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Idaho National Laboratory Site Offsite Environmental Surveillance Program Report:

Third Quarter 2020

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EXECUTIVE SUMMARY

None of the radionuclides detected in samples collected during the third quarter of 2020 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 2020 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, 2020. All sample types (media) and the sampling schedule followed during 2020 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
- Agricultural Products, including alfalfa, lettuce, and grain
- Large game animals
- Soil

Table ES-1. Summary of Results for the Third Quarter of 2020.

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	Gross alpha results for September were invalidated. Due to equipment failures, the laboratory was not able to count the samples for a long period of time after collection. This resulted in the ingrowth of radon-222 decay products. Concentrations for all locations during these weeks were abnormally high as a result. Among valid results, 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. A few results exceeded the 99%/95% upper tolerance limit (UTL) for gross alpha activity in air at the end of August. No gross alpha or gross beta results exceeded the Derived Concentration Standard (DCS).
	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	Five of the 15 results showed tritium concentrations greater than the 3s uncertainty during the quarter. No sample results exceeded the 99%/95% UTL or the DCS for tritium in air.

Media	Sample Type	Analysis	Results
Precipitation	Liquid	Tritium	Four of the ten 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 and the INL Oversight Program.
Milk	Liquid	Iodine-131, other gamma-emitting radionuclides	Forty-four milk samples were collected at eight locations (including duplicate samples and the offsite control sample from Colorado). No Iodine-131 or other human-made gamma emitting radionuclides were detected.
Alfalfa	Vegetation	Gamma-emitting radionuclides, strontium-90	Samples were collected from three locations. No human-made gamma emitting radionuclides or Strontium-90 were found.
Lettuce	Vegetation	Gamma-emitting radionuclides, strontium-90	Ten samples were collected; five came from portable planters used by the ESER program. No human-made gamma emitting radionuclides or Strontium-90 were found.
Grain	Vegetation	Gamma-emitting radionuclides, strontium-90	Ten samples were collected. No human-made gamma emitting radionuclides or Strontium-90 were found.
Large game animals	Tissue	Gamma-emitting radionuclides	Two game animals (an elk and a mule deer were sampled. Muscle, liver, and thyroid samples were obtained for both animals. No human-made gamma-emitting radionuclides were found in any of the tissues.

Media	Sample Type	Analysis	Results
Soil	Soil	Gamma-emitting radionuclides, strontium-90, actinides (americium and plutonium)	Soil samples were collected from 12 locations around the INL Site. Cesium-137 was detected in all the samples but has shown a decreasing trend over time consistent with its 30-year half-life. Strontium-90 was detected in four samples. Although ^{90}Sr has approximately the same half-life as ^{137}Cs, it has decreased at a greater rate, possibly reflecting greater mobility in the environment. Plutonium-238 was not detected in any sample. Plutonium-239/240 was detected in five samples and persists in the environment due to long half-lives. No particular trend is apparent in the concentrations over time. Americium-241 was detected in four samples. The concentration appears to be increasing since the late 1970s as a result of the ingrowth from decay of ^{241}Pu.

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 2020, 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 third quarter of 2020 (July 1 - September 30, 2020).

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 4 locations around the INL Site
- precipitation from four locations (at the same sites where air moisture is sampled) on and around the INL Site
- 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 seven 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). 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.

Data are also compared to historical measurements using the upper tolerance limit (UTL). The UTL is a value such that 99% of the population (in this case, all valid measurements made between 2010-2019) is less than the UTL with 95% confidence (EPA 2015). With a 99%/95% UTL it is expected that approximately 1% of the measurements will exceed the UTL if the concentration of a radionuclide is within the normal range. This means that if a concentration exceeds the UTL it does not necessarily indicate that the site is outside of the normal range. Rather, it indicates that the measurement should be closely examined to determine if it is unusually high.

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.

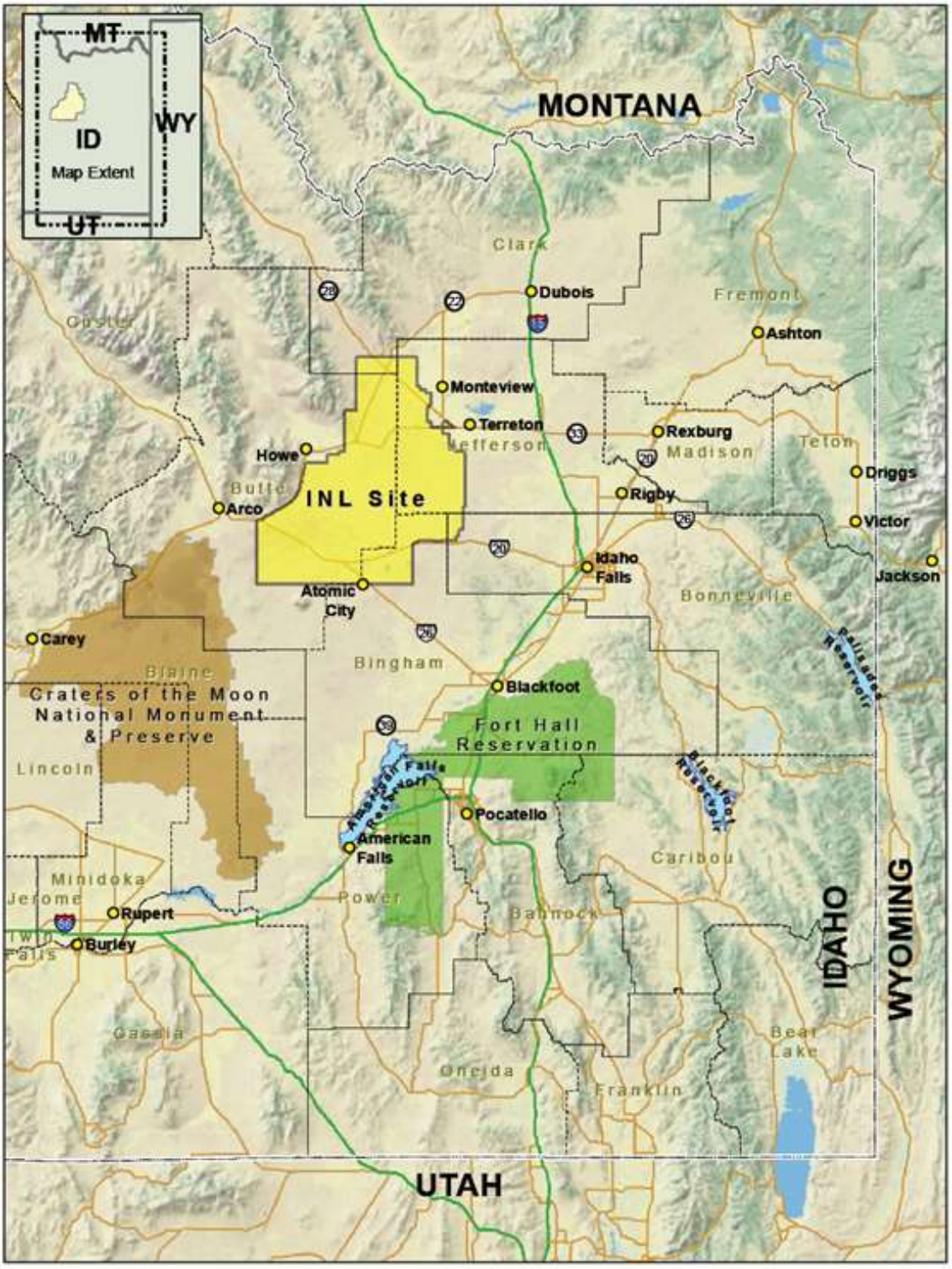

Figure 1. Location of the Idaho National Laboratory Site.

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 third quarter of 2020 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 third quarter of 2020 (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 2020, one replicate sampler was moved to Arco (a Boundary location) and one was moved to Mud Lake (also a Boundary location). An average of 18,991 ft^3 (538 m^3) of air was sampled at each location, each week, at an average flow rate of 1.88 ft^3/min (0.05 m^3/min). Particulates in air were collected on membrane particulate filters (1.2-µm pore size). Gases passing through the filter were collected with an activated charcoal cartridge.

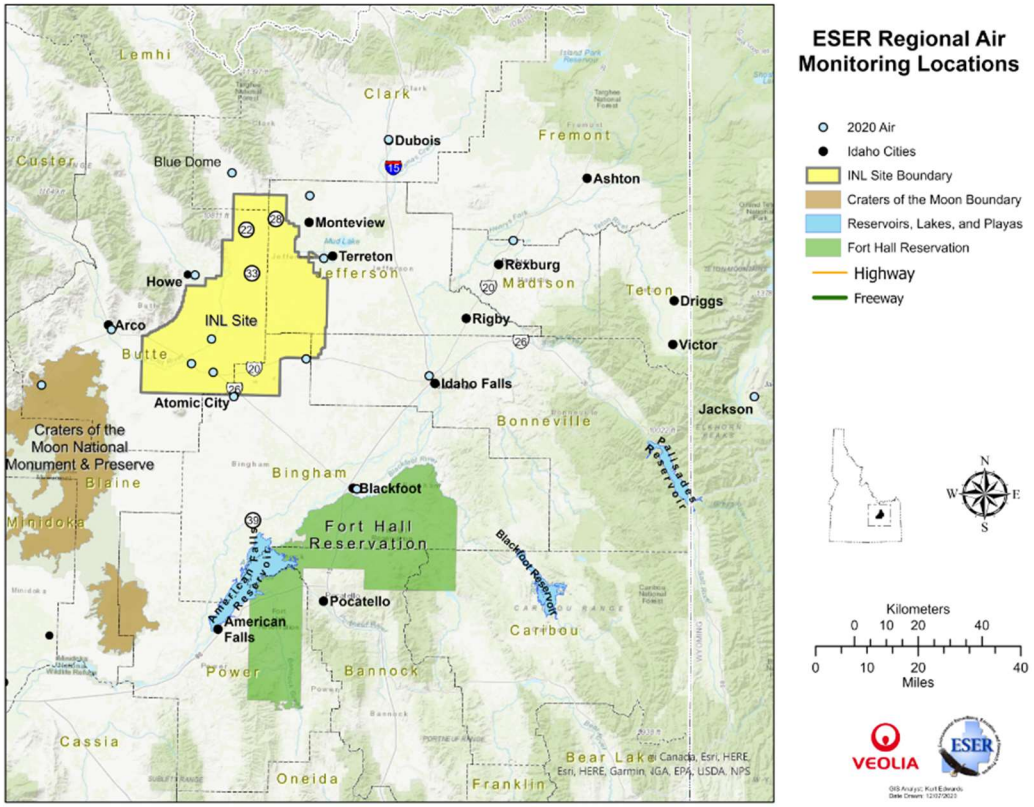

Figure 2. ESER air monitoring locations.

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.

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. The gross alpha values for the month of September were considered invalid and were not used in statistical calculations for the quarter. Due to multiple equipment failures the laboratory was not able to analyze the filters until well after the normal five-day time period following collection. This resulted in the ingrowth of longer-lived decay products of radon-222. This caused the gross alpha concentrations to be abnormally high during the month of September as can be seen in Figure 6. Nearly all of the results from each sampling location were above the 99%/95% upper tolerance limit, indicating they are atypically high.

Gross alpha concentrations measured in valid samples ranged from a low of $(-0.82 \pm 1.1) \times 10^{-16}$ µCi/mL at Jackson on July 15, 2020, to a high of $(8.4 \pm 0.7) \times 10^{-15}$ µCi/mL, also at Jackson on August 26, 2020. 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 2010 through 2019) 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. There were no statistical differences noted for gross alpha during the third quarter (Table D-2).

Gross beta results for the third quarter were considered valid as the laboratory issues described in the gross alpha section did not appear to impact the gross beta concentrations. Gross beta values 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 $(2.28 \pm 0.45) \times 10^{-15}$ µCi/mL at Jackson on July 15, 2020, to a high of $(5.7 \pm 0.10 \times 10^{-14}$ µCi/mL at Howe on August 5, 2020. All results were less than the Derived Concentration Standard (DCS) of 2.5×10^{-11} 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 (6.4×10^{-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 (Table D-3). The only statistical difference noted was between Arco and Craters of the Moon.

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.

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 fifteen atmospheric moisture samples collected at the INL Site, Boundary, and Distant locations during the third quarter of 2020 (Figure 11). Five of the concentrations exceeded the 3s uncertainty level for tritium, with a maximum reported value of $(1.32 \pm 0.12) \times 10^{-12}$ $\mu Ci/mL_{air}$ at EFS. The maximum result did not exceed the 99%/95% UTL of 1.6×10^{-12} $\mu Ci/mL_{air}$ and 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.

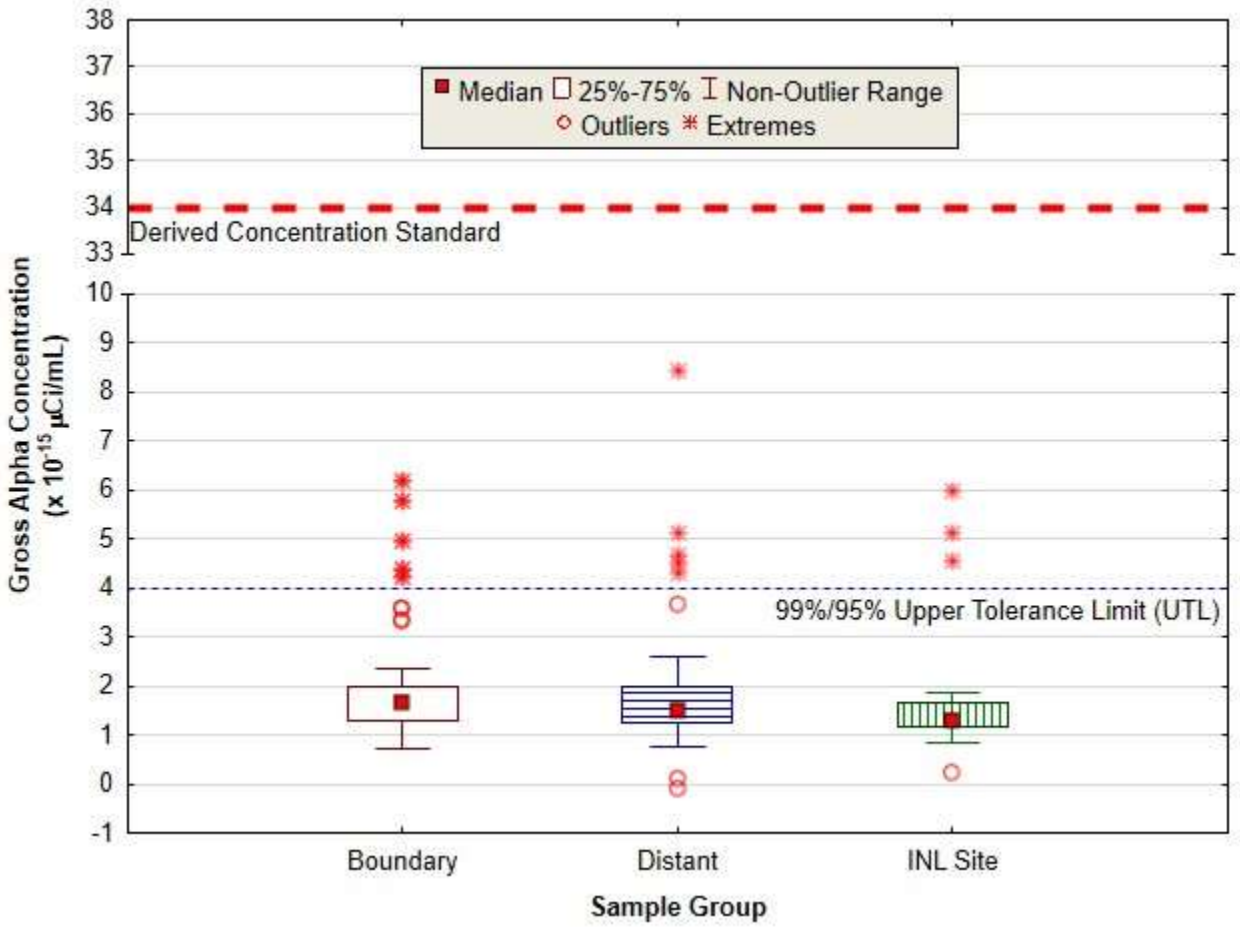

Figure 3. Gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations for the third quarter of 2020. This graph does not include results for the month of September, which were considered invalid. See the text for complete explanation. The DOE Derived Concentration Standard (DCS) 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.

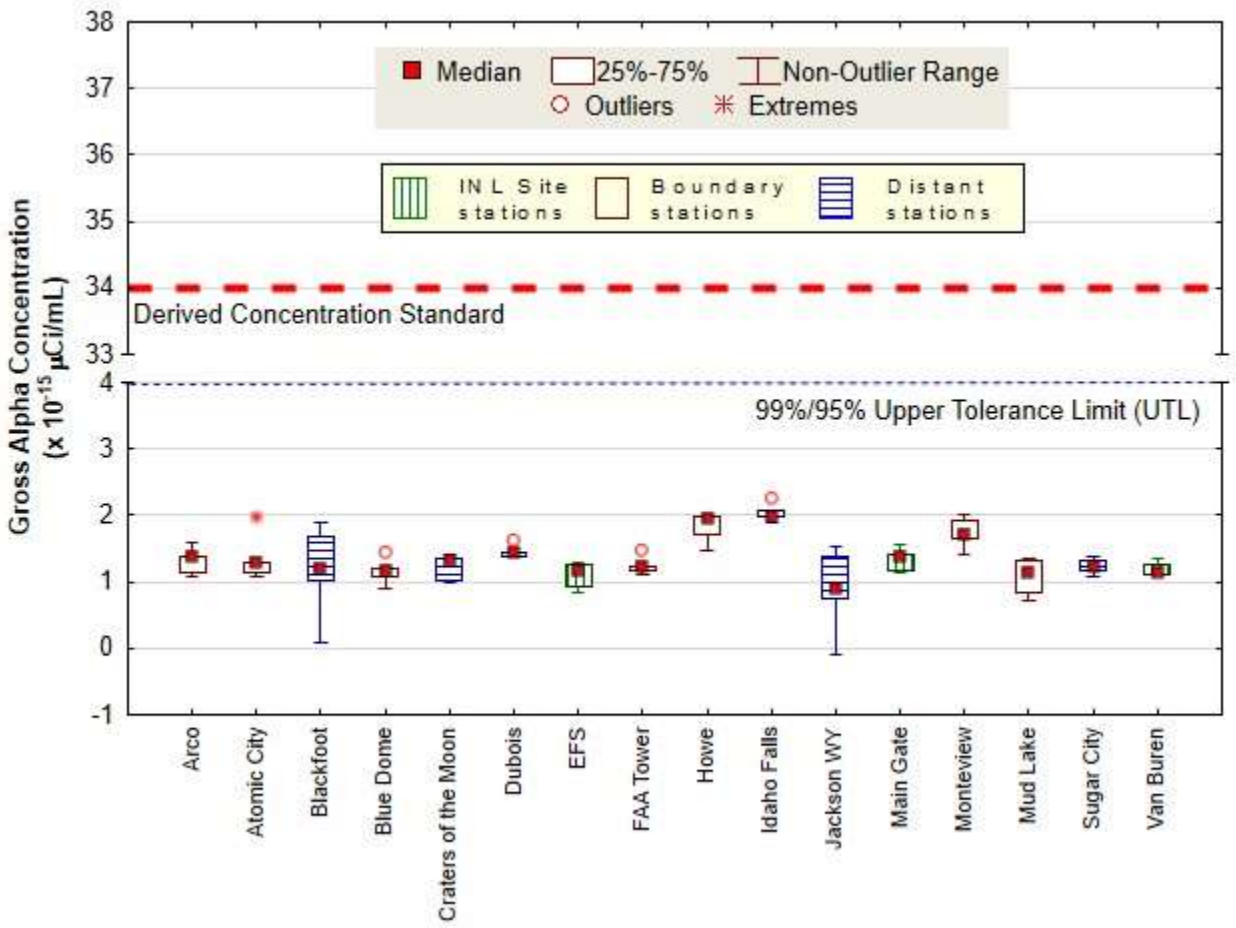

Figure 4. July 2020 gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location, except Mud Lake (N = 4). The Derived Concentration Standard (DCS) is the concentration of plutonium-239/240 ($^{239/240}$Pu) in air which, if inhaled for 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.

