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Idaho National Laboratory Site Offsite Environmental Surveillance Program Report: Third Quarter 2012

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EXECUTIVE SUMMARY

None of the radionuclides detected in samples collected during the third quarter of 2012 could be directly linked with INL Site activities. Levels of detected radionuclides were no different than values measured at other locations across the western United States. All detected radionuclide concentrations were well below standards set by the U.S. Department of Energy (DOE) and regulatory standards established by the U.S. Environmental Protection Agency (EPA) for protection of the public.

This report for the third quarter of 2012 contains results from the Environmental Surveillance, Education, and Research (ESER) Program's monitoring of the Department of Energy's Idaho National Laboratory (INL) Site's offsite environment, July 1 through September 30, 2012. All sample types (media) and the sampling schedule followed during 2012 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 sampling
- Milk, lettuce, grain, and large game animal sampling
- Soil sampling

Table E-1 Summary of results for the Third Quarter of 2012.

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	Gross alpha concentrations were elevated at all sampling locations during August and September due to naturally-occurring polonium-210 in smoke from large wildfires. Gross beta concentrations were statistically higher at Distant locations than at Boundary and INL Site locations for the quarter and during September. This does not indicate an impact from INL Site operations. 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 were detected. Plutonium-238 was reported on one composite right at the lower limit of detection. Strontium-90 was detected at all locations at similar concentrations to those found throughout the past year.
	Charcoal Cartridge	Iodine-131	No Iodine-131 was found on any third quarter charcoal cartridges.
Atmospheric Moisture	Liquid	Tritium	Ten of the 20 results had tritium concentrations greater than the 3s uncertainty. No sample result exceeded the DCS for tritium in air. Results were consistent with historical measurements.
Precipitation	Liquid	Tritium	Ten samples were collected. Two 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.
Milk	Liquid	Iodine-131, other gamma-emitting radionuclides	No Iodine-131 or other human-made gamma-emitting radionuclides were detected.
Lettuce	Vegetation	Gamma-emitting radionuclides, ^{90}Sr	Eleven lettuce samples were collected. No manmade gamma-emitting radionuclides were found in any sample. Strontium-90 was detected in five samples at levels consistent with fallout from weapons testing.
Grain	Vegetation	Gamma-emitting radionuclides, ^{90}Sr	Ten wheat samples were collected. No manmade gamma-

			emitting radionuclides or ^{90}Sr was found in any sample.
Large Game Animals	Tissue	Gamma-emitting radionuclides	One game animal was sampled during the quarter. No human-made radionuclides were detected.
Soil	Solid	Gamma emitting radionuclides, ^{90}Sr, ^{241}Am, and plutonium	Cesium-137 was detected in all 14 samples collected. Strontium-90 was detected in six of the samples and Plutonium-239/240 was found in 11 samples. The origin of these nuclides is probably deposition of fallout from atmospheric nuclear weapons testing and concentrations over time are consistent with their relative half-lives.

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 2012, 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), ALS Environmental, and the Wildlife Conservation Society.

This report contains monitoring results from the ESER Program for samples collected during the third quarter of 2012 (July 1-September 30, 2012).

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 six dairies around the INL Site, potatoes from at least five local producers, wheat from approximately 10 local producers, and lettuce from approximately nine home-owned and portable gardens on and around the INL
- soil from 12 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. Beginning with second quarter samples, 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 a new laboratory—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, the EPA may request additional sampling be performed through RadNet [previously known as the Environmental Radiation Ambient Monitoring System (ERAMS) network] (EPA 2011). 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.

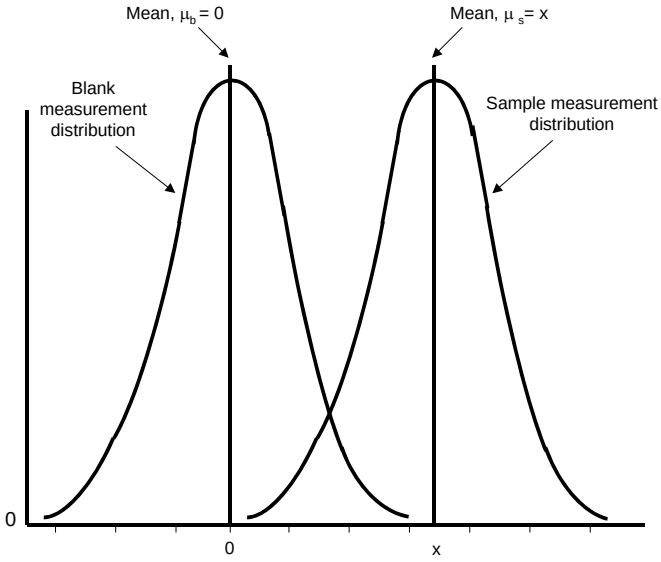

Figure 1. Example of overlap of blank and sample measurement distributions.

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 by 2012.

3. AIR SAMPLING

The primary pathway by which radionuclides can move off the INL Site is through the air and for this reason the air pathway is the primary focus of monitoring on and around the INL Site. Samples for particulates and iodine-131 (^{131}I) gas in air were collected weekly for the duration of the quarter at 16 locations using low-volume air samplers. Moisture in the atmosphere was sampled at four locations around the INL Site and analyzed for tritium. Air sampling activities and results for the third quarter of 2012 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 third quarter of 2012 (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 18,306 ft^3 (518 m^3) of air was sampled at each location, each week, at an average flow rate of 1.82 ft^3/min (0.05 m^3/min). Particulates in air were collected on membrane particulate filters (1.2-µm pore size). Gases passing through the filter were collected with an activated charcoal cartridge.

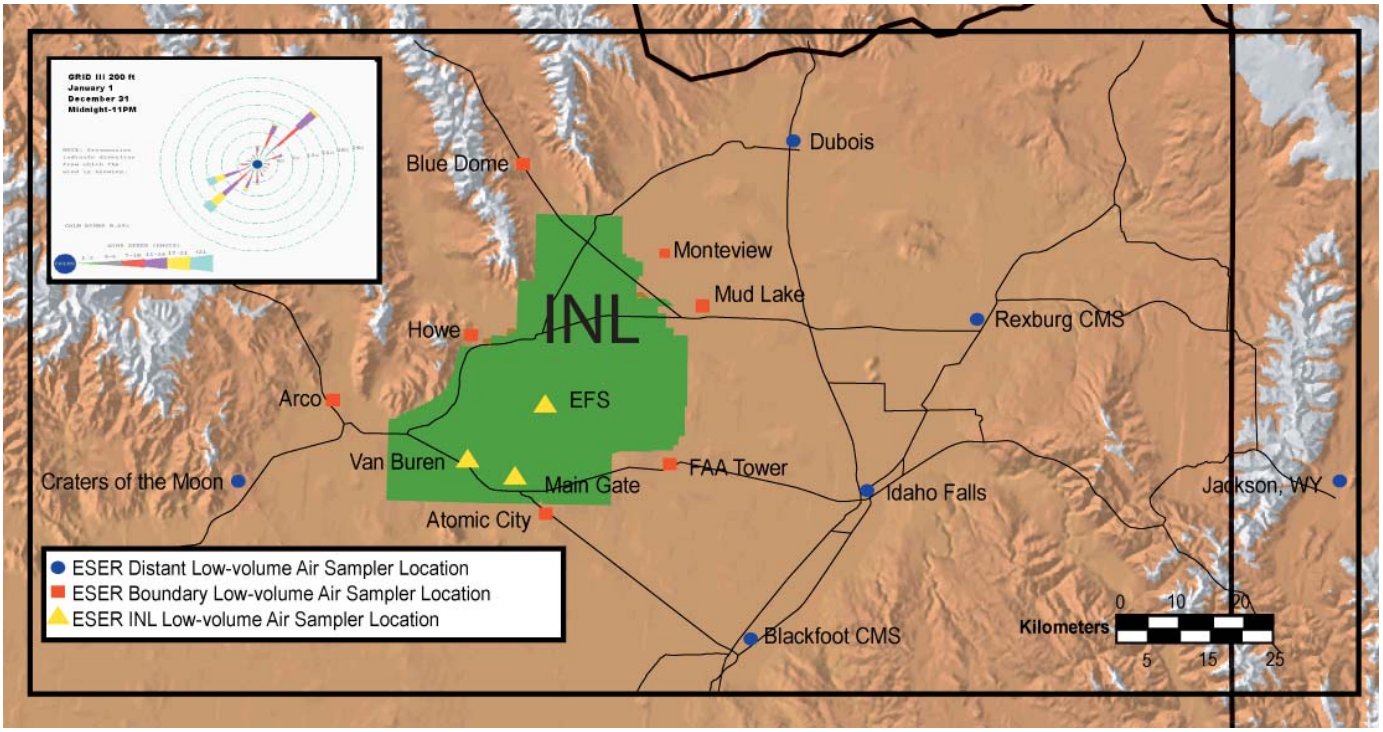

Figure 2. Low-volume air sampler locations.

