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Idaho National Laboratory Site Offsite Environmental Surveillance Program Report: Fourth Quarter 2013

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Contributors:
Russ Mitchell, Marilyn Case

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By Gonzales Stoller Surveillance, LLC
Environmental Surveillance, Education, and Research Program
Douglas K. Halford, Program Manager
120 Technology Dr., Idaho Falls, Idaho 83401
www.gsseser.com

EXECUTIVE SUMMARY

None of the radionuclides detected in samples collected during the fourth quarter of 2013 could be directly linked with INL Site activities, with the exception of waterfowl collected at the Advanced Test Reactor Complex. Levels of detected radionuclides were no different than values measured at other locations across the western United States. All detected radionuclide concentrations were well below standards set by the U.S. Department of Energy (DOE) and regulatory standards established by the U.S. Environmental Protection Agency (EPA) for protection of the public.

This report for the fourth quarter of 2013 contains results from the Environmental Surveillance, Education, and Research (ESER) Program's monitoring of the Department of Energy's Idaho National Laboratory (INL) Site's offsite environment, October 1 through December 31, 2013. All sample types (media) and the sampling schedule followed during 2013 are listed in Appendix A. Specifically, this report contains the results for the following:

- Air sampling, including particulate air filters, charcoal cartridges, and atmospheric moisture
- Precipitation, drinking water, and surface water sampling
- Milk and potato sampling
- Waterfowl sampling
- Environmental radiation measurements

Table E-1 Summary of results for the Fourth Quarter of 2013.

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	Gross alpha were statistically the same for Distant, Boundary, and INL Site sample groups for the quarter, each month of the quarter, and each week. Statistical differences were found in gross beta concentrations for the quarter, during December, and during three weeks. The differences appeared due to normal variability in the data rather than an INL Site impact. No result exceeded the DCS for gross alpha or gross beta activity in air.
		Gamma-emitting radionuclides, ^{90}Sr, actinides (americium and plutonium)	No human-made gamma-emitting were detected. Results for ^{90}Sr and actinides were not available.
	Charcoal Cartridge	Iodine-131	Iodine-131 was not detected in any of the 28 batches counted during the quarter.
Atmospheric Moisture	Liquid	Tritium	Nine of the 11 sample results showed tritium concentrations greater than the 3s uncertainty during the quarter. No sample result exceeded the DCS for tritium in air. Results were consistent at all four sample locations.
Precipitation	Liquid	Tritium	Nine samples were collected. Six of the results were greater than the 3s uncertainty. The concentrations were consistent with those reported across the region by the Environmental Protection Agency and with previous results.
Drinking/surface water	Liquid	Gross alpha, gross beta, tritium	Gross alpha activity was reported in two samples close to the minimum detectable concentration. Gross beta was detected in most of the drinking water and all of the surface water samples. Activities were consistent with natural levels of radioactivity in the aquifer. Tritium was detected in six drinking water samples, including a sample of bottled water, and in three surface water samples. The results were well below the DCS

			for tritium in drinking water.
Milk	Liquid	Iodine-131, other gamma-emitting radionuclides, ^{90}Sr, tritium	No Iodine-131 or other human-made gamma emitting radionuclides were detected. Strontium-90 was found in all of the samples analyzed. The maximum concentration was toward the upper range of the past few years, but results from locally-produced milk were similar to a result from an out-of-state sample. Tritium was detected in five of eight samples at concentrations similar to those from other sample media.
Potatoes	Vegetation	Gamma-emitting radionuclides, ^{90}Sr	No human-made gamma-emitting radionuclides were found. Strontium-90 was detected in one sample. This radionuclide is only occasionally detected in potatoes despite its presence in soil from worldwide fallout from nuclear weapons testing.
Large Game Animals	Tissue	Gamma-emitting radionuclides	No large game animals were sampled in the fourth quarter.
Waterfowl	Tissue	Gamma emitting radionuclides, ^{90}Sr, ^{241}Am, and plutonium	Seven radionuclides were found in two of the ducks from the Advanced Test Reactor complex. Four of these were also detected in the edible tissues of these two ducks. These were likely to have originated from wastewater ponds at the facility. A dose of 0.036 mrem was calculated from consumption of an entire duck with the detected concentrations. Strontium-90 was found in portions of ducks from the Materials and Fuels Complex, but not in edible tissues. No human-made radionuclides were found in control ducks.
Environmental Dosimeters	Environmental radiation	External radioactivity	Measurements of environmental radiation were made using both thermoluminescent dosimeters (TLDs) and optically-stimulated luminescent dosimeters (OSLDs). Both dosimeter types showed a similar pattern with slightly higher measurements at Distant locations than Boundary locations.

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
GSS	Gonzales Stoller Surveillance, LLC
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

LIST OF UNITS

Bq	becquerel
Ci	curie
g	gram
L	liter
µCi	microcurie
mL	milliliter
pCi	picocurie

1. ESER PROGRAM DESCRIPTION

Operations at the Idaho National Laboratory (INL) Site are conducted under requirements imposed by the U.S. Department of Energy (DOE) under authority of the Atomic Energy Act and the U.S. Environmental Protection Agency (EPA) under a number of acts (e.g. the Clean Air Act and Safe Drinking Water Act). The requirements imposed by DOE are specified in DOE Orders. These requirements include those to monitor the effects of DOE activities both inside and outside the boundaries of DOE facilities (DOE 2003). During calendar year 2013, environmental monitoring within the INL Site boundaries was primarily the responsibility of the INL and Idaho Cleanup Project (ICP) contractors, while monitoring outside the INL Site boundaries was conducted under the Environmental Surveillance, Education, and Research (ESER) Program. At the beginning of the first quarter of 2011, the ESER Program became led by a new partnership between S.M. Stoller and Jerome Gonzales Management Systems, Inc. with the support of the previous team members. This partnership is named Gonzales Stoller Surveillance, LLC (GSS).The ESER Program was led by GSS in cooperation with its team members, including the University of Idaho, Idaho State University (ISU), and ALS Environmental.

This report contains monitoring results from the ESER Program for samples collected during the fourth quarter of 2013 (October 1-December 30, 2013).

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

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

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

Environmental samples collected include:

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

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

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

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

In the event of any suspected worldwide nuclear incidents, like the 1986 Chernobyl accident or the 2011 Fukushima accident, the EPA may request additional sampling be performed through RadNet [previously known as the Environmental Radiation Ambient Monitoring System (ERAMS) network] (EPA 2013). The EPA established the ERAMS network in 1973 with an emphasis on identifying trends in the accumulation of long-lived radionuclides in the environment. ERAMS was renamed RadNet in 2005 to reflect a new mission. RadNet is comprised of a nationwide network of sampling stations that provide air, precipitation, drinking water, and milk samples. The ESER Program currently operates a high-volume air sampler and collects precipitation and drinking water in Idaho Falls for this national program and routinely sends samples to EPA's Eastern Environmental Radiation Facility for analyses. The RadNet data collected at Idaho Falls are not reported by the ESER Program but are available through the EPA RadNet website (http://www.epa.gov/narel/radnet/).

Once samples have been collected and analyzed, the ESER Program has the responsibility for quality control of the data and for preparing quarterly reports on results from the environmental surveillance program. The quarterly reports are then consolidated into the INL Site Environmental Report for each calendar year. These annual reports also include data collected by other INL Site contractors.

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

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

statistically different from background. The ESER has adopted guidelines developed by the United States Geological Survey (Bartholomay, et al. 2003), based on an extension of a method proposed by Currie (1984), to interpret analytical results and make decisions concerning detection. Most of the following discussion is taken from Bartholomay et al (2003).

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). Instrument signals for the target and blank vary randomly about the true signals and may overlap making it difficult to distinguish between radionuclide activities in blank and in environmental samples (Figure 1).That is, the variability around the sample result may substantially overlap the variability around a net activity of zero for samples with no radioactivity. 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.

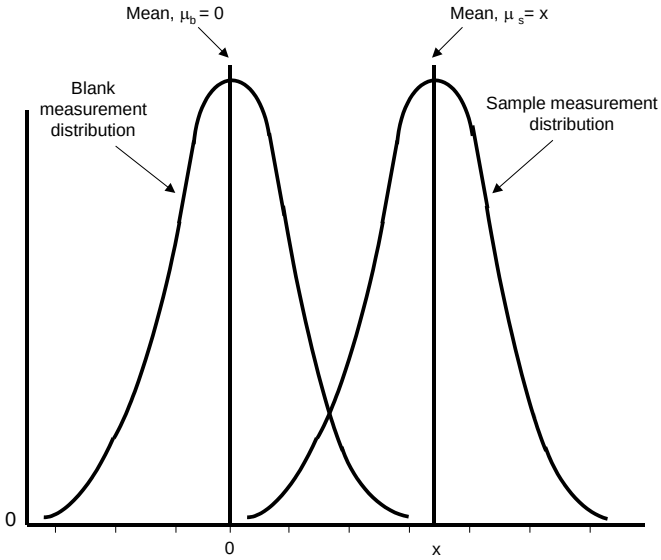

Figure 1. Example of overlap of blank and sample measurement distributions.

In the laboratory, instrument signals must exceed a critical level of 1.6s before the qualitative decision can be made as to whether the radionuclide was detected in a sample. At 1.6s there is about a 95-percent probability that the correct conclusion—not detected—will be made. Given a large number of samples, approximately 5 percent of the samples with measured concentrations greater than or equal to 1.6s, which were concluded as being detected, might not contain the radionuclide. These are referred to as false positives. For purposes of simplicity and consistency with past reporting, the ESER has rounded the 1.6s critical level estimate to 2s.

Once the critical level has been defined, the minimum detectable concentration may be determined. Concentrations that equal 3s represent a measurement at the detection level or minimum detectable concentration. For true concentrations of 3s or greater, there is a greater than 99-percent probability that the radionuclide was detected in the target sample. In a large number of samples, the conclusion—not detected—will be made in less than one percent of the samples with true concentrations at the minimum detectable concentration of 3s. These

measurements are known as false negatives. 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 detection may not be reliable. Measurements made between 2s and 3s are examined further to determine if they are a part of a pattern (temporal or spatial) that might warrant further investigation or recounting. For example, if a particular radionuclide is typically 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 little confidence that the radionuclide is present in the sample. Analytical results in this report are presented as the result value ± one standard deviation (1s) for reporting consistency with the annual report. To obtain the 2s or 3s values simply multiply the uncertainty term by 2 or 3.

For more information concerning the ESER Program, contact GSS at (208) 525-8250, or visit the Program’s web page (http://www. gsseser.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 (2300 km^2) of the upper Snake River Plain in Southeastern Idaho. The history of the INL Site began during World War II when the U.S. Naval Ordnance Station was located in Pocatello, Idaho. This station, one of two such installations in the U.S., retooled large guns from U.S. Navy warships. The retooled guns were tested on the nearby, uninhabited plain, known as the Naval Proving Ground. In the years following the war, as the nation worked to develop nuclear power, the Atomic Energy Commission (AEC), predecessor to the DOE, became interested in the Naval Proving Ground and made plans for a facility to build, test, and perfect nuclear power reactors.

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

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

3. AIR SAMPLING

The primary pathway by which radionuclides can move off the INL Site is through the air and for this reason the air pathway is the primary focus of monitoring on and around the INL Site. Samples for particulates and iodine-131 (^{131}I) gas in air were collected weekly for the duration of the quarter at 16 locations using low-volume air samplers. Moisture in the atmosphere was sampled at four locations around the INL Site and analyzed for tritium. Air sampling activities and results for the fourth quarter of 2013 are discussed below. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses and DOE Derived Concentration Standard (DCS) (DOE 2011) values is provided in Appendix B.

LOW-VOLUME AIR SAMPLING

Radioactivity associated with airborne particulates was monitored continuously by 18 low-volume air samplers (two of which are used as replicate samplers) at 16 locations during the fourth quarter of 2013 (Figure 2). Three of these samplers are located on the INL Site, nine are situated off the INL Site near the boundary, and six 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 2012, one replicate sampler was moved to Monteview (a Boundary location) and one was moved to Arco (also a Boundary location). An average of 20,562 ft^3 (582 m^3) of air was sampled at each location, each week, at an average flow rate of 2.04 ft^3/min (0.06 m^3/min). Particulates in air were collected on membrane particulate filters (1.2-µm pore size). Gases passing through the filter were collected with an activated charcoal cartridge.

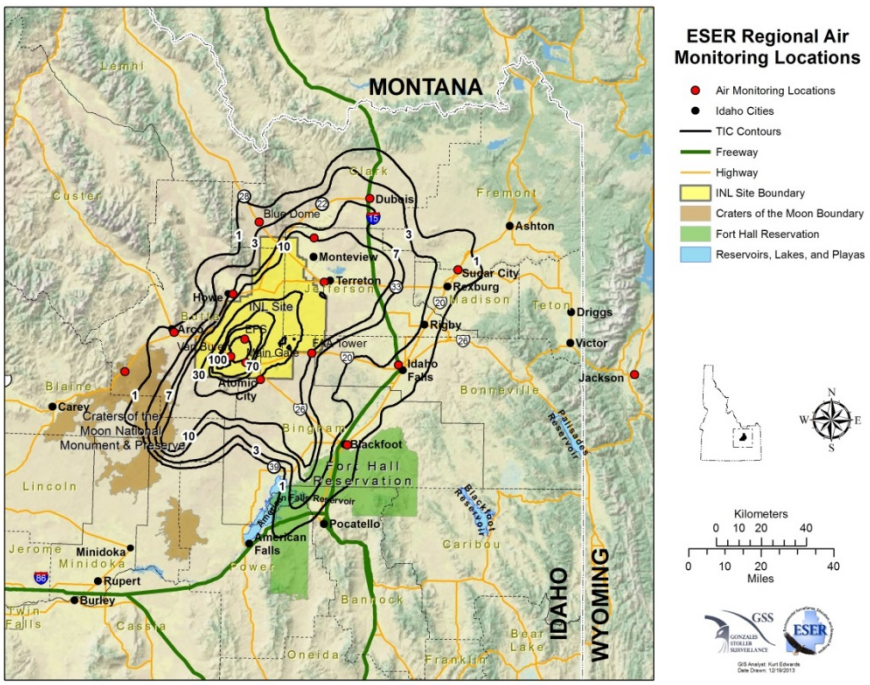

Figure 2. Low-volume air sampler locations.

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

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

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

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

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

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

Gross beta results are presented in Table C-1 and displayed in Figures 7 through 10. The data were tested and found to be neither normally nor log-normally distributed. Box and whiskers plots were used for presentation of the data. Outliers and extreme values were retained in subsequent statistical analyses because they are within the range of measurements made in the past five years, and because these values could not be attributed to mistakes in collection, analysis, or reporting procedures. A statistical difference was noted in the quarterly data and during the month of December using the Kruskal-Wallis test (Table D-1). This is discussed further in the next paragraph.

Comparison of weekly Boundary and Distant gross beta data sets, using the Mann Whitney U test, showed a statistical difference between Boundary and Distant measurements during three weeks of the fourth quarter (Table D-1). In each case, the Boundary locations were statistically greater than the Distant locations. Analysis of the data for these weeks and the quarter as a whole did not show a consistent pattern that would indicate an INL Site impact on the results. There was a general tendency for slightly higher results at some of the northern Boundary stations (particularly Monteview and Mud Lake) and lower results at some of the higher elevation stations (Craters of the Moon and Jackson). This pattern is sometimes seen in

the winter months during periods of consistent inversion conditions. Gross beta concentrations for the locations on the INL Site were generally clustered towards the middle of the data set.

Iodine-131 was not detected in any of the 28 sets of charcoal cartridges measured during the fourth quarter. Weekly ^{131}I results for each location are listed in Table C-2 of Appendix C.

No ^{137}Cs or other human-made gamma-emitting radionuclides were found in quarterly composites. Strontium-90 and actinide analyses results were not yet available. All available quarterly composite results are found in Appendix C, Table C-3.

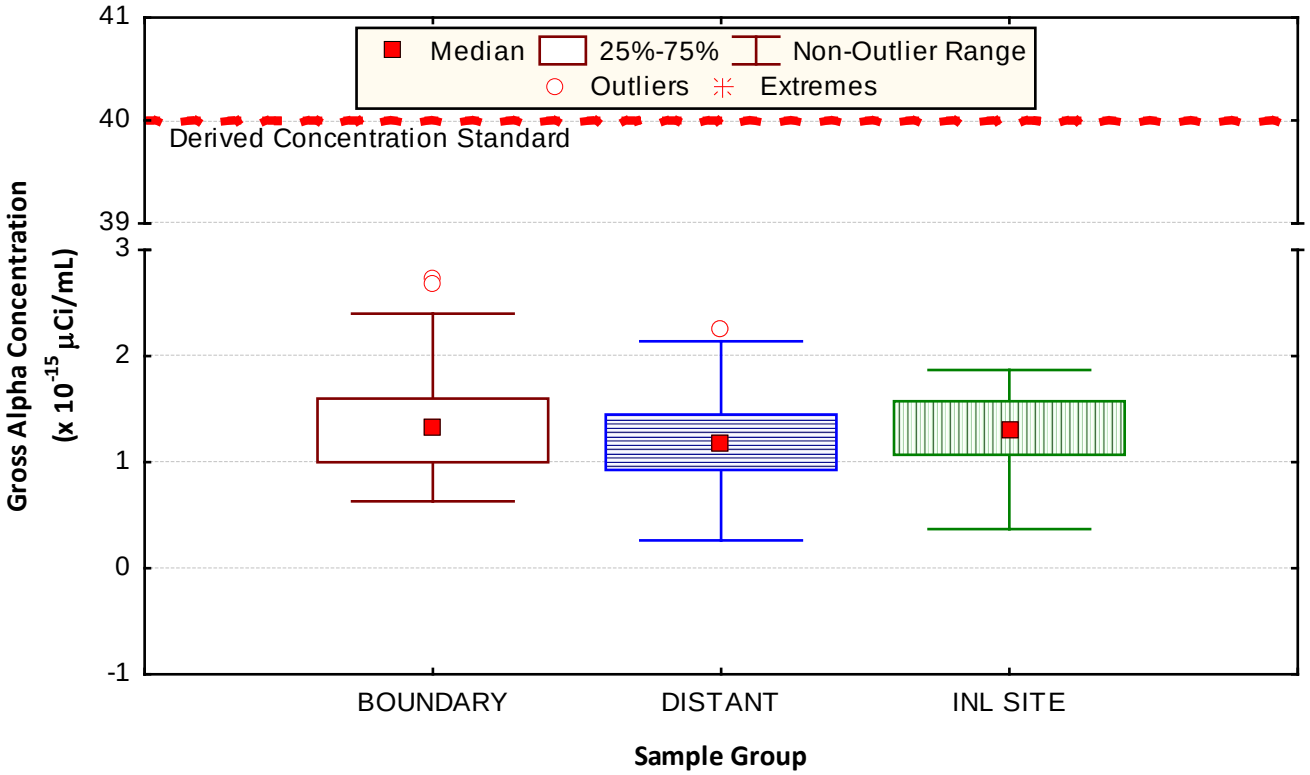

Figure 3. Gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations for the fourth quarter of 2013.

