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Idaho National Laboratory Site Offsite Environmental Surveillance Program Report: Second Quarter 2014

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EXECUTIVE SUMMARY

None of the radionuclides detected in samples collected during the second quarter of 2014 could be directly linked with INL Site activities. Levels of detected radionuclides were no different than values measured at other locations across the western United States. All detected radionuclide concentrations were well below standards set by the U.S. Department of Energy (DOE) and regulatory standards established by the U.S. Environmental Protection Agency (EPA) for protection of the public.

This report for the second quarter of 2014 contains results from the Environmental Surveillance, Education, and Research (ESER) Program's monitoring of the Department of Energy's Idaho National Laboratory (INL) Site's offsite environment, April 1 through June 30, 2014. All sample types (media) and the sampling schedule followed during 2014 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 alfalfa sampling
- Environmental radiation measurements using thermoluminescent dosimeters and optically-stimulated luminescent dosimeters.

Table E-1 Summary of results for the Second Quarter of 2014.

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	Gross alpha and gross beta concentrations were statistically the same for Distant, Boundary, and INL Site sample groups for the quarter and each month of the quarter. A statistical difference was found in gross beta concentrations during one week. The difference 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 radionuclides or actinides were detected. Strontium-90 was detected at two locations at values just above the detection limit.
	Charcoal Cartridge	Iodine-131	Iodine-131 was not detected in any of the 26 batches counted during the quarter.
Atmospheric Moisture	Liquid	Tritium	Nine of the 18 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	Eight samples were collected. Seven 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 one sample. Gross beta was detected in all of the drinking water samples except for the control sample of bottled water and in all of the surface water samples. Activities were consistent with natural levels of radioactivity in the aquifer. Tritium was detected in seven drinking water samples, including the bottled water, but in none of the 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 detected in all the samples analyzed including a control sample from out-of-state. All concentrations were well within the range of detections during the past few years. Tritium was detected in only one of eight samples analyzed at a concentration similar to those found in other liquid media.
Alfalfa	Vegetation	Gamma-emitting radionuclides, ^{90}Sr	No human-made gamma-emitting radionuclides were found in the three subsamples analyzed. Strontium-90 was just above the minimum detectable concentration in one subsample and below the minimum detectable concentration in the other two subsamples.
Large Game Animals	Tissue	Gamma-emitting radionuclides	No large game animals were sampled in the second quarter.
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 2014, 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 second quarter of 2014 (April 1-June 30, 2014).

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.

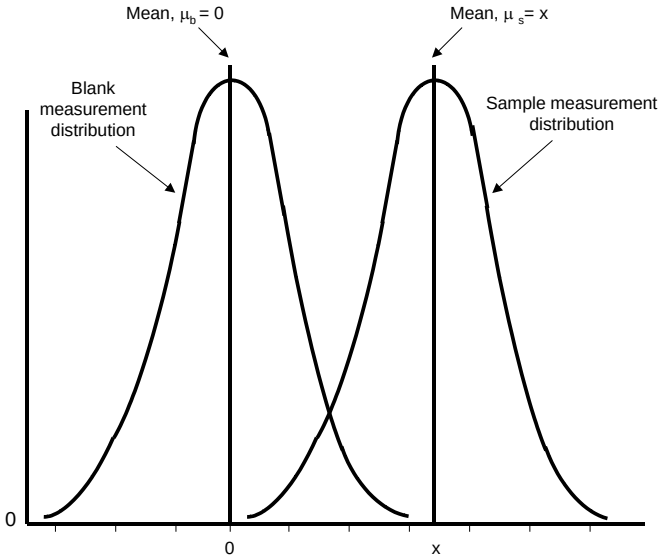

Figure 1. Example of overlap of blank and sample measurement distributions.

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 second quarter of 2014 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 second quarter of 2014 (Figure 2). Four of these samplers are located on the INL Site, seven are situated off the INL Site near the boundary, and seven have been placed at locations distant to the INL Site. Samplers are divided into INL Site, Boundary, and Distant groups to determine if there is a gradient of radionuclide concentrations, increasing towards the INL Site. Each replicate sampler is relocated every other year to a new location. At the start of 2014, one replicate sampler was moved to Idaho Falls (a Distant location) and one was moved to Main Gate (an INL Site location). An average of 20,637 ft^3 (584 m^3) of air was sampled at each location, each week, at an average flow rate of 2.05 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.

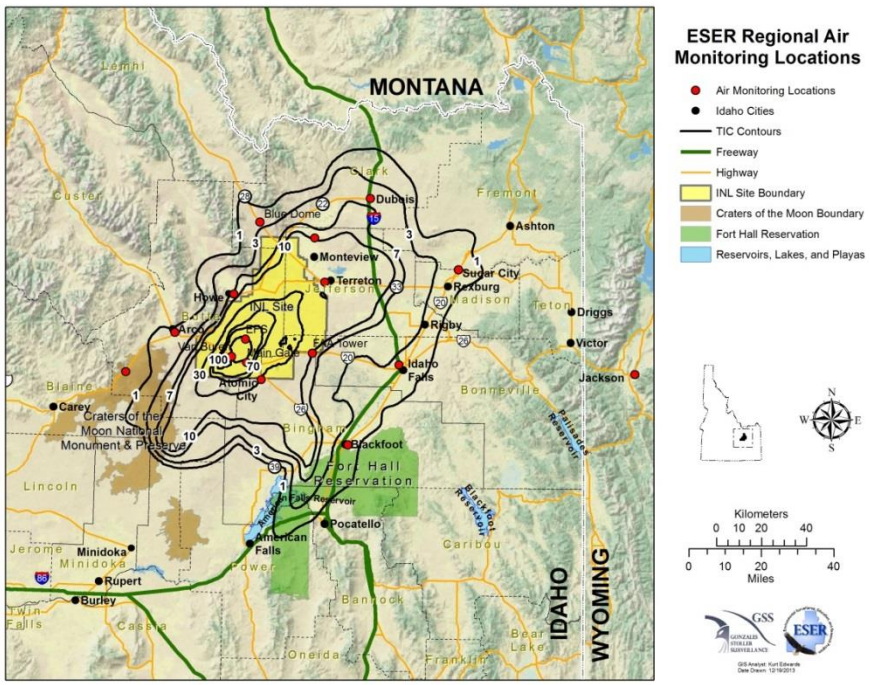

Figure 2. Low-volume air sampler locations.

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 second 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. No statistical differences were noted in the quarterly data and or during any month of the quarter using the Kruskal-Wallis test (Table D-1).

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 one week, the week of April 9, in the second quarter (Table D-1). In this case, the Boundary locations were statistically greater than the Distant locations. Analysis of the data for this week showed that all gross beta values were well below the annual median value (about 24 x 10^{-15} µCi/mL in 2013). The results for the Distant stations was particularly tightly clumped during the week. Gross beta concentrations for the locations on the INL Site were generally in the middle of the two offsite groups.

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

No ^{137}Cs or other human-made gamma-emitting radionuclides were found in quarterly composites. Specific actinides (plutonium and americium) were not detected in any sample. Strontium-90 was detected at values just above the detection limit at Atomic City and Main Gate. The higher detected value was 0.00012 percent of the Derived Concentration Standard. All quarterly composite results are found in Appendix C, Table C-3.

ATMOSPHERIC MOISTURE SAMPLING

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

Results were available for 18 atmospheric moisture samples collected during the second quarter of 2014. Nine of these exceeded the 3s uncertainty level for tritium, with similar results to those reported previously and similar results at all four sampling locations. All samples were significantly below the DOE DCS for tritium in air of 1.4×10^{-8} $\mu Ci/mL_{air}$ with a maximum reported value of 6.5×10^{-13} $\mu Ci/mL_{air}$ at Blackfoot. Results are shown in Table C-4, Appendix C.

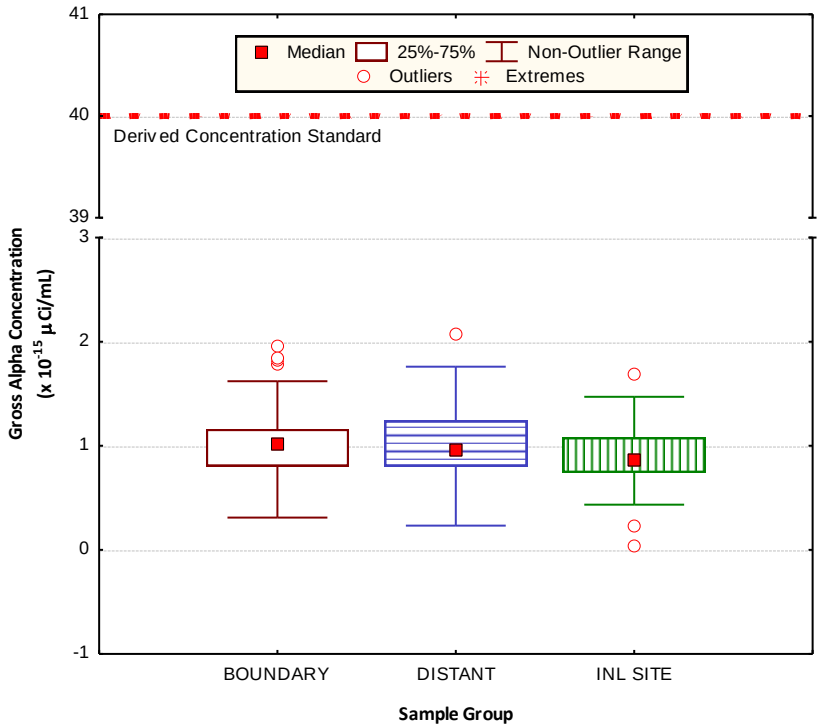

Figure 3. Gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations for the second quarter of 2014.

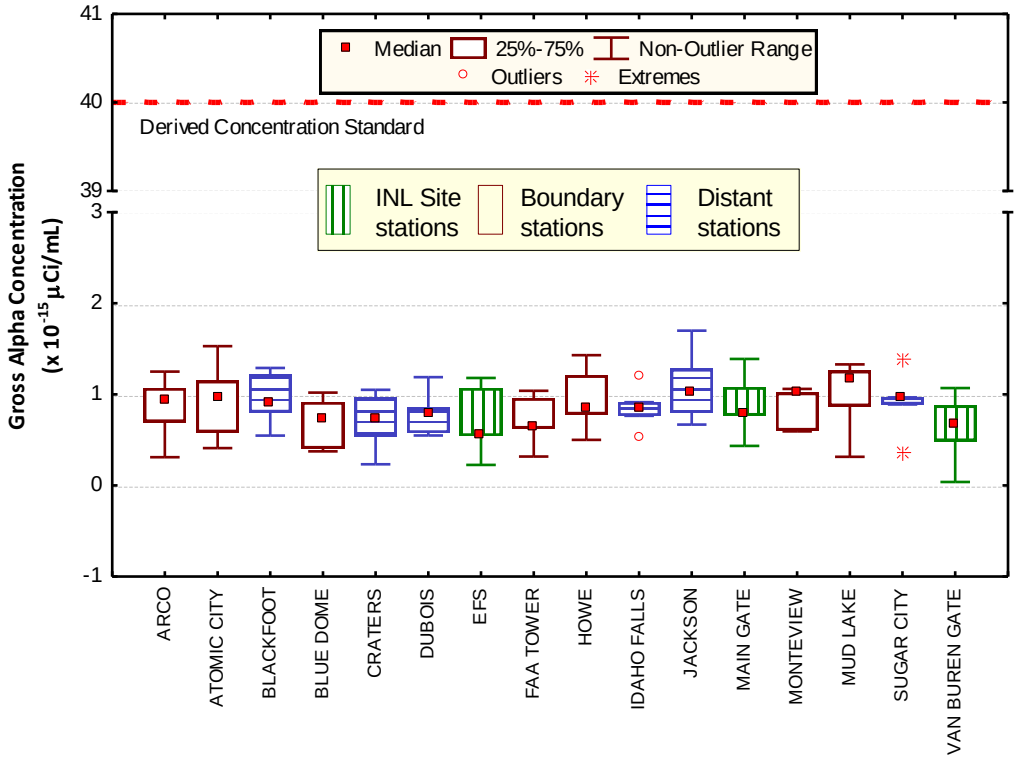

Figure 4. April gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location.