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 not a statistical difference noted.

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). Elevated concentrations of gross alpha were found at all sampling locations throughout the second half of August and most of September. During this period, very smoky conditions were present in the sampling area due to large wildfires. Fires release naturally-occurring polonium-210 that has been taken up from the soil by vegetation and this leads to higher than normal gross alpha concentrations.

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 third quarter, there were two weeks where a statistical difference existed between the two sample groups (Table D-2). During one of these (August 1), the Distant group was higher than the Boundary group, with a similar pattern to the overall pattern for the quarter. In the second instance (August 15) the Boundary concentration was higher. This was the first week where smoke from wildfires appeared in the Snake River Plain. The largest wildfire was in the Salmon area, and may have first affected the sampling locations in that direction, i.e. Blue Dome and Howe.

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 were noted in the quarterly data and during the month of September using the Kruskal-Wallace test (Table D-1). However, in both cases the Distant locations had higher gross beta concentrations than the Boundary and INL Site locations. This is the opposite of what would be expected if the INL Site were contributing to the differences.

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 the week of September 12 (Table D-1). As with the quarterly and monthly data, higher concentrations were noted at Distant stations during this week (Blackfoot, Jackson, and Rexburg) but this appears to be normal variation in the results.

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

No ^{137}Cs, $^{239/240}Pu$, or ^{241}Am.were detected. Plutonium-238 was reported on the composite from Mud Lake but the value was right at the lower limit of detection.

Strontiium-90 was detected in six of the seven composites analyzed. Similar concentrations were found at Distant, Boundary, and INL Site locations, and concentrations were similar to those detected beginning in the second half of 2011 after a more sensitive analytical method went into use.

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 20 atmospheric moisture samples collected during the third quarter of 2012. Ten 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 11.2×10^{-13} $\mu Ci/mL_{air}$ at Rexburg. Results are shown in Table C-4, Appendix C.

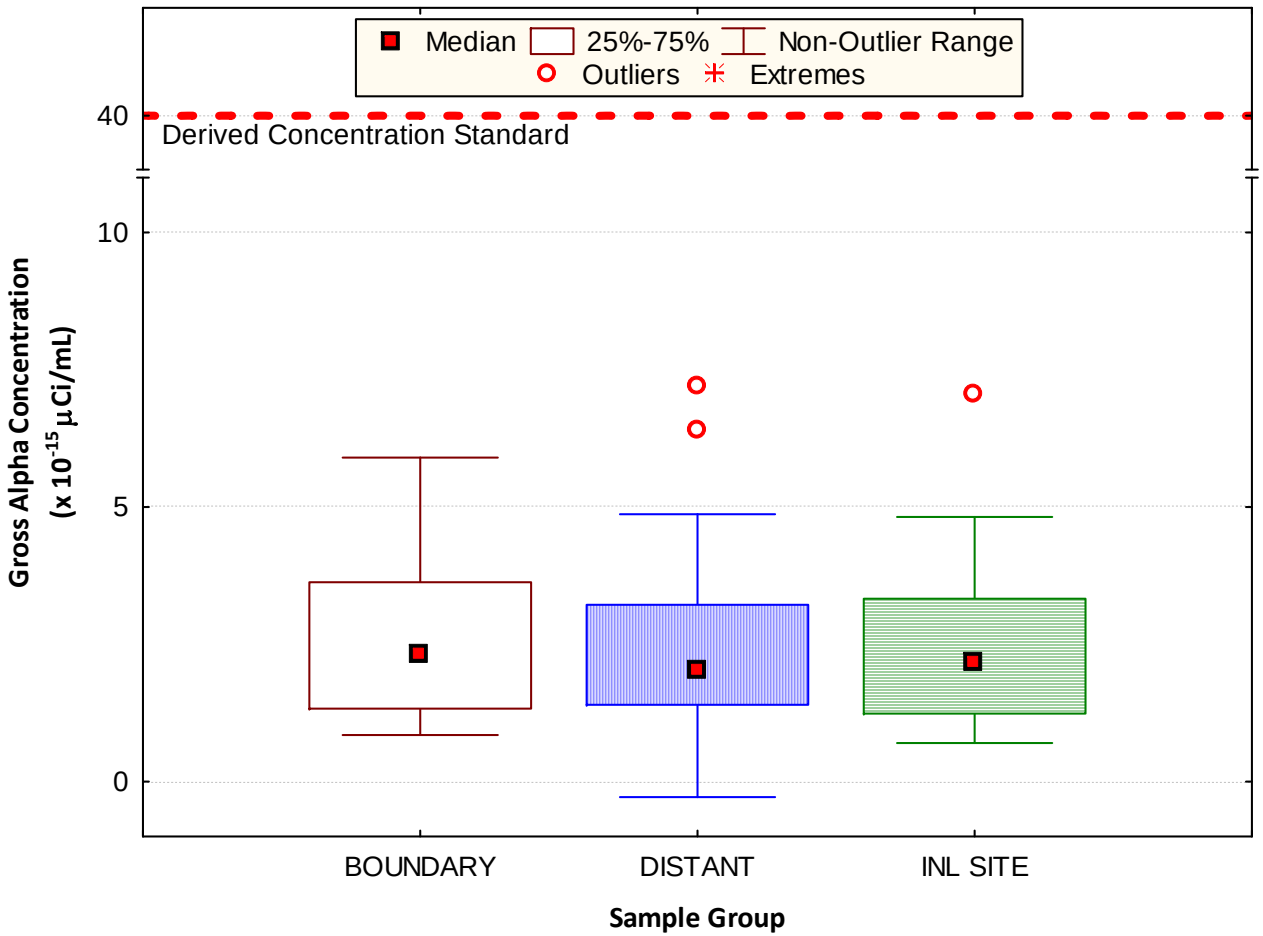

Figure 3. Gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations for the third quarter of 2012.

