Wastren Advantage Inc.
Environmental Surveillance, Education, and Research Program
ISSN NUMBER 1089-5469

Idaho National Laboratory Site Offsite Environmental Surveillance Program Report: Third Quarter 2016

May 2017

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

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EXECUTIVE SUMMARY

None of the radionuclides detected in samples collected during the third quarter of 2016 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 third quarter of 2016 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, July 1 through September 30, 2016. All sample types (media) and the sampling schedule followed during 2016 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
- Milk
- Lettuce
- Grain
- Soil

Table E-1 Summary of results for the Third Quarter of 2016

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	There were no statistical differences in weekly, monthly, or quarterly gross alpha or gross beta concentrations measured at Distant, Boundary, and INL Site sampling locations. No result exceeded the DCS for gross alpha or gross beta activity in air.
	Quarterly Composite	Gamma-emitting radionuclides, ^{90}Sr, actinides (americium and plutonium)	No human-made gamma-emitting radionuclides or ^{90}Sr were detected above 3s uncertainty in any of the third quarter composites. Americium-241 was detected in one composite and $^{239/240}$Pu was detected in two composites. All of the results were just above the reporting levels and were less than 0.02 percent of the applicable DCS.
	Charcoal Cartridge	Iodine-131	Iodine-131 was not detected in any of the 26 batches counted during the quarter.
Atmospheric Moisture	Liquid	Tritium	Ten of the 19 sample results showed tritium concentrations greater than the 3s uncertainty values during the third quarter. No sample result exceeded the DCS for tritium in air.
Precipitation	Liquid	Tritium	Nine samples were collected. Seven of the results were greater than the associated 3s uncertainty. All results were within the range previously measured and were consistent with those reported across the region by the U.S. Environmental Protection Agency.
Milk	Liquid	Iodine-131, other gamma-emitting radionuclides	Milk was collected at seven locations. No Iodine-131 or other human-made gamma emitting radionuclides were detected.
Lettuce	Vegetation	Gamma-emitting radionuclides and ^{90}Sr	No human-made gamma emitting radionuclides were

			detected. Strontium-90 was detected in all of the locally-grown samples. The continued presence of ^{90}Sr in soil from above-ground nuclear weapons testing is the likely source.
Grain	Vegetation	Gamma-emitting radionuclides and ^{90}Sr	No human-made gamma-emitting radionuclides were detected in sampled tissues. Strontium-90 was detected in two samples just above the detection limit.
Soil	Soil	Gamma-emitting radionuclides, ^{90}Sr, actinides (americium and plutonium)	Cesium-137 and ^{90}Sr were detected in nearly all the samples but have shown a decreasing trend over time consistent with their half-lives. Plutonium-239/240 was detected in all samples but has not shown either a decreasing or increasing trend due to its long half-life. Americium-241 and ^{238}Pu were each detected in four samples as a result of lower detection limits by the new laboratory (ORAU) achieved in 2016.

LIST OF ABBREVIATIONS

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

LIST OF UNITS

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

1. ESER PROGRAM DESCRIPTION

Operations at the Idaho National Laboratory (INL) Site are conducted under requirements imposed by the U.S. Department of Energy (DOE) under authority of the Atomic Energy Act and the U.S. Environmental Protection Agency (EPA) under a number of acts (e.g. the Clean Air Act and Safe Drinking Water Act). The requirements imposed by DOE are specified in DOE Orders. These requirements include those to monitor the effects of DOE activities both inside and outside the boundaries of DOE facilities (DOE 2011a, DOE 2015a). During calendar year 2016, environmental monitoring within the INL Site boundaries was primarily the responsibility of the INL and Idaho Cleanup Project (ICP) contractors. At the beginning of the second quarter of 2016, ESER Program responsibilities were assumed by Wastren Advantage, Inc. (WAI), in conjunction with team members Idaho State University and Oak Ridge Associated Universities (ORAU).

This report contains monitoring results from the ESER Program for samples collected during the third quarter of 2016 (July 1- September 30, 2016).

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

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

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

Environmental samples collected include:

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

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

The ESER Program used two laboratories to perform analyses on routine environmental samples collected during the quarter reported here. The ISU Environmental Assessment Laboratory (EAL) performed routine gross alpha, gross beta, tritium, and gamma spectrometry analyses. Analyses requiring radiochemistry including strontium-90 (^{90}Sr), plutonium-238 (^{238}Pu), plutonium-239/240 ($^{239/240}$Pu), and americium-241 (^{241}Am) were performed by Oak Ridge Associated Universities (ORAU).

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

In the event of any suspected worldwide nuclear incidents, like the 1986 Chernobyl accident or the 2011 Fukushima accident, the EPA may request additional sampling be performed through RadNet [previously known as the Environmental Radiation Ambient Monitoring System (ERAMS) network] (EPA 2016). The EPA established the ERAMS network in 1973 with an emphasis on identifying trends in the accumulation of long-lived radionuclides in the environment. ERAMS was renamed RadNet in 2005 to reflect a new mission. RadNet is comprised of a nationwide network of sampling stations that provide air, precipitation, drinking water, and milk samples. 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 and for preparing quarterly reports on results from the environmental surveillance program. The quarterly reports are then consolidated into the INL Site Environmental Report for each calendar year. These annual reports also include data collected by other INL Site contractors.

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

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

sample collected in the environment, except that the radionuclide of interest is absent). In order to conclude that a radionuclide has been detected, it is essential to consider two fundamental aspects of the problem of detection: (1) the instrument signal for the sample must be greater than that observed for the blank before the decision can be made that the radionuclide has been detected; and (2) an estimate must be made of the minimum radionuclide concentration that will yield a sufficiently large observed signal before the correct decision can be made for detection or non-detection. ESER currently defines a detection of radioactivity in an individual sample if the result exceeds the minimum detectable concentration (MDC) calculated by the laboratory after the analysis of a background sample (i.e., the *a posteriori* measurement) based on calculations derived by Curie (1968). The MDC is defined as the concentration at which there is a 95 percent confidence that an analyte signal will be distinguishable from an analyte-free sample.

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

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

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

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

2. THE INL SITE

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

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

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

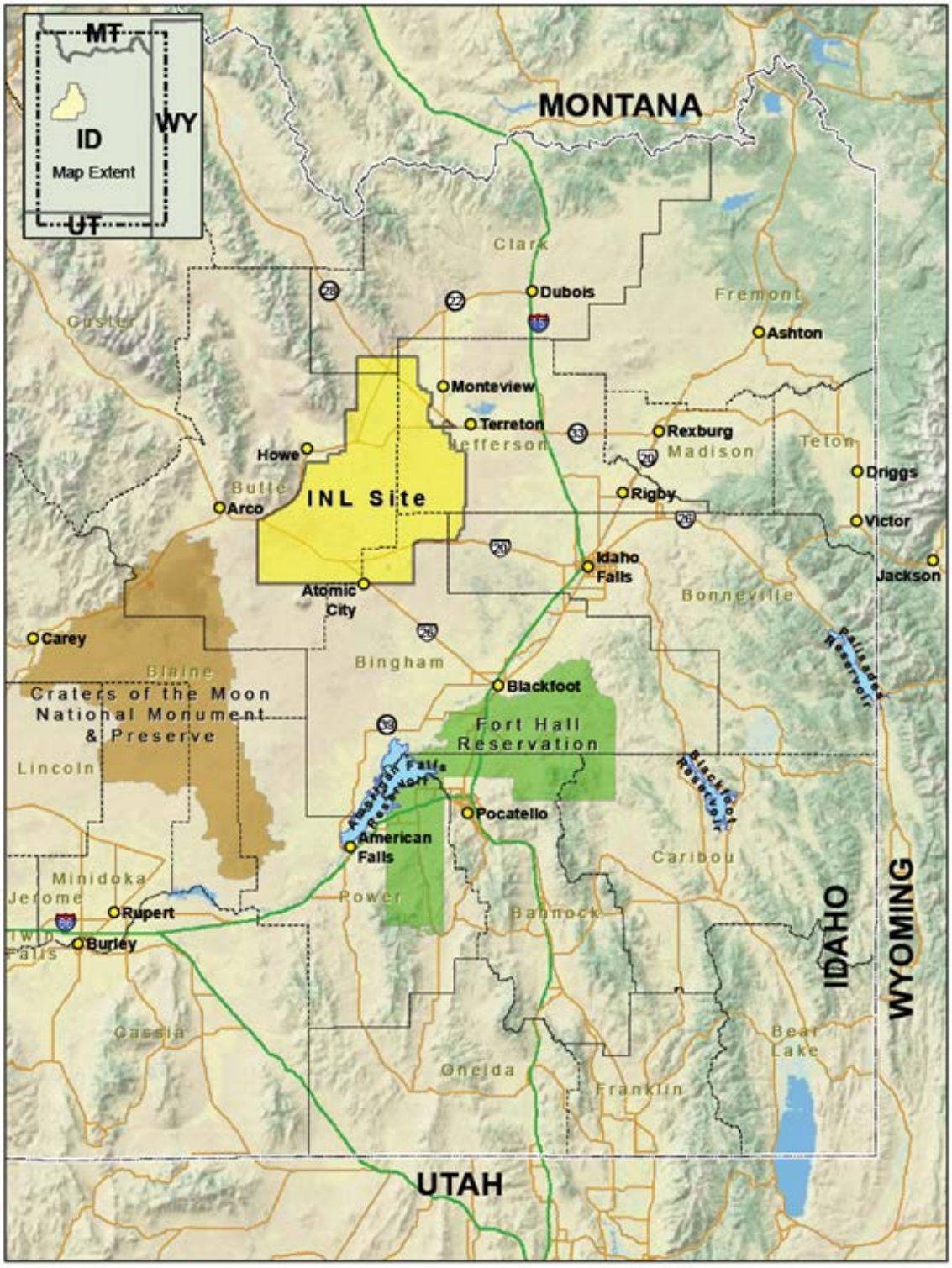

Figure 1. Location of the Idaho National Laboratory Site.

3. AIR SAMPLING

The primary pathway by which radionuclides can move off the INL Site is through the air and for this reason the air pathway is the primary focus of monitoring on and around the INL Site. Samples for particulates and iodine-131 (^{131}I) gas in air were collected weekly for the duration of the quarter at 15 locations using low-volume air samplers. The sampler in Jackson did not operate during 2016 while a more suitable location was selected and constructed. Moisture in the atmosphere was sampled at four locations around the INL Site and analyzed for tritium. Air sampling activities and results for the third quarter of 2016 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 17 low-volume air samplers (two of which are used as replicate samplers) at 15 locations during the third quarter of 2016 (Figure 2). Three of these samplers are located on the INL Site, seven are situated off the INL Site near the boundary, and seven 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 2016, one replicate sampler was moved to Sugar City (a Distant location) and one was moved to Blackfoot (also a Distant location). An average of 19,559 ft^3 (554 m^3) of air was sampled at each location, each week, at an average flow rate of 1.94 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.

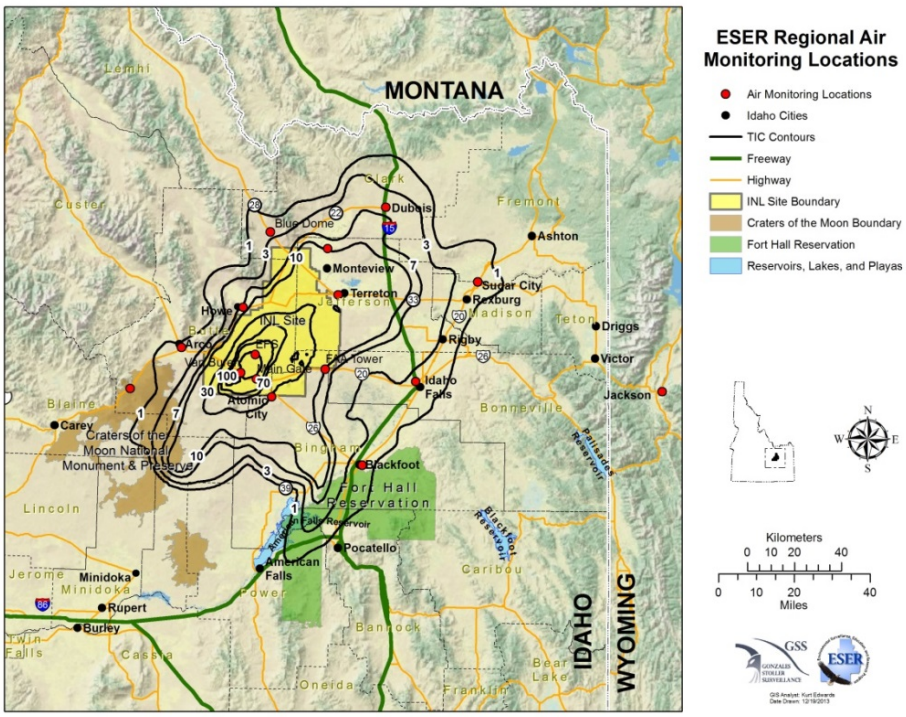

Figure 2. Low-volume air sampler locations.

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.

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

Gross alpha results are reported in Table C-1 and shown in Figures 3 through 6. Gross alpha data are tested for normality prior to statistical analyses, and generally show no consistent discernible distribution. Because there is no discernible distribution of the data, the nonparametric Kruskal-Wallis test of multiple independent groups was used to test for statistical differences between INL Site, Boundary, and Distant locations. The use of nonparametric tests, such as Kruskal-Wallis, gives less weight to outlier and extreme values thus allowing a more appropriate comparison of data groups. A statistically significant difference exists between data groups if the (p) value is less than 0.05. Values greater than 0.05 translate into a 95 percent confidence that the medians are statistically the same. The p-value for each comparison is shown in Table D-1. For the quarter, there was no statistical difference noted in the data, as the p-value was above 0.05.

Comparisons of gross alpha concentrations were made for each month of the quarter. Again the Kruskal-Wallis test of multiple independent groups was used to determine if statistical differences exist between INL Site, Boundary, and Distant data groups. No statistical differences were found for any month of the quarter (Table D-1).

As an additional check, comparisons between gross alpha concentrations measured at Boundary and Distant locations were made on a weekly basis. The Mann-Whitney U test was used to compare the Boundary and Distant data because it is the most powerful nonparametric alternative to the t-test for independent samples. INL Site sample results were not included in this analysis because the onsite data, collected at only three locations, are not representative of the entire INL Site and would not aid in determining offsite impacts. There were no weeks where a statistical difference existed between the two sample groups (Table D-2).

Gross beta results are presented in Table C-1 and displayed in Figures 7 through 10. The data are tested quarterly and generally are found to be neither normally nor log-normally distributed. Box and whiskers plots were used for presentation of the data. Outliers and extreme values were retained in subsequent statistical analyses because they are within the range of measurements made in the past five years, and because these values could not be attributed to mistakes in collection, analysis, or reporting procedures. No statistical differences were noted in the quarterly data or during any month of the quarter using the Kruskal-Wallis test (Table D-1). Weekly comparisons were also made using the same methodology as for the gross alpha data and no statistical differences were found during any week of the quarter (Table D-2).

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

No ^{137}Cs or other human-made gamma-emitting radionuclides were found in quarterly composites. No ^{90}Sr or ^{238}Pu were found either. Americium-241 was above the reporting level in the composite from Blackfoot and $^{239/240}Pu$ was above the reporting level in composites from Blackfoot and the FAA Tower. All of the results were just above the reporting levels. In comparison to the Derived Concentration Standards, the ^{241}Am result was 0.016 percent of the DCS and the higher of the two $^{239/240}Pu$ results was 0.006 percent of the DCS. Results for these analyses are found in Table C-3 of Appendix C.

ATMOSPHERIC MOISTURE SAMPLING

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

Results were available for 19 atmospheric moisture samples collected during the third quarter of 2016. Ten of the 19 results exceeded the 3s uncertainty level for tritium, with similar results to those reported previously. Results also remain similar between the four sampling locations. All samples were significantly below the DOE DCS for tritium in air of 1.4×10^{-8} $\mu Ci/mL_{air}$ with a maximum reported value of 10.90×10^{-13} $\mu Ci/mL_{air}$ at Sugar City. Results are shown in Table C-4, Appendix C.