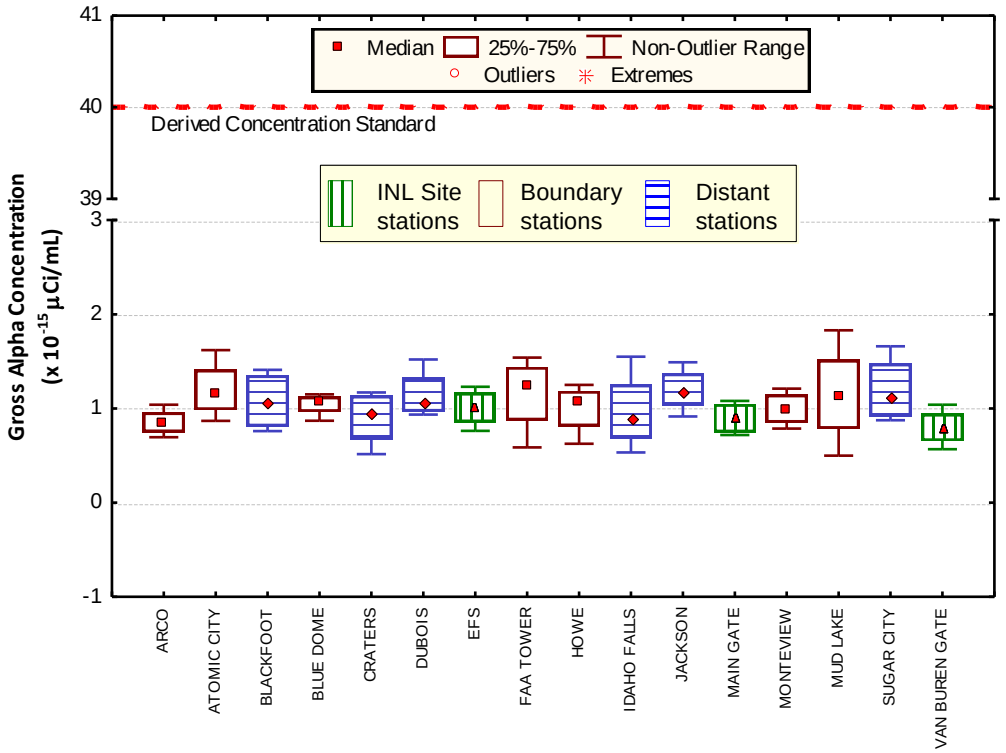

Figure 5. May gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

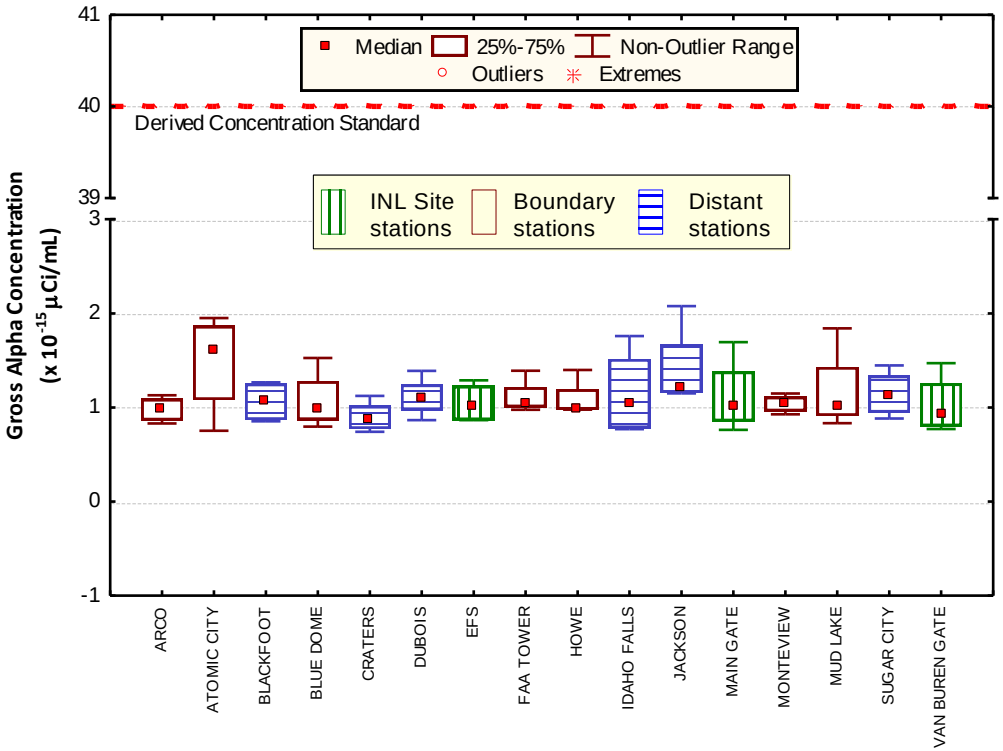

Figure 6. June gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

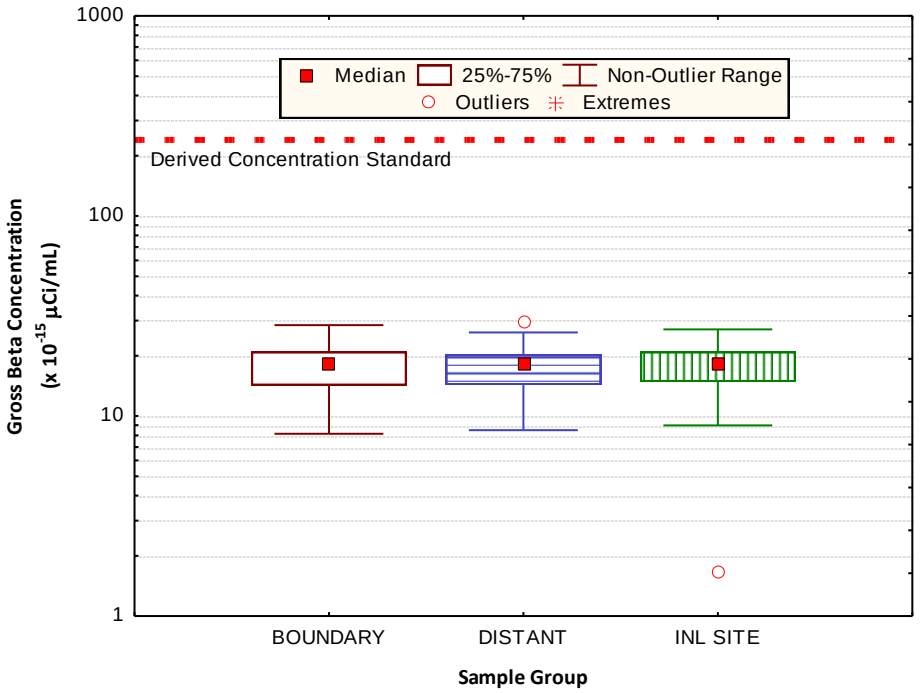

Figure 7. Gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations for the second **quarter of 2014.**

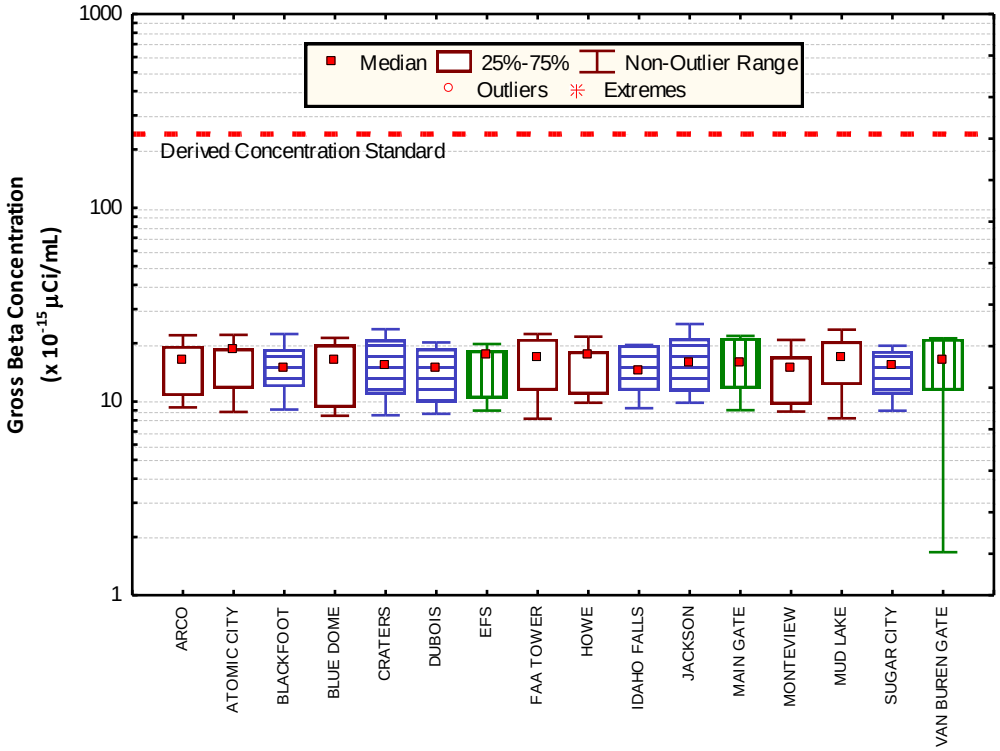

Figure 8. April gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location.

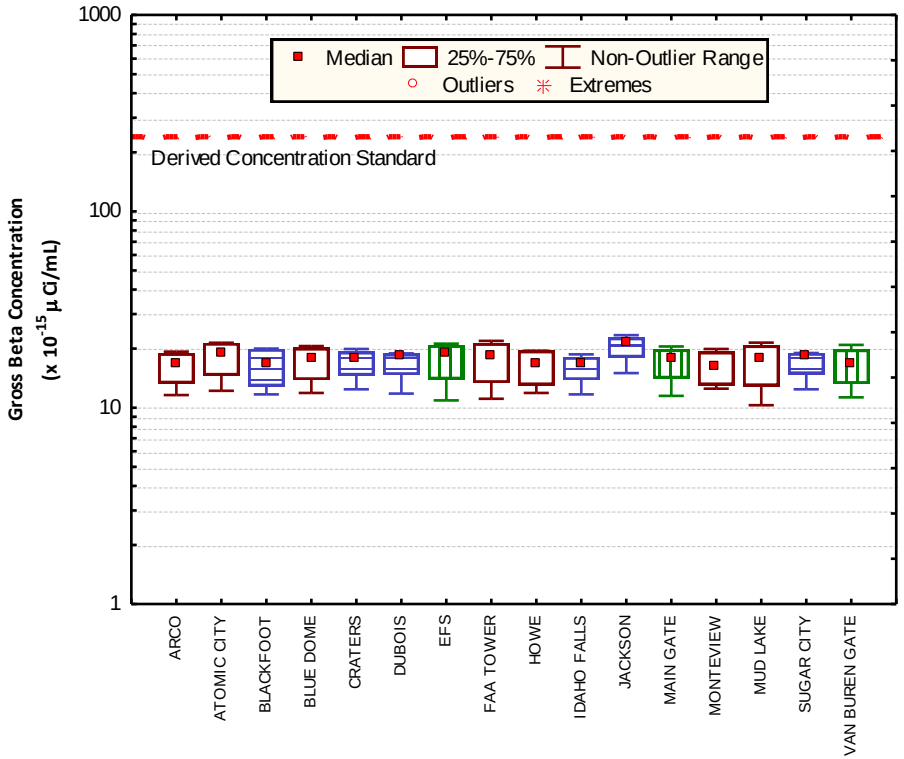

Figure 9. May gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

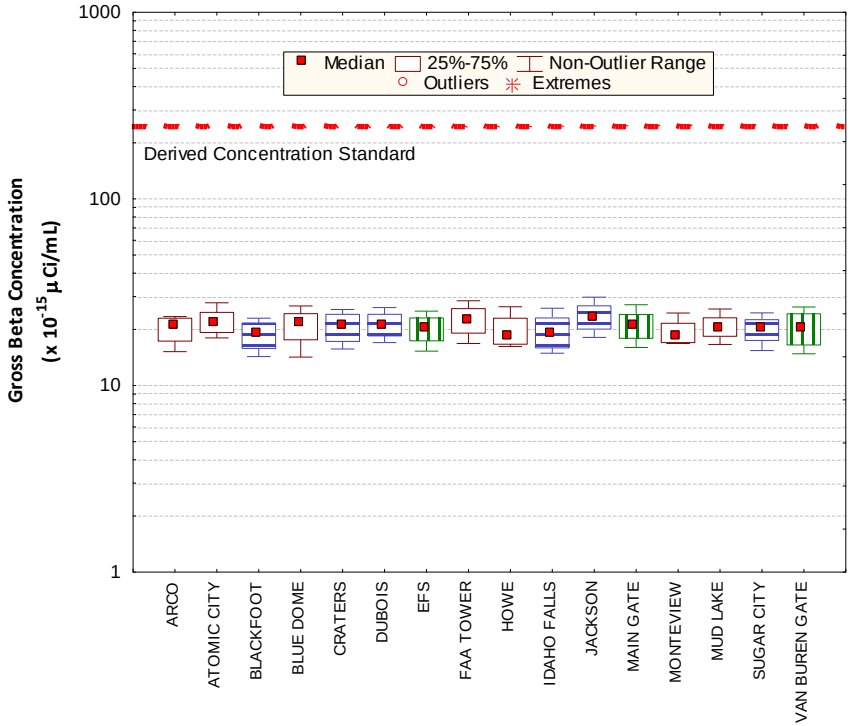

Figure 10. June gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

4. PRECIPITATION AND WATER SAMPLING

PRECIPITATION SAMPLING

Precipitation samples are gathered when sufficient precipitation occurs to allow for the collection of the minimum sample volume of approximately 50 mL. Samples are taken of monthly composites from Idaho Falls and CFA, and weekly from the EFS. Precipitation samples are analyzed for tritium. Storm events in the second quarter of 2014 produced sufficient precipitation to yield only eight samples.

Tritium was measured above the 3s values in seven of the eight 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). Most samples have values up to about 150 pCi/L, with occasional values up to about 300 pCi/L. The maximum value in the second quarter was 112 pCi/L in an April EFS sample.

WATER SAMPLING

Drinking water samples were collected at eight locations (plus a duplicate). A control sample of bottled water was also prepared. Surface water samples were collected at three Thousand Springs locations. All samples were analyzed for gross alpha, gross beta, and tritium. Results are listed in Table C-6 of Appendix C. During the summer of 2020, a review of Table C-6 determined the activity concentration values for the drinking water sample collected at Minodoka were incorrect, however, the uncertainty values were correct. The activity concentrations were incorrect due to inadvertently copying the wrong values. The activity concentrations were updated with the correct values.

Gross alpha activity was detected in one of the drinking water samples (Craters of the Moon) at a level slightly above the minimum detectable concentration. Gross beta activity was detected in all of the drinking water samples except the control sample and in all 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 seven of the drinking water samples (including the bottled water), but none of the three surface water samples. The concentrations were similar to those found in atmospheric moisture and precipitation samples and were consistent with previous results, with a maximum of 139 pCi/L at the US 20/26 Rest Area. 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 second quarter of 2014.

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 second quarter of 2014. 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. Samples from May were also analyzed for ^{90}Sr and tritium.