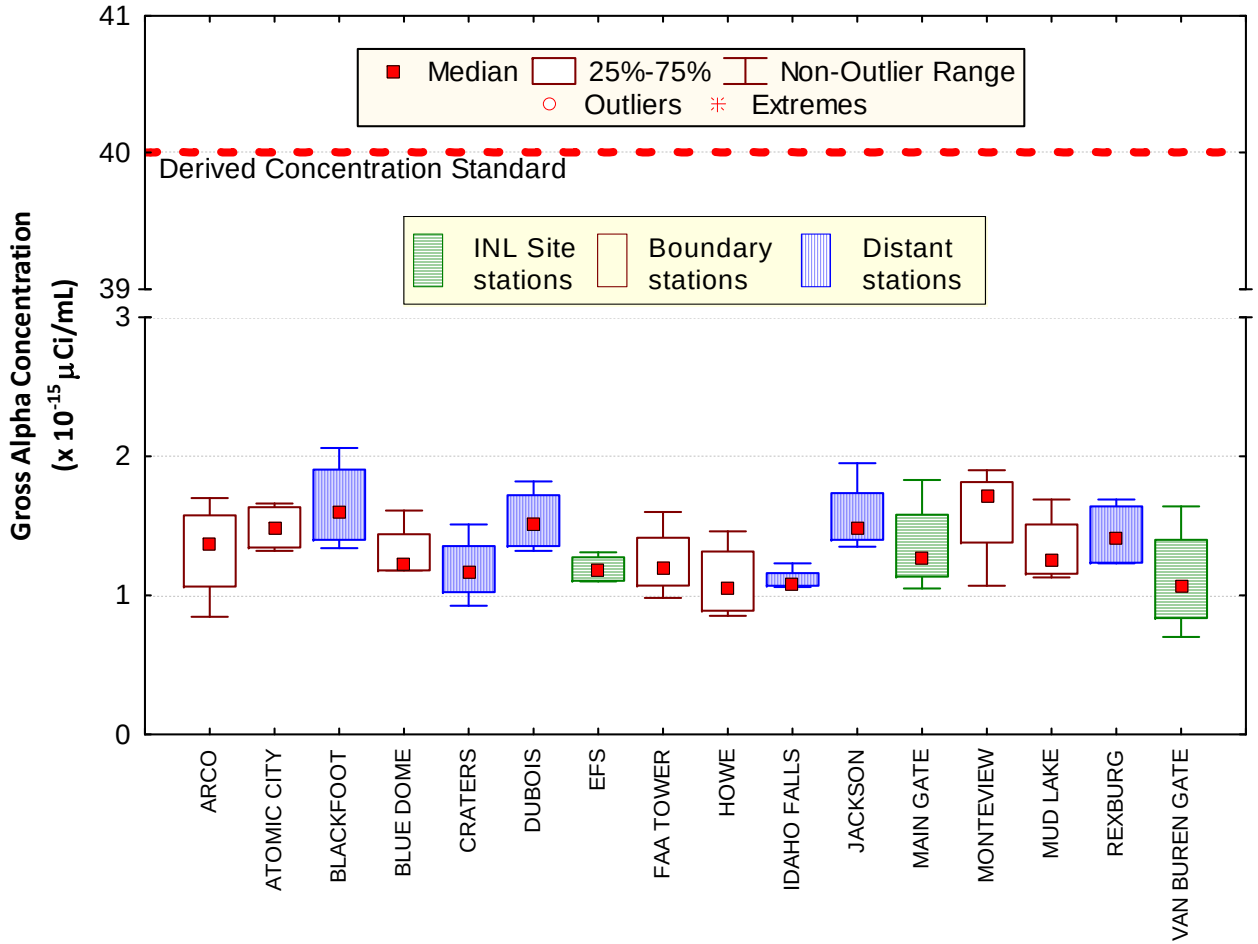

Figure 4. July gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

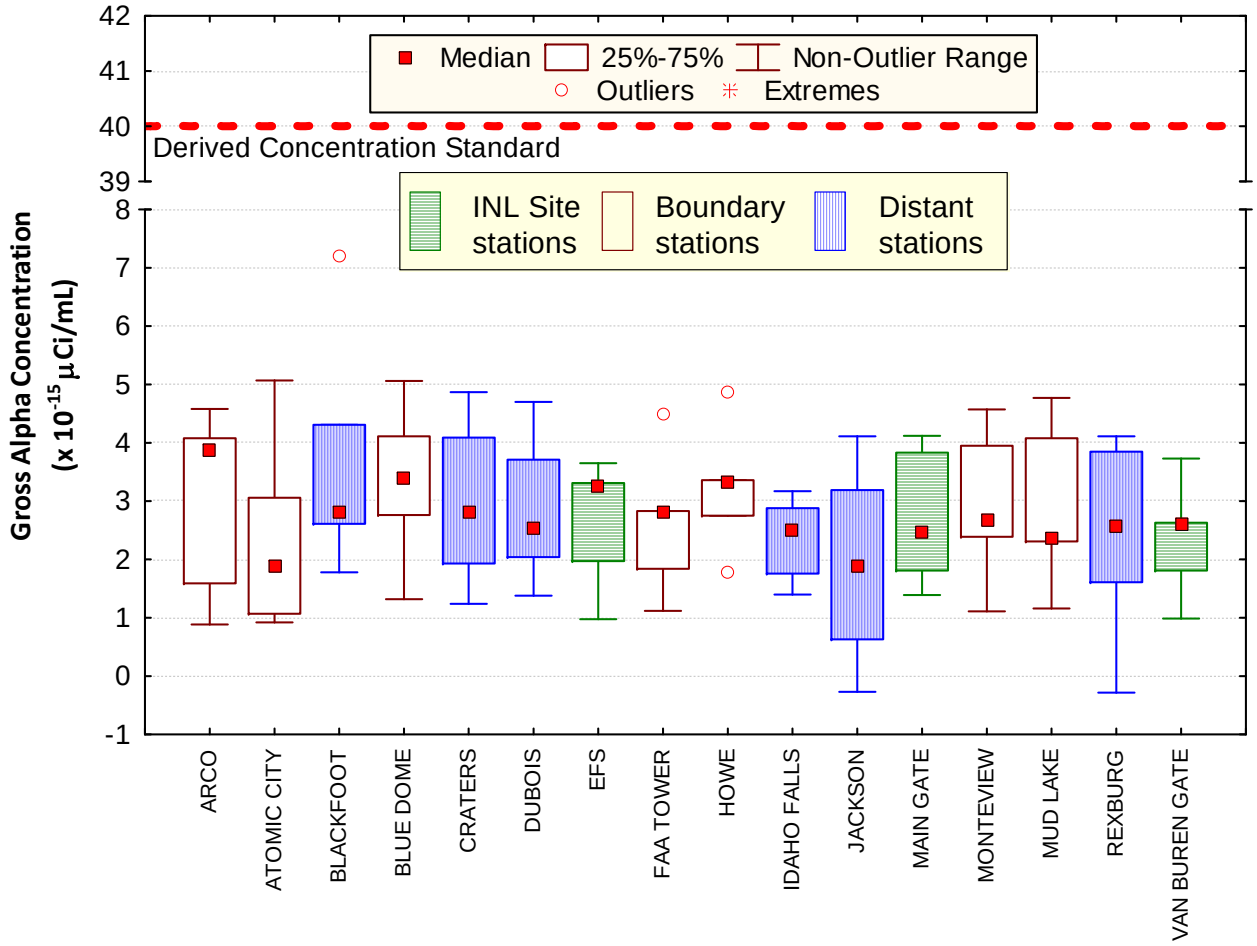

Figure 5. August gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location, except Jackson (N = 4).