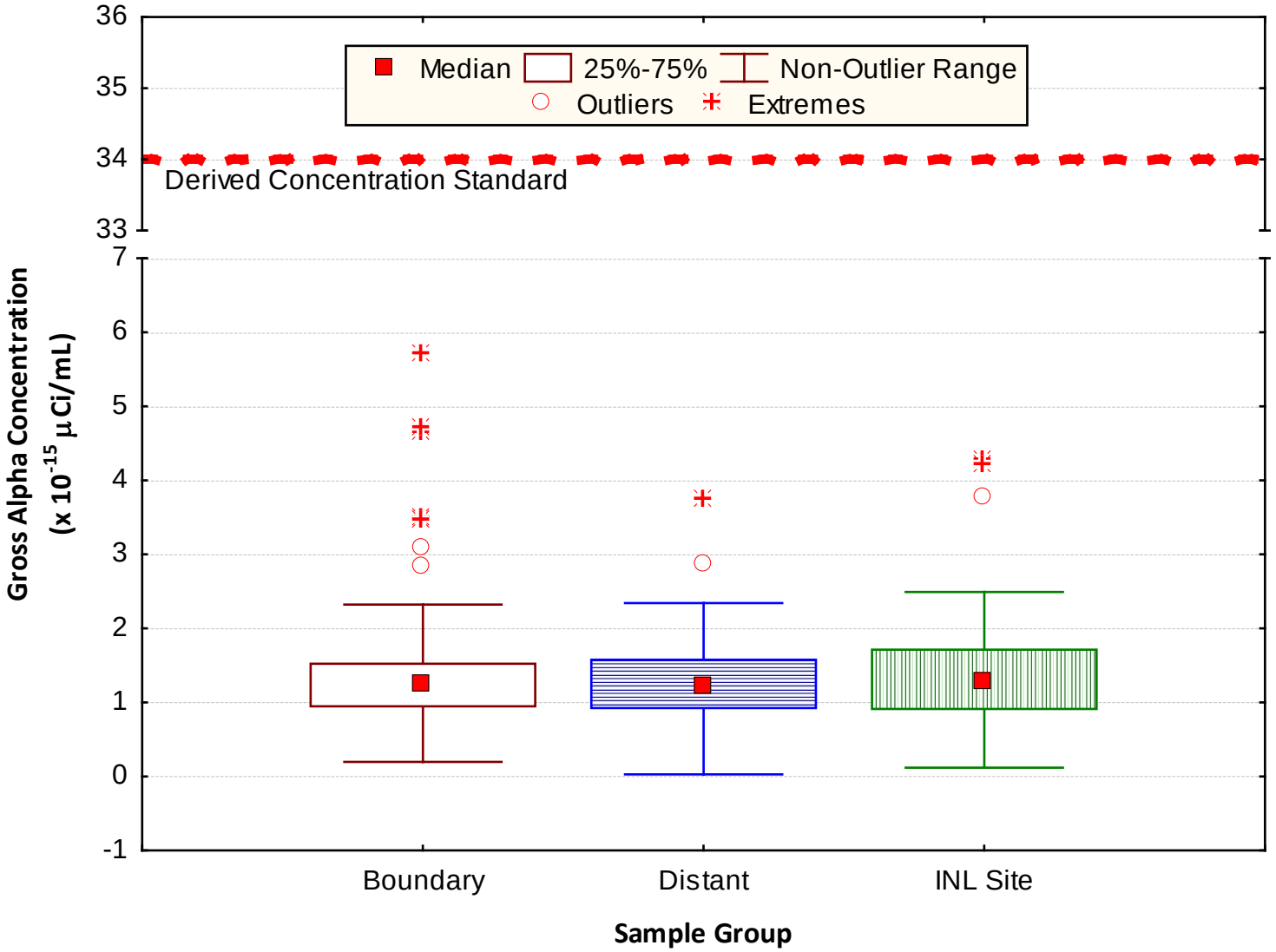

Figure 3. Gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations for the third quarter of 2016.

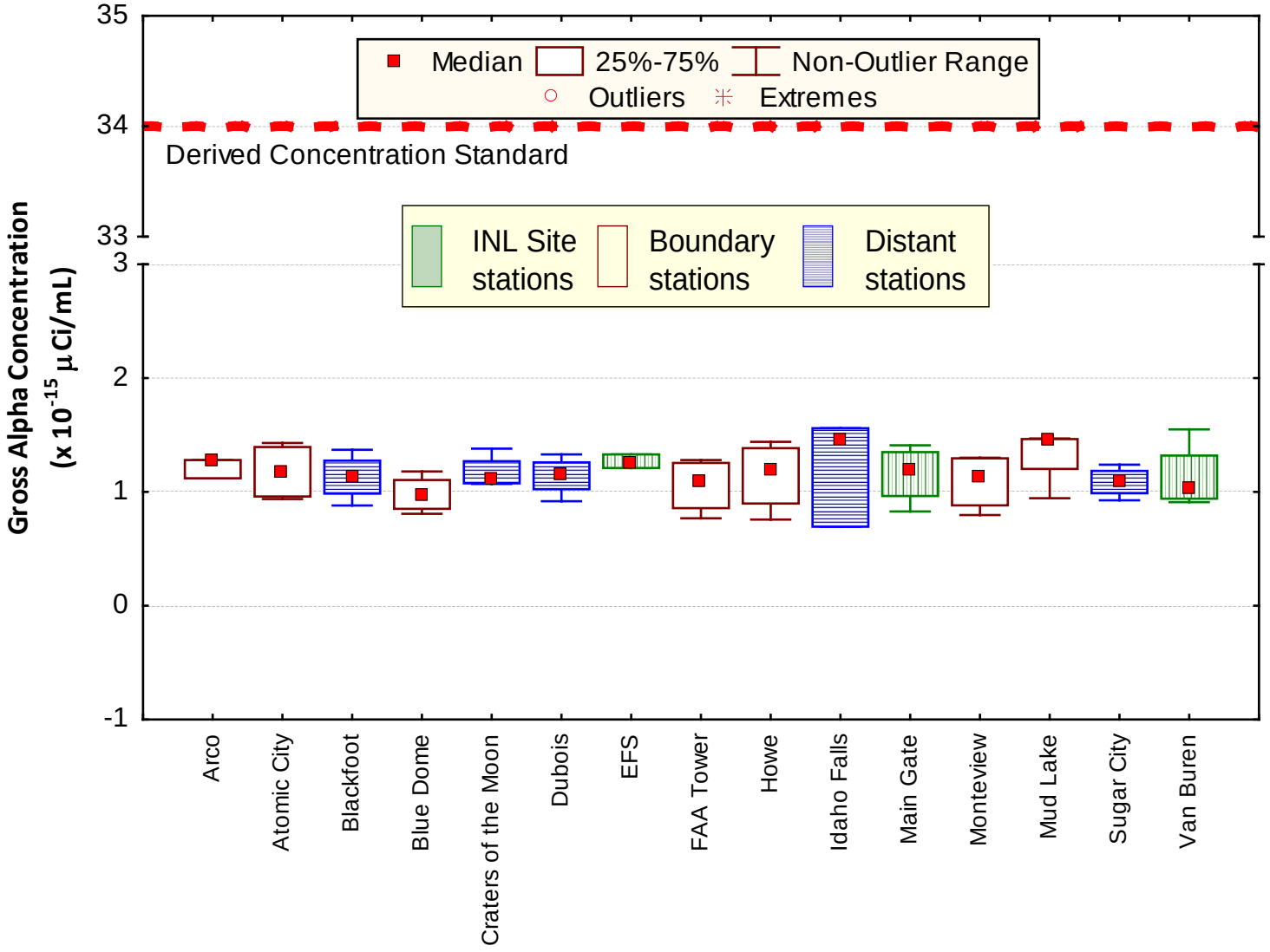

Figure 4. July gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location, except Arco, EFS, and Idaho Falls (N = 3).

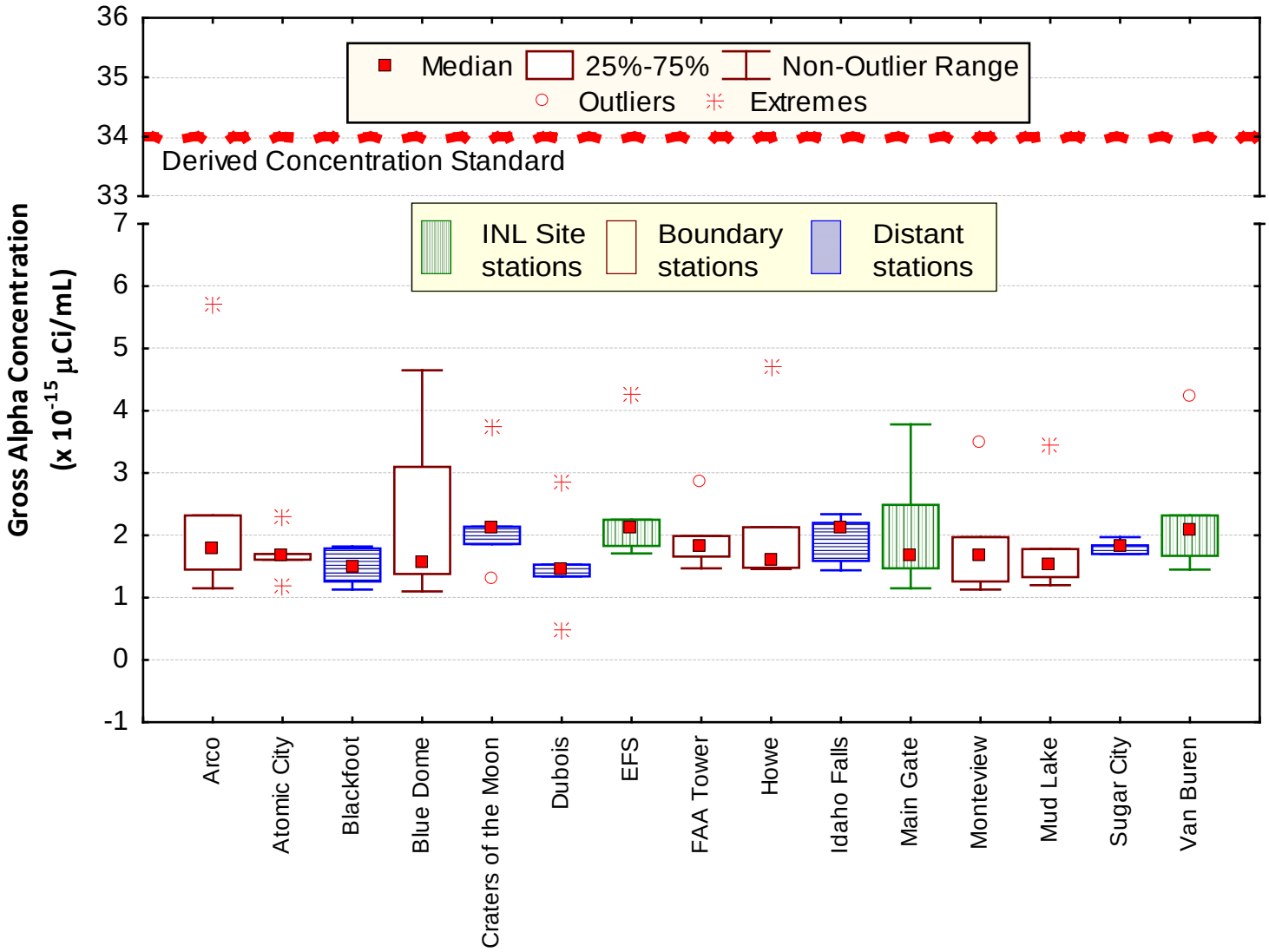

Figure 5. August gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location.

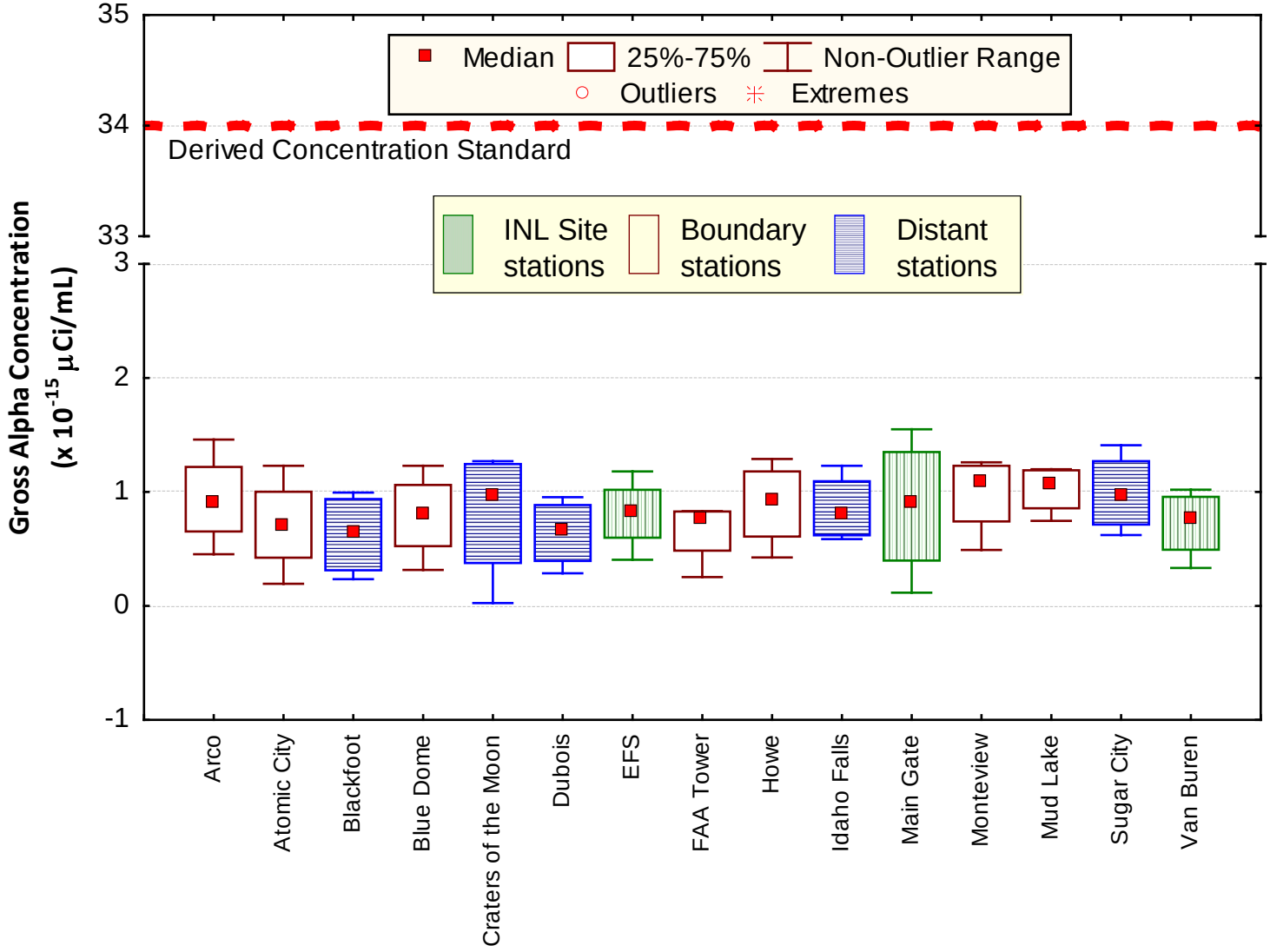

Figure 6. September gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

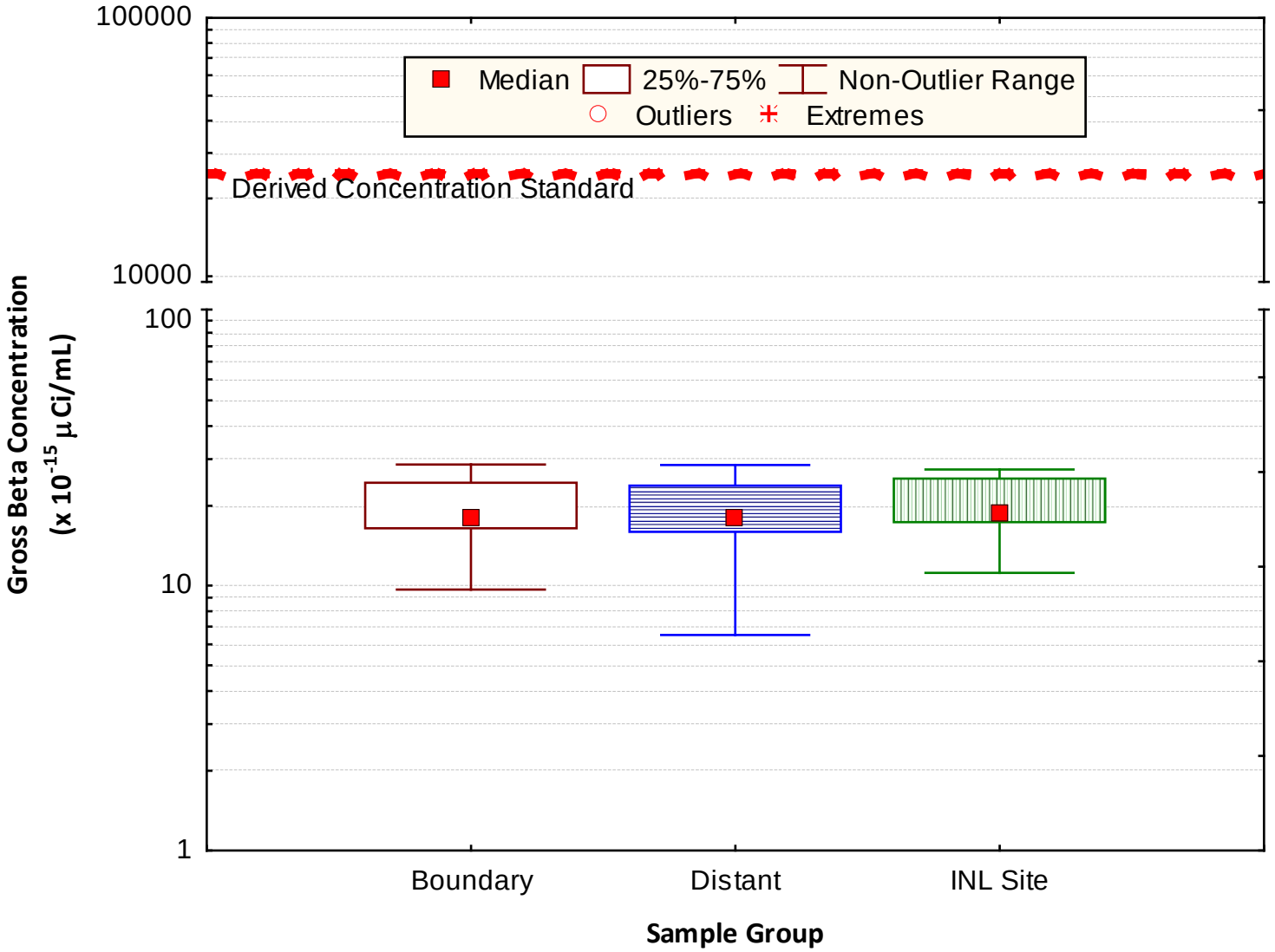

Figure 7. Gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations for the third quarter of 2016.