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

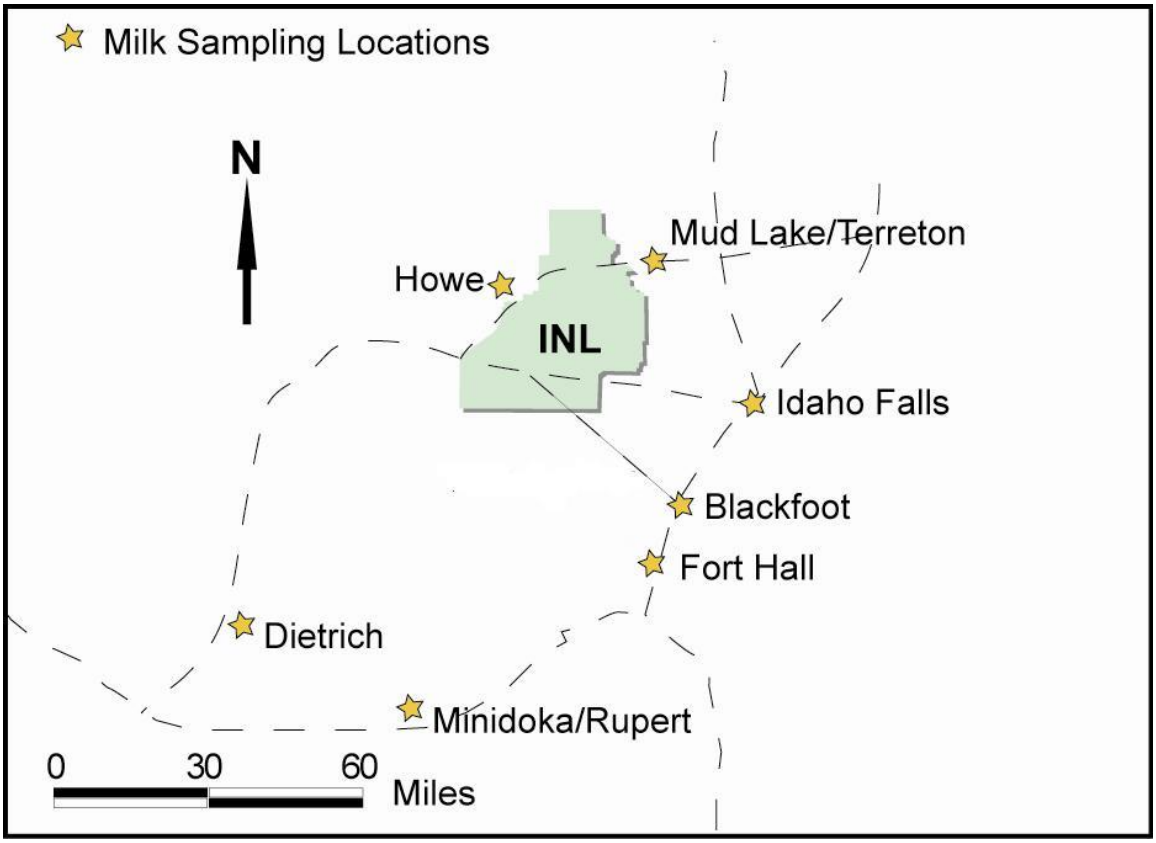

Figure 11. ESER milk sampling locations

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 0.66 pCi/L from Terreton is well within the range of concentrations for the past several years, and results were very consistent in all the samples. 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 only one of eight samples analyzed. The detected results was 99 pCi/L at Terreton, similar to those measured in atmospheric moisture and precipitation. There is no DCS for tritium in milk, but the results were well below the DCS for tritium in drinking water (1.9×10^6 pCi/L).

ALFALFA SAMPLING

A sample of alfalfa was obtained from a grower in the Mud Lake area. The sample was then divided into three subsamples and analyzed for gamma-emitting radionuclides and ^{90}Sr. Data for ^{137}Cs and ^{90}Sr in alfalfa samples are listed in Appendix C, Table C-9.

No human-made gamma-emitting radionuclides were found in any of the subsamples. One of the three subsamples showed detectable ^{90}Sr at 72 pCi/kg, which is just above the detection limit; the other two subsamples were just below the detection limit. During each of the four years alfalfa has been collected, ^{90}Sr has been found in one of three subsamples, always in the 70-150 pCi/kg range.

LARGE GAME ANIMAL SAMPLING

No large game animals were sampled in the second quarter.

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 second quarter TLDs are presented in Appendix C, Table C-10. The result from the Blackfoot location was considered to be invalid. At the start of the sampling period, the dosimeter was moved from an area that was becoming inaccessible within the Idaho Transportation Department maintenance yard. The results for the sampling period were about twice the average for the other locations. A survey with a hand-held radiation meter found an area of gravel in the vicinity of the dosimeter with radiation readings about double the average value for background radiation. This was likely due to naturally-occurring radioactive elements in the gravel material. The dosimeter was relocated to an area with normal background readings.

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 56.8 milliRotengens (mR) at Arco to 71.8 mR at Mud Lake. The overall Boundary exposure was 63.6 mR. Distant exposures ranged from 56.5 mR at Dubois to 80.3 mR for the TLD at Sugar City. The average Distant exposure was 65.3 mR.

OSLD results from the second quarter followed a similar pattern to the TLDs (Appendix C, Table C-11). OSLDs are presented in dose units of millirem (mrem). Boundary OSLD values ranged from 40.80 mrem at Blue Dome to 60.40 mrem at Arco, with an overall average of 51.57 mrem. Distant results varied from 42.80 mrem at Dubois to 65.10 mrem at Sugar City. The Distant average was 52.50 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 Second Quarter of 2014 (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/OSLDs				
Gamma Radiation	semiannual	Aberdeen, Blackfoot (2), Craters of the Moon, Dubois, Idaho Falls, Jackson WY, Minidoka, Sugar City, Roberts	Arco, Atomic City, Birch Creek, Blue Dome, Howe, Monteview, Mud Lake	None
SOIL SAMPLING				
SOIL				
Gamma Spec, ^{90}Sr, Transuranics	biennially	Carey, Crystal Ice Caves (Aberdeen), Blackfoot, St. Anthony	Butte City, Monteview, Atomic City, FAA Tower, Howe, Mud Lake (2), Birch Creek, Frenchman's Cabin	None

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

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INL Site
FOODSTUFF SAMPLING				
MILK				
Gamma Spec (^{131}I)	weekly	Idaho Falls	None	None
Gamma Spec (^{131}I)	monthly	Blackfoot, Dietrich, Fort Hall, Idaho Falls, Minidoka	Howe, Terreton	None
Tritium, ^{90}Sr	Semi-annually	Blackfoot, Dietrich, Fort Hall, Idaho Falls, Minidoka	Howe, Terreton	None
POTATOES				
Gamma Spec, ^{90}Sr	annually	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 Second Quarter 2014