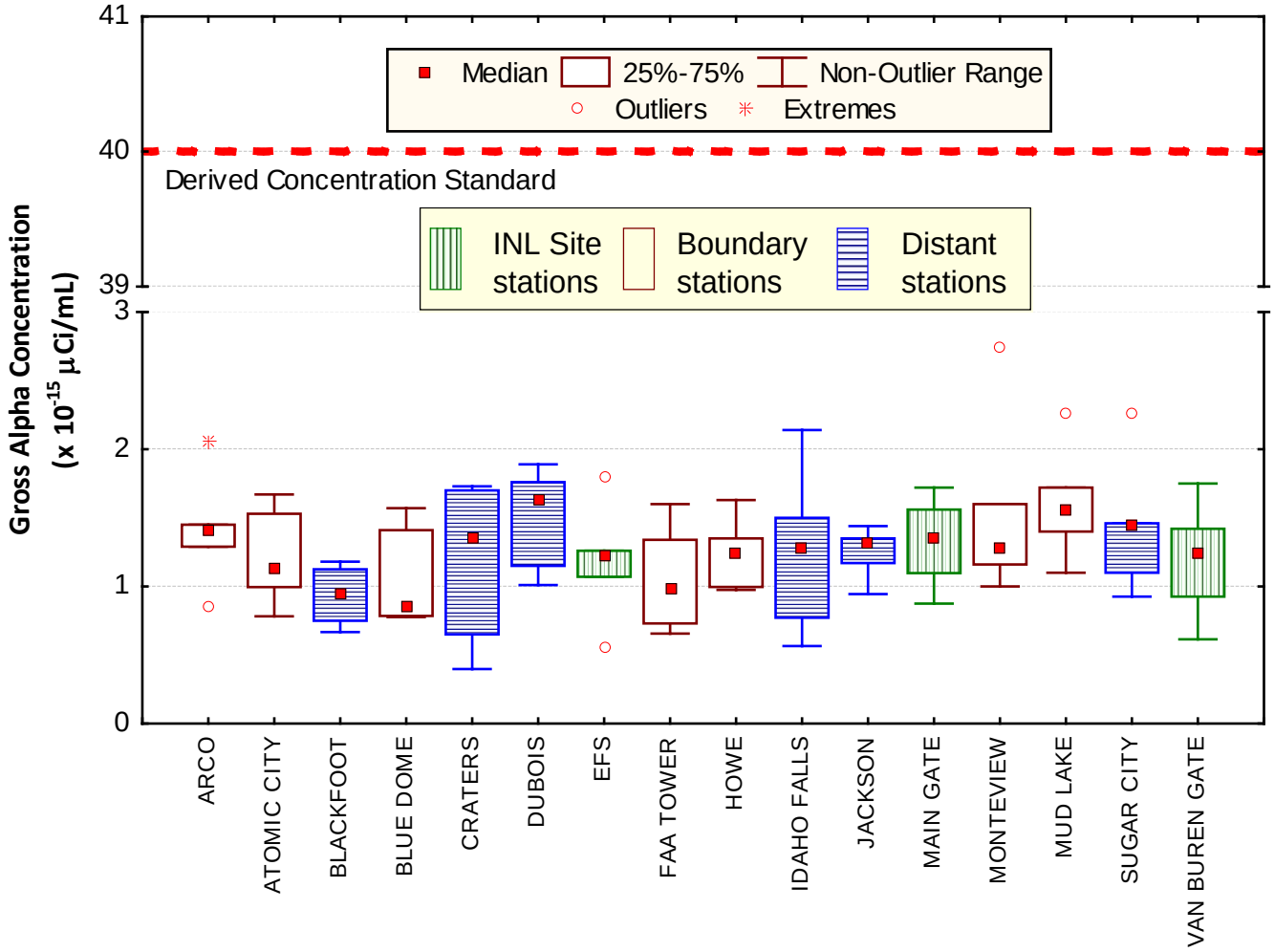

Figure 4. October gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location, except Blackfoot and Main Gate (N = 4).

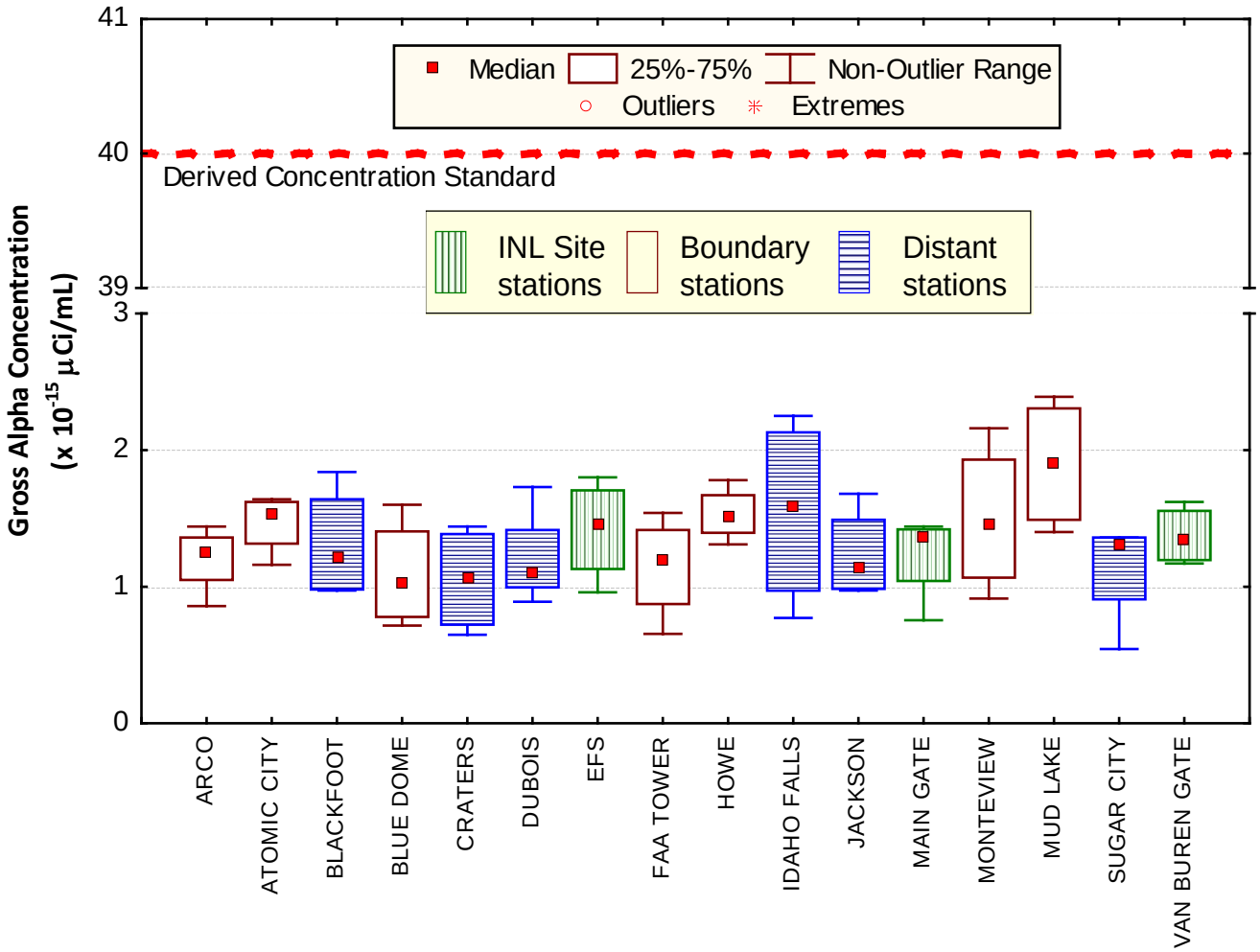

Figure 5. Novembert gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

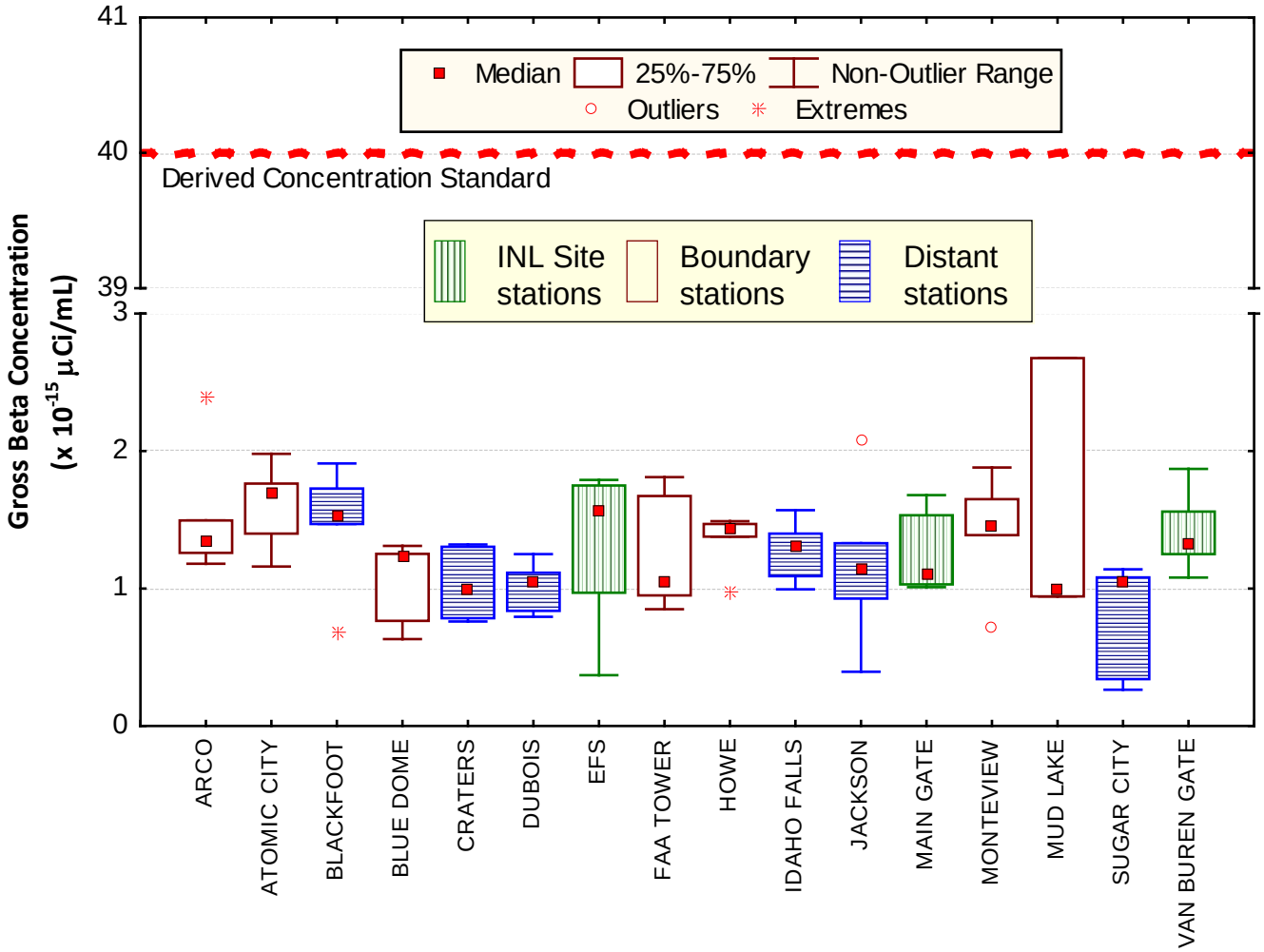

Figure 6. December gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location, except Mud Lake (N = 3).

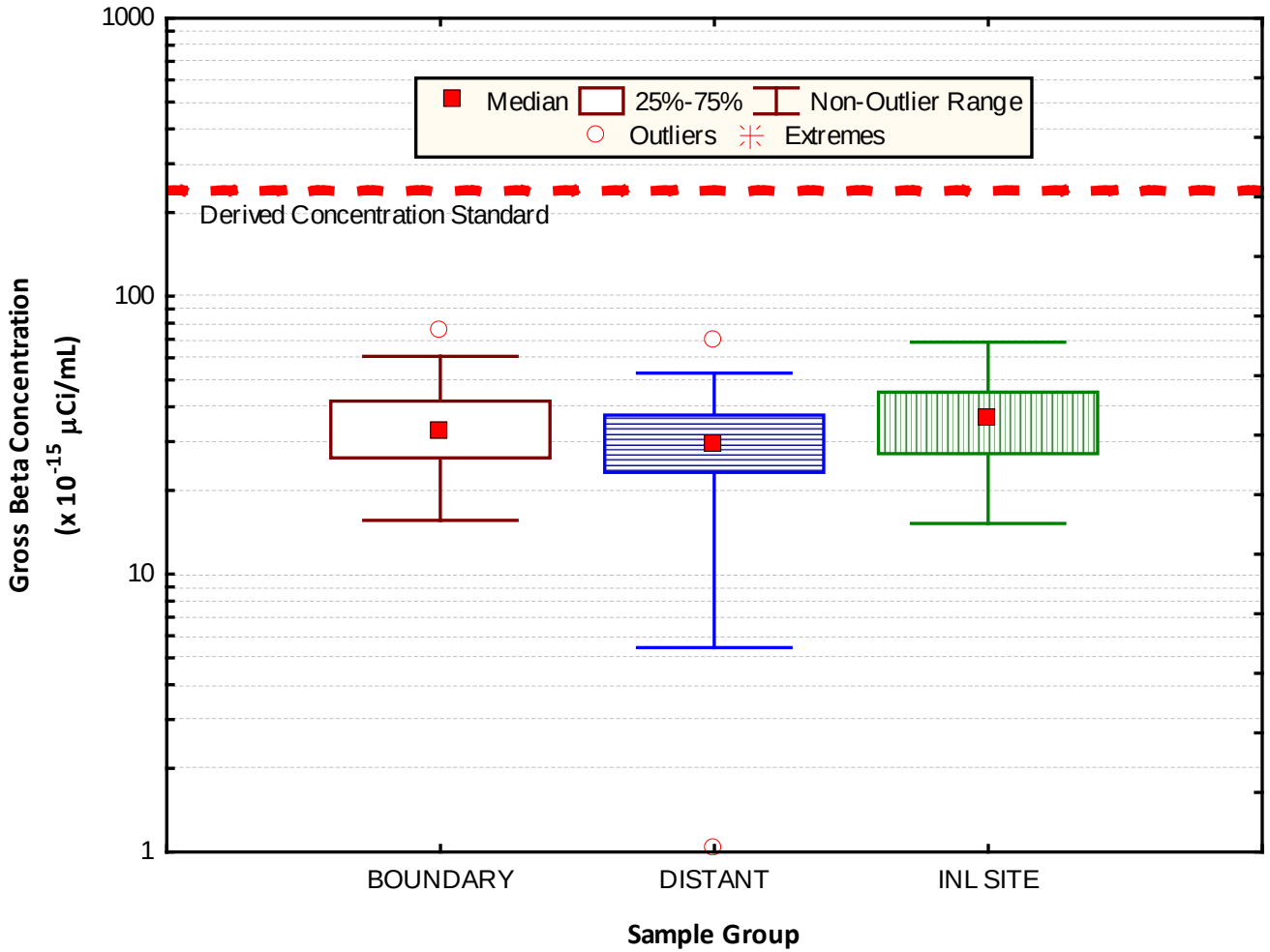

Figure 7. Gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations for the fourth **quarter of 2013.**

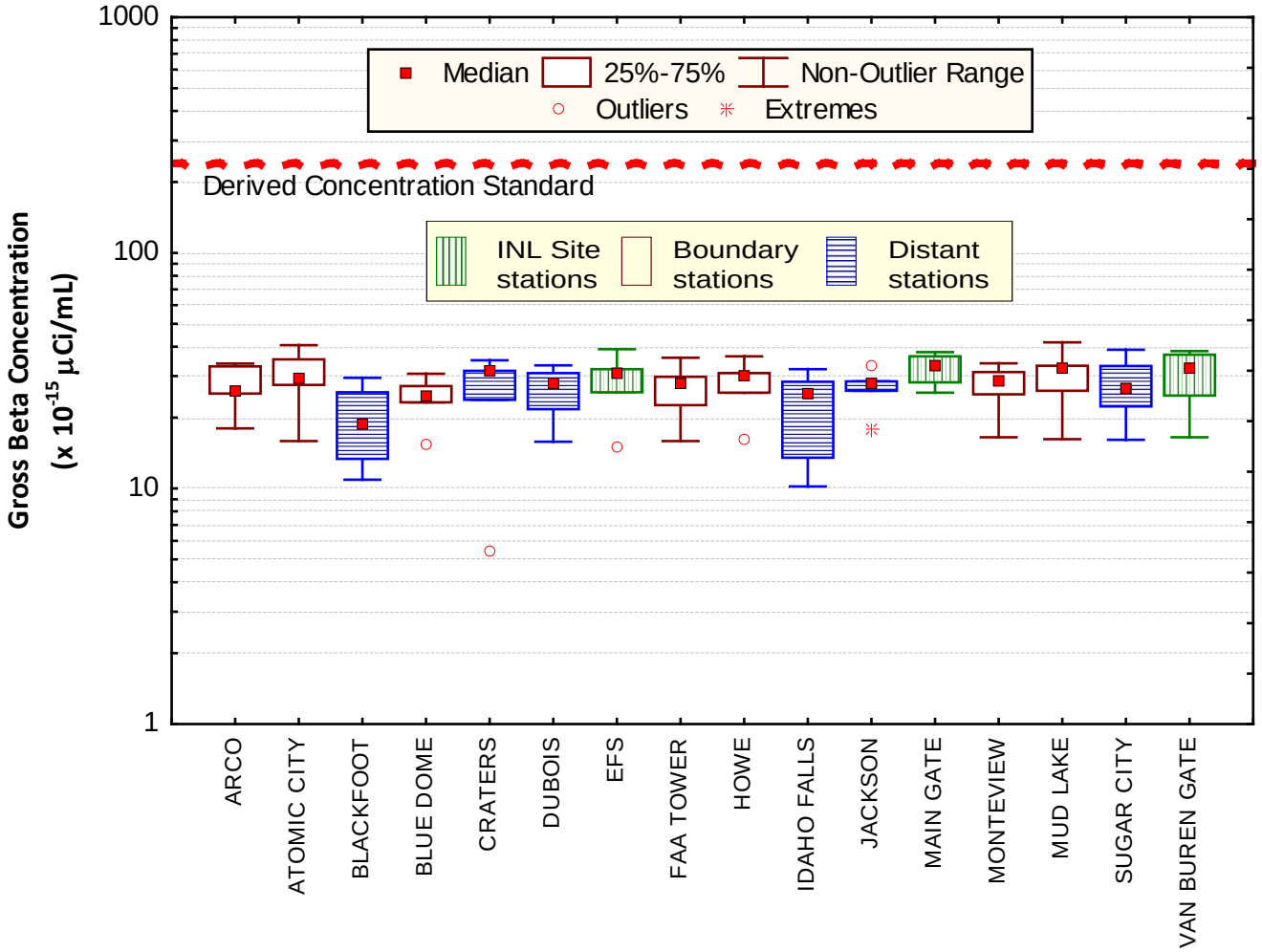

Figure 8. October gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location, except Blackfoot and Main Gate (N = 4).