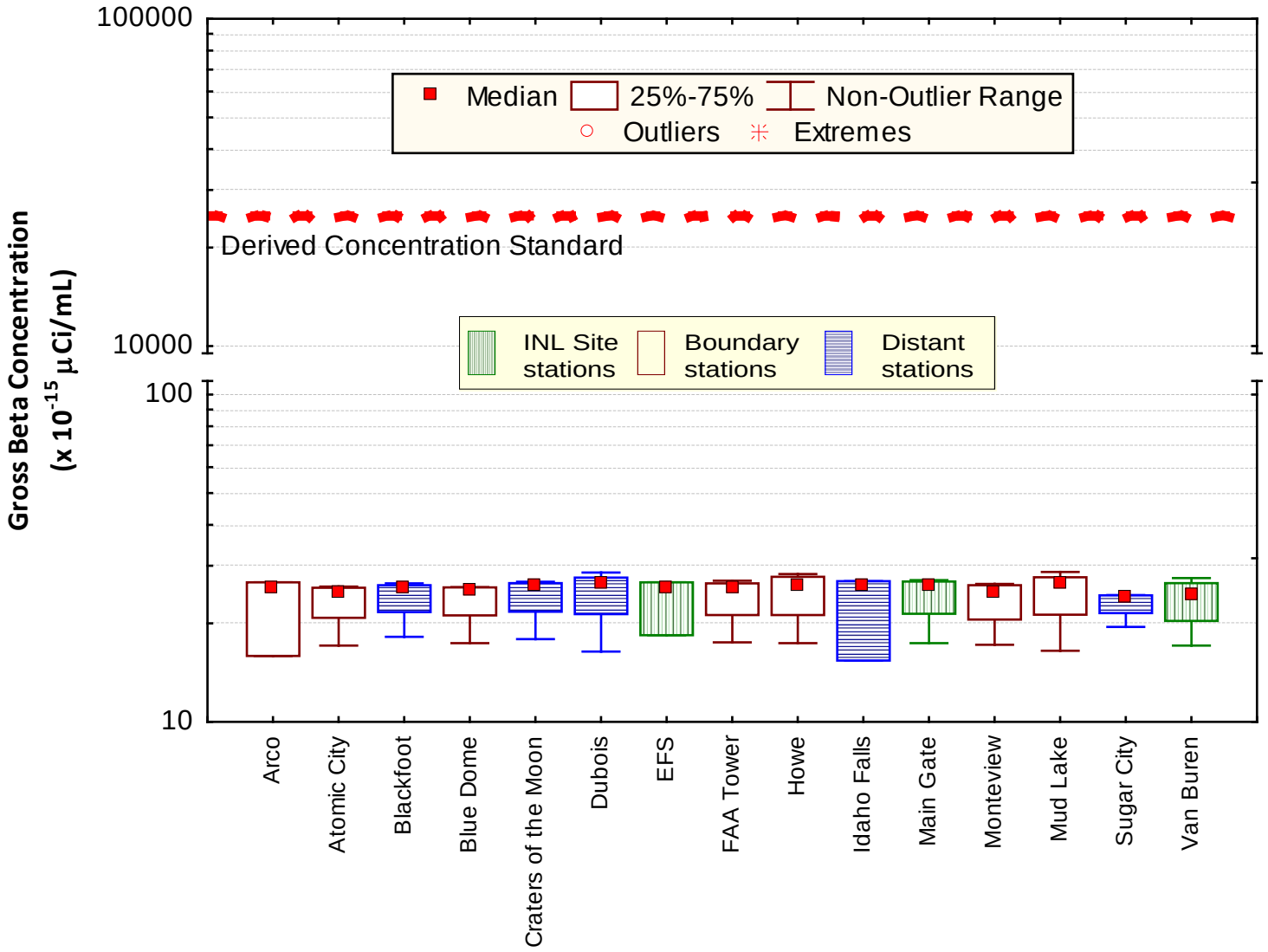

Figure 8. July gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location, except Arco, Idaho Falls, and EFS (N = 3).

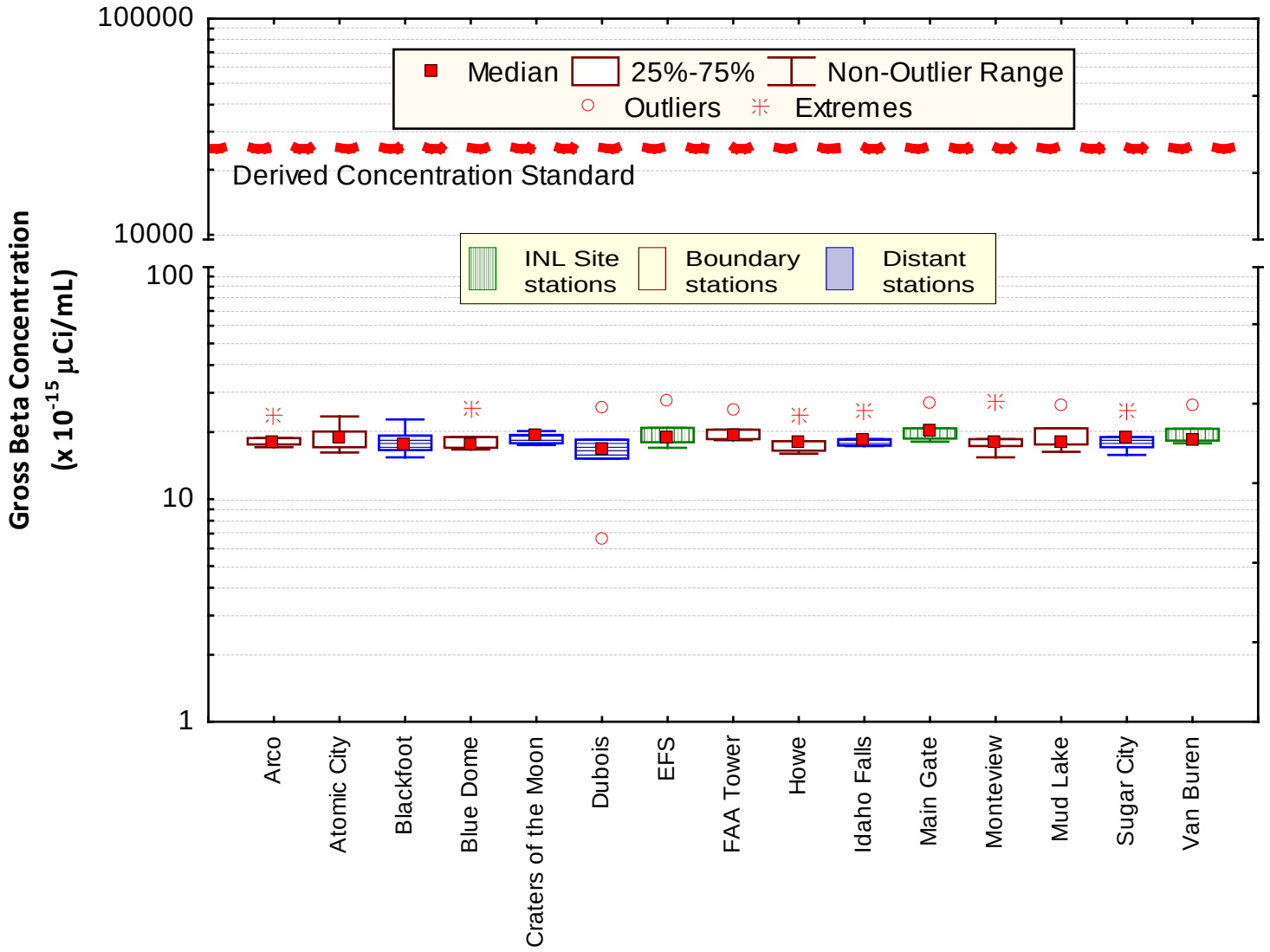

Figure 9. August gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location.

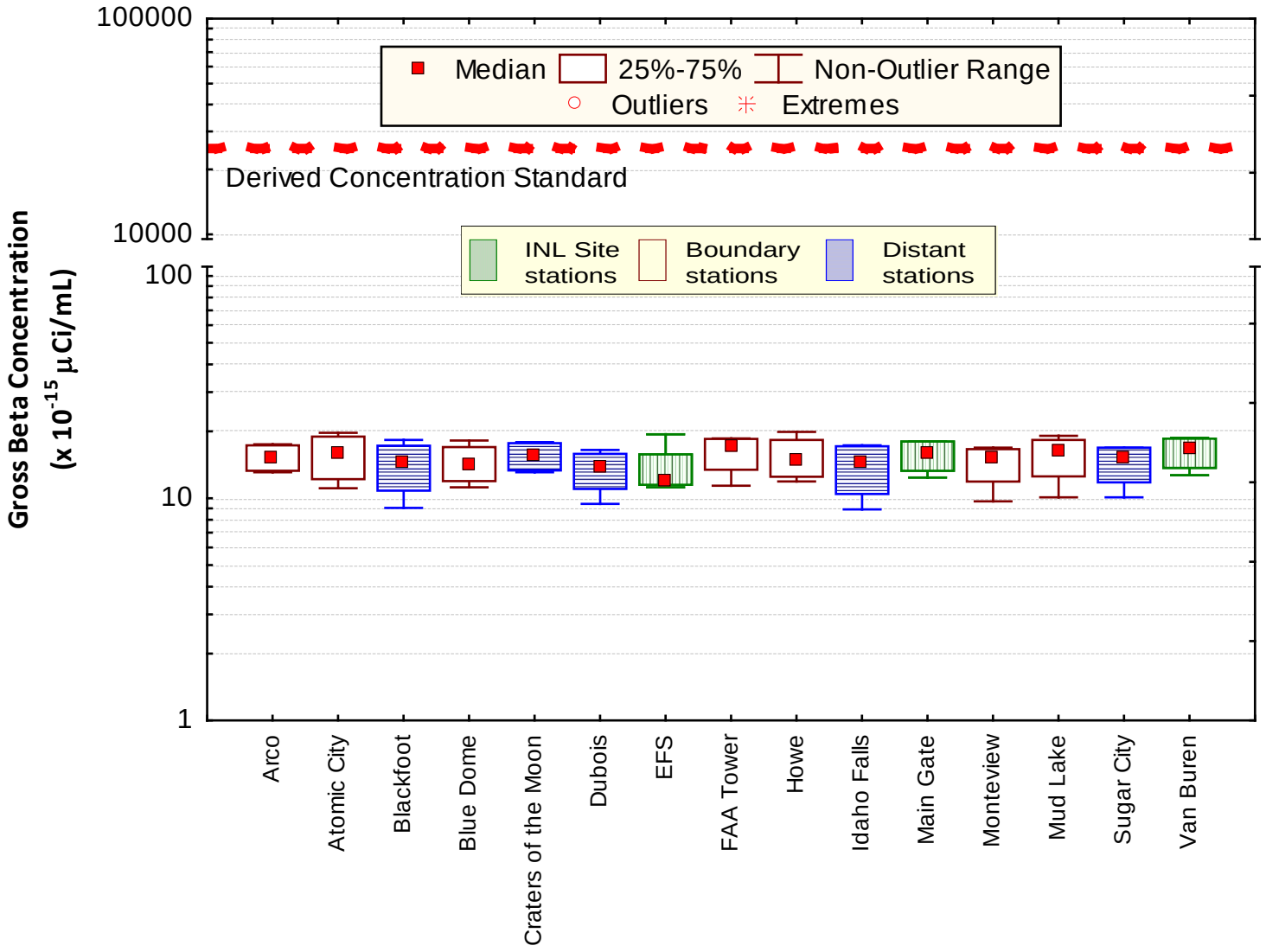

Figure 10. September gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

4. PRECIPITATION AND WATER SAMPLING

PRECIPITATION SAMPLING

Precipitation samples are gathered when sufficient precipitation occurs to allow for the collection of the minimum sample volume of approximately 50 mL. Samples are taken of monthly composites from Idaho Falls and CFA, and weekly from the EFS. Precipitation samples are analyzed for tritium. Storm events in the third quarter of 2016 produced sufficient precipitation to yield nine samples.

Tritium was measured above the 3s uncertainty values in 7 of the 9 samples. These results are listed in Table C-5 (Appendix C). Low levels of tritium exist in the environment at all times as a result of cosmic ray reactions with water molecules in the upper atmosphere and the remnants of fallout from nuclear weapons testing. When detected, tritium values have remained well within the historical range detected in ESER samples and within the range measured across the country by the EPA Radnet program (EPA 2015). Most samples have values up to about 150 pCi/L, with occasional values ranging up to about 300-400 pCi/L. The maximum value in the third quarter was 144 pCi/L in a July EFS sample.

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 and agricultural products samples available during the third quarter of 2016.

MILK SAMPLING

Milk samples were collected weekly in Idaho Falls. Monthly samples were collected at five other locations around the INL Site (Figure 11) during the third quarter of 2016. The Fort Hall dairy was not in operation during the quarter. 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.

Iodine-131 was not detected in any weekly or monthly samples during the third 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-6.

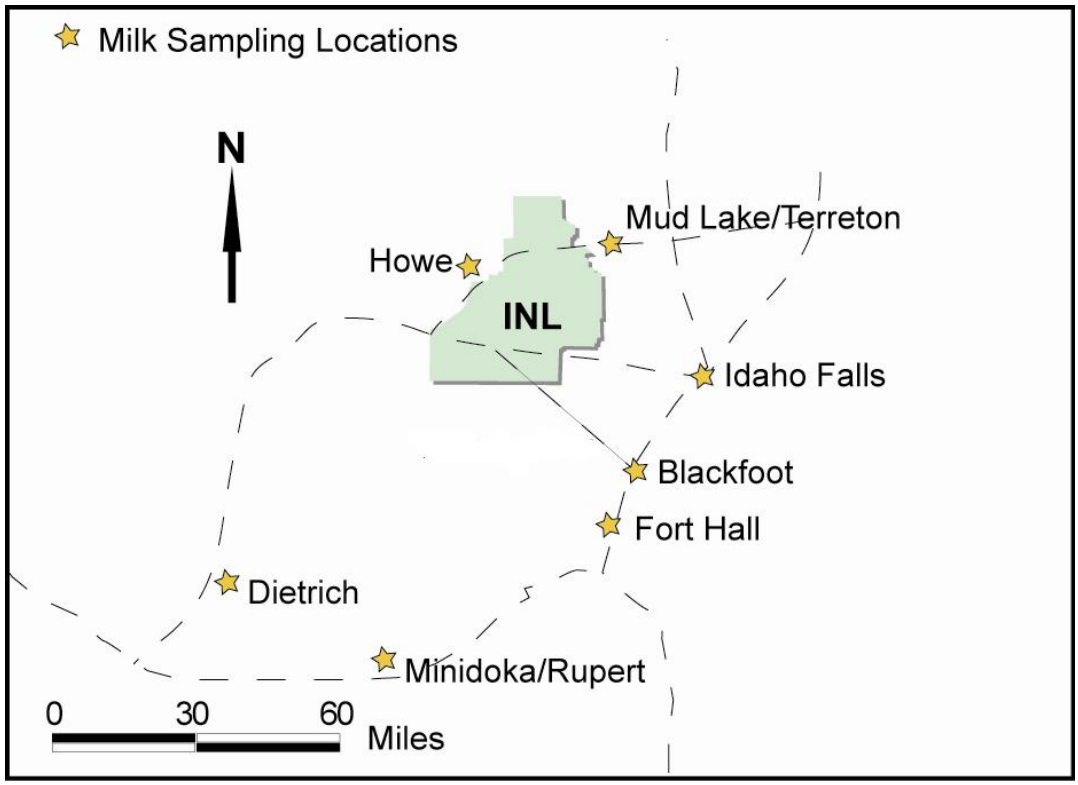

Figure 11. ESER milk sampling locations.