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Standard[b] (DCS)
Air (particulate filter)[e]	Gross alpha[c]	4.34×10^{-16} µCi/mL	4×10^{-14} µCi/mL
	Gross beta[d]	1.18×10^{-15} µCi/mL	2.4×10^{-13} µCi/mL
	^{90}Sr	2.59×10^{-17} µCi/mL	2.5×10^{-11} µCi/mL
	^{137}Cs	7.30×10^{-17} µCi/mL	3.9×10^{-10} µCi/mL
	^{238}Pu	1.43×10^{-18} µCi/mL	3.7×10^{-14} µCi/mL
	$^{239/240}$Pu	1.87×10^{-18} µCi/mL	3.4×10^{-14} µCi/mL
	^{241}Am	3.50×10^{-18} µCi/mL	1.8×10^{-12} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	8.78×10^{-16} µCi/mL	2.3×10^{-19} µCi/mL
Air (atmospheric moisture)	^{3}H	78.8 pCi/L_{water}	2.1×10^{-7} $\mu Ci/mL_{air}$
Air (precipitation)	^{3}H	78.6 pCi/L	1.9×10^{-3} µCi/mL
Milk	^{131}I	0.56 pCi/L	--
	^{137}Cs	0.55 pCi/L	--
	^{3}H	80.3 pCi/L	--
	^{90}Sr	0.24 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	4/2/2014	0.31 ± 0.11	1.15 ± 0.39	No	9.32 ± 0.43	34.48 ± 1.57	**Yes**
	4/9/2014	0.92 ± 0.15	3.42 ± 0.54	**Yes**	16.50 ± 0.52	61.05 ± 1.93	**Yes**
	4/16/2014	1.07 ± 0.15	3.96 ± 0.57	**Yes**	19.30 ± 0.55	71.41 ± 2.02	**Yes**
	4/23/2014	1.25 ± 0.17	4.63 ± 0.63	**Yes**	22.00 ± 0.61	81.40 ± 2.25	**Yes**
	4/30/2014	0.70 ± 0.13	2.58 ± 0.49	**Yes**	10.70 ± 0.46	39.59 ± 1.69	**Yes**
	5/7/2014	0.80 ± 0.15	2.97 ± 0.54	**Yes**	18.58 ± 0.54	68.74 ± 2.00	**Yes**
	5/14/2014	0.69 ± 0.13	2.57 ± 0.47	**Yes**	11.60 ± 0.45	42.92 ± 1.66	**Yes**
	5/21/2014	1.04 ± 0.15	3.85 ± 0.57	**Yes**	19.30 ± 0.56	71.41 ± 2.06	**Yes**
	5/28/2014	0.88 ± 0.19	3.24 ± 0.69	**Yes**	15.00 ± 0.51	55.50 ± 1.90	**Yes**
	6/4/2014	0.89 ± 0.15	3.31 ± 0.55	**Yes**	23.40 ± 0.61	86.60 ± 2.27	**Yes**
	6/11/2014	1.13 ± 0.16	4.18 ± 0.59	**Yes**	19.40 ± 0.55	71.78 ± 2.04	**Yes**
	6/18/2014	0.83 ± 0.14	3.07 ± 0.52	**Yes**	15.20 ± 0.50	56.24 ± 1.84	**Yes**
	6/25/2014	1.05 ± 0.17	3.89 ± 0.63	**Yes**	22.50 ± 0.64	83.25 ± 2.36	**Yes**
ATOMIC CITY	4/2/2014	0.41 ± 0.12	1.52 ± 0.43	**Yes**	8.83 ± 0.43	32.67 ± 1.59	**Yes**
	4/9/2014	0.58 ± 0.14	2.16 ± 0.51	**Yes**	18.30 ± 0.57	67.71 ± 2.12	**Yes**
	4/16/2014	1.15 ± 0.16	4.26 ± 0.59	**Yes**	18.70 ± 0.55	69.19 ± 2.02	**Yes**
	4/23/2014	1.53 ± 0.18	5.66 ± 0.67	**Yes**	22.10 ± 0.60	81.77 ± 2.22	**Yes**
	4/30/2014	0.97 ± 0.15	3.59 ± 0.54	**Yes**	11.70 ± 0.46	43.29 ± 1.70	**Yes**
	5/7/2014	1.20 ± 0.18	4.44 ± 0.65	**Yes**	21.41 ± 0.60	79.21 ± 2.24	**Yes**
	5/14/2014	0.87 ± 0.14	3.21 ± 0.51	**Yes**	12.20 ± 0.46	45.14 ± 1.71	**Yes**
	5/21/2014	1.62 ± 0.19	5.99 ± 0.68	**Yes**	21.30 ± 0.59	78.81 ± 2.20	**Yes**
	5/28/2014	1.10 ± 0.20	4.07 ± 0.75	**Yes**	17.00 ± 0.55	62.90 ± 2.05	**Yes**
	6/4/2014	1.78 ± 0.20	6.60 ± 0.74	**Yes**	27.75 ± 0.68	102.68 ± 2.52	**Yes**
	6/11/2014	1.41 ± 0.18	5.22 ± 0.67	**Yes**	20.50 ± 0.59	75.85 ± 2.19	**Yes**
	6/18/2014	1.95 ± 0.20	7.22 ± 0.75	**Yes**	18.00 ± 0.56	66.60 ± 2.08	**Yes**
	6/25/2014	0.75 ± 0.15	2.78 ± 0.57	**Yes**	21.60 ± 0.63	79.92 ± 2.33	**Yes**
BLUE DOME	4/2/2014	0.41 ± 0.11	1.50 ± 0.42	**Yes**	8.44 ± 0.42	31.23 ± 1.55	**Yes**
	4/9/2014	0.74 ± 0.14	2.74 ± 0.51	**Yes**	16.30 ± 0.52	60.31 ± 1.91	**Yes**
	4/16/2014	0.92 ± 0.15	3.39 ± 0.55	**Yes**	19.60 ± 0.56	72.52 ± 2.06	**Yes**
	4/23/2014	1.02 ± 0.15	3.77 ± 0.56	**Yes**	21.30 ± 0.57	78.81 ± 2.12	**Yes**
	4/30/2014	0.38 ± 0.11	1.39 ± 0.40	**Yes**	9.32 ± 0.43	34.48 ± 1.58	**Yes**
	5/7/2014	1.15 ± 0.17	4.26 ± 0.61	**Yes**	19.65 ± 0.56	72.72 ± 2.07	**Yes**
	5/14/2014	0.87 ± 0.14	3.22 ± 0.53	**Yes**	11.90 ± 0.48	44.03 ± 1.77	**Yes**
	5/21/2014	1.06 ± 0.16	3.92 ± 0.59	**Yes**	20.60 ± 0.59	76.22 ± 2.16	**Yes**
	5/28/2014	1.10 ± 0.20	4.07 ± 0.73	**Yes**	15.80 ± 0.53	58.46 ± 1.95	**Yes**
	6/4/2014	1.53 ± 0.18	5.65 ± 0.67	**Yes**	26.71 ± 0.65	98.81 ± 2.41	**Yes**
	6/11/2014	1.03 ± 0.16	3.81 ± 0.60	**Yes**	21.00 ± 0.59	77.70 ± 2.19	**Yes**
	6/18/2014	0.80 ± 0.14	2.95 ± 0.53	**Yes**	14.20 ± 0.50	52.54 ± 1.84	**Yes**
	6/25/2014	0.94 ± 0.16	3.46 ± 0.61	**Yes**	21.80 ± 0.63	80.66 ± 2.32	**Yes**
FAA TOWER	4/2/2014	0.32 ± 0.11	1.18 ± 0.41	No	8.15 ± 0.43	30.16 ± 1.59	**Yes**
	4/9/2014	0.65 ± 0.14	2.41 ± 0.53	**Yes**	16.60 ± 0.55	61.42 ± 2.05	**Yes**
	4/16/2014	1.04 ± 0.16	3.85 ± 0.61	**Yes**	22.30 ± 0.62	82.51 ± 2.29	**Yes**
	4/23/2014	0.96 ± 0.15	3.55 ± 0.57	**Yes**	21.00 ± 0.59	77.70 ± 2.17	**Yes**
	4/30/2014	0.63 ± 0.13	2.31 ± 0.48	**Yes**	11.40 ± 0.47	42.18 ± 1.75	**Yes**
	5/7/2014	1.34 ± 0.19	4.96 ± 0.70	**Yes**	21.92 ± 0.63	81.11 ± 2.32	**Yes**
	5/14/2014	0.59 ± 0.13	2.17 ± 0.47	**Yes**	11.10 ± 0.47	41.07 ± 1.74	**Yes**
	5/21/2014	1.16 ± 0.17	4.29 ± 0.63	**Yes**	20.70 ± 0.61	76.59 ± 2.26	**Yes**
	5/28/2014	1.54 ± 0.23	5.70 ± 0.83	**Yes**	15.70 ± 0.55	58.09 ± 2.02	**Yes**
	6/4/2014	1.39 ± 0.18	5.15 ± 0.68	**Yes**	28.47 ± 0.70	105.34 ± 2.58	**Yes**
	6/11/2014	1.03 ± 0.16	3.81 ± 0.60	**Yes**	21.40 ± 0.60	79.18 ± 2.22	**Yes**
	6/18/2014	0.98 ± 0.16	3.61 ± 0.60	**Yes**	16.80 ± 0.56	62.16 ± 2.06	**Yes**
	6/25/2014	1.04 ± 0.17	3.85 ± 0.64	**Yes**	23.20 ± 0.66	85.84 ± 2.44	**Yes**
HOWE	4/2/2014	0.50 ± 0.12	1.85 ± 0.43	**Yes**	9.85 ± 0.43	36.45 ± 1.58	**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
	4/9/2014	1.21 ± 0.17	4.48 ± 0.61	Yes	18.10 ± 0.55	66.97 ± 2.04	Yes
	4/16/2014	0.84 ± 0.14	3.12 ± 0.51	Yes	17.30 ± 0.51	64.01 ± 1.89	Yes
	4/23/2014	1.43 ± 0.17	5.29 ± 0.63	Yes	21.60 ± 0.58	79.92 ± 2.14	Yes
	4/30/2014	0.78 ± 0.13	2.89 ± 0.50	Yes	10.90 ± 0.45	40.33 ± 1.65	Yes
	5/7/2014	1.25 ± 0.17	4.63 ± 0.63	Yes	19.49 ± 0.56	72.10 ± 2.07	Yes
	5/14/2014	0.63 ± 0.12	2.31 ± 0.46	Yes	11.90 ± 0.45	44.03 ± 1.68	Yes
	5/21/2014	1.12 ± 0.16	4.14 ± 0.58	Yes	19.50 ± 0.56	72.15 ± 2.06	Yes
	5/28/2014	1.00 ± 0.19	3.69 ± 0.69	Yes	14.20 ± 0.49	52.54 ± 1.83	Yes
	6/4/2014	1.40 ± 0.18	5.17 ± 0.65	Yes	26.44 ± 0.65	97.82 ± 2.40	Yes
	6/11/2014	0.00 ± 0.00	0.00 ± 0.00	Yes	17.10 ± 0.52	63.27 ± 1.92	Yes
	6/18/2014	0.98 ± 0.15	3.62 ± 0.54	Yes	16.20 ± 0.50	59.94 ± 1.86	Yes
	6/25/2014	0.98 ± 0.16	3.62 ± 0.58	Yes	19.50 ± 0.57	72.15 ± 2.12	Yes
MONTEVIEW	4/2/2014	0.60 ± 0.12	2.20 ± 0.45	Yes	8.88 ± 0.41	32.86 ± 1.52	Yes
	4/9/2014	1.02 ± 0.15	3.77 ± 0.56	Yes	15.00 ± 0.51	55.50 ± 1.87	Yes
	4/16/2014	1.06 ± 0.15	3.92 ± 0.54	Yes	17.00 ± 0.50	62.90 ± 1.86	Yes
	4/23/2014	1.01 ± 0.14	3.74 ± 0.53	Yes	20.80 ± 0.54	76.96 ± 2.01	Yes
	4/30/2014	0.60 ± 0.12	2.23 ± 0.45	Yes	9.69 ± 0.42	35.85 ± 1.55	Yes
	5/7/2014	0.92 ± 0.15	3.39 ± 0.57	Yes	18.65 ± 0.55	69.02 ± 2.03	Yes
	5/14/2014	0.79 ± 0.14	2.91 ± 0.50	Yes	12.50 ± 0.47	46.25 ± 1.73	Yes
	5/21/2014	1.08 ± 0.16	4.00 ± 0.59	Yes	19.90 ± 0.57	73.63 ± 2.12	Yes
	5/28/2014	1.21 ± 0.19	4.48 ± 0.71	Yes	13.60 ± 0.48	50.32 ± 1.76	Yes
	6/4/2014	1.15 ± 0.16	4.25 ± 0.60	Yes	24.46 ± 0.63	90.49 ± 2.32	Yes
	6/11/2014	1.08 ± 0.16	4.00 ± 0.58	Yes	18.70 ± 0.54	69.19 ± 2.01	Yes
	6/18/2014	0.93 ± 0.15	3.43 ± 0.56	Yes	16.80 ± 0.53	62.16 ± 1.96	Yes
	6/25/2014	0.99 ± 0.15	3.66 ± 0.55	Yes	17.20 ± 0.52	63.64 ± 1.93	Yes
MUD LAKE	4/2/2014	0.32 ± 0.10	1.17 ± 0.37	Yes	8.19 ± 0.39	30.30 ± 1.46	Yes
	4/9/2014	1.17 ± 0.15	4.33 ± 0.57	Yes	16.80 ± 0.50	62.16 ± 1.86	Yes
	4/16/2014	1.33 ± 0.16	4.92 ± 0.60	Yes	20.40 ± 0.55	75.48 ± 2.03	Yes
	4/23/2014	1.26 ± 0.16	4.66 ± 0.61	Yes	23.50 ± 0.60	86.95 ± 2.21	Yes
	4/30/2014	0.87 ± 0.14	3.22 ± 0.51	Yes	12.20 ± 0.45	45.14 ± 1.68	Yes
	5/7/2014	1.20 ± 0.17	4.44 ± 0.61	Yes	21.45 ± 0.57	79.35 ± 2.11	Yes
	5/14/2014	0.50 ± 0.11	1.85 ± 0.42	Yes	10.30 ± 0.43	38.11 ± 1.59	Yes
	5/21/2014	1.07 ± 0.15	3.96 ± 0.57	Yes	20.10 ± 0.56	74.37 ± 2.06	Yes
	5/28/2014	1.83 ± 0.23	6.77 ± 0.84	Yes	15.50 ± 0.53	57.35 ± 1.94	Yes
	6/4/2014	1.84 ± 0.19	6.81 ± 0.71	Yes	25.70 ± 0.63	95.08 ± 2.32	Yes
	6/11/2014	1.02 ± 0.16	3.77 ± 0.58	Yes	20.10 ± 0.57	74.37 ± 2.09	Yes
	6/18/2014	0.83 ± 0.14	3.08 ± 0.53	Yes	16.60 ± 0.52	61.42 ± 1.91	Yes
	6/25/2014	0.99 ± 0.16	3.66 ± 0.58	Yes	20.40 ± 0.58	75.48 ± 2.14	Yes
DISTANT							
BLACKFOOT	4/2/2014	0.55 ± 0.13	2.03 ± 0.48	Yes	9.09 ± 0.46	33.63 ± 1.69	Yes
	4/9/2014	0.80 ± 0.15	2.97 ± 0.55	Yes	14.70 ± 0.52	54.39 ± 1.94	Yes
	4/16/2014	1.22 ± 0.18	4.51 ± 0.67	Yes	18.60 ± 0.61	68.82 ± 2.25	Yes
	4/23/2014	1.29 ± 0.18	4.77 ± 0.65	Yes	22.30 ± 0.63	82.51 ± 2.31	Yes
	4/30/2014	0.90 ± 0.15	3.32 ± 0.56	Yes	11.90 ± 0.49	44.03 ± 1.81	Yes
	5/7/2014	0.86 ± 0.16	3.19 ± 0.57	Yes	19.74 ± 0.57	73.04 ± 2.11	Yes
	5/14/2014	0.76 ± 0.14	2.81 ± 0.53	Yes	11.70 ± 0.50	43.29 ± 1.84	Yes
	5/21/2014	1.29 ± 0.16	4.77 ± 0.58	Yes	20.00 ± 0.53	74.00 ± 1.98	Yes
	5/28/2014	1.41 ± 0.34	5.22 ± 1.26	Yes	14.00 ± 0.80	51.80 ± 2.96	Yes
	6/4/2014	1.27 ± 0.16	4.69 ± 0.58	Yes	22.93 ± 0.57	84.85 ± 2.09	Yes
	6/11/2014	0.88 ± 0.14	3.27 ± 0.51	Yes	17.30 ± 0.50	64.01 ± 1.85	Yes
	6/18/2014	1.24 ± 0.15	4.59 ± 0.57	Yes	14.30 ± 0.46	52.91 ± 1.72	Yes
	6/25/2014	0.85 ± 0.14	3.16 ± 0.53	Yes	20.30 ± 0.56	75.11 ± 2.07	Yes
CRATERS OF	4/2/2014	0.23 ± 0.10	0.86 ± 0.38	No	8.50 ± 0.43	31.45 ± 1.60	Yes
THE MOON	4/9/2014	0.73 ± 0.14	2.68 ± 0.51	Yes	15.50 ± 0.52	57.35 ± 1.91	Yes
	4/16/2014	0.97 ± 0.16	3.57 ± 0.58	Yes	23.60 ± 0.62	87.32 ± 2.28	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
	4/23/2014	1.05 ± 0.16	3.89 ± 0.57	Yes	20.80 ± 0.57	76.96 ± 2.12	Yes
	4/30/2014	0.54 ± 0.12	1.99 ± 0.45	Yes	10.90 ± 0.45	40.33 ± 1.68	Yes
	5/7/2014	0.84 ± 0.15	3.09 ± 0.57	Yes	18.63 ± 0.56	68.95 ± 2.06	Yes
	5/14/2014	0.52 ± 0.12	1.91 ± 0.45	Yes	12.40 ± 0.47	45.88 ± 1.75	Yes
	5/21/2014	1.10 ± 0.16	4.07 ± 0.58	Yes	19.90 ± 0.57	73.63 ± 2.10	Yes
	5/28/2014	1.17 ± 0.21	4.33 ± 0.76	Yes	16.80 ± 0.55	62.16 ± 2.02	Yes
	6/4/2014	1.12 ± 0.16	4.16 ± 0.61	Yes	25.54 ± 0.64	94.50 ± 2.37	Yes
	6/11/2014	0.80 ± 0.15	2.97 ± 0.54	Yes	18.80 ± 0.56	69.56 ± 2.08	Yes
	6/18/2014	0.91 ± 0.15	3.37 ± 0.56	Yes	15.70 ± 0.52	58.09 ± 1.94	Yes
	6/25/2014	0.74 ± 0.15	2.74 ± 0.57	Yes	22.60 ± 0.64	83.62 ± 2.37	Yes
DUBOIS	4/2/2014	0.58 ± 0.12	2.13 ± 0.46	Yes	9.84 ± 0.43	36.41 ± 1.61	Yes
	4/9/2014	0.80 ± 0.14	2.97 ± 0.51	Yes	15.00 ± 0.50	55.50 ± 1.84	Yes
	4/16/2014	0.86 ± 0.14	3.17 ± 0.52	Yes	18.70 ± 0.53	69.19 ± 1.98	Yes
	4/23/2014	1.19 ± 0.16	4.40 ± 0.59	Yes	20.20 ± 0.56	74.74 ± 2.07	Yes
	4/30/2014	0.55 ± 0.12	2.03 ± 0.43	Yes	8.64 ± 0.40	31.97 ± 1.47	Yes
	5/7/2014	1.00 ± 0.16	3.70 ± 0.58	Yes	18.70 ± 0.54	69.19 ± 2.01	Yes
	5/14/2014	0.94 ± 0.15	3.46 ± 0.54	Yes	18.65 ± 0.54	69.02 ± 2.01	Yes
	5/21/2014	1.13 ± 0.16	4.18 ± 0.58	Yes	11.80 ± 0.47	43.66 ± 1.74	Yes
	5/28/2014	1.52 ± 0.23	5.62 ± 0.84	Yes	18.90 ± 0.55	69.93 ± 2.02	Yes
	6/4/2014	1.39 ± 0.17	5.14 ± 0.64	Yes	17.60 ± 0.57	65.12 ± 2.11	Yes
	6/11/2014	1.10 ± 0.17	4.07 ± 0.61	Yes	26.17 ± 0.63	96.84 ± 2.34	Yes
	6/18/2014	0.87 ± 0.15	3.20 ± 0.55	Yes	22.00 ± 0.61	81.40 ± 2.24	Yes
	6/25/2014	1.08 ± 0.17	4.00 ± 0.61	Yes	17.00 ± 0.54	62.90 ± 1.98	Yes
IDAHO FALLS	4/2/2014	0.52 ± 0.11	1.92 ± 0.41	Yes	9.23 ± 0.40	34.15 ± 1.47	Yes
	4/9/2014	0.86 ± 0.13	3.16 ± 0.49	Yes	14.20 ± 0.46	52.54 ± 1.69	Yes
	4/16/2014	1.21 ± 0.15	4.48 ± 0.55	Yes	19.60 ± 0.51	72.52 ± 1.90	Yes
	4/23/2014	0.91 ± 0.14	3.38 ± 0.50	Yes	19.50 ± 0.52	72.15 ± 1.92	Yes
	4/30/2014	0.77 ± 0.13	2.83 ± 0.46	Yes	11.40 ± 0.42	42.18 ± 1.56	Yes
	5/7/2014	0.95 ± 0.15	3.52 ± 0.54	Yes	17.51 ± 0.50	64.78 ± 1.85	Yes
	5/14/2014	0.53 ± 0.11	1.98 ± 0.41	Yes	11.70 ± 0.43	43.29 ± 1.59	Yes
	5/21/2014	0.83 ± 0.13	3.06 ± 0.50	Yes	18.70 ± 0.52	69.19 ± 1.91	Yes
	5/28/2014	1.55 ± 0.21	5.74 ± 0.78	Yes	16.00 ± 0.52	59.20 ± 1.91	Yes