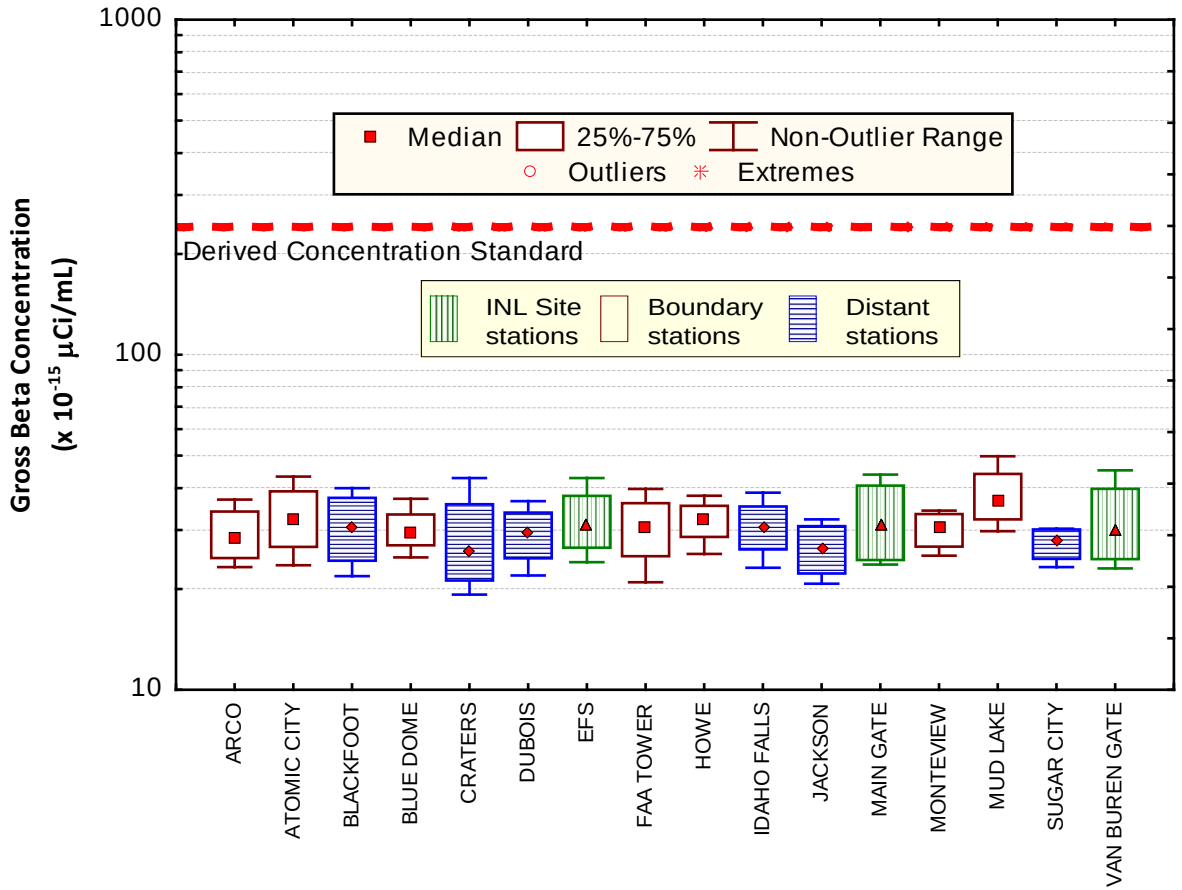

Figure 9. November gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

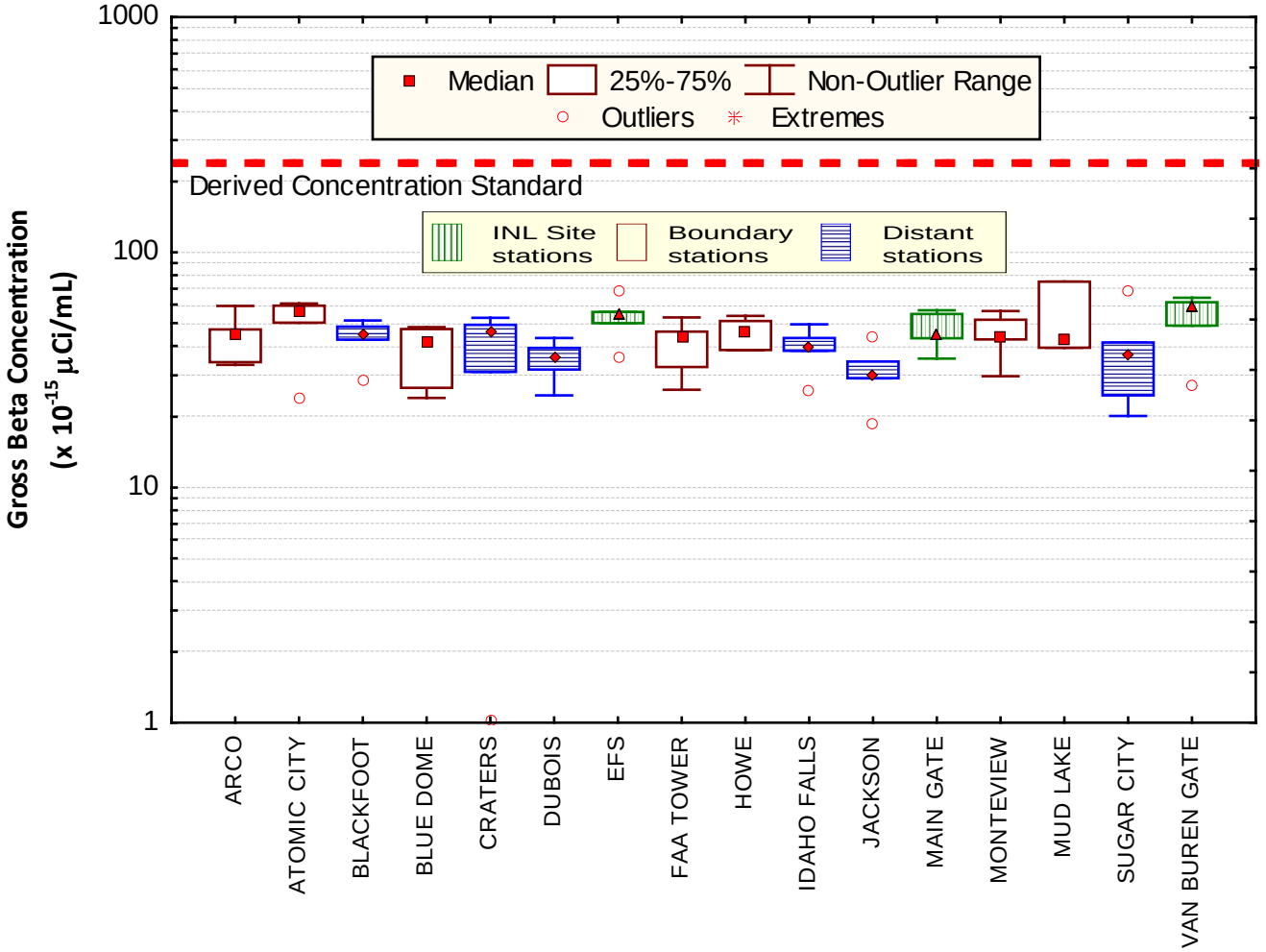

Figure 10. December gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location, except Mud Lake (N = 3).

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 11 atmospheric moisture samples collected during the fourth quarter of 2013. Nine of these exceeded the 3s uncertainty level for tritium, with similar results to those reported previously. All samples were significantly below the DOE DCS for tritium in air of 1.4×10^{-8} $\mu Ci/mL_{air}$ with a maximum reported value of 9.9×10^{-13} $\mu Ci/mL_{air}$ at Atomic City. Results are shown in Table C-4, Appendix C.

4. PRECIPITATION AND WATER SAMPLING

PRECIPITATION SAMPLING

Precipitation samples are gathered when sufficient precipitation occurs to allow for the collection of the minimum sample volume of approximately 50 mL. Samples are taken of monthly composites from Idaho Falls and CFA, and weekly from the EFS. Precipitation samples are analyzed for tritium. Storm events in the fourth quarter of 2013 produced sufficient precipitation to yield only nine samples.

Tritium was measured above the 3s values in six of the nine samples. These results are listed in Table C-5 (Appendix C). Low levels of tritium exist in the environment at all times as a result of cosmic ray reactions with water molecules in the upper atmosphere and nuclear weapons testing. When detected, tritium values have remained well within the historical range and the range measured across the country by the EPA Radnet program (EPA 2013).

WATER SAMPLING

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

Gross alpha activity was detected in two of the drinking water samples (Craters of the Moon and the US20/26 rest area) at levels just slightly above the minimum detectable concentration. Gross beta activity was detected in most of the drinking water samples (all except Howe and the control sample) and in all four of the surface water samples. All concentrations were generally similar to previous results from drinking and surface water sampling. Natural levels of radioactive decay products of thorium and uranium exist in the Snake River Plain Aquifer and are the likely source of the measured concentrations.

Tritium was also detected in six of the drinking water samples (including the bottled water), and in three surface water samples. The concentrations were similar to those found in atmospheric moisture and precipitation samples and were consistent with previous results. The results are well below the DCS of 1.9×10^6 pCi/L for tritium in drinking water.

5. AGRICULTURAL PRODUCT, WILDLIFE, AND SOIL SAMPLING

Another potential pathway for contaminants to reach humans is through the food chain. The ESER Program samples multiple agricultural products and game animals from around the INL Site and Southeast Idaho. Specifically, milk, alfalfa, grain, potatoes, lettuce, large game animals, and waterfowl are sampled. Milk is sampled throughout the year and large game animals are sampled whenever large game animals are killed onsite from vehicle collisions. Alfalfa is collected during the second quarter, lettuce and grain are sampled during the third quarter, while potatoes are collected during the fourth quarter. Waterfowl are collected in either the third or fourth quarter. See Table A-1, Appendix A, for more details on agricultural product and wildlife sampling. This section discusses results from milk and agricultural products samples available during the fourth quarter of 2013.

MILK SAMPLING

Milk samples were collected weekly in Idaho Falls. Monthly samples were collected at six other locations around the INL Site (Figure 11) during the fourth quarter of 2013. In addition, commercially-available organic milk was purchased as a control sample. All samples were analyzed for gamma emitting radionuclides, with particular emphasis on Iodine-131. Fourth quarter samples were also analyzed for ^{90}Sr and tritium.

Iodine-131 was not detected in any weekly or monthly samples during the fourth quarter. No other human-made gamma-emitting radionuclides were found either. Data for ^{131}I and ^{137}Cs in milk samples are listed in Appendix C, Table C-7.

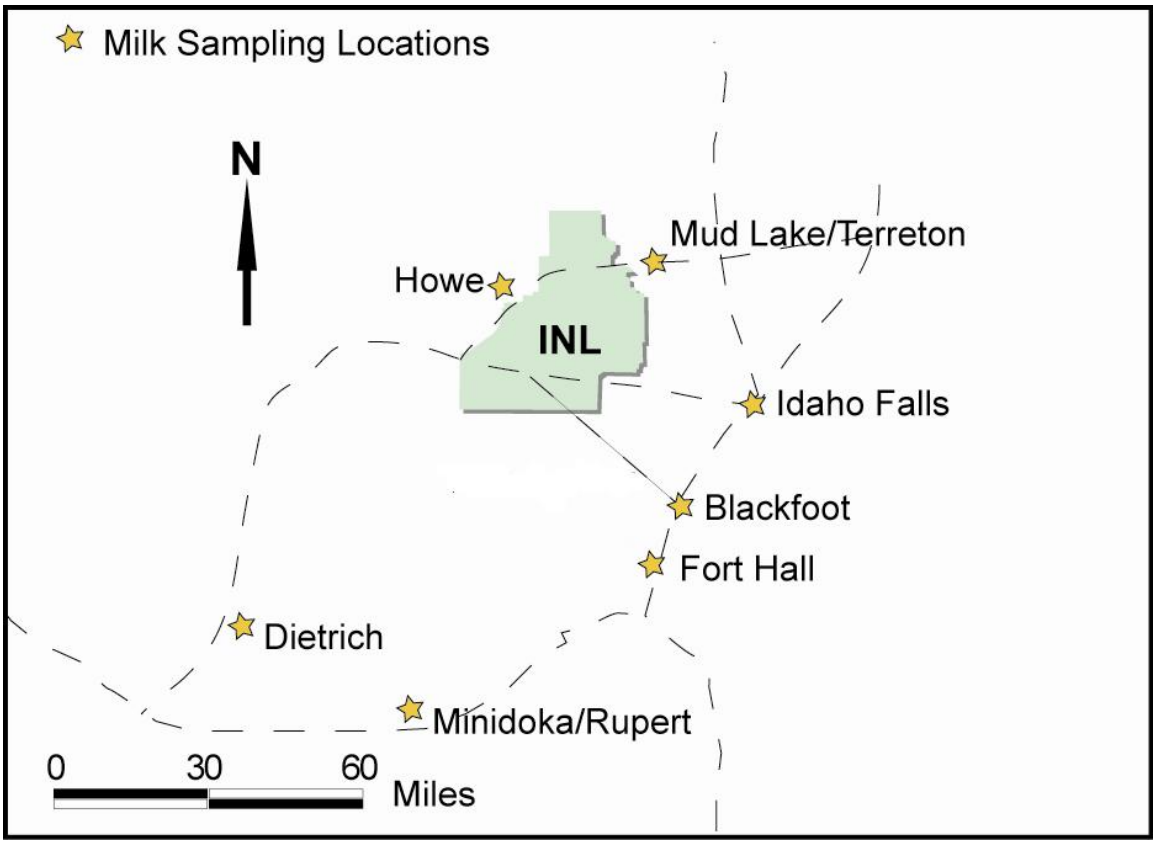

Figure 11. ESER milk sampling locations

Results for ^{90}Sr and tritium are listed in Appendix C, Table C-8. Strontium-90 was detected in all of the samples, including the control sample. The maximum concentration of 2.4 pCi/L from Fort Hall is toward the higher end of the range of concentrations for the past several years.; however, the presence of ^{90}Sr at similar levels in all the samples, including the organic milk from Colorado, does not indicate an INL Site impact of the results. There is no DCS for ^{90}Sr in milk; however, for comparison the results were well below the drinking water DCS of 1.1×10^3 pCi/L.

Tritium was detected in five of eight samples analyzed. All results were similar to those previously measured. There is no DCS for tritium in milk, but the results were well below the DCS for tritium in drinking water (1.9×10^6 pCi/L).

POTATO SAMPLING

Locally-grown potatoes from seven locations and one duplicate were analyzed for gamma-emitting radionuclides and ^{90}Sr. A control sample from a local grocery store was also analyzed. No human-made gamma-emitters were found in any sample. Strontium-90 was detected in one sample from Shelley. This radionuclide is present in the soil as a result of worldwide fallout from nuclear weapons testing, but it is only occasionally detected in potato samples. This is because potatoes are generally less efficient at removing radioactive elements from soil than leafy vegetables such as lettuce. Data for potato samples are listed in Appendix C, Table C-9.

LARGE GAME ANIMAL SAMPLING

No large game animals were sampled in the fourth quarter.

WATERFOWL SAMPLING

Three samples from wastewater ponds located at the Advanced Test Reactor Complex (ATR Complex) and from ponds near the Materials and Fuels Complex (MFC) plus two control samples were analyzed for gamma-emitting radionuclides, ^{90}Sr, and actinides (^{241}Am, ^{238}Pu, and $^{239/240}Pu$). Each sample was divided into the following three sub-samples: 1) edible tissue (muscle, gizzard, heart, and liver), 2) external portion (feathers, feet, and head), and 3) all remaining tissue. Results are shown in Appendix C, Table C-10. During the summer of 2020, a review of Appendix C, Table C-10 determined the activity concentration values reported for the media were correct, however, the unit of concentration listed in the column headings were incorrect. Prior to 2010, concentrations were reported in either pCi/g or pCi/kg. In 2010, the concentration unit of pCi/kg was adopted for reporting radionuclide concentrations in soil and biota (vegetation and animals). The reasons for doing this include: 1) the use of one unit (pCi/kg) ensures consistency and comparability in reporting concentrations in various media, 2) the use of one unit (pCi/kg) minimizes mistakes (due to confusion about units) in data entry into the database, and 3) the unit of pCi/kg was selected because it is the unit associated with models that are used for dose calculations and the results tend to be whole numbers (e.g. 14 pCi/kg versus 0.014 pCi/g). The column headings have been updated to the correct units of concentration [pCi/kg and ($x10^{-2}$) Bq/kg]..