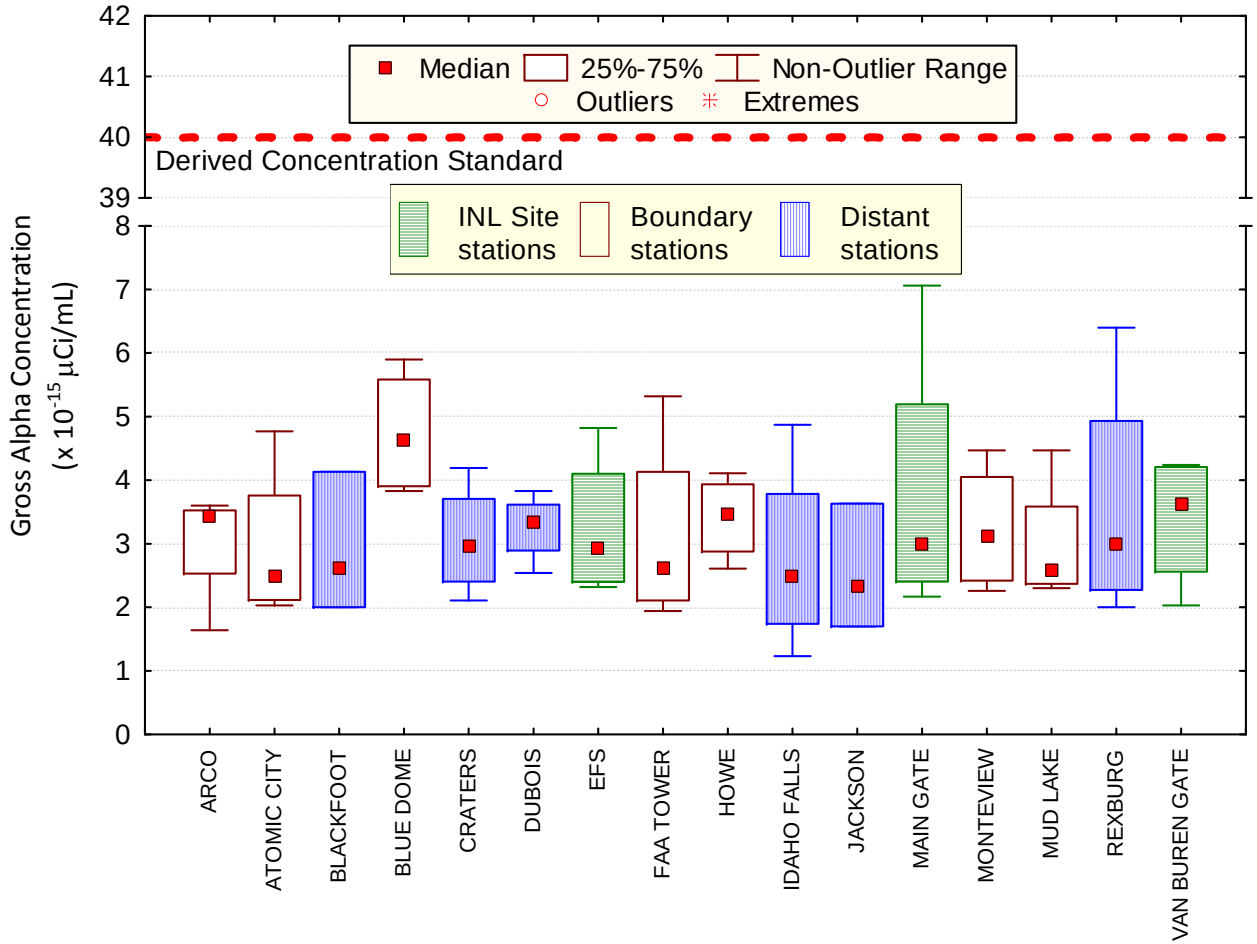

Figure 6. September gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location, except Blackfoot and Jackson (N = 3).

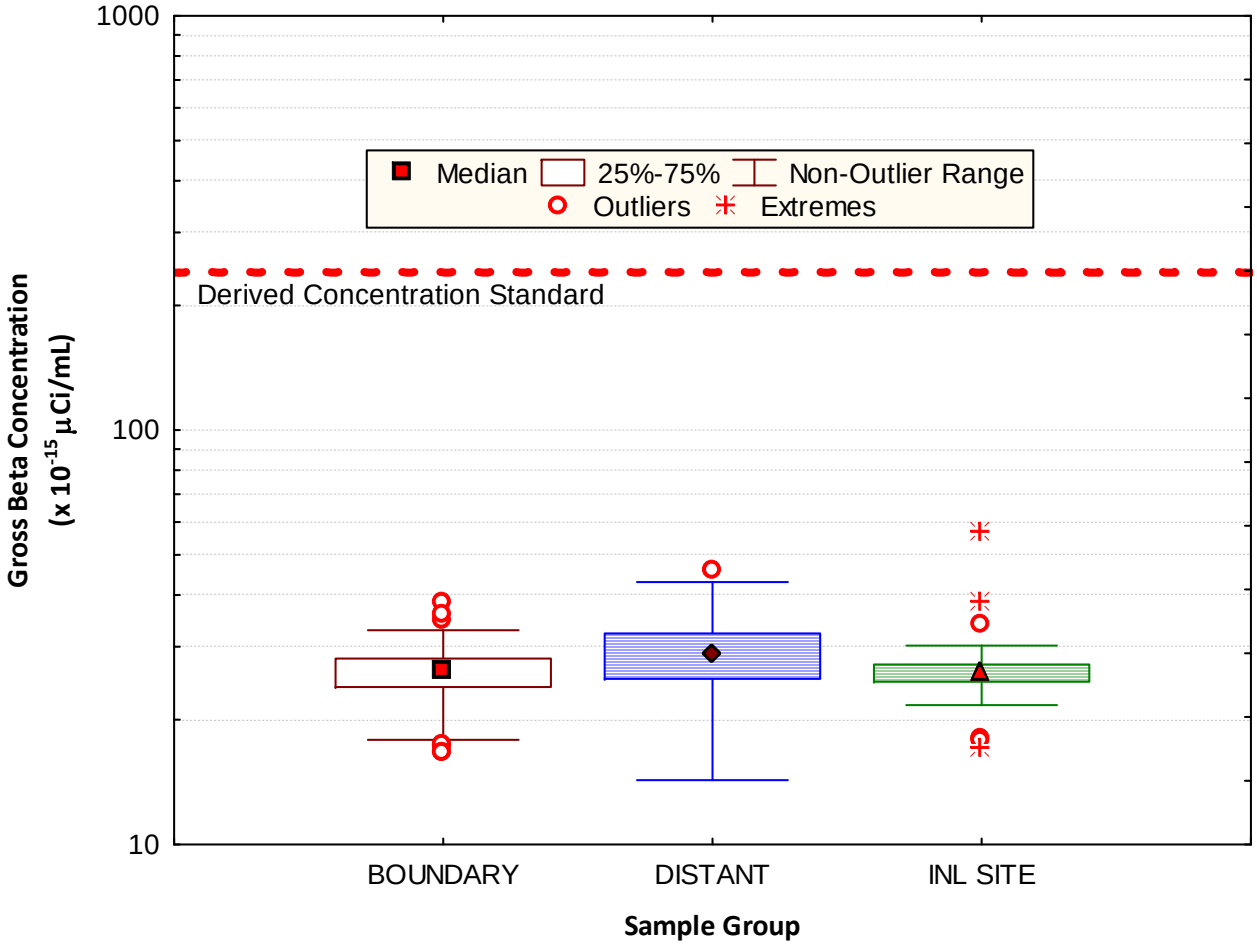

Figure 7. Gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations for the third quarter of 2012.