	6/4/2014	1.76 ± 0.18	6.51 ± 0.68	Yes	25.95 ± 0.62	96.02 ± 2.29	Yes
	6/11/2014	1.27 ± 0.17	4.70 ± 0.61	Yes	16.90 ± 0.53	62.53 ± 1.94	Yes
	6/18/2014	0.77 ± 0.13	2.85 ± 0.49	Yes	14.90 ± 0.47	55.13 ± 1.75	Yes
	6/25/2014	0.79 ± 0.14	2.93 ± 0.53	Yes	20.10 ± 0.56	74.37 ± 2.08	Yes
QA-2	4/2/2014	0.44 ± 0.11	1.61 ± 0.41	Yes	10.40 ± 0.43	38.48 ± 1.57	Yes
(IDAHO FALLS)	4/9/2014	0.69 ± 0.13	2.53 ± 0.48	Yes	14.70 ± 0.48	54.39 ± 1.78	Yes
	4/16/2014	1.26 ± 0.16	4.66 ± 0.58	Yes	16.40 ± 0.50	60.68 ± 1.84	Yes
	4/23/2014	1.02 ± 0.15	3.77 ± 0.54	Yes	20.30 ± 0.54	75.11 ± 2.00	Yes
	4/30/2014	0.70 ± 0.12	2.59 ± 0.46	Yes	10.70 ± 0.42	39.59 ± 1.55	Yes
	5/7/2014	1.16 ± 0.17	4.29 ± 0.61	Yes	21.35 ± 0.57	78.98 ± 2.12	Yes
	5/14/2014	0.73 ± 0.13	2.70 ± 0.47	Yes	11.40 ± 0.44	42.18 ± 1.62	Yes
	5/21/2014	1.00 ± 0.15	3.70 ± 0.56	Yes	21.60 ± 0.57	79.92 ± 2.12	Yes
	5/28/2014	1.32 ± 0.20	4.88 ± 0.75	Yes	15.50 ± 0.52	57.35 ± 1.91	Yes
	6/4/2014	1.72 ± 0.19	6.38 ± 0.69	Yes	25.83 ± 0.62	95.57 ± 2.31	Yes
	6/11/2014	1.18 ± 0.16	4.37 ± 0.59	Yes	18.40 ± 0.53	68.08 ± 1.97	Yes
	6/18/2014	1.16 ± 0.16	4.29 ± 0.58	Yes	16.40 ± 0.51	60.68 ± 1.90	Yes
	6/25/2014	0.65 ± 0.13	2.40 ± 0.50	Yes	19.50 ± 0.56	72.15 ± 2.06	Yes
JACKSON	4/2/2014	0.67 ± 0.15	2.48 ± 0.56	Yes	11.20 ± 0.53	41.44 ± 1.97	Yes
	4/9/2014	1.02 ± 0.16	3.77 ± 0.60	Yes	15.60 ± 0.55	57.72 ± 2.02	Yes
	4/16/2014	1.28 ± 0.18	4.74 ± 0.66	Yes	21.10 ± 0.62	78.07 ± 2.29	Yes
	4/23/2014	1.70 ± 0.20	6.29 ± 0.73	Yes	25.10 ± 0.66	92.87 ± 2.44	Yes
	4/30/2014	0.80 ± 0.14	2.95 ± 0.53	Yes	9.86 ± 0.46	36.48 ± 1.70	Yes
	5/7/2014	1.25 ± 0.19	4.63 ± 0.69	Yes	22.04 ± 0.64	81.54 ± 2.35	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
	5/14/2014	0.92 ± 0.16	3.39 ± 0.58	Yes	15.00 ± 0.55	55.50 ± 2.03	Yes
	5/21/2014	1.14 ± 0.17	4.22 ± 0.64	Yes	23.40 ± 0.65	86.58 ± 2.41	Yes
	5/28/2014	1.49 ± 0.25	5.51 ± 0.91	Yes	21.10 ± 0.65	78.07 ± 2.42	Yes
	6/4/2014	2.08 ± 0.22	7.69 ± 0.83	Yes	29.77 ± 0.74	110.13 ± 2.74	Yes
	6/11/2014	1.15 ± 0.18	4.26 ± 0.67	Yes	22.00 ± 0.65	81.40 ± 2.39	Yes
	6/18/2014	1.26 ± 0.18	4.66 ± 0.68	Yes	18.10 ± 0.60	66.97 ± 2.22	Yes
	6/25/2014	1.16 ± 0.18	4.29 ± 0.67	Yes	23.70 ± 0.67	87.69 ± 2.48	Yes
SUGAR CITY	4/2/2014	0.39 ± 0.11	1.43 ± 0.41	Yes	8.97 ± 0.43	33.19 ± 1.58	Yes
	4/9/2014	0.95 ± 0.15	3.53 ± 0.56	Yes	15.40 ± 0.52	56.98 ± 1.92	Yes
	4/16/2014	1.41 ± 0.17	5.22 ± 0.62	Yes	18.20 ± 0.53	67.34 ± 1.97	Yes
	4/23/2014	0.97 ± 0.14	3.58 ± 0.53	Yes	19.40 ± 0.53	71.78 ± 1.97	Yes
	4/30/2014	0.89 ± 0.14	3.29 ± 0.51	Yes	10.90 ± 0.43	40.33 ± 1.60	Yes
	5/7/2014	0.95 ± 0.15	3.51 ± 0.56	Yes	18.91 ± 0.54	69.96 ± 2.00	Yes
	5/14/2014	0.88 ± 0.14	3.24 ± 0.53	Yes	12.40 ± 0.48	45.88 ± 1.79	Yes
	5/21/2014	1.29 ± 0.16	4.77 ± 0.60	Yes	19.00 ± 0.54	70.30 ± 2.00	Yes
	5/28/2014	1.66 ± 0.23	6.14 ± 0.84	Yes	17.30 ± 0.56	64.01 ± 2.06	Yes
	6/4/2014	1.45 ± 0.17	5.35 ± 0.64	Yes	24.49 ± 0.61	90.62 ± 2.25	Yes
	6/11/2014	1.23 ± 0.18	4.55 ± 0.65	Yes	19.50 ± 0.60	72.15 ± 2.21	Yes
	6/18/2014	0.88 ± 0.15	3.26 ± 0.54	Yes	15.40 ± 0.50	56.98 ± 1.86	Yes
	6/25/2014	1.01 ± 0.17	3.74 ± 0.61	Yes	20.60 ± 0.61	76.22 ± 2.26	Yes
INL SITE							
EFS	4/2/2014	0.23 ± 0.10	0.84 ± 0.38	No	8.98 ± 0.44	33.23 ± 1.62	Yes
	4/9/2014	0.54 ± 0.14	2.01 ± 0.50	Yes	17.20 ± 0.56	63.64 ± 2.07	Yes
	4/16/2014	1.07 ± 0.16	3.96 ± 0.57	Yes	18.30 ± 0.54	67.71 ± 2.01	Yes
	4/23/2014	1.18 ± 0.16	4.37 ± 0.58	Yes	19.80 ± 0.56	73.26 ± 2.05	Yes
	4/30/2014	0.55 ± 0.13	2.04 ± 0.47	Yes	10.40 ± 0.46	38.48 ± 1.69	Yes
	5/7/2014	1.10 ± 0.17	4.07 ± 0.61	Yes	20.42 ± 0.58	75.54 ± 2.13	Yes
	5/14/2014	0.95 ± 0.15	3.51 ± 0.56	Yes	10.90 ± 0.47	40.33 ± 1.74	Yes
	5/21/2014	0.76 ± 0.15	2.82 ± 0.54	Yes	21.20 ± 0.60	78.44 ± 2.22	Yes
	5/28/2014	1.23 ± 0.21	4.55 ± 0.78	Yes	17.00 ± 0.56	62.90 ± 2.07	Yes
	6/4/2014	1.29 ± 0.17	4.77 ± 0.63	Yes	25.05 ± 0.63	92.68 ± 2.33	Yes
	6/11/2014	0.87 ± 0.15	3.20 ± 0.56	Yes	19.40 ± 0.57	71.78 ± 2.11	Yes
	6/18/2014	0.87 ± 0.15	3.20 ± 0.57	Yes	15.30 ± 0.53	56.61 ± 1.97	Yes
	6/25/2014	1.17 ± 0.18	4.33 ± 0.67	Yes	21.00 ± 0.64	77.70 ± 2.35	Yes
MAIN GATE	4/2/2014	0.44 ± 0.11	1.61 ± 0.42	Yes	9.02 ± 0.42	33.37 ± 1.56	Yes
	4/9/2014	0.77 ± 0.13	2.84 ± 0.50	Yes	15.90 ± 0.49	58.83 ± 1.83	Yes
	4/16/2014	1.39 ± 0.17	5.14 ± 0.63	Yes	21.20 ± 0.57	78.44 ± 2.11	Yes
	4/23/2014	1.08 ± 0.15	4.00 ± 0.55	Yes	21.80 ± 0.55	80.66 ± 2.05	Yes
	4/30/2014	0.78 ± 0.13	2.87 ± 0.49	Yes	11.70 ± 0.45	43.29 ± 1.68	Yes
	5/7/2014	0.72 ± 0.14	2.66 ± 0.51	Yes	20.51 ± 0.55	75.89 ± 2.03	Yes
	5/14/2014	0.77 ± 0.13	2.86 ± 0.49	Yes	11.50 ± 0.45	42.55 ± 1.66	Yes
	5/21/2014	1.01 ± 0.14	3.74 ± 0.53	Yes	19.10 ± 0.53	70.67 ± 1.95	Yes
	5/28/2014	1.08 ± 0.19	4.00 ± 0.72	Yes	16.70 ± 0.53	61.79 ± 1.94	Yes
	6/4/2014	1.69 ± 0.18	6.27 ± 0.67	Yes	27.10 ± 0.62	100.28 ± 2.30	Yes
	6/11/2014	1.07 ± 0.15	3.96 ± 0.56	Yes	19.80 ± 0.54	73.26 ± 2.01	Yes
	6/18/2014	0.76 ± 0.14	2.82 ± 0.50	Yes	16.00 ± 0.50	59.20 ± 1.84	Yes
	6/25/2014	0.94 ± 0.16	3.49 ± 0.57	Yes	21.00 ± 0.59	77.70 ± 2.18	Yes
QA-1	4/2/2014	0.25 ± 0.09	0.91 ± 0.35	No	8.95 ± 0.40	33.12 ± 1.48	Yes
(MAIN GATE)	4/9/2014	0.75 ± 0.13	2.79 ± 0.47	Yes	16.40 ± 0.48	60.68 ± 1.76	Yes
	4/16/2014	1.04 ± 0.14	3.85 ± 0.53	Yes	18.50 ± 0.50	68.45 ± 1.86	Yes
	4/23/2014	1.29 ± 0.15	4.77 ± 0.56	Yes	19.30 ± 0.51	71.41 ± 1.88	Yes
	4/30/2014	0.80 ± 0.13	2.95 ± 0.47	Yes	10.60 ± 0.41	39.22 ± 1.53	Yes
	5/7/2014	1.09 ± 0.15	4.03 ± 0.55	Yes	19.21 ± 0.51	71.07 ± 1.88	Yes
	5/14/2014	0.59 ± 0.11	2.19 ± 0.42	Yes	11.10 ± 0.42	41.07 ± 1.54	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
	5/21/2014	1.05 ± 0.14	3.89 ± 0.53	**Yes**	20.10 ± 0.52	74.37 ± 1.93	**Yes**
	5/28/2014	1.22 ± 0.19	4.51 ± 0.69	**Yes**	14.00 ± 0.47	51.80 ± 1.74	**Yes**
	6/4/2014	1.39 ± 0.16	5.15 ± 0.59	**Yes**	22.89 ± 0.56	84.68 ± 2.06	**Yes**
	6/11/2014	0.92 ± 0.14	3.40 ± 0.53	**Yes**	18.50 ± 0.52	68.45 ± 1.94	**Yes**
	6/18/2014	0.90 ± 0.13	3.34 ± 0.50	**Yes**	14.80 ± 0.46	54.76 ± 1.70	**Yes**
	6/25/2014	0.91 ± 0.14	3.35 ± 0.51	**Yes**	17.40 ± 0.50	64.38 ± 1.85	**Yes**
VAN BUREN GATE	4/2/2014	0.04 ± 0.09	0.14 ± 0.32	No	1.67 ± 0.33	6.18 ± 1.20	**Yes**
	4/9/2014	0.67 ± 0.15	2.49 ± 0.54	**Yes**	16.30 ± 0.56	60.31 ± 2.06	**Yes**
	4/16/2014	0.88 ± 0.15	3.26 ± 0.57	**Yes**	21.20 ± 0.60	78.44 ± 2.23	**Yes**
	4/23/2014	1.07 ± 0.15	3.96 ± 0.55	**Yes**	21.00 ± 0.55	77.70 ± 2.04	**Yes**
	4/30/2014	0.49 ± 0.12	1.81 ± 0.44	**Yes**	11.40 ± 0.46	42.18 ± 1.71	**Yes**
	5/7/2014	0.74 ± 0.14	2.75 ± 0.53	**Yes**	18.67 ± 0.53	69.08 ± 1.98	**Yes**
	5/14/2014	0.57 ± 0.12	2.10 ± 0.44	**Yes**	11.30 ± 0.45	41.81 ± 1.65	**Yes**
	5/21/2014	1.04 ± 0.16	3.85 ± 0.59	**Yes**	20.90 ± 0.59	77.33 ± 2.19	**Yes**
	5/28/2014	0.84 ± 0.19	3.12 ± 0.69	**Yes**	15.20 ± 0.52	56.24 ± 1.91	**Yes**
	6/4/2014	1.47 ± 0.18	5.44 ± 0.65	**Yes**	26.33 ± 0.64	97.44 ± 2.35	**Yes**
	6/11/2014	0.83 ± 0.14	3.07 ± 0.53	**Yes**	18.20 ± 0.54	67.34 ± 1.99	**Yes**
	6/18/2014	0.77 ± 0.14	2.85 ± 0.50	**Yes**	14.80 ± 0.48	54.76 ± 1.79	**Yes**
	6/25/2014	1.04 ± 0.17	3.85 ± 0.62	**Yes**	22.10 ± 0.63	81.77 ± 2.32	**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	04/02/2014	-4.39	±	1.89	-16.26	±	6.98	No
	04/09/2014	-2.76	±	1.86	-10.20	±	6.88	No
	04/16/2014	-3.12	±	1.81	-11.54	±	6.71	No
	04/23/2014	-1.76	±	1.91	-6.53	±	7.07	No
	04/30/2014	-1.58	±	1.92	-5.83	±	7.11	No
	05/07/2014	-2.24	±	1.80	-8.27	±	6.67	No
	05/14/2014	-1.15	±	1.73	-4.24	±	6.40	No
	05/21/2014	-4.17	±	1.90	-15.42	±	7.04	No
	05/28/2014	-2.18	±	1.83	-8.07	±	6.76	No
	06/04/2014	-1.87	±	1.87	-6.93	±	6.93	No
	06/11/2014	-0.58	±	1.11	-2.13	±	4.12	No
	06/18/2014	-0.04	±	1.08	-0.13	±	3.98	No
	06/25/2014	1.42	±	1.36	5.26	±	5.02	No
ATOMIC CITY	04/02/2014	-4.59	±	1.97	-16.99	±	7.29	No
	04/09/2014	-3.03	±	2.04	-11.20	±	7.56	No
	04/16/2014	-3.19	±	1.85	-11.79	±	6.86	No
	04/23/2014	-1.71	±	1.85	-6.33	±	6.85	No
	04/30/2014	-1.52	±	1.85	-5.61	±	6.84	No
	05/07/2014	-2.45	±	1.98	-9.08	±	7.32	No
	05/14/2014	-1.17	±	1.76	-4.32	±	6.52	No
	05/21/2014	-4.33	±	1.98	-16.00	±	7.31	No
	05/28/2014	-2.29	±	1.92	-8.47	±	7.09	No
	06/04/2014	-1.97	±	1.97	-7.31	±	7.31	No
	06/11/2014	-0.62	±	1.20	-2.30	±	4.44	No
	06/18/2014	-0.04	±	1.17	-0.14	±	4.33	No
	06/25/2014	1.43	±	1.36	5.30	±	5.05	No
BLUE DOME	04/02/2014	-1.20	±	1.69	-4.44	±	6.25	No
	04/09/2014	-2.10	±	1.68	-7.78	±	6.22	No
	04/16/2014	-3.74	±	1.74	-13.82	±	6.44	No
	04/23/2014	-2.17	±	1.66	-8.02	±	6.15	No
	04/30/2014	0.55	±	1.71	2.03	±	6.31	No
	05/07/2014	-1.83	±	1.69	-6.75	±	6.25	No
	05/14/2014	-3.22	±	1.80	-11.90	±	6.68	No
	05/21/2014	-4.64	±	2.00	-17.16	±	7.39	No
	05/28/2014	-1.38	±	1.68	-5.09	±	6.21	No
	06/04/2014	-1.52	±	1.73	-5.62	±	6.41	No
	06/11/2014	0.48	±	1.10	1.79	±	4.07	No
	06/18/2014	1.18	±	1.10	4.35	±	4.06	No
	06/25/2014	-2.11	±	1.22	-7.82	±	4.53	No
FAA TOWER	04/02/2014	-1.26	±	1.77	-4.66	±	6.55	No
	04/09/2014	-2.33	±	1.86	-8.62	±	6.89	No
	04/16/2014	-4.08	±	1.90	-15.09	±	7.03	No
	04/23/2014	-2.28	±	1.75	-8.42	±	6.46	No
	04/30/2014	0.57	±	1.79	2.12	±	6.61	No
	05/07/2014	-2.04	±	1.89	-7.55	±	6.99	No
	05/14/2014	-3.27	±	1.84	-12.10	±	6.79	No
	05/21/2014	-4.95	±	2.13	-18.30	±	7.88	No
	05/28/2014	-1.45	±	1.77	-5.37	±	6.55	No
	06/04/2014	-1.62	±	1.85	-6.01	±	6.86	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								
	06/11/2014	0.49	±	1.12	1.81	±	4.13	No
	06/18/2014	1.28	±	1.19	4.73	±	4.41	No
	06/25/2014	-2.19	±	1.27	-8.10	±	4.69	No
HOWE	04/02/2014	-1.14	±	1.61	-4.22	±	5.94	No
	04/09/2014	-2.19	±	1.75	-8.10	±	6.48	No
	04/16/2014	-3.51	±	1.64	-12.98	±	6.05	No
	04/23/2014	-2.18	±	1.67	-8.07	±	6.19	No
	04/30/2014	0.53	±	1.67	1.98	±	6.17	No
	05/07/2014	-1.84	±	1.70	-6.79	±	6.29	No
	05/14/2014	-2.99	±	1.68	-11.06	±	6.21	No
	05/21/2014	-4.42	±	1.91	-16.37	±	7.05	No
	05/28/2014	-1.32	±	1.61	-4.89	±	5.96	No
	06/04/2014	-1.52	±	1.73	-5.61	±	6.41	No
	06/11/2014	0.45	±	1.02	1.65	±	3.76	No
	06/18/2014	1.10	±	1.03	4.09	±	3.81	No
	06/25/2014	-1.95	±	1.13	-7.20	±	4.17	No
MONTEVIEW	04/02/2014	-1.14	±	1.60	-4.22	±	5.93	No
	04/09/2014	-2.13	±	1.70	-7.88	±	6.30	No
	04/16/2014	-3.45	±	1.61	-12.75	±	5.94	No
	04/23/2014	-2.02	±	1.55	-7.47	±	5.73	No
	04/30/2014	0.52	±	1.62	1.93	±	6.00	No
	05/07/2014	-1.82	±	1.69	-6.75	±	6.25	No
	05/14/2014	-3.05	±	1.71	-11.29	±	6.33	No
	05/21/2014	-4.58	±	1.97	-16.96	±	7.31	No
	05/28/2014	-1.28	±	1.56	-4.74	±	5.78	No
	06/04/2014	-1.51	±	1.72	-5.59	±	6.38	No
	06/11/2014	0.45	±	1.02	1.67	±	3.79	No
	06/18/2014	1.17	±	1.09	4.33	±	4.04	No
	06/25/2014	-1.80	±	1.05	-6.68	±	3.87	No
MUD LAKE	04/02/2014	-1.12	±	1.57	-4.13	±	5.80	No
	04/09/2014	-1.98	±	1.58	-7.31	±	5.84	No
	04/16/2014	-3.53	±	1.65	-13.06	±	6.09	No
	04/23/2014	-2.18	±	1.67	-8.06	±	6.18	No
	04/30/2014	0.52	±	1.61	1.91	±	5.95	No
	05/07/2014	-1.77	±	1.64	-6.55	±	6.07	No
	05/14/2014	-2.96	±	1.66	-10.96	±	6.15	No
	05/21/2014	-4.33	±	1.86	-16.01	±	6.90	No
	05/28/2014	-1.38	±	1.68	-5.10	±	6.22	No
	06/04/2014	-1.46	±	1.67	-5.40	±	6.16	No
	06/11/2014	0.46	±	1.05	1.71	±	3.89	No
	06/18/2014	1.13	±	1.05	4.18	±	3.90	No
	06/25/2014	-1.92	±	1.11	-7.12	±	4.12	No
DISTANT								
BLACKFOOT	04/02/2014	-4.96	±	2.13	-18.35	±	7.87	No
	04/09/2014	-2.99	±	2.02	-11.06	±	7.47	No
	04/16/2014	-3.80	±	2.21	-14.05	±	8.18	No
	04/23/2014	-1.83	±	1.98	-6.76	±	7.33	No
	04/30/2014	-1.65	±	2.02	-6.12	±	7.47	No
	05/07/2014	-2.36	±	1.90	-8.72	±	7.03	No
	05/14/2014	-1.34	±	2.02	-4.96	±	7.48	No