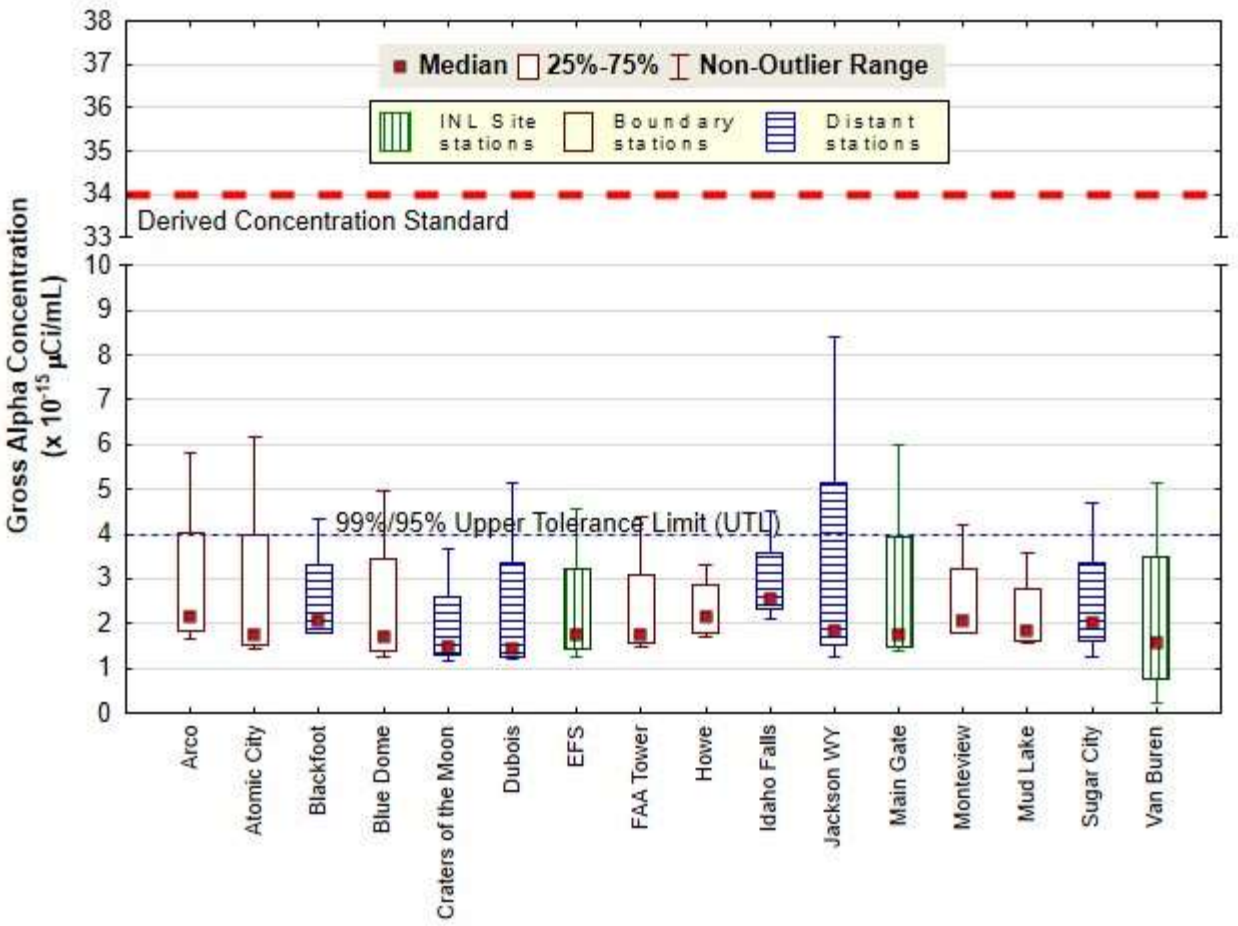

Figure 5. August 2020 gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location. The Derived Concentration Standard (DCS) is the concentration of plutonium-239/240 ($^{239/240}$Pu) in air which, if inhaled for a year, would result 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.

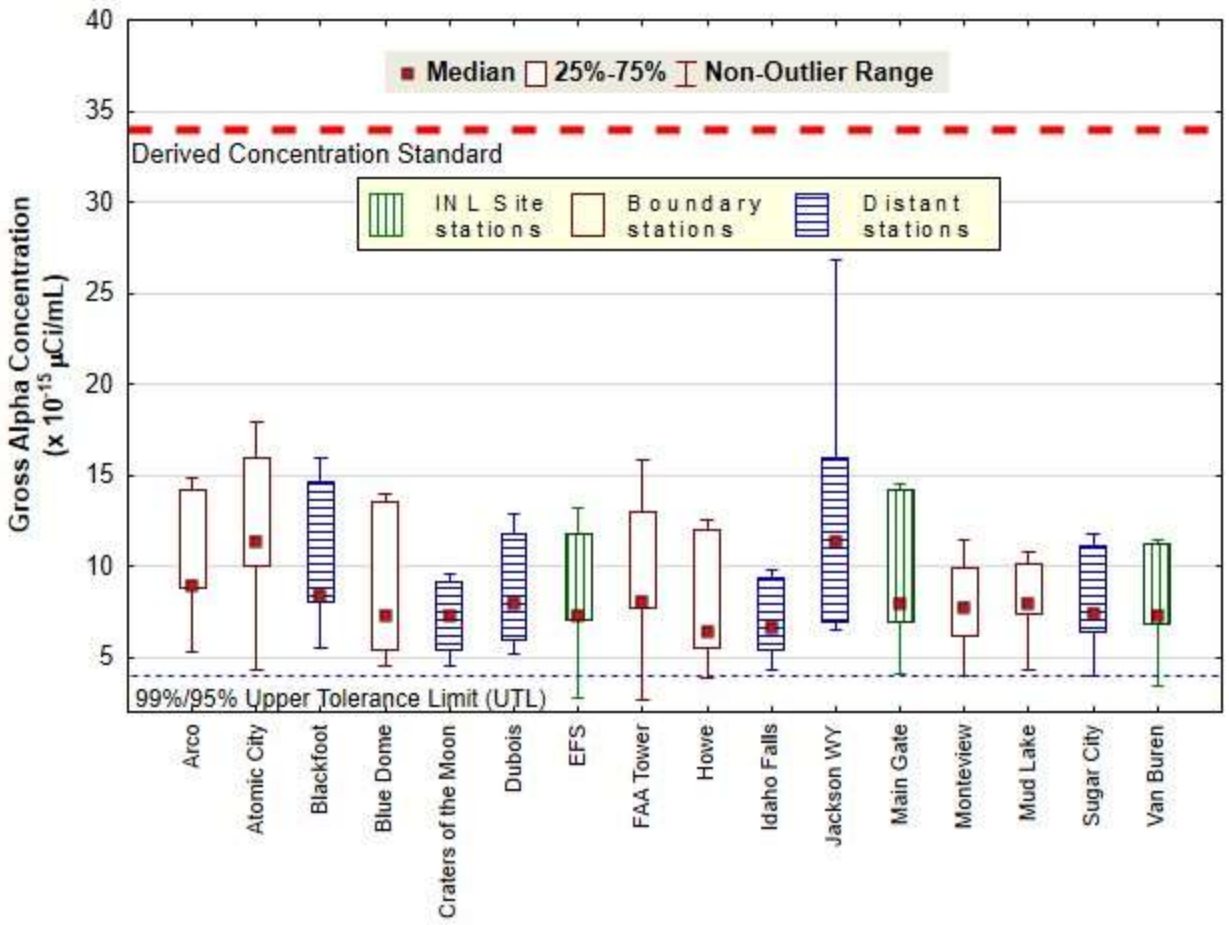

Figure 6. September 2020 gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. These results were considered invalid. A full explanation for this is provided in the text. Number of samples (N) = 5 at each location. The Derived Concentration Standard (DCS) is the concentration 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.

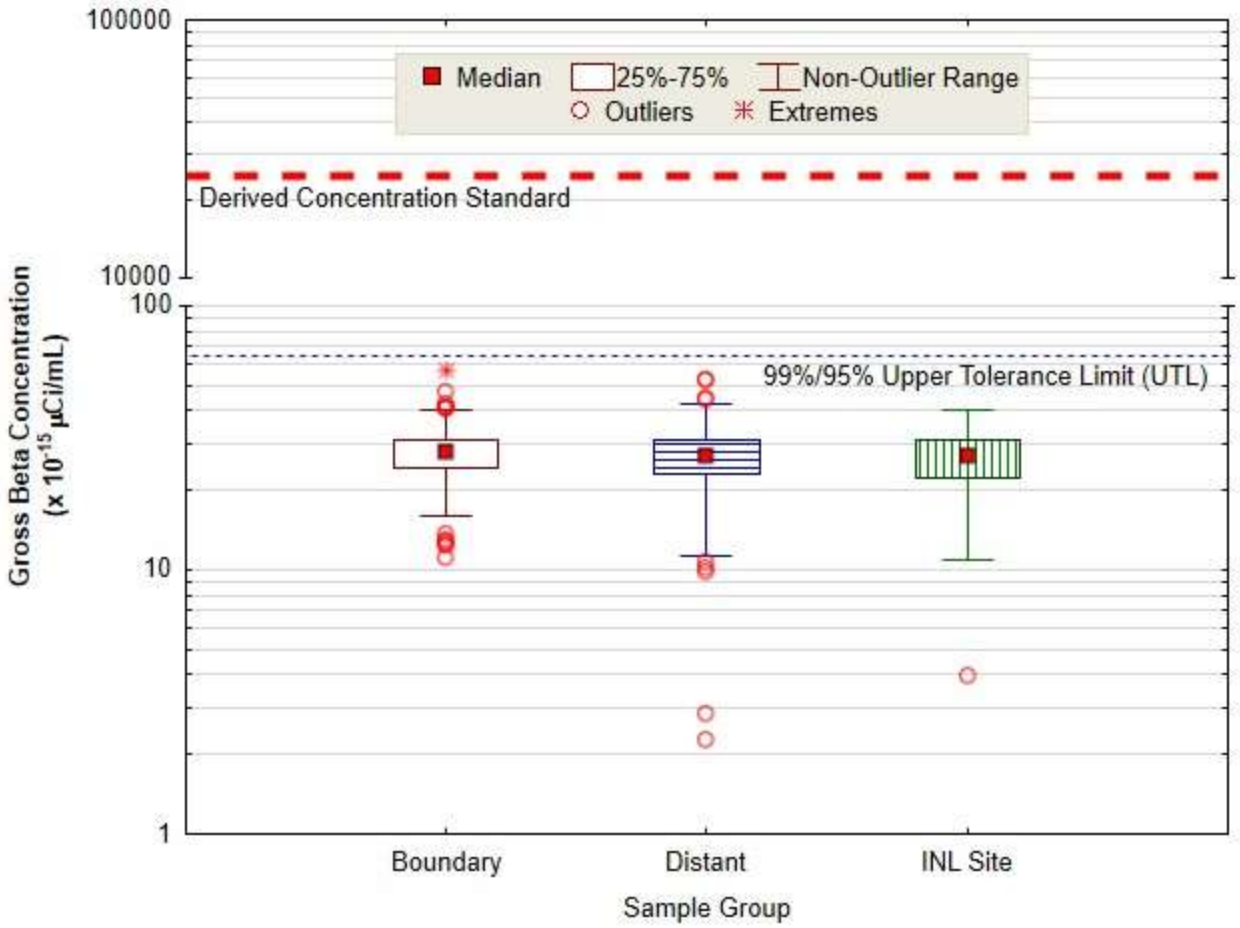

Figure 7. Gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations for the third quarter of 2020. The Derived Concentration Standard (DCS) is the concentration of strontium-90 (^{90}Sr) in air which, if inhaled for a year, would result in a dose of 100 mrem/yr. Because the measurements 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.

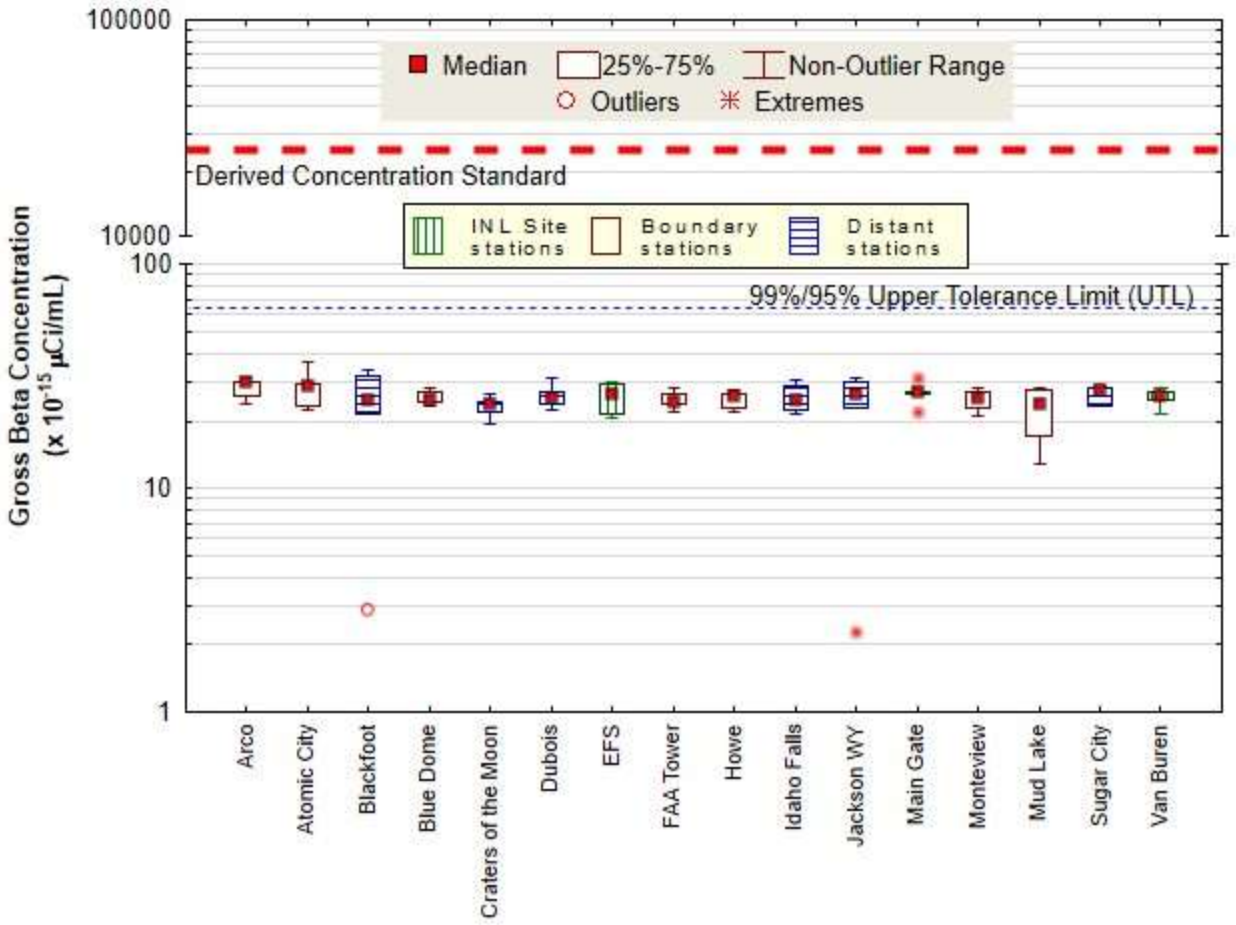

Figure 8. July 2020 gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location, except Mud Lake (N = 4). The Derived Concentration Standard (DCS) is the concentration of strontium-90 (^{90}Sr) in air which, if inhaled for a year, would 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.

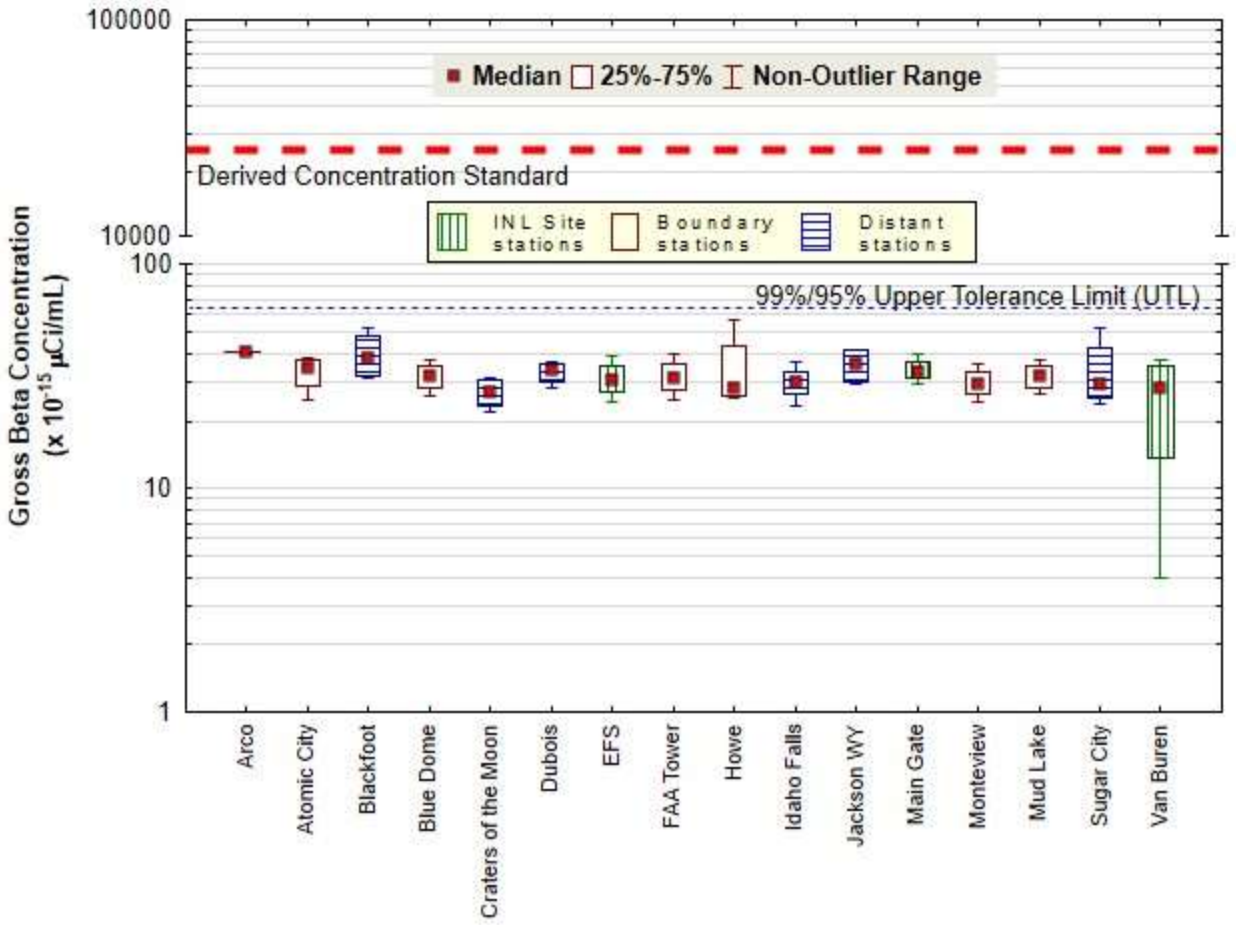

Figure 9. August 2020 gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location. The Derived Concentration Standard (DCS) is the concentration of strontium-90 (^{90}Sr) in air which, if inhaled for a year, would result in a dose of 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.

