.15	3.89	±	0.57	Yes	17.10	±	0.55	63.27	±	2.04	Yes
	06/05/19	1.33	±	0.18	4.92	±	0.65	Yes	32.10	±	0.72	118.77	±	2.68	Yes
	06/12/19	1.01	±	0.16	3.74	±	0.59	Yes	17.80	±	0.56	65.86	±	2.09	Yes
	06/19/19	1.13	±	0.17	4.18	±	0.62	Yes	26.90	±	0.67	99.53	±	2.49	Yes
	06/26/19	1.48	±	0.17	5.48	±	0.64	Yes	19.13	±	0.56	70.79	±	2.09	Yes
IDAHO FALLS	04/03/19	2.07	±	0.21	7.66	±	0.77	Yes	23.40	±	0.65	86.58	±	2.40	Yes
	04/10/19	1.49	±	0.18	5.51	±	0.65	Yes	15.60	±	0.55	57.72	±	2.05	Yes
	04/17/19	1.78	±	0.19	6.59	±	0.70	Yes	10.90	±	0.49	40.33	±	1.82	Yes
	04/24/19	2.05	±	0.21	7.59	±	0.76	Yes	15.90	±	0.56	58.83	±	2.06	Yes
	05/01/19	2.33	±	0.22	8.62	±	0.80	Yes	23.40	±	0.64	86.58	±	2.37	Yes
	05/08/19	1.63	±	0.27	6.03	±	0.98	Yes	24.70	±	0.71	91.39	±	2.61	Yes
	05/15/19	2.58	±	0.24	9.55	±	0.87	Yes	30.10	±	0.72	111.37	±	2.66	Yes
	05/22/19	1.60	±	0.19	5.92	±	0.68	Yes	15.90	±	0.56	58.83	±	2.06	Yes
	05/29/19	2.05	±	0.20	7.59	±	0.75	Yes	17.40	±	0.57	64.38	±	2.10	Yes
	06/05/19	2.57	±	0.22	9.51	±	0.83	Yes	30.50	±	0.71	112.85	±	2.61	Yes
	06/12/19	2.22	±	0.22	8.21	±	0.81	Yes	19.80	±	0.61	73.26	±	2.27	Yes
	06/19/19	2.44	±	0.23	9.03	±	0.83	Yes	29.00	±	0.70	107.30	±	2.60	Yes
	06/26/19	2.43	±	0.22	8.99	±	0.81	Yes	21.66	±	0.62	80.14	±	2.28	Yes
JACKSON	04/03/19	1.24	±	0.17	4.59	±	0.64	Yes	25.00	±	0.66	92.50	±	2.43	Yes
	04/10/19	0.48	±	0.13	1.79	±	0.47	Yes	16.40	±	0.59	60.68	±	2.18	Yes
	04/17/19	0.19	±	0.10	0.69	±	0.36	No	9.32	±	0.46	34.48	±	1.69	Yes
	04/24/19	0.83	±	0.15	3.05	±	0.56	Yes	17.30	±	0.57	64.01	±	2.11	Yes
	05/01/19	1.15	±	0.17	4.26	±	0.62	Yes	21.90	±	0.63	81.03	±	2.31	Yes
	05/08/19	1.87	±	0.27	6.92	±	0.99	Yes	24.50	±	0.69	90.65	±	2.55	Yes
	05/15/19	1.41	±	0.18	5.22	±	0.67	Yes	26.20	±	0.66	96.94	±	2.43	Yes
	05/22/19	0.81	±	0.15	2.98	±	0.55	Yes	14.10	±	0.55	52.17	±	2.02	Yes
	05/29/19	0.73	±	0.14	2.69	±	0.50	Yes	13.30	±	0.51	49.21	±	1.89	Yes
	06/05/19	1.36	±	0.18	5.03	±	0.67	Yes	30.20	±	0.72	111.74	±	2.66	Yes
	06/12/19	0.80	±	0.15	2.94	±	0.56	Yes	18.30	±	0.58	67.71	±	2.14	Yes
	06/19/19	1.53	±	0.19	5.66	±	0.71	Yes	27.40	±	0.70	101.38	±	2.59	Yes
	06/26/19	0.96	±	0.16	3.54	±	0.58	Yes	19.53	±	0.60	72.25	±	2.23	Yes
SUGAR CITY	04/03/19	1.20	±	0.15	4.44	±	0.57	Yes	24.40	±	0.59	90.28	±	2.18	Yes
	04/10/19	0.87	±	0.14	3.21	±	0.53	Yes	15.60	±	0.54	57.72	±	2.01	Yes
	04/17/19	0.53	±	0.12	1.94	±	0.45	Yes	10.90	±	0.48	40.33	±	1.76	Yes
	04/24/19	1.20	±	0.17	4.44	±	0.63	Yes	18.00	±	0.58	66.60	±	2.15	Yes
	05/01/19	1.22	±	0.15	4.51	±	0.57	Yes	21.20	±	0.56	78.44	±	2.06	Yes
	05/08/19	1.73	±	0.26	6.40	±	0.97	Yes	27.90	±	0.71	103.23	±	2.64	Yes
	05/15/19	2.11	±	0.20	7.81	±	0.74	Yes	30.60	±	0.66	113.22	±	2.44	Yes
	05/22/19	1.10	±	0.17	4.07	±	0.61	Yes	15.20	±	0.56	56.24	±	2.09	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
	05/29/19	0.83	±	0.13	3.06	±	0.48	Yes	15.90	±	0.49	58.83	±	1.82	Yes
	06/05/19	1.63	±	0.17	6.03	±	0.64	Yes	29.00	±	0.63	107.30	±	2.33	Yes
	06/12/19	1.13	±	0.17	4.18	±	0.61	Yes	21.20	±	0.60	78.44	±	2.23	Yes
	06/19/19	1.87	±	0.20	6.92	±	0.74	Yes	29.50	±	0.70	109.15	±	2.57	Yes
	06/26/19	1.37	±	0.18	5.08	±	0.67	Yes	23.05	±	0.65	85.29	±	2.41	Yes
INL SITE															
EFS	04/03/19	0.86	±	0.15	3.19	±	0.54	Yes	20.20	±	0.58	74.74	±	2.16	Yes
	04/10/19	0.41	±	0.11	1.52	±	0.41	Yes	13.10	±	0.50	48.47	±	1.84	Yes
	04/17/19	0.26	±	0.11	0.95	±	0.39	No	9.42	±	0.47	34.85	±	1.73	Yes
	04/24/19	0.67	±	0.15	2.49	±	0.54	Yes	17.90	±	0.59	66.23	±	2.19	Yes
	05/01/19	1.12	±	0.17	4.14	±	0.61	Yes	22.60	±	0.62	83.62	±	2.31	Yes
	05/08/19	2.14	±	0.29	7.92	±	1.07	Yes	27.40	±	0.74	101.38	±	2.73	Yes
	05/15/19	1.49	±	0.20	5.51	±	0.73	Yes	27.80	±	0.71	102.86	±	2.64	Yes
	05/22/19	0.90	±	0.16	3.32	±	0.58	Yes	13.10	±	0.55	48.47	±	2.03	Yes
	05/29/19	1.09	±	0.16	4.03	±	0.58	Yes	15.80	±	0.55	58.46	±	2.02	Yes
	06/05/19	1.32	±	0.18	4.88	±	0.65	Yes	30.10	±	0.70	111.37	±	2.60	Yes
	06/12/19	0.66	±	0.14	2.43	±	0.51	Yes	14.20	±	0.51	52.54	±	1.90	Yes
	06/19/19	1.30	±	0.17	4.81	±	0.63	Yes	26.60	±	0.66	98.42	±	2.42	Yes
	06/26/19	0.89	±	0.14	3.31	±	0.53	Yes	16.83	±	0.54	62.28	±	1.99	Yes
MAIN GATE	04/03/19	1.10	±	0.16	4.07	±	0.60	Yes	23.20	±	0.62	85.84	±	2.30	Yes
	04/10/19	0.60	±	0.13	2.23	±	0.46	Yes	13.00	±	0.51	48.10	±	1.88	Yes
	04/17/19	0.45	±	0.12	1.67	±	0.44	Yes	9.68	±	0.47	35.82	±	1.72	Yes
	04/24/19	0.71	±	0.14	2.62	±	0.53	Yes	16.00	±	0.55	59.20	±	2.02	Yes
	05/01/19	1.06	±	0.16	3.92	±	0.58	Yes	23.40	±	0.61	86.58	±	2.27	Yes
	05/08/19	0.90	±	0.22	3.34	±	0.81	Yes	24.40	±	0.67	90.28	±	2.46	Yes
	05/15/19	1.27	±	0.17	4.70	±	0.64	Yes	28.50	±	0.67	105.45	±	2.46	Yes
	05/22/19	0.49	±	0.12	1.81	±	0.45	Yes	14.20	±	0.52	52.54	±	1.91	Yes
	05/29/19	0.74	±	0.13	2.73	±	0.49	Yes	16.90	±	0.53	62.53	±	1.97	Yes
	06/05/19	1.25	±	0.18	4.63	±	0.67	Yes	32.80	±	0.77	121.36	±	2.84	Yes
	06/12/19	0.86	±	0.15	3.19	±	0.55	Yes	18.10	±	0.55	66.97	±	2.05	Yes
	06/19/19	1.25	±	0.17	4.63	±	0.64	Yes	29.10	±	0.69	107.67	±	2.56	Yes
	06/26/19	0.90	±	0.15	3.32	±	0.54	Yes	19.78	±	0.57	73.19	±	2.11	Yes
VAN BUREN GATE	04/03/19	1.14	±	0.17	4.22	±	0.62	Yes	24.10	±	0.65	89.17	±	2.39	Yes
	04/10/19	0.59	±	0.13	2.17	±	0.46	Yes	15.00	±	0.53	55.50	±	1.97	Yes
	04/17/19	0.73	±	0.14	2.70	±	0.52	Yes	13.30	±	0.53	49.21	±	1.95	Yes
	04/24/19	0.79	±	0.15	2.92	±	0.57	Yes	18.30	±	0.59	67.71	±	2.18	Yes
	05/01/19	1.69	±	0.19	6.25	±	0.70	Yes	27.30	±	0.67	101.01	±	2.48	Yes
	05/08/19	1.70	±	0.26	6.29	±	0.97	Yes	29.40	±	0.73	108.78	±	2.71	Yes
	05/15/19	1.66	±	0.20	6.14	±	0.74	Yes	33.10	±	0.74	122.47	±	2.75	Yes
	05/22/19	0.91	±	0.15	3.37	±	0.54	Yes	14.30	±	0.52	52.91	±	1.91	Yes
	05/29/19	0.74	±	0.14	2.73	±	0.50	Yes	18.60	±	0.57	68.82	±	2.09	Yes
	06/05/19	1.74	±	0.19	6.44	±	0.72	Yes	32.70	±	0.73	120.99	±	2.69	Yes
	06/12/19	0.96	±	0.15	3.55	±	0.57	Yes	18.70	±	0.57	69.19	±	2.09	Yes
	06/19/19	1.35	±	0.18	5.00	±	0.65	Yes	29.10	±	0.69	107.67	±	2.55	Yes
	06/26/19	1.17	±	0.16	4.35	±	0.60	Yes	22.56	±	0.61	83.47	±	2.25	Yes