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Milk samples were collected weekly in Idaho Falls. Monthly samples were collected at five other locations around the INL Site (Figure 11) during the third quarter of 2016. The Fort Hall dairy was not in operation during the quarter. 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.

Iodine-131 was not detected in any weekly or monthly samples during the third 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-6.

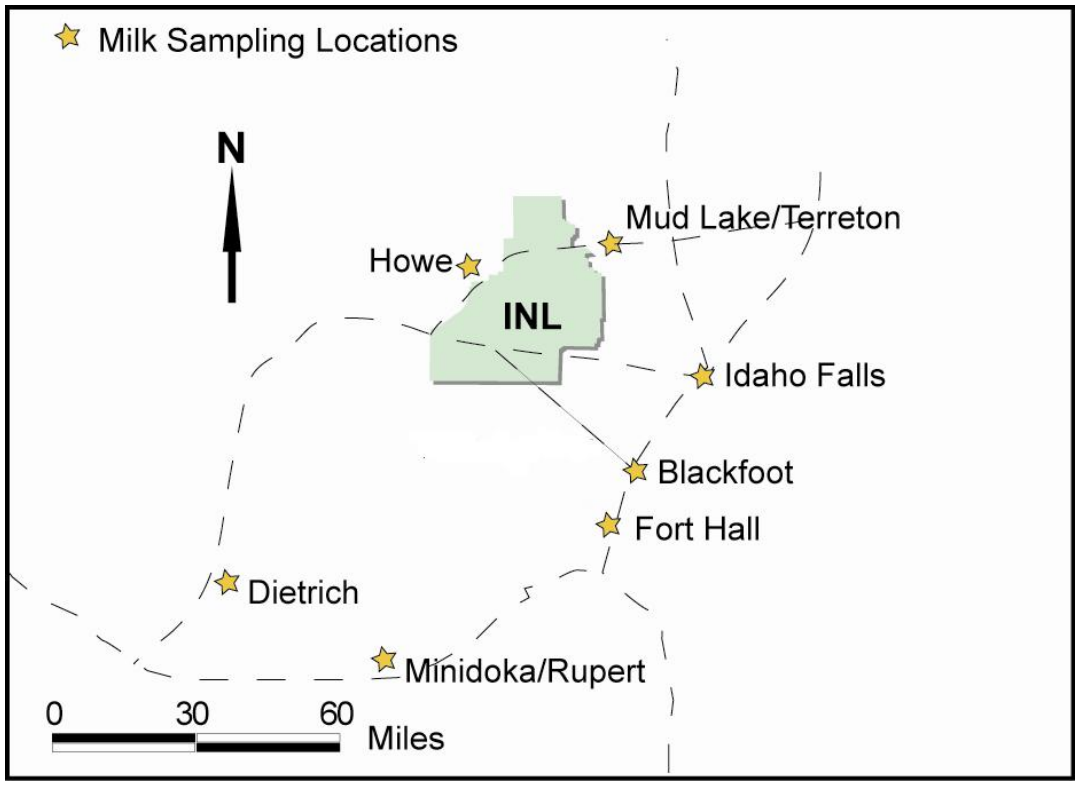

Figure 11. ESER milk sampling locations.

LETTUCE SAMPLING

Lettuce sampling was completed during the third quarter. A total of ten samples were collected, including a commercially-available sample from a grocery store. Five lettuce samples were collected from portable planters at Atomic City, EFS, the Federal Aviation Administration (FAA) Tower, Howe, and Monteview. In 2016, soil from the vicinity of the sampling locations was used in the planters. This soil was amended with potting soil as a gardener in the region would typically do when they grow their lettuce. In addition to the portable samplers, samples were obtained from gardens at Blackfoot, Idaho Falls, and Rigby.

No human-made gamma-emitting radionuclides were found in any of the samples. Strontium-90 was detected in all of the samples analyzed, except the grocery store sample which was just below the detection limit. Strontium-90 is present in the environment as a residual of fallout from aboveground nuclear weapons testing, which occurred between 1945 and 1980. This is the likely source for the measured results. Data for ^{137}Cs and ^{90}Sr in all lettuce samples taken during the third quarter are listed in Appendix C, Table C-7. During the summer of 2020, a review of Table C-7 determined the activity concentrations and uncertainty values reported for the media were correct, however, the unit of concentration listed in the column headings were incorrect. Prior to 2010, concentrations were reported in either pCi/g or pCi/kg. In 2010, the concentration unit of pCi/kg was adopted for reporting radionuclide concentrations in soil and biota (vegetation and animals). The reasons for doing this include: 1) the use of one unit (pCi/kg) ensures consistency and comparability in reporting concentrations in various media, 2) the use of one unit (pCi/kg) minimizes mistakes (due to confusion about units) in data entry into the database, and 3) the unit of pCi/kg was selected because it is the unit associated with models that are used for dose calculations and the results tend to be whole numbers (e.g. 14 pCi/kg versus 0.014 pCi/g). The column headings have been updated to the correct units of concentration (pCi/kg and Bq/kg).

GRAIN SAMPLING

Grain sampling (wheat and barley) was completed during the third quarter of 2016. A total of 10 grain samples (including one duplicate) were collected from local grain growers. In addition, a commercially-available sample was obtained from outside the local area. All samples were analyzed for gamma-emitting radionuclides and ^{90}Sr.

No human-made gamma-emitting radionuclides were detected in any grain sample. Two of the 11 grain samples collected in 2016 contained a detectable concentration of ^{90}Sr. A lower detection limit was achieved in 2016 and both detectable results were close to this lower limit. The measured concentrations were 3.0 pCi/kg from Arco and 3.6 pCi/kg from Idaho Falls. The concentrations of ^{90}Sr sometimes measured in grain are generally much less than those measured in lettuce and the frequency of detections is much lower. Agricultural products such as fruits and grains are naturally lower in radionuclides than green, leafy vegetables like lettuce (Pinder 1990). Data for ^{137}Cs and ^{90}Sr in all grain samples taken during the third quarter are listed in Appendix C, Table C-8.

LARGE GAME ANIMAL SAMPLING

No game animals were sampled during the third quarter.

SOIL SAMPLING

Thirteen soil samples (including one duplicate at Reno Ranch) were collected at boundary and distant locations in the third quarter. All samples were analyzed for gamma-emitting radionuclides, ^{241}Am, ^{238}Pu, $^{239/240}$Pu, and ^{90}Sr. Results can be found in Appendix C, Table C-9. A review of Appendix C, Table C-9, performed in the summer of 2020, determined the values listed in the table were correct with the exception of the ^{137}Cs result and uncertainty

values listed for a soil sample collected from Reno Ranch on July 12, 2016. The incorrect values for the Reno Ranch sample were due to the values not being updated following an internal assessment which discovered a miscalculation of the soil sample weight. The result and uncertainty values were updated with the correct values.

Cesium-137 was detected in all samples at concentrations consistent with historical measurements and is most likely present from past atmospheric nuclear weapons testing fallout. Similarly ^{90}Sr, another fallout radionuclide, was detected in all but one of the 13 soil samples at levels within historical measurements. Analysis of concentrations of ^{137}Cs and ^{90}Sr over time indicate that concentrations are decreasing in soil at a rate consistent with the approximate 30-year half-life of these radionuclides.

Plutonium-239/240 was above the detection limit in all of the samples analyzed. No particular trend has been seen over the past several years. This is consistent with the long half-life of the radionuclide. Improved methodologies used in the analysis of the 2016 samples resulted in some lower detection limits for the transuranic radionuclides. This resulted in detectable concentrations reported in four samples for ^{238}Pu and four samples for ^{241}Am. All were very near the detection limit and all were within the range considered to be background levels based on an analysis of historical soil data in the vicinity of the INL Site (BEA 2015).

6. QUALITY ASSURANCE

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

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

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

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

Assessments of ESER data quality are achieved through analysis of spike, performance evaluation, and duplicate samples; through sample recounts; through analysis of blank samples; and through comparison of sample results to established method quality objectives. These assessments are documented in the ESER Quality Assurance for the Third Quarter of 2016 (WAI 2017).

7. REFERENCES

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APPENDIX A

SUMMARY OF SAMPLING SCHEDULE

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

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

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

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

APPENDIX B

SUMMARY OF MDCs AND DCSs

Table B-1. Summary of Approximate Minimum Detectable Concentrations for Radiological Analyses Performed during Third Quarter 2016

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Standard[b] (DCS)
Air (particulate filter)[e]	Gross alpha[c]	4.28×10^{-16} µCi/mL	3.4×10^{-14} µCi/mL
	Gross beta[d]	1.04×10^{-15} µCi/mL	2.5×10^{-11} µCi/mL
	^{137}Cs	6.74×10^{-17} µCi/mL	9.8×10^{-11} µCi/mL
	^{90}Sr	2.98×10^{-17} µCi/mL	2.5×10^{-11} µCi/mL
	^{241}Am	5.37×10^{-18} µCi/mL	4.1×10^{-14} µCi/mL
	^{238}Pu	3.67×10^{-18} µCi/mL	3.7×10^{-14} µCi/mL
	$^{239/240}$Pu	1.44×10^{-18} µCi/mL	3.4×10^{-14} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	4.24×10^{-16} µCi/mL	2.3×10^{-19} µCi/mL
Air (atmospheric moisture)	^{3}H	81.2 pCi/L_{water}	2.1×10^{-7} µCi/mL_{air}
Air (precipitation)	^{3}H	91.2 pCi/L	1.9×10^{-3} µCi/mL
Milk	^{131}I	0.55 pCi/L	--
	^{137}Cs	0.85 pCi/L	--
Lettuce	^{137}Cs	1.83 pCi/kg	--
	^{90}Sr	10.9 pCi/kg	--
Grain	^{137}Cs	0.9 pCi/kg	--
	^{90}Sr	4.22 pCi/kg	--
Soil	^{137}Cs	0.6 pCi/kg	--
	^{90}Sr	62.8 pCi/kg	--
	^{241}Am	15.9 pCi/kg	--
	^{238}Pu	11.1 pCi/kg	--
	$^{239/240}$Pu	6.12 pCi/kg	--