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
	05/21/2014	-3.78	±	1.72	-13.97	±	6.38	No
	05/28/2014	-4.21	±	3.53	-15.59	±	13.05	No
	06/04/2014	-1.65	±	1.65	-6.11	±	6.11	No
	06/11/2014	-0.53	±	1.02	-1.95	±	3.77	No
	06/18/2014	-0.03	±	0.99	-0.12	±	3.67	No
	06/25/2014	1.22	±	1.17	4.53	±	4.31	No
CRATERS	04/02/2014	-4.71	±	2.02	-17.44	±	7.48	No
	04/09/2014	-2.82	±	1.90	-10.42	±	7.03	No
	04/16/2014	-3.35	±	1.95	-12.40	±	7.21	No
	04/23/2014	-1.66	±	1.80	-6.15	±	6.67	No
	04/30/2014	-1.54	±	1.88	-5.71	±	6.97	No
	05/07/2014	-2.35	±	1.89	-8.69	±	7.00	No
	05/14/2014	-1.21	±	1.82	-4.47	±	6.75	No
	05/21/2014	-4.19	±	1.92	-15.51	±	7.09	No
	05/28/2014	-2.25	±	1.89	-8.33	±	6.97	No
	06/04/2014	-1.90	±	1.90	-7.04	±	7.04	No
	06/11/2014	-0.61	±	1.18	-2.26	±	4.36	No
	06/18/2014	-0.04	±	1.14	-0.14	±	4.21	No
	06/25/2014	1.43	±	1.36	5.29	±	5.04	No
DUBOIS	04/02/2014	-1.17	±	1.65	-4.34	±	6.11	No
	04/09/2014	-2.08	±	1.67	-7.71	±	6.16	No
	04/16/2014	-3.60	±	1.68	-13.32	±	6.21	No
	04/23/2014	-2.16	±	1.66	-7.98	±	6.13	No
	04/30/2014	0.51	±	1.57	1.87	±	5.83	No
	05/07/2014	-1.79	±	1.66	-6.63	±	6.14	No
	05/14/2014	-3.17	±	1.78	-11.72	±	6.58	No
	05/21/2014	-4.35	±	1.87	-16.08	±	6.93	No
	05/28/2014	-1.47	±	1.79	-5.43	±	6.62	No
	06/04/2014	-1.46	±	1.67	-5.41	±	6.18	No
	06/11/2014	0.49	±	1.11	1.80	±	4.10	No
	06/18/2014	1.19	±	1.11	4.40	±	4.10	No
	06/25/2014	-2.01	±	1.17	-7.44	±	4.31	No
IDAHO FALLS	04/02/2014	-1.06	±	1.49	-3.92	±	5.52	No
	04/09/2014	-1.88	±	1.51	-6.97	±	5.57	No
	04/16/2014	-3.25	±	1.52	-12.03	±	5.61	No
	04/23/2014	-1.95	±	1.49	-7.20	±	5.53	No
	04/30/2014	0.48	±	1.49	1.77	±	5.52	No
	05/07/2014	-1.64	±	1.52	-6.07	±	5.62	No
	05/14/2014	-2.78	±	1.56	-10.28	±	5.77	No
	05/21/2014	-4.01	±	1.73	-14.84	±	6.39	No
	05/28/2014	-1.32	±	1.61	-4.88	±	5.95	No
	06/04/2014	-1.41	±	1.61	-5.23	±	5.97	No
	06/11/2014	0.46	±	1.04	1.69	±	3.85	No
	06/18/2014	1.06	±	0.98	3.91	±	3.64	No
	06/25/2014	-1.85	±	1.07	-6.83	±	3.96	No
QA-2 (IDAHO FALLS)	04/02/2014	-1.11	±	1.56	-4.11	±	5.77	No
	04/09/2014	-2.00	±	1.60	-7.41	±	5.92	No
	04/16/2014	-3.47	±	1.62	-12.85	±	5.99	No
	04/23/2014	-2.04	±	1.57	-7.55	±	5.80	No
	04/30/2014	0.49	±	1.53	1.82	±	5.68	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								
	05/07/2014	-1.79	±	1.66	-6.63	±	6.14	No
	05/14/2014	-2.88	±	1.62	-10.66	±	5.98	No
	05/21/2014	-4.33	±	1.87	-16.04	±	6.91	No
	05/28/2014	-1.34	±	1.64	-4.96	±	6.05	No
	06/04/2014	-1.44	±	1.65	-5.33	±	6.09	No
	06/11/2014	0.44	±	1.01	1.64	±	3.73	No
	06/18/2014	1.13	±	1.06	4.19	±	3.91	No
	06/25/2014	-1.85	±	1.07	-6.86	±	3.98	No
JACKSON	04/02/2014	-5.61	±	2.41	-20.75	±	8.90	No
	04/09/2014	-3.06	±	2.07	-11.34	±	7.65	No
	04/16/2014	-3.64	±	2.12	-13.46	±	7.83	No
	04/23/2014	-1.84	±	2.00	-6.81	±	7.38	No
	04/30/2014	-1.66	±	2.02	-6.14	±	7.48	No
	05/07/2014	-2.62	±	2.11	-9.68	±	7.80	No
	05/14/2014	-1.36	±	2.05	-5.02	±	7.57	No
	05/21/2014	-4.75	±	2.17	-17.57	±	8.03	No
	05/28/2014	-2.63	±	2.20	-9.74	±	8.15	No
	06/04/2014	-2.17	±	2.17	-8.03	±	8.03	No
	06/11/2014	-0.69	±	1.32	-2.54	±	4.90	No
	06/18/2014	-0.04	±	1.30	-0.16	±	4.81	No
	06/25/2014	1.49	±	1.42	5.52	±	5.26	No
SUGAR CITY	04/02/2014	-1.20	±	1.69	-4.46	±	6.26	No
	04/09/2014	-2.18	±	1.75	-8.08	±	6.46	No
	04/16/2014	-3.63	±	1.69	-13.43	±	6.26	No
	04/23/2014	-2.04	±	1.57	-7.55	±	5.79	No
	04/30/2014	0.51	±	1.60	1.89	±	5.90	No
	05/07/2014	-1.76	±	1.63	-6.52	±	6.04	No
	05/14/2014	-3.20	±	1.79	-11.82	±	6.63	No
	05/21/2014	-4.26	±	1.83	-15.75	±	6.78	No
	05/28/2014	-1.43	±	1.74	-5.29	±	6.45	No
	06/04/2014	-1.43	±	1.64	-5.30	±	6.05	No
	06/11/2014	0.51	±	1.17	1.90	±	4.33	No
	06/18/2014	1.14	±	1.06	4.22	±	3.93	No
	06/25/2014	-2.10	±	1.22	-7.76	±	4.50	No
INL SITE								
EFS	04/02/2014	-4.67	±	2.01	-17.30	±	7.42	No
	04/09/2014	-3.03	±	2.04	-11.20	±	7.56	No
	04/16/2014	-3.20	±	1.86	-11.85	±	6.89	No
	04/23/2014	-1.63	±	1.76	-6.01	±	6.52	No
	04/30/2014	-1.61	±	1.96	-5.95	±	7.26	No
	05/07/2014	-2.34	±	1.89	-8.66	±	6.98	No
	05/14/2014	-1.27	±	1.91	-4.70	±	7.08	No
	05/21/2014	-4.45	±	2.03	-16.46	±	7.52	No
	05/28/2014	-2.32	±	1.95	-8.60	±	7.20	No
	06/04/2014	-1.86	±	1.86	-6.87	±	6.87	No
	06/11/2014	-0.61	±	1.18	-2.26	±	4.36	No
	06/18/2014	-0.04	±	1.19	-0.14	±	4.41	No
	06/25/2014	1.48	±	1.41	5.46	±	5.21	No
MAIN GATE	04/02/2014	-4.42	±	1.90	-16.36	±	7.02	No
	04/09/2014	-2.59	±	1.75	-9.60	±	6.48	No