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	04/03/19	0.54	±	0.90	1.99	±	3.32	No
	04/10/19	1.03	±	1.64	3.81	±	6.07	No
	04/17/19	-0.06	±	0.82	-0.20	±	3.05	No
	04/24/19	3.13	±	1.16	11.58	±	4.29	No
	05/01/19	0.91	±	0.83	3.35	±	3.06	No
	05/08/19	0.43	±	0.90	1.58	±	3.34	No
	05/15/19	1.04	±	0.91	3.85	±	3.37	No
	05/22/19	2.62	±	1.51	9.69	±	5.59	No
	05/29/19	-1.32	±	1.52	-4.88	±	5.62	No
	06/05/19	1.39	±	0.98	5.14	±	3.61	No
	06/12/19	0.52	±	0.81	1.92	±	3.00	No
	06/19/19	-0.19	±	0.82	-0.71	±	3.02	No
	06/26/19	0.57	±	0.85	2.11	±	3.14	No
ATOMIC CITY	04/03/19	0.51	±	0.85	1.89	±	3.14	No
	04/10/19	0.96	±	1.53	3.57	±	5.66	No
	04/17/19	-0.05	±	0.81	-0.20	±	2.99	No
	04/24/19	3.04	±	1.13	11.25	±	4.18	No
	05/01/19	0.91	±	0.83	3.36	±	3.07	No
	05/08/19	0.39	±	0.82	1.44	±	3.04	No
	05/15/19	0.99	±	0.87	3.66	±	3.22	No
	05/22/19	2.52	±	1.45	9.32	±	5.37	No
	05/29/19	-1.32	±	1.52	-4.88	±	5.62	No
	06/05/19	1.31	±	0.92	4.85	±	3.40	No
	06/12/19	0.52	±	0.80	1.91	±	2.97	No
	06/19/19	-0.19	±	0.80	-0.70	±	2.96	No
	06/26/19	0.59	±	0.88	2.17	±	3.24	No
QA-1	04/03/19	0.50	±	0.84	1.86	±	3.09	No
(ATOMIC CITY)	04/10/19	0.99	±	1.58	3.67	±	5.85	No
	04/17/19	-0.05	±	0.77	-0.19	±	2.83	No
	04/24/19	2.91	±	1.08	10.77	±	4.00	No
	05/01/19	0.88	±	0.81	3.26	±	2.98	No
	05/08/19	0.40	±	0.86	1.49	±	3.16	No
	05/15/19	0.98	±	0.86	3.61	±	3.18	No
	05/22/19	2.46	±	1.42	9.10	±	5.25	No
	05/29/19	-1.27	±	1.47	-4.70	±	5.44	No
	06/05/19	1.29	±	0.91	4.77	±	3.35	No
	06/12/19	0.49	±	0.76	1.81	±	2.82	No
	06/19/19	-0.18	±	0.77	-0.67	±	2.86	No
	06/26/19	0.55	±	0.82	2.03	±	3.02	No
BLUE DOME	04/03/19	-0.35	±	0.83	-1.28	±	3.06	No
	04/10/19	0.39	±	0.86	1.46	±	3.19	No
	04/17/19	-0.80	±	1.42	-2.96	±	5.25	No
	04/24/19	-0.13	±	0.85	-0.50	±	3.13	No
	05/01/19	0.61	±	1.22	2.24	±	4.51	No
	05/08/19	0.21	±	1.12	0.76	±	4.14	No
	05/15/19	-0.01	±	1.51	-0.02	±	5.59	No
	05/22/19	-0.07	±	0.81	-0.28	±	2.99	No
	05/29/19	-1.19	±	0.84	-4.40	±	3.09	No
	06/05/19	0.03	±	0.82	0.13	±	3.03	No
	06/12/19	1.58	±	1.46	5.85	±	5.40	No
	06/19/19	0.48	±	2.03	1.77	±	7.51	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
	06/26/19	0.76	±	0.82	2.82	±	3.02	No
QA-2	04/03/19	-0.35	±	0.83	-1.28	±	3.06	No
(BLUE DOME)	04/10/19	0.38	±	0.84	1.42	±	3.11	No
	04/17/19	-0.81	±	1.44	-2.99	±	5.33	No
	04/24/19	-0.13	±	0.84	-0.49	±	3.09	No
	05/01/19	0.66	±	1.32	2.43	±	4.88	No
	05/08/19	0.14	±	0.75	0.51	±	2.77	No
	05/15/19	-0.01	±	1.35	-0.02	±	5.00	No
	05/22/19	-0.07	±	0.77	-0.26	±	2.83	No
	05/29/19	-1.13	±	0.79	-4.18	±	2.93	No
	06/05/19	0.03	±	0.81	0.12	±	2.98	No
	06/12/19	1.56	±	1.44	5.77	±	5.33	No
	06/19/19	0.35	±	1.48	1.30	±	5.48	No
	06/26/19	0.76	±	0.82	2.83	±	3.03	No
FAA TOWER	04/03/19	-0.33	±	0.79	-1.22	±	2.91	No
	04/10/19	0.36	±	0.79	1.33	±	2.90	No
	04/17/19	-0.78	±	1.38	-2.88	±	5.11	No
	04/24/19	-0.13	±	0.81	-0.48	±	3.00	No
	05/01/19	0.66	±	1.33	2.45	±	4.92	No
	05/08/19	0.14	±	0.77	0.52	±	2.84	No
	05/15/19	-0.01	±	1.48	-0.02	±	5.48	No
	05/22/19	-0.07	±	0.79	-0.27	±	2.92	No
	05/29/19	-1.18	±	0.83	-4.37	±	3.07	No
	06/05/19	0.04	±	0.85	0.13	±	3.16	No
	06/12/19	1.56	±	1.44	5.77	±	5.33	No
	06/19/19	0.34	±	1.45	1.27	±	5.37	No
	06/26/19	0.76	±	0.82	2.82	±	3.02	No
HOWE	04/03/19	-0.33	±	0.78	-1.21	±	2.90	No
	04/10/19	0.37	±	0.82	1.38	±	3.03	No
	04/17/19	-0.84	±	1.49	-3.10	±	5.51	No
	04/24/19	-0.14	±	0.85	-0.50	±	3.14	No
	05/01/19	0.65	±	1.31	2.41	±	4.85	No
	05/08/19	0.13	±	0.73	0.49	±	2.69	No
	05/15/19	-0.01	±	1.41	-0.02	±	5.22	No
	05/22/19	-0.07	±	0.78	-0.26	±	2.87	No
	05/29/19	-1.14	±	0.80	-4.22	±	2.95	No
	06/05/19	0.03	±	0.79	0.12	±	2.94	No
	06/12/19	1.54	±	1.43	5.70	±	5.29	No
	06/19/19	0.34	±	1.45	1.27	±	5.37	No
	06/26/19	0.77	±	0.83	2.86	±	3.07	No
MONTEVIEW	04/03/19	-0.33	±	0.79	-1.22	±	2.93	No
	04/10/19	0.37	±	0.81	1.37	±	3.00	No
	04/17/19	-0.79	±	1.41	-2.93	±	5.22	No
	04/24/19	-0.13	±	0.82	-0.48	±	3.03	No
	05/01/19	0.67	±	1.35	2.48	±	5.00	No
	05/08/19	0.14	±	0.75	0.51	±	2.78	No
	05/15/19	-0.01	±	1.39	-0.02	±	5.14	No
	05/22/19	-0.09	±	0.96	-0.33	±	3.56	No
	05/29/19	-1.30	±	0.91	-4.81	±	3.37	No
	06/05/19	0.03	±	0.77	0.12	±	2.86	No