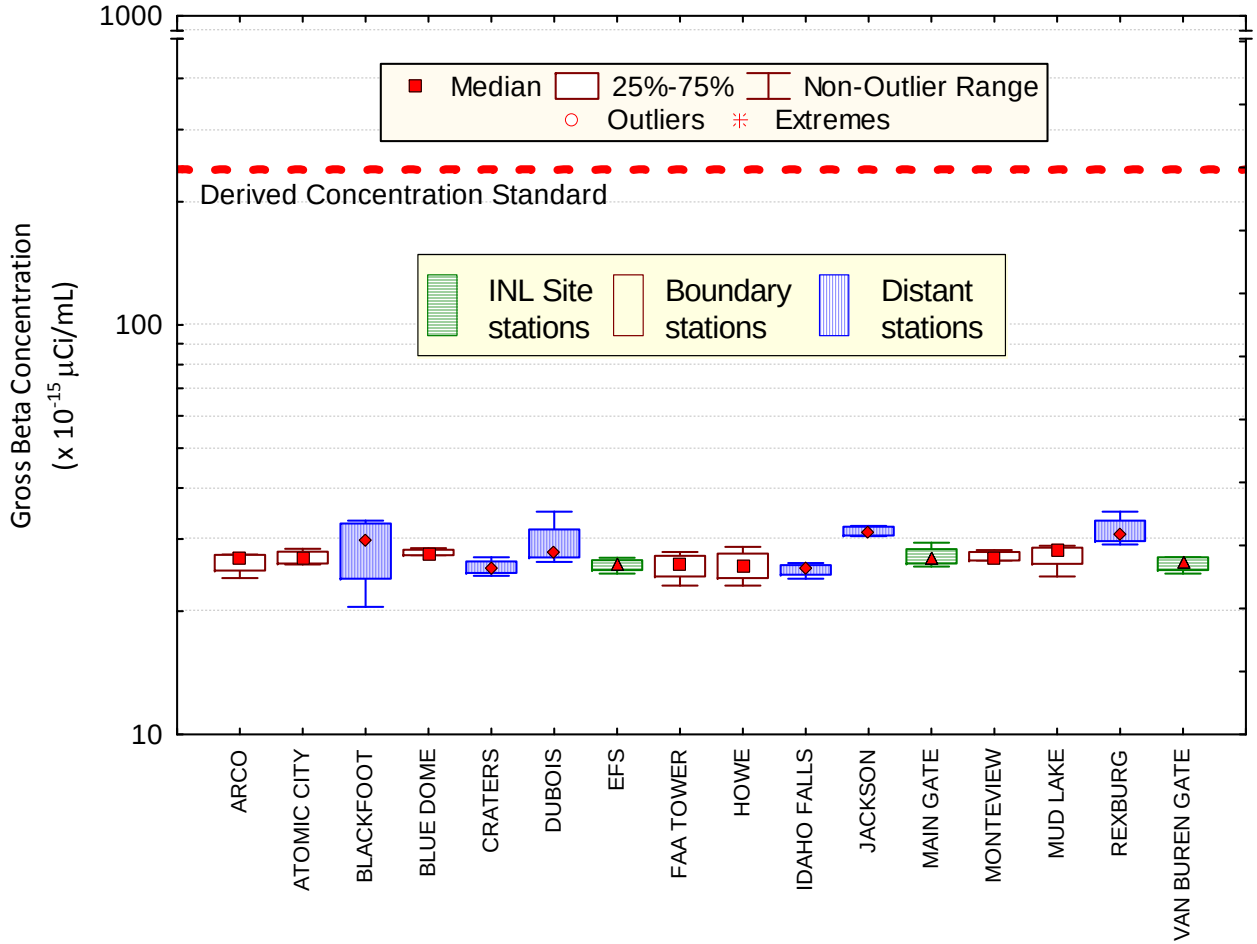

Figure 8. July gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

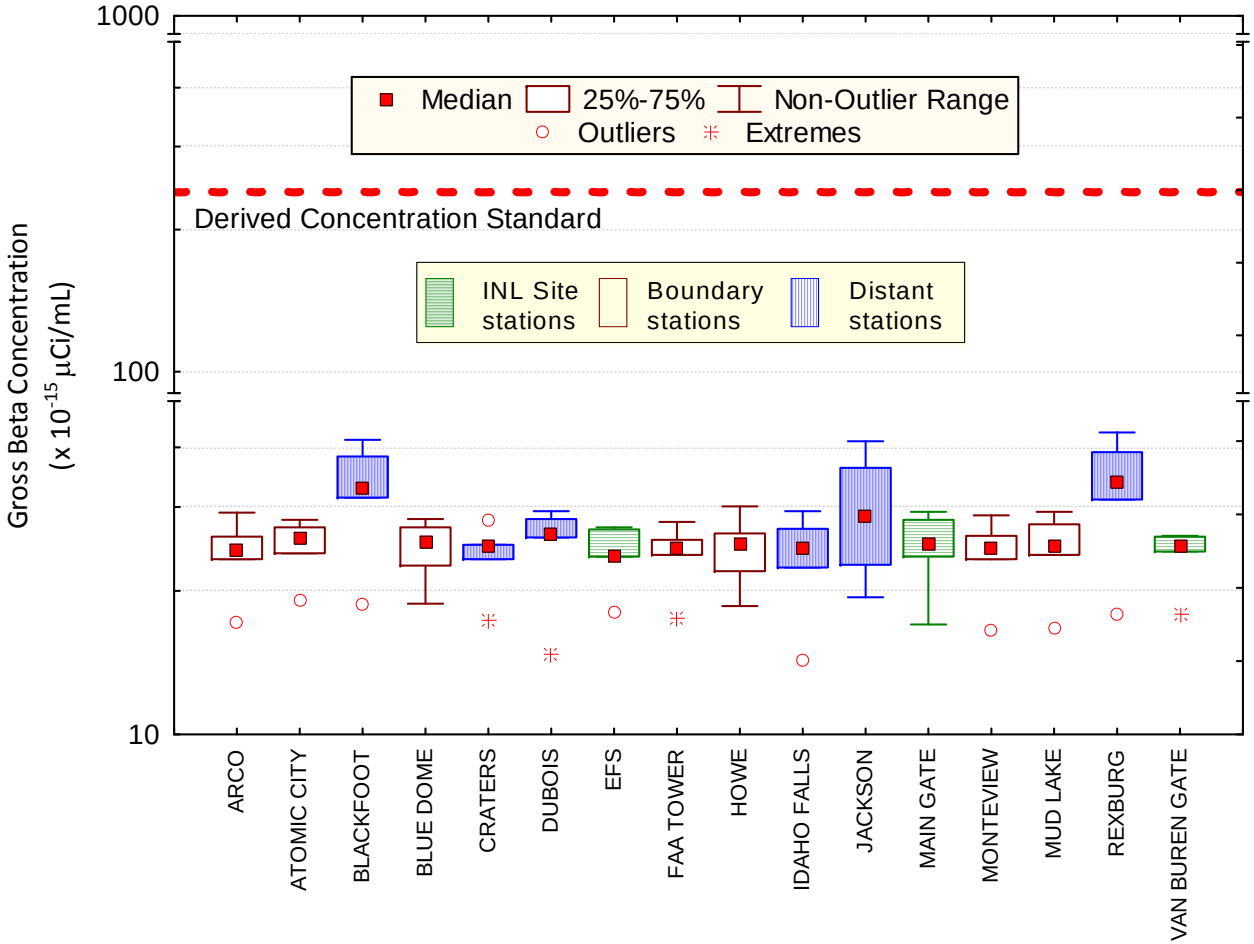

Figure 9. August gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location, except Jackson (N = 4).