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

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

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

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

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

APPENDIX C

SAMPLE ANALYSIS RESULTS

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

		GROSS ALPHA							GROSS BETA						
Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY															
ARCO	7/6/2016	1.28	±	0.18	4.74	±	0.67	Yes	25.60	±	0.64	94.72	±	2.37	Yes
	7/13/2016	1.12	±	0.17	4.14	±	0.64	Yes	15.90	±	0.56	58.83	±	2.08	Yes
a	7/20/2016		±			±		No		±			±		No
	7/27/2016	1.28	±	0.19	4.74	±	0.71	Yes	26.70	±	0.68	98.79	±	2.53	Yes
	8/3/2016	5.71	±	0.38	21.13	±	1.41	Yes	23.80	±	0.68	88.06	±	2.52	Yes
	8/10/2016	1.15	±	0.22	4.26	±	0.83	Yes	18.00	±	0.57	66.60	±	2.11	Yes
	8/17/2016	1.77	±	0.24	6.55	±	0.89	Yes	18.80	±	0.58	69.56	±	2.16	Yes
	8/24/2016	2.32	±	0.26	8.58	±	0.97	Yes	17.10	±	0.59	63.27	±	2.18	Yes
	8/31/2016	1.45	±	0.22	5.37	±	0.83	Yes	17.60	±	0.58	65.12	±	2.13	Yes
	9/7/2016	0.85	±	0.20	3.16	±	0.72	Yes	17.10	±	0.55	63.27	±	2.03	Yes
	9/14/2016	1.46	±	0.23	5.40	±	0.84	Yes	13.10	±	0.52	48.47	±	1.92	Yes
	9/21/2016	0.98	±	0.21	3.63	±	0.79	Yes	17.50	±	0.57	64.75	±	2.11	Yes
	9/28/2016	0.45	±	0.22	1.68	±	0.80	No	13.50	±	0.51	49.95	±	1.88	Yes
ATOMIC CITY	7/6/2016	0.98	±	0.17	3.63	±	0.61	Yes	25.50	±	0.63	94.35	±	2.33	Yes
	7/13/2016	0.94	±	0.16	3.47	±	0.59	Yes	17.10	±	0.56	63.27	±	2.08	Yes
	7/20/2016	1.36	±	0.18	5.03	±	0.68	Yes	24.50	±	0.62	90.65	±	2.29	Yes
	7/27/2016	1.43	±	0.19	5.29	±	0.69	Yes	25.90	±	0.63	95.83	±	2.34	Yes
	8/3/2016	2.32	±	0.25	8.58	±	0.94	Yes	23.50	±	0.62	86.95	±	2.28	Yes
	8/10/2016	1.18	±	0.22	4.37	±	0.80	Yes	17.10	±	0.54	63.27	±	2.01	Yes
	8/17/2016	1.68	±	0.23	6.22	±	0.84	Yes	20.10	±	0.57	74.37	±	2.12	Yes
	8/24/2016	1.70	±	0.23	6.29	±	0.84	Yes	18.60	±	0.58	68.82	±	2.13	Yes
	8/31/2016	1.61	±	0.22	5.96	±	0.83	Yes	16.20	±	0.54	59.94	±	2.01	Yes
	9/7/2016	0.78	±	0.20	2.87	±	0.73	Yes	18.20	±	0.57	67.34	±	2.12	Yes
	9/14/2016	0.65	±	0.19	2.42	±	0.69	Yes	11.10	±	0.48	41.07	±	1.78	Yes
	9/21/2016	1.23	±	0.23	4.55	±	0.83	Yes	19.70	±	0.60	72.89	±	2.20	Yes
	9/28/2016	0.20	±	0.21	0.72	±	0.76	No	13.30	±	0.50	49.21	±	1.86	Yes
BLUE DOME	7/6/2016	0.81	±	0.17	2.99	±	0.63	Yes	25.80	±	0.67	95.46	±	2.48	Yes
	7/13/2016	0.90	±	0.16	3.31	±	0.59	Yes	17.40	±	0.58	64.38	±	2.13	Yes
	7/20/2016	1.03	±	0.18	3.81	±	0.67	Yes	25.70	±	0.66	95.09	±	2.46	Yes
	7/27/2016	1.18	±	0.19	4.37	±	0.68	Yes	24.90	±	0.65	92.13	±	2.42	Yes
	8/3/2016	4.65	±	0.36	17.21	±	1.32	Yes	25.70	±	0.71	95.09	±	2.62	Yes
	8/10/2016	1.38	±	0.25	5.11	±	0.91	Yes	17.60	±	0.60	65.12	±	2.22	Yes
	8/17/2016	1.10	±	0.22	4.07	±	0.80	Yes	19.00	±	0.59	70.30	±	2.19	Yes
	8/24/2016	3.10	±	0.30	11.47	±	1.11	Yes	17.00	±	0.61	62.90	±	2.26	Yes
	8/31/2016	1.56	±	0.24	5.77	±	0.87	Yes	16.70	±	0.59	61.79	±	2.17	Yes
	9/7/2016	0.89	±	0.20	3.30	±	0.73	Yes	15.80	±	0.54	58.46	±	1.99	Yes
	9/14/2016	0.73	±	0.19	2.71	±	0.70	Yes	11.20	±	0.48	41.44	±	1.78	Yes
	9/21/2016	1.23	±	0.22	4.55	±	0.83	Yes	18.20	±	0.58	67.34	±	2.13	Yes
	9/28/2016	0.32	±	0.21	1.17	±	0.77	No	12.70	±	0.49	46.99	±	1.82	Yes
FAA TOWER	7/6/2016	1.23	±	0.19	4.55	±	0.71	Yes	27.00	±	0.69	99.90	±	2.56	Yes
	7/13/2016	0.95	±	0.16	3.50	±	0.60	Yes	17.50	±	0.58	64.75	±	2.13	Yes
	7/20/2016	0.77	±	0.17	2.84	±	0.63	Yes	24.90	±	0.66	92.13	±	2.45	Yes
	7/27/2016	1.28	±	0.19	4.74	±	0.70	Yes	26.00	±	0.66	96.20	±	2.45	Yes
	8/3/2016	2.85	±	0.29	10.55	±	1.05	Yes	25.00	±	0.66	92.50	±	2.45	Yes
	8/10/2016	1.47	±	0.23	5.44	±	0.87	Yes	18.60	±	0.58	68.82	±	2.13	Yes
	8/17/2016	1.83	±	0.25	6.77	±	0.94	Yes	20.50	±	0.63	75.85	±	2.32	Yes
	8/24/2016	1.99	±	0.26	7.36	±	0.95	Yes	19.30	±	0.62	71.41	±	2.29	Yes
	8/31/2016	1.66	±	0.25	6.14	±	0.91	Yes	18.40	±	0.62	68.08	±	2.28	Yes
	9/7/2016	0.83	±	0.20	3.08	±	0.75	Yes	18.40	±	0.59	68.08	±	2.16	Yes
	9/14/2016	0.72	±	0.19	2.66	±	0.71	Yes	11.40	±	0.49	42.18	±	1.82	Yes
	9/21/2016	0.83	±	0.21	3.05	±	0.77	Yes	18.60	±	0.58	68.82	±	2.15	Yes
	9/28/2016	0.25	±	0.21	0.94	±	0.79	No	15.50	±	0.54	57.35	±	1.99	Yes
HOWE	7/6/2016	1.44	±	0.20	5.33	±	0.73	Yes	28.30	±	0.69	104.71	±	2.56	Yes
	7/13/2016	0.76	±	0.15	2.80	±	0.56	Yes	17.40	±	0.57	64.38	±	2.12	Yes
	7/20/2016	1.04	±	0.18	3.85	±	0.65	Yes	25.00	±	0.65	92.50	±	2.40	Yes
	7/27/2016	1.33	±	0.19	4.92	±	0.70	Yes	27.20	±	0.66	100.64	±	2.46	Yes
	8/3/2016	4.70	±	0.36	17.39	±	1.31	Yes	23.70	±	0.68	87.69	±	2.52	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**
	8/10/2016	1.48	±	0.22	5.48	±	0.81	**Yes**	16.50	±	0.52	61.05	±	1.92	**Yes**
	8/17/2016	1.46	±	0.22	5.40	±	0.80	**Yes**	18.00	±	0.54	66.60	±	2.01	**Yes**
	8/24/2016	2.13	±	0.25	7.88	±	0.91	**Yes**	18.20	±	0.58	67.34	±	2.13	**Yes**
	8/31/2016	1.60	±	0.22	5.92	±	0.80	**Yes**	16.00	±	0.53	59.20	±	1.96	**Yes**
	9/7/2016	1.29	±	0.19	4.77	±	0.72	**Yes**	16.70	±	0.50	61.79	±	1.85	**Yes**
	9/14/2016	0.79	±	0.18	2.93	±	0.65	**Yes**	11.90	±	0.45	44.03	±	1.67	**Yes**
	9/21/2016	1.07	±	0.22	3.96	±	0.80	**Yes**	19.90	±	0.59	73.63	±	2.17	**Yes**
	9/28/2016	0.43	±	0.20	1.58	±	0.75	No	13.10	±	0.48	48.47	±	1.79	**Yes**
MONTEVIEW	7/6/2016	1.29	±	0.19	4.77	±	0.70	**Yes**	25.90	±	0.66	95.83	±	2.45	**Yes**
	7/13/2016	0.97	±	0.16	3.57	±	0.60	**Yes**	17.20	±	0.57	63.64	±	2.10	**Yes**
	7/20/2016	0.80	±	0.17	2.95	±	0.61	**Yes**	23.90	±	0.64	88.43	±	2.37	**Yes**
	7/27/2016	1.30	±	0.19	4.81	±	0.71	**Yes**	26.40	±	0.67	97.68	±	2.49	**Yes**
	8/3/2016	3.48	±	0.38	12.88	±	1.40	**Yes**	27.30	±	0.84	101.01	±	3.12	**Yes**
	8/10/2016	1.66	±	0.24	6.14	±	0.90	**Yes**	18.60	±	0.58	68.82	±	2.15	**Yes**
	8/17/2016	1.13	±	0.22	4.18	±	0.81	**Yes**	17.90	±	0.58	66.23	±	2.14	**Yes**
	8/24/2016	1.97	±	0.24	7.29	±	0.89	**Yes**	17.30	±	0.57	64.01	±	2.09	**Yes**
	8/31/2016	1.26	±	0.21	4.66	±	0.77	**Yes**	15.40	±	0.53	56.98	±	1.96	**Yes**
	9/7/2016	1.20	±	0.22	4.44	±	0.80	**Yes**	16.40	±	0.56	60.68	±	2.06	**Yes**
	9/14/2016	0.99	±	0.20	3.67	±	0.73	**Yes**	9.69	±	0.46	35.85	±	1.68	**Yes**
	9/21/2016	1.26	±	0.22	4.66	±	0.83	**Yes**	16.90	±	0.56	62.53	±	2.07	**Yes**
	9/28/2016	0.49	±	0.22	1.82	±	0.80	No	14.10	±	0.51	52.17	±	1.89	**Yes**
MUD LAKE	7/6/2016	1.46	±	0.20	5.40	±	0.73	**Yes**	26.60	±	0.67	98.42	±	2.49	**Yes**
	7/13/2016	0.95	±	0.16	3.50	±	0.58	**Yes**	16.50	±	0.55	61.05	±	2.02	**Yes**
	7/20/2016	1.46	±	0.20	5.40	±	0.74	**Yes**	28.70	±	0.70	106.19	±	2.59	**Yes**
	7/27/2016	1.47	±	0.19	5.44	±	0.70	**Yes**	26.00	±	0.64	96.20	±	2.35	**Yes**
	8/3/2016	3.45	±	0.29	12.77	±	1.07	**Yes**	26.10	±	0.64	96.57	±	2.36	**Yes**
	8/10/2016	1.33	±	0.21	4.92	±	0.78	**Yes**	18.00	±	0.53	66.60	±	1.97	**Yes**
	8/17/2016	1.52	±	0.22	5.62	±	0.83	**Yes**	20.80	±	0.58	76.96	±	2.16	**Yes**
	8/24/2016	1.78	±	0.22	6.59	±	0.82	**Yes**	16.30	±	0.53	60.31	±	1.96	**Yes**
	8/31/2016	1.20	±	0.21	4.44	±	0.76	**Yes**	17.60	±	0.55	65.12	±	2.05	**Yes**
	9/7/2016	1.20	±	0.21	4.44	±	0.79	**Yes**	17.50	±	0.56	64.75	±	2.08	**Yes**
	9/14/2016	0.75	±	0.20	2.76	±	0.73	**Yes**	10.10	±	0.48	37.37	±	1.78	**Yes**
	9/21/2016	1.18	±	0.22	4.37	±	0.82	**Yes**	19.10	±	0.59	70.67	±	2.17	**Yes**
	9/28/2016	0.97	±	0.25	3.58	±	0.91	**Yes**	15.00	±	0.54	55.50	±	2.00	**Yes**
DISTANT															
BLACKFOOT	7/6/2016	1.37	±	0.18	5.07	±	0.67	**Yes**	25.80	±	0.63	95.46	±	2.32	**Yes**
	7/13/2016	0.88	±	0.16	3.26	±	0.57	**Yes**	18.20	±	0.57	67.34	±	2.11	**Yes**
	7/20/2016	1.18	±	0.19	4.37	±	0.69	**Yes**	25.10	±	0.66	92.87	±	2.43	**Yes**
	7/27/2016	1.09	±	0.18	4.03	±	0.65	**Yes**	26.50	±	0.65	98.05	±	2.40	**Yes**
	8/3/2016	1.82	±	0.23	6.73	±	0.85	**Yes**	22.80	±	0.60	84.36	±	2.20	**Yes**
	8/10/2016	1.13	±	0.23	4.18	±	0.84	**Yes**	15.40	±	0.56	56.98	±	2.05	**Yes**
	8/17/2016	1.26	±	0.21	4.66	±	0.78	**Yes**	19.30	±	0.57	71.41	±	2.09	**Yes**
	8/24/2016	1.79	±	0.23	6.62	±	0.83	**Yes**	16.60	±	0.54	61.42	±	2.00	**Yes**
	8/31/2016	1.48	±	0.22	5.48	±	0.80	**Yes**	17.70	±	0.55	65.49	±	2.04	**Yes**
	9/7/2016	0.88	±	0.19	3.26	±	0.72	**Yes**	16.20	±	0.53	59.94	±	1.98	**Yes**
	9/14/2016	0.24	±	0.19	0.87	±	0.71	No	9.05	±	0.51	33.49	±	1.90	**Yes**
	9/21/2016	1.00	±	0.22	3.68	±	0.81	**Yes**	18.30	±	0.59	67.71	±	2.17	**Yes**
	9/28/2016	0.39	±	0.20	1.45	±	0.74	No	12.60	±	0.47	46.62	±	1.75	**Yes**
QA-1	7/6/2016	1.12	±	0.17	4.14	±	0.62	**Yes**	23.40	±	0.59	86.58	±	2.20	**Yes**
(BLACKFOOT)	7/13/2016	1.07	±	0.16	3.96	±	0.60	**Yes**	18.00	±	0.56	66.60	±	2.05	**Yes**
	7/20/2016	1.42	±	0.19	5.25	±	0.70	**Yes**	25.60	±	0.64	94.72	±	2.37	**Yes**
	7/27/2016	1.18	±	0.17	4.37	±	0.64	**Yes**	23.80	±	0.61	88.06	±	2.25	**Yes**
	8/3/2016	1.51	±	0.21	5.59	±	0.79	**Yes**	20.80	±	0.57	76.96	±	2.09	**Yes**
	8/10/2016	1.20	±	0.22	4.44	±	0.83	**Yes**	16.20	±	0.55	59.94	±	2.04	**Yes**
	8/17/2016	1.38	±	0.21	5.11	±	0.78	**Yes**	20.00	±	0.56	74.00	±	2.08	**Yes**
	8/24/2016	1.54	±	0.21	5.70	±	0.78	**Yes**	16.90	±	0.53	62.53	±	1.95	**Yes**
	8/31/2016	1.52	±	0.22	5.62	±	0.82	**Yes**	18.20	±	0.57	67.34	±	2.11	**Yes**
	9/7/2016	1.07	±	0.21	3.96	±	0.76	**Yes**	16.70	±	0.55	61.79	±	2.03	**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
		9/14/2016	0.82	±	0.19	3.02	±	0.72	Yes	10.20	±	0.47	37.74	±	1.74	Yes
		9/21/2016	1.13	±	0.22	4.18	±	0.80	Yes	19.60	±	0.58	72.52	±	2.16	Yes
		9/28/2016	0.44	±	0.20	1.64	±	0.73	No	13.50	±	0.47	49.95	±	1.75	Yes
CRATERS OF		7/6/2016	1.38	±	0.19	5.11	±	0.71	Yes	26.30	±	0.66	97.31	±	2.45	Yes
THE MOON		7/13/2016	1.07	±	0.16	3.96	±	0.61	Yes	17.90	±	0.56	66.23	±	2.09	Yes
		7/20/2016	1.08	±	0.19	4.00	±	0.68	Yes	26.80	±	0.68	99.16	±	2.53	Yes
		7/27/2016	1.16	±	0.19	4.29	±	0.70	Yes	25.50	±	0.68	94.35	±	2.50	Yes
		8/3/2016	3.73	±	0.30	13.80	±	1.10	Yes	20.20	±	0.59	74.74	±	2.17	Yes
		8/10/2016	1.86	±	0.27	6.88	±	1.00	Yes	17.80	±	0.62	65.86	±	2.28	Yes
		8/17/2016	2.14	±	0.26	7.92	±	0.96	Yes	19.40	±	0.60	71.78	±	2.23	Yes
		8/24/2016	2.13	±	0.27	7.88	±	0.99	Yes	19.20	±	0.64	71.04	±	2.36	Yes
		8/31/2016	1.31	±	0.22	4.85	±	0.80	Yes	17.50	±	0.57	64.75	±	2.11	Yes
		9/7/2016	1.27	±	0.21	4.70	±	0.76	Yes	17.90	±	0.54	66.23	±	2.01	Yes
		9/14/2016	0.73	±	0.19	2.69	±	0.70	Yes	13.10	±	0.50	48.47	±	1.86	Yes
		9/21/2016	1.22	±	0.22	4.51	±	0.80	Yes	17.50	±	0.56	64.75	±	2.05	Yes
		9/28/2016	0.03	±	0.20	0.10	±	0.75	No	13.60	±	0.52	50.32	±	1.91	Yes
a		7/6/2016	1.13	±	0.19	4.18	±	0.68	Yes	28.60	±	0.70	105.82	±	2.58	Yes
		7/13/2016	0.92	±	0.15	3.40	±	0.57	Yes	16.40	±	0.54	60.68	±	1.98	Yes
		7/20/2016	1.33	±	0.20	4.92	±	0.73	Yes	26.30	±	0.69	97.31	±	2.54	Yes
		7/27/2016	1.19	±	0.18	4.40	±	0.67	Yes	26.60	±	0.65	98.42	±	2.42	Yes
		8/3/2016	2.86	±	0.28	10.58	±	1.02	Yes	25.90	±	0.65	95.83	±	2.41	Yes
		8/10/2016	1.34	±	0.23	4.96	±	0.84	Yes	16.70	±	0.55	61.79	±	2.05	Yes
		8/17/2016	1.44	±	0.23	5.33	±	0.83	Yes	18.50	±	0.57	68.45	±	2.11	Yes
		8/24/2016	1.53	±	0.23	5.66	±	0.84	Yes	15.20	±	0.55	56.24	±	2.04	Yes
		8/31/2016	0.50	±	0.17	1.84	±	0.61	No	6.53	±	0.41	24.16	±	1.52	Yes
		9/7/2016	0.95	±	0.19	3.53	±	0.70	Yes	15.20	±	0.51	56.24	±	1.88	Yes
		9/14/2016	0.82	±	0.19	3.02	±	0.71	Yes	9.44	±	0.46	34.93	±	1.70	Yes
		9/21/2016	0.50	±	0.18	1.86	±	0.65	No	16.50	±	0.52	61.05	±	1.92	Yes
		9/28/2016	0.29	±	0.22	1.06	±	0.80	No	12.60	±	0.51	46.62	±	1.88	Yes
IDAHO FALLS	a	7/6/2016		±			±		No		±			±		No
		7/13/2016	0.70	±	0.17	2.57	±	0.64	Yes	15.40	±	0.64	56.98	±	2.35	Yes
		7/20/2016	1.45	±	0.20	5.37	±	0.75	Yes	25.90	±	0.69	95.83	±	2.54	Yes
		7/27/2016	1.56	±	0.20	5.77	±	0.74	Yes	26.90	±	0.67	99.53	±	2.49	Yes
		8/3/2016	2.34	±	0.26	8.66	±	0.98	Yes	24.90	±	0.65	92.13	±	2.41	Yes
		8/10/2016	1.44	±	0.23	5.33	±	0.85	Yes	18.60	±	0.57	68.82	±	2.12	Yes
		8/17/2016	1.59	±	0.23	5.88	±	0.84	Yes	18.40	±	0.56	68.08	±	2.08	Yes
		8/24/2016	2.20	±	0.24	8.14	±	0.90	Yes	17.40	±	0.56	64.38	±	2.06	Yes
		8/31/2016	2.13	±	0.25	7.88	±	0.94	Yes	17.30	±	0.58	64.01	±	2.15	Yes
		9/7/2016	0.96	±	0.19	3.54	±	0.69	Yes	17.00	±	0.52	62.90	±	1.92	Yes
		9/14/2016	0.59	±	0.18	2.17	±	0.65	Yes	8.91	±	0.44	32.97	±	1.61	Yes
		9/21/2016	1.23	±	0.20	4.55	±	0.75	Yes	17.30	±	0.52	64.01	±	1.94	Yes
		9/28/2016	0.65	±	0.20	2.42	±	0.74	Yes	12.00	±	0.45	44.40	±	1.66	Yes
SUGAR CITY		7/6/2016	1.13	±	0.17	4.18	±	0.64	Yes	24.30	±	0.62	89.91	±	2.28	Yes
		7/13/2016	0.93	±	0.16	3.43	±	0.58	Yes	19.50	±	0.58	72.15	±	2.13	Yes
		7/20/2016	1.05	±	0.17	3.89	±	0.63	Yes	23.50	±	0.61	86.95	±	2.27	Yes
		7/27/2016	1.24	±	0.17	4.59	±	0.64	Yes	24.40	±	0.61	90.28	±	2.24	Yes
		8/3/2016	1.97	±	0.23	7.29	±	0.84	Yes	25.20	±	0.60	93.24	±	2.22	Yes
		8/10/2016	1.70	±	0.22	6.29	±	0.82	Yes	19.00	±	0.53	70.30	±	1.97	Yes
		8/17/2016	1.70	±	0.22	6.29	±	0.80	Yes	18.90	±	0.54	69.93	±	1.99	Yes
		8/24/2016	1.84	±	0.22	6.81	±	0.81	Yes	17.10	±	0.53	63.27	±	1.95	Yes
		8/31/2016	1.83	±	0.22	6.77	±	0.80	Yes	15.80	±	0.50	58.46	±	1.86	Yes
		9/7/2016	1.13	±	0.19	4.18	±	0.70	Yes	16.90	±	0.51	62.53	±	1.88	Yes
		9/14/2016	0.81	±	0.18	2.98	±	0.67	Yes	10.10	±	0.44	37.37	±	1.64	Yes
		9/21/2016	1.41	±	0.21	5.22	±	0.78	Yes	16.90	±	0.52	62.53	±	1.94	Yes
		9/28/2016	0.62	±	0.23	2.30	±	0.84	No	13.50	±	0.51	49.95	±	1.90	Yes
QA-2		7/6/2016	1.48	±	0.20	5.48	±	0.75	Yes	26.60	±	0.69	98.42	±	2.54	Yes
a		7/13/2016	1.30	±	0.18	4.81	±	0.68	Yes	19.20	±	0.61	71.04	±	2.25	Yes
		7/20/2016	1.34	±	0.20	4.96	±	0.75	Yes	28.20	±	0.72	104.34	±	2.66	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**
	7/27/2016	1.39	±	0.20	5.14	±	0.75	**Yes**	31.30	±	0.74	115.81	±	2.73	**Yes**
	8/3/2016	2.18	±	0.28	8.07	±	1.03	**Yes**	25.80	±	0.71	95.46	±	2.61	**Yes**
	8/10/2016	1.40	±	0.25	5.18	±	0.92	**Yes**	22.20	±	0.65	82.14	±	2.40	**Yes**
	8/17/2016	1.63	±	0.26	6.03	±	0.97	**Yes**	23.50	±	0.69	86.95	±	2.55	**Yes**
	8/24/2016	2.39	±	0.28	8.84	±	1.05	**Yes**	20.00	±	0.66	74.00	±	2.45	**Yes**
	8/31/2016	2.38	±	0.29	8.81	±	1.08	**Yes**	18.40	±	0.66	68.08	±	2.43	**Yes**
	9/7/2016	1.19	±	0.23	4.40	±	0.84	**Yes**	20.20	±	0.62	74.74	±	2.30	**Yes**
	9/14/2016	0.86	±	0.23	3.19	±	0.84	**Yes**	10.10	±	0.54	37.37	±	1.99	**Yes**
	9/21/2016	1.28	±	0.24	4.74	±	0.89	**Yes**	19.90	±	0.63	73.63	±	2.32	**Yes**
	9/28/2016	0.44	±	0.25	1.64	±	0.91	No	15.50	±	0.58	57.35	±	2.15	**Yes**
INL SITE															
EFS	7/6/2016	1.21	±	0.19	4.48	±	0.68	**Yes**	26.70	±	0.67	98.79	±	2.48	**Yes**
	7/13/2016	1.33	±	0.18	4.92	±	0.66	**Yes**	18.40	±	0.58	68.08	±	2.15	**Yes**
	7/20/2016	1.25	±	0.19	4.63	±	0.71	**Yes**	25.80	±	0.67	95.46	±	2.49	**Yes**
a	7/27/2016		±			±		No		±			±		No
	8/3/2016	4.28	±	0.48	15.84	±	1.77	**Yes**	27.50	±	1.00	101.75	±	3.70	**Yes**
	8/10/2016	2.13	±	0.31	7.88	±	1.15	**Yes**	19.00	±	0.69	70.30	±	2.56	**Yes**
	8/17/2016	1.83	±	0.27	6.77	±	1.00	**Yes**	20.90	±	0.67	77.33	±	2.47	**Yes**
	8/24/2016	2.25	±	0.27	8.33	±	1.00	**Yes**	17.00	±	0.61	62.90	±	2.26	**Yes**
	8/31/2016	1.71	±	0.27	6.33	±	1.00	**Yes**	18.00	±	0.66	66.60	±	2.45	**Yes**
	9/7/2016	0.86	±	0.20	3.18	±	0.73	**Yes**	11.80	±	0.50	43.66	±	1.84	**Yes**
	9/14/2016	1.18	±	0.23	4.37	±	0.85	**Yes**	12.10	±	0.54	44.77	±	1.99	**Yes**
	9/21/2016	0.79	±	0.21	2.93	±	0.79	**Yes**	11.20	±	0.52	41.44	±	1.92	**Yes**
	9/28/2016	0.41	±	0.30	1.50	±	1.11	No	19.40	±	0.73	71.78	±	2.69	**Yes**
MAIN GATE	7/6/2016	1.10	±	0.18	4.07	±	0.67	**Yes**	25.40	±	0.66	93.98	±	2.44	**Yes**
	7/13/2016	1.29	±	0.18	4.77	±	0.66	**Yes**	17.40	±	0.57	64.38	±	2.11	**Yes**
	7/20/2016	0.83	±	0.18	3.06	±	0.65	**Yes**	26.60	±	0.69	98.42	±	2.55	**Yes**
	7/27/2016	1.41	±	0.20	5.22	±	0.72	**Yes**	27.10	±	0.68	100.27	±	2.50	**Yes**
	8/3/2016	3.78	±	0.31	13.99	±	1.14	**Yes**	26.90	±	0.67	99.53	±	2.47	**Yes**
	8/10/2016	1.67	±	0.24	6.18	±	0.88	**Yes**	20.20	±	0.59	74.74	±	2.16	**Yes**
	8/17/2016	1.47	±	0.23	5.44	±	0.84	**Yes**	20.80	±	0.59	76.96	±	2.20	**Yes**
	8/24/2016	2.49	±	0.26	9.21	±	0.95	**Yes**	18.70	±	0.58	69.19	±	2.14	**Yes**
	8/31/2016	1.15	±	0.20	4.26	±	0.75	**Yes**	18.10	±	0.56	66.97	±	2.06	**Yes**
	9/7/2016	1.55	±	0.35	5.74	±	1.29	**Yes**	18.00	±	0.84	66.60	±	3.12	**Yes**
	9/14/2016	0.68	±	0.24	2.51	±	0.90	No	12.40	±	0.62	45.88	±	2.28	**Yes**
	9/21/2016	1.15	±	0.20	4.26	±	0.75	**Yes**	18.00	±	0.54	66.60	±	1.99	**Yes**
	9/28/2016	0.12	±	0.21	0.43	±	0.79	No	14.20	±	0.54	52.54	±	1.98	**Yes**
VAN BUREN GATE	7/6/2016	1.09	±	0.17	4.03	±	0.64	**Yes**	23.60	±	0.62	87.32	±	2.29	**Yes**
	7/13/2016	0.91	±	0.16	3.37	±	0.59	**Yes**	17.10	±	0.56	63.27	±	2.09	**Yes**
	7/20/2016	0.97	±	0.18	3.60	±	0.65	**Yes**	25.60	±	0.66	94.72	±	2.44	**Yes**
	7/27/2016	1.55	±	0.20	5.74	±	0.74	**Yes**	27.50	±	0.68	101.75	±	2.51	**Yes**
	8/3/2016	4.22	±	0.33	15.61	±	1.21	**Yes**	26.10	±	0.68	96.57	±	2.50	**Yes**
	8/10/2016	1.45	±	0.23	5.37	±	0.84	**Yes**	18.50	±	0.56	68.45	±	2.07	**Yes**
	8/17/2016	1.67	±	0.24	6.18	±	0.88	**Yes**	20.70	±	0.60	76.59	±	2.23	**Yes**
	8/24/2016	2.09	±	0.25	7.73	±	0.92	**Yes**	18.30	±	0.59	67.71	±	2.18	**Yes**
	8/31/2016	2.32	±	0.26	8.58	±	0.94	**Yes**	17.80	±	0.58	65.86	±	2.13	**Yes**
	9/7/2016	1.02	±	0.20	3.77	±	0.75	**Yes**	18.40	±	0.56	68.08	±	2.08	**Yes**
	9/14/2016	0.65	±	0.19	2.42	±	0.69	**Yes**	12.70	±	0.50	46.99	±	1.85	**Yes**
	9/21/2016	0.89	±	0.21	3.31	±	0.76	**Yes**	18.70	±	0.57	69.19	±	2.11	**Yes**
	9/28/2016	0.33	±	0.23	1.24	±	0.83	No	14.70	±	0.54	54.39	±	2.01	**Yes**