	06/12/19	1.54	±	1.42	5.70	±	5.25	No
	06/19/19	0.35	±	1.48	1.29	±	5.48	No
	06/26/19	0.75	±	0.80	2.76	±	2.96	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
MUD LAKE	04/03/19	-0.33	±	0.79	-1.22	±	2.93	No
	04/10/19	0.38	±	0.82	1.39	±	3.04	No
	04/17/19	-0.77	±	1.37	-2.85	±	5.07	No
	04/24/19	-0.13	±	0.81	-0.48	±	3.01	No
	05/01/19	0.68	±	1.36	2.50	±	5.03	No
	05/08/19	0.14	±	0.76	0.51	±	2.80	No
	05/15/19	-0.01	±	1.40	-0.02	±	5.18	No
	05/22/19	-0.07	±	0.78	-0.27	±	2.90	No
	05/29/19	-1.16	±	0.81	-4.29	±	3.00	No
	06/05/19	0.03	±	0.81	0.13	±	3.01	No
	06/12/19	1.50	±	1.38	5.55	±	5.11	No
	06/19/19	0.36	±	1.50	1.31	±	5.55	No
	06/26/19	0.75	±	0.81	2.79	±	2.99	No
DISTANT								
BLACKFOOT	04/03/19	0.50	±	0.83	1.85	±	3.07	No
	04/10/19	0.91	±	1.45	3.37	±	5.37	No
	04/17/19	-0.05	±	0.79	-0.20	±	2.94	No
	04/24/19	3.00	±	1.11	11.10	±	4.11	No
	05/01/19	0.90	±	0.82	3.32	±	3.03	No
	05/08/19	0.40	±	0.85	1.49	±	3.15	No
	05/15/19	0.97	±	0.85	3.59	±	3.16	No
	05/22/19	2.45	±	1.41	9.07	±	5.22	No
	05/29/19	-1.26	±	1.46	-4.66	±	5.40	No
	06/05/19	1.28	±	0.90	4.74	±	3.33	No
	06/12/19	0.49	±	0.76	1.81	±	2.82	No
	06/19/19	-0.18	±	0.78	-0.68	±	2.88	No
	06/26/19	0.55	±	0.81	2.02	±	3.01	No
CRATERS OF THE MOON	04/03/19	0.53	±	0.88	1.95	±	3.24	No
	04/10/19	1.00	±	1.60	3.70	±	5.92	No
	04/17/19	-0.06	±	0.83	-0.21	±	3.06	No
	04/24/19	3.15	±	1.17	11.66	±	4.33	No
	05/01/19	0.91	±	0.83	3.36	±	3.06	No
	05/08/19	0.42	±	0.90	1.57	±	3.32	No
	05/15/19	0.98	±	0.86	3.61	±	3.19	No
	05/22/19	2.64	±	1.52	9.77	±	5.62	No
	05/29/19	-1.31	±	1.51	-4.85	±	5.59	No
	06/05/19	1.39	±	0.97	5.14	±	3.59	No
	06/12/19	0.53	±	0.82	1.95	±	3.05	No
	06/19/19	-0.20	±	0.84	-0.73	±	3.11	No
	06/26/19	0.60	±	0.89	2.21	±	3.30	No
DUBOIS	04/03/19	-0.33	±	0.78	-1.21	±	2.89	No
	04/10/19	0.37	±	0.81	1.37	±	2.99	No
	04/17/19	-0.81	±	1.44	-3.00	±	5.33	No
	04/24/19	-0.13	±	0.79	-0.47	±	2.94	No
	05/01/19	0.66	±	1.32	2.43	±	4.88	No
	05/08/19	0.14	±	0.79	0.53	±	2.91	No
	05/15/19	-0.01	±	1.40	-0.02	±	5.18	No
	05/22/19	-0.07	±	0.81	-0.28	±	3.00	No
	05/29/19	-1.16	±	0.81	-4.29	±	3.00	No
	06/05/19	0.03	±	0.81	0.12	±	2.99	No
	06/12/19	1.57	±	1.45	5.81	±	5.37	No
	06/19/19	0.35	±	1.48	1.30	±	5.48	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
	06/26/19	0.74	±	0.79	2.73	±	2.93	No
IDAHO FALLS	04/03/19	-0.35	±	0.83	-1.28	±	3.05	No
	04/10/19	0.38	±	0.84	1.42	±	3.11	No
	04/17/19	-0.80	±	1.42	-2.95	±	5.25	No
	04/24/19	-0.13	±	0.83	-0.49	±	3.06	No
	05/01/19	0.69	±	1.39	2.56	±	5.14	No
	05/08/19	0.15	±	0.82	0.56	±	3.05	No
	05/15/19	-0.01	±	1.48	-0.02	±	5.48	No
	05/22/19	-0.07	±	0.81	-0.28	±	3.01	No
	05/29/19	-1.19	±	0.84	-4.40	±	3.09	No
	06/05/19	0.03	±	0.80	0.12	±	2.95	No
	06/12/19	1.67	±	1.54	6.18	±	5.70	No
	06/19/19	0.36	±	1.51	1.32	±	5.59	No
	06/26/19	0.79	±	0.84	2.90	±	3.11	No
JACKSON	04/03/19	0.54	±	0.90	1.99	±	3.31	No
	04/10/19	1.08	±	1.71	4.00	±	6.33	No
	04/17/19	-0.05	±	0.78	-0.19	±	2.90	No
	04/24/19	2.97	±	1.10	10.99	±	4.07	No
	05/01/19	0.93	±	0.85	3.42	±	3.13	No
	05/08/19	0.43	±	0.90	1.57	±	3.33	No
	05/15/19	0.99	±	0.87	3.66	±	3.22	No
	05/22/19	2.82	±	1.62	10.43	±	5.99	No
	05/29/19	-1.34	±	1.55	-4.96	±	5.74	No
	06/05/19	1.43	±	1.00	5.29	±	3.70	No
	06/12/19	0.54	±	0.84	1.99	±	3.10	No
	06/19/19	-0.21	±	0.87	-0.76	±	3.22	No
	06/26/19	0.62	±	0.92	2.29	±	3.40	No
SUGAR CITY	04/03/19	-0.29	±	0.69	-1.06	±	2.54	No
	04/10/19	0.37	±	0.82	1.38	±	3.03	No
	04/17/19	-0.77	±	1.37	-2.85	±	5.07	No
	04/24/19	-0.13	±	0.83	-0.48	±	3.05	No
	05/01/19	0.59	±	1.18	2.18	±	4.37	No
	05/08/19	0.14	±	0.78	0.53	±	2.89	No
	05/15/19	-0.01	±	1.25	-0.02	±	4.63	No
	05/22/19	-0.08	±	0.86	-0.29	±	3.17	No
	05/29/19	-1.02	±	0.71	-3.77	±	2.63	No
	06/05/19	0.03	±	0.68	0.10	±	2.52	No
	06/12/19	1.57	±	1.45	5.81	±	5.37	No
	06/19/19	0.35	±	1.46	1.28	±	5.40	No
	06/26/19	0.83	±	0.89	3.07	±	3.29	No
INL SITE								
EFS	04/03/19	0.51	±	0.85	1.89	±	3.13	No
	04/10/19	0.94	±	1.49	3.46	±	5.51	No
	04/17/19	-0.05	±	0.81	-0.20	±	2.99	No
	04/24/19	3.08	±	1.14	11.40	±	4.22	No
	05/01/19	0.91	±	0.83	3.35	±	3.06	No
	05/08/19	0.45	±	0.94	1.65	±	3.49	No