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

Sampling Group and Location	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-15}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-11}$ Bq/mL)			Result > 3s
BOUNDARY								
	04/16/2014	-3.15	±	1.83	-11.65	±	6.78	No
	04/23/2014	-1.51	±	1.64	-5.59	±	6.06	No
	04/30/2014	-1.48	±	1.80	-5.46	±	6.66	No
	05/07/2014	-2.15	±	1.73	-7.94	±	6.40	No
	05/14/2014	-1.15	±	1.74	-4.27	±	6.44	No
	05/21/2014	-3.81	±	1.74	-14.10	±	6.44	No
	05/28/2014	-2.14	±	1.79	-7.90	±	6.61	No
	06/04/2014	-1.72	±	1.72	-6.37	±	6.37	No
	06/11/2014	-0.55	±	1.07	-2.04	±	3.94	No
	06/18/2014	-0.03	±	1.04	-0.13	±	3.85	No
	06/25/2014	1.30	±	1.24	4.81	±	4.59	No
QA-1	04/02/2014	-4.10	±	1.76	-15.15	±	6.50	No
(MAIN GATE)	04/09/2014	-2.38	±	1.61	-8.82	±	5.95	No
	04/16/2014	-2.80	±	1.63	-10.36	±	6.03	No
	04/23/2014	-1.42	±	1.54	-5.26	±	5.70	No
	04/30/2014	-1.36	±	1.66	-5.03	±	6.13	No
	05/07/2014	-1.97	±	1.59	-7.30	±	5.89	No
	05/14/2014	-1.05	±	1.58	-3.88	±	5.86	No
	05/21/2014	-3.63	±	1.66	-13.45	±	6.14	No
	05/28/2014	-1.96	±	1.64	-7.27	±	6.08	No
	06/04/2014	-1.60	±	1.60	-5.94	±	5.94	No
	06/11/2014	-0.54	±	1.05	-2.01	±	3.88	No
	06/18/2014	-0.03	±	0.96	-0.12	±	3.54	No
	06/25/2014	1.12	±	1.07	4.16	±	3.96	No
VAN BUREN GATE	04/02/2014	-4.99	±	2.14	-18.46	±	7.92	No
	04/09/2014	-3.11	±	2.10	-11.51	±	7.77	No
	04/16/2014	-3.47	±	2.02	-12.82	±	7.46	No
	04/23/2014	-1.54	±	1.67	-5.70	±	6.18	No
	04/30/2014	-1.55	±	1.89	-5.73	±	7.00	No
	05/07/2014	-2.20	±	1.77	-8.13	±	6.55	No
	05/14/2014	-1.15	±	1.74	-4.26	±	6.42	No
	05/21/2014	-4.39	±	2.00	-16.23	±	7.41	No
	05/28/2014	-2.19	±	1.83	-8.11	±	6.79	No
	06/04/2014	-1.83	±	1.83	-6.75	±	6.75	No
	06/11/2014	-0.57	±	1.11	-2.12	±	4.10	No
	06/18/2014	-0.03	±	1.04	-0.13	±	3.85	No
	06/25/2014	1.40	±	1.33	5.17	±	4.93	No

a. Invalid sample result

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

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Result > 3s
BOUNDARY									
ARCO	6/25/2014	CESIUM-137	70.20	±	108.00	259.74	±	399.60	No
		STRONTIUM-90	21.40	±	9.61	79.18	±	35.56	No
ATOMIC CITY	6/25/2014	CESIUM-137	74.10	±	87.70	274.17	±	324.49	No
		STRONTIUM-90	30.10	±	9.47	111.37	±	35.04	**Yes**
BLUE DOME	6/25/2014	AMERICIUM-241	-0.80	±	0.71	-2.96	±	2.64	No
		CESIUM-137	-59.70	±	88.10	-220.89	±	325.97	No
		PLUTONIUM-238	0.97	±	0.60	3.59	±	2.22	No
		PLUTONIUM-239/240	-0.48	±	0.59	-1.79	±	2.19	No
FAA TOWER	6/25/2014	CESIUM-137	-144.00	±	138.00	-532.80	±	510.60	No
HOWE	6/25/2014	AMERICIUM-241	0.55	±	0.80	2.04	±	2.97	No
		CESIUM-137	21.30	±	82.90	78.81	±	306.73	No
		PLUTONIUM-238	0.28	±	0.69	1.05	±	2.56	No
		PLUTONIUM-239/240	1.97	±	0.76	7.29	±	2.82	No
MONTEVIEW	6/25/2014	CESIUM-137	24.00	±	84.40	88.80	±	312.28	No
MUD LAKE	6/25/2014	AMERICIUM-241	1.12	±	1.00	4.14	±	3.70	No
		CESIUM-137	87.20	±	108.00	322.64	±	399.60	No
		PLUTONIUM-238	0.84	±	0.69	3.10	±	2.54	No
		PLUTONIUM-239/240	1.39	±	0.75	5.14	±	2.76	No
DISTANT									
BLACKFOOT	6/25/2014	CESIUM-137	331.00	±	143.00	1224.70	±	529.10	No
CRATERS	6/25/2014	AMERICIUM-241	-2.28	±	0.99	-8.44	±	3.67	No
		CESIUM-137	-34.60	±	132.00	-128.02	±	488.40	No
		PLUTONIUM-238	0.00	±	0.67	0.00	±	2.46	No
		PLUTONIUM-239/240	0.00	±	0.66	0.00	±	2.46	No
DUBOIS	6/25/2014	CESIUM-137	46.30	±	83.80	171.31	±	310.06	No
IDAHO FALLS	6/25/2014	CESIUM-137	184.00	±	116.00	680.80	±	429.20	No
		STRONTIUM-90	25.30	±	8.54	93.61	±	31.60	No
QA-2 (IDAHO FALLS)	6/25/2014	CESIUM-137	107.00	±	110.00	395.90	±	407.00	No
		STRONTIUM-90	-3.56	±	8.32	-13.17	±	30.78	No

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

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Result > 3s
JACKSON	6/25/2014	CESIUM-137	-3.56	±	98.50	-13.17	±	364.45	No
SUGAR CITY	6/25/2014	AMERICIUM-241	-0.67	±	0.72	-2.48	±	2.66	No
		CESIUM-137	-170.00	±	91.30	-629.00	±	337.81	No
		PLUTONIUM-238	0.55	±	0.67	2.03	±	2.49	No
		PLUTONIUM-239/240	1.91	±	0.92	7.07	±	3.40	No
INL SITE									
EFS	6/25/2014	AMERICIUM-241	-0.52	±	0.70	-1.93	±	2.57	No
		CESIUM-137	-61.80	±	126.00	-228.66	±	466.20	No
		PLUTONIUM-238	0.57	±	0.70	2.09	±	2.57	No
		PLUTONIUM-239/240	0.85	±	0.70	3.13	±	2.57	No
MAIN GATE	6/25/2014	CESIUM-137	3.00	±	124.00	11.10	±	458.80	No
		STRONTIUM-90	25.90	±	8.09	95.83	±	29.93	**Yes**
QA-1 (MAIN GATE)	6/25/2014	CESIUM-137	161.00	±	104.00	595.70	±	384.80	No
		STRONTIUM-90	-2.99	±	4.68	-11.06	±	17.32	No
VAN BUREN GATE	6/25/2014	AMERICIUM-241	-0.15	±	0.91	-0.56	±	3.35	No
		CESIUM-137	-56.00	±	126.00	-207.20	±	466.20	No
		PLUTONIUM-238	2.55	±	0.87	9.44	±	3.23	No
		PLUTONIUM-239/240	1.41	±	0.76	5.22	±	2.80	No

TABLE C-4. Tritium Concentrations in Atmospheric Moisture

Sampling Group and Location	Start Date	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-13}$ µCi/mL$_{air}$)			Result ± 1s Uncertainty ($\times 10^{-9}$ Bq/mL$_{air}$)			Result > 3s
BOUNDARY									
ATOMIC CITY	03/12/2014	04/17/2014	2.01	±	0.70	7.46	±	2.57	No
ATOMIC CITY	04/17/2014	05/14/2014	3.00	±	0.93	11.10	±	3.44	**Yes**
ATOMIC CITY	05/14/2014	06/11/2014	4.84	±	1.07	17.91	±	3.95	**Yes**
DISTANT									
BLACKFOOT	03/12/2014	04/09/2014	1.11	±	0.88	4.12	±	3.27	No
BLACKFOOT	04/09/2014	04/30/2014	3.18	±	1.00	11.75	±	3.71	**Yes**
BLACKFOOT	04/30/2014	05/21/2014	2.21	±	0.98	8.18	±	3.64	No
BLACKFOOT	05/21/2014	06/04/2014	6.52	±	1.50	24.11	±	5.55	**Yes**
BLACKFOOT	06/04/2014	06/18/2014	1.91	±	1.43	7.07	±	5.30	No
IDAHO FALLS	03/19/2014	04/17/2014	2.08	±	0.76	7.69	±	2.82	No
IDAHO FALLS	04/17/2014	05/09/2014	4.76	±	1.15	17.62	±	4.25	**Yes**
IDAHO FALLS	05/09/2014	05/28/2014	4.37	±	1.18	16.18	±	4.38	**Yes**
IDAHO FALLS	05/28/2014	06/11/2014	4.17	±	1.43	15.41	±	5.30	No
IDAHO FALLS	06/11/2014	06/25/2014	3.15	±	1.57	11.65	±	5.80	No
SUGAR CITY	03/26/2014	04/23/2014	3.41	±	0.97	12.62	±	3.60	**Yes**
SUGAR CITY	04/23/2014	05/14/2014	2.16	±	1.06	8.00	±	3.93	No
SUGAR CITY	05/14/2014	05/28/2014	5.53	±	1.41	20.45	±	5.23	**Yes**
SUGAR CITY	05/28/2014	06/11/2014	5.93	±	1.44	21.95	±	5.33	**Yes**
SUGAR CITY	06/11/2014	06/25/2014	4.13	±	1.49	15.29	±	5.51	No

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

Location	Start Date	End Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
IDAHO FALLS	3/31/2014	4/30/2014	74.30	±	21.10	2.75	±	0.78	**Yes**
	4/30/2014	5/30/2014	58.70	±	20.80	2.17	±	0.77	No
	5/30/2014	6/30/2014	76.60	±	21.86	2.83	±	0.81	**Yes**
CFA	3/3/2014	4/1/2014	91.30	±	23.00	3.38	±	0.85	**Yes**
	4/1/2014	4/28/2014	75.10	±	21.40	2.78	±	0.79	**Yes**
	4/28/2014	6/2/2014	93.40	±	21.20	3.46	±	0.78	**Yes**
EFS	3/26/2014	4/2/2014	80.80	±	22.20	2.99	±	0.82	**Yes**
	4/23/2014	4/30/2014	112.00	±	21.60	4.14	±	0.80	**Yes**

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

Location	Sampling Date	Analyte	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
SURFACE WATER									
Alpheus Spring	5/12/2014	GROSS ALPHA	1.03	±	0.63	0.04	±	0.02	No
		GROSS BETA	10.60	±	0.56	0.39	±	0.02	**Yes**
		TRITIUM	40.67	±	21.27	1.51	±	0.79	No
Bill Jones Fish Farm	5/12/2014	GROSS ALPHA	0.77	±	0.48	0.03	±	0.02	No
		GROSS BETA	3.23	±	0.50	0.12	±	0.02	**Yes**
		TRITIUM	5.89	±	21.60	0.22	±	0.80	No
Clear Springs	5/12/2014	GROSS ALPHA	0.53	±	0.55	0.02	±	0.02	No
		GROSS BETA	3.80	±	0.54	0.14	±	0.02	**Yes**
		TRITIUM	28.00	±	21.90	1.04	±	0.81	No
DRINKING WATER									
Atomic City	5/14/2014	GROSS ALPHA	0.49	±	0.44	0.02	±	0.02	No
		GROSS BETA	4.42	±	0.51	0.16	±	0.02	**Yes**
		TRITIUM	37.40	±	21.00	1.39	±	0.78	No
Control	5/13/2014	GROSS ALPHA	0.26	±	0.24	0.01	±	0.01	No
		GROSS BETA	0.27	±	0.39	0.01	±	0.01	No
		TRITIUM	71.10	±	20.90	2.63	±	0.77	**Yes**
Craters of the Moon	5/14/2014	GROSS ALPHA	2.48	±	0.51	0.09	±	0.02	**Yes**
		GROSS BETA	3.39	±	0.50	0.13	±	0.02	**Yes**
		TRITIUM	103.00	±	21.60	3.81	±	0.80	**Yes**
Howe	5/14/2014	GROSS ALPHA	0.02	±	0.47	0.00	±	0.02	No
		GROSS BETA	3.82	±	0.44	0.14	±	0.02	**Yes**
		TRITIUM	60.80	±	21.00	2.25	±	0.78	No
Idaho Falls	5/13/2014	GROSS ALPHA	-0.37	±	0.55	-0.01	±	0.02	No
		GROSS BETA	5.31	±	0.49	0.20	±	0.02	**Yes**
		TRITIUM	62.50	±	20.70	2.31	±	0.77	**Yes**
Minidoka	5/12/2014	GROSS ALPHA[a]	1.18	±	0.52	0.04	±	0.02	No
		GROSS BETA[a]	3.33	±	0.52	0.12	±	0.02	**Yes**
		TRITIUM[a]	102.00	±	21.30	3.78	±	0.79	**Yes**

[a] A review of the table, performed during the summer of 2020, identified the value listed for the result was incorrect. The value was updated with the correct value. The uncertainty value listed was correct and did not require an update. For further discussion, see Water Sampling in Section 4.