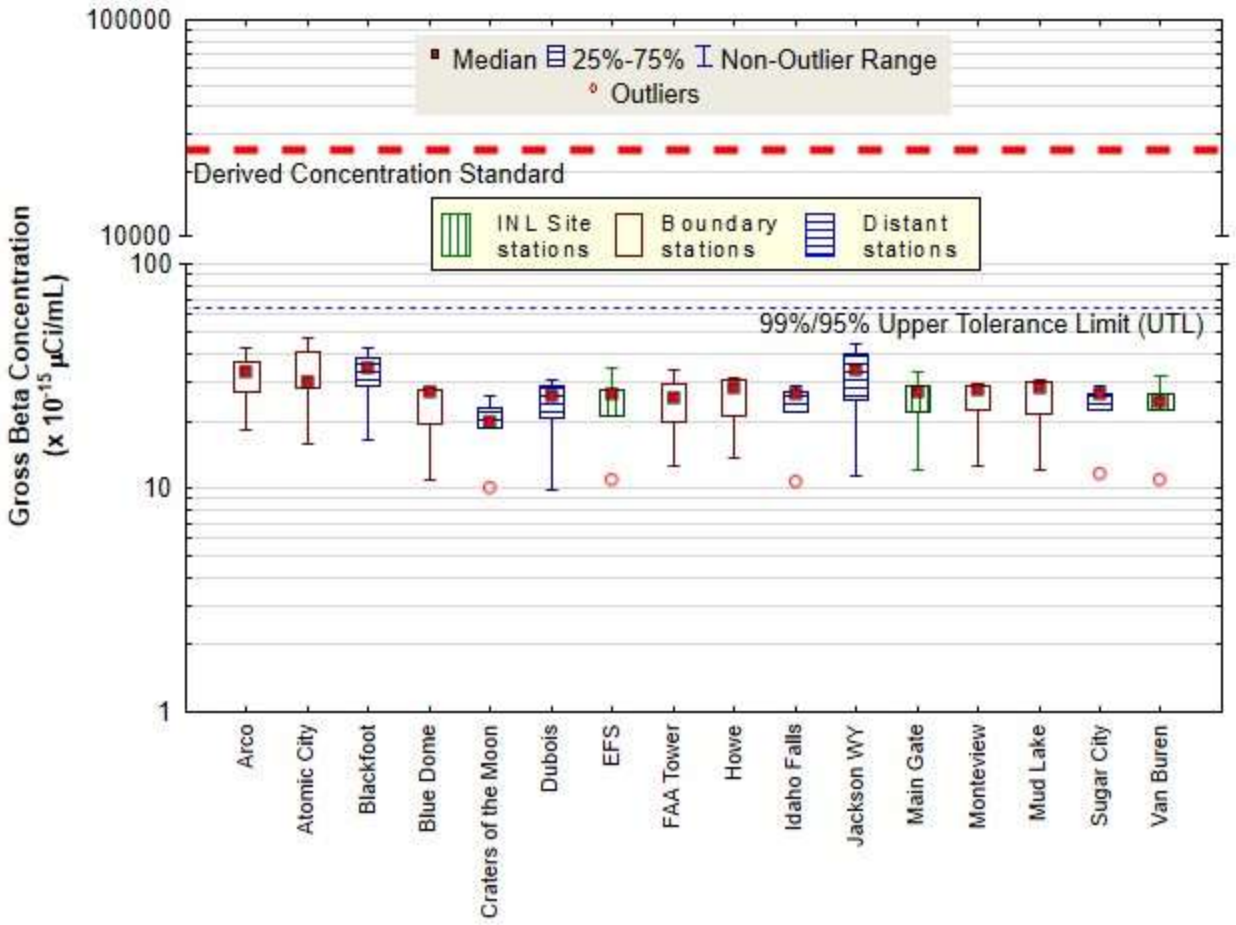

Figure 10. September 2020 gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location. The Derived Concentration Standard (DCS) is the concentration of strontium-90 (^{90}Sr) in air which, if inhaled for a year, would result in a dose 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 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 (Figure 11). These are the same locations that atmospheric moisture samples are collected at. Precipitation samples are analyzed for tritium. Storm events in the third quarter of 2020 produced sufficient precipitation to yield only ten samples.

Tritium was measured above the 3s values in four of the ten samples collected during the third quarter. 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 and INL Oversight Program. The EPA Radnet database lists tritium results for precipitation collected in Idaho. The last sample for which results are available was collected on December 15, 2011. A search of the RadNet database (https://enviro.epa.gov/enviro/erams_query_v2.simple_query) for tritium in precipitation collected in Idaho from 2007 through 2011 shows a range of -84 to 123 pCi/L. The INL Oversight Program presents tritium results for 2016 through 2019 (http://www.deq.idaho.gov/inl-oversight/monitoring/reports/) and the results range from -100 to 140 pCi/L. The maximum value in the third quarter was (288 ± 28) pCi/L in an EFS sample collected in late June. The result was below the 99%/95% UTL of 311 pCi/ml.

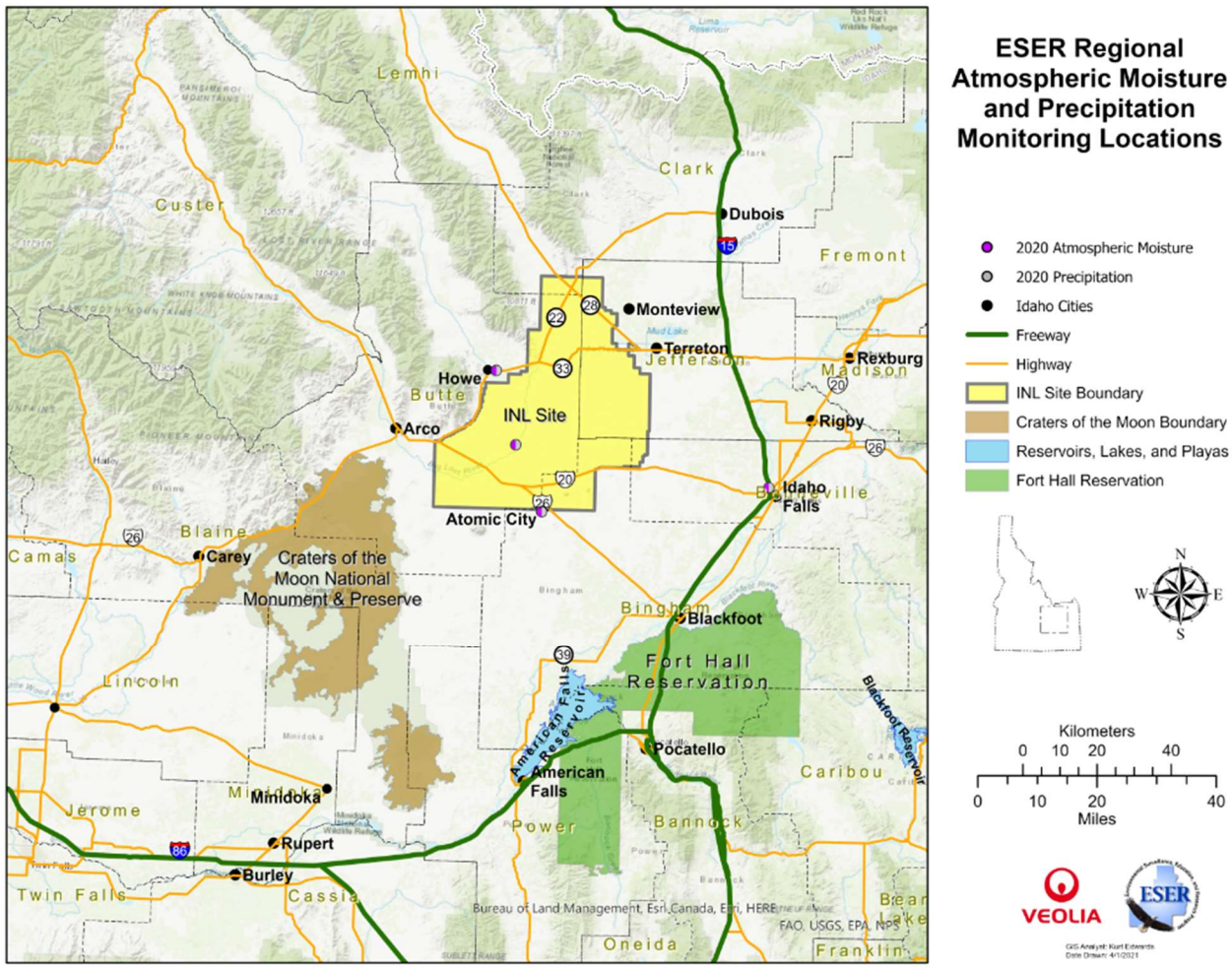

Figure 11. ESER atmospheric moisture and precipitation monitoring locations.

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 or third quarter, lettuce and grain are sampled during the third quarter, while potatoes are collected during the third/fourth quarters. 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, lettuce, grain, and wildlife samples available during the third quarter of 2020.

MILK SAMPLING

Milk samples were collected weekly at Idaho Falls and Terreton. Monthly samples were collected at five other locations around the INL Site (Figure 12) during the third quarter of 2020. 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.

Neither ^{131}I nor ^{137}Cs was 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.

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 were analyzed for ^{90}Sr. Data for ^{137}Cs and ^{90}Sr in alfalfa samples are listed in Appendix C, Table C-7.

No human-made gamma-emitting radionuclides were found in any of the samples this year. Strontium-90 was not detected in the samples either. In past years ^{90}Sr has been found at low concentrations in a few samples.

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 and a duplicate sample at Idaho Falls. Five lettuce samples were collected from portable planters at Atomic City, EFS, the Federal Aviation Administration (FAA) Tower, Howe, and Monteview. 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, a sample was obtained from a garden in Blackfoot, Idaho Falls (plus a duplicate), and Pocatello.

No human-made gamma-emitting radionuclides were found in any of the samples. Strontium-90 was also not detected in any of the samples. Data for ^{137}Cs and ^{90}Sr in all lettuce samples taken during the third quarter are listed in Appendix C, Table C-8.

GRAIN SAMPLING

Locally grown grain (wheat and barley) was collected from nine Southeast Idaho locations and one duplicate from Rupert. In addition, a commercially-available sample was obtained from outside the local area. All samples were analyzed for gamma-emitting radionuclides and ^{90}Sr.

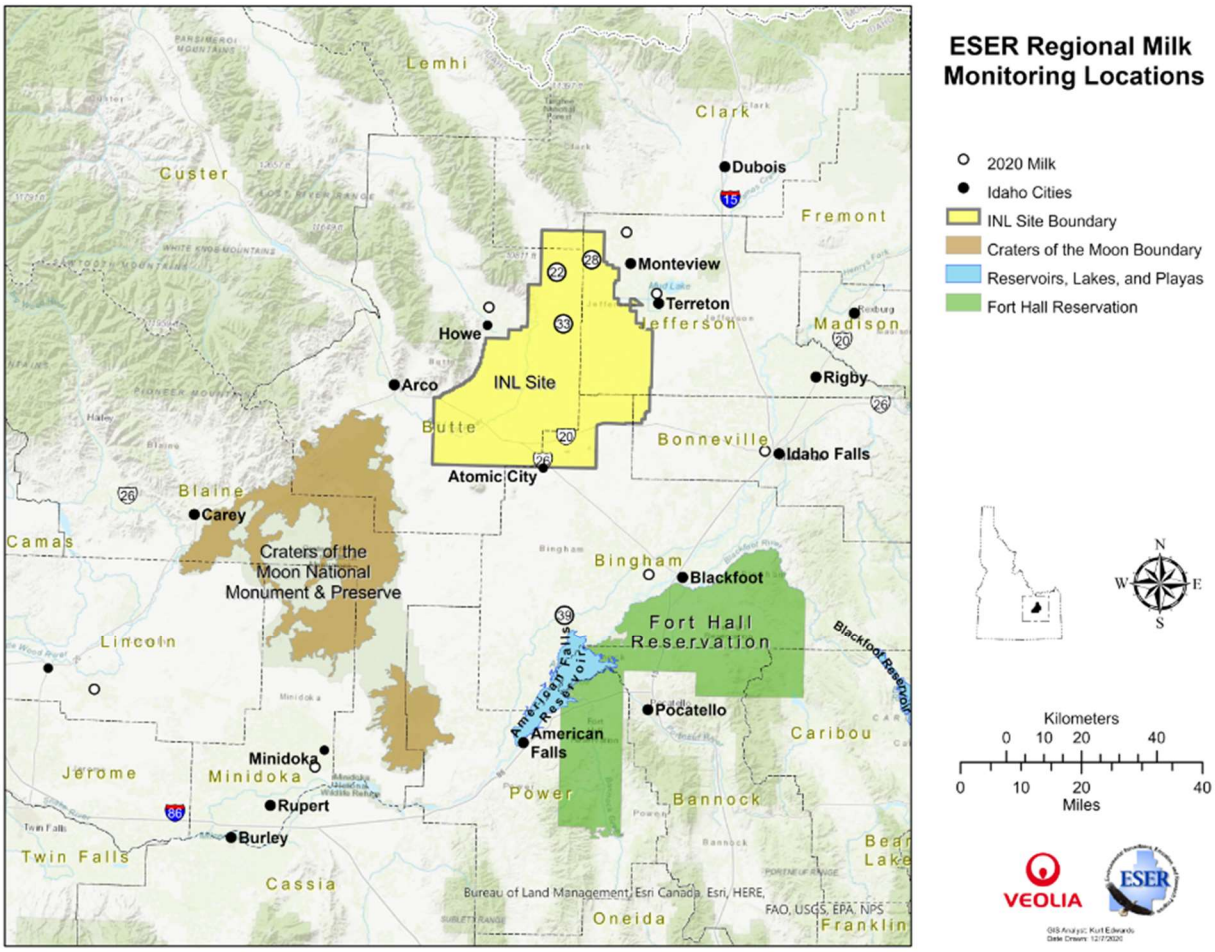

Figure 12. ESER milk sampling locations.

No human-made gamma-emitting radionuclides were detected in any grain sample. None of the 11 grain samples collected in 2020 contained a detectable concentration of ^{90}Sr. Data for ^{137}Cs and ^{90}Sr in all grain samples taken during 2020 are listed in Appendix C, Table C-9.

LARGE GAME ANIMAL SAMPLING

Two large game animals killed by vehicular collisions were available for sampling during the third quarter of 2020. One was an elk killed near the Advanced Test Reactor Complex; the other was a mule deer struck by a vehicle at the Central Facilities Area. Muscle, liver, and thyroid tissues were collected from both animals. No human-made gamma-emitting radionuclides were detected in any of the tissues. Data for game animals are found in Appendix C, Table C-10.

SOIL SAMPLING

Soil samples were collected at twelve boundary and distant locations in the third quarter (Figure 13). Undisturbed locations sampled historically and representing areas of maximum potential airborne deposition as well as population centers and unaffected regions were selected for this purpose. All surface (0-5 cm) 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-11. In addition, all subsurface (5-10 cm) samples were analyzed for gamma-emitting radionuclides.

Cesium-137 was detected in all soil samples at concentrations consistent with historical measurements and is most likely present from fallout from past atmospheric nuclear weapons testing, which were carried out mainly in the 1960s. The majority of ^{137}Cs is present in surface soils at an average ratio of 2.5:1 (surface soil concentration to subsurface soil concentration). Analysis of the geometric mean of areal concentrations of ^{137}Cs in surface soil over time indicate that concentrations are decreasing at a rate consistent with the approximate 30-year half-life of this radionuclide (Figure 14).

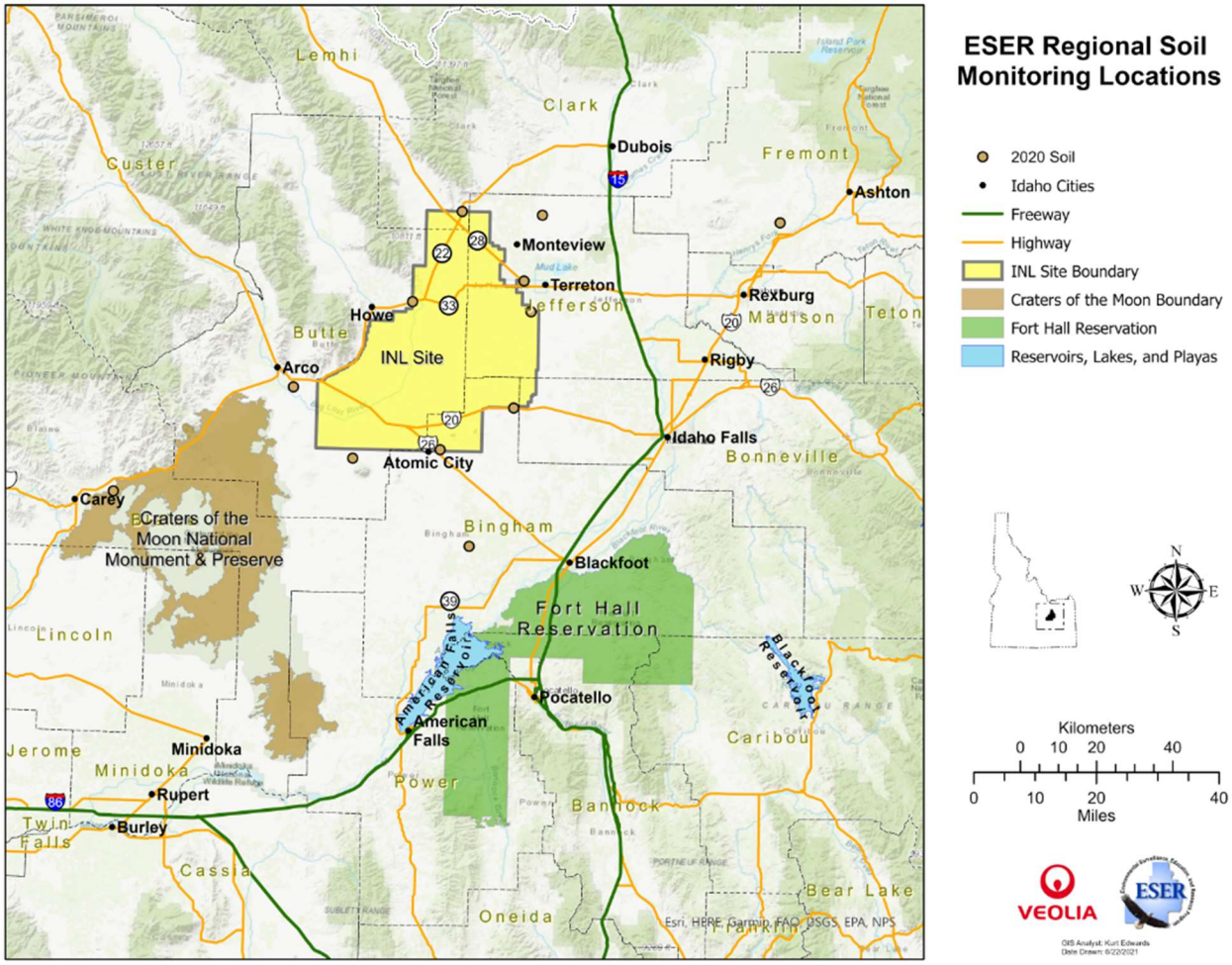

Figure 13. ESER soil monitoring locations.

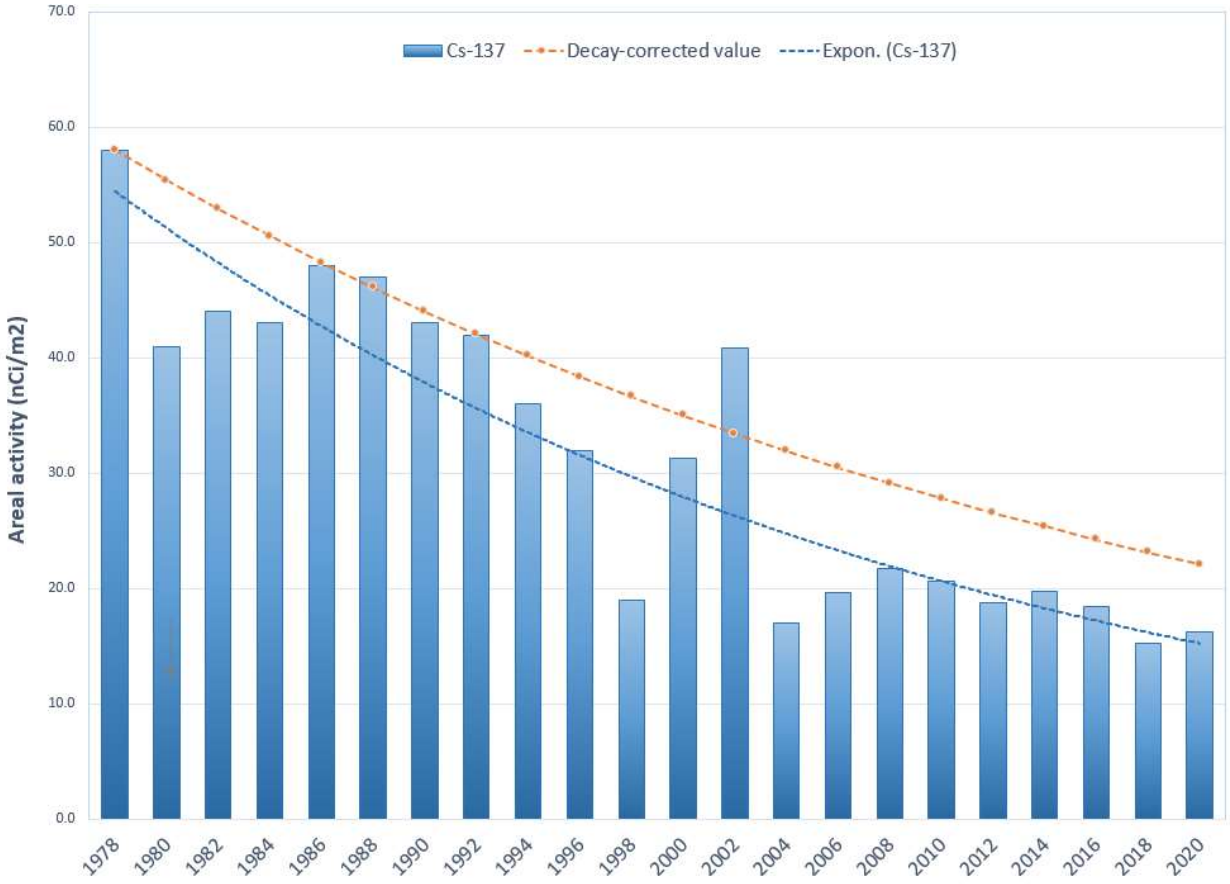

Figure 14. Mean (geometric) areal activities of ^{137}Cs in surface (0–5 cm [0–2.5 in.]) soils off the INL Site (1978–2020). Decay-corrected values assume an initial mean areal activity measured in 1978 and a half-life of 30.17 years. The decreasing trend in the mean activity in soil samples is best represented by an exponential function (R^2=0.79).