	05/15/19	1.09	±	0.96	4.03	±	3.54	No
	05/22/19	2.95	±	1.70	10.92	±	6.29	No
	05/29/19	-1.35	±	1.55	-5.00	±	5.74	No
	06/05/19	1.38	±	0.97	5.11	±	3.58	No
	06/12/19	0.52	±	0.81	1.91	±	2.99	No
	06/19/19	-0.19	±	0.79	-0.69	±	2.93	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
	06/26/19	0.56	±	0.84	2.08	±	3.10	No
MAIN GATE	04/03/19	0.52	±	0.86	1.92	±	3.19	No
	04/10/19	0.97	±	1.54	3.59	±	5.70	No
	04/17/19	-0.05	±	0.79	-0.20	±	2.92	No
	04/24/19	2.91	±	1.08	10.77	±	4.00	No
	05/01/19	0.86	±	0.79	3.19	±	2.91	No
	05/08/19	0.41	±	0.86	1.50	±	3.18	No
	05/15/19	0.95	±	0.84	3.53	±	3.10	No
	05/22/19	2.58	±	1.49	9.55	±	5.51	No
	05/29/19	-1.25	±	1.44	-4.63	±	5.33	No
	06/05/19	1.51	±	1.06	5.59	±	3.92	No
	06/12/19	0.51	±	0.79	1.87	±	2.92	No
	06/19/19	-0.19	±	0.82	-0.71	±	3.03	No
	06/26/19	0.56	±	0.84	2.08	±	3.10	No
VAN BUREN GATE	04/03/19	0.54	±	0.89	1.99	±	3.31	No
	04/10/19	0.97	±	1.54	3.58	±	5.70	No
	04/17/19	-0.05	±	0.81	-0.20	±	3.01	No
	04/24/19	3.04	±	1.13	11.25	±	4.18	No
	05/01/19	0.90	±	0.82	3.32	±	3.03	No
	05/08/19	0.42	±	0.89	1.56	±	3.30	No
	05/15/19	1.03	±	0.91	3.81	±	3.37	No
	05/22/19	2.57	±	1.48	9.51	±	5.48	No
	05/29/19	-1.29	±	1.49	-4.77	±	5.51	No
	06/05/19	1.38	±	0.96	5.11	±	3.57	No
	06/12/19	0.51	±	0.80	1.89	±	2.95	No
	06/19/19	-0.19	±	0.81	-0.71	±	3.00	No
	06/26/19	0.58	±	0.86	2.13	±	3.17	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	06/30/19	CESIUM-137	-124	±	103	-458.80	±	381.10	No
	06/30/19	STRONTIUM-90	8.98	±	10.50	33.23	±	38.85	No
ATOMIC CITY	06/30/19	AMERICIUM-241	1.88	±	1.92	6.96	±	7.10	No
	06/30/19	CESIUM-137	59.30	±	81.20	219.41	±	300.44	No
	06/30/19	PLUTONIUM-238	0.96	±	2.26	3.55	±	8.36	No
	06/30/19	PLUTONIUM-239/240	1.60	±	2.16	5.92	±	7.99	No
QA-1 (ATOMIC CITY)	06/30/19	AMERICIUM-241	-2.55	±	2.09	-9.44	±	7.73	No
	06/30/19	CESIUM-137	20.10	±	76.80	74.37	±	284.16	No
	06/30/19	PLUTONIUM-238	-3.34	±	2.03	-12.36	±	7.51	No
	06/30/19	PLUTONIUM-239/240	3.61	±	1.67	13.36	±	6.18	No
BLUE DOME	06/30/19	CESIUM-137	57.80	±	102.00	213.86	±	377.40	No
	06/30/19	STRONTIUM-90	-23.00	±	9.61	-85.10	±	35.56	No
(QA-2) BLUE DOME	06/30/19	CESIUM-137	41.60	±	98.30	153.92	±	363.71	No
	06/30/19	STRONTIUM-90	35.00	±	11.90	129.50	±	44.03	No
FAA TOWER	06/30/19	AMERICIUM-241	2.27	±	1.77	8.40	±	6.55	No
	06/30/19	CESIUM-137	-13.10	±	78.90	-48.47	±	291.93	No
	06/30/19	PLUTONIUM-238	-0.28	±	1.78	-1.04	±	6.59	No
	06/30/19	PLUTONIUM-239/240	-3.09	±	1.82	-11.43	±	6.73	No
HOWE	06/30/19	CESIUM-137	-105.00	±	101.00	-388.50	±	373.70	No
MONTEVIEW	06/30/19	CESIUM-137	-16.30	±	107.00	-60.31	±	395.90	No
	06/30/19	STRONTIUM-90	-20.40	±	9.60	-75.48	±	35.52	No
MUD LAKE	06/30/19	CESIUM-137	-28.00	±	79.90	-103.60	±	295.63	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
DISTANT									
BLACKFOOT	06/30/19	CESIUM-137	104.00	±	99.30	384.80	±	367.41	No
CRATERS OF THE MOON	06/30/19	AMERICIUM-241	1.76	±	2.02	6.51	±	7.47	No
	06/30/19	CESIUM-137	-81.80	±	106.00	-302.66	±	392.20	No
	06/30/19	PLUTONIUM-238	-6.60	±	3.37	-24.42	±	12.47	No
	06/30/19	PLUTONIUM-239/240	2.77	±	2.27	10.25	±	8.40	No
DUBOIS	06/30/19	CESIUM-137	-152.00	±	105.00	-562.40	±	388.50	No
IDAHO FALLS	06/30/19	CESIUM-137	180.00	±	109.00	666.00	±	403.30	No
JACKSON WY	06/30/19	AMERICIUM-241	-3.92	±	3.02	-14.50	±	11.17	No
	06/30/19	CESIUM-137	101.00	±	106.00	373.70	±	392.20	No
	06/30/19	PLUTONIUM-238	-2.68	±	2.35	-9.92	±	8.70	No
	06/30/19	PLUTONIUM-239/240	-6.24	±	2.56	-23.09	±	9.47	No
SUGAR CITY	06/30/19	CESIUM-137	36.30	±	81.00	134.31	±	299.70	No
	06/30/19	STRONTIUM-90	10.60	±	10.20	39.22	±	37.74	No
INL SITE									
EFS	06/30/19	CESIUM-137	122.00	±	108.00	451.40	±	399.60	No
	06/30/19	STRONTIUM-90	-5.52	±	10.00	-20.42	±	37.00	No
MAIN GATE	06/30/19	CESIUM-137	94.90	±	106.00	351.13	±	392.20	No
	06/30/19	STRONTIUM-90	-10.40	±	10.20	-38.48	±	37.74	No
VAN BUREN GATE	06/30/19	AMERICIUM-241	1.03	±	1.48	3.81	±	5.48	No
	06/30/19	CESIUM-137	217.00	±	115	802.90	±	425.50	No
	06/30/19	PLUTONIUM-238	1.10	±	2.88	4.07	±	10.66	No
	06/30/19	PLUTONIUM-239/240	4.01	±	3.05	14.84	±	11.29	No