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
Mud Lake	5/15/2014	GROSS ALPHA	0.10	±	0.35	0.00	±	0.01	No
		GROSS BETA	3.15	±	0.47	0.12	±	0.02	**Yes**
		TRITIUM	78.80	±	20.90	2.92	±	0.77	**Yes**
Rest Area	5/14/2014	GROSS ALPHA	0.49	±	0.45	0.02	±	0.02	No
		GROSS BETA	1.83	±	0.48	0.07	±	0.02	**Yes**
		TRITIUM	139.00	±	21.70	5.15	±	0.80	**Yes**
Shoshone	5/12/2014	GROSS ALPHA	0.42	±	0.49	0.02	±	0.02	No
		GROSS BETA	2.92	±	0.51	0.11	±	0.02	**Yes**
		TRITIUM	46.60	±	20.60	1.73	±	0.76	No
Shoshone (duplicate)	5/12/2014	GROSS ALPHA	1.15	±	0.52	0.04	±	0.02	No
		GROSS BETA	3.96	±	0.50	0.15	±	0.02	**Yes**
		TRITIUM	85.70	±	21.10	3.17	±	0.78	**Yes**

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	04/03/14	0.75	±	1.81	0.028	±	0.067	No	0.76	±	1.51	0.028	±	0.056	No
Duplicate	04/03/14	0.98	±	1.58	0.036	±	0.059	No	2.76	±	1.00	0.102	±	0.037	No
	05/04/14	-0.41	±	1.17	-0.015	±	0.043	No	0.77	±	0.94	0.028	±	0.035	No
	06/01/14	-0.68	±	1.18	-0.025	±	0.044	No	1.35	±	0.97	0.050	±	0.036	No
CONTROL	04/01/14	1.67	±	1.40	0.062	±	0.052	No	3.13	±	1.73	0.116	±	0.064	No
	05/06/14	0.80	±	1.95	0.030	±	0.072	No	0.59	±	1.39	0.022	±	0.051	No
	06/03/14	0.25	±	1.40	0.009	±	0.052	No	-0.29	±	1.55	-0.011	±	0.057	No
DIETRICH	04/01/14	0.18	±	1.33	0.007	±	0.049	No	-0.51	±	1.12	-0.019	±	0.041	No
	05/06/14	-1.01	±	1.42	-0.037	±	0.053	No	-0.63	±	1.58	-0.023	±	0.059	No
	06/03/14	2.70	±	1.38	0.100	±	0.051	No	-0.91	±	0.71	-0.034	±	0.026	No
FORT HALL	04/03/14	1.52	±	1.99	0.056	±	0.074	No	1.20	±	1.62	0.044	±	0.060	No
	05/05/14	-1.67	±	1.50	-0.062	±	0.056	No	-1.76	±	0.77	-0.065	±	0.029	No
HOWE	04/01/14	1.07	±	1.35	0.040	±	0.050	No	-0.39	±	0.73	-0.014	±	0.027	No
	05/06/14	1.00	±	1.71	0.037	±	0.063	No	-0.63	±	1.39	-0.023	±	0.051	No
	06/03/14	1.49	±	1.30	0.055	±	0.048	No	2.04	±	1.46	0.076	±	0.054	No
Duplicate	06/03/14	-1.36	±	1.81	-0.050	±	0.067	No	0.41	±	1.43	0.015	±	0.053	No
IDAHO FALLS	04/01/14	1.02	±	1.21	0.038	±	0.045	No	2.06	±	1.53	0.076	±	0.057	No
	04/08/14	2.40	±	1.35	0.089	±	0.050	No	0.19	±	0.74	0.007	±	0.027	No
	04/15/14	-0.27	±	1.30	-0.010	±	0.048	No	-0.23	±	0.71	-0.009	±	0.026	No
	04/22/14	0.42	±	1.16	0.015	±	0.043	No	0.48	±	1.59	0.018	±	0.059	No
	04/29/14	-1.27	±	1.03	-0.047	±	0.038	No	1.86	±	0.94	0.069	±	0.035	No
	05/06/14	-1.39	±	1.78	-0.051	±	0.066	No	-0.18	±	1.40	-0.007	±	0.052	No
	05/13/14	1.82	±	1.06	0.067	±	0.039	No	0.96	±	0.90	0.036	±	0.033	No
	05/20/14	-0.60	±	1.03	-0.022	±	0.038	No	0.60	±	0.92	0.022	±	0.034	No
	05/27/14	-0.03	±	0.99	-0.001	±	0.037	No	0.67	±	0.92	0.025	±	0.034	No
	06/03/14	-0.99	±	1.12	-0.037	±	0.041	No	2.39	±	1.46	0.089	±	0.054	No
	06/10/14	0.71	±	1.02	0.026	±	0.038	No	0.04	±	0.91	0.002	±	0.034	No
	06/17/14	0.63	±	1.00	0.023	±	0.037	No	0.25	±	0.88	0.009	±	0.032	No
	06/24/14	-1.85	±	1.35	-0.069	±	0.050	No	0.06	±	0.70	0.002	±	0.026	No
RUPERT	04/01/14	-2.54	±	1.42	-0.094	±	0.053	No	0.29	±	1.45	0.011	±	0.054	No
	05/06/14	0.05	±	1.21	0.002	±	0.045	No	0.45	±	1.47	0.016	±	0.054	No
	06/03/14	0.57	±	1.09	0.021	±	0.040	No	-1.23	±	0.99	-0.046	±	0.037	No
TERRETON	04/01/14	0.43	±	1.44	0.016	±	0.053	No	0.23	±	1.11	0.008	±	0.041	No
	05/06/14	-1.56	±	1.17	-0.058	±	0.043	No	-0.93	±	0.95	-0.035	±	0.035	No
	06/03/14	-1.47	±	1.40	-0.054	±	0.052	No	0.69	±	0.75	0.026	±	0.028	No

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

Location	Sampling Date	Strontium-90 Result ± 1s Uncertainty (pCi/L)			Strontium-90 Result ± 1s Uncertainty (Bq/L)			Result > 3s
3.33333E+61	05/04/14	0.43	±	0.09	0.016	±	0.003	**Yes**
CONTROL	05/06/14	0.50	±	0.10	0.019	±	0.004	**Yes**
DIETRICH	05/06/14	0.50	±	0.09	0.019	±	0.004	**Yes**
FORT HALL	05/05/14	0.53	±	0.10	0.020	±	0.004	**Yes**
HOWE	05/06/14	0.36	±	0.09	0.013	±	0.003	**Yes**
IDAHO FALLS	05/06/14	0.44	±	0.09	0.016	±	0.003	**Yes**
RUPERT	05/06/14	0.32	±	0.08	0.012	±	0.003	**Yes**
TERRETON	05/06/14	0.66	±	0.11	0.024	±	0.004	**Yes**
		Tritium						
		Concentration ± 1s			**Concentration ± 1s**			**Result > 3s**
BLACKFOOT	05/04/14	36.66	±	21.31	1.358	±	0.789	No
CONTROL	05/06/14	60.06	±	21.50	2.225	±	0.796	No
DIETRICH	05/06/14	29.26	±	21.32	1.084	±	0.790	No
FORT HALL	05/05/14	64.86	±	21.67	2.402	±	0.803	No
HOWE	05/06/14	59.50	±	21.21	2.204	±	0.785	No
IDAHO FALLS	05/06/14	55.76	±	21.66	2.065	±	0.802	No
RUPERT	05/06/14	38.47	±	21.33	1.425	±	0.790	No
TERRETON	05/06/14	98.55	±	21.71	3.650	±	0.804	**Yes**

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

Location	Sampling Date	Result ± 1s Uncertainty pCi/kg			Result ± 1s Uncertainty Bq/kg			Result > 3s
		Cesium-137						
MUD LAKE	06/17/14	-2.31	±	152.00	-0.09	±	5.63	No
MUD LAKE	06/17/14	11.30	±	144.00	0.42	±	5.33	No
MUD LAKE	06/17/14	90.40	±	144.00	3.35	±	5.33	No
		Strontium-90						
MUD LAKE	06/17/14	50.70	±	19.50	1.88	±	0.72	No
MUD LAKE	06/17/14	34.90	±	19.00	1.29	±	0.70	No
MUD LAKE	06/17/14	71.80	±	22.70	2.66	±	0.84	**Yes**

Table C-10. Environmental Radiation Measurements Using TLDs

Location	Start Date	End Date	Radiation Measurement ± 2s Uncertainty mR			Exposure mR/day
BOUNDARY						
ARCO	11/6/2013	5/7/2014	56.80	±	13.10	0.31
ATOMIC CITY	11/6/2013	5/7/2014	69.60	±	13.66	0.38
BIRCH CREEK	11/6/2013	5/7/2014	61.00	±	11.96	0.34
BLUE DOME	11/6/2013	5/7/2014	57.00	±	11.18	0.31
HOWE	11/6/2013	5/7/2014	65.40	±	12.82	0.36
MONTEVIEW	11/6/2013	5/7/2014	63.90	±	12.52	0.35
MUD LAKE	11/6/2013	5/7/2014	71.80	±	14.08	0.39
					Boundary Average	**0.35**
DISTANT						
ABERDEEN	11/5/2013	5/6/2014	66.60	±	12.82	0.37
BLACKFOOT	11/6/2013	5/7/2014	Invalid Result-see text for explanation			
BLACKFOOT CMS	11/6/2013	5/7/2014	60.00	±	11.76	0.33
CRATERS	11/6/2013	5/7/2014	64.60	±	12.68	0.35
DUBOIS	11/6/2013	5/7/2014	56.50	±	11.08	0.31
IDAHO FALLS	11/6/2013	5/7/2014	64.30	±	12.62	0.35
MINIDOKA	11/5/2013	5/6/2014	61.50	±	12.06	0.34
ROBERTS	11/5/2013	5/6/2014	68.90	±	13.52	0.38
SUGAR CITY	11/6/2013	5/7/2014	80.30	±	15.74	0.44
					Distant Average	**0.36**
OUT-OF-STATE						
JACKSON	11/4/2013	5/1/2014	53.40	±	10.48	0.30

Table C-11. Environmental Radiation Measurements Using OSLDs

Location	Start Date	End Date	Radiation Measurement ± 2s Uncertainty mrem	Dose mrem/day
BOUNDARY				
ARCO	11/6/2013	5/7/2014	60.40 ± 6.04	0.33
ATOMIC CITY	11/6/2013	5/7/2014	53.00 ± 5.29	0.29
BIRCH CREEK	11/6/2013	5/7/2014	49.90 ± 4.99	0.27
BLUE DOME	11/6/2013	5/7/2014	40.80 ± 4.08	0.22
HOWE	11/6/2013	5/7/2014	48.50 ± 4.84	0.27
MONTEVIEW	11/6/2013	5/7/2014	49.70 ± 4.97	0.27
MUD LAKE	11/6/2013	5/7/2014	58.70 ± 5.86	0.32
			Boundary Average	**0.28**
DISTANT				
ABERDEEN	11/5/2013	5/6/2014	54.30 ± 5.43	0.30
BLACKFOOT	11/6/2013	5/7/2014	Invalid Result-see text for explanation	
BLACKFOOT CMS	11/6/2013	5/7/2014	50.00 ± 5.00	0.27
CRATERS	11/6/2013	5/7/2014	53.10 ± 5.32	0.29
DUBOIS	11/6/2013	5/7/2014	42.80 ± 4.27	0.23
IDAHO FALLS	11/6/2013	5/7/2014	48.70 ± 4.87	0.27
MINIDOKA	11/5/2013	5/6/2014	51.80 ± 5.18	0.28
ROBERTS	11/5/2013	5/6/2014	54.20 ± 5.43	0.30
SUGAR CITY	11/6/2013	5/7/2014	65.10 ± 6.50	0.36
			Distant Average	**0.29**
OUT-OF-STATE				
JACKSON	11/4/2013	5/1/2014	43.70 ± 4.37	0.25

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	0.16
April	0.56
May	0.15
June	0.81
Gross Beta	
Quarter	1.00
April	0.97
May	0.99
June	0.98

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		
	April 2	0.32
	April 9	0.83
	April 16	0.32
	April 23	0.78
	April 30	0.78
	May 7	0.28
	May 14	0.39
	May 21	0.47
	May 28	0.15
	June 4	1.00
	June 11	0.57
	June 18	1.00
	June 25	1.00
Gross Beta		
	April 2	0.15
	April 9	0.01
	April 16	0.67
	April 23	0.28
	April 30	0.83
	May 7	0.48
	May 14	0.32
	May 21	0.22
	May 28	0.06
	June 4	0.57
	June 11	1.00
	June 18	0.77
	June 25	0.89

a. A 'p' value greater than 0.05 signifies no statistical difference between data groups. A 'p' value less than or equal to 0.05 and highlighted in red signifies a statistical difference between data groups