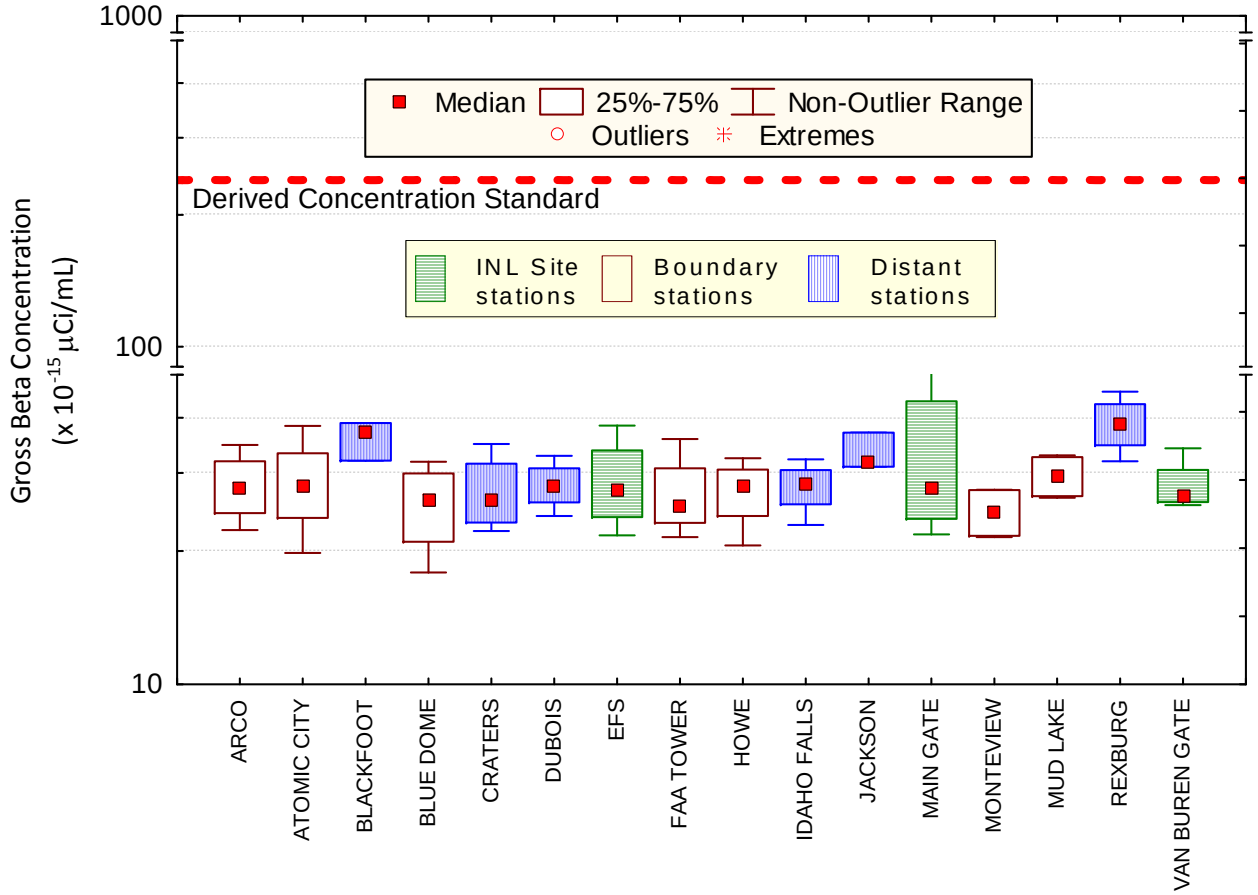

Figure 10. September gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location, except Blackfoot and Jackson (N = 3).

4. PRECIPITATION AND WATER SAMPLING

PRECIPITATION SAMPLING

Precipitation samples are gathered when sufficient precipitation occurs to allow for the collection of the minimum sample volume of approximately 50 mL. Samples are taken of monthly composites from Idaho Falls and CFA, and weekly from the EFS. Precipitation samples are analyzed for tritium. Storm events in the third quarter of 2012 produced sufficient precipitation to yield ten samples.

Tritium was measured above the 3s values in two of the ten samples. 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. Data for third quarter precipitation samples collected by the ESER Program averaged 89 pCi/L, which is well within the historical range and the range measured by the EPA Radnet program in samples from Region 10, which includes Idaho (EPA 2011). These results are listed in Table C-5 (Appendix C).

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, 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. Lettuce and grain are sampled during the third quarter, while potatoes are collected during the fourth quarter. Waterfowl are collected in either the third or fourth quarter. See Table A-1, Appendix A, for more details on agricultural product and wildlife sampling. This section discusses results from milk and agricultural products samples available during the third quarter of 2012.

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 third quarter of 2012. In addition, commercially-available organic milk was purchased as a control sample. All samples were analyzed for gamma emitting radionuclides.

Iodine-131 and other human-made radionuclides were not detected in any weekly or monthly samples during the third quarter. Data for ^{131}I and ^{137}Cs in milk samples are listed in Appendix C, Table C-6.

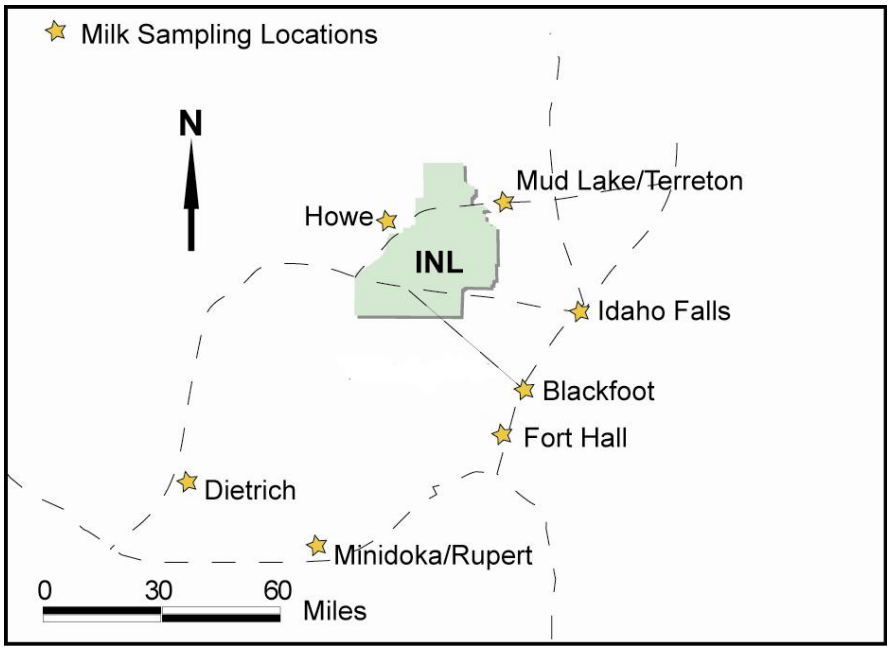

Figure 11. ESER milk sampling locations.

LETTUCE SAMPLING

Lettuce sampling was completed during the third quarter. No human-made gamma-emitting radionuclides were found in any of the 11 samples. Strontium-90 was detected in five of the samples analyzed. Strontium-90 is present in the environment as a residual of fallout from aboveground nuclear weapons testing, which occurred between 1945 and 1980. This is the likely source for the measured results. Data for ^{137}Cs and ^{90}Sr in all lettuce samples taken during the third quarter are listed in Appendix C, Table C-7. During the summer of 2020, a review of Appendix C, Table C-7 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 Bq/kg).

GRAIN SAMPLING

Grain sampling (wheat and barley) was completed during the third quarter of 2011. A total of ten grain samples (including one duplicate) were collected from local grain growers. In addition, a commercially-available sample was obtained from outside the local area. All samples were analyzed for gamma-emitting radionuclides and ^{90}Sr. No human-made gamma-emitting radionuclides or ^{90}Sr were detected in any grain sample. Data for ^{137}Cs and ^{90}Sr in all grain samples taken during the third quarter are listed in Appendix C, Table C-8.

LARGE GAME ANIMAL SAMPLING

One large game animal (a mule deer) was available for sampling during the third quarter. Samples were collected of muscle, liver, and thyroid tissue. No human-made gamma-emitting radionuclides were detected in any of the tissues. Results are found in Appendix C, Table C-9.

SOIL SAMPLING

Fourteen soil samples (including one duplicate at Carey) were collected at boundary and offsite locations in the third quarter. All samples were analyzed for gamma-emitting radionuclides, ^{241}Am, ^{238}Pu, $^{239/240}$Pu, and ^{90}Sr. Results can be found in Appendix C, Table C-10.

Cesium-137 was detected in all samples at concentrations consistent with historical measurements and is most likely present from past atmospheric nuclear weapons testing fallout. Similarly ^{90}Sr, another fallout radionuclide, was detected in six of the 14 soil samples at levels within historical measurements. Analysis of concentrations of ^{137}Cs and ^{90}Sr over time indicate that concentrations are decreasing in soil at a rate consistent with the approximate 30-year half-life of these radionuclides.

No ^{241}Am or ^{238}Pu were detected in any of the samples. Plutonium-239/240 was detected in 11 of the 14 samples. This radionuclide had not been detected in the previous two sampling cycles but a lower detection limit was achieved by the new laboratory used this year. Similar concentrations were found at locations distant to the INL Site and those from the INL Site boundary. The long-term trend of $^{239/240}$Pu concentrations appears to be relatively flat.

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. TLDs and OSLDs are changed out in May and again in November after six months in the field. A comparison of the results from the second quarter for the TLDs and OSLDs are presented in Appendix C, Table C-11. Results for OSLDs appear to average eight mrems lower than the equivalent TLDs during the first comparison period.

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). The following table summarizes the results of the quality assurance program for the third quarter of 2012.