Strontium-90, another fallout radionuclide, was detected above 3s in four surface soil samples at levels within historical measurements. Current results are typically below detection levels and it is thus apparent that ^{90}Sr is becoming more undetectable in surface soil. Mean annual (geometric) concentrations of ^{90}Sr in surface over time appear to decrease at a rate which exceeds that projected for radioactive decay (Figure 15). Strontium-90 is more mobile than ^{137}Cs in alkaline soils and the accelerated decrease may be due to other processes in the soil, such as movement into lower depths or uptake by plants.

No accumulation of either ^{137}Cs or ^{90}Sr on surface soil is indicated as a result of operations at the INL Site.

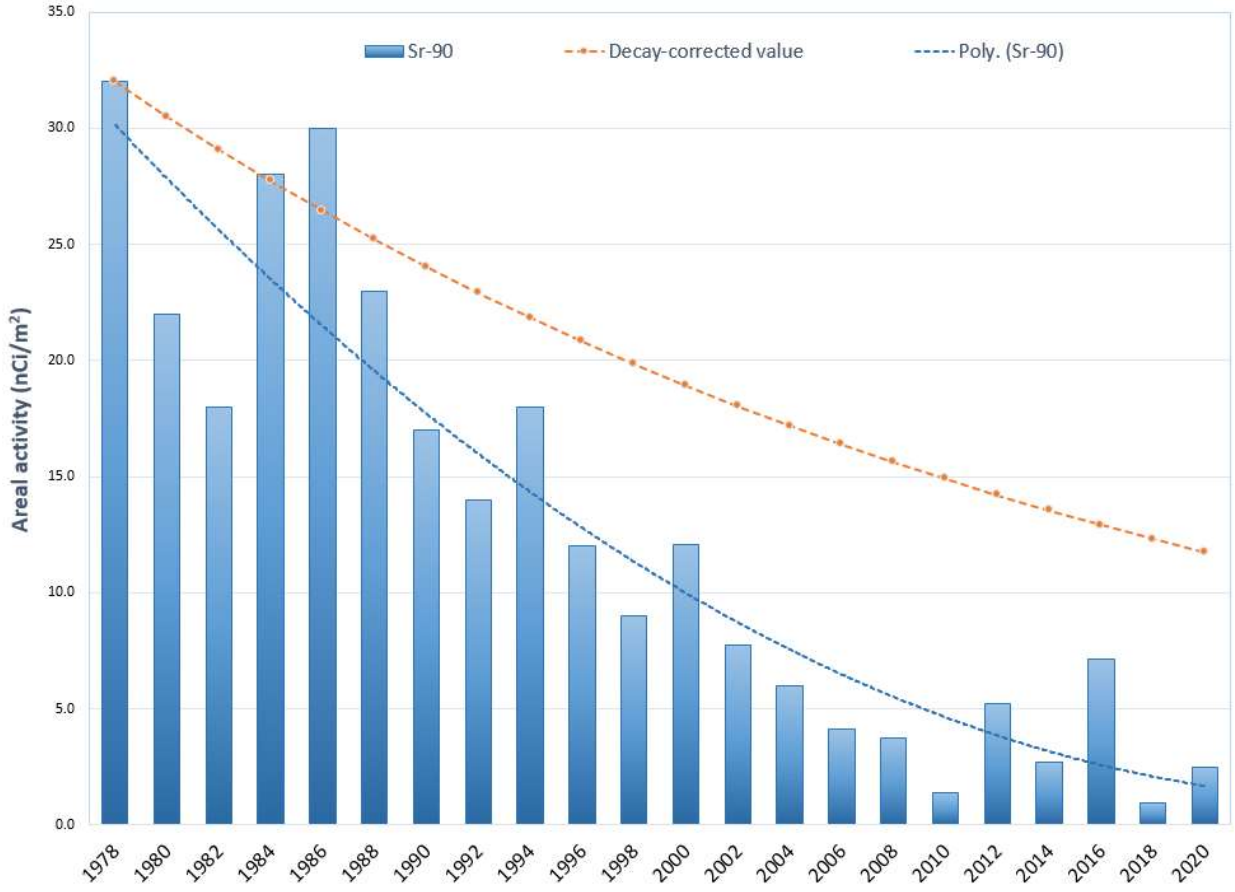

Figure 15. Mean (geometric) areal activities of ^{90}Sr in surface (0–5 cm [0–2.5 in.]) soils off the INL Site (1978–2020). All results were included in the calculation of the geometric mean. Decay-corrected values assume an initial mean areal activity measured in 1978 and a half-life of 28.8 years. The decreasing trend in the mean activity in soil samples is best represented by a second order polynomial (R^2=0.85).

Transuranic radionuclides (including isotopes of plutonium) are present in our environment as a result of global fallout from above-ground nuclear weapon tests. Until 1979 the integrated deposition in the north temperate zone (40-50° latitude) was estimated for ^{238}Pu (1.5 Bq/m^2 [0.04 nCi/m^2]); $^{239/240}$Pu (58 Bq/m^2 [1.6 nCi/m^2]); ^{241}Pu (730 Bq/m^2 [19.73 nCi/m^2]) and ^{241}Am (25 Bq/m^2 [0.68 nCi/m^2]) (Bunzl et al 1987). Measurements of ^{238}Pu, $^{239/240}$Pu, and ^{241}Am made by the DOE Radiological and Environmental Sciences Laboratory (RESL) during the same time period are shown in Table 1. The estimated fallout lies within the 95% confidence intervals reported for ^{238}Pu (both years) and $^{239/240}$Pu (1978). The concentrations of ^{241}Am measured in surface soils in 1978 and 1980 are about half of the fallout concentrations estimated for 1979.

Based on the estimated fallout presented in Table 1, ^{238}Pu would not be expected to be detected very often in the environment. Not surprisingly, no particular trend in ^{238}Pu has been observed over time by the ESER program because it is infrequently detected (about 10% of the time since 2008). In addition, the half-life of ^{238}Pu is 87.7 years so about 25% of the original activity has decayed. Plutonium-238 was not detected above 3s in any ESER sample in 2020 (Table C-11).

Table 1. Radionuclides in offsite surface soils[a] (1978 and 1980)

Radionuclide	Year	Geometric Average[b] pCi/kg	Geometric Average[b] nCi/m^2	No. of samples	Detection Limit pCi/kg	Detection Limit nCi/m^2	Estimated Fallout (1979)[c] (nCi/m^2)
^{238}Pu	1978	1.0 ×/÷ 1.9	0.06 ×/÷ 1.9	10	2	0.2	0.04
	1980	0.7 ×/÷ 1.3	0.05 ×/÷ 1.3	10	2	0.2	
$^{239/240}$Pu	1978	18.0 ×/÷ 1.4	1.09 ×/÷ 1.7	10	4	0.3	1.57
	1980	10.0 ×/÷ 1.7	0.63 ×/÷ 1.3	10	4	0.3	
^{241}Am	1978	6.2 ×/÷ 1.4	0.38 ×/÷ 1.3	10	4	0.3	0.68
	1980	3.0 ×/÷ 1.3	0.20 ×/÷ 1.4	10	4	0.3	

a. Soil samples collected to a depth of 5 cm.
b. Geometric average ×/÷ 2 standard geometric deviations of the mean. This represents the 95% confidence interval for the mean. From DOE-ID 1981.
c. From Bunzl et al. 1987.

Plutonium-239 and -240 have long half-lives (24,100 years and 6,561 years, respectively) and thus these fallout radionuclides persist in the environment. Five of the 12 samples analyzed in 2020 had detectable concentrations (greater than 3s) of ^{239,240}Pu (Table C-11). The highest result (38.7 ± 6.4 pCi/kg or 1.36 nCi/m^2) from Carey is slightly higher than would be expected from estimated fallout (1.16 nCi/m^2), as shown in Table 1, but well within historical measurements (Figure 16).

No statistical trend is discernible, most likely because of several factors. These include:

- the heterogeneous nature of soils (variation of particle size and soil chemistry) and consequently of radionuclide concentrations across the area sampled
- nonuniform redistribution of contaminated soil via deposition and resuspension resulting from differences in wind, vegetation cover and topography
- the use of multiple laboratories, which have different procedures and detection limits, over the past four decades
- the small subsample analyzed. Radiochemical analyses of soil samples involve the consumption of a small subsample (typically only 5 g) which represents about 0.25% of the original sample weight. Although the sample is dried and sieved (< 35 mesh or 0.5 mm), the subsample is not homogeneous and not necessarily representative of the entire sample collected. [Note: Gamma analyses, on the other hand, can be performed on a much large sample size (~500 g)].

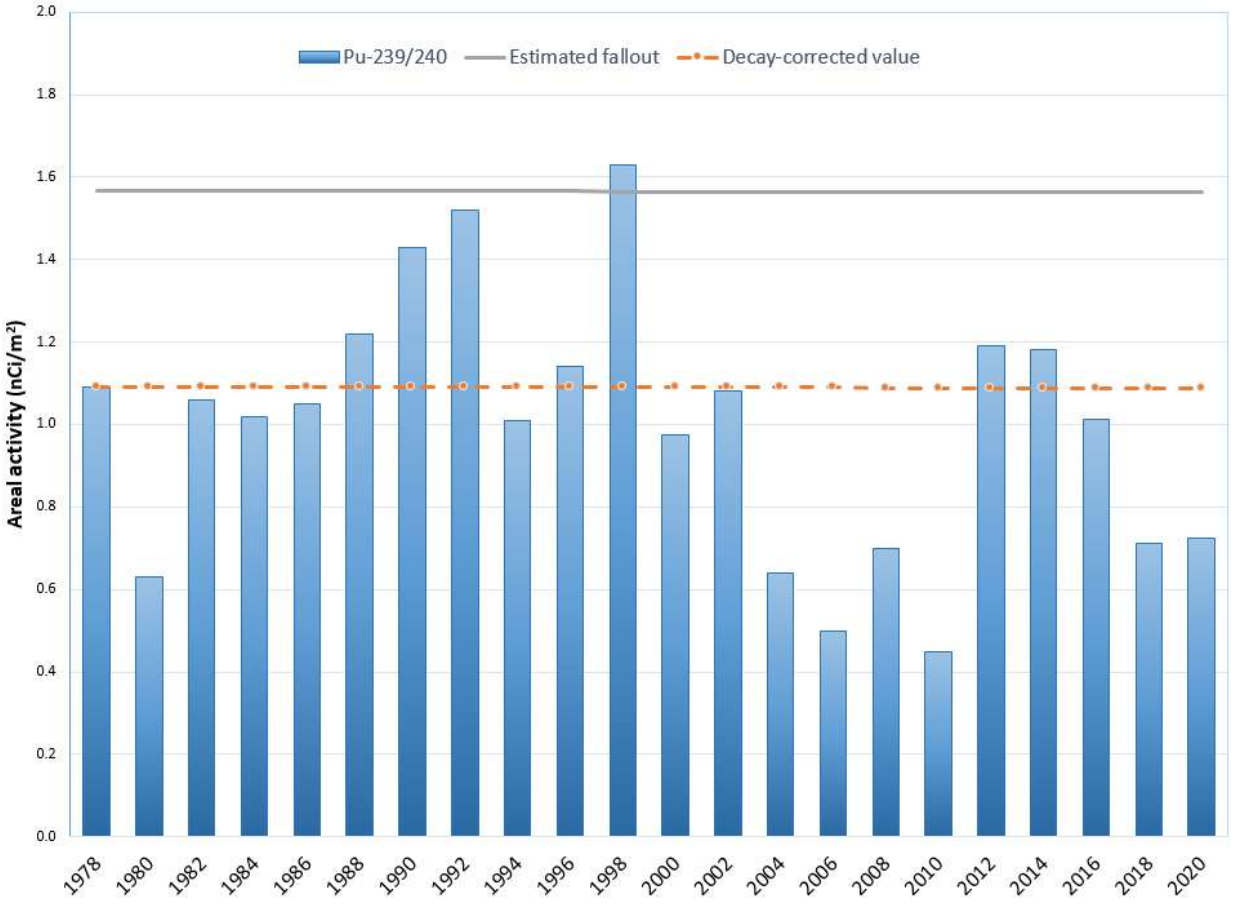

Figure 16. Mean (geometric) areal activities of $^{239/240}$Pu in surface (0–5 cm [0–2.5 in.]) soils off the INL Site (1978–2020). All results were included in the calculation of the geometric mean. No statistically significant trend in the mean activity in soil samples could be determined. The fallout concentration was estimated from Bunzl et al. 1987.

Americium-241 is not produced directly in nuclear explosions but is the decay product of the fallout alpha-emitter ^{241} Pu (half-life 14.4 y). For this reason, the ^{241}Am activity in the environment is expected to increase as ^{241}Pu decays. Americium-241 was detected (>3σ) in four of the 12 samples collected in 2020 (Table C-11). The highest result (30.2 ± 8.0 pCi/kg or 1.28 nCi/m^2), collected from Reno Ranch at the north boundary of the INL Site, is about 10% higher than expected from that projected from estimated fallout (Figure 17). Soil concentrations in samples collected by ESER appear to show an increasing trend with time, although no statistically significant trend was evident.

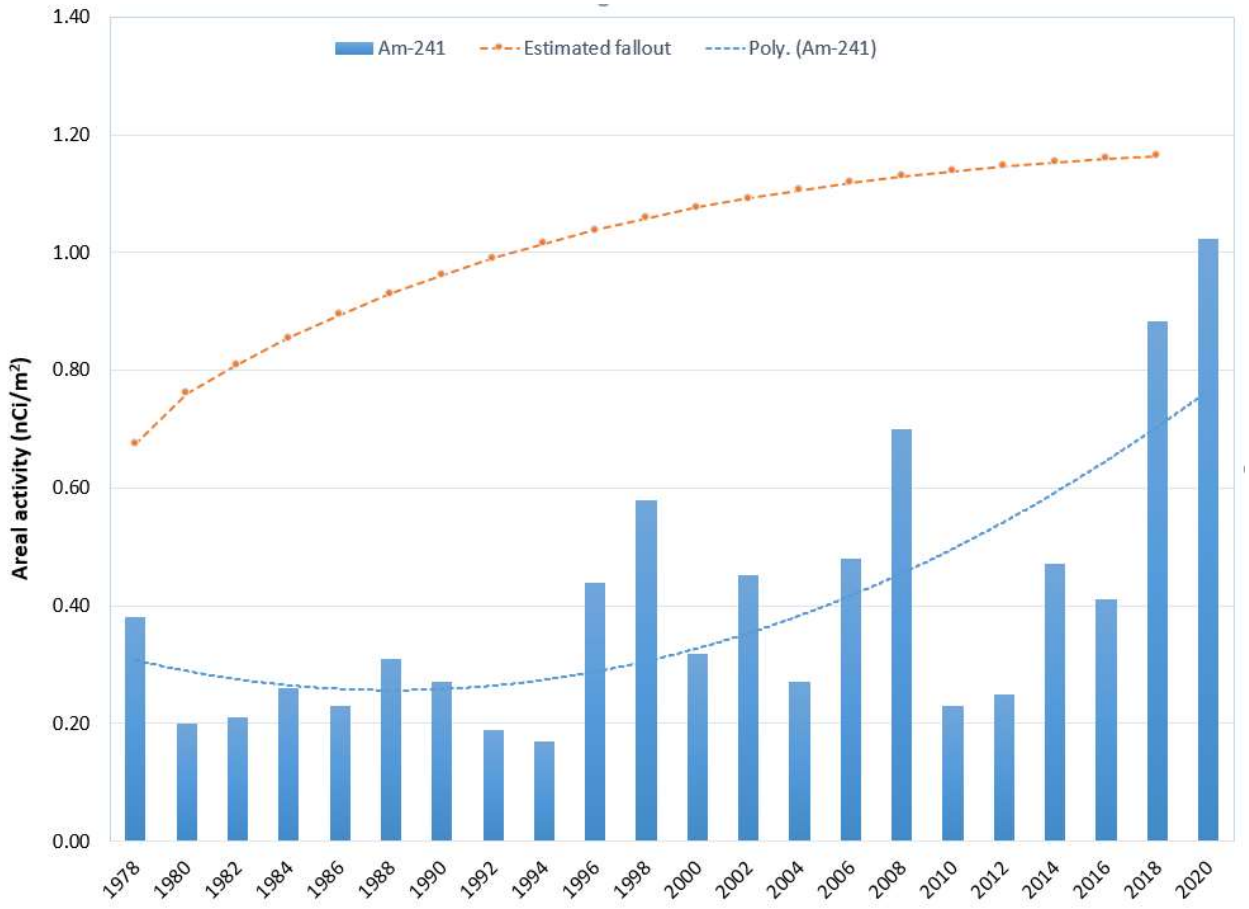

Figure 17. Mean (geometric) areal activities of ^{241}Am in surface (0–5 cm [0–2.5 in.]) soils off the INL Site (1978–2020). The projected concentration assumes the initial fallout areal concentration reported in Bunzl et al (1987) plus the decay of ^{241}Pu to ^{241}Am. All results were included in the calculation of the geometric mean. Decay-corrected values assume an initial mean areal activity measured in 1978 and a half-life of 432.2 years for ^{241}Am and 14.4 years for ^{241}Pu. No statistically significant trend in the mean activity in soil samples could be determined. The fallout concentration was estimated using Bunzl et al. 1987.

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 (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 Third Quarter of 2020 (VNSFS 2021).