Table C-4. Tritium Concentrations in Atmospheric Moisture

Sampling Group and Location	Start Date	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-13}$ µCi/mL$_{air}$)			Result ± 1s Uncertainty ($\times 10^{-9}$ Bq/mL$_{air}$)			Result > 3s
BOUNDARY									
ATOMIC CITY	03/27/19	04/24/19	4.66	±	1.43	17.24	±	5.29	**Yes**
ATOMIC CITY	04/24/19	05/29/19	4.31	±	1.23	15.95	±	4.55	**Yes**
ATOMIC CITY	05/29/19	06/19/19	3.4	±	1.71	12.58	±	6.33	No
HOWE	02/27/19	04/03/19	2.93	±	0.98	10.84	±	3.62	No
HOWE	03/04/19	05/01/19	2.52	±	1.26	9.32	±	4.66	No
HOWE	05/01/19	05/22/19	4.79	±	1.54	17.72	±	5.70	**Yes**
HOWE	05/22/19	06/12/19	10.50	±	1.78	38.85	±	6.59	**Yes**
DISTANT									
IDAHO FALLS	03/13/19	04/10/19	-0.29	±	1.26	-1.08	±	4.66	No
IDAHO FALLS	04/10/19	05/01/19	5.28	±	1.27	19.54	±	4.70	**Yes**
IDAHO FALLS	05/01/19	05/22/19	4.56	±	1.46	16.87	±	5.40	**Yes**
IDAHO FALLS	05/22/19	06/12/19	6.03	±	1.46	22.31	±	5.40	**Yes**
IDAHO FALLS	06/12/19	06/26/19	7.13	±	1.96	26.38	±	7.25	**Yes**
INL SITE									
EFS	03/13/19	04/10/19	5.84	±	1.05	21.61	±	3.89	**Yes**
EFS	04/10/19	05/01/19	5.02	±	1.12	18.57	±	4.14	**Yes**
EFS	05/01/19	05/22/19	7.61	±	1.28	28.16	±	4.74	**Yes**
EFS	05/22/19	06/05/19	9.07	±	1.73	33.56	±	6.40	**Yes**
EFS	06/05/19	06/19/19	8.90	±	1.67	32.93	±	6.18	**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	03/27/19	04/03/19	61.7	±	24.3	2.28	±	0.90	No
ATOMIC CITY	04/03/19	04/10/19	42.5	±	24.6	1.57	±	0.91	No
ATOMIC CITY	04/10/19	04/17/19	118	±	25.6	4.37	±	0.95	**Yes**
ATOMIC CITY	05/01/19	05/08/19	47.4	±	24.3	1.75	±	0.90	No
ATOMIC CITY	05/15/19	05/22/19	18.1	±	23.9	0.67	±	0.88	No
ATOMIC CITY	05/22/19	05/29/19	10.8	±	24.6	0.40	±	0.91	No
ATOMIC CITY	06/12/19	06/19/19	75.1	±	23.8	2.78	±	0.88	**Yes**
HOWE	03/27/19	04/03/19	98.9	±	25.0	3.66	±	0.93	**Yes**
HOWE	04/03/19	04/10/19	53.0	±	24.4	1.96	±	0.90	No
HOWE	04/10/19	04/17/19	26.3	±	24.1	0.97	±	0.89	No
HOWE	05/01/19	05/08/19	42.0	±	23.9	1.55	±	0.88	No
HOWE	05/15/19	05/22/19	48.2	±	23.9	1.78	±	0.88	No
HOWE	05/22/19	05/29/19	42.4	±	24.2	1.57	±	0.90	No
HOWE	06/12/19	06/29/19	72.5	±	23.8	2.68	±	0.88	**Yes**
DISTANT									
IDAHO FALLS	03/31/19	04/30/19	62.6	±	25.3	2.32	±	0.94	No
IDAHO FALLS	04/30/19	05/31/19	52.0	±	24.0	1.92	±	0.89	No
IDAHO FALLS	05/31/19	06/30/19	73.7	±	23.6	2.73	±	0.87	**Yes**
INL SITE									
EFS	03/27/19	04/03/19	78.9	±	24.7	2.92	±	0.91	**Yes**
EFS	04/03/19	04/10/19	51.1	±	24.4	1.89	±	0.90	No
EFS	04/10/19	04/17/19	77.0	±	24.7	2.85	±	0.91	**Yes**
EFS	05/01/19	05/08/19	39.3	±	24.0	1.45	±	0.89	No
EFS	05/15/19	05/22/19	66.6	±	24.3	2.46	±	0.90	No
EFS	05/22/19	05/29/19	71.8	±	24.4	2.66	±	0.90	No
EFS	05/29/19	06/05/19	116	±	24.2	4.29	±	0.90	**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	5/20/2019	GROSS ALPHA	0.90	±	0.47	0.03	±	0.02	No
		GROSS BETA	7.89	±	0.50	0.29	±	0.02	**Yes**
		TRITIUM	10.60	±	22.90	0.39	±	0.85	No
Bill Jones, Jr. Trout Farm	5/20/2019	GROSS ALPHA	0.69	±	0.31	0.03	±	0.01	No
		GROSS BETA	3.16	±	0.40	0.12	±	0.01	**Yes**
		TRITIUM	98.20	±	23.60	3.64	±	0.87	**Yes**
Clear Springs	5/20/2019	GROSS ALPHA	0.71	±	0.36	0.03	±	0.01	No
		GROSS BETA	2.68	±	0.41	0.10	±	0.02	**Yes**
		TRITIUM	80.50	±	23.40	2.98	±	0.87	**Yes**
DRINKING WATER									
Atomic City	05/22/19	GROSS ALPHA	1.08	±	0.34	0.04	±	0.01	**Yes**
		GROSS BETA	2.96	±	0.39	0.11	±	0.01	**Yes**
		TRITIUM	113.00	±	24.00	4.19	±	0.89	**Yes**
Control	05/23/19	GROSS ALPHA	0.03	±	0.17	0.00	±	0.01	No
		GROSS BETA	0.08	±	0.31	0.00	±	0.01	No
		TRITIUM	35.30	±	23.10	1.31	±	0.86	No
Craters of the Moon	05/22/19	GROSS ALPHA	0.91	±	0.30	0.03	±	0.01	No
		GROSS BETA	1.24	±	0.37	0.05	±	0.01	**Yes**
		TRITIUM	94.60	±	23.70	3.50	±	0.88	**Yes**
Howe	05/22/19	GROSS ALPHA	0.71	±	0.33	0.03	±	0.01	No
		GROSS BETA	1.47	±	0.37	0.05	±	0.01	**Yes**
		TRITIUM	78.20	±	23.50	2.90	±	0.87	**Yes**
Idaho Falls	05/22/19	GROSS ALPHA	0.84	±	0.40	0.03	±	0.01	No
		GROSS BETA	3.18	±	0.44	0.12	±	0.02	**Yes**
		TRITIUM	95.80	±	23.60	3.55	±	0.87	**Yes**
Minidoka	05/20/19	GROSS ALPHA	0.64	±	0.39	0.02	±	0.01	No
		GROSS BETA	2.88	±	0.42	0.11	±	0.02	**Yes**
		TRITIUM	114.00	±	23.80	4.22	±	0.88	**Yes**
Mud Lake	05/23/19	GROSS ALPHA	0.12	±	0.25	0.00	±	0.01	No
		GROSS BETA	4.09	±	0.40	0.15	±	0.01	**Yes**
		TRITIUM	45.10	±	22.90	1.67	±	0.85	No

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
Rest Area	05/22/19	GROSS ALPHA	0.92	±	0.34	0.03	±	0.01	No
		GROSS BETA	2.02	±	0.38	0.07	±	0.01	**Yes**
		TRITIUM	46.60	±	23.40	1.73	±	0.87	No
Rest Area (Duplicate)	05/22/19	GROSS ALPHA	0.90	±	0.37	0.03	±	0.01	No
		GROSS BETA	2.68	±	0.41	0.10	±	0.02	**Yes**
		TRITIUM	92.20	±	24.00	3.41	±	0.89	**Yes**
Shoshone	05/20/19	GROSS ALPHA	1.33	±	0.39	0.05	±	0.01	**Yes**
		GROSS BETA	2.71	±	0.40	0.10	±	0.01	**Yes**
		TRITIUM	120.00	±	24.30	4.44	±	0.90	**Yes**

Table C-7. Gross Alpha, Gross Beta, and Tritium 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	04/16/19	GROSS ALPHA	1.67	±	0.41	0.06	±	0.02	**Yes**
		GROSS BETA	4.62	±	0.40	0.17	±	0.01	**Yes**
		TRITIUM	6.60	±	23.10	0.24	±	0.86	No
		CESIUM-137	1.68	±	0.85	0.06	±	0.03	No
BLR at Rest Area (Duplicate)	04/16/19	GROSS ALPHA	1.90	±	0.40	0.07	±	0.01	**Yes**
		GROSS BETA	2.97	±	0.41	0.11	±	0.02	**Yes**
		TRITIUM	-6.26	±	23.40	-0.23	±	0.87	No
		CESIUM-137	-0.53	±	1.55	-0.02	±	0.06	No
BLR at INTEC	04/16/19	GROSS ALPHA	2.22	±	0.45	0.08	±	0.02	**Yes**
		GROSS BETA	2.21	±	0.43	0.08	±	0.02	**Yes**
		TRITIUM	39.60	±	23.30	1.47	±	0.86	No
		CESIUM-137	-0.65	±	1.11	-0.02	±	0.04	No
BLR at EFS	04/16/19	GROSS ALPHA	1.77	±	0.45	0.07	±	0.02	**Yes**
		GROSS BETA	2.77	±	0.43	0.10	±	0.02	**Yes**
		TRITIUM	48.80	±	23.50	1.81	±	0.87	No
		CESIUM-137	0.20	±	0.81	0.01	±	0.03	No
BLR at NRF	04/16/19	GROSS ALPHA	2.11	±	0.45	0.08	±	0.02	**Yes**
		GROSS BETA	2.48	±	0.43	0.09	±	0.02	**Yes**
		TRITIUM	49.20	±	23.50	1.82	±	0.87	No
		CESIUM-137	-3.89	±	1.70	-0.14	±	0.06	No
BLR at Sinks	04/16/19	GROSS ALPHA	1.60	±	0.38	0.06	±	0.01	**Yes**
		GROSS BETA	3.27	±	0.40	0.12	±	0.01	**Yes**
		TRITIUM	27.00	±	23.40	1.00	±	0.87	No
		CESIUM-137	0.35	±	1.50	0.01	±	0.06	No
BLR Control (Birch Creek)	04/16/19	GROSS ALPHA	1.51	±	0.38	0.06	±	0.01	**Yes**
		GROSS BETA	1.91	±	0.40	0.07	±	0.01	**Yes**
		TRITIUM	14.80	±	23.20	0.55	±	0.86	No
		CESIUM-137	-0.39	±	0.94	-0.01	±	0.03	No