A total of seven human-made radionuclides were detected in the samples from at least one of the ducks collected at the ATR Complex ponds. These included ^{241}Am, ^{137}Cs, cobalt-60 (^{60}Co), ^{238}Pu, $^{239/240}Pu$, ^{90}Sr, and zinc-65 (^{65}Zn). Strontium-90 was also detected in the external

and remainder portions of ducks from MFC. No human-made radionuclides were found in either of the control ducks.

Cesium-137, ^{60}Co, ^{90}Sr, and ^{65}Zn were also found in the edible tissue portions of two of the ATR Complex ducks. No human-made radionuclides were found in any edible tissues of ducks from MFC or the control samples.

Because most of the detected human-made radionuclides were found in ducks from ATR Complex and not at other locations, it is assumed that the evaporation pond associated with this facility is the source of these radionuclides. The ducks were not taken directly from the two-celled hypalon-lined radioactive wastewater evaporation pond, but rather from an adjacent sewage lagoon. However, the ducks probably also spent time at the evaporation pond. It is most likely that the source of the radionuclides is sediment, which acts as a sink for contaminants.

Concentrations were generally higher in 2013 than in 2012. A dose was calculated based on the maximum concentrations found in the edible portion of a duck from the ATR Complex, using the assumption that the entire edible portion of the duck is eaten immediately after it leaves the facility. The calculated dose for 2013 was 0.036 mrem, compared to 0.009 mrem for 2012. While the dose was higher during the 2013 sampling than the previous few years it is substantially below the 0.89 mrem reported in ducks during a study conducted during the 1990s (Warren et al 2001).

6. ENVIRONMENTAL RADIATION

An array of thermoluminescent dosimeters (TLDs) is distributed throughout the Eastern Snake River Plain to monitor for environmental radiation. In November 2011 the ESER Program also placed optically stimulated luminescent dosimeters (OSLDs) in the same locations as the TLDs to run a side-by-side comparison of the two dosimeter technologies. Two OSLDs are in place at each location. TLDs and OSLDs are changed out in May and again in November after six months in the field.

Results from the fourth quarter TLDs are presented in Appendix C, Table C-11. Similar to the low-volume air results the environmental dosimeter locations are also divided into Boundary and Distant groupings. For the Boundary group, six-month exposures ranged from 56.7 milliRotengens (mR) at Blue Dome to 69.6 mR at Arco. The overall Boundary exposure was 63.6 mR. Distant exposures ranged from 56.8 mR at Dubois to 83.9 mR for the TLD which was in Rexburg for the first half of the exposure period before being moved to Sugar City for the second half. The average Distant exposure was 65.4 mR.

OSLD results from the second quarter followed a similar pattern to the TLDs (Appendix C, Table C-12). OSLDs are presented in dose units of millirem (mrem). Boundary OSLD values ranged from 42.85 mrem at Blue Dome to 60.35 mrem at Arco, with an overall average of 53.61 mrem. Distant results varied from 48.30 mrem at Dubois to 76.50 mrem at Rexburg/Sugar City. The Distant average was 58.46 mrem.

7. QUALITY ASSURANCE

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

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

Sample results are compared to criteria described in the Quality Assurance Project Plan for the INL Site Offsite Environmental Surveillance Program (GSS 2012). Criteria established by DOE for Quality Assurance activities include:

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

Assessments of ESER data quality are achieved through analysis of spike, performance evaluation, and duplicate samples; through sample recounts; through analysis of blank samples; and through comparison of sample results to established method quality objectives. These assessments are documented in the ESER Quality Assurance for the Fourth Quarter of 2013 (GSS 2014).

8. REFERENCES

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APPENDIX A

SUMMARY OF SAMPLING SCHEDULE

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

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

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

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

APPENDIX B

SUMMARY OF MDCs AND DCSs

Table B-1. Summary of Approximate Minimum Detectable Concentrations for Radiological Analyses Performed during Fourth Quarter 2013

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Standard[b] (DCS)
Air (particulate filter)[e]	Gross alpha[c]	4.68×10^{-16} µCi/mL	4×10^{-14} µCi/mL
	Gross beta[d]	1.25×10^{-15} µCi/mL	2.4×10^{-13} µCi/mL
	^{137}Cs	8.91×10^{-17} µCi/mL	3.9×10^{-10} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	4.47×10^{-16} µCi/mL	2.3×10^{-19} µCi/mL
Air (atmospheric moisture)	^{3}H	79.7 pCi/L_{water}	2.1×10^{-7} $\mu Ci/mL_{air}$
Air (precipitation)	^{3}H	79.4 pCi/L	1.9×10^{-3} µCi/mL
Milk	^{131}I	0.60 pCi/L	--
	^{137}Cs	0.52 pCi/L	--
	^{3}H	81.2 pCi/L	--
	^{90}Sr	0.19 pCi/L	--

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 and precision of plus or minus 100 percent under a specified set of typical laboratory measurement conditions.

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 The DCS for gross alpha is equivalent to the DCSs for ^{241}Am.

d The DCS for gross beta is equivalent to the DCSs for ^{228}Ra

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

APPENDIX C

SAMPLE ANALYSIS RESULTS

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)	GROSS BETA Result > 3s
BOUNDARY							
ARCO	10/2/2013	0.85 ± 0.15	3.14 ± 0.55	Yes	18.00 ± 0.54	66.60 ± 1.98	Yes
	10/9/2013	1.29 ± 0.17	4.77 ± 0.62	Yes	25.30 ± 0.60	93.61 ± 2.23	Yes
	10/16/2013	1.41 ± 0.18	5.22 ± 0.68	Yes	33.90 ± 0.69	125.43 ± 2.55	Yes
	10/23/2013	1.45 ± 0.17	5.37 ± 0.63	Yes	33.00 ± 0.65	122.10 ± 2.41	Yes
	10/30/2013	2.05 ± 0.24	7.59 ± 0.89	Yes	26.10 ± 0.63	96.57 ± 2.31	Yes
	11/6/2013	0.86 ± 0.15	3.17 ± 0.56	Yes	23.20 ± 0.58	85.84 ± 2.13	Yes
	11/13/2013	1.44 ± 0.17	5.33 ± 0.63	Yes	31.10 ± 0.66	115.07 ± 2.45	Yes
	11/20/2013	1.24 ± 0.16	4.59 ± 0.60	Yes	26.20 ± 0.58	96.94 ± 2.14	Yes
	11/27/2013	1.28 ± 0.17	4.74 ± 0.64	Yes	36.90 ± 0.67	136.53 ± 2.47	Yes
	12/4/2013	1.50 ± 0.19	5.53 ± 0.70	Yes	44.86 ± 0.74	165.97 ± 2.75	Yes
	12/11/2013	2.40 ± 0.22	8.88 ± 0.81	Yes	59.30 ± 0.85	219.41 ± 3.13	Yes
	12/18/2013	1.34 ± 0.19	4.96 ± 0.71	Yes	47.10 ± 0.80	174.27 ± 2.95	Yes
	12/24/2013	1.26 ± 0.18	4.66 ± 0.67	Yes	33.30 ± 0.70	123.21 ± 2.59	Yes
	12/31/2013	1.18 ± 0.16	4.37 ± 0.60	Yes	34.20 ± 0.64	126.54 ± 2.36	Yes
QA-1 (ARCO)	10/2/2013	0.73 ± 0.13	2.70 ± 0.49	Yes	15.90 ± 0.48	58.83 ± 1.78	Yes
	10/9/2013	0.93 ± 0.14	3.43 ± 0.52	Yes	21.50 ± 0.53	79.55 ± 1.97	Yes
	10/16/2013	1.39 ± 0.17	5.14 ± 0.63	Yes	32.80 ± 0.64	121.36 ± 2.36	Yes
	10/23/2013	1.35 ± 0.16	5.00 ± 0.60	Yes	32.50 ± 0.64	120.25 ± 2.37	Yes
	10/30/2013	0.52 ± 0.17	1.92 ± 0.63	Yes	23.20 ± 0.57	85.84 ± 2.12	Yes
	11/6/2013	1.19 ± 0.16	4.40 ± 0.60	Yes	22.60 ± 0.55	83.62 ± 2.03	Yes
	11/13/2013	1.37 ± 0.17	5.07 ± 0.61	Yes	28.50 ± 0.64	105.45 ± 2.35	Yes
	11/20/2013	1.18 ± 0.18	4.37 ± 0.67	Yes	28.50 ± 0.67	105.45 ± 2.46	Yes
	11/27/2013	1.35 ± 0.19	5.00 ± 0.69	Yes	35.60 ± 0.70	131.72 ± 2.58	Yes
	12/4/2013	2.05 ± 0.23	7.59 ± 0.85	Yes	53.51 ± 0.87	197.99 ± 3.24	Yes
	12/11/2013	2.09 ± 0.22	7.73 ± 0.80	Yes	54.70 ± 0.85	202.39 ± 3.13	Yes
	12/18/2013	1.51 ± 0.19	5.59 ± 0.71	Yes	51.20 ± 0.80	189.44 ± 2.96	Yes
	12/24/2013	1.23 ± 0.20	4.55 ± 0.72	Yes	36.00 ± 0.77	133.20 ± 2.86	Yes
	12/31/2013	1.72 ± 0.19	6.36 ± 0.70	Yes	34.40 ± 0.67	127.28 ± 2.46	Yes
ATOMIC CITY	10/2/2013	0.78 ± 0.15	2.89 ± 0.56	Yes	15.90 ± 0.53	58.83 ± 1.96	Yes
	10/9/2013	1.14 ± 0.18	4.22 ± 0.68	Yes	27.50 ± 0.70	101.75 ± 2.58	Yes
	10/16/2013	1.53 ± 0.19	5.66 ± 0.70	Yes	35.30 ± 0.71	130.61 ± 2.62	Yes
	10/23/2013	1.67 ± 0.19	6.18 ± 0.71	Yes	40.60 ± 0.75	150.22 ± 2.79	Yes
	10/30/2013	1.00 ± 0.21	3.68 ± 0.77	Yes	29.70 ± 0.67	109.89 ± 2.46	Yes
	11/6/2013	1.64 ± 0.19	6.07 ± 0.71	Yes	23.50 ± 0.60	86.95 ± 2.20	Yes
	11/13/2013	1.47 ± 0.17	5.44 ± 0.64	Yes	34.90 ± 0.70	129.13 ± 2.57	Yes
	11/20/2013	1.16 ± 0.18	4.29 ± 0.65	Yes	29.80 ± 0.66	110.26 ± 2.43	Yes
	11/27/2013	1.60 ± 0.19	5.92 ± 0.71	Yes	43.20 ± 0.73	159.84 ± 2.70	Yes
	12/4/2013	1.76 ± 0.21	6.52 ± 0.79	Yes	59.42 ± 0.88	219.84 ± 3.26	Yes
	12/11/2013	1.40 ± 0.19	5.18 ± 0.69	Yes	56.90 ± 0.84	210.53 ± 3.10	Yes
	12/18/2013	1.16 ± 0.20	4.29 ± 0.73	Yes	60.70 ± 0.92	224.59 ± 3.40	Yes
	12/24/2013	1.98 ± 0.22	7.33 ± 0.82	Yes	24.10 ± 0.65	89.17 ± 2.42	Yes
	12/31/2013	1.69 ± 0.20	6.25 ± 0.74	Yes	50.30 ± 0.81	186.11 ± 3.00	Yes
BLUE DOME	10/2/2013	0.79 ± 0.14	2.90 ± 0.50	Yes	15.60 ± 0.48	57.72 ± 1.78	Yes
	10/9/2013	0.78 ± 0.14	2.87 ± 0.50	Yes	24.50 ± 0.57	90.65 ± 2.09	Yes
	10/16/2013	1.41 ± 0.17	5.22 ± 0.63	Yes	30.70 ± 0.63	113.59 ± 2.31	Yes
	10/23/2013	1.57 ± 0.17	5.81 ± 0.63	Yes	27.20 ± 0.59	100.64 ± 2.18	Yes
	10/30/2013	0.85 ± 0.19	3.15 ± 0.68	Yes	23.20 ± 0.57	85.84 ± 2.12	Yes
	11/6/2013	0.84 ± 0.15	3.12 ± 0.55	Yes	24.80 ± 0.58	91.76 ± 2.14	Yes
	11/13/2013	1.21 ± 0.15	4.48 ± 0.57	Yes	29.50 ± 0.62	109.15 ± 2.30	Yes
	11/20/2013	0.72 ± 0.15	2.65 ± 0.54	Yes	29.10 ± 0.62	107.67 ± 2.29	Yes
	11/27/2013	1.60 ± 0.20	5.92 ± 0.75	Yes	37.10 ± 0.73	137.27 ± 2.70	Yes
	12/4/2013	1.25 ± 0.21	4.63 ± 0.78	Yes	47.28 ± 0.87	174.93 ± 3.20	Yes
	12/11/2013	1.31 ± 0.20	4.85 ± 0.75	Yes	48.20 ± 0.87	178.34 ± 3.22	Yes

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)	GROSS BETA Result > 3s
	12/18/2013	1.23 ± 0.21	4.55 ± 0.77	Yes	42.10 ± 0.84	155.77 ± 3.10	Yes
	12/24/2013	0.77 ± 0.19	2.83 ± 0.71	Yes	24.10 ± 0.74	89.17 ± 2.74	Yes
	12/31/2013	0.63 ± 0.17	2.34 ± 0.63	Yes	26.60 ± 0.70	98.42 ± 2.58	Yes
FAA TOWER	10/2/2013	0.66 ± 0.14	2.43 ± 0.53	Yes	15.90 ± 0.53	58.83 ± 1.95	Yes
	10/9/2013	0.73 ± 0.15	2.70 ± 0.54	Yes	22.60 ± 0.60	83.62 ± 2.22	Yes
	10/16/2013	1.34 ± 0.18	4.96 ± 0.67	Yes	29.80 ± 0.66	110.26 ± 2.44	Yes
	10/23/2013	1.60 ± 0.19	5.92 ± 0.71	Yes	35.90 ± 0.73	132.83 ± 2.72	Yes
	10/30/2013	0.98 ± 0.21	3.61 ± 0.78	Yes	28.30 ± 0.67	104.71 ± 2.47	Yes
	11/6/2013	0.66 ± 0.15	2.42 ± 0.56	Yes	20.90 ± 0.59	77.33 ± 2.18	Yes
	11/13/2013	1.54 ± 0.18	5.70 ± 0.67	Yes	32.30 ± 0.70	119.51 ± 2.58	Yes
	11/20/2013	1.09 ± 0.18	4.03 ± 0.65	Yes	29.10 ± 0.67	107.67 ± 2.48	Yes
	11/27/2013	1.29 ± 0.19	4.77 ± 0.69	Yes	39.70 ± 0.73	146.89 ± 2.70	Yes
	12/4/2013	1.67 ± 0.21	6.19 ± 0.79	Yes	52.98 ± 0.86	196.02 ± 3.17	Yes
	12/11/2013	1.81 ± 0.20	6.70 ± 0.74	Yes	46.10 ± 0.78	170.57 ± 2.87	Yes
	12/18/2013	0.85 ± 0.16	3.15 ± 0.60	Yes	44.10 ± 0.74	163.17 ± 2.75	Yes
	12/24/2013	0.95 ± 0.18	3.52 ± 0.65	Yes	26.10 ± 0.68	96.57 ± 2.50	Yes
	12/31/2013	1.05 ± 0.17	3.89 ± 0.62	Yes	32.60 ± 0.66	120.62 ± 2.45	Yes
HOWE	10/2/2013	0.98 ± 0.16	3.61 ± 0.60	Yes	16.10 ± 0.54	59.57 ± 2.01	Yes
	10/9/2013	1.00 ± 0.17	3.69 ± 0.61	Yes	25.50 ± 0.64	94.35 ± 2.38	Yes
	10/16/2013	1.35 ± 0.19	5.00 ± 0.69	Yes	30.90 ± 0.69	114.33 ± 2.56	Yes
	10/23/2013	1.63 ± 0.20	6.03 ± 0.74	Yes	36.40 ± 0.77	134.68 ± 2.84	Yes
	10/30/2013	1.25 ± 0.24	4.63 ± 0.87	Yes	29.90 ± 0.72	110.63 ± 2.65	Yes
	11/6/2013	1.48 ± 0.20	5.48 ± 0.74	Yes	25.40 ± 0.66	93.98 ± 2.46	Yes
	11/13/2013	1.56 ± 0.18	5.77 ± 0.66	Yes	31.70 ± 0.68	117.29 ± 2.50	Yes
	11/20/2013	1.31 ± 0.18	4.85 ± 0.67	Yes	32.80 ± 0.68	121.36 ± 2.50	Yes
	11/27/2013	1.78 ± 0.20	6.59 ± 0.72	Yes	37.90 ± 0.69	140.23 ± 2.54	Yes
	12/4/2013	1.38 ± 0.19	5.10 ± 0.71	Yes	51.17 ± 0.81	189.33 ± 2.98	Yes
	12/11/2013	1.49 ± 0.19	5.51 ± 0.70	Yes	53.80 ± 0.82	199.06 ± 3.04	Yes
	12/18/2013	1.43 ± 0.18	5.29 ± 0.65	Yes	46.50 ± 0.73	172.05 ± 2.70	Yes
	12/24/2013	1.47 ± 0.21	5.44 ± 0.76	Yes	38.40 ± 0.79	142.08 ± 2.92	Yes
	12/31/2013	0.98 ± 0.17	3.62 ± 0.61	Yes	38.50 ± 0.71	142.45 ± 2.63	Yes
MONTEVIEW	10/2/2013	1.00 ± 0.17	3.70 ± 0.62	Yes	16.50 ± 0.56	61.05 ± 2.06	Yes
	10/9/2013	1.28 ± 0.19	4.74 ± 0.69	Yes	25.10 ± 0.66	92.87 ± 2.45	Yes
	10/16/2013	1.60 ± 0.21	5.92 ± 0.76	Yes	31.20 ± 0.72	115.44 ± 2.67	Yes
	10/23/2013	2.74 ± 0.25	10.14 ± 0.92	Yes	34.00 ± 0.76	125.80 ± 2.80	Yes
	10/30/2013	1.16 ± 0.24	4.29 ± 0.88	Yes	29.00 ± 0.72	107.30 ± 2.68	Yes
	11/6/2013	1.22 ± 0.20	4.51 ± 0.73	Yes	28.30 ± 0.71	104.71 ± 2.63	Yes
	11/13/2013	2.16 ± 0.22	7.99 ± 0.82	Yes	32.60 ± 0.75	120.62 ± 2.77	Yes
	11/20/2013	1.70 ± 0.22	6.29 ± 0.83	Yes	34.20 ± 0.78	126.54 ± 2.89	Yes
	11/27/2013	0.91 ± 0.32	3.38 ± 1.19	No	25.10 ± 1.05	92.87 ± 3.89	Yes
	12/4/2013	1.39 ± 0.18	5.14 ± 0.65	Yes	51.77 ± 0.76	191.54 ± 2.79	Yes
	12/11/2013	1.46 ± 0.17	5.40 ± 0.62	Yes	42.70 ± 0.68	157.99 ± 2.52	Yes
	12/18/2013	1.65 ± 0.18	6.11 ± 0.65	Yes	56.40 ± 0.74	208.68 ± 2.75	Yes
	12/24/2013	0.72 ± 0.14	2.67 ± 0.53	Yes	29.80 ± 0.62	110.26 ± 2.28	Yes
	12/31/2013	1.88 ± 0.18	6.96 ± 0.65	Yes	43.50 ± 0.66	160.95 ± 2.44	Yes
QA-2	10/2/2013	0.87 ± 0.17	3.23 ± 0.62	Yes	16.40 ± 0.58	60.68 ± 2.14	Yes
(MONTEVIEW)	10/9/2013	1.08 ± 0.19	4.00 ± 0.70	Yes	27.40 ± 0.73	101.38 ± 2.70	Yes
	10/16/2013	1.65 ± 0.23	6.11 ± 0.86	Yes	33.20 ± 0.82	122.84 ± 3.02	Yes
a	10/23/2013	±	±	No	±	±	No
	10/30/2013	1.07 ± 0.21	3.96 ± 0.77	Yes	27.90 ± 0.65	103.23 ± 2.41	Yes
	11/6/2013	1.36 ± 0.17	5.03 ± 0.61	Yes	28.10 ± 0.59	103.97 ± 2.16	Yes
	11/13/2013	1.38 ± 0.15	5.11 ± 0.57	Yes	31.20 ± 0.61	115.44 ± 2.24	Yes
	11/20/2013	1.16 ± 0.16	4.29 ± 0.59	Yes	32.10 ± 0.62	118.77 ± 2.30	Yes
	11/27/2013	2.14 ± 0.20	7.92 ± 0.73	Yes	40.30 ± 0.67	149.11 ± 2.49	Yes
	12/4/2013	1.76 ± 0.19	6.50 ± 0.71	Yes	54.06 ± 0.78	200.04 ± 2.87	Yes