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APPENDIX A

SUMMARY OF SAMPLING SCHEDULE

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

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INL Site
AIR SAMPLING				
LOW-VOLUME AIR				
Gross Alpha, Gross Beta, ^{131}I	weekly	Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Sugar City	Arco, Atomic City, FAA Tower, Howe, Monteview, Mud Lake, Blue Dome	Main Gate, EFS, Van Buren
Gamma Spec	quarterly	Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Sugar City	Arco, Atomic City, FAA Tower, Howe, Monteview, Mud Lake, Blue Dome	Main Gate, EFS, Van Buren
^{90}Sr, Transuranics	quarterly	Rotating schedule	Rotating schedule	Rotating schedule
ATMOSPHERIC MOISTURE				
Tritium	2 to 13 weeks	Idaho Falls	Atomic City, Howe	EFS
PRECIPITATION				
Tritium	monthly	Idaho Falls	None	None
Tritium	weekly	None	Atomic City, Howe	EFS
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, Frenchmans 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, Pocatello, 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 Third Quarter 2020

Sample Type	Analysis	Average Minimum Detectable Concentration[a] (MDC)	Derived Concentration Standard[b] (DCS)
Air (particulate filter)[e]	Gross alpha	4.4×10^{-16} µCi/mL	3.4×10^{-14} µCi/mL[c]
	Gross beta	1.8×10^{-15} µCi/mL	2.5×10^{-11} µCi/mL[d]
	^{137}Cs	9.6×10^{-17} µCi/mL	9.8×10^{-11} µCi/mL
	^{90}Sr	4.6×10^{-17} µCi/mL	2.5×10^{-11} µCi/mL
	^{241}Am	3.3×10^{-18} µCi/mL	4.1×10^{-14} µCi/mL
	^{238}Pu	3.9×10^{-18} µCi/mL	3.7×10^{-14} µCi/mL
	$^{239/240}$Pu	3.8×10^{-18} µCi/mL	3.4×10^{-14} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	9.4×10^{-16} µCi/mL	4.1×10^{-10} µCi/mL
Air (atmospheric moisture)	^{3}H	95.4 pCi/L_{water} 5.8×10^{-13} µCi/mL_{air}	1.9×10^{6} pCi/L_{water} 2.1×10^{-7} µCi/mL_{air}
Air (precipitation)	^{3}H	95.2 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	1.1 pCi/L	3.0×10^{3} pCi/L[f]
Alfalfa	^{137}Cs	84.2 pCi/kg	[g]
	^{90}Sr	63.5 pCi/kg	--
Lettuce	^{137}Cs	87.4 pCi/kg	--
	^{90}Sr	62.5 pCi/kg	--
Grain	^{137}Cs	1.0 pCi/kg	--
	^{90}Sr	52.2 pCi/kg	--
Large Game	^{131}I	85.7 pCi/kg (thyroid)	--
	^{137}Cs	31.6 pCi/kg (thyroid) 1.1 pCi/kg (muscle/liver)	--
Soil	^{137}Cs	0.71 pCi/kg	--
	^{90}Sr	57.7 pCi/kg	--
	^{241}Am	24.0 pCi/kg	--
	^{238}Pu	9.2 pCi/kg	--
	$^{239/240}$Pu	11.9 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. – 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	7/1/2020	1.08	±	0.16	4.00	±	0.57	Yes	23.80	±	0.64	88.06	±	2.35	Yes
	7/8/2020	1.14	±	0.17	4.22	±	0.64	Yes	31.20	±	0.73	115.44	±	2.69	Yes
	7/15/2020	1.37	±	0.20	5.07	±	0.75	Yes	30.00	±	0.81	111.00	±	2.98	Yes
	7/22/2020	1.38	±	0.18	5.11	±	0.67	Yes	25.90	±	0.67	95.83	±	2.49	Yes
	7/29/2020	1.60	±	0.19	5.92	±	0.70	Yes	30.20	±	0.71	111.74	±	2.64	Yes
	8/5/2020	1.98	±	0.23	7.33	±	0.85	Yes	41.10	±	0.88	152.07	±	3.27	Yes
	8/12/2020	2.28	±	0.24	8.44	±	0.90	Yes	41.00	±	0.91	151.70	±	3.37	Yes
	8/19/2020	1.66	±	0.21	6.14	±	0.77	Yes	40.80	±	0.89	150.96	±	3.27	Yes
	8/26/2020	5.80	±	0.48	21.46	±	1.77	Yes	40.30	±	2.00	149.11	±	7.40	Yes
a	9/2/2020	8.92	±	0.36	33.00	±	1.34	Yes	27.10	±	0.61	100.27	±	2.26	Yes
a	9/9/2020	5.25	±	0.39	19.43	±	1.43	Yes	32.90	±	1.55	121.73	±	5.74	Yes
a	9/16/2020	14.20	±	0.58	52.54	±	2.14	Yes	42.50	±	0.93	157.25	±	3.43	Yes
a	9/23/2020	14.90	±	0.61	55.13	±	2.26	Yes	36.90	±	0.91	136.53	±	3.36	Yes
a	9/30/2020	8.80	±	0.84	32.56	±	3.11	Yes	18.20	±	1.32	67.34	±	4.88	Yes
QA-1	7/1/2020	0.95	±	0.15	3.50	±	0.55	Yes	21.40	±	0.61	79.18	±	2.26	Yes
(ARCO)	7/8/2020	1.51	±	0.19	5.59	±	0.68	Yes	29.20	±	0.69	108.04	±	2.56	Yes
	7/15/2020	0.04	±	0.11	0.14	±	0.39	No	2.87	±	0.41	10.62	±	1.52	Yes
	7/22/2020	1.17	±	0.16	4.33	±	0.61	Yes	24.30	±	0.63	89.91	±	2.32	Yes
	7/29/2020	2.19	±	0.21	8.10	±	0.79	Yes	31.90	±	0.73	118.03	±	2.69	Yes
	8/5/2020	2.37	±	0.23	8.77	±	0.85	Yes	39.70	±	0.82	146.89	±	3.04	Yes
	8/12/2020	1.60	±	0.19	5.92	±	0.71	Yes	26.50	±	0.70	98.05	±	2.60	Yes
	8/19/2020	1.41	±	0.18	5.22	±	0.68	Yes	33.80	±	0.77	125.06	±	2.85	Yes
	8/26/2020	3.51	±	0.36	12.99	±	1.33	Yes	21.20	±	1.52	78.44	±	5.62	Yes
a	9/2/2020	6.37	±	0.29	23.57	±	1.08	Yes	21.10	±	0.52	78.07	±	1.91	Yes
a	9/9/2020	3.79	±	0.29	14.02	±	1.07	Yes	25.80	±	1.18	95.46	±	4.37	Yes
a	9/16/2020	11.50	±	0.47	42.55	±	1.74	Yes	30.00	±	0.72	111.00	±	2.65	Yes
a	9/23/2020	7.61	±	0.37	28.16	±	1.35	Yes	14.30	±	0.51	52.91	±	1.88	Yes
a	9/30/2020	6.00	±	0.57	22.20	±	2.11	Yes	13.30	±	0.91	49.21	±	3.35	Yes
ATOMIC CITY	7/1/2020	1.14	±	0.16	4.22	±	0.58	Yes	23.20	±	0.63	85.84	±	2.33	Yes
	7/8/2020	1.09	±	0.17	4.03	±	0.63	Yes	29.60	±	0.71	109.52	±	2.62	Yes
	7/15/2020	1.29	±	0.17	4.77	±	0.63	Yes	22.60	±	0.62	83.62	±	2.31	Yes
	7/22/2020	1.28	±	0.18	4.74	±	0.67	Yes	36.70	±	0.78	135.79	±	2.87	Yes
	7/29/2020	1.98	±	0.21	7.33	±	0.76	Yes	28.50	±	0.70	105.45	±	2.58	Yes
	8/5/2020	1.66	±	0.19	6.14	±	0.72	Yes	36.00	±	0.76	133.20	±	2.81	Yes
	8/12/2020	1.43	±	0.18	5.29	±	0.68	Yes	24.60	±	0.68	91.02	±	2.50	Yes
	8/19/2020	1.80	±	0.20	6.66	±	0.75	Yes	32.90	±	0.78	121.73	±	2.89	Yes
	8/26/2020	6.19	±	0.49	22.90	±	1.81	Yes	38.60	±	2.00	142.82	±	7.40	Yes
a	9/2/2020	9.98	±	0.39	36.93	±	1.43	Yes	28.30	±	0.63	104.71	±	2.33	Yes
a	9/9/2020	4.31	±	0.39	15.95	±	1.45	Yes	30.00	±	1.67	111.00	±	6.18	Yes
a	9/16/2020	17.90	±	0.63	66.23	±	2.32	Yes	47.20	±	0.95	174.64	±	3.50	Yes
a	9/23/2020	15.90	±	0.66	58.83	±	2.43	Yes	40.70	±	0.99	150.59	±	3.67	Yes
a	9/30/2020	11.30	±	0.92	41.81	±	3.39	Yes	15.90	±	1.24	58.83	±	4.59	Yes
BLUE DOME	7/1/2020	1.18	±	0.17	4.37	±	0.62	Yes	24.80	±	0.67	91.76	±	2.48	Yes
	7/8/2020	1.45	±	0.18	5.37	±	0.68	Yes	28.20	±	0.69	104.34	±	2.54	Yes
	7/15/2020	0.90	±	0.16	3.32	±	0.58	Yes	23.50	±	0.66	86.95	±	2.43	Yes
	7/22/2020	1.07	±	0.17	3.96	±	0.61	Yes	24.20	±	0.65	89.54	±	2.39	Yes
	7/29/2020	1.20	±	0.17	4.44	±	0.64	Yes	27.20	±	0.69	100.64	±	2.54	Yes
	8/5/2020	1.51	±	0.19	5.59	±	0.70	Yes	37.30	±	0.78	138.01	±	2.87	Yes
	8/12/2020	1.26	±	0.18	4.66	±	0.67	Yes	26.00	±	0.71	96.20	±	2.63	Yes
	8/19/2020	1.89	±	0.19	6.99	±	0.71	Yes	33.30	±	0.72	123.21	±	2.67	Yes
	8/26/2020	4.97	±	0.41	18.39	±	1.50	Yes	29.90	±	1.65	110.63	±	6.11	Yes
a	9/2/2020	7.23	±	0.31	26.75	±	1.13	Yes	19.50	±	0.49	72.15	±	1.82	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
a	9/9/2020	4.57	±	0.33	16.91	±	1.22	Yes	27.30	±	1.30	101.01	±	4.81	Yes
a	9/16/2020	14.00	±	0.52	51.80	±	1.92	Yes	28.10	±	0.71	103.97	±	2.63	Yes
a	9/23/2020	13.50	±	0.58	49.95	±	2.15	Yes	27.20	±	0.81	100.64	±	3.00	Yes
a	9/30/2020	5.38	±	0.55	19.91	±	2.02	Yes	11.00	±	0.87	40.70	±	3.20	Yes
FAA TOWER	7/1/2020	1.16	±	0.16	4.29	±	0.58	Yes	22.10	±	0.60	81.77	±	2.23	Yes
	7/8/2020	1.48	±	0.19	5.48	±	0.68	Yes	28.30	±	0.69	104.71	±	2.55	Yes
	7/15/2020	1.12	±	0.17	4.14	±	0.62	Yes	24.50	±	0.66	90.65	±	2.45	Yes
	7/22/2020	1.24	±	0.17	4.59	±	0.64	Yes	23.70	±	0.64	87.69	±	2.38	Yes
	7/29/2020	1.22	±	0.17	4.51	±	0.62	Yes	26.60	±	0.66	98.42	±	2.44	Yes
	8/5/2020	1.82	±	0.21	6.73	±	0.78	Yes	40.20	±	0.83	148.74	±	3.08	Yes
	8/12/2020	1.46	±	0.19	5.40	±	0.70	Yes	24.70	±	0.69	91.39	±	2.55	Yes
	8/19/2020	1.71	±	0.20	6.33	±	0.73	Yes	31.20	±	0.75	115.44	±	2.76	Yes
	8/26/2020	4.39	±	0.52	16.24	±	1.93	Yes	30.60	±	2.28	113.22	±	8.44	Yes
a	9/2/2020	7.69	±	0.34	28.45	±	1.26	Yes	19.90	±	0.55	73.63	±	2.02	Yes
a	9/9/2020	2.68	±	0.32	9.92	±	1.17	Yes	29.30	±	1.57	108.41	±	5.81	Yes
a	9/16/2020	15.80	±	0.60	58.46	±	2.22	Yes	34.00	±	0.84	125.80	±	3.12	Yes
a	9/23/2020	13.00	±	0.55	48.10	±	2.02	Yes	25.40	±	0.75	93.98	±	2.78	Yes
a	9/30/2020	8.10	±	0.69	29.97	±	2.56	Yes	12.60	±	0.97	46.62	±	3.60	Yes
HOWE	7/1/2020	1.95	±	0.21	7.22	±	0.76	Yes	22.10	±	0.66	81.77	±	2.44	Yes
	7/8/2020	1.97	±	0.23	7.29	±	0.84	Yes	27.80	±	0.76	102.86	±	2.82	Yes
	7/15/2020	1.97	±	0.23	7.29	±	0.84	Yes	22.90	±	0.73	84.73	±	2.70	Yes
	7/22/2020	1.47	±	0.19	5.44	±	0.70	Yes	26.60	±	0.69	98.42	±	2.55	Yes
	7/29/2020	1.70	±	0.22	6.29	±	0.80	Yes	25.90	±	0.75	95.83	±	2.77	Yes
	8/5/2020	1.94	±	0.22	7.18	±	0.83	Yes	56.80	±	0.98	210.16	±	3.64	Yes
	8/12/2020	1.68	±	0.20	6.22	±	0.75	Yes	26.30	±	0.73	97.31	±	2.70	Yes
	8/19/2020	2.36	±	0.21	8.73	±	0.79	Yes	30.30	±	0.71	112.11	±	2.64	Yes
	8/26/2020	3.33	±	0.42	12.32	±	1.54	Yes	25.40	±	1.86	93.98	±	6.88	Yes
a	9/2/2020	6.43	±	0.30	23.79	±	1.12	Yes	21.10	±	0.53	78.07	±	1.98	Yes
a	9/9/2020	3.92	±	0.34	14.50	±	1.25	Yes	30.30	±	1.46	112.11	±	5.40	Yes
a	9/16/2020	12.00	±	0.50	44.40	±	1.86	Yes	30.90	±	0.77	114.33	±	2.83	Yes
a	9/23/2020	12.60	±	0.57	46.62	±	2.10	Yes	28.40	±	0.83	105.08	±	3.06	Yes
a	9/30/2020	5.51	±	0.61	20.39	±	2.26	Yes	13.60	±	1.04	50.32	±	3.85	Yes
MONTEVIEW	7/1/2020	1.93	±	0.20	7.14	±	0.73	Yes	21.00	±	0.63	77.70	±	2.32	Yes
	7/8/2020	2.00	±	0.21	7.40	±	0.77	Yes	27.90	±	0.69	103.23	±	2.56	Yes
	7/15/2020	1.70	±	0.20	6.29	±	0.72	Yes	23.00	±	0.66	85.10	±	2.44	Yes
	7/22/2020	1.41	±	0.18	5.22	±	0.67	Yes	25.10	±	0.65	92.87	±	2.42	Yes
	7/29/2020	1.64	±	0.19	6.07	±	0.70	Yes	26.80	±	0.67	99.16	±	2.47	Yes
	8/5/2020	1.83	±	0.22	6.77	±	0.81	Yes	35.90	±	0.82	132.83	±	3.03	Yes
	8/12/2020	1.77	±	0.19	6.55	±	0.71	Yes	24.30	±	0.65	89.91	±	2.42	Yes
	8/19/2020	2.26	±	0.21	8.36	±	0.77	Yes	30.60	±	0.71	113.22	±	2.62	Yes
	8/26/2020	4.22	±	0.44	15.61	±	1.61	Yes	28.50	±	1.86	105.45	±	6.88	Yes
a	9/2/2020	7.77	±	0.33	28.75	±	1.21	Yes	22.30	±	0.54	82.51	±	2.01	Yes
a	9/9/2020	3.98	±	0.30	14.73	±	1.12	Yes	28.80	±	1.26	106.56	±	4.66	Yes
a	9/16/2020	11.50	±	0.48	42.55	±	1.79	Yes	29.40	±	0.73	108.78	±	2.70	Yes
a	9/23/2020	9.91	±	0.45	36.67	±	1.67	Yes	27.30	±	0.71	101.01	±	2.62	Yes
a	9/30/2020	6.13	±	0.62	22.68	±	2.28	Yes	12.70	±	0.98	46.99	±	3.61	Yes
MUD LAKE	7/1/2020	0.71	±	0.14	2.63	±	0.53	Yes	12.90	±	0.54	47.73	±	2.01	Yes
	7/8/2020	1.35	±	0.17	5.00	±	0.64	Yes	26.90	±	0.66	99.53	±	2.43	Yes
	7/15/2020	1.28	±	0.19	4.74	±	0.70	Yes	21.20	±	0.68	78.44	±	2.52	Yes
b	7/22/2020		±			±		No		±			±		No
	7/29/2020	1.00	±	0.18	3.69	±	0.68	Yes	28.30	±	0.78	104.71	±	2.88	Yes
	8/5/2020	2.00	±	0.24	7.40	±	0.89	Yes	37.50	±	0.89	138.75	±	3.30	Yes
	8/12/2020	1.55	±	0.19	5.74	±	0.72	Yes	26.40	±	0.71	97.68	±	2.63	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
	8/19/2020	1.66	±	0.19	6.14	±	0.70	Yes	33.70	±	0.75	124.69	±	2.79	Yes
	8/26/2020	3.57	±	0.50	13.21	±	1.86	Yes	29.50	±	2.29	109.15	±	8.47	Yes
a	9/2/2020	7.90	±	0.32	29.23	±	1.17	Yes	21.50	±	0.51	79.55	±	1.88	Yes
a	9/9/2020	4.29	±	0.31	15.87	±	1.14	Yes	30.10	±	1.26	111.37	±	4.66	Yes
a	9/16/2020	10.80	±	0.47	39.96	±	1.73	Yes	30.70	±	0.74	113.59	±	2.73	Yes
a	9/23/2020	10.10	±	0.44	37.37	±	1.61	Yes	28.10	±	0.68	103.97	±	2.52	Yes
a	9/30/2020	7.41	±	0.66	27.42	±	2.45	Yes	12.20	±	0.96	45.14	±	3.54	Yes
QA-2	7/1/2020	1.08	±	0.16	4.00	±	0.58	Yes	20.80	±	0.61	76.96	±	2.25	Yes
(MUD LAKE)	7/8/2020	1.48	±	0.19	5.48	±	0.70	Yes	30.40	±	0.73	112.48	±	2.69	Yes
	7/15/2020	1.43	±	0.19	5.29	±	0.68	Yes	23.40	±	0.67	86.58	±	2.47	Yes
	7/22/2020	1.08	±	0.17	4.00	±	0.61	Yes	27.50	±	0.68	101.75	±	2.50	Yes
	7/29/2020	1.28	±	0.17	4.74	±	0.63	Yes	26.80	±	0.66	99.16	±	2.46	Yes
	8/5/2020	1.67	±	0.21	6.18	±	0.76	Yes	39.90	±	0.83	147.63	±	3.07	Yes
	8/12/2020	1.70	±	0.21	6.29	±	0.78	Yes	27.50	±	0.76	101.75	±	2.80	Yes
	8/19/2020	1.67	±	0.19	6.18	±	0.70	Yes	33.30	±	0.74	123.21	±	2.74	Yes
	8/26/2020	4.82	±	0.55	17.83	±	2.04	Yes	28.60	±	2.35	105.82	±	8.70	Yes
a	9/2/2020	7.45	±	0.30	27.57	±	1.11	Yes	22.60	±	0.50	83.62	±	1.86	Yes
a	9/9/2020	4.19	±	0.33	15.50	±	1.21	Yes	32.30	±	1.40	119.51	±	5.18	Yes
a	9/16/2020	10.70	±	0.48	39.59	±	1.77	Yes	36.90	±	0.82	136.53	±	3.02	Yes
a	9/23/2020	9.96	±	0.45	36.85	±	1.65	Yes	30.00	±	0.72	111.00	±	2.67	Yes
a	9/30/2020	5.86	±	0.59	21.68	±	2.17	Yes	15.50	±	0.99	57.35	±	3.67	Yes
DISTANT															
BLACKFOOT	7/1/2020	1.03	±	0.15	3.81	±	0.54	Yes	21.60	±	0.59	79.92	±	2.17	Yes
	7/8/2020	1.68	±	0.19	6.22	±	0.71	Yes	31.60	±	0.72	116.92	±	2.66	Yes
	7/15/2020	0.10	±	0.11	0.37	±	0.39	No	2.87	±	0.40	10.62	±	1.48	Yes
	7/22/2020	1.21	±	0.16	4.48	±	0.59	Yes	24.80	±	0.61	91.76	±	2.26	Yes
	7/29/2020	1.89	±	0.21	6.99	±	0.77	Yes	34.20	±	0.77	126.54	±	2.86	Yes
	8/5/2020	2.33	±	0.24	8.62	±	0.88	Yes	44.10	±	0.89	163.17	±	3.31	Yes
	8/12/2020	1.83	±	0.21	6.77	±	0.78	Yes	32.90	±	0.80	121.73	±	2.95	Yes
	8/19/2020	1.78	±	0.22	6.59	±	0.81	Yes	52.30	±	0.99	193.51	±	3.67	Yes
	8/26/2020	4.32	±	0.52	15.98	±	1.91	Yes	31.30	±	2.28	115.81	±	8.44	Yes
a	9/2/2020	8.38	±	0.37	31.01	±	1.37	Yes	28.70	±	0.66	106.19	±	2.44	Yes
a	9/9/2020	5.56	±	0.40	20.57	±	1.49	Yes	34.30	±	1.60	126.91	±	5.92	Yes
a	9/16/2020	14.60	±	0.61	54.02	±	2.26	Yes	38.60	±	0.93	142.82	±	3.45	Yes
a	9/23/2020	15.90	±	0.62	58.83	±	2.31	Yes	42.30	±	0.95	156.51	±	3.52	Yes
a	9/30/2020	8.05	±	0.80	29.79	±	2.97	Yes	16.50	±	1.27	61.05	±	4.70	Yes
CRATERS OF	7/1/2020	0.98	±	0.15	3.61	±	0.54	Yes	19.40	±	0.58	71.78	±	2.13	Yes
THE MOON	7/8/2020	1.31	±	0.18	4.85	±	0.65	Yes	26.30	±	0.66	97.31	±	2.45	Yes
	7/15/2020	1.40	±	0.18	5.18	±	0.67	Yes	24.00	±	0.66	88.80	±	2.45	Yes
	7/22/2020	1.01	±	0.14	3.74	±	0.53	Yes	21.90	±	0.56	81.03	±	2.06	Yes
	7/29/2020	1.35	±	0.16	5.00	±	0.59	Yes	24.40	±	0.59	90.28	±	2.18	Yes
	8/5/2020	1.45	±	0.19	5.37	±	0.68	Yes	31.20	±	0.72	115.44	±	2.66	Yes
	8/12/2020	1.15	±	0.18	4.26	±	0.66	Yes	22.00	±	0.68	81.40	±	2.51	Yes
	8/19/2020	1.55	±	0.21	5.74	±	0.76	Yes	29.50	±	0.80	109.15	±	2.95	Yes
	8/26/2020	3.67	±	0.32	13.58	±	1.20	Yes	24.90	±	1.36	92.13	±	5.03	Yes
a	9/2/2020	7.29	±	0.34	26.97	±	1.25	Yes	19.80	±	0.56	73.26	±	2.06	Yes
a	9/9/2020	4.51	±	0.33	16.69	±	1.21	Yes	25.90	±	1.28	95.83	±	4.74	Yes
a	9/16/2020	9.60	±	0.39	35.52	±	1.43	Yes	23.10	±	0.57	85.47	±	2.10	Yes
a	9/23/2020	9.13	±	0.39	33.78	±	1.43	Yes	18.50	±	0.54	68.45	±	2.00	Yes
a	9/30/2020	5.39	±	0.52	19.94	±	1.92	Yes	10.10	±	0.79	37.37	±	2.93	Yes
DUBOIS	7/1/2020	1.43	±	0.18	5.29	±	0.65	Yes	22.30	±	0.64	82.51	±	2.37	Yes
	7/8/2020	1.61	±	0.20	5.96	±	0.73	Yes	31.00	±	0.74	114.70	±	2.74	Yes
	7/15/2020	1.38	±	0.19	5.11	±	0.69	Yes	23.70	±	0.69	87.69	±	2.53	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
	7/22/2020	1.45	±	0.19	5.37	±	0.69	Yes	25.40	±	0.67	93.98	±	2.49	Yes
	7/29/2020	1.38	±	0.18	5.11	±	0.67	Yes	27.00	±	0.69	99.90	±	2.54	Yes
	8/5/2020	1.57	±	0.20	5.81	±	0.74	Yes	35.60	±	0.79	131.72	±	2.94	Yes
	8/12/2020	1.31	±	0.19	4.85	±	0.68	Yes	36.60	±	0.81	135.42	±	2.98	Yes
	8/19/2020	1.22	±	0.17	4.51	±	0.63	Yes	27.90	±	0.71	103.23	±	2.61	Yes
	8/26/2020	5.15	±	0.45	19.06	±	1.65	Yes	31.90	±	1.84	118.03	±	6.81	Yes
a	9/2/2020	7.93	±	0.32	29.34	±	1.19	Yes	20.50	±	0.51	75.85	±	1.88	Yes
a	9/9/2020	5.18	±	0.35	19.17	±	1.30	Yes	30.80	±	1.36	113.96	±	5.03	Yes
a	9/16/2020	11.80	±	0.50	43.66	±	1.86	Yes	26.10	±	0.72	96.57	±	2.68	Yes
a	9/23/2020	12.90	±	0.57	47.73	±	2.09	Yes	28.90	±	0.82	106.93	±	3.03	Yes
a	9/30/2020	5.94	±	0.61	21.98	±	2.26	Yes	9.79	±	0.92	36.22	±	3.42	Yes
IDAHO FALLS	7/1/2020	1.97	±	0.20	7.29	±	0.73	Yes	22.30	±	0.63	82.51	±	2.33	Yes
	7/8/2020	2.27	±	0.22	8.40	±	0.81	Yes	30.60	±	0.73	113.22	±	2.68	Yes
	7/15/2020	1.98	±	0.20	7.33	±	0.74	Yes	21.30	±	0.62	78.81	±	2.31	Yes
	7/22/2020	1.89	±	0.20	6.99	±	0.75	Yes	24.70	±	0.66	91.39	±	2.43	Yes
	7/29/2020	2.08	±	0.21	7.70	±	0.77	Yes	28.70	±	0.70	106.19	±	2.59	Yes
	8/5/2020	2.61	±	0.24	9.66	±	0.88	Yes	36.50	±	0.79	135.05	±	2.93	Yes
	8/12/2020	2.11	±	0.21	7.81	±	0.77	Yes	23.20	±	0.65	85.84	±	2.40	Yes
	8/19/2020	2.50	±	0.23	9.25	±	0.83	Yes	30.20	±	0.73	111.74	±	2.71	Yes
	8/26/2020	4.52	±	0.43	16.72	±	1.61	Yes	29.70	±	1.83	109.89	±	6.77	Yes
a	9/2/2020	6.62	±	0.28	24.49	±	1.04	Yes	21.90	±	0.49	81.03	±	1.82	Yes
a	9/9/2020	4.30	±	0.31	15.91	±	1.14	Yes	26.90	±	1.23	99.53	±	4.55	Yes
a	9/16/2020	9.84	±	0.44	36.41	±	1.62	Yes	28.50	±	0.70	105.45	±	2.58	Yes
a	9/23/2020	9.36	±	0.43	34.63	±	1.60	Yes	26.30	±	0.68	97.31	±	2.53	Yes
a	9/30/2020	5.44	±	0.56	20.13	±	2.05	Yes	10.70	±	0.87	39.59	±	3.23	Yes
JACKSON	7/1/2020	0.75	±	0.15	2.78	±	0.57	Yes	23.10	±	0.69	85.47	±	2.56	Yes
	7/8/2020	0.91	±	0.18	3.36	±	0.65	Yes	26.60	±	0.74	98.42	±	2.73	Yes
	7/15/2020	-0.08	±	0.11	-0.30	±	0.40	No	2.28	±	0.45	8.44	±	1.65	Yes
	7/22/2020	1.38	±	0.22	5.11	±	0.82	Yes	31.10	±	0.86	115.07	±	3.19	Yes
	7/29/2020	1.53	±	0.19	5.66	±	0.71	Yes	29.70	±	0.72	109.89	±	2.67	Yes
	8/5/2020	1.84	±	0.22	6.81	±	0.80	Yes	40.80	±	0.86	150.96	±	3.17	Yes
	8/12/2020	1.85	±	0.21	6.85	±	0.77	Yes	30.80	±	0.76	113.96	±	2.82	Yes
	8/19/2020	1.24	±	0.18	4.59	±	0.66	Yes	29.60	±	0.75	109.52	±	2.76	Yes
	8/26/2020	8.43	±	0.76	31.19	±	2.82	Yes	42.00	±	3.06	155.40	±	11.32	Yes
a	9/2/2020	11.30	±	0.44	41.81	±	1.62	Yes	24.60	±	0.64	91.02	±	2.38	Yes
a	9/9/2020	7.00	±	0.45	25.90	±	1.66	Yes	40.10	±	1.71	148.37	±	6.33	Yes
a	9/16/2020	16.00	±	0.67	59.20	±	2.49	Yes	34.00	±	0.95	125.80	±	3.53	Yes
a	9/23/2020	26.80	±	1.04	99.16	±	3.85	Yes	44.70	±	1.34	165.39	±	4.96	Yes
a	9/30/2020	6.54	±	0.65	24.20	±	2.41	Yes	11.30	±	0.98	41.81	±	3.63	Yes
SUGAR CITY	7/1/2020	1.09	±	0.16	4.03	±	0.58	Yes	23.40	±	0.64	86.58	±	2.37	Yes
	7/8/2020	1.37	±	0.18	5.07	±	0.65	Yes	27.70	±	0.67	102.49	±	2.47	Yes
	7/15/2020	1.32	±	0.18	4.88	±	0.66	Yes	23.40	±	0.66	86.58	±	2.45	Yes
	7/22/2020	1.23	±	0.17	4.55	±	0.64	Yes	28.50	±	0.68	105.45	±	2.53	Yes
	7/29/2020	1.18	±	0.17	4.37	±	0.62	Yes	28.20	±	0.68	104.34	±	2.51	Yes
	8/5/2020	2.02	±	0.22	7.47	±	0.81	Yes	52.40	±	0.93	193.88	±	3.43	Yes
	8/12/2020	1.24	±	0.18	4.59	±	0.67	Yes	23.70	±	0.69	87.69	±	2.56	Yes
	8/19/2020	1.99	±	0.20	7.36	±	0.73	Yes	31.80	±	0.72	117.66	±	2.66	Yes
	8/26/2020	4.70	±	0.48	17.39	±	1.78	Yes	27.10	±	2.02	100.27	±	7.47	Yes
a	9/2/2020	7.42	±	0.29	27.45	±	1.09	Yes	22.40	±	0.49	82.88	±	1.82	Yes
a	9/9/2020	4.01	±	0.30	14.84	±	1.12	Yes	26.50	±	1.23	98.05	±	4.55	Yes
a	9/16/2020	11.80	±	0.48	43.66	±	1.78	Yes	28.90	±	0.71	106.93	±	2.64	Yes
a	9/23/2020	11.10	±	0.48	41.07	±	1.78	Yes	26.20	±	0.71	96.94	±	2.63	Yes
a	9/30/2020	6.38	±	0.60	23.61	±	2.23	Yes	11.70	±	0.91	43.29	±	3.37	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
INL SITE															
EFS	7/1/2020	0.92	±	0.15	3.41	±	0.54	Yes	20.50	±	0.60	75.85	±	2.21	Yes
	7/8/2020	1.27	±	0.18	4.70	±	0.65	Yes	29.90	±	0.70	110.63	±	2.60	Yes
	7/15/2020	0.84	±	0.16	3.12	±	0.58	Yes	21.40	±	0.64	79.18	±	2.37	Yes
	7/22/2020	1.18	±	0.18	4.37	±	0.65	Yes	26.60	±	0.69	98.42	±	2.54	Yes
	7/29/2020	1.30	±	0.18	4.81	±	0.67	Yes	29.10	±	0.72	107.67	±	2.65	Yes
	8/5/2020	1.64	±	0.20	6.07	±	0.75	Yes	39.10	±	0.82	144.67	±	3.02	Yes
	8/12/2020	1.24	±	0.18	4.59	±	0.67	Yes	24.30	±	0.70	89.91	±	2.58	Yes
	8/19/2020	1.88	±	0.21	6.96	±	0.77	Yes	32.00	±	0.77	118.40	±	2.85	Yes
	8/26/2020	4.56	±	0.41	16.87	±	1.51	Yes	29.50	±	1.71	109.15	±	6.33	Yes
a	9/2/2020	7.05	±	0.31	26.09	±	1.16	Yes	21.20	±	0.53	78.44	±	1.96	Yes
a	9/9/2020	2.81	±	0.29	10.40	±	1.05	Yes	26.40	±	1.33	97.68	±	4.92	Yes
a	9/16/2020	13.20	±	0.51	48.84	±	1.90	Yes	34.40	±	0.78	127.28	±	2.87	Yes
a	9/23/2020	11.80	±	0.47	43.66	±	1.75	Yes	27.30	±	0.69	101.01	±	2.53	Yes
a	9/30/2020	7.28	±	0.66	26.94	±	2.46	Yes	10.90	±	0.95	40.33	±	3.50	Yes
MAIN GATE	7/1/2020	1.15	±	0.16	4.26	±	0.57	Yes	21.90	±	0.60	81.03	±	2.23	Yes
	7/8/2020	1.16	±	0.16	4.29	±	0.60	Yes	26.90	±	0.65	99.53	±	2.39	Yes
	7/15/2020	1.55	±	0.19	5.74	±	0.71	Yes	26.40	±	0.70	97.68	±	2.60	Yes
	7/22/2020	1.37	±	0.18	5.07	±	0.66	Yes	26.90	±	0.67	99.53	±	2.47	Yes
	7/29/2020	1.42	±	0.18	5.25	±	0.68	Yes	31.00	±	0.72	114.70	±	2.67	Yes
	8/5/2020	1.85	±	0.21	6.85	±	0.78	Yes	40.10	±	0.82	148.37	±	3.05	Yes
	8/12/2020	1.38	±	0.19	5.11	±	0.69	Yes	29.60	±	0.74	109.52	±	2.75	Yes
	8/19/2020	1.61	±	0.19	5.96	±	0.70	Yes	32.90	±	0.75	121.73	±	2.76	Yes
	8/26/2020	6.00	±	0.45	22.20	±	1.67	Yes	33.80	±	1.79	125.06	±	6.62	Yes
a	9/2/2020	7.99	±	0.33	29.56	±	1.23	Yes	21.90	±	0.54	81.03	±	2.00	Yes
a	9/9/2020	4.11	±	0.32	15.21	±	1.19	Yes	27.00	±	1.31	99.90	±	4.85	Yes
a	9/16/2020	14.20	±	0.54	52.54	±	1.98	Yes	33.10	±	0.78	122.47	±	2.87	Yes
a	9/23/2020	14.50	±	0.53	53.65	±	1.95	Yes	28.90	±	0.72	106.93	±	2.66	Yes
a	9/30/2020	6.92	±	0.63	25.60	±	2.33	Yes	12.10	±	0.93	44.77	±	3.44	Yes
VAN BUREN GATE	7/1/2020	1.10	±	0.15	4.07	±	0.57	Yes	21.50	±	0.61	79.55	±	2.24	Yes
	7/8/2020	1.35	±	0.17	5.00	±	0.64	Yes	27.20	±	0.66	100.64	±	2.44	Yes
	7/15/2020	1.14	±	0.17	4.22	±	0.63	Yes	24.70	±	0.67	91.39	±	2.48	Yes
	7/22/2020	1.11	±	0.17	4.11	±	0.61	Yes	25.70	±	0.66	95.09	±	2.43	Yes
	7/29/2020	1.27	±	0.17	4.70	±	0.63	Yes	28.40	±	0.68	105.08	±	2.50	Yes
	8/5/2020	1.82	±	0.20	6.73	±	0.75	Yes	37.90	±	0.79	140.23	±	2.92	Yes
	8/12/2020	1.30	±	0.18	4.81	±	0.65	Yes	23.30	±	0.66	86.21	±	2.44	Yes
	8/19/2020	0.23	±	0.11	0.87	±	0.42	No	3.98	±	0.43	14.73	±	1.61	Yes
	8/26/2020	5.15	±	0.41	19.06	±	1.50	Yes	32.80	±	1.66	121.36	±	6.14	Yes
a	9/2/2020	7.24	±	0.35	26.79	±	1.28	Yes	22.40	±	0.60	82.88	±	2.21	Yes
a	9/9/2020	3.40	±	0.28	12.58	±	1.04	Yes	24.40	±	1.18	90.28	±	4.37	Yes
a	9/16/2020	11.50	±	0.47	42.55	±	1.72	Yes	31.70	±	0.72	117.29	±	2.68	Yes
a	9/23/2020	11.20	±	0.46	41.44	±	1.69	Yes	26.60	±	0.67	98.42	±	2.48	Yes
a	9/30/2020	6.84	±	0.61	25.31	±	2.26	Yes	10.80	±	0.88	39.96	±	3.25	Yes