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

Location	Sampling Date	Analyte	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
BLR at Rest Area	05/29/19	GROSS ALPHA	5.91	±	0.66	0.22	±	0.02	**Yes**
		GROSS BETA	12.00	±	0.57	0.44	±	0.02	**Yes**
		TRITIUM	77.50	±	25.10	2.87	±	0.93	**Yes**
		CESIUM-137	1.98	±	0.84	0.07	±	0.03	No
BLR at INTEC	05/29/19	GROSS ALPHA	5.44	±	0.64	0.20	±	0.02	**Yes**
		GROSS BETA	12.80	±	0.58	0.47	±	0.02	**Yes**
		TRITIUM	62.40	±	24.90	2.31	±	0.92	No
		CESIUM-137	-1.26	±	1.01	-0.05	±	0.04	No
BLR at INTEC (Duplicate)	05/29/19	GROSS ALPHA	5.03	±	0.64	0.19	±	0.02	**Yes**
		GROSS BETA	12.90	±	0.58	0.48	±	0.02	**Yes**
		TRITIUM	24.60	±	24.10	0.91	±	0.89	No
		CESIUM-137	-1.47	±	1.58	-0.05	±	0.06	No
BLR at EFS	05/29/19	GROSS ALPHA	5.82	±	0.66	0.22	±	0.02	**Yes**
		GROSS BETA	13.90	±	0.59	0.51	±	0.02	**Yes**
		TRITIUM	100.00	±	24.60	3.70	±	0.91	**Yes**
		CESIUM-137	0.68	±	0.81	0.03	±	0.03	No
BLR at NRF	05/29/19	GROSS ALPHA	4.49	±	0.65	0.17	±	0.02	**Yes**
		GROSS BETA	14.80	±	0.61	0.55	±	0.02	**Yes**
		TRITIUM	51.40	±	24.80	1.90	±	0.92	No
		CESIUM-137	-1.57	±	1.54	-0.06	±	0.06	No
BLR at Sinks	05/30/19	GROSS ALPHA	0.94	±	0.31	0.03	±	0.01	**Yes**
		GROSS BETA	1.69	±	0.38	0.06	±	0.01	**Yes**
		TRITIUM	87.70	±	25.30	3.25	±	0.94	**Yes**
		CESIUM-137	-1.30	±	1.17	-0.05	±	0.04	No
BLR Control (Birch Creek)	05/29/19	GROSS ALPHA	2.50	±	0.46	0.09	±	0.02	**Yes**
		GROSS BETA	2.10	±	0.41	0.08	±	0.02	**Yes**
		TRITIUM	43.40	±	24.30	1.61	±	0.90	No
		CESIUM-137	-0.68	±	0.96	-0.03	±	0.04	No

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

Location	Sampling Date	Analyte	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
BLR at Rest Area	06/25/19	GROSS ALPHA	3.17	±	0.44	0.12	±	0.02	**Yes**
		GROSS BETA	5.30	±	0.44	0.20	±	0.02	**Yes**
		TRITIUM	69.34	±	23.94	2.57	±	0.89	No
		CESIUM-137	0.05	±	0.77	0.00	±	0.03	No
BLR at INTEC	06/25/19	GROSS ALPHA	3.43	±	0.51	0.13	±	0.02	**Yes**
		GROSS BETA	8.20	±	0.49	0.30	±	0.02	**Yes**
		TRITIUM	109.28	±	23.51	4.05	±	0.87	**Yes**
		CESIUM-137	0.46	±	1.58	0.02	±	0.06	No
BLR at EFS	06/25/19	GROSS ALPHA	2.83	±	0.46	0.10	±	0.02	**Yes**
		GROSS BETA	6.60	±	0.46	0.24	±	0.02	**Yes**
		TRITIUM	147.76	±	24.01	5.47	±	0.89	**Yes**
		CESIUM-137	-0.78	±	0.95	-0.03	±	0.04	No
BLR at EFS (Duplicate)	06/25/19	GROSS ALPHA	2.43	±	0.42	0.09	±	0.02	**Yes**
		GROSS BETA	4.68	±	0.44	0.17	±	0.02	**Yes**
		TRITIUM	51.20	±	24.18	1.90	±	0.90	No
		CESIUM-137	0.64	±	1.60	0.02	±	0.06	No
BLR at NRF	06/25/19	GROSS ALPHA	2.76	±	0.46	0.10	±	0.02	**Yes**
		GROSS BETA	5.94	±	0.46	0.22	±	0.02	**Yes**
		TRITIUM	36.49	±	23.51	1.35	±	0.87	No
		CESIUM-137	1.01	±	0.83	0.04	±	0.03	No
BLR at Sinks	06/25/19	GROSS ALPHA	3.34	±	0.45	0.12	±	0.02	**Yes**
		GROSS BETA	5.69	±	0.45	0.21	±	0.02	**Yes**
		TRITIUM	51.85	±	23.71	1.92	±	0.88	No
		CESIUM-137	1.07	±	1.14	0.04	±	0.04	No
BLR Control (Birch Creek)	06/25/19	GROSS ALPHA	2.57	±	0.43	0.10	±	0.02	**Yes**
		GROSS BETA	3.05	±	0.41	0.11	±	0.02	**Yes**
		TRITIUM	22.11	±	23.81	0.82	±	0.88	No
		CESIUM-137	-0.83	±	0.97	-0.03	±	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	04/07/19	-3.03	±	2.73	-0.11	±	0.10	No	-0.53	±	1.88	-0.02	±	0.07	No
	05/05/19	-2.25	±	2.37	0.00	±	0.00	No	-2.49	±	1.59	0.00	±	0.00	No
	06/02/19	1.08	±	2.07	0.00	±	0.00	No	1.66	±	1.46	0.00	±	0.00	No
Duplicate	06/02/19	3.00	±	1.73	0.00	±	0.00	No	-0.16	±	0.99	0.00	±	0.00	No
CONTROL	04/02/19	0.00	±	2.14	0.00	±	0.08	No	-1.54	±	1.91	-0.06	±	0.07	No
	04/23/19	-0.40	±	2.80	-0.01	±	0.10	No	-0.38	±	0.88	-0.01	±	0.03	No
	06/04/19	0.34	±	0.99	0.01	±	0.04	No	-0.10	±	0.85	0.00	±	0.03	No
DIETRICH	04/02/19	-0.61	±	1.15	-0.02	±	0.04	No	0.01	±	0.96	0.00	±	0.04	No
	05/07/19	0.89	±	1.01	0.03	±	0.04	No	0.38	±	0.88	0.01	±	0.03	No
	06/04/19	1.14	±	1.21	0.04	±	0.04	No	-0.51	±	1.02	-0.02	±	0.04	No
HOWE	04/02/19	0.36	±	2.50	0.01	±	0.09	No	-2.16	±	1.88	-0.08	±	0.07	No
	05/07/19	-1.09	±	2.39	-0.04	±	0.09	No	-1.65	±	1.89	-0.06	±	0.07	No
	06/04/19	0.83	±	1.27	0.03	±	0.05	No	0.68	±	0.99	0.03	±	0.04	No
Duplicate	06/04/19	-0.42	±	2.52	-0.02	±	0.09	No	0.82	±	1.86	0.03	±	0.07	No
IDAHO FALLS	04/02/19	-0.88	±	1.28	-0.03	±	0.05	No	1.36	±	1.01	0.05	±	0.04	No
	04/09/19	0.32	±	0.85	0.01	±	0.03	No	0.36	±	0.86	0.01	±	0.03	No
	04/16/19	-3.03	±	1.74	-0.11	±	0.06	No	-0.70	±	1.38	-0.03	±	0.05	No
	04/23/19	0.17	±	0.90	0.01	±	0.03	No	0.96	±	0.90	0.04	±	0.03	No
	04/30/19	2.00	±	2.19	0.07	±	0.08	No	-1.55	±	1.85	-0.06	±	0.07	No
	05/07/19	0.04	±	2.12	0.00	±	0.08	No	-3.55	±	1.98	-0.13	±	0.07	No
	05/14/19	-2.01	±	1.67	-0.07	±	0.06	No	2.61	±	1.42	0.10	±	0.05	No
	05/21/19	-1.27	±	1.64	-0.05	±	0.06	No	0.39	±	1.31	0.01	±	0.05	No
	05/28/19	-0.13	±	1.51	0.00	±	0.06	No	-0.20	±	1.47	-0.01	±	0.05	No
	06/04/19	0.16	±	0.86	0.01	±	0.03	No	0.90	±	0.88	0.03	±	0.03	No
	06/11/19	-1.53	±	1.66	-0.06	±	0.06	No	0.46	±	1.31	0.02	±	0.05	No
	06/18/19	2.09	±	1.55	0.08	±	0.06	No	0.84	±	1.40	0.03	±	0.05	No
	06/25/19	3.35	±	1.64	0.12	±	0.06	No	0.48	±	1.44	0.02	±	0.05	No
MINIDOKA	04/02/19	0.48	±	0.89	0.02	±	0.03	No	0.76	±	0.90	0.03	±	0.03	No
	05/07/19	0.35	±	1.24	0.01	±	0.05	No	-0.20	±	0.97	-0.01	±	0.04	No
	06/04/19	1.65	±	0.99	0.06	±	0.04	No	2.02	±	0.95	1.48	±	0.04	No
TERRETON	04/02/19	-0.35	±	2.33	-0.01	±	0.09	No	-0.71	±	1.91	0.86	±	0.07	No
	04/10/19	0.70	±	1.06	0.03	±	0.04	No	1.65	±	1.06	-0.54	±	0.04	No
Duplicate	04/10/19	0.36	±	1.14	0.01	±	0.04	No	0.06	±	0.98	0.25	±	0.04	No
	04/17/19	-1.37	±	1.99	-0.05	±	0.07	No	1.34	±	1.87	0.63	±	0.07	No
	04/24/19	0.98	±	2.06	0.04	±	0.08	No	-0.86	±	1.85	0.35	±	0.07	No
	05/01/19	0.22	±	1.49	0.01	±	0.06	No	-0.90	±	1.48	1.07	±	0.05	No
	05/07/19	-0.50	±	0.93	-0.02	±	0.03	No	-0.70	±	0.88	0.46	±	0.03	No
	05/15/19	1.21	±	1.95	0.04	±	0.07	No	0.37	±	1.87	-0.93	±	0.07	No
	05/23/19	-0.55	±	1.31	-0.02	±	0.05	No	0.42	±	0.89	1.48	±	0.03	No
	05/29/19	-1.87	±	2.01	-0.07	±	0.07	No	-2.38	±	1.97	-0.56	±	0.07	No
	06/04/19	-2.29	±	1.75	-0.08	±	0.06	No	-0.62	±	1.52	1.58	±	0.06	No
	06/12/19	0.63	±	1.94	0.02	±	0.07	No	1.67	±	1.85	0.28	±	0.07	No
	06/20/19	1.19	±	1.34	0.04	±	0.05	No	1.48	±	0.89	-1.01	±	0.03	No
	06/26/19	0.82	±	1.08	0.03	±	0.04	No	-0.43	±	0.98	-2.31	±	0.04	No