QA Sample Type	Number of Sample Results	Number of Results Meeting Criteria	Percentage Meeting Criteria
Spikes/Laboratory Control Samples	260	259	99.6
Field Duplicates	81	78	96.3
Laboratory Splits	49	48	98.0
Recounts	216	216	100.0
Blanks	78	72	96.0
Method Uncertainty	1963	1929	92.3

8. REFERENCES

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EPA, 2011, RadNet—Tracking Environmental Radiation Nationwide, Web-page: http://www.epa.gov/narel/radnet/

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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, Rexburg	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, Rexburg	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, Rexburg	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, Rexburg, 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
GRAIN				
Gamma Spec, ^{90}Sr	annually	American Falls, Blackfoot, Carey Hamer, Idaho Falls, Minidoka, Roberts	Arco, Monteview, Mud Lake, Taber, Terreton	None
LETTUCE				
Gamma Spec, ^{90}Sr	annually	Blackfoot, Carey, Idaho Falls	Arco, Atomic City, FAA Tower, Howe, Monteview	EFS
BIG GAME				
Gamma Spec	varies	Occasional samples across the U.S.	Public Highways	INL Site roads
WATERFOWL				
Gamma Spec, ^{90}Sr, Transuranics	annually	Varies among: Heise, Firth, Fort Hall, Mud Lake, Market Lake, and American Falls	None	INL Site wastewater disposal ponds

APPENDIX B

SUMMARY OF MDCs AND DCSs

Table B-1. Summary of Approximate Minimum Detectable Concentrations for Radiological Analyses Performed during Third Quarter 2012