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)	GROSS BETA Result > 3s
	12/11/2013	2.44 ± 0.29	9.03 ± 1.06	Yes	79.20 ± 1.21	293.04 ± 4.48	Yes
	12/18/2013	2.10 ± 0.23	7.77 ± 0.84	Yes	77.00 ± 0.99	284.90 ± 3.68	Yes
	12/24/2013	1.05 ± 0.18	3.89 ± 0.68	Yes	42.70 ± 0.81	157.99 ± 2.98	Yes
	12/31/2013	1.65 ± 0.19	6.11 ± 0.71	Yes	47.80 ± 0.77	176.86 ± 2.84	Yes
MUD LAKE	10/2/2013	1.10 ± 0.18	4.07 ± 0.66	Yes	16.20 ± 0.57	59.94 ± 2.12	Yes
	10/9/2013	1.40 ± 0.19	5.18 ± 0.68	Yes	26.00 ± 0.65	96.20 ± 2.39	Yes
	10/16/2013	1.72 ± 0.21	6.36 ± 0.77	Yes	32.60 ± 0.73	120.62 ± 2.68	Yes
	10/23/2013	2.27 ± 0.24	8.40 ± 0.88	Yes	41.70 ± 0.85	154.29 ± 3.13	Yes
	10/30/2013	1.56 ± 0.27	5.77 ± 0.98	Yes	33.20 ± 0.79	122.84 ± 2.91	Yes
	11/6/2013	1.58 ± 0.21	5.85 ± 0.78	Yes	29.70 ± 0.72	109.89 ± 2.66	Yes
	11/13/2013	2.22 ± 0.22	8.21 ± 0.82	Yes	38.30 ± 0.79	141.71 ± 2.90	Yes
	11/20/2013	1.40 ± 0.20	5.18 ± 0.74	Yes	34.70 ± 0.74	128.39 ± 2.74	Yes
	11/27/2013	2.39 ± 0.24	8.84 ± 0.89	Yes	49.70 ± 0.84	183.89 ± 3.12	Yes
	12/4/2013	2.68 ± 0.28	9.90 ± 1.04	Yes	75.23 ± 1.10	278.34 ± 4.07	Yes
a	12/11/2013	±	±	No	±	±	No
a	12/18/2013	±	±	No	±	±	No
	12/24/2013	0.94 ± 0.16	3.49 ± 0.61	Yes	39.40 ± 0.73	145.78 ± 2.70	Yes
	12/31/2013	1.00 ± 0.16	3.70 ± 0.59	Yes	43.00 ± 0.71	159.10 ± 2.63	Yes
DISTANT							
BLACKFOOT	10/2/2013	0.67 ± 0.14	2.47 ± 0.53	Yes	10.90 ± 0.47	40.33 ± 1.73	Yes
	10/9/2013	0.83 ± 0.15	3.08 ± 0.55	Yes	15.80 ± 0.52	58.46 ± 1.92	Yes
	10/16/2013	1.07 ± 0.17	3.96 ± 0.63	Yes	21.70 ± 0.60	80.29 ± 2.20	Yes
a	10/23/2013	±	±	No	±	±	No
	10/30/2013	1.18 ± 0.24	4.37 ± 0.87	Yes	29.50 ± 0.72	109.15 ± 2.65	Yes
	11/6/2013	0.99 ± 0.17	3.65 ± 0.63	Yes	21.80 ± 0.60	80.66 ± 2.23	Yes
	11/13/2013	1.44 ± 0.18	5.33 ± 0.68	Yes	34.80 ± 0.74	128.76 ± 2.73	Yes
	11/20/2013	0.97 ± 0.17	3.60 ± 0.62	Yes	26.70 ± 0.64	98.79 ± 2.35	Yes
	11/27/2013	1.84 ± 0.20	6.81 ± 0.75	Yes	39.90 ± 0.72	147.63 ± 2.68	Yes
	12/4/2013	1.73 ± 0.20	6.39 ± 0.74	Yes	44.85 ± 0.76	165.94 ± 2.80	Yes
	12/11/2013	1.91 ± 0.21	7.07 ± 0.77	Yes	48.40 ± 0.80	179.08 ± 2.97	Yes
	12/18/2013	1.47 ± 0.20	5.44 ± 0.74	Yes	51.40 ± 0.84	190.18 ± 3.10	Yes
	12/24/2013	0.67 ± 0.16	2.49 ± 0.59	Yes	28.50 ± 0.68	105.45 ± 2.52	Yes
	12/31/2013	1.53 ± 0.19	5.66 ± 0.70	Yes	42.60 ± 0.75	157.62 ± 2.76	Yes
CRATERS OF	10/2/2013	0.40 ± 0.13	1.47 ± 0.48	Yes	5.43 ± 0.41	20.09 ± 1.51	Yes
THE MOON	10/9/2013	0.65 ± 0.14	2.41 ± 0.52	Yes	23.80 ± 0.61	88.06 ± 2.24	Yes
	10/16/2013	1.36 ± 0.19	5.03 ± 0.69	Yes	31.30 ± 0.69	115.81 ± 2.56	Yes
	10/23/2013	1.70 ± 0.19	6.29 ± 0.71	Yes	35.00 ± 0.71	129.50 ± 2.63	Yes
	10/30/2013	1.73 ± 0.25	6.40 ± 0.91	Yes	31.60 ± 0.71	116.92 ± 2.63	Yes
	11/6/2013	0.80 ± 0.15	2.95 ± 0.57	Yes	19.20 ± 0.55	71.04 ± 2.04	Yes
	11/13/2013	1.33 ± 0.17	4.92 ± 0.62	Yes	28.70 ± 0.65	106.19 ± 2.42	Yes
	11/20/2013	0.65 ± 0.15	2.40 ± 0.54	Yes	23.10 ± 0.59	85.47 ± 2.17	Yes
	11/27/2013	1.44 ± 0.20	5.33 ± 0.73	Yes	42.80 ± 0.77	158.36 ± 2.83	Yes
	12/4/2013	1.30 ± 0.19	4.82 ± 0.70	Yes	46.50 ± 0.78	172.06 ± 2.88	Yes
	12/11/2013	1.32 ± 0.18	4.88 ± 0.67	Yes	52.80 ± 0.81	195.36 ± 3.01	Yes
	12/18/2013	0.76 ± 0.16	2.81 ± 0.60	Yes	49.30 ± 0.79	182.41 ± 2.93	Yes
	12/24/2013	1.00 ± 0.17	3.70 ± 0.63	Yes	1.03 ± 0.32	3.81 ± 1.18	Yes
	12/31/2013	0.78 ± 0.15	2.90 ± 0.57	Yes	31.10 ± 0.65	115.07 ± 2.40	Yes
DUBOIS	10/2/2013	1.15 ± 0.17	4.26 ± 0.63	Yes	15.80 ± 0.54	58.46 ± 1.98	Yes
	10/9/2013	1.01 ± 0.16	3.74 ± 0.58	Yes	21.70 ± 0.58	80.29 ± 2.14	Yes
	10/16/2013	1.76 ± 0.21	6.51 ± 0.77	Yes	30.90 ± 0.70	114.33 ± 2.60	Yes
	10/23/2013	1.89 ± 0.21	6.99 ± 0.77	Yes	33.30 ± 0.72	123.21 ± 2.68	Yes
	10/30/2013	1.64 ± 0.25	6.07 ± 0.94	Yes	27.70 ± 0.71	102.49 ± 2.62	Yes
	11/6/2013	0.89 ± 0.18	3.29 ± 0.65	Yes	21.90 ± 0.63	81.03 ± 2.35	Yes
	11/13/2013	1.73 ± 0.20	6.40 ± 0.73	Yes	31.00 ± 0.71	114.70 ± 2.63	Yes
	11/20/2013	1.10 ± 0.18	4.07 ± 0.66	Yes	27.40 ± 0.66	101.38 ± 2.43	Yes

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)	GROSS BETA Result > 3s
	11/27/2013	1.10 ± 0.18	4.07 ± 0.65	Yes	36.50 ± 0.70	135.05 ± 2.60	Yes
	12/4/2013	1.11 ± 0.18	4.13 ± 0.66	Yes	43.33 ± 0.75	160.33 ± 2.78	Yes
	12/11/2013	1.25 ± 0.17	4.63 ± 0.61	Yes	39.30 ± 0.68	145.41 ± 2.51	Yes
	12/18/2013	0.84 ± 0.16	3.10 ± 0.60	Yes	36.10 ± 0.69	133.57 ± 2.55	Yes
	12/24/2013	1.06 ± 0.18	3.92 ± 0.67	Yes	31.80 ± 0.72	117.66 ± 2.65	Yes
	12/31/2013	0.79 ± 0.15	2.94 ± 0.54	Yes	24.70 ± 0.57	91.39 ± 2.12	Yes
IDAHO FALLS	10/2/2013	0.77 ± 0.13	2.86 ± 0.50	Yes	13.50 ± 0.45	49.95 ± 1.68	Yes
	10/9/2013	0.57 ± 0.13	2.09 ± 0.48	Yes	10.20 ± 0.44	37.74 ± 1.64	Yes
	10/16/2013	1.29 ± 0.16	4.77 ± 0.61	Yes	25.50 ± 0.58	94.35 ± 2.13	Yes
	10/23/2013	2.14 ± 0.20	7.92 ± 0.73	Yes	32.10 ± 0.65	118.77 ± 2.39	Yes
	10/30/2013	1.50 ± 0.24	5.55 ± 0.87	Yes	28.40 ± 0.68	105.08 ± 2.52	Yes
	11/6/2013	0.77 ± 0.17	2.85 ± 0.62	Yes	23.10 ± 0.64	85.47 ± 2.37	Yes
	11/13/2013	2.01 ± 0.21	7.44 ± 0.78	Yes	31.70 ± 0.73	117.29 ± 2.70	Yes
	11/20/2013	1.17 ± 0.20	4.33 ± 0.73	Yes	29.30 ± 0.73	108.41 ± 2.69	Yes
	11/27/2013	2.25 ± 0.24	8.33 ± 0.88	Yes	38.70 ± 0.78	143.19 ± 2.87	Yes
	12/4/2013	1.31 ± 0.21	4.84 ± 0.76	Yes	39.25 ± 0.79	145.22 ± 2.91	Yes
	12/11/2013	1.40 ± 0.20	5.18 ± 0.73	Yes	43.30 ± 0.80	160.21 ± 2.97	Yes
	12/18/2013	1.09 ± 0.18	4.03 ± 0.68	Yes	49.50 ± 0.82	183.15 ± 3.03	Yes
	12/24/2013	1.57 ± 0.22	5.81 ± 0.80	Yes	25.70 ± 0.70	95.09 ± 2.59	Yes
	12/31/2013	0.99 ± 0.18	3.68 ± 0.65	Yes	38.20 ± 0.75	141.34 ± 2.78	Yes
JACKSON	10/2/2013	1.31 ± 0.19	4.85 ± 0.68	Yes	17.90 ± 0.58	66.23 ± 2.15	Yes
	10/9/2013	0.94 ± 0.17	3.49 ± 0.62	Yes	28.20 ± 0.69	104.34 ± 2.54	Yes
	10/16/2013	1.35 ± 0.19	5.00 ± 0.71	Yes	32.90 ± 0.73	121.73 ± 2.69	Yes
	10/23/2013	1.44 ± 0.19	5.33 ± 0.68	Yes	28.50 ± 0.67	105.45 ± 2.49	Yes
	10/30/2013	1.17 ± 0.24	4.33 ± 0.88	Yes	26.00 ± 0.69	96.20 ± 2.56	Yes
	11/6/2013	1.00 ± 0.17	3.69 ± 0.64	Yes	20.70 ± 0.60	76.59 ± 2.22	Yes
	11/13/2013	1.68 ± 0.19	6.22 ± 0.71	Yes	29.30 ± 0.69	108.41 ± 2.55	Yes
	11/20/2013	1.30 ± 0.19	4.81 ± 0.69	Yes	23.70 ± 0.62	87.69 ± 2.29	Yes
	11/27/2013	0.97 ± 0.18	3.60 ± 0.66	Yes	32.20 ± 0.70	119.14 ± 2.58	Yes
	12/2/2013	1.33 ± 0.26	4.92 ± 0.97	Yes	44.20 ± 1.00	163.54 ± 3.70	Yes
	12/11/2013	2.08 ± 0.19	7.70 ± 0.71	Yes	34.40 ± 0.64	127.28 ± 2.37	Yes
	12/18/2013	0.40 ± 0.15	1.46 ± 0.54	No	30.20 ± 0.67	111.74 ± 2.47	Yes
	12/24/2013	0.93 ± 0.19	3.43 ± 0.69	Yes	18.60 ± 0.64	68.82 ± 2.35	Yes
	12/30/2013	1.14 ± 0.20	4.22 ± 0.74	Yes	29.20 ± 0.73	108.04 ± 2.70	Yes
SUGAR CITY	10/2/2013	0.93 ± 0.17	3.43 ± 0.61	Yes	16.10 ± 0.56	59.57 ± 2.07	Yes
	10/9/2013	1.10 ± 0.18	4.07 ± 0.65	Yes	22.30 ± 0.63	82.51 ± 2.34	Yes
	10/16/2013	1.46 ± 0.21	5.40 ± 0.78	Yes	38.80 ± 0.82	143.56 ± 3.02	Yes
	10/23/2013	2.26 ± 0.23	8.36 ± 0.85	Yes	33.10 ± 0.76	122.47 ± 2.79	Yes
	10/30/2013	1.45 ± 0.26	5.37 ± 0.95	Yes	26.40 ± 0.72	97.68 ± 2.67	Yes
	11/6/2013	1.27 ± 0.19	4.70 ± 0.71	Yes	23.20 ± 0.65	85.84 ± 2.39	Yes
	11/13/2013	1.36 ± 0.19	5.03 ± 0.70	Yes	30.20 ± 0.74	111.74 ± 2.75	Yes
	11/20/2013	0.54 ± 0.16	2.01 ± 0.59	Yes	25.90 ± 0.68	95.83 ± 2.51	Yes
	11/27/2013	1.36 ± 0.20	5.03 ± 0.75	Yes	29.90 ± 0.70	110.63 ± 2.59	Yes
	12/4/2013	1.08 ± 0.20	4.00 ± 0.75	Yes	41.47 ± 0.82	153.45 ± 3.05	Yes
	12/11/2013	1.14 ± 0.20	4.22 ± 0.73	Yes	37.30 ± 0.80	138.01 ± 2.95	Yes
	12/18/2013	0.26 ± 0.24	0.98 ± 0.90	No	68.70 ± 1.32	254.19 ± 4.88	Yes
	12/24/2013	1.06 ± 0.18	3.92 ± 0.67	Yes	24.70 ± 0.66	91.39 ± 2.42	Yes
	12/31/2013	0.34 ± 0.26	1.26 ± 0.96	No	20.20 ± 0.97	74.74 ± 3.57	Yes
INL SITE							
EFS	10/2/2013	0.55 ± 0.13	2.04 ± 0.48	Yes	15.20 ± 0.50	56.24 ± 1.86	Yes
	10/9/2013	1.23 ± 0.17	4.55 ± 0.61	Yes	25.60 ± 0.61	94.72 ± 2.24	Yes
	10/16/2013	1.26 ± 0.18	4.66 ± 0.67	Yes	30.90 ± 0.68	114.33 ± 2.52	Yes
	10/23/2013	1.80 ± 0.20	6.66 ± 0.72	Yes	39.00 ± 0.74	144.30 ± 2.73	Yes
	10/30/2013	1.07 ± 0.21	3.96 ± 0.78	Yes	32.10 ± 0.69	118.77 ± 2.56	Yes
	11/6/2013	1.30 ± 0.17	4.81 ± 0.64	Yes	24.00 ± 0.59	88.80 ± 2.17	Yes