a. Gross alpha results shown in green were invalidated, due to a laboratory delay in counting after collection. See report text for more information.
b. 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	07/01/20	0.49	±	1.11	1.80	±	4.11	No
	07/08/20	1.59	±	1.30	5.88	±	4.81	No
	07/15/20	-0.46	±	1.40	-1.71	±	5.18	No
	07/22/20	1.71	±	1.26	6.33	±	4.66	No
	07/29/20	0.14	±	1.15	0.52	±	4.26	No
	08/05/20	-0.56	±	1.53	-2.08	±	5.66	No
	08/12/20	-0.65	±	1.58	-2.39	±	5.85	No
	08/19/20	-3.62	±	2.27	-13.39	±	8.40	No
	08/26/20	-1.69	±	1.64	-6.25	±	6.07	No
	09/02/20	2.14	±	1.23	7.92	±	4.55	No
	09/09/20	0.86	±	1.27	3.20	±	4.70	No
	09/16/20	-0.61	±	1.83	-2.25	±	6.77	No
	09/23/20	-0.48	±	1.64	-1.78	±	6.07	No
	09/30/20	-0.83	±	1.88	-3.06	±	6.96	No
QA-1	07/01/20	0.49	±	1.12	1.82	±	4.14	No
(ARCO)	07/08/20	1.53	±	1.25	5.66	±	4.63	No
	07/15/20	-0.41	±	1.25	-1.52	±	4.63	No
	07/22/20	1.59	±	1.17	5.88	±	4.33	No
	07/29/20	0.14	±	1.14	0.52	±	4.22	No
	08/05/20	-0.51	±	1.38	-1.87	±	5.11	No
	08/12/20	-0.56	±	1.37	-2.07	±	5.07	No
	08/19/20	-3.26	±	2.04	-12.06	±	7.55	No
	08/26/20	-1.42	±	1.38	-5.25	±	5.11	No
	09/02/20	1.93	±	1.11	7.14	±	4.11	No
	09/09/20	0.66	±	0.97	2.42	±	3.58	No
	09/16/20	-0.50	±	1.50	-1.85	±	5.55	No
	09/23/20	-0.34	±	1.16	-1.26	±	4.29	No
	09/30/20	-0.56	±	1.26	-2.06	±	4.66	No
ATOMIC CITY	07/01/20	0.49	±	1.11	1.80	±	4.11	No
	07/08/20	1.58	±	1.29	5.85	±	4.77	No
	07/15/20	-0.36	±	1.10	-1.34	±	4.07	No
	07/22/20	1.70	±	1.25	6.29	±	4.63	No
	07/29/20	0.14	±	1.15	0.52	±	4.26	No
	08/05/20	-0.48	±	1.30	-1.76	±	4.81	No
	08/12/20	-0.55	±	1.35	-2.03	±	5.00	No
	08/19/20	-3.39	±	2.12	-12.54	±	7.84	No
	08/26/20	-1.70	±	1.65	-6.29	±	6.11	No
	09/02/20	2.18	±	1.26	8.07	±	4.66	No
	09/09/20	1.02	±	1.51	3.77	±	5.59	No
	09/16/20	-0.57	±	1.71	-2.11	±	6.33	No
	09/23/20	-0.52	±	1.78	-1.94	±	6.59	No
	09/30/20	-0.78	±	1.77	-2.89	±	6.55	No
BLUE DOME	07/01/20	-2.05	±	1.92	-7.59	±	7.10	No
	07/08/20	-0.08	±	1.13	-0.30	±	4.18	No
	07/15/20	2.47	±	1.31	9.14	±	4.85	No
	07/22/20	1.38	±	1.91	5.11	±	7.07	No
	07/29/20	-2.73	±	2.05	-10.10	±	7.59	No
	08/05/20	1.12	±	1.24	4.14	±	4.59	No
	08/12/20	-0.10	±	1.24	-0.38	±	4.59	No
	08/19/20	1.06	±	1.13	3.92	±	4.18	No
	08/26/20	0.70	±	1.28	2.60	±	4.74	No