a. Invalid sample result shown in red

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
ARCO	07/06/2016	0.16	±	1.09	0.59	±	4.03	No
	07/13/2016	-0.60	±	1.22	-2.20	±	4.51	No
a	07/20/2016		±			±		No
	07/27/2016	-0.28	±	1.24	-1.02	±	4.59	No
	08/03/2016	-0.63	±	1.37	-2.32	±	5.07	No
	08/10/2016	-0.59	±	1.17	-2.17	±	4.33	No
	08/17/2016	-0.31	±	1.20	-1.14	±	4.44	No
	08/24/2016	-1.33	±	1.30	-4.92	±	4.81	No
	08/31/2016	0.61	±	1.25	2.26	±	4.63	No
	09/07/2016	0.35	±	1.14	1.29	±	4.22	No
	09/14/2016	1.56	±	1.23	5.77	±	4.55	No
	09/21/2016	0.24	±	1.23	0.88	±	4.55	No
	09/28/2016	1.92	±	1.26	7.10	±	4.66	No
ATOMIC CITY	07/06/2016	0.16	±	1.07	0.58	±	3.96	No
	07/13/2016	-0.58	±	1.18	-2.13	±	4.37	No
	07/20/2016	0.95	±	1.11	3.51	±	4.11	No
	07/27/2016	-0.25	±	1.11	-0.91	±	4.11	No
	08/03/2016	-0.55	±	1.20	-2.03	±	4.44	No
	08/10/2016	-0.56	±	1.12	-2.07	±	4.14	No
	08/17/2016	-0.29	±	1.13	-1.07	±	4.18	No
	08/24/2016	-1.23	±	1.20	-4.55	±	4.44	No
	08/31/2016	0.59	±	1.20	2.16	±	4.44	No
	09/07/2016	0.36	±	1.18	1.34	±	4.37	No
	09/14/2016	1.51	±	1.19	5.59	±	4.40	No
	09/21/2016	0.24	±	1.24	0.88	±	4.59	No
	09/28/2016	1.91	±	1.26	7.07	±	4.66	No
BLUE DOME	07/06/2016	0.98	±	1.13	3.61	±	4.18	No
	07/13/2016	0.62	±	1.07	2.30	±	3.96	No
	07/20/2016	-1.86	±	1.12	-6.88	±	4.14	No
	07/27/2016	1.14	±	1.12	4.22	±	4.14	No
	08/03/2016	0.14	±	1.24	0.53	±	4.59	No
	08/10/2016	0.02	±	1.14	0.07	±	4.22	No
	08/17/2016	0.37	±	1.12	1.38	±	4.14	No
	08/24/2016	0.34	±	1.22	1.27	±	4.51	No
	08/31/2016	0.19	±	1.20	0.70	±	4.44	No
	09/07/2016	0.42	±	1.04	1.54	±	3.85	No
	09/14/2016	-1.04	±	1.04	-3.85	±	3.85	No
	09/21/2016	-1.60	±	1.16	-5.92	±	4.29	No
	09/28/2016	0.36	±	1.07	1.34	±	3.96	No
FAA TOWER	07/06/2016	1.00	±	1.16	3.69	±	4.29	No
	07/13/2016	0.62	±	1.07	2.31	±	3.96	No
	07/20/2016	-1.89	±	1.14	-6.99	±	4.22	No
	07/27/2016	1.13	±	1.11	4.18	±	4.11	No
	08/03/2016	0.13	±	1.14	0.49	±	4.22	No
	08/10/2016	0.02	±	1.05	0.07	±	3.89	No
	08/17/2016	0.39	±	1.18	1.45	±	4.37	No
	08/24/2016	0.33	±	1.18	1.23	±	4.37	No
	08/31/2016	0.20	±	1.24	0.73	±	4.59	No
	09/07/2016	0.44	±	1.09	1.62	±	4.03	No
	09/14/2016	-1.07	±	1.06	-3.96	±	3.92	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
	09/21/2016	-1.61	±	1.17	-5.96	±	4.33	No
	09/28/2016	0.38	±	1.11	1.40	±	4.11	No
HOWE	07/06/2016	0.96	±	1.12	3.57	±	4.14	No
	07/13/2016	0.62	±	1.07	2.29	±	3.96	No
	07/20/2016	-1.82	±	1.10	-6.73	±	4.07	No
	07/27/2016	1.10	±	1.08	4.07	±	4.00	No
	08/03/2016	0.14	±	1.22	0.53	±	4.51	No
	08/10/2016	0.02	±	0.95	0.06	±	3.52	No
	08/17/2016	0.34	±	1.01	1.25	±	3.74	No
	08/24/2016	0.31	±	1.08	1.13	±	4.00	No
	08/31/2016	0.17	±	1.05	0.62	±	3.89	No
	09/07/2016	0.36	±	0.90	1.34	±	3.33	No
	09/14/2016	-0.93	±	0.92	-3.43	±	3.40	No
	09/21/2016	-1.57	±	1.14	-5.81	±	4.22	No
	09/28/2016	0.35	±	1.03	1.30	±	3.81	No
MONTEVIEW	07/06/2016	0.95	±	1.10	3.53	±	4.07	No
	07/13/2016	0.61	±	1.06	2.27	±	3.92	No
	07/20/2016	-1.84	±	1.11	-6.81	±	4.11	No
	07/27/2016	1.15	±	1.13	4.26	±	4.18	No
	08/03/2016	0.19	±	1.59	0.68	±	5.88	No
	08/10/2016	0.02	±	1.06	0.07	±	3.92	No
	08/17/2016	0.37	±	1.12	1.38	±	4.14	No
	08/24/2016	0.31	±	1.08	1.13	±	4.00	No
	08/31/2016	0.17	±	1.08	0.63	±	4.00	No
	09/07/2016	0.43	±	1.07	1.59	±	3.96	No
	09/14/2016	-1.02	±	1.01	-3.77	±	3.74	No
	09/21/2016	-1.59	±	1.15	-5.88	±	4.26	No
	09/28/2016	0.37	±	1.08	1.35	±	4.00	No
MUD LAKE	07/06/2016	0.96	±	1.11	3.54	±	4.11	No
	07/13/2016	0.59	±	1.02	2.19	±	3.77	No
	07/20/2016	-1.89	±	1.14	-6.99	±	4.22	No
	07/27/2016	1.05	±	1.04	3.89	±	3.85	No
	08/03/2016	0.12	±	1.04	0.45	±	3.85	No
	08/10/2016	0.02	±	0.95	0.06	±	3.50	No
	08/17/2016	0.35	±	1.05	1.29	±	3.89	No
	08/24/2016	0.28	±	1.00	1.05	±	3.70	No
	08/31/2016	0.17	±	1.08	0.63	±	4.00	No
	09/07/2016	0.42	±	1.05	1.57	±	3.89	No
	09/14/2016	-1.09	±	1.08	-4.03	±	4.00	No
	09/21/2016	-1.61	±	1.16	-5.96	±	4.29	No
	09/28/2016	0.39	±	1.13	1.42	±	4.18	No
DISTANT								
BLACKFOOT	07/06/2016	0.15	±	1.05	0.57	±	3.89	No
	07/13/2016	-0.57	±	1.16	-2.09	±	4.29	No
	07/20/2016	1.03	±	1.20	3.81	±	4.44	No
	07/27/2016	-0.25	±	1.15	-0.94	±	4.26	No
	08/03/2016	-0.53	±	1.16	-1.96	±	4.29	No
	08/10/2016	-0.61	±	1.21	-2.24	±	4.48	No
	08/17/2016	-0.29	±	1.14	-1.08	±	4.22	No
	08/24/2016	-1.18	±	1.16	-4.37	±	4.29	No
	08/31/2016	0.57	±	1.17	2.12	±	4.33	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
		09/07/2016	0.34	±	1.12	1.27	±	4.14	No
		09/14/2016	1.78	±	1.40	6.59	±	5.18	No
		09/21/2016	0.24	±	1.26	0.90	±	4.66	No
		09/28/2016	1.79	±	1.18	6.62	±	4.37	No
QA-1		07/06/2016	0.15	±	1.02	0.56	±	3.77	No
(BLACKFOOT)		07/13/2016	-0.55	±	1.12	-2.02	±	4.14	No
		07/20/2016	0.97	±	1.14	3.60	±	4.22	No
		07/27/2016	-0.25	±	1.11	-0.91	±	4.11	No
		08/03/2016	-0.52	±	1.13	-1.91	±	4.18	No
		08/10/2016	-0.58	±	1.17	-2.16	±	4.33	No
		08/17/2016	-0.28	±	1.10	-1.04	±	4.07	No
		08/24/2016	-1.14	±	1.11	-4.22	±	4.11	No
		08/31/2016	0.59	±	1.21	2.18	±	4.48	No
		09/07/2016	0.35	±	1.15	1.30	±	4.26	No
		09/14/2016	1.52	±	1.19	5.62	±	4.40	No
		09/21/2016	0.23	±	1.20	0.86	±	4.44	No
		09/28/2016	1.73	±	1.14	6.40	±	4.22	No
CRATERS		07/06/2016	0.17	±	1.13	0.61	±	4.18	No
		07/13/2016	-0.56	±	1.15	-2.08	±	4.26	No
		07/20/2016	1.05	±	1.23	3.89	±	4.55	No
		07/27/2016	-0.28	±	1.26	-1.03	±	4.66	No
		08/03/2016	-0.55	±	1.20	-2.03	±	4.44	No
		08/10/2016	-0.66	±	1.31	-2.43	±	4.85	No
		08/17/2016	-0.32	±	1.24	-1.18	±	4.59	No
		08/24/2016	-1.41	±	1.38	-5.22	±	5.11	No
		08/31/2016	0.61	±	1.24	2.25	±	4.59	No
		09/07/2016	0.33	±	1.09	1.24	±	4.03	No
		09/14/2016	1.50	±	1.18	5.55	±	4.37	No
		09/21/2016	0.23	±	1.18	0.84	±	4.37	No
		09/28/2016	1.97	±	1.30	7.29	±	4.81	No
DUBOIS		07/06/2016	0.97	±	1.12	3.59	±	4.14	No
		07/13/2016	0.58	±	0.99	2.13	±	3.67	No
		07/20/2016	-1.94	±	1.17	-7.18	±	4.33	No
		07/27/2016	1.09	±	1.07	4.03	±	3.96	No
		08/03/2016	0.13	±	1.08	0.47	±	4.00	No
		08/10/2016	0.02	±	1.04	0.07	±	3.85	No
		08/17/2016	0.36	±	1.08	1.33	±	4.00	No
		08/24/2016	0.31	±	1.11	1.15	±	4.11	No
		08/31/2016	0.17	±	1.06	0.62	±	3.92	No
		09/07/2016	0.39	±	0.97	1.44	±	3.58	No
		09/14/2016	-1.04	±	1.04	-3.85	±	3.85	No
		09/21/2016	-1.45	±	1.05	-5.37	±	3.89	No
		09/28/2016	0.38	±	1.13	1.42	±	4.18	No
IDAHO FALLS	a	07/06/2016		±			±		No
		07/13/2016	0.77	±	1.33	2.86	±	4.92	No
		07/20/2016	-1.95	±	1.18	-7.22	±	4.37	No
		07/27/2016	1.13	±	1.11	4.18	±	4.11	No
		08/03/2016	0.13	±	1.12	0.48	±	4.14	No
		08/10/2016	0.02	±	1.04	0.07	±	3.85	No
		08/17/2016	0.35	±	1.05	1.29	±	3.89	No
		08/24/2016	0.30	±	1.05	1.09	±	3.89	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
	08/31/2016	0.18	±	1.16	0.68	±	4.29	No
	09/07/2016	0.38	±	0.95	1.40	±	3.50	No
	09/14/2016	-0.99	±	0.99	-3.67	±	3.65	No
	09/21/2016	-1.42	±	1.03	-5.25	±	3.81	No
	09/28/2016	0.32	±	0.95	1.20	±	3.53	No
SUGAR CITY	07/06/2016	0.88	±	1.02	3.26	±	3.77	No
	07/13/2016	0.58	±	1.00	2.15	±	3.70	No
	07/20/2016	-1.73	±	1.05	-6.40	±	3.89	No
	07/27/2016	1.01	±	0.99	3.74	±	3.67	No
	08/03/2016	0.11	±	0.97	0.41	±	3.59	No
	08/10/2016	0.02	±	0.92	0.06	±	3.40	No
	08/17/2016	0.32	±	0.97	1.19	±	3.58	No
	08/24/2016	0.28	±	0.98	1.02	±	3.63	No
	08/31/2016	0.16	±	0.98	0.57	±	3.63	No
	09/07/2016	0.37	±	0.92	1.37	±	3.41	No
	09/14/2016	-0.97	±	0.96	-3.58	±	3.56	No
	09/21/2016	-1.44	±	1.04	-5.33	±	3.85	No
	09/28/2016	0.38	±	1.11	1.39	±	4.11	No
QA-2	07/06/2016	0.99	±	1.15	3.67	±	4.26	No
(SUGAR CITY)	07/13/2016	0.64	±	1.11	2.38	±	4.11	No
	07/20/2016	-1.99	±	1.20	-7.36	±	4.44	No
	07/27/2016	1.20	±	1.18	4.44	±	4.37	No
	08/03/2016	0.14	±	1.24	0.53	±	4.59	No
	08/10/2016	0.02	±	1.14	0.07	±	4.22	No
	08/17/2016	0.42	±	1.26	1.56	±	4.66	No
	08/24/2016	0.36	±	1.27	1.32	±	4.70	No
	08/31/2016	0.22	±	1.36	0.80	±	5.03	No
	09/07/2016	0.46	±	1.14	1.69	±	4.22	No
	09/14/2016	-1.26	±	1.26	-4.66	±	4.66	No
	09/21/2016	-1.74	±	1.26	-6.44	±	4.66	No
	09/28/2016	0.42	±	1.25	1.57	±	4.63	No
INL SITE								
EFS	07/06/2016	0.17	±	1.15	0.62	±	4.26	No
	07/13/2016	-0.58	±	1.18	-2.13	±	4.37	No
	07/20/2016	1.05	±	1.23	3.89	±	4.55	No
a	07/27/2016		±			±		No
	08/03/2016	-1.07	±	2.32	-3.96	±	8.58	No
	08/10/2016	-0.76	±	1.51	-2.80	±	5.59	No
	08/17/2016	-0.36	±	1.40	-1.32	±	5.18	No
	08/24/2016	-1.40	±	1.37	-5.18	±	5.07	No
	08/31/2016	0.74	±	1.52	2.75	±	5.62	No
	09/07/2016	0.36	±	1.16	1.32	±	4.29	No
	09/14/2016	1.71	±	1.35	6.33	±	5.00	No
	09/21/2016	0.25	±	1.31	0.94	±	4.85	No
	09/28/2016	2.76	±	1.82	10.21	±	6.73	No
MAIN GATE	07/06/2016	0.17	±	1.15	0.63	±	4.26	No
	07/13/2016	-0.58	±	1.19	-2.15	±	4.40	No
	07/20/2016	1.07	±	1.25	3.96	±	4.63	No
	07/27/2016	-0.27	±	1.20	-0.98	±	4.44	No
	08/03/2016	-0.57	±	1.24	-2.11	±	4.59	No
	08/10/2016	-0.57	±	1.14	-2.11	±	4.22	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
	08/17/2016	-0.30	±	1.17	-1.11	±	4.33	No
	08/24/2016	-1.23	±	1.21	-4.55	±	4.48	No
	08/31/2016	0.58	±	1.18	2.13	±	4.37	No
	09/07/2016	0.63	±	2.06	2.33	±	7.62	No
	09/14/2016	2.04	±	1.61	7.55	±	5.96	No
	09/21/2016	0.22	±	1.11	0.80	±	4.11	No
	09/28/2016	2.04	±	1.34	7.55	±	4.96	No
VAN BUREN GATE	07/06/2016	0.16	±	1.09	0.59	±	4.03	No
	07/13/2016	-0.58	±	1.18	-2.14	±	4.37	No
	07/20/2016	1.03	±	1.20	3.81	±	4.44	No
	07/27/2016	-0.27	±	1.20	-0.98	±	4.44	No
	08/03/2016	-0.59	±	1.29	-2.19	±	4.77	No
	08/10/2016	-0.56	±	1.12	-2.07	±	4.14	No
	08/17/2016	-0.31	±	1.20	-1.14	±	4.44	No
	08/24/2016	-1.28	±	1.25	-4.74	±	4.63	No
	08/31/2016	0.61	±	1.24	2.25	±	4.59	No
	09/07/2016	0.35	±	1.14	1.28	±	4.22	No
	09/14/2016	1.51	±	1.19	5.59	±	4.40	No
	09/21/2016	0.23	±	1.19	0.85	±	4.40	No
	09/28/2016	2.05	±	1.35	7.59	±	5.00	No