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

Sampling Group and Location	Sampling Date	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS ALPHA Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)	GROSS ALPHA Result > 3s	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)	GROSS BETA Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)	GROSS BETA Result > 3s
	11/13/2013	1.61 ± 0.18	5.96 ± 0.68	Yes	32.90 ± 0.70	121.73 ± 2.58	Yes
	11/20/2013	0.96 ± 0.16	3.55 ± 0.61	Yes	29.00 ± 0.65	107.30 ± 2.39	Yes
	11/27/2013	1.80 ± 0.20	6.66 ± 0.74	Yes	42.80 ± 0.73	158.36 ± 2.71	Yes
	12/4/2013	1.57 ± 0.21	5.83 ± 0.78	Yes	55.20 ± 0.87	204.23 ± 3.21	Yes
	12/11/2013	1.75 ± 0.21	6.48 ± 0.79	Yes	55.90 ± 0.89	206.83 ± 3.30	Yes
	12/18/2013	0.97 ± 0.18	3.59 ± 0.67	Yes	68.20 ± 0.93	252.34 ± 3.44	Yes
	12/24/2013	0.37 ± 0.15	1.37 ± 0.55	No	36.10 ± 0.76	133.57 ± 2.83	Yes
	12/31/2013	1.79 ± 0.21	6.62 ± 0.76	Yes	50.10 ± 0.82	185.37 ± 3.02	Yes
a	10/2/2013	±	±	No	±	±	No
MAIN GATE	10/9/2013	1.40 ± 0.18	5.18 ± 0.67	Yes	25.50 ± 0.63	94.35 ± 2.32	Yes
	10/16/2013	1.32 ± 0.19	4.88 ± 0.71	Yes	34.90 ± 0.75	129.13 ± 2.76	Yes
	10/23/2013	1.72 ± 0.19	6.36 ± 0.72	Yes	37.90 ± 0.74	140.23 ± 2.73	Yes
	10/30/2013	0.88 ± 0.22	3.24 ± 0.82	Yes	30.90 ± 0.73	114.33 ± 2.69	Yes
	11/6/2013	1.44 ± 0.19	5.33 ± 0.71	Yes	23.60 ± 0.62	87.32 ± 2.30	Yes
	11/13/2013	1.40 ± 0.18	5.18 ± 0.65	Yes	37.40 ± 0.74	138.38 ± 2.74	Yes
	11/20/2013	0.75 ± 0.14	2.79 ± 0.52	Yes	25.10 ± 0.56	92.87 ± 2.09	Yes
	11/27/2013	1.33 ± 0.18	4.92 ± 0.66	Yes	43.80 ± 0.72	162.06 ± 2.68	Yes
	12/4/2013	1.53 ± 0.19	5.67 ± 0.72	Yes	56.85 ± 0.83	210.35 ± 3.05	Yes
	12/11/2013	1.68 ± 0.20	6.22 ± 0.73	Yes	54.80 ± 0.83	202.76 ± 3.09	Yes
	12/18/2013	1.03 ± 0.16	3.81 ± 0.59	Yes	44.60 ± 0.71	165.02 ± 2.62	Yes
	12/24/2013	1.11 ± 0.19	4.11 ± 0.68	Yes	35.40 ± 0.75	130.98 ± 2.78	Yes
	12/31/2013	1.01 ± 0.16	3.74 ± 0.60	Yes	43.20 ± 0.73	159.84 ± 2.69	Yes
VAN BUREN GATE	10/2/2013	0.62 ± 0.14	2.28 ± 0.50	Yes	16.50 ± 0.52	61.05 ± 1.92	Yes
	10/9/2013	0.93 ± 0.15	3.43 ± 0.57	Yes	24.80 ± 0.60	91.76 ± 2.23	Yes
	10/16/2013	1.24 ± 0.18	4.59 ± 0.65	Yes	37.00 ± 0.72	136.90 ± 2.65	Yes
	10/23/2013	1.42 ± 0.18	5.25 ± 0.66	Yes	38.30 ± 0.73	141.71 ± 2.69	Yes
	10/30/2013	1.75 ± 0.24	6.48 ± 0.90	Yes	32.40 ± 0.71	119.88 ± 2.62	Yes
	11/6/2013	1.22 ± 0.17	4.51 ± 0.64	Yes	23.00 ± 0.59	85.10 ± 2.19	Yes
	11/13/2013	1.49 ± 0.18	5.51 ± 0.68	Yes	34.40 ± 0.73	127.28 ± 2.69	Yes
	11/20/2013	1.17 ± 0.19	4.33 ± 0.69	Yes	26.00 ± 0.66	96.20 ± 2.45	Yes
	11/27/2013	1.62 ± 0.21	5.99 ± 0.78	Yes	45.10 ± 0.81	166.87 ± 2.99	Yes
	12/4/2013	1.56 ± 0.23	5.77 ± 0.84	Yes	61.50 ± 0.97	227.53 ± 3.57	Yes
	12/11/2013	1.87 ± 0.25	6.92 ± 0.93	Yes	64.20 ± 1.07	237.54 ± 3.96	Yes
	12/18/2013	1.32 ± 0.21	4.88 ± 0.78	Yes	59.60 ± 0.95	220.52 ± 3.50	Yes
	12/24/2013	1.08 ± 0.20	4.00 ± 0.74	Yes	27.10 ± 0.74	100.27 ± 2.73	Yes
	12/31/2013	1.25 ± 0.20	4.63 ± 0.74	Yes	48.90 ± 0.86	180.93 ± 3.20	Yes

a. Invalid sample result

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
ARCO	10/02/2013	0.40	±	1.10	1.49	±	4.07	No
	10/09/2013	1.84	±	1.16	6.82	±	4.30	No
	10/16/2013	-0.48	±	1.12	-1.76	±	4.15	No
	10/23/2013	0.92	±	1.12	3.40	±	4.15	No
	10/30/2013	-0.08	±	1.03	-0.30	±	3.83	No
	11/06/2013	1.62	±	1.11	5.99	±	4.10	No
	11/13/2013	-1.18	±	1.15	-4.37	±	4.24	No
	11/20/2013	0.49	±	0.96	1.81	±	3.57	No
	11/27/2013	-0.52	±	1.06	-1.91	±	3.92	No
	12/04/2013	2.00	±	1.14	7.40	±	4.21	No
	12/11/2013	-1.58	±	1.21	-5.85	±	4.46	No
	12/18/2013	1.29	±	1.40	4.79	±	5.20	No
	12/24/2013	-0.78	±	1.13	-2.89	±	4.20	No
	12/31/2013	0.15	±	0.99	0.56	±	3.67	No
QA-1	10/02/2013	0.37	±	1.00	1.35	±	3.69	No
(ARCO)	10/09/2013	1.68	±	1.06	6.22	±	3.93	No
	10/16/2013	-0.43	±	1.00	-1.57	±	3.71	No
	10/23/2013	0.91	±	1.10	3.35	±	4.09	No
	10/30/2013	-0.08	±	0.97	-0.28	±	3.59	No
	11/06/2013	1.51	±	1.04	5.60	±	3.83	No
	11/13/2013	-1.17	±	1.13	-4.32	±	4.19	No
	11/20/2013	0.59	±	1.16	2.17	±	4.29	No
	11/27/2013	-0.57	±	1.17	-2.11	±	4.33	No
	12/04/2013	2.33	±	1.33	8.63	±	4.90	No
	12/11/2013	-1.69	±	1.29	-6.26	±	4.77	No
	12/18/2013	1.21	±	1.32	4.49	±	4.88	No
	12/24/2013	-0.88	±	1.27	-3.24	±	4.71	No
	12/31/2013	0.16	±	1.07	0.61	±	3.95	No
ATOMIC CITY	10/02/2013	0.43	±	1.17	1.59	±	4.33	No
	10/09/2013	2.24	±	1.42	8.30	±	5.24	No
	10/16/2013	-0.48	±	1.14	-1.79	±	4.21	No
	10/23/2013	1.01	±	1.24	3.75	±	4.58	No
	10/30/2013	-0.08	±	1.06	-0.31	±	3.93	No
	11/06/2013	1.69	±	1.16	6.25	±	4.27	No
	11/13/2013	-1.18	±	1.14	-4.35	±	4.22	No
	11/20/2013	0.55	±	1.09	2.05	±	4.05	No
	11/27/2013	-0.53	±	1.10	-1.98	±	4.06	No
	12/04/2013	2.17	±	1.23	8.03	±	4.57	No
	12/11/2013	-1.61	±	1.23	-5.97	±	4.56	No
	12/18/2013	1.35	±	1.47	5.01	±	5.44	No
	12/24/2013	-0.87	±	1.26	-3.21	±	4.67	No
	12/31/2013	0.17	±	1.12	0.64	±	4.15	No
BLUE DOME	10/02/2013	0.10	±	0.93	0.39	±	3.45	No
	10/09/2013	0.72	±	0.95	2.67	±	3.52	No
	10/16/2013	0.60	±	0.95	2.21	±	3.52	No
	10/23/2013	-0.38	±	0.93	-1.41	±	3.46	No
	10/30/2013	2.99	±	9.34	11.05	±	34.56	No
	11/06/2013	-0.52	±	0.91	-1.91	±	3.37	No
	11/13/2013	-0.69	±	0.97	-2.54	±	3.60	No
	11/20/2013	-0.28	±	0.90	-1.02	±	3.33	No
	11/27/2013	-0.42	±	1.12	-1.55	±	4.13	No
	12/04/2013	-0.87	±	1.30	-3.23	±	4.83	No
	12/11/2013	1.70	±	1.47	6.29	±	5.46	No
	12/18/2013	-0.65	±	1.57	-2.42	±	5.79	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
BOUNDARY								
	12/24/2013	-0.41	±	1.42	-1.50	±	5.26	No
	12/31/2013	1.97	±	1.36	7.28	±	5.02	No
FAA TOWER	10/02/2013	0.12	±	1.07	0.45	±	3.96	No
	10/09/2013	0.84	±	1.11	3.12	±	4.11	No
	10/16/2013	0.67	±	1.07	2.49	±	3.97	No
	10/23/2013	-0.46	±	1.12	-1.68	±	4.13	No
	10/30/2013	3.39	±	10.59	12.53	±	39.19	No
	11/06/2013	-0.60	±	1.06	-2.21	±	3.90	No
	11/13/2013	-0.78	±	1.11	-2.89	±	4.10	No
	11/20/2013	-0.32	±	1.03	-1.17	±	3.83	No
	11/27/2013	-0.40	±	1.06	-1.47	±	3.91	No
	12/04/2013	-0.78	±	1.17	-2.89	±	4.32	No
	12/11/2013	1.43	±	1.25	5.31	±	4.61	No
	12/18/2013	-0.51	±	1.22	-1.88	±	4.50	No
	12/24/2013	-0.33	±	1.15	-1.22	±	4.27	No
	12/31/2013	1.56	±	1.08	5.77	±	3.98	No
HOWE	10/02/2013	0.13	±	1.11	0.46	±	4.11	No
	10/09/2013	0.88	±	1.15	3.24	±	4.27	No
	10/16/2013	0.71	±	1.13	2.62	±	4.18	No
	10/23/2013	-0.49	±	1.19	-1.80	±	4.42	No
	10/30/2013	3.66	±	11.45	13.55	±	42.37	No
	11/06/2013	-0.64	±	1.13	-2.36	±	4.17	No
	11/13/2013	-0.75	±	1.07	-2.79	±	3.95	No
	11/20/2013	-0.29	±	0.96	-1.08	±	3.54	No
	11/27/2013	-0.37	±	0.98	-1.37	±	3.64	No
	12/04/2013	-0.72	±	1.07	-2.66	±	3.98	No
	12/11/2013	1.40	±	1.22	5.19	±	4.51	No
	12/18/2013	-0.47	±	1.12	-1.73	±	4.14	No
	12/24/2013	-0.33	±	1.14	-1.21	±	4.23	No
	12/31/2013	1.55	±	1.07	5.75	±	3.97	No
MONTEVIEW	10/02/2013	0.13	±	1.14	0.48	±	4.23	No
	10/09/2013	0.92	±	1.22	3.42	±	4.50	No
	10/16/2013	0.76	±	1.21	2.80	±	4.47	No
	10/23/2013	-0.50	±	1.22	-1.85	±	4.53	No
	10/30/2013	3.79	±	11.86	14.03	±	43.87	No
	11/06/2013	-0.67	±	1.18	-2.47	±	4.36	No
	11/13/2013	-0.88	±	1.24	-3.25	±	4.60	No
	11/20/2013	-0.36	±	1.19	-1.35	±	4.42	No
	11/27/2013	-0.97	±	2.59	-3.60	±	9.59	No
	12/04/2013	-0.63	±	0.95	-2.34	±	3.50	No
	12/11/2013	1.19	±	1.03	4.39	±	3.81	No
	12/18/2013	-0.41	±	0.99	-1.52	±	3.65	No
	12/24/2013	-0.26	±	0.90	-0.95	±	3.33	No
	12/31/2013	1.22	±	0.84	4.52	±	3.12	No
QA-2	10/02/2013	0.14	±	1.22	0.51	±	4.50	No
(MONTEVIEW)	10/09/2013	1.03	±	1.36	3.82	±	5.03	No
	10/16/2013	0.90	±	1.43	3.31	±	5.28	No
a	10/23/2013		±			±		No
	10/30/2013	3.27	±	10.23	12.10	±	37.84	No
	11/06/2013	-0.48	±	0.84	-1.77	±	3.13	No
	11/13/2013	-0.63	±	0.89	-2.32	±	3.29	No
	11/20/2013	-0.26	±	0.84	-0.95	±	3.11	No
	11/27/2013	-0.34	±	0.90	-1.25	±	3.34	No
	12/04/2013	-0.64	±	0.96	-2.37	±	3.54	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
BOUNDARY								
	12/11/2013	1.25	±	1.09	4.64	±	4.02	No
	12/18/2013	-0.54	±	1.29	-2.00	±	4.78	No
	12/24/2013	-0.31	±	1.09	-1.15	±	4.03	No
	12/31/2013	1.50	±	1.03	5.53	±	3.82	No
MUD LAKE	10/02/2013	0.14	±	1.20	0.50	±	4.45	No
	10/09/2013	0.87	±	1.14	3.21	±	4.23	No
	10/16/2013	0.74	±	1.18	2.74	±	4.37	No
	10/23/2013	-0.52	±	1.27	-1.92	±	4.71	No
	10/30/2013	3.99	±	12.48	14.77	±	46.18	No
	11/06/2013	-0.66	±	1.16	-2.43	±	4.30	No
	11/13/2013	-0.85	±	1.20	-3.13	±	4.43	No
	11/20/2013	-0.33	±	1.08	-1.22	±	4.00	No
	11/27/2013	-0.43	±	1.15	-1.59	±	4.24	No
	12/04/2013	-0.92	±	1.37	-3.40	±	5.09	No
a	12/11/2013		±			±		No
a	12/18/2013		±			±		No
	12/24/2013	-0.28	±	0.97	-1.03	±	3.61	No
	12/31/2013	1.42	±	0.98	5.24	±	3.61	No
DISTANT								
BLACKFOOT	10/02/2013	0.43	±	1.18	1.60	±	4.37	No
	10/09/2013	1.98	±	1.25	7.31	±	4.62	No
	10/16/2013	-0.51	±	1.20	-1.88	±	4.44	No
	10/23/2013	1.19	±	1.45	4.40	±	5.36	No
	10/30/2013	-0.09	±	1.21	-0.35	±	4.46	No
	11/06/2013	1.82	±	1.25	6.74	±	4.61	No
	11/13/2013	-1.31	±	1.27	-4.86	±	4.72	No
	11/20/2013	0.57	±	1.12	2.10	±	4.14	No
	11/27/2013	-0.56	±	1.15	-2.07	±	4.25	No
	12/04/2013	2.07	±	1.17	7.64	±	4.35	No
	12/11/2013	-1.70	±	1.30	-6.29	±	4.80	No
	12/18/2013	1.32	±	1.43	4.87	±	5.29	No
	12/24/2013	-0.84	±	1.22	-3.10	±	4.50	No
	12/31/2013	0.17	±	1.11	0.63	±	4.10	No
CRATERS	10/02/2013	0.47	±	1.28	1.74	±	4.74	No
	10/09/2013	1.94	±	1.23	7.19	±	4.54	No
	10/16/2013	-0.51	±	1.19	-1.87	±	4.41	No
	10/23/2013	1.03	±	1.25	3.80	±	4.64	No
	10/30/2013	-0.09	±	1.13	-0.33	±	4.19	No
	11/06/2013	1.70	±	1.17	6.31	±	4.31	No
	11/13/2013	-1.22	±	1.19	-4.53	±	4.40	No
	11/20/2013	0.55	±	1.09	2.04	±	4.02	No
	11/27/2013	-0.59	±	1.21	-2.18	±	4.47	No
	12/04/2013	2.12	±	1.20	7.84	±	4.46	No
	12/11/2013	-1.62	±	1.24	-6.01	±	4.58	No
	12/18/2013	1.23	±	1.34	4.55	±	4.94	No
	12/24/2013	-0.88	±	1.27	-3.24	±	4.71	No
	12/31/2013	0.17	±	1.10	0.63	±	4.08	No
DUBOIS	10/02/2013	0.12	±	1.10	0.46	±	4.05	No
	10/09/2013	0.81	±	1.07	3.01	±	3.97	No
	10/16/2013	0.73	±	1.16	2.69	±	4.29	No
	10/23/2013	-0.47	±	1.15	-1.74	±	4.26	No
	10/30/2013	3.76	±	11.76	13.92	±	43.52	No
	11/06/2013	-0.66	±	1.16	-2.43	±	4.29	No
	11/13/2013	-0.84	±	1.18	-3.09	±	4.37	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
BOUNDARY								
	11/20/2013	-0.32	±	1.04	-1.18	±	3.85	No
	11/27/2013	-0.40	±	1.06	-1.47	±	3.91	No
	12/04/2013	-0.72	±	1.08	-2.68	±	4.00	No
	12/11/2013	1.28	±	1.11	4.75	±	4.12	No
	12/18/2013	-0.52	±	1.25	-1.92	±	4.61	No
	12/24/2013	-0.32	±	1.11	-1.17	±	4.11	No
	12/31/2013	1.48	±	1.02	5.49	±	3.79	No
IDAHO FALLS	10/02/2013	0.10	±	0.93	0.39	±	3.43	No
	10/09/2013	0.83	±	1.09	3.07	±	4.04	No
	10/16/2013	0.60	±	0.95	2.21	±	3.52	No
	10/23/2013	-0.40	±	0.97	-1.46	±	3.58	No
	10/30/2013	3.48	±	10.88	12.88	±	40.27	No
	11/06/2013	-0.64	±	1.14	-2.38	±	4.21	No
	11/13/2013	-0.86	±	1.22	-3.18	±	4.50	No
	11/20/2013	-0.36	±	1.19	-1.34	±	4.39	No
	11/27/2013	-0.45	±	1.20	-1.66	±	4.43	No
	12/04/2013	-0.85	±	1.27	-3.13	±	4.68	No
	12/11/2013	1.61	±	1.39	5.94	±	5.16	No
	12/18/2013	-0.55	±	1.32	-2.04	±	4.89	No
	12/24/2013	-0.35	±	1.24	-1.31	±	4.58	No
	12/31/2013	1.72	±	1.19	6.36	±	4.39	No
JACKSON	10/02/2013	0.46	±	1.25	1.70	±	4.63	No
	10/09/2013	2.14	±	1.35	7.91	±	4.99	No
	10/16/2013	-0.53	±	1.26	-1.98	±	4.66	No
	10/23/2013	1.09	±	1.33	4.03	±	4.91	No
	10/30/2013	-0.10	±	1.23	-0.36	±	4.56	No
	11/06/2013	1.87	±	1.28	6.93	±	4.74	No
	11/13/2013	-1.31	±	1.27	-4.86	±	4.71	No
	11/20/2013	0.59	±	1.17	2.19	±	4.32	No
	11/27/2013	-0.62	±	1.25	-2.28	±	4.61	No
	12/04/2013	3.21	±	1.94	11.89	±	7.19	No
	12/11/2013	-1.48	±	1.13	-5.49	±	4.19	No
	12/18/2013	1.33	±	1.45	4.94	±	5.36	No
	12/24/2013	-0.23	±	1.55	-0.86	±	5.72	No
	12/31/2013	0.22	±	1.42	0.81	±	5.25	No
SUGAR CITY	10/02/2013	0.13	±	1.17	0.49	±	4.34	No
	10/09/2013	0.93	±	1.22	3.44	±	4.52	No
	10/16/2013	0.80	±	1.28	2.97	±	4.74	No
	10/23/2013	-0.51	±	1.24	-1.87	±	4.59	No
	10/30/2013	3.99	±	12.48	14.76	±	46.18	No
	11/06/2013	-0.65	±	1.15	-2.40	±	4.24	No
	11/13/2013	-0.92	±	1.30	-3.40	±	4.81	No
	11/20/2013	-0.35	±	1.15	-1.30	±	4.25	No
	11/27/2013	-0.46	±	1.22	-1.69	±	4.51	No
	12/04/2013	-0.88	±	1.32	-3.27	±	4.89	No
	12/11/2013	1.78	±	1.54	6.57	±	5.70	No
	12/18/2013	-1.01	±	2.41	-3.73	±	8.93	No
	12/24/2013	-0.32	±	1.14	-1.20	±	4.20	No
	12/31/2013	0.35	±	0.24	1.30	±	0.89	No
INL SITE								
EFS	10/02/2013	0.41	±	1.11	1.50	±	4.09	No
	10/09/2013	1.85	±	1.17	6.83	±	4.31	No
	10/16/2013	-0.50	±	1.18	-1.85	±	4.37	No
	10/23/2013	1.01	±	1.23	3.72	±	4.54	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
BOUNDARY								
	10/30/2013	-0.08	±	1.07	-0.31	±	3.97	No
	11/06/2013	1.62	±	1.11	6.01	±	4.11	No
	11/13/2013	-1.24	±	1.20	-4.58	±	4.45	No
	11/20/2013	0.55	±	1.09	2.03	±	4.02	No
	11/27/2013	-0.54	±	1.11	-2.00	±	4.11	No
	12/04/2013	2.25	±	1.28	8.31	±	4.73	No
	12/11/2013	-1.83	±	1.40	-6.77	±	5.17	No
	12/18/2013	1.26	±	1.37	4.66	±	5.06	No
	12/24/2013	-0.86	±	1.25	-3.18	±	4.62	No
	12/31/2013	0.18	±	1.14	0.65	±	4.23	No
MAIN GATE	10/02/2013	0.49	±	1.32	1.80	±	4.90	No
	10/09/2013	1.97	±	1.25	7.30	±	4.61	No
	10/16/2013	-0.54	±	1.26	-1.98	±	4.67	No
	10/23/2013	1.03	±	1.25	3.80	±	4.64	No
	10/30/2013	-0.09	±	1.20	-0.35	±	4.44	No
	11/06/2013	1.81	±	1.24	6.70	±	4.58	No
	11/13/2013	-1.25	±	1.21	-4.63	±	4.49	No
	11/20/2013	0.48	±	0.96	1.79	±	3.53	No
	11/27/2013	-0.52	±	1.07	-1.93	±	3.96	No
	12/04/2013	2.00	±	1.14	7.39	±	4.20	No
	12/11/2013	-1.65	±	1.26	-6.10	±	4.65	No
	12/18/2013	1.09	±	1.18	4.03	±	4.37	No
	12/24/2013	-0.84	±	1.23	-3.12	±	4.54	No
	12/31/2013	0.16	±	1.04	0.59	±	3.86	No
VAN BUREN GATE	10/02/2013	0.40	±	1.10	1.50	±	4.08	No
	10/09/2013	1.88	±	1.19	6.97	±	4.40	No
	10/16/2013	-0.48	±	1.12	-1.76	±	4.15	No
	10/23/2013	1.00	±	1.22	3.69	±	4.50	No
	10/30/2013	-0.09	±	1.11	-0.32	±	4.10	No
	11/06/2013	1.69	±	1.16	6.27	±	4.29	No
	11/13/2013	-1.28	±	1.25	-4.75	±	4.61	No
	11/20/2013	0.62	±	1.22	2.28	±	4.51	No
	11/27/2013	-0.62	±	1.27	-2.29	±	4.70	No
	12/04/2013	2.50	±	1.42	9.24	±	5.25	No
	12/11/2013	-2.26	±	1.73	-8.37	±	6.39	No
	12/18/2013	1.46	±	1.58	5.39	±	5.85	No
	12/24/2013	-0.99	±	1.44	-3.67	±	5.34	No
	12/31/2013	0.20	±	1.29	0.73	±	4.79	No