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
	09/02/20	-0.94	±	1.11	-3.49	±	4.11	No
	09/09/20	-0.81	±	1.34	-3.00	±	4.96	No
	09/16/20	0.89	±	1.34	3.29	±	4.96	No
	09/23/20	-1.49	±	1.86	-5.51	±	6.88	No
	09/30/20	2.45	±	1.99	9.07	±	7.36	No
FAA TOWER	07/01/20	-1.86	±	1.74	-6.88	±	6.44	No
	07/08/20	-0.08	±	1.14	-0.30	±	4.22	No
	07/15/20	2.43	±	1.29	8.99	±	4.77	No
	07/22/20	1.39	±	1.92	5.14	±	7.10	No
	07/29/20	-2.58	±	1.94	-9.55	±	7.18	No
	08/05/20	1.19	±	1.33	4.40	±	4.92	No
	08/12/20	-0.10	±	1.21	-0.37	±	4.48	No
	08/19/20	1.18	±	1.26	4.37	±	4.66	No
	08/26/20	1.07	±	1.95	3.96	±	7.22	No
	09/02/20	-1.11	±	1.30	-4.11	±	4.81	No
	09/09/20	-1.07	±	1.77	-3.96	±	6.55	No
	09/16/20	1.05	±	1.58	3.89	±	5.85	No
	09/23/20	-1.36	±	1.70	-5.03	±	6.29	No
	09/30/20	2.65	±	2.16	9.81	±	7.99	No
HOWE	07/01/20	-2.13	±	2.00	-7.88	±	7.40	No
	07/08/20	-0.10	±	1.36	-0.36	±	5.03	No
	07/15/20	2.93	±	1.55	10.84	±	5.74	No
	07/22/20	1.43	±	1.99	5.29	±	7.36	No
	07/29/20	-3.23	±	2.43	-11.95	±	8.99	No
	08/05/20	1.23	±	1.37	4.55	±	5.07	No
	08/12/20	-0.11	±	1.28	-0.39	±	4.74	No
	08/19/20	1.11	±	1.18	4.11	±	4.37	No
	08/26/20	0.87	±	1.58	3.20	±	5.85	No
	09/02/20	-1.04	±	1.22	-3.85	±	4.51	No
	09/09/20	-0.93	±	1.53	-3.44	±	5.66	No
	09/16/20	0.97	±	1.46	3.59	±	5.40	No
	09/23/20	-1.51	±	1.89	-5.59	±	6.99	No
	09/30/20	2.95	±	2.41	10.92	±	8.92	No
MONTEVIEW	07/01/20	-2.03	±	1.90	-7.51	±	7.03	No
	07/08/20	-0.08	±	1.15	-0.31	±	4.26	No
	07/15/20	2.51	±	1.33	9.29	±	4.92	No
	07/22/20	1.36	±	1.89	5.03	±	6.99	No
	07/29/20	-2.62	±	1.97	-9.69	±	7.29	No
	08/05/20	1.26	±	1.40	4.66	±	5.18	No
	08/12/20	-0.09	±	1.12	-0.34	±	4.14	No
	08/19/20	1.09	±	1.16	4.03	±	4.29	No
	08/26/20	0.84	±	1.53	3.11	±	5.66	No
	09/02/20	-1.02	±	1.19	-3.77	±	4.40	No
	09/09/20	-0.76	±	1.26	-2.82	±	4.66	No
	09/16/20	0.93	±	1.39	3.43	±	5.14	No
	09/23/20	-1.21	±	1.52	-4.48	±	5.62	No
	09/30/20	2.73	±	2.23	10.10	±	8.25	No
MUD LAKE	07/01/20	-2.15	±	2.01	-7.96	±	7.44	No
	07/08/20	-0.08	±	1.09	-0.29	±	4.03	No
	07/15/20	2.77	±	1.47	10.25	±	5.44	No
a	07/22/20		±			±		No
	07/29/20	-3.27	±	2.46	-12.10	±	9.10	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
	08/05/20	1.42	±	1.58	5.25	±	5.85	No
	08/12/20	-0.10	±	1.22	-0.37	±	4.51	No
	08/19/20	1.14	±	1.21	4.22	±	4.48	No
	08/26/20	1.09	±	1.99	4.03	±	7.36	No
	09/02/20	-0.92	±	1.08	-3.42	±	4.00	No
	09/09/20	-0.74	±	1.22	-2.75	±	4.51	No
	09/16/20	0.93	±	1.39	3.42	±	5.14	No
	09/23/20	-1.11	±	1.39	-4.11	±	5.14	No
	09/30/20	2.64	±	2.15	9.77	±	7.96	No
QA-2	07/01/20	-1.96	±	1.83	-7.25	±	6.77	No
(MUD LAKE)	07/08/20	-0.08	±	1.18	-0.31	±	4.37	No
	07/15/20	2.53	±	1.34	9.36	±	4.96	No
	07/22/20	1.36	±	1.89	5.03	±	6.99	No
	07/29/20	-2.60	±	1.96	-9.62	±	7.25	No
	08/05/20	1.20	±	1.33	4.44	±	4.92	No
	08/12/20	-0.11	±	1.32	-0.40	±	4.88	No
	08/19/20	1.11	±	1.18	4.11	±	4.37	No
	08/26/20	1.12	±	2.04	4.14	±	7.55	No
	09/02/20	-0.89	±	1.04	-3.29	±	3.85	No
	09/09/20	-0.84	±	1.39	-3.12	±	5.14	No
	09/16/20	0.97	±	1.46	3.60	±	5.40	No
	09/23/20	-1.18	±	1.48	-4.37	±	5.48	No
	09/30/20	2.58	±	2.10	9.55	±	7.77	No
DISTANT								
BLACKFOOT	07/01/20	0.45	±	1.04	1.68	±	3.85	No
	07/08/20	1.54	±	1.26	5.70	±	4.66	No
	07/15/20	-0.40	±	1.20	-1.47	±	4.44	No
	07/22/20	1.50	±	1.11	5.55	±	4.11	No
	07/29/20	0.15	±	1.21	0.55	±	4.48	No
	08/05/20	-0.54	±	1.48	-2.01	±	5.48	No
	08/12/20	-0.60	±	1.46	-2.21	±	5.40	No
	08/19/20	-3.69	±	2.31	-13.65	±	8.55	No
	08/26/20	-2.15	±	2.09	-7.96	±	7.73	No
	09/02/20	2.36	±	1.36	8.73	±	5.03	No
	09/09/20	0.89	±	1.31	3.27	±	4.85	No
	09/16/20	-0.66	±	1.97	-2.43	±	7.29	No
	09/23/20	-0.47	±	1.61	-1.75	±	5.96	No
	09/30/20	-0.88	±	2.00	-3.26	±	7.40	No
CRATERS	07/01/20	0.47	±	1.08	1.75	±	4.00	No
OF THE MOON	07/08/20	1.54	±	1.26	5.70	±	4.66	No
	07/15/20	-0.39	±	1.17	-1.43	±	4.33	No
	07/22/20	1.39	±	1.03	5.14	±	3.81	No
	07/29/20	0.12	±	0.96	0.44	±	3.57	No
	08/05/20	-0.48	±	1.31	-1.78	±	4.85	No
	08/12/20	-0.59	±	1.45	-2.19	±	5.37	No
	08/19/20	-3.78	±	2.36	-13.99	±	8.73	No
	08/26/20	-1.18	±	1.15	-4.37	±	4.26	No
	09/02/20	2.27	±	1.31	8.40	±	4.85	No
	09/09/20	0.73	±	1.07	2.69	±	3.96	No
	09/16/20	-0.40	±	1.21	-1.49	±	4.48	No
	09/23/20	-0.32	±	1.08	-1.18	±	4.00	No
	09/30/20	-0.52	±	1.17	-1.91	±	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
DUBOIS	07/01/20	-2.04	±	1.91	-7.55	±	7.07	No
	07/08/20	-0.09	±	1.21	-0.32	±	4.48	No
	07/15/20	2.62	±	1.39	9.69	±	5.14	No
	07/22/20	1.42	±	1.97	5.25	±	7.29	No
	07/29/20	-2.74	±	2.06	-10.14	±	7.62	No
	08/05/20	1.21	±	1.34	4.48	±	4.96	No
	08/12/20	-0.10	±	1.21	-0.37	±	4.48	No
	08/19/20	1.16	±	1.23	4.29	±	4.55	No
	08/26/20	0.80	±	1.46	2.96	±	5.40	No
	09/02/20	-0.96	±	1.13	-3.55	±	4.18	No
	09/09/20	-0.81	±	1.33	-2.99	±	4.92	No
	09/16/20	0.98	±	1.47	3.63	±	5.44	No
	09/23/20	-1.47	±	1.84	-5.44	±	6.81	No
	09/30/20	2.77	±	2.26	10.25	±	8.36	No
IDAHO FALLS	07/01/20	-1.97	±	1.85	-7.29	±	6.85	No
	07/08/20	-0.08	±	1.17	-0.31	±	4.33	No
	07/15/20	2.39	±	1.26	8.84	±	4.66	No
	07/22/20	1.39	±	1.93	5.14	±	7.14	No
	07/29/20	-2.70	±	2.03	-9.99	±	7.51	No
	08/05/20	1.17	±	1.31	4.33	±	4.85	No
	08/12/20	-0.09	±	1.14	-0.35	±	4.22	No
	08/19/20	1.16	±	1.24	4.29	±	4.59	No
	08/26/20	0.81	±	1.48	3.01	±	5.48	No
	09/02/20	-0.88	±	1.03	-3.24	±	3.81	No
	09/09/20	-0.75	±	1.23	-2.77	±	4.55	No
	09/16/20	0.89	±	1.33	3.29	±	4.92	No
	09/23/20	-1.18	±	1.47	-4.37	±	5.44	No
	09/30/20	2.49	±	2.03	9.21	±	7.51	No
JACKSON	07/01/20	0.57	±	1.31	2.12	±	4.85	No
	07/08/20	1.83	±	1.49	6.77	±	5.51	No
	07/15/20	-0.46	±	1.40	-1.71	±	5.18	No
	07/22/20	2.29	±	1.69	8.47	±	6.25	No
	07/29/20	0.15	±	1.19	0.54	±	4.40	No
	08/05/20	-0.53	±	1.46	-1.98	±	5.40	No
	08/12/20	-0.60	±	1.46	-2.21	±	5.40	No
	08/19/20	-3.39	±	2.12	-12.54	±	7.84	No
	08/26/20	-2.85	±	2.77	-10.55	±	10.25	No
	09/02/20	2.46	±	1.42	9.10	±	5.25	No
	09/09/20	0.90	±	1.32	3.32	±	4.88	No
	09/16/20	-0.74	±	2.21	-2.72	±	8.18	No
	09/23/20	-0.78	±	2.66	-2.89	±	9.84	No
	09/30/20	-0.66	±	1.50	-2.46	±	5.55	No
SUGAR CITY	07/01/20	-1.97	±	1.85	-7.29	±	6.85	No
	07/08/20	-0.08	±	1.10	-0.29	±	4.07	No
	07/15/20	2.50	±	1.33	9.25	±	4.92	No
	07/22/20	1.35	±	1.88	5.00	±	6.96	No
	07/29/20	-2.61	±	1.96	-9.66	±	7.25	No
	08/05/20	1.18	±	1.31	4.37	±	4.85	No
	08/12/20	-0.10	±	1.25	-0.38	±	4.63	No
	08/19/20	1.09	±	1.16	4.03	±	4.29	No
	08/26/20	0.94	±	1.71	3.46	±	6.33	No
	09/02/20	-0.86	±	1.00	-3.16	±	3.70	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
	09/09/20	-0.76	±	1.26	-2.83	±	4.66	No
	09/16/20	0.90	±	1.35	3.32	±	5.00	No
	09/23/20	-1.24	±	1.55	-4.59	±	5.74	No
	09/30/20	2.54	±	2.07	9.40	±	7.66	No
INL SITE								
EFS	07/01/20	0.48	±	1.11	1.79	±	4.11	No
	07/08/20	1.55	±	1.27	5.74	±	4.70	No
	07/15/20	-0.39	±	1.19	-1.45	±	4.40	No
	07/22/20	1.74	±	1.28	6.44	±	4.74	No
	07/29/20	0.15	±	1.19	0.54	±	4.40	No
	08/05/20	-0.51	±	1.39	-1.89	±	5.14	No
	08/12/20	-0.58	±	1.42	-2.15	±	5.25	No
	08/19/20	-3.39	±	2.12	-12.54	±	7.84	No
	08/26/20	-1.51	±	1.47	-5.59	±	5.44	No
	09/02/20	2.00	±	1.16	7.40	±	4.29	No
	09/09/20	0.79	±	1.17	2.93	±	4.33	No
	09/16/20	-0.52	±	1.55	-1.92	±	5.74	No
	09/23/20	-0.37	±	1.24	-1.35	±	4.59	No
	09/30/20	-0.63	±	1.43	-2.33	±	5.29	No
MAIN GATE	07/01/20	0.47	±	1.08	1.74	±	4.00	No
	07/08/20	1.45	±	1.18	5.37	±	4.37	No
	07/15/20	-0.40	±	1.22	-1.49	±	4.51	No
	07/22/20	1.64	±	1.21	6.07	±	4.48	No
	07/29/20	0.14	±	1.15	0.53	±	4.26	No
	08/05/20	-0.51	±	1.38	-1.87	±	5.11	No
	08/12/20	-0.57	±	1.40	-2.11	±	5.18	No
	08/19/20	-3.15	±	1.97	-11.66	±	7.29	No
	08/26/20	-1.52	±	1.48	-5.62	±	5.48	No
	09/02/20	2.01	±	1.16	7.44	±	4.29	No
	09/09/20	0.75	±	1.10	2.77	±	4.07	No
	09/16/20	-0.53	±	1.58	-1.95	±	5.85	No
	09/23/20	-0.37	±	1.27	-1.38	±	4.70	No
	09/30/20	-0.60	±	1.35	-2.20	±	5.00	No
VAN BUREN GATE	07/01/20	0.48	±	1.10	1.77	±	4.07	No
	07/08/20	1.49	±	1.22	5.51	±	4.51	No
	07/15/20	-0.39	±	1.18	-1.43	±	4.37	No
	07/22/20	1.65	±	1.22	6.11	±	4.51	No
	07/29/20	0.14	±	1.10	0.50	±	4.07	No
	08/05/20	-0.49	±	1.34	-1.81	±	4.96	No
	08/12/20	-0.55	±	1.34	-2.02	±	4.96	No
	08/19/20	-3.56	±	2.22	-13.17	±	8.21	No
	08/26/20	-1.40	±	1.36	-5.18	±	5.03	No
	09/02/20	2.36	±	1.36	8.73	±	5.03	No
	09/09/20	0.68	±	1.00	2.50	±	3.69	No
	09/16/20	-0.49	±	1.47	-1.81	±	5.44	No
	09/23/20	-0.36	±	1.23	-1.33	±	4.55	No
	09/30/20	-0.57	±	1.29	-2.11	±	4.77	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	09/30/20	AMERICIUM-241	1.17	±	1.17	4.33	±	4.33	No
		CESIUM-137	23.54	±	118.84	87.08	±	439.71	No
		PLUTONIUM-238	-1.57	±	1.40	-5.81	±	5.18	No
		PLUTONIUM-239/240	1.36	±	1.17	5.03	±	4.33	No
QA-1 (ARCO)	09/30/20	AMERICIUM-241	0.72	±	0.88	2.66	±	3.25	No
		CESIUM-137	-56.92	±	105.70	-210.62	±	391.09	No
		PLUTONIUM-238	-0.17	±	0.98	-0.62	±	3.63	No
		PLUTONIUM-239/240	-0.34	±	1.20	-1.24	±	4.44	No
ATOMIC CITY	09/30/20	CESIUM-137	5.64	±	79.00	20.86	±	292.32	No
BLUE DOME	09/30/20	CESIUM-137	-160.33	±	114.71	-593.23	±	424.42	No
FAA TOWER	09/30/20	CESIUM-137	94.23	±	117.45	348.66	±	434.58	No
		STRONTIUM-90	6.92	±	20.20	25.60	±	74.74	No
HOWE	09/30/20	CESIUM-137	208.61	±	85.27	771.85	±	315.51	No
		STRONTIUM-90	21.60	±	16.70	79.92	±	61.79	No
MONTEVIEW	09/30/20	CESIUM-137	20.27	±	74.06	74.98	±	274.01	No
		STRONTIUM-90	23.60	±	8.14	87.32	±	30.12	No
MUD LAKE	09/30/20	AMERICIUM-241	1.83	±	1.47	6.77	±	5.44	No
		CESIUM-137	-219.97	±	126.41	-813.89	±	467.73	No
		PLUTONIUM-238	0.47	±	0.83	1.73	±	3.09	No
		PLUTONIUM-239/240	0.19	±	0.78	0.70	±	2.89	No
QA-2 (MUD LAKE)	09/30/20	AMERICIUM-241	0.72	±	1.14	2.66	±	4.22	No
		CESIUM-137	49.90	±	115.61	184.63	±	427.75	No
		PLUTONIUM-238	0.00	±	0.69	0.00	±	2.56	No
		PLUTONIUM-239/240	-0.73	±	0.88	-2.70	±	3.24	No
DISTANT									
BLACKFOOT	09/30/20	CESIUM-137	40.13	±	84.51	148.50	±	312.67	No
CRATERS	09/30/20	CESIUM-137	-180.62	±	106.99	-668.30	±	395.85	No
		STRONTIUM-90	44.40	±	16.20	164.28	±	59.94	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
DUBOIS	09/30/20	CESIUM-137	-41.53	±	130.86	-153.67	±	484.19	No
IDAHO FALLS	09/30/20	AMERICIUM-241	2.49	±	1.23	9.21	±	4.55	No
		CESIUM-137	62.73	±	76.02	232.10	±	281.27	No
		PLUTONIUM-238	0.67	±	0.97	2.48	±	3.60	No
		PLUTONIUM-239/240	2.35	±	1.10	8.70	±	4.07	No
JACKSON	09/30/20	AMERICIUM-241	2.37	±	1.37	8.77	±	5.07	No
		CESIUM-137	-114.46	±	163.27	-423.51	±	604.11	No
		PLUTONIUM-238	-0.87	±	1.79	-3.23	±	6.62	No
		PLUTONIUM-239/240	-0.65	±	1.54	-2.41	±	5.70	No
SUGAR CITY	09/30/20	CESIUM-137	-144.12	±	132.71	-533.24	±	491.02	No
INL SITE									
EFS	09/30/20	CESIUM-137	-91.58	±	113.35	-338.85	±	419.38	No
		STRONTIUM-90	31.50	±	12.20	116.55	±	45.14	No
MAIN GATE	09/30/20	CESIUM-137	-5.65	±	127.14	-20.90	±	470.40	No
		STRONTIUM-90	27.50	±	10.10	101.75	±	37.37	No
VAN BUREN GATE	09/30/20	AMERICIUM-241	0.32	±	1.05	1.17	±	3.89	No
		CESIUM-137	52.14	±	72.40	192.93	±	267.89	No
		PLUTONIUM-238	1.76	±	1.13	6.51	±	4.18	No
		PLUTONIUM-239/240	1.75	±	1.13	6.48	±	4.18	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	6/17/2020	7/8/2020	1.48	±	1.52	5.48	±	5.62	No
ATOMIC CITY	7/8/2020	8/4/2020	1.81	±	1.29	6.70	±	4.77	No
ATOMIC CITY	8/4/2020	9/2/2020	-1.56	±	1.57	-5.77	±	5.81	No
HOWE	6/24/2020	7/22/2020	0.05	±	1.31	0.20	±	4.85	No
HOWE	7/22/2020	8/5/2020	1.78	±	2.43	6.59	±	8.99	No
HOWE	8/5/2020	8/26/2020	-4.33	±	1.63	-16.02	±	6.03	No
HOWE	8/26/2020	9/23/2020	-3.90	±	1.33	-14.43	±	4.92	No
DISTANT									
IDAHO FALLS	6/17/2020	7/1/2020	5.13	±	2.51	18.98	±	9.29	No
IDAHO FALLS	7/1/2020	7/29/2020	1.11	±	1.70	4.11	±	6.29	No
IDAHO FALLS	7/29/2020	8/19/2020	0.60	±	1.48	2.23	±	5.48	No
IDAHO FALLS	8/19/2020	9/16/2020	6.96	±	1.22	25.75	±	4.51	**Yes**
INL SITE									
EFS	5/28/2020	7/8/2020	8.21	±	1.28	30.38	±	4.74	**Yes**
EFS	7/8/2020	7/29/2020	7.96	±	1.39	29.45	±	5.14	**Yes**
EFS	7/29/2020	9/2/2020	7.27	±	0.89	26.90	±	3.29	**Yes**
EFS	9/2/2020	9/30/2020	13.20	±	1.24	48.84	±	4.59	**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	6/24/2020	7/1/2020	159.00	±	25.40	5.88	±	0.94	**Yes**
ATOMIC CITY	9/2/2020	9/9/2020	-41.20	±	24.40	-1.52	±	0.90	No
HOWE	6/24/2020	7/1/2020	-0.44	±	24.70	-0.02	±	0.91	No
HOWE	7/22/2020	7/29/2020	-6.20	±	23.90	-0.23	±	0.88	No
HOWE	8/26/2020	9/2/2020	227.00	±	27.50	8.40	±	1.02	**Yes**
HOWE	9/16/2020	9/23/2020	106.00	±	26.10	3.92	±	0.97	**Yes**
DISTANT									
IDAHO FALLS	8/31/2020	9/30/2020	-45.90	±	24.20	-1.70	±	0.90	No
INL SITE									
EFS	6/24/2020	7/1/2020	288.00	±	28.10	10.66	±	1.04	**Yes**
EFS	7/22/2020	7/29/2020	-3.84	±	23.90	-0.14	±	0.88	No
EFS	8/19/2020	8/26/2020	66.90	±	25.30	2.48	±	0.94	No