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

Location	Sampling Date	Strontium-90 Result ± 1s Uncertainty (pCi/L)	Strontium-90 Result ± 1s Uncertainty (Bq/L)	Result > 3s
BLACKFOOT	05/05/19	0.15 ± 0.051	0.005 ± 0.0019	No
CONTROL	04/23/19	0.11 ± 0.050	0.004 ± 0.0018	No
DIETRICH	05/07/19	0.10 ± 0.049	0.004 ± 0.0018	No
HOWE	05/07/19	0.05 ± 0.049	0.002 ± 0.0018	No
IDAHO FALLS	04/30/19	0.03 ± 0.045	0.001 ± 0.0017	No
MINIDOKA	05/07/19	0.08 ± 0.049	0.003 ± 0.0018	No
TERRETON	05/07/19	0.01 ± 0.047	0.001 ± 0.0017	No

Location	Sampling Date	Tritium Concentration ± 1s (pCi/L)	Tritium Concentration ± 1s (Bq/L)	Result > 3s
BLACKFOOT	05/05/19	65.00 ± 23.70	2.41 ± 0.88	No
CONTROL	04/23/19	48.00 ± 23.70	1.78 ± 0.88	No
DIETRICH	05/07/19	-23.70 ± 23.00	-0.88 ± 0.85	No
HOWE	05/07/19	15.60 ± 23.10	0.58 ± 0.86	No
IDAHO FALLS	05/07/19	16.90 ± 23.50	0.63 ± 0.87	No
MINIDOKA	05/07/19	31.20 ± 23.70	1.16 ± 0.88	No
TERRETON	05/07/19	20.20 ± 23.50	0.75 ± 0.87	No

Table C-10. Gamma-emitting Radionuclides and Strontium-90 in Alfalfa

Location	Sampling Date	Result ± 1s Uncertainty pCi/kg			Result ± 1s Uncertainty Bq/kg			Result > 3s
Cesium-137								
HOWE	06/12/19	-25.70	±	52.20	-0.95	±	1.93	No
HOWE (duplicate)	06/12/19	-45.30	±	57.70	-1.68	±	2.14	No
IDAHO FALLS	06/12/19	8.96	±	53.40	0.33	±	1.98	No
MUD LAKE	06/12/19	-28.20	±	52.50	-1.04	±	1.94	No
Strontium-90								
HOWE	06/12/19	24.00	±	13.90	0.89	±	0.51	No
IDAHO FALLS	06/12/19	16.90	±	18.80	0.63	±	0.70	No
MUD LAKE	06/12/19	-5.29	±	13.30	-0.20	±	0.49	No

Table C-11. Environmental Radiation Measurements Using OSLDs

Location	Start Date	End Date	Radiation Measurement ± 2s Uncertainty mrem	Exposure mrem/day
BOUNDARY				
ARCO	11/07/18	05/08/19	57.85 ± 5.78	0.32
ATOMIC CITY	11/07/18	05/08/19	62.95 ± 6.30	0.35
BIRCH CREEK	11/07/18	05/08/19	52.55 ± 5.26	0.29
BLUE DOME	11/07/18	05/08/19	50.65 ± 5.07	0.28
HOWE	11/07/18	05/08/19	56.85 ± 5.69	0.31
MONTEVIEW	11/07/18	05/08/19	58.60 ± 5.85	0.32
MUD LAKE	11/07/18	05/08/19	61.30 ± 6.13	0.34
Boundary Average			**57.25**	**0.31**
DISTANT				
ABERDEEN	11/08/18	05/07/19	60.65 ± 6.07	0.34
CRATERS	11/07/18	05/08/19	53.70 ± 5.37	0.30
DUBOIS	11/07/18	05/08/19	49.50 ± 4.95	0.27
IDAHO FALLS	11/07/18	05/08/19	60.45 ± 6.05	0.33
JACKSON	11/09/18	05/10/19	50.30 ± 5.03	0.28
MINIDOKA	11/06/18	05/07/19	55.30 ± 5.53	0.30
MOUNTAIN VIEW	11/07/18	05/16/19	54.20 ± 5.43	0.29
ROBERTS	11/05/18	05/07/19	58.70 ± 5.86	0.32
SUGAR CITY	11/07/18	05/08/19	73.95 ± 7.40	0.41
Distant Average			**57.42**	**0.31**

APPENDIX D

STATISTICAL ANALYSIS RESULTS

Table D-1. Results of the Kruskal-Wallace one-way analysis of variance by ranks between INL Site, Boundary, and Distant sample groups by quarter and by month.