a. Invalid sample result shown in red.

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	9/28/2016	CESIUM-137	-93.40	±	126.00	-345.58	±	466.20	No
		STRONTIUM-90	-7.50	±	9.08	-27.73	±	33.61	No
ATOMIC CITY	9/28/2016	CESIUM-137	-66.00	±	115.00	-244.20	±	425.50	No
		STRONTIUM-90	5.73	±	8.24	21.19	±	30.51	No
BLUE DOME	9/28/2016	CESIUM-137	185.00	±	128.00	684.50	±	473.60	No
		STRONTIUM-90	-8.30	±	8.91	-30.70	±	32.98	No
FAA TOWER	9/28/2016	AMERICIUM-241	0.32	±	1.17	1.20	±	4.32	No
		CESIUM-137	-58.50	±	78.00	-216.45	±	288.60	No
		PLUTONIUM-238	0.27	±	1.02	1.00	±	3.76	No
		PLUTONIUM-239/240	1.49	±	0.45	5.53	±	1.68	**Yes**
HOWE	9/28/2016	CESIUM-137	125.00	±	73.00	462.50	±	270.10	No
MONTEVIEW	9/28/2016	CESIUM-137	-151.00	±	105.00	-558.70	±	388.50	No
MUD LAKE	9/28/2016	AMERICIUM-241	1.29	±	1.11	4.78	±	4.11	No
		CESIUM-137	187.00	±	122.00	691.90	±	451.40	No
		PLUTONIUM-238	0.52	±	0.30	1.93	±	1.11	No
		PLUTONIUM-239/240	1.21	±	0.63	4.49	±	2.32	No
DISTANT									
BLACKFOOT	9/28/2016	AMERICIUM-241	6.55	±	1.30	24.24	±	4.80	**Yes**
		CESIUM-137	-78.70	±	118.00	-291.19	±	436.60	No
		PLUTONIUM-238	1.13	±	1.00	4.19	±	3.70	No
		PLUTONIUM-239/240	1.98	±	0.53	7.33	±	1.98	**Yes**
QA-1 (BLACKFOOT)	9/28/2016	AMERICIUM-241	2.52	±	1.15	9.32	±	4.24	No
		CESIUM-137	-21.20	±	83.20	-78.44	±	307.84	No
		PLUTONIUM-238	1.16	±	0.62	4.30	±	2.28	No
		PLUTONIUM-239/240	0.70	±	0.64	2.58	±	2.36	No
CRATERS	9/28/2016	CESIUM-137	127.00	±	91.70	469.90	±	339.29	No
DUBOIS	9/28/2016	CESIUM-137	18.80	±	83.10	69.56	±	307.47	No
IDAHO FALLS	9/28/2016	CESIUM-137	161.00	±	124.00	595.70	±	458.80	No
SUGAR CITY	9/28/2016	CESIUM-137	-29.20	±	79.90	-108.04	±	295.63	No
		STRONTIUM-90	-3.56	±	7.73	-13.15	±	28.60	No
QA-2 (SUGAR CITY)	9/28/2016	CESIUM-137	77.50	±	125.00	286.75	±	462.50	No

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

		STRONTIUM-90	0.89	±	8.83	3.29	±	32.66	No
INL SITE									
EFS	9/28/2016	CESIUM-137	-123.00	±	110.00	-455.10	±	407.00	No
		STRONTIUM-90	10.29	±	10.44	38.06	±	38.63	No
MAIN GATE	9/28/2016	AMERICIUM-241	-0.45	±	1.25	-1.67	±	4.62	No
		CESIUM-137	-32.50	±	130.00	-120.25	±	481.00	No
		PLUTONIUM-238	-0.60	±	0.77	-2.20	±	2.84	No
		PLUTONIUM-239/240	0.50	±	0.41	1.83	±	1.51	No
VAN BUREN GATE	9/28/2016	CESIUM-137	21.50	±	72.50	79.55	±	268.25	No
		STRONTIUM-90	6.67	±	8.97	24.68	±	33.19	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	06/08/16	07/06/16	2.18	±	0.50	8.07	±	1.86	**Yes**
ATOMIC CITY	07/06/16	08/03/16	3.52	±	0.63	13.02	±	2.32	**Yes**
ATOMIC CITY	08/03/16	09/07/16	2.04	±	0.79	7.55	±	2.94	No
ATOMIC CITY	09/07/16	09/28/16	2.56	±	1.41	9.47	±	5.22	No
DISTANT									
BLACKFOOT	06/22/16	07/06/16	5.88	±	1.50	21.76	±	5.55	**Yes**
BLACKFOOT	07/06/16	08/03/16	4.43	±	1.31	16.39	±	4.85	**Yes**
BLACKFOOT	08/03/16	08/17/16	2.83	±	0.88	10.47	±	3.27	**Yes**
BLACKFOOT	08/17/16	09/06/16	2.05	±	1.06	7.59	±	3.92	No
BLACKFOOT	09/06/16	09/21/16	5.16	±	1.44	19.09	±	5.33	**Yes**
IDAHO FALLS	06/25/16	07/08/16	5.53	±	1.46	20.46	±	5.40	**Yes**
IDAHO FALLS	07/08/16	07/25/16	3.77	±	1.36	13.95	±	5.03	No
IDAHO FALLS	07/25/16	08/12/16	1.27	±	1.20	4.70	±	4.44	No
IDAHO FALLS	08/12/16	08/31/16	0.73	±	1.17	2.70	±	4.33	No
IDAHO FALLS	08/31/16	09/22/16	0.53	±	1.55	1.98	±	5.74	No
SUGAR CITY	06/22/16	07/06/16	7.00	±	2.05	25.90	±	7.59	**Yes**
SUGAR CITY	07/06/16	07/20/16	4.11	±	1.87	15.21	±	6.92	No
SUGAR CITY	07/20/16	08/10/16	5.87	±	1.83	21.72	±	6.77	**Yes**
SUGAR CITY	08/10/16	08/31/16	10.90	±	1.66	40.33	±	6.14	**Yes**
SUGAR CITY	08/31/16	09/22/16	-0.25	±	1.65	-0.91	±	6.11	No

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
IDAHO FALLS	06/30/16	07/29/16	113.00	±	23.50	4.18	±	0.87	**Yes**
	07/29/16	08/31/16	50.20	±	24.00	1.86	±	0.89	No
	08/31/16	09/30/16	65.60	±	25.20	2.43	±	0.93	No
CFA	05/31/16	07/01/16	95.20	±	24.30	3.52	±	0.90	**Yes**
	07/01/16	07/25/16	100.00	±	23.10	3.70	±	0.85	**Yes**
EFS	07/06/16	07/13/16	144.00	±	23.60	5.33	±	0.87	**Yes**
	08/31/16	09/07/16	138.00	±	25.10	5.11	±	0.93	**Yes**
	09/07/16	09/14/16	99.90	±	24.70	3.70	±	0.91	**Yes**
	09/21/16	09/28/16	111.00	±	25.70	4.11	±	0.95	**Yes**