Table C-6. 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	07/05/20	-1.56	±	1.37	-0.06	±	0.05	No	1.21	±	1.44	0.04	±	0.05	No
	08/02/20	3.41	±	3.55	0.13	±	0.13	No	1.87	±	1.38	0.07	±	0.05	No
	09/07/20	4.91	±	3.36	0.18	±	0.12	No	-2.70	±	1.47	-0.10	±	0.05	No
CONTROL	07/06/20	-2.21	±	1.20	-0.08	±	0.04	No	0.88	±	0.66	0.03	±	0.02	No
	08/03/20	0.54	±	1.75	0.02	±	0.06	No	-0.91	±	1.36	-0.03	±	0.05	No
	09/01/20	-1.68	±	1.26	-0.06	±	0.05	No	1.90	±	1.41	0.07	±	0.05	No
DIETRICH	07/07/20	0.19	±	1.25	0.01	±	0.05	No	-0.47	±	1.04	-0.02	±	0.04	No
	08/04/20	-1.15	±	1.07	-0.04	±	0.04	No	-0.93	±	0.67	-0.03	±	0.02	No
	09/01/20	-1.44	±	1.07	-0.05	±	0.04	No	0.58	±	1.48	0.02	±	0.05	No
HOWE	07/06/20	-0.65	±	1.32	-0.02	±	0.05	No	-0.37	±	1.04	-0.01	±	0.04	No
	08/03/20	-0.13	±	1.16	0.00	±	0.04	No	0.28	±	1.37	0.01	±	0.05	No
	09/02/20	-1.69	±	1.34	-0.06	±	0.05	No	0.78	±	1.02	0.03	±	0.04	No
IDAHO FALLS	07/07/20	-0.11	±	0.96	0.00	±	0.04	No	-0.05	±	0.64	0.00	±	0.02	No
	07/14/20	-0.19	±	1.07	-0.01	±	0.04	No	-1.54	±	1.50	-0.06	±	0.06	No
	07/21/20	-1.32	±	1.10	-0.05	±	0.04	No	0.28	±	1.51	0.01	±	0.06	No
	07/28/20	2.71	±	1.11	0.10	±	0.04	No	1.96	±	1.49	0.07	±	0.06	No
	08/04/20	-0.10	±	0.94	0.00	±	0.03	No	0.53	±	0.65	0.02	±	0.02	No
	08/11/20	-0.18	±	0.90	-0.01	±	0.03	No	1.02	±	0.67	0.04	±	0.02	No
	08/18/20	-0.36	±	1.07	-0.01	±	0.04	No	0.00	±	1.38	0.00	±	0.05	No
	08/25/20	-0.56	±	1.23	-0.02	±	0.05	No	-1.27	±	1.04	-0.05	±	0.04	No
	09/01/20	-0.46	±	0.90	-0.02	±	0.03	No	-0.48	±	0.63	-0.02	±	0.02	No
	09/08/20	0.58	±	1.08	0.02	±	0.04	No	-0.39	±	1.40	-0.01	±	0.05	No
	09/15/20	2.84	±	1.54	0.11	±	0.06	No	-0.03	±	0.72	0.00	±	0.03	No
	09/22/20	-0.26	±	0.90	-0.01	±	0.03	No	-0.09	±	0.62	0.00	±	0.02	No
	09/29/20	-0.15	±	1.31	-0.01	±	0.05	No	-0.65	±	1.03	-0.02	±	0.04	No
MINIDOKA	07/07/20	0.21	±	1.71	0.01	±	0.06	No	0.78	±	1.37	0.03	±	0.05	No
	08/04/20	0.34	±	1.39	0.01	±	0.05	No	2.58	±	1.08	0.10	±	0.04	No
	09/01/20	1.39	±	1.65	0.05	±	0.06	No	-2.15	±	1.38	-0.08	±	0.05	No
MONTEVIEW	07/03/20	1.30	±	2.35	0.05	±	0.09	No	1.24	±	1.37	0.05	±	0.05	No
	08/03/20	2.35	±	1.38	0.09	±	0.05	No	-1.04	±	1.10	-0.04	±	0.04	No
	09/01/20	0.31	±	1.03	0.01	±	0.04	No	1.77	±	0.69	0.07	±	0.03	No
TERRETON	07/01/20	-1.53	±	1.52	-0.06	±	0.06	No	0.96	±	1.34	0.04	±	0.05	No
	07/06/20	-1.66	±	1.01	-0.06	±	0.04	No	0.38	±	0.64	0.01	±	0.02	No
	07/15/20	-1.25	±	1.56	-0.05	±	0.06	No	-1.58	±	1.36	-0.06	±	0.05	No
	07/22/20	0.32	±	1.48	0.01	±	0.05	No	0.28	±	1.34	0.01	±	0.05	No
	07/29/20	-1.00	±	1.53	-0.04	±	0.06	No	0.31	±	1.35	0.01	±	0.05	No
	08/03/20	0.57	±	0.98	0.02	±	0.04	No	-0.64	±	0.64	-0.02	±	0.02	No
	08/12/20	0.56	±	1.11	0.02	±	0.04	No	3.66	±	1.44	0.14	±	0.05	No
	08/19/20	-0.82	±	1.13	-0.03	±	0.04	No	-0.69	±	1.05	-0.03	±	0.04	No
	08/26/20	-0.80	±	1.03	-0.03	±	0.04	No	1.30	±	1.41	0.05	±	0.05	No
	09/02/20	-1.52	±	1.97	-0.06	±	0.07	No	0.84	±	1.38	0.03	±	0.05	No
	09/16/20	1.18	±	1.12	0.04	±	0.04	No	-0.94	±	1.04	-0.03	±	0.04	No
	09/23/20	-0.93	±	1.51	-0.03	±	0.06	No	1.44	±	1.39	0.05	±	0.05	No
	09/30/20	0.82	±	1.54	0.03	±	0.06	No	0.94	±	1.32	0.03	±	0.05	No

Table C-7. 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	07/08/20	131.00	±	111.00	4.85	±	4.11	No
IDAHO FALLS	07/08/20	-65.70	±	90.70	-2.43	±	3.36	No
MUD LAKE	07/08/20	28.10	±	72.20	1.04	±	2.67	No
MUD LAKE (duplicate)	07/08/20	-44.60	±	63.00	-1.65	±	2.33	No
Strontium-90								
HOWE	07/08/20	5.95	±	17.60	0.22	±	0.65	No
IDAHO FALLS	07/08/20	46.60	±	20.40	1.73	±	0.76	No
MUD LAKE	07/08/20	33.80	±	19.10	1.25	±	0.71	No

Tabel C-8. Cesium-137 and Strontium-90 Concentrations in Lettuce

Location	Sampling Date	Cesium-137 Result ± 1s Uncertainty pCi/kg			Cesium-137 Result ± 1s Uncertainty ($\times 10^{-2}$ Bq/kg)			Result > 3s
ATOMIC CITY	07/16/20	78.50	±	158.00	290.74	±	585.19	No
BLACKFOOT	08/15/20	17.80	±	82.50	65.93	±	305.56	No
CONTROL	08/17/20	54.30	±	78.00	201.11	±	288.89	No
EFS	07/29/20	-26.70	±	152.00	-98.89	±	562.96	No
FAA TOWER	07/29/20	48.80	±	91.40	180.74	±	338.52	No
HOWE	07/29/20	6.38	±	148.00	23.63	±	548.15	No
IDAHO FALLS	08/15/20	-68.70	±	47.40	-254.44	±	175.56	No
IDAHO FALLS (duplicate)	08/15/20	13.00	±	59.50	48.15	±	220.37	No
MONTEVIEW	07/29/20	51.90	±	93.60	192.22	±	346.67	No
POCATELLO	08/29/20	19.20	±	85.90	71.11	±	318.15	No

Location	Sampling Date	Strontium-90 Result ± 1s Uncertainty pCi/kg			Strontium-90 Result ± 1s Uncertainty ($\times 10^{-2}$ Bq/kg)			Result > 3s
ATOMIC CITY	07/16/20	-13.00	±	17.30	-48.15	±	64.07	No
BLACKFOOT	08/15/20	22.70	±	18.40	84.07	±	68.15	No
CONTROL	08/17/20	-9.07	±	16.50	-33.59	±	61.11	No
EFS	07/29/20	14.20	±	18.40	52.59	±	68.15	No
FAA TOWER	07/29/20	28.80	±	18.80	106.67	±	69.63	No
HOWE	07/29/20	-24.30	±	15.10	-90.00	±	55.93	No
IDAHO FALLS	08/15/20	-18.70	±	15.40	-69.26	±	57.04	No
IDAHO FALLS (duplicate)	08/15/20	-14.80	±	16.10	-54.81	±	59.63	No
MONTEVIEW	07/29/20	17.50	±	18.30	64.81	±	67.78	No
POCATELLO	08/29/20	4.18	±	17.20	15.48	±	63.70	No

Table C-9. Cesium-137 and Strontium-90 Concentrations in Grain

Location	Sampling Date	Cesium-137 Result ± 1s Uncertainty pCi/kg			Cesium-137 Result ± 1s Uncertainty Bq/kg			Result > 3s
AMERICAN FALLS	08/25/20	-3.01	±	2.35	-0.11	±	0.09	No
ARCO	08/31/20	-0.54	±	2.76	-0.02	±	0.10	No
CONTROL	09/08/20	-0.68	±	2.01	-0.03	±	0.07	No
IDAHO FALLS	08/24/20	0.27	±	2.17	0.01	±	0.08	No
KIMAMA	08/25/20	3.25	±	2.30	0.12	±	0.09	No
MONTEVIEW	08/31/20	-0.20	±	1.34	-0.01	±	0.05	No
MORELAND	08/25/20	1.80	±	1.13	0.07	±	0.04	No
ROBERTS	08/31/20	2.16	±	1.77	0.08	±	0.07	No
RUPERT	08/25/20	1.62	±	1.09	0.06	±	0.04	No
RUPERT (duplicate)	08/25/20	-0.23	±	1.10	-0.01	±	0.04	No
TERRETON	08/31/20	-0.18	±	2.22	-0.01	±	0.08	No
		Strontium-90						
		Result ± 1s Uncertainty pCi/kg			**Result ± 1s Uncertainty Bq/kg**			**Result > 3s**
AMERICAN FALLS	8/25/2020	-18.20	±	13.10	-0.67	±	0.49	No
ARCO	8/31/2020	25.50	±	15.60	0.94	±	0.58	No
CONTROL	9/8/2020	-16.00	±	11.80	-0.59	±	0.44	No
IDAHO FALLS	8/24/2020	18.40	±	15.30	0.68	±	0.57	No
KIMAMA	8/25/2020	45.80	±	17.60	1.70	±	0.65	No
MONTEVIEW	8/31/2020	17.90	±	16.00	0.66	±	0.59	No
MORELAND	8/25/2020	-26.30	±	12.80	-0.97	±	0.47	No
ROBERTS	8/31/2020	8.43	±	14.50	0.31	±	0.54	No
RUPERT	8/25/2020	11.30	±	15.50	0.42	±	0.57	No
RUPERT (duplicate)	8/25/2020	-20.00	±	13.40	-0.74	±	0.50	No
TERRETON	8/31/2020	-14.30	±	9.20	-0.53	±	0.34	No

Table C-10. Gamma-emitting Radionuclides in Large Game Animals

Species	Collection Date	Tissue	Analyte	Result ± 1s Uncertainty (pCi/kg wet weight)			Result ± 1s Uncertainty (x 10^{-2} Bq/kg wet weight)			Result > 3s
ELK	07/15/20	Liver	^{131}I	-13.00	±	9.25	-48.10	±	34.23	No
			^{137}Cs	6.51	±	4.76	24.09	±	17.61	No
MULE DEER	09/22/20		^{131}I	0.43	±	1.51	1.57	±	5.59	No
			^{137}Cs	1.63	±	1.07	6.03	±	3.96	No
ELK	07/15/20	Muscle	^{131}I	-2.64	±	2.41	-9.77	±	8.92	No
			^{137}Cs	0.81	±	1.21	3.00	±	4.48	No
MULE DEER	09/22/20		^{131}I	-1.47	±	2.04	-5.44	±	7.55	No
			^{137}Cs	0.63	±	1.81	2.33	±	6.70	No
ELK	07/15/20	Thyroid	^{131}I	-21.60	±	77.10	-79.92	±	285.27	No
			^{137}Cs	25.60	±	48.80	94.72	±	180.56	No
MULE DEER	09/22/20		^{131}I	66.50	±	94.30	246.05	±	348.91	No
			^{137}Cs	-103.00	±	86.30	-381.10	±	319.31	No

Table C-11. 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	07/28/20	28.40	±	10.60	1.05	±	0.39	No
BUTTE CITY	07/28/20	21.00	±	12.80	0.78	±	0.47	No
FAA TOWER	07/28/20	18.50	±	14.00	0.69	±	0.52	No
FRENCHMANS CABIN	07/28/20	13.60	±	7.70	0.50	±	0.29	No
HOWE	07/21/20	20.20	±	4.72	0.75	±	0.17	**Yes**
MONTEVIEW	07/21/20	14.00	±	3.99	0.52	±	0.15	**Yes**
MUD LAKE #1	07/21/20	23.50	±	7.70	0.87	±	0.29	**Yes**
MUD LAKE #2	07/21/20	22.20	±	7.91	0.82	±	0.29	No
RENO RANCH	07/21/20	30.20	±	8.01	1.12	±	0.30	**Yes**
DISTANT								
BLACKFOOT	07/28/20	15.90	±	8.42	0.59	±	0.31	No
CAREY	07/28/20	24.90	±	10.60	0.92	±	0.39	No
ST. ANTHONY	07/21/20	22.60	±	10.20	0.84	±	0.38	No

Location	Sampling Date	Cesium-137 Concentration ± 1s (pCi/Kg)			Cesium-137 Concentration ± 1s (Bq/Kg)			Result > 3s
BOUNDARY								
ATOMIC CITY	07/28/20	463.00	±	22.00	17.15	±	0.81	**Yes**
BUTTE CITY	07/28/20	262.00	±	14.20	9.70	±	0.53	**Yes**
FAA TOWER	07/28/20	496.00	±	25.00	18.37	±	0.93	**Yes**
FRENCHMANS CABIN	07/28/20	364.00	±	18.80	13.48	±	0.70	**Yes**
HOWE	07/21/20	299.00	±	15.60	11.07	±	0.58	**Yes**
MONTEVIEW	07/21/20	201.00	±	10.00	7.44	±	0.37	**Yes**
MUD LAKE #1	07/21/20	202.00	±	10.20	7.48	±	0.38	**Yes**
MUD LAKE #2	07/21/20	144.00	±	8.46	5.33	±	0.31	**Yes**
RENO RANCH	07/21/20	472.00	±	22.90	17.48	±	0.85	**Yes**
DISTANT								
BLACKFOOT	07/28/20	143.00	±	8.64	5.30	±	0.32	**Yes**
CAREY	07/28/20	799.00	±	36.90	29.59	±	1.37	**Yes**
ST. ANTHONY	07/21/20	500.00	±	23.50	18.52	±	0.87	**Yes**

Table C-11. 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	07/28/20	2.95	±	2.36	0.11	±	0.09	No
BUTTE CITY	07/28/20	-2.10	±	2.10	-0.08	±	0.08	No
FAA TOWER	07/28/20	2.53	±	1.60	0.09	±	0.06	No
FRENCHMANS CABIN	07/28/20	-7.52	±	6.01	-0.28	±	0.22	No
HOWE	07/21/20	-3.08	±	5.81	-0.11	±	0.22	No
MONTEVIEW	07/21/20	1.75	±	1.70	0.06	±	0.06	No
MUD LAKE #1	07/21/20	0.00	±	1.40	0.00	±	0.05	No
MUD LAKE #2	07/21/20	1.46	±	1.46	0.05	±	0.05	No
RENO RANCH	07/21/20	0.00	±	2.94	0.00	±	0.11	No
DISTANT								
BLACKFOOT	07/28/20	2.87	±	2.84	0.11	±	0.11	No
CAREY	07/28/20	5.35	±	3.14	0.20	±	0.12	No
ST. ANTHONY	07/21/20	0.00	±	1.07	0.00	±	0.04	No

Location	Sampling Date	Plutonium-239/240 Concentration ± 1s (pCi/kg) (pCi/Kg)			Plutonium-239/240 Concentration ± 1s (Bq/Kg)			Result > 3s
BOUNDARY								
ATOMIC CITY	07/28/20	12.40	±	5.27	0.46	±	0.20	No
BUTTE CITY	07/28/20	29.40	±	5.14	1.09	±	0.19	**Yes**
FAA TOWER	07/28/20	10.60	±	4.16	0.39	±	0.15	No
FRENCHMANS CABIN	07/28/20	12.50	±	7.19	0.46	±	0.27	No
HOWE	07/21/20	10.30	±	8.52	0.38	±	0.32	No
MONTEVIEW	07/21/20	8.31	±	3.03	0.31	±	0.11	No
MUD LAKE #1	07/21/20	14.30	±	3.18	0.53	±	0.12	**Yes**
MUD LAKE #2	07/21/20	6.30	±	2.22	0.23	±	0.08	No
RENO RANCH	07/21/20	31.60	±	4.72	1.17	±	0.17	**Yes**
DISTANT								
BLACKFOOT	07/28/20	6.13	±	2.52	0.23	±	0.09	No
CAREY	07/28/20	38.70	±	6.41	1.43	±	0.24	**Yes**
ST. ANTHONY	07/21/20	22.70	±	4.55	0.84	±	0.17	**Yes**

Table C-11. 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	07/28/20	28.90	±	19.10	1.07	±	0.71	No
BUTTE CITY	07/28/20	72.50	±	19.50	2.69	±	0.72	**Yes**
FAA TOWER	07/28/20	27.30	±	17.90	1.01	±	0.66	No
FRENCHMANS CABIN	07/28/20	44.40	±	20.00	1.64	±	0.74	No
HOWE	07/21/20	39.60	±	12.90	1.47	±	0.48	**Yes**
MONTEVIEW	07/21/20	32.00	±	14.80	1.19	±	0.55	No
MUD LAKE #1	07/21/20	22.60	±	19.00	0.84	±	0.70	No
MUD LAKE #2	07/21/20	-14.10	±	15.60	-0.52	±	0.58	No
RENO RANCH	07/21/20	57.50	±	20.20	2.13	±	0.75	No
DISTANT								
BLACKFOOT	07/28/20	195.00	±	21.60	7.22	±	0.80	**Yes**
CAREY	07/28/20	58.10	±	20.40	2.15	±	0.76	No
ST. ANTHONY	07/21/20	98.50	±	22.40	3.65	±	0.83	**Yes**

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	62	4751.500	76.63710		
Distant	54	3992.500	73.93519	4.212096	0.1217
INL Site	27	1552.000	57.48148		
July	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	34	1441.500	42.39706		
Distant	30	1263.000	42.10000	3.266720	0.1953
INL Site	15	455.500	33.36667		
August	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	28	952.500	34.01786		
Distant	24	792.0000	33.00000	0.917667	0.6320
INL Site	12	335.500	27.95833		
September[c]	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	0	NA	NA		
Distant	0	NA	NA	NA	NA
INL Site	0	NA	NA		
Gross Beta					
Quarter	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	97	11286.000	116.3505		
Distant	84	9227.000	109.8452	0.8670171	0.6482
INL Site	42	4463.000	106.2619		
July	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	34	1380.500	40.60294		
Distant	30	1158.000	38.60000	0.1936908	0.9077
INL Site	15	621.500	41.43333		
August	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	28	947.500	33.83929		
Distant	24	774.500	32.27083	0.3947818	0.8209
INL Site	12	358.0000	29.83333		
June	Valid N	Sum of ranks	Mean rank	H	*p*
Boundary	35	1528.500	43.67143		
Distant	30	1157.500	38.58333	1.209529	0.5462
INL Site	15	554.0000	36.93333		

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.
c. September gross alpha data were invalidated so no statistical tests were performed. See text of report for further information.

Table D-2. Results of multiple comparisons of gross alpha results between locations during the third 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 (3rd-Qtr-2020-LVf)																	
Depend.: Coded Result	Arco	Atomic City	Blackfoot	Blue Dome	Craters of the Moon	Dubois	EFS	FAA Tower	Howe	Idaho Falls	Jackson WY	Main Gate	Monteview	Mud Lake	QA-1 (Arco)	QA-2 (Mud Lake)	Sugar City	Van Buren
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
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
QA-1 (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
QA-2 (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
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	

Table D-3. Results of multiple comparisons of gross beta results between locations during the third 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 (3rd-Qtr-2020-LVf)																	
Depend.: Coded Result	Arco	Atomic City	Blackfoot	Blue Dome	Craters of the Moon	Dubois	EFS	FAA Tower	Howe	Idaho Falls	Jackson WY	Main Gate	Montevie w	Mud Lake	QA-1 (Arco)	QA-2 (Mud Lake)	Sugar City	Van Buren
Arco		1.000000	1.000000	1.000000	0.023663	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	0.716288	1.000000	1.000000	0.959790
Atomic City	1.000000		1.000000	1.000000	0.334448	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	0.154604	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	0.023663	0.334448	0.154604	1.000000		1.000000	1.000000	1.000000	1.000000	1.000000	0.566678	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	0.566678	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
QA-1 (Arco)	0.716288	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
QA-2 (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
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	0.959790	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	