Gross Alpha					
Quarter	Valid N	Sum of ranks	Mean rank	H[a]	*p*[b]
Boundary	91	9468.500	104.0495		
Distant	78	8785.000	112.6282	3.916807	0.1411
INL Site	39	3482.500	89.2949		
April	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	28	939.000	33.53571		
Distant	24	836.000	34.83333	2.200444	0.3328
INL Site	12	305.000	25.41667		
May	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	35	1435.000	41.00000		
Distant	30	1269.000	42.30000	0.8274815	0.6612
INL Site	15	536.000	35.73333		
June	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	28	871.500	31.12500		
Distant	24	883.500	36.81250	2.456309	0.2928
INL Site	12	325.000	27.08333		
Gross Beta					
Quarter	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	91	9412.500	103.4341		
Distant	78	8145.500	104.4295	0.1030198	0.9498
INL Site	39	4178.000	107.1282		
April	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	28	913.000	32.60714		
Distant	24	765.000	31.87500	0.0626145	0.9692
INL Site	12	402.000	33.50000		
May	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	35	1427.500	40.78571		
Distant	30	1170.500	39.01667	0.2745181	0.8717
INL Site	15	642.000	42.80000		
June	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	28	878.500	31.37500		
Distant	24	808.500	33.68750	0.2020734	0.9039
INL Site	12	393.000	32.75000		

a. H = Kruskal Wallis test statistic calculated using mean ranks. This test assumes H is approximately distributed as χ^2.

b. A p-value (probability value) greater than 0.05 signifies no statistical difference between data groups. Any values below 0.05 are indicated in red.

Table D-2. Results of multiple comparisons of gross alpha results between locations during the second quarter. A 'p' value greater than 0.05 signifies no statistical difference between data groups. Any values below 0.05 are indicated in red. R represents the average rank for each location.

All Groups
Multiple Comparisons p values (2-tailed); Coded Result (Spreadsheet in 2nd-Qtr-19-LVF)
Independent (grouping) variable: GeographicName
Kruskal-Wallis test: H (15, N= 208) =54.01419 p =.0000
Include condition: v6='Gross Alpha'

Depend.: Coded Result	**Arco R:96.615**	Atomic City R:102.42	Blackfoot R:85.731	Blue Dome R:75.500	Craters of the Moon R:80.077	Dubois R:98.885	EFS R:86.731	FAA Tower R:93.769	Howe R:145.23	Idaho Falls R:195.08	Jackson WY R:91.115	Main Gate R:71.462	Monteview R:131.27	Mud Lake R:83.538	Sugar City R:124.88	Van Buren R:109.69
Arco		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	0.003644	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Atomic City	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	0.010421	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Blackfoot	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	0.000435	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Blue Dome	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	0.376782	0.000049	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Craters of the Moon	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	0.693974	0.000133	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Dubois	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	0.005532	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
EFS	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	0.000533	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
FAA Tower	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	0.002132	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Howe	1.000000	1.000000	1.000000	0.376782	0.693974	1.000000	1.000000	1.000000		1.000000	1.000000	0.213535	1.000000	1.000000	1.000000	1.000000
Idaho Falls	0.003644	0.010421	0.000435	0.000049	0.000133	0.005532	0.000533	0.002132	1.000000		0.001277	0.000020	0.825072	0.000277	0.353593	0.035795
Jackson WY	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	0.001277		1.000000	1.000000	1.000000	1.000000	1.000000
Main Gate	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	0.213535	0.000020	1.000000		1.000000	1.000000	1.000000	1.000000
Monteview	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	0.825072	1.000000	1.000000		1.000000	1.000000	1.000000
Mud Lake	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	0.000277	1.000000	1.000000	1.000000		1.000000	1.000000
Sugar City	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	0.353593	1.000000	1.000000	1.000000	1.000000		1.000000
Van Buren	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	0.035795	1.000000	1.000000	1.000000	1.000000	1.000000	

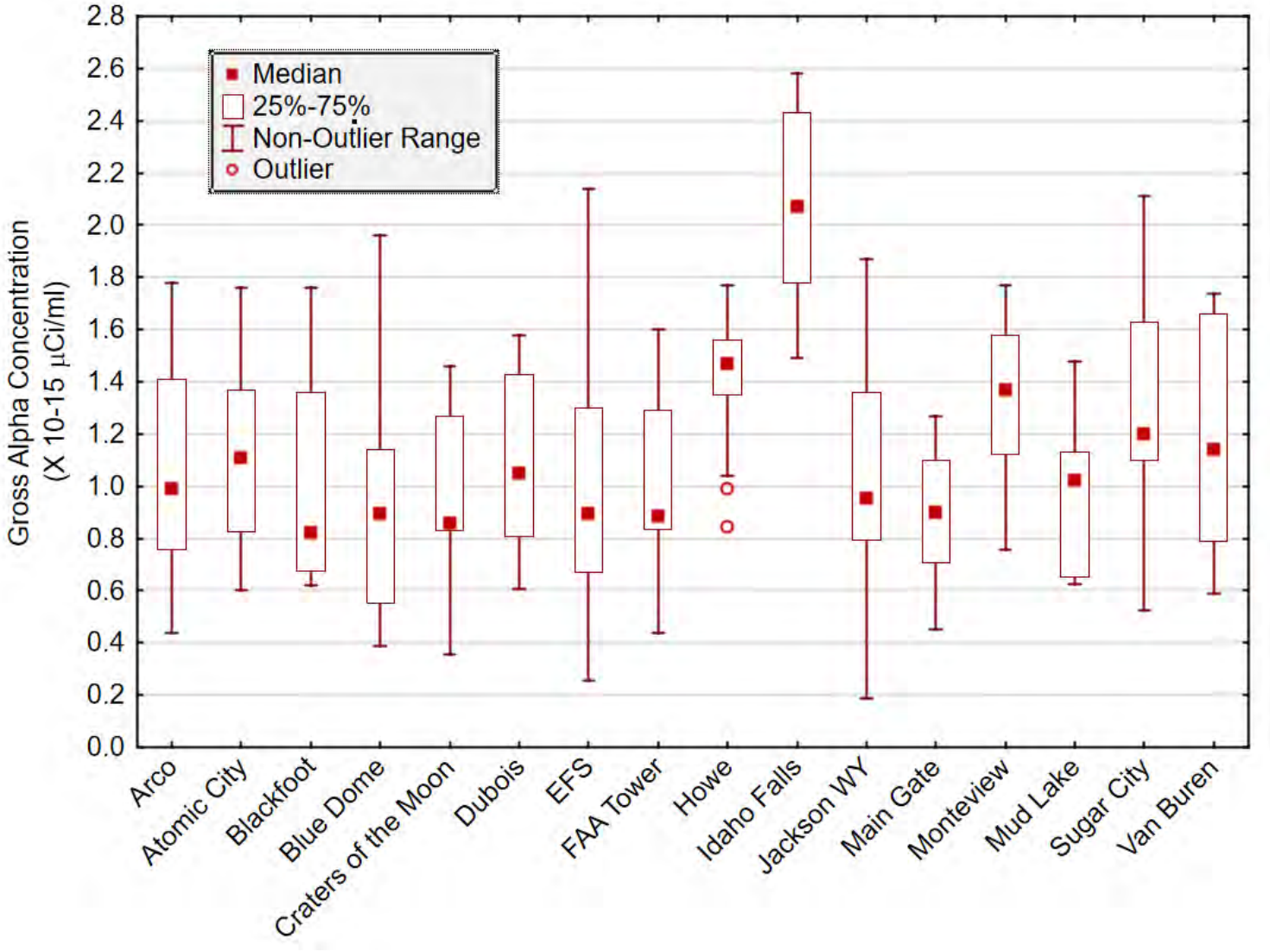

Figure D-1. Second quarter gross alpha concentrations in air at all sampling locations. Number of samples (N) = 13 at each location.

Table D-3. Results of multiple comparisons of gross beta results between locations during the second quarter. A 'p' value greater than 0.05 signifies no statistical difference between data groups. Any values below 0.05 are indicated in red. R represents the average rank for each location.

Multiple Comparisons p values (2-tailed); Coded Result (Spreadsheet in 2nd-Qtr-19-LVF)
Independent (grouping) variable: GeographicName
Kruskal-Wallis test: H (17, N= 208) =4.033642 p =.9995
Include condition: v6='Gross Beta'

Depend.: Coded Result	**Arco R:106.19**	Atomic City R:113.65	Blackfoot R:95.208	Blue Dome R:91.308	Craters of the Moon R:104.35	Dubios R:98.500	Dubois R:98.875	EFS R:93.846	FAA Tower R:106.81	Howe R:92.808	Idaho Falls R:111.73	Jackson WY R:102.31	Main Gate R:104.35	Monteview R:106.81	Mud Lake R:106.46	MVMS R:104.00	Sugar City R:113.46	Van Buren R:123.19
Arco		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Atomic City	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Blackfoot	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Blue Dome	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Craters of the Moon	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Dubios	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Dubois	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
EFS	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
FAA Tower	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Howe	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Idaho Falls	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Jackson WY	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	1.000000
Main Gate	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000
Monteview	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000	1.000000
Mud Lake	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000	1.000000
MVMS	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000	1.000000
Sugar City	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000		1.000000
Van Buren	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	