Table C-6. Weekly and Monthly Iodine-131 and Cesium-137 Concentrations in Milk

Location	Sampling Date	Iodine-131 Result ± 1s Uncertainty (pCi[†]/L)	Iodine-131 Result ± 1s Uncertainty (Bq[‡]/L)	Iodine-131 Result > 3s	Cesium-137 Result ± 1s Uncertainty (pCi/L)	Cesium-137 Result ± 1s Uncertainty (Bq/L)	Cesium-137 Result > 3s
BLACKFOOT	07/04/16	1.36 ± 1.97	0.050 ± 0.073	No	2.70 ± 1.46	0.100 ± 0.054	No
Duplicate	07/01/16	1.05 ± 1.50	0.039 ± 0.056	No	-0.29 ± 0.91	-0.011 ± 0.034	No
	08/08/16	4.25 ± 3.82	0.157 ± 0.141	No	0.14 ± 1.31	0.005 ± 0.049	No
	09/19/16	0.20 ± 1.89	0.007 ± 0.070	No	-0.57 ± 1.32	-0.021 ± 0.049	No
CONTROL	07/05/16	-2.37 ± 2.36	-0.088 ± 0.087	No	0.52 ± 1.34	0.019 ± 0.050	No
	08/02/16	-0.85 ± 1.20	-0.031 ± 0.044	No	-0.90 ± 0.94	-0.033 ± 0.035	No
	09/06/16	2.02 ± 2.36	0.075 ± 0.087	No	1.09 ± 1.32	0.040 ± 0.049	No
DIETRICH	07/05/16	1.41 ± 1.11	0.052 ± 0.041	No	-0.26 ± 0.91	-0.010 ± 0.034	No
	08/02/16	-1.64 ± 1.84	-0.061 ± 0.068	No	-1.09 ± 1.37	-0.040 ± 0.051	No
	09/06/16	-0.53 ± 1.75	-0.019 ± 0.065	No	1.56 ± 1.36	0.058 ± 0.050	No
HOWE	07/05/16	1.45 ± 1.21	0.054 ± 0.045	No	-0.09 ± 0.90	-0.003 ± 0.033	No
	08/02/16	1.14 ± 1.13	0.042 ± 0.042	No	0.85 ± 0.91	0.032 ± 0.034	No
	09/06/16	0.54 ± 1.08	0.020 ± 0.040	No	-0.30 ± 0.92	-0.011 ± 0.034	No
IDAHO FALLS	07/05/16	0.19 ± 1.40	0.007 ± 0.052	No	-0.87 ± 1.55	-0.032 ± 0.057	No
	07/12/16	0.87 ± 1.37	0.032 ± 0.051	No	1.78 ± 1.51	0.066 ± 0.056	No
	07/19/16	2.72 ± 1.40	0.101 ± 0.052	No	0.17 ± 1.49	0.006 ± 0.055	No
	07/26/16	-2.34 ± 1.43	-0.087 ± 0.053	No	2.36 ± 1.55	0.087 ± 0.057	No
	08/02/16	0.72 ± 1.35	0.027 ± 0.050	No	2.75 ± 1.49	0.102 ± 0.055	No
	08/09/16	-1.71 ± 1.36	-0.063 ± 0.050	No	-1.32 ± 1.60	-0.049 ± 0.059	No
	08/16/16	-1.46 ± 1.37	-0.054 ± 0.051	No	1.26 ± 1.47	0.047 ± 0.054	No
	08/23/16	-0.09 ± 1.34	-0.003 ± 0.050	No	0.14 ± 1.55	0.005 ± 0.057	No
	08/30/16	-3.46 ± 1.55	-0.128 ± 0.057	No	0.86 ± 1.67	0.032 ± 0.062	No
	09/06/16	-0.94 ± 1.33	-0.035 ± 0.049	No	-0.08 ± 1.51	-0.003 ± 0.056	No
	09/13/16	1.57 ± 1.36	0.058 ± 0.050	No	-0.06 ± 1.53	-0.002 ± 0.057	No
	09/20/16	-2.67 ± 1.46	-0.099 ± 0.054	No	0.05 ± 1.40	0.002 ± 0.052	No
	09/27/16	-2.26 ± 1.55	-0.084 ± 0.057	No	-2.63 ± 1.68	-0.097 ± 0.062	No
MINIDOKA	07/05/16	-1.33 ± 1.54	-0.049 ± 0.057	No	0.79 ± 1.58	0.029 ± 0.059	No
	08/02/16	0.93 ± 1.49	0.035 ± 0.055	No	-0.77 ± 1.64	-0.029 ± 0.061	No
	09/06/16	-1.42 ± 1.52	-0.053 ± 0.056	No	1.37 ± 1.59	0.051 ± 0.059	No
TERRETON	07/05/16	-1.56 ± 2.16	-0.058 ± 0.080	No	-0.38 ± 1.34	-0.014 ± 0.050	No
	08/02/16	1.77 ± 1.96	0.066 ± 0.073	No	0.95 ± 1.34	0.035 ± 0.050	No
	09/06/16	-0.06 ± 1.96	-0.002 ± 0.073	No	-0.09 ± 1.26	-0.004 ± 0.047	No
Duplicate	09/06/16	0.15 ± 1.20	0.006 ± 0.044	No	-0.61 ± 0.92	-0.022 ± 0.034	No

Table C-7. Gamma-emitting Radionuclides and Strontium-90 in Lettuce

Location	Sampling Date	Cesium-137 Result ± 1s Uncertainty pCi/kg[a]	Cesium-137 Result ± 1s Uncertainty (x 10^{-2} Bq/kg)[a]	Result > 3s
ATOMIC CITY	7/26/2016	18.20 ± 195.00	67.41 ± 722.22	No
BLACKFOOT	8/27/2016	-59.70 ± 49.40	-221.11 ± 182.96	No
CONTROL	8/30/2016	-95.00 ± 42.90	-351.85 ± 158.89	No
EFS	8/4/2016	-42.60 ± 135.00	-157.78 ± 500.00	No
FAA TOWER	8/10/2016	29.80 ± 86.50	110.37 ± 320.37	No
HOWE	7/27/2016	-95.80 ± 121.00	-354.81 ± 448.15	No
IDAHO FALLS	8/26/2016	-17.80 ± 40.80	-65.93 ± 151.11	No
MONTEVIEW	8/31/2016	37.00 ± 42.30	137.04 ± 156.67	No
RIGBY	8/25/2016	-80.30 ± 70.60	-297.41 ± 261.48	No
RIGBY (DUPLICATE)	8/25/2016	-117.00 ± 64.80	-433.33 ± 240.00	No

Location	Sampling Date	Strontium-90 Result ± 1s Uncertainty pCi/kg[a]	Strontium-90 Result ± 1s Uncertainty (x 10^{-2} Bq/kg)[a]	Result > 3s
ATOMIC CITY	7/26/2016	103.00 ± 6.47	381.48 ± 23.96	**Yes**
BLACKFOOT	8/27/2016	29.80 ± 3.33	110.37 ± 12.33	**Yes**
CONTROL	8/30/2016	13.20 ± 4.56	48.89 ± 16.89	No
EFS	8/4/2016	241.00 ± 7.40	892.59 ± 27.41	**Yes**
FAA TOWER	8/10/2016	103.00 ± 4.95	381.48 ± 18.33	**Yes**
HOWE	7/27/2016	94.20 ± 6.77	348.89 ± 25.07	**Yes**
IDAHO FALLS	8/26/2016	37.60 ± 3.45	139.26 ± 12.78	**Yes**
MONTEVIEW	8/31/2016	38.30 ± 3.31	141.85 ± 12.26	**Yes**
RIGBY	8/25/2016	22.40 ± 3.24	82.96 ± 12.00	**Yes**
RIGBY (DUPLICATE)	8/25/2016	18.51 ± 3.08	68.55 ± 11.40	**Yes**

[a] During the summer of 2020, a review of the table determined the activity concentration values reported for the media were correct, however, the unit of concentration listed in the column headings were incorrect. The column headings have been updated to the correct units of concentration (pCi/kg and Bq/kg). For further discussion see Lettuce Sampling in Section 5.

Table C-8. Gamma-emitting Radionuclides and Strontium-90 in Grain

Location	Sampling Date	Cesium-137 Result ± 1s Uncertainty pCi/kg			Cesium-137 Result ± 1s Uncertainty Bq/kg			Result > 3s
AMERICAN FALLS	08/09/16	-0.34	±	1.57	-0.01	±	0.06	No
ARCO	09/06/16	-6.02	±	2.76	-0.22	±	0.10	No
CONTROL	09/12/16	-3.07	±	2.14	-0.11	±	0.08	No
HOWE	09/06/16	0.08	±	2.72	0.00	±	0.10	No
IDAHO FALLS	08/02/16	1.26	±	1.53	0.05	±	0.06	No
KIMAMA	08/09/16	-0.88	±	1.82	-0.03	±	0.07	No
KIMAMA (DUPLICATE	08/09/16	0.10	±	1.79	0.00	±	0.07	No
MONTEVIEW	08/10/16	3.18	±	2.76	0.12	±	0.10	No
MORELAND	08/09/16	-0.36	±	2.20	-0.01	±	0.08	No
RUPERT	08/09/16	3.32	±	2.27	0.12	±	0.08	No
TERRETON	08/17/16	0.00	±	1.60	0.00	±	0.06	No

Location	Sampling Date	Strontium-90 Result ± 1s Uncertainty pCi/kg			Strontium-90 Result ± 1s Uncertainty Bq/kg			Result > 3s
AMERICAN FALLS	08/09/16	1.58	±	0.82	0.06	±	0.03	No
ARCO	09/06/16	3.03	±	0.99	0.11	±	0.04	**Yes**
CONTROL	09/12/16	1.70	±	0.82	0.06	±	0.03	No
HOWE	09/06/16	0.51	±	1.17	0.02	±	0.04	No
IDAHO FALLS	08/02/16	3.63	±	0.94	0.13	±	0.03	**Yes**
KIMAMA	08/09/16	1.57	±	1.00	0.06	±	0.04	No
KIMAMA (DUPLICATE	08/09/16	1.06	±	1.04	0.04	±	0.04	No
MONTEVIEW	08/10/16	-0.14	±	0.93	-0.01	±	0.03	No
MORELAND	08/09/16	0.74	±	1.52	0.03	±	0.06	No
RUPERT	08/09/16	-0.31	±	0.78	-0.01	±	0.03	No
TERRETON	08/17/16	1.17	±	0.94	0.04	±	0.03	No

Table C-9. Actinide, Cesium-137, and Strontium-90 Concentrations in Soil

Location	Sampling Date	Americium-241 Concentration ± 1s (pCi/Kg)			Americium-241 Concentration ± 1s (Bq/Kg)			Result > 3s
BOUNDARY								
ATOMIC CITY	07/11/16	4.24	±	3.07	0.16	±	0.11	No
BUTTE CITY	07/11/16	7.35	±	3.84	0.27	±	0.14	No
FAA TOWER	07/11/16	8.18	±	4.36	0.30	±	0.16	No
FRENCHMAN'S CABIN	07/11/16	12.40	±	3.65	0.46	±	0.14	**Yes**
HOWE	07/12/16	4.62	±	3.54	0.17	±	0.13	No
MONTEVIEW	07/12/16	2.75	±	3.37	0.10	±	0.12	No
MUD LAKE #1	07/12/16	-5.73	±	4.79	-0.21	±	0.18	No
MUD LAKE #2	07/12/16	5.31	±	3.89	0.20	±	0.14	No
RENO RANCH	07/12/16	13.70	±	4.36	0.51	±	0.16	**Yes**
RENO RANCH (DUPLICATE)	07/12/16	9.40	±	2.18	0.35	±	0.08	**Yes**
DISTANT								
BLACKFOOT	07/11/16	5.85	±	2.80	0.22	±	0.10	No
CAREY	07/11/16	11.20	±	3.76	0.41	±	0.14	No
ST. ANTHONY	07/12/16	14.80	±	4.43	0.55	±	0.16	**Yes**

Location	Sampling Date	Cesium-137 Concentration ± 1s (pCi/Kg)			Cesium-137 Concentration ± 1s (Bq/Kg)			Result > 3s
BOUNDARY								
ATOMIC CITY	07/11/16	264.00	±	15.40	9.78	±	0.57	**Yes**
BUTTE CITY	07/11/16	490.00	±	27.80	18.15	±	1.03	**Yes**
FAA TOWER	07/11/16	509.00	±	29.60	18.85	±	1.10	**Yes**
FRENCHMAN'S CABIN	07/11/16	181.00	±	11.10	6.70	±	0.41	**Yes**
HOWE	07/12/16	238.00	±	14.40	8.81	±	0.53	**Yes**
MONTEVIEW	07/12/16	256.00	±	15.30	9.48	±	0.57	**Yes**
MUD LAKE #1	07/12/16	202.00	±	12.40	7.48	±	0.46	**Yes**
MUD LAKE #2	07/12/16	87.80	±	6.20	3.25	±	0.23	**Yes**
RENO RANCH[a]	07/12/16	558.00	±	32.20	20.67	±	1.19	**Yes**
RENO RANCH (DUPLICATE)	07/12/16	453.00	±	26.50	16.78	±	0.98	**Yes**
DISTANT								
BLACKFOOT	07/11/16	217.00	±	13.30	8.04	±	0.49	**Yes**
CAREY	07/11/16	569.00	±	32.30	21.07	±	1.20	**Yes**
ST. ANTHONY	07/12/16	539.00	±	31.10	19.96	±	1.15	**Yes**

[a] A review of the table, performed in the summer of 2020, determined that the ^{137}Cs result and uncertainty values listed were incorrect. The ^{137}Cs result and uncertainty values were updated to the correct values. For further discussion, see Soil Sampling in Section 5.

Table C-9. Actinide, Cesium-137, and Strontium-90 Concentrations in Soil

Location	Sampling Date	Plutonium-238 Concentration ± 1s (pCi/Kg)			Plutonium-238 Concentration ± 1s (Bq/Kg)			Result > 3s
BOUNDARY								
ATOMIC CITY	07/11/16	3.51	±	2.03	0.13	±	0.08	No
BUTTE CITY	07/11/16	-0.36	±	2.72	-0.01	±	0.10	No
FAA TOWER	07/11/16	10.30	±	2.73	0.38	±	0.10	**Yes**
FRENCHMAN'S CABIN	07/11/16	8.12	±	2.55	0.30	±	0.09	**Yes**
HOWE	07/12/16	1.42	±	1.43	0.05	±	0.05	No
MONTEVIEW	07/12/16	3.27	±	2.27	0.12	±	0.08	No
MUD LAKE #1	07/12/16	4.97	±	3.83	0.18	±	0.14	No
MUD LAKE #2	07/12/16	-0.75	±	3.39	-0.03	±	0.13	No
RENO RANCH	07/12/16	4.85	±	3.59	0.18	±	0.13	No
RENO RANCH (DUPLICATE)	07/12/16	2.09	±	1.82	0.08	±	0.07	No
DISTANT								
BLACKFOOT	07/11/16	6.66	±	2.12	0.25	±	0.08	**Yes**
CAREY	07/11/16	4.07	±	1.18	0.15	±	0.04	**Yes**
ST. ANTHONY	07/12/16	0.00	±	3.06	0.00	±	0.11	No

Location	Sampling Date	Plutonium-239/240 Concentration ± 1s (pCi/Kg)			Plutonium-239/240 Concentration ± 1s (Bq/Kg)			Result > 3s
BOUNDARY								
ATOMIC CITY	07/11/16	12.50	±	2.44	0.46	±	0.09	**Yes**
BUTTE CITY	07/11/16	33.00	±	3.80	1.22	±	0.14	**Yes**
FAA TOWER	07/11/16	37.70	±	4.01	1.40	±	0.15	**Yes**
FRENCHMAN'S CABIN	07/11/16	6.49	±	1.47	0.24	±	0.05	**Yes**
HOWE	07/12/16	14.60	±	2.91	0.54	±	0.11	**Yes**
MONTEVIEW	07/12/16	8.36	±	2.17	0.31	±	0.08	**Yes**
MUD LAKE #1	07/12/16	13.90	±	2.43	0.51	±	0.09	**Yes**
MUD LAKE #2	07/12/16	7.49	±	2.13	0.28	±	0.08	**Yes**
RENO RANCH	07/12/16	30.10	±	3.73	1.11	±	0.14	**Yes**
RENO RANCH (DUPLICATE)	07/12/16	16.40	±	3.07	0.61	±	0.11	**Yes**
DISTANT								
BLACKFOOT	07/11/16	15.70	±	2.71	0.58	±	0.10	**Yes**
CAREY	07/11/16	34.30	±	3.60	1.27	±	0.13	**Yes**
ST. ANTHONY	07/12/16	26.70	±	3.60	0.99	±	0.13	**Yes**

Table C-9. Actinide, Cesium-137, and Strontium-90 Concentrations in Soil

Location	Sampling Date	Strontium-90 Concentration ± 1s (pCi/Kg)			Strontium-90 Concentration ± 1s (Bq/Kg)			Result > 3s
BOUNDARY								
ATOMIC CITY	07/11/16	172.00	±	22.10	6.37	±	0.82	**Yes**
BUTTE CITY	07/11/16	171.00	±	22.30	6.33	±	0.83	**Yes**
FAA TOWER	07/11/16	213.00	±	23.40	7.89	±	0.87	**Yes**
FRENCHMAN'S CABIN	07/11/16	93.90	±	20.70	3.48	±	0.77	**Yes**
HOWE	07/12/16	85.90	±	22.60	3.18	±	0.84	**Yes**
MONTEVIEW	07/12/16	27.30	±	19.20	1.01	±	0.71	No
MUD LAKE #1	07/12/16	68.20	±	19.20	2.53	±	0.71	**Yes**
MUD LAKE #2	07/12/16	96.60	±	20.70	3.58	±	0.77	**Yes**
RENO RANCH	07/12/16	177.00	±	23.20	6.56	±	0.86	**Yes**
RENO RANCH (DUPLICATE)	07/12/16	213.84	±	23.67	7.92	±	0.88	**Yes**
DISTANT								
BLACKFOOT	07/11/16	118.00	±	21.30	4.37	±	0.79	**Yes**
CAREY	07/11/16	178.00	±	22.50	6.59	±	0.83	**Yes**
ST. ANTHONY	07/12/16	136.00	±	22.30	5.04	±	0.83	**Yes**

APPENDIX D

STATISTICAL ANALYSIS RESULTS

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

Parameter	P[a]
Gross Alpha	
Quarter	0.77
July	0.99
August	0.29
September	0.76
Gross Beta	
Quarter	0.33
July	0.99
August	0.12
September	0.51

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

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

		Mann-Whitney U test
Parameter	**Week**	**P[a]**
Gross Alpha		
	July 6	1.00
	July 13	0.29
	July 20	0.27
	July 27	0.17
	August 3	0.09
	August 10	0.57
	August 17	0.68
	August 24	0.52
	August 31	0.81
	September 7	0.57
	September 14	0.37
	September 21	0.94
	September 28	0.94
Gross Beta		
	July 6	0.92
	July 13	0.46
	July 20	0.47
	July 27	0.94
	August 3	0.37
	August 10	0.94
	August 17	0.68
	August 24	0.52
	August 31	0.68
	September 7	0.37
	September 14	0.12
	September 21	0.06
	September 28	0.10

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