a. Invalid sample result

TABLE C-3. Quarterly Cesium-137 Concentrations in Composite Air Filters.

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Result > 3s
BOUNDARY									
ARCO	12/31/2013	CESIUM-137	-44.70	±	112.00	-165.39	±	414.40	No
ARCO (QA-1)	12/31/2013	CESIUM-137	-53.40	±	126.00	-197.58	±	432.90	No
ATOMIC CITY	12/31/2013	CESIUM-137	83.50	±	117.00	308.95	±	432.90	No
BLUE DOME	12/31/2013	CESIUM-137	37.60	±	117.00	139.12	±	432.90	No
FAA TOWER	12/31/2013	CESIUM-137	-4.49	±	98.00	-16.61	±	362.60	No
HOWE	12/31/2013	CESIUM-137	-93.90	±	138.00	-347.43	±	510.60	No
MONTEVIEW	12/31/2013	CESIUM-137	195.00	±	123.00	721.50	±	455.10	No
MONTEVIEW (QA-2)	12/31/2013	CESIUM-137	-123.00	±	142.00	-455.10	±	525.40	No
MUD LAKE	12/31/2013	CESIUM-137	-123.00	±	147.00	-455.10	±	543.90	No
DISTANT									
BLACKFOOT	12/31/2013	CESIUM-137	-118.00	±	104.00	-436.60	±	384.80	No
CRATERS	12/31/2013	CESIUM-137	-17.10	±	135.00	-63.27	±	499.50	No
DUBOIS	12/31/2013	CESIUM-137	-132.00	±	123.00	-488.40	±	455.10	No
IDAHO FALLS	12/31/2013	CESIUM-137	28.20	±	103.00	104.34	±	381.10	No
JACKSON	12/31/2013	CESIUM-137	-110.00	±	134.00	-407.00	±	495.80	No
SUGAR CITY	12/31/2013	CESIUM-137	51.80	±	122.00	191.66	±	451.40	No
INL SITE									No
EFS	12/31/2013	CESIUM-137	97.20	±	113.00	359.64	±	418.10	No
MAIN GATE	12/31/2013	CESIUM-137	-34.80	±	107.00	-128.76	±	395.90	No
VAN BUREN GATE	12/31/2013	CESIUM-137	-179.00	±	124.00	-662.30	±	458.80	No

TABLE C-4. Tritium Concentrations in Atmospheric Moisture

Sampling Group and Location	Start Date	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-13}$ $\mu Ci/mL_{air}$)			Result ± 1s Uncertainty ($\times 10^{-9}$ Bq/mL_{air})			Result > 3s
BOUNDARY									
ATOMIC CITY	09/18/2013	10/16/2013	9.94	±	1.27	36.79	±	4.68	**Yes**
ATOMIC CITY	10/16/2013	11/13/2013	7.33	±	1.02	27.11	±	3.79	**Yes**
ATOMIC CITY	11/13/2013	12/31/2013	4.39	±	0.57	16.23	±	2.10	**Yes**
DISTANT									
BLACKFOOT	09/25/2013	10/16/2013	0.49	±	1.34	1.80	±	4.97	No
BLACKFOOT	10/16/2013	11/13/2013	5.77	±	1.01	21.36	±	3.73	**Yes**
BLACKFOOT	11/13/2013	12/18/2013	2.90	±	0.62	10.74	±	2.31	**Yes**
IDAHO FALLS	09/25/2013	10/17/2013	4.56	±	1.15	16.88	±	4.24	**Yes**
IDAHO FALLS	10/17/2013	11/13/2013	5.76	±	0.95	21.32	±	3.53	**Yes**
IDAHO FALLS	11/23/2013	12/24/2013	4.07	±	0.57	15.08	±	2.11	**Yes**
SUGAR CITY	09/25/2013	10/23/2013	3.53	±	1.42	13.07	±	5.26	No
SUGAR CITY	10/23/2013	11/20/2013	9.64	±	1.38	35.68	±	5.10	**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
IDAHO FALLS	9/3/2013	10/1/2013	83.30	±	21.80	3.08	±	0.81	**Yes**
	10/1/2013	11/1/2013	163.00	±	24.20	6.03	±	0.90	**Yes**
	11/1/2013	12/2/2013	-28.50	±	21.90	-1.05	±	0.81	No
CFA	9/3/2013	10/1/2013	95.40	±	22.20	3.53	±	0.82	**Yes**
	10/1/2013	11/4/2013	93.90	±	22.80	3.47	±	0.84	**Yes**
EFS	10/9/2013	10/16/2013	132.00	±	23.80	4.88	±	0.88	**Yes**
	10/23/2013	10/30/2013	73.50	±	22.50	2.72	±	0.83	**Yes**
	11/20/2013	11/27/2013	29.90	±	22.20	1.11	±	0.82	No
	11/27/2013	12/4/2013	22.80	±	22.10	0.84	±	0.82	No

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

Location	Sampling Date	Analyte	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
SURFACE WATER									
Alpheus Spring	11/19/2013	GROSS ALPHA	1.19	±	0.63	0.04	±	0.02	No
		GROSS BETA	10.10	±	0.65	0.37	±	0.02	**Yes**
		TRITIUM	93.90	±	23.60	3.48	±	0.87	**Yes**
Bill Jones Fish Farm	11/19/2013	GROSS ALPHA	0.07	±	0.51	0.00	±	0.02	No
		GROSS BETA	3.84	±	0.51	0.14	±	0.02	**Yes**
		TRITIUM	47.80	±	22.20	1.77	±	0.82	No
Clear Springs	11/19/2013	GROSS ALPHA	1.07	±	0.53	0.04	±	0.02	No
		GROSS BETA	2.79	±	0.52	0.10	±	0.02	**Yes**
		TRITIUM	82.90	±	22.70	3.07	±	0.84	**Yes**
Clear Springs (duplicate)	11/19/2013	GROSS ALPHA	0.78	±	0.97	0.03	±	0.04	No
		GROSS BETA	9.97	±	0.65	0.37	±	0.02	**Yes**
		TRITIUM	89.30	±	23.60	3.31	±	0.87	**Yes**
DRINKING WATER									
Atomic City	11/20/2013	GROSS ALPHA	0.60	±	0.47	0.02	±	0.02	No
		GROSS BETA	4.53	±	0.58	0.17	±	0.02	**Yes**
		TRITIUM	90.80	±	23.40	3.36	±	0.87	**Yes**
Control	11/21/2013	GROSS ALPHA	0.23	±	0.23	0.01	±	0.01	No
		GROSS BETA	0.13	±	0.42	0.00	±	0.02	No
		TRITIUM	106.00	±	23.00	3.93	±	0.85	**Yes**
Craters of the Moon	11/20/2013	GROSS ALPHA	1.88	±	0.49	0.07	±	0.02	**Yes**
		GROSS BETA	3.44	±	0.57	0.13	±	0.02	**Yes**
		TRITIUM	98.70	±	23.50	3.66	±	0.87	**Yes**
Howe	11/20/2013	GROSS ALPHA	0.34	±	0.34	0.01	±	0.01	No
		GROSS BETA	1.30	±	0.44	0.05	±	0.02	No
		TRITIUM	93.30	±	23.40	3.46	±	0.87	**Yes**
Idaho Falls	11/21/2013	GROSS ALPHA	1.06	±	0.71	0.04	±	0.03	No
		GROSS BETA	4.88	±	0.66	0.18	±	0.02	**Yes**
		TRITIUM	66.60	±	23.00	2.47	±	0.85	No
Minidoka	11/19/2013	GROSS ALPHA	0.70	±	0.65	0.03	±	0.02	No
		GROSS BETA	3.12	±	0.60	0.12	±	0.02	**Yes**
		TRITIUM	95.70	±	23.30	3.54	±	0.86	**Yes**
Mud Lake	11/20/2013	GROSS ALPHA	0.58	±	0.55	0.02	±	0.02	No
		GROSS BETA	4.79	±	0.58	0.18	±	0.02	**Yes**
		TRITIUM	24.90	±	22.70	0.92	±	0.84	No
Rest Area	11/20/2013	GROSS ALPHA	1.30	±	0.42	0.05	±	0.02	**Yes**
		GROSS BETA	3.71	±	0.51	0.14	±	0.02	**Yes**
		TRITIUM	193.00	±	23.90	7.15	±	0.89	**Yes**
Shoshone	11/19/2013	GROSS ALPHA	0.73	±	0.67	0.03	±	0.02	No
		GROSS BETA	4.96	±	0.64	0.18	±	0.02	**Yes**
		TRITIUM	25.50	±	22.80	0.94	±	0.84	No

Table C-7. Weekly and Monthly Iodine-131 and Cesium-137 Concentrations in Milk

		Iodine-131							Cesium-137						
Location	Sampling Date	Result ± 1s Uncertainty (pCi[†]/L)			Result ± 1s Uncertainty (Bq[‡]/L)			Result > 3s	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
BLACKFOOT	10/07/13	0.23	±	1.32	0.008	±	0.049	No	0.20	±	1.53	0.008	±	0.057	No
	11/03/13	0.64	±	1.89	0.024	±	0.070	No	-1.34	±	1.49	-0.050	±	0.055	No
	12/01/13	0.61	±	1.53	0.023	±	0.057	No	1.16	±	1.64	0.043	±	0.061	No
CONTROL	10/01/13	-0.28	±	1.76	-0.010	±	0.065	No	-0.24	±	1.41	-0.009	±	0.052	No
	11/05/13	-3.61	±	2.45	-0.134	±	0.091	No	-0.52	±	1.44	-0.019	±	0.053	No
	12/03/13	-0.61	±	2.11	-0.022	±	0.078	No	-2.00	±	1.47	-0.074	±	0.054	No
DIETRICH	10/01/13	0.60	±	1.18	0.022	±	0.044	No	2.00	±	1.61	0.074	±	0.060	No
	11/05/13	-0.03	±	1.75	-0.001	±	0.065	No	-1.47	±	1.40	-0.054	±	0.052	No
	12/03/13	-0.35	±	1.19	-0.013	±	0.044	No	0.70	±	1.57	0.026	±	0.058	No
Duplicate	12/03/13	0.28	±	1.71	0.010	±	0.063	No	-1.33	±	1.63	-0.049	±	0.060	No
FORT HALL	10/07/13	0.88	±	1.08	0.033	±	0.040	No	0.27	±	0.83	0.010	±	0.031	No
	11/04/13	0.15	±	1.28	0.006	±	0.047	No	1.36	±	1.64	0.050	±	0.061	No
	12/02/13	-0.91	±	1.17	-0.034	±	0.043	No	1.52	±	0.85	0.056	±	0.031	No
HOWE	10/01/13	-0.37	±	1.01	-0.014	±	0.037	No	0.81	±	0.79	0.030	±	0.029	No
	11/05/13	-2.63	±	2.00	-0.097	±	0.074	No	-0.76	±	1.42	-0.028	±	0.053	No
	12/03/13	0.01	±	1.13	0.000	±	0.042	No	1.37	±	0.84	0.051	±	0.031	No
IDAHO FALLS	10/01/13	1.11	±	0.94	0.041	±	0.035	No	1.12	±	0.82	0.041	±	0.030	No
Duplicate	10/01/13	-0.65	±	0.94	-0.024	±	0.035	No	0.06	±	0.80	0.002	±	0.029	No
	10/08/13	-0.96	±	1.38	-0.036	±	0.051	No	2.54	±	1.51	0.094	±	0.056	No
	10/15/13	-1.23	±	0.95	-0.046	±	0.035	No	1.89	±	0.82	0.070	±	0.030	No
	10/22/13	-0.49	±	1.20	-0.018	±	0.044	No	1.18	±	1.48	0.044	±	0.055	No
	10/29/13	1.52	±	1.28	0.056	±	0.047	No	1.22	±	1.57	0.045	±	0.058	No
	11/05/13	-0.93	±	1.31	-0.034	±	0.049	No	-0.63	±	1.62	-0.023	±	0.060	No
	11/12/13	-1.45	±	1.21	-0.054	±	0.045	No	-0.41	±	1.62	-0.015	±	0.060	No
	11/19/13	0.49	±	0.93	0.018	±	0.034	No	0.55	±	0.78	0.020	±	0.029	No
	11/26/13	-0.07	±	1.17	-0.003	±	0.043	No	0.42	±	1.55	0.016	±	0.057	No
	12/03/13	0.65	±	0.95	0.024	±	0.035	No	-0.28	±	0.78	-0.010	±	0.029	No
	12/10/13	0.13	±	0.92	0.005	±	0.034	No	-0.13	±	0.80	-0.005	±	0.030	No
	12/17/13	-0.96	±	1.00	-0.036	±	0.037	No	0.51	±	0.81	0.019	±	0.030	No
	12/24/13	1.27	±	1.06	0.047	±	0.039	No	0.17	±	1.49	0.006	±	0.055	No
	12/31/13	1.82	±	1.10	0.067	±	0.041	No	-0.21	±	1.50	-0.008	±	0.056	No
RUPERT	10/01/13	-0.34	±	0.99	-0.013	±	0.037	No	-0.57	±	0.84	-0.021	±	0.031	No
	11/05/13	2.66	±	1.41	0.099	±	0.052	No	-0.20	±	1.62	-0.008	±	0.060	No
	12/03/13	-0.88	±	1.66	-0.032	±	0.061	No	2.41	±	1.51	0.089	±	0.056	No
TERRETON	10/01/13	2.07	±	1.72	0.077	±	0.064	No	1.25	±	1.40	0.046	±	0.052	No
	11/05/13	0.19	±	2.14	0.007	±	0.079	No	0.03	±	1.38	0.001	±	0.051	No
	12/03/13	0.55	±	1.42	0.020	±	0.053	No	4.05	±	1.65	0.150	±	0.061	No

Table C-8. Strontium-90 and Tritium Concentrations in Milk

Location	Sampling Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
Strontium-90								
BLACKFOOT	11/03/13	2.19	±	0.27	0.081	±	0.010	**Yes**
CONTROL	11/05/13	1.71	±	0.21	0.063	±	0.008	**Yes**
DIETRICH	11/05/13	1.25	±	0.16	0.046	±	0.006	**Yes**
FORT HALL	11/04/13	2.37	±	0.29	0.088	±	0.011	**Yes**
HOWE	11/05/13	0.80	±	0.12	0.030	±	0.004	**Yes**
IDAHO FALLS	11/05/13	1.49	±	0.19	0.055	±	0.007	**Yes**
RUPERT	11/05/13	1.28	±	0.16	0.047	±	0.006	**Yes**
TERRETON	11/05/13	1.46	±	0.19	0.054	±	0.007	**Yes**
Tritium								
		Concentration ± 1s (pCi/L)			Concentration ± 1s (Bq/L)			Result > 3s
BLACKFOOT	11/03/13	85.50	±	23.12	3.167	±	0.856	**Yes**
CONTROL	11/05/13	58.30	±	22.30	2.159	±	0.826	No
DIETRICH	11/05/13	90.10	±	23.20	3.337	±	0.859	**Yes**
FORT HALL	11/04/13	204.50	±	23.98	7.574	±	0.888	**Yes**
HOWE	11/05/13	66.20	±	22.30	2.452	±	0.826	No
IDAHO FALLS	11/05/13	65.10	±	22.90	2.411	±	0.848	No
RUPERT	11/05/13	68.90	±	22.90	2.552	±	0.848	**Yes**
TERRETON	11/05/13	74.00	±	22.50	2.741	±	0.833	**Yes**

Table C-9. Gamma-emitting Radionuclides and Strontium-90 in Potatoes

Location	Sampling Date	Cesium-137 Result ± 1s Uncertainty pCi/kg			Cesium-137 Result ± 1s Uncertainty Bq/kg			Result > 3s
ARCO	9/25/2013	0.03	±	1.18	0.00	±	0.04	No
ARCO (DUPLICATE)	9/25/2013	0.50	±	1.22	0.02	±	0.05	No
BLACKFOOT	9/30/2013	-0.58	±	2.66	-0.02	±	0.10	No
CONTROL	10/8/2013	0.14	±	1.11	0.01	±	0.04	No
IDAHO FALLS	10/8/2013	-0.42	±	2.32	-0.02	±	0.09	No
RUPERT	10/1/2013	0.50	±	2.44	0.02	±	0.09	No
SHELLEY	9/30/2013	-0.04	±	2.44	0.00	±	0.09	No
TERRETON	10/1/2013	-0.64	±	1.21	-0.02	±	0.04	No
		Strontium-90						
		Result ± 1s Uncertainty pCi/kg			**Result ± 1s Uncertainty Bq/kg**			**Result > 3s**
ARCO	9/25/2013	2.17	±	4.19	0.08	±	0.16	No
ARCO (DUPLICATE)	9/25/2013	-4.30	±	4.21	-0.16	±	0.16	No
BLACKFOOT	9/30/2013	5.53	±	4.56	0.20	±	0.17	No
CONTROL	10/8/2013	4.76	±	4.26	0.18	±	0.16	No
IDAHO FALLS	10/8/2013	-1.33	±	4.33	-0.05	±	0.16	No
RUPERT	10/1/2013	12.70	±	4.30	0.47	±	0.16	No
SHELLEY	9/30/2013	35.70	±	6.44	1.32	±	0.24	**Yes**
TERRETON	10/1/2013	2.77	±	4.30	0.10	±	0.16	No

Table C-10. Actinide, Gamma-emitting Radionuclide, and Strontium-90 Concentrations in Edible Tissues of Waterfowl

Location	Sampling Date	Analyte	Result	± Uncertainty(1s) pCi/kg		Result	± Uncertainty(1s) (x 10^{-2}) Bq/kg		Result > 3s
ATR Complex	9/14/2013								
		AMERICIUM-241	-0.55	±	0.40	-2.04	±	1.46	No
		CESIUM-137	-8.38	±	19.80	-31.04	±	73.33	No
		CHROMIUM-51	-155.00	±	266.00	-574.07	±	985.19	No
		COBALT-60	-12.50	±	11.70	-46.30	±	43.33	No
		PLUTONIUM-238	0.82	±	0.44	3.04	±	1.63	No
		PLUTONIUM-239/240	0.33	±	0.46	1.21	±	1.72	No
		STRONTIUM-90	16.00	±	5.59	59.26	±	20.70	No
		ZINC-65	-13.10	±	36.00	-48.52	±	133.33	No
ATR Complex	9/14/2013								
		AMERICIUM-241	0.49	±	0.66	1.82	±	2.43	No
		CESIUM-137	474.00	±	34.70	1755.56	±	128.52	**Yes**
		CHROMIUM-51	469.00	±	204.00	1737.04	±	755.56	No
		COBALT-60	710.00	±	43.90	2629.63	±	162.59	**Yes**
		PLUTONIUM-238	1.34	±	0.50	4.96	±	1.87	No
		PLUTONIUM-239/240	1.18	±	0.52	4.37	±	1.93	No
		STRONTIUM-90	502.00	±	60.20	1859.26	±	222.96	**Yes**
		ZINC-65	500.00	±	51.40	1851.85	±	190.37	**Yes**
ATR Complex	9/14/2013								
		AMERICIUM-241	-0.56	±	0.56	-2.09	±	2.06	No
		CESIUM-137	1610.00	±	95.30	5962.96	±	352.96	**Yes**
		CHROMIUM-51	-200.00	±	152.00	-740.74	±	562.96	No
		COBALT-60	1270.00	±	70.80	4703.70	±	262.22	**Yes**
		PLUTONIUM-238	0.39	±	0.48	1.44	±	1.77	No
		PLUTONIUM-239/240	0.58	±	0.58	2.15	±	2.16	No
		STRONTIUM-90	374.00	±	45.00	1385.19	±	166.67	**Yes**
		ZINC-65	666.00	±	56.10	2466.67	±	207.78	**Yes**
MFC	9/6/2013								
		AMERICIUM-241	-0.11	±	0.48	-0.42	±	1.77	No
		CESIUM-137	10.90	±	27.10	40.37	±	100.37	No
		CHROMIUM-51	-165.00	±	268.00	-611.11	±	992.59	No
		COBALT-60	-2.85	±	15.70	-10.56	±	58.15	No
		PLUTONIUM-238	0.33	±	0.41	1.24	±	1.52	No

NOTE: During the summer of 2020, a review of the table determined the activity concentration values reported for the media were correct, however, the unit of concentration listed in the column headings were incorrect. The column headings have been updated to the correct units of concentration [pCi/kg and (x10^{-2}) Bq/kg). For further discussion see Waterfowl Sampling in Section 5.

Table C-10. Actinide, Gamma-emitting Radionuclide, and Strontium-90 Concentrations in Edible Tissues of Waterfowl

Location	Sampling Date	Analyte	Result	± Uncertainty(1s) pCi/kg		Result	± Uncertainty(1s) (x 10^{-2}) Bq/kg		Result > 3s
		PLUTONIUM-239/240	1.17	±	0.45	4.33	±	1.67	No
		STRONTIUM-90	-1.53	±	9.67	-5.67	±	35.81	No
		ZINC-65	-65.70	±	50.10	-243.33	±	185.56	No
MFC	9/6/2013								
		AMERICIUM-241	-0.59	±	0.52	-2.20	±	1.93	No
		CESIUM-137	0.65	±	2.58	2.40	±	9.56	No
		CHROMIUM-51	28.10	±	46.50	104.07	±	172.22	No
		COBALT-60	2.45	±	1.79	9.07	±	6.63	No
		PLUTONIUM-238	0.77	±	0.48	2.85	±	1.76	No
		PLUTONIUM-239/240	0.57	±	0.64	2.13	±	2.36	No
		STRONTIUM-90	10.30	±	8.80	38.15	±	32.59	No
		ZINC-65	-4.15	±	5.49	-15.37	±	20.33	No
MFC	9/14/2013								
		AMERICIUM-241	-0.48	±	0.49	-1.76	±	1.80	No
		CESIUM-137	12.90	±	6.83	47.78	±	25.30	No
		CHROMIUM-51	105.00	±	115.00	388.89	±	425.93	No
		COBALT-60	-0.16	±	3.97	-0.60	±	14.70	No
		PLUTONIUM-238	-0.18	±	0.55	-0.68	±	2.04	No
		PLUTONIUM-239/240	0.37	±	0.52	1.36	±	1.92	No
		STRONTIUM-90	-16.10	±	7.96	-59.63	±	29.48	No
		ZINC-65	-7.65	±	14.20	-28.33	±	52.59	No
Control	11/16/2013								
		AMERICIUM-241	-0.23	±	0.44	-0.87	±	1.64	No
		CESIUM-137	2.01	±	3.67	7.44	±	13.59	No
		CHROMIUM-51	-3.37	±	30.40	-12.48	±	112.59	No
		COBALT-60	-1.20	±	2.50	-4.44	±	9.26	No
		PLUTONIUM-238	0.15	±	0.40	0.55	±	1.46	No
		PLUTONIUM-239/240	0.74	±	0.40	2.75	±	1.47	No
		STRONTIUM-90	3.18	±	3.89	11.78	±	14.41	No
		ZINC-65	-0.23	±	7.28	-0.87	±	26.96	No

NOTE: During the summer of 2020, a review of the table determined the activity concentration values reported for the media were correct, however, the unit of concentration listed in the column headings were incorrect. The column headings have been updated to the correct units of concentration [pCi/kg and (x10-2) Bq/kg]]. For further discussion see Waterfowl Sampling in Section 5.

Table C-10. Actinide, Gamma-emitting Radionuclide, and Strontium-90 Concentrations in Edible Tissues of Waterfowl

Location	Sampling Date	Analyte	Result	± Uncertainty(1s) pCi/kg		Result	± Uncertainty(1s) (x 10^{-2}) Bq/kg		Result > 3s
Control	12/20/2013								
		AMERICIUM-241	-0.74	±	0.44	-2.75	±	1.64	No
		CESIUM-137	0.52	±	1.89	1.93	±	7.00	No
		CHROMIUM-51	-2.90	±	13.20	-10.74	±	48.89	No
		COBALT-60	-0.58	±	1.29	-2.13	±	4.78	No
		PLUTONIUM-238	0.69	±	0.43	2.57	±	1.59	No
		PLUTONIUM-239/240	1.21	±	0.47	4.48	±	1.73	No
		STRONTIUM-90	-4.68	±	7.76	-17.33	±	28.74	No
		ZINC-65	-8.92	±	4.24	-33.04	±	15.70	No

NOTE: During the summer of 2020, a review of the table determined the activity concentration values reported for the media were correct, however, the unit of concentration listed in the column headings were incorrect. The column headings have been updated to the correct units of concentration [pCi/kg and (x10-2) Bq/kg]. For further discussion see Waterfowl Sampling in Section 5.

Table C-11. Environmental Radiation Measurements Using TLDs

Location	Start Date	End Date	Radiation Measurement ± 2s Uncertainty mR	Exposure mR/day
BOUNDARY				
ARCO	5/8/2013	11/6/2013	69.6 ± 13.6	0.38
ATOMIC CITY	5/8/2013	11/6/2013	66.3 ± 13.0	0.36
BIRCH CREEK	5/8/2013	11/6/2013	60.6 ± 11.9	0.33
BLUE DOME	5/8/2013	11/6/2013	56.7 ± 11.1	0.31
HOWE	5/8/2013	11/6/2013	62.6 ± 12.3	0.34
MONTEVIEW	5/8/2013	11/6/2013	60.1 ± 11.8	0.33
MUD LAKE	5/8/2013	11/6/2013	69.2 ± 13.6	0.38
			Boundary Average	**0.35**
DISTANT				
ABERDEEN	5/7/2013	11/5/2013	65.5 ± 12.8	0.36
BLACKFOOT	5/8/2013	11/6/2013	60.3 ± 11.8	0.33
BLACKFOOT CMS	5/8/2013	11/6/2013	58.7 ± 11.5	0.32
CRATERS	5/8/2013	11/6/2013	65.2 ± 12.8	0.36
DUBOIS	5/8/2013	11/6/2013	56.8 ± 11.1	0.31
IDAHO FALLS	5/8/2013	11/6/2013	65.4 ± 12.8	0.36
MINIDOKA	5/7/2013	11/5/2013	59.8 ± 11.7	0.33
ROBERTS	5/7/2013	11/5/2013	73.3 ± 14.4	0.40
SUGAR CITY	5/8/2013	11/6/2013	83.9 ± 16.4	0.46
			Distant Average	**0.36**
OUT-OF-STATE				
JACKSON	5/3/2013	11/4/2013	53.3 ± 10.5	0.29

Table C-12. Environmental Radiation Measurements Using OSLDs

Location	Start Date	End Date	Radiation Measurement ± 2s Uncertainty mrem	Dose mrem/day
BOUNDARY				
ARCO	5/8/2013	11/6/2013	60.35 ± 6.04	0.33
ATOMIC CITY	5/8/2013	11/6/2013	59.65 ± 5.96	0.33
BIRCH CREEK	5/8/2013	11/6/2013	50.20 ± 5.02	0.28
BLUE DOME	5/8/2013	11/6/2013	42.85 ± 4.29	0.24
HOWE	5/8/2013	11/6/2013	52.95 ± 5.30	0.29
MONTEVIEW	5/8/2013	11/6/2013	50.50 ± 5.05	0.28
MUD LAKE	5/8/2013	11/6/2013	58.75 ± 5.88	0.32
			Boundary Average	**0.29**
DISTANT				
ABERDEEN	5/7/2013	11/5/2013	60.50 ± 6.05	0.33
BLACKFOOT	5/8/2013	11/6/2013	57.95 ± 5.79	0.32
BLACKFOOT CMS	5/8/2013	11/6/2013	54.45 ± 5.45	0.30
CRATERS	5/8/2013	11/6/2013	53.35 ± 5.34	0.29
DUBOIS	5/8/2013	11/6/2013	48.30 ± 4.83	0.27
IDAHO FALLS	5/8/2013	11/6/2013	58.00 ± 5.80	0.32
MINIDOKA	5/7/2013	11/5/2013	52.30 ± 5.23	0.29
ROBERTS	5/7/2013	11/5/2013	64.80 ± 6.47	0.36
SUGAR CITY	5/8/2013	11/6/2013	76.50 ± 7.65	0.42
			Distant Average	**0.32**
OUT-OF-STATE				
JACKSON	5/3/2013	11/4/2013	39.55 ± 3.96	0.21

APPENDIX D

STATISTICAL ANALYSIS RESULTS

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

Parameter	P[a]
Gross Alpha	
Quarter	0.08
October	0.94
November	0.36
December	0.08
Gross Beta	
Quarter	0.01
October	0.12
November	0.21
December	0.00

a. A 'p' value greater than 0.05 signifies no statistical difference between data groups.

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

	Mann-Whitney U test	
Parameter	**Week**	**P[a]**
Gross Alpha		
	October 2	0.89
	October 9	0.12
	October 16	0.35
	October 23	0.68
	October 30	0.20
	November 6	0.39
	November 13	0.72
	November 20	0.12
	November 27	0.89
	December 4	0.06
	December 11	0.17
	December 18	0.05
	December 24	0.89
	December 31	0.25
Gross Beta		
	October 2	0.13
	October 9	0.06
	October 16	0.72
	October 23	0.17
	October 30	0.67
	November 6	0.02
	November 13	0.10
	November 20	0.02
	November 27	0.57
	December 4	0.00
	December 11	0.14
	December 18	1.00
	December 24	0.15
	December 31	0.09

a. A 'p' value greater than 0.05 signifies no statistical difference between data groups.