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Standard[b] (DCS)
Air (particulate filter)[e]	Gross alpha[c]	4.00×10^{-16} µCi/mL	4×10^{-14} µCi/mL
	Gross beta[d]	1.32×10^{-15} µCi/mL	2.4×10^{-13} µCi/mL
	^{137}Cs	1.22×10^{-16} µCi/mL	3.9×10^{-10} µCi/mL
	^{241}Am	6.19×10^{-18} µCi/mL	4.1×10^{-14} µCi/mL
	^{238}Pu	2.31×10^{-18} µCi/mL	3.7×10^{-14} µCi/mL
	$^{239/240}$Pu	3.18×10^{-18} µCi/mL	3.4×10^{-14} µCi/mL
	^{90}Sr	3.37×10^{-17} µCi/mL	2.5×10^{-11} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	5.31×10^{-16} µCi/mL	4.1×10^{-10} µCi/mL
Air (atmospheric moisture)	^{3}H	119.6 pCi/L_{water}	1.4×10^{-8} $\mu Ci/mL_{air}$
Air (precipitation)	^{3}H	121.3 pCi/L	1.9×10^{-3} µCi/mL
Milk	^{131}I	0.50 pCi/L	--
	^{137}Cs	1.09 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	7/3/2012	0.85 ± 0.16	3.13 ± 0.58	Yes	24.10 ± 0.64	89.17 ± 2.38	Yes
	7/11/2012	1.70 ± 0.17	6.29 ± 0.63	Yes	27.40 ± 0.58	101.38 ± 2.16	Yes
	7/18/2012	1.45 ± 0.18	5.37 ± 0.68	Yes	26.20 ± 0.64	96.94 ± 2.38	Yes
	7/25/2012	1.28 ± 0.16	4.74 ± 0.60	Yes	27.50 ± 0.62	101.75 ± 2.31	Yes
	8/1/2012	0.89 ± 0.15	3.28 ± 0.54	Yes	17.20 ± 0.51	63.64 ± 1.88	Yes
	8/8/2012	1.59 ± 0.18	5.88 ± 0.67	Yes	24.30 ± 0.60	89.91 ± 2.22	Yes
	8/15/2012	3.89 ± 0.29	14.39 ± 1.07	Yes	26.00 ± 0.71	96.20 ± 2.62	Yes
	8/22/2012	4.08 ± 0.30	15.10 ± 1.11	Yes	29.20 ± 0.75	108.04 ± 2.78	Yes
	8/29/2012	4.58 ± 0.31	16.95 ± 1.15	Yes	23.30 ± 0.67	86.21 ± 2.49	Yes
	9/5/2012	3.42 ± 0.25	12.65 ± 0.92	Yes	22.30 ± 0.61	82.51 ± 2.25	Yes
	9/12/2012	1.64 ± 0.20	6.07 ± 0.75	Yes	26.40 ± 0.70	97.68 ± 2.58	Yes
	9/19/2012	3.60 ± 0.26	13.32 ± 0.96	Yes	29.10 ± 0.68	107.67 ± 2.53	Yes
	9/26/2012	3.45 ± 0.29	12.77 ± 1.05	Yes	34.70 ± 0.82	128.39 ± 3.02	Yes
QA-1 (ARCO)	7/3/2012	1.02 ± 0.16	3.77 ± 0.60	Yes	22.80 ± 0.62	84.36 ± 2.29	Yes
	7/11/2012	1.08 ± 0.14	4.00 ± 0.51	Yes	24.30 ± 0.53	89.91 ± 1.96	Yes
	7/18/2012	1.63 ± 0.19	6.03 ± 0.68	Yes	24.20 ± 0.60	89.54 ± 2.23	Yes
	7/25/2012	0.84 ± 0.13	3.09 ± 0.50	Yes	21.80 ± 0.55	80.66 ± 2.02	Yes
	8/1/2012	1.19 ± 0.15	4.40 ± 0.57	Yes	17.00 ± 0.48	62.90 ± 1.79	Yes
	8/8/2012	1.27 ± 0.16	4.70 ± 0.60	Yes	22.10 ± 0.57	81.77 ± 2.09	Yes
	8/15/2012	3.55 ± 0.27	13.14 ± 0.99	Yes	23.50 ± 0.65	86.95 ± 2.41	Yes
	8/22/2012	3.55 ± 0.28	13.14 ± 1.03	Yes	24.80 ± 0.69	91.76 ± 2.56	Yes
	8/29/2012	3.70 ± 0.27	13.69 ± 1.00	Yes	22.70 ± 0.62	83.99 ± 2.29	Yes
	9/5/2012	2.83 ± 0.23	10.47 ± 0.84	Yes	20.20 ± 0.59	74.74 ± 2.16	Yes
	9/12/2012	1.80 ± 0.20	6.66 ± 0.74	Yes	23.20 ± 0.63	85.84 ± 2.32	Yes
	9/19/2012	3.15 ± 0.24	11.66 ± 0.90	Yes	27.10 ± 0.66	100.27 ± 2.46	Yes
	9/26/2012	4.19 ± 0.29	15.50 ± 1.06	Yes	33.40 ± 0.75	123.58 ± 2.76	Yes
ATOMIC CITY	7/3/2012	1.66 ± 0.22	6.14 ± 0.80	Yes	27.50 ± 0.74	101.75 ± 2.73	Yes
	7/11/2012	1.37 ± 0.16	5.07 ± 0.60	Yes	26.30 ± 0.59	97.31 ± 2.17	Yes
	7/18/2012	1.61 ± 0.19	5.96 ± 0.69	Yes	28.40 ± 0.65	105.08 ± 2.41	Yes
	7/25/2012	1.32 ± 0.17	4.88 ± 0.62	Yes	26.00 ± 0.62	96.20 ± 2.31	Yes
	8/1/2012	1.07 ± 0.17	3.96 ± 0.61	Yes	19.10 ± 0.56	70.67 ± 2.07	Yes
	8/8/2012	1.88 ± 0.20	6.96 ± 0.74	Yes	25.70 ± 0.64	95.09 ± 2.36	Yes
	8/15/2012	5.07 ± 0.31	18.76 ± 1.16	Yes	28.20 ± 0.71	104.34 ± 2.61	Yes
	8/22/2012	3.06 ± 0.26	11.32 ± 0.95	Yes	27.20 ± 0.70	100.64 ± 2.59	Yes
	8/29/2012	0.92 ± 0.16	3.42 ± 0.59	Yes	24.00 ± 0.63	88.80 ± 2.35	Yes
	9/5/2012	2.03 ± 0.21	7.51 ± 0.77	Yes	19.80 ± 0.61	73.26 ± 2.25	Yes
	9/12/2012	2.20 ± 0.21	8.14 ± 0.77	Yes	28.20 ± 0.65	104.34 ± 2.42	Yes
	9/19/2012	2.75 ± 0.24	10.18 ± 0.88	Yes	27.70 ± 0.69	102.49 ± 2.55	Yes
	9/26/2012	4.77 ± 0.34	17.65 ± 1.25	Yes	38.30 ± 0.88	141.71 ± 3.26	Yes
BLUE DOME	7/3/2012	1.27 ± 0.21	4.70 ± 0.78	Yes	28.50 ± 0.80	105.45 ± 2.96	Yes
	7/11/2012	1.18 ± 0.17	4.37 ± 0.64	Yes	28.00 ± 0.67	103.60 ± 2.46	Yes
	7/18/2012	1.61 ± 0.20	5.96 ± 0.74	Yes	27.40 ± 0.68	101.38 ± 2.53	Yes
	7/25/2012	1.18 ± 0.18	4.37 ± 0.67	Yes	27.40 ± 0.70	101.38 ± 2.60	Yes
	8/1/2012	1.32 ± 0.19	4.88 ± 0.72	Yes	18.80 ± 0.62	69.56 ± 2.29	Yes
	8/8/2012	2.76 ± 0.25	10.21 ± 0.91	Yes	25.40 ± 0.68	93.98 ± 2.50	Yes
	8/15/2012	5.06 ± 0.37	18.72 ± 1.36	Yes	27.20 ± 0.83	100.64 ± 3.07	Yes
	8/22/2012	3.38 ± 0.27	12.51 ± 1.01	Yes	28.30 ± 0.73	104.71 ± 2.69	Yes
	8/29/2012	4.11 ± 0.32	15.21 ± 1.18	Yes	22.60 ± 0.72	83.62 ± 2.68	Yes
	9/5/2012	3.83 ± 0.31	14.17 ± 1.14	Yes	17.90 ± 0.68	66.23 ± 2.52	Yes
	9/12/2012	3.98 ± 0.29	14.73 ± 1.07	Yes	24.10 ± 0.68	89.17 ± 2.50	Yes
	9/19/2012	5.27 ± 0.32	19.50 ± 1.17	Yes	28.10 ± 0.70	103.97 ± 2.58	Yes
	9/26/2012	5.90 ± 0.38	21.83 ± 1.41	Yes	31.80 ± 0.85	117.66 ± 3.13	Yes
FAA TOWER	7/3/2012	0.98 ± 0.17	3.63 ± 0.64	Yes	25.50 ± 0.69	94.35 ± 2.54	Yes
	7/11/2012	1.23 ± 0.16	4.55 ± 0.58	Yes	27.90 ± 0.61	103.23 ± 2.24	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
	7/18/2012	1.60 ± 0.19	5.92 ± 0.68	Yes	26.70 ± 0.63	98.79 ± 2.33	Yes
	7/25/2012	1.16 ± 0.16	4.29 ± 0.58	Yes	23.10 ± 0.59	85.47 ± 2.16	Yes
	8/1/2012	1.12 ± 0.16	4.14 ± 0.61	Yes	17.50 ± 0.54	64.75 ± 1.98	Yes
	8/8/2012	1.84 ± 0.20	6.81 ± 0.74	Yes	23.80 ± 0.62	88.06 ± 2.30	Yes
	8/15/2012	4.49 ± 0.31	16.61 ± 1.14	Yes	25.60 ± 0.71	94.72 ± 2.61	Yes
	8/22/2012	2.82 ± 0.24	10.43 ± 0.90	Yes	27.90 ± 0.69	103.23 ± 2.54	Yes
	8/29/2012	2.83 ± 0.24	10.47 ± 0.88	Yes	24.60 ± 0.64	91.02 ± 2.38	Yes
	9/5/2012	2.28 ± 0.21	8.44 ± 0.76	Yes	21.50 ± 0.59	79.55 ± 2.18	Yes
	9/12/2012	1.94 ± 0.22	7.18 ± 0.80	Yes	24.80 ± 0.68	91.76 ± 2.51	Yes
	9/19/2012	2.94 ± 0.23	10.88 ± 0.86	Yes	25.70 ± 0.64	95.09 ± 2.36	Yes
	9/26/2012	5.32 ± 0.35	19.68 ± 1.30	Yes	35.80 ± 0.85	132.46 ± 3.14	Yes
HOWE	7/3/2012	0.93 ± 0.18	3.43 ± 0.65	Yes	23.10 ± 0.69	85.47 ± 2.55	Yes
	7/11/2012	0.85 ± 0.13	3.16 ± 0.50	Yes	25.10 ± 0.56	92.87 ± 2.07	Yes
	7/18/2012	1.46 ± 0.19	5.40 ± 0.70	Yes	28.70 ± 0.68	106.19 ± 2.51	Yes
	7/25/2012	1.17 ± 0.17	4.33 ± 0.61	Yes	26.60 ± 0.65	98.42 ± 2.39	Yes
	8/1/2012	1.79 ± 0.20	6.62 ± 0.75	Yes	18.60 ± 0.59	68.82 ± 2.17	Yes
	8/8/2012	2.75 ± 0.25	10.18 ± 0.93	Yes	22.00 ± 0.66	81.40 ± 2.42	Yes
	8/15/2012	4.87 ± 0.30	18.02 ± 1.11	Yes	30.10 ± 0.70	111.37 ± 2.59	Yes
	8/22/2012	3.33 ± 0.28	12.32 ± 1.02	Yes	26.40 ± 0.72	97.68 ± 2.67	Yes
	8/29/2012	3.36 ± 0.27	12.43 ± 1.00	Yes	25.00 ± 0.68	92.50 ± 2.52	Yes
	9/5/2012	3.15 ± 0.25	11.66 ± 0.91	Yes	20.60 ± 0.60	76.22 ± 2.23	Yes
	9/12/2012	2.61 ± 0.22	9.66 ± 0.83	Yes	28.70 ± 0.66	106.19 ± 2.46	Yes
	9/19/2012	3.76 ± 0.26	13.91 ± 0.97	Yes	27.40 ± 0.67	101.38 ± 2.46	Yes
	9/26/2012	4.11 ± 0.30	15.21 ± 1.09	Yes	32.40 ± 0.77	119.88 ± 2.83	Yes
MONTEVIEW	7/3/2012	1.07 ± 0.19	3.96 ± 0.69	Yes	26.60 ± 0.73	98.42 ± 2.69	Yes
	7/11/2012	1.69 ± 0.18	6.25 ± 0.66	Yes	26.60 ± 0.60	98.42 ± 2.22	Yes
	7/18/2012	1.90 ± 0.21	7.03 ± 0.77	Yes	27.60 ± 0.68	102.12 ± 2.50	Yes
	7/25/2012	1.73 ± 0.20	6.40 ± 0.74	Yes	28.20 ± 0.69	104.34 ± 2.56	Yes
	8/1/2012	1.11 ± 0.17	4.11 ± 0.64	Yes	16.60 ± 0.56	61.42 ± 2.06	Yes
	8/8/2012	2.39 ± 0.22	8.84 ± 0.81	Yes	24.60 ± 0.63	91.02 ± 2.31	Yes
	8/15/2012	4.57 ± 0.30	16.91 ± 1.09	Yes	28.80 ± 0.70	106.56 ± 2.59	Yes
	8/22/2012	2.66 ± 0.25	9.84 ± 0.91	Yes	26.10 ± 0.70	96.57 ± 2.59	Yes
	8/29/2012	3.95 ± 0.29	14.62 ± 1.08	Yes	23.30 ± 0.68	86.21 ± 2.50	Yes
	9/5/2012	2.58 ± 0.22	9.55 ± 0.81	Yes	21.50 ± 0.60	79.55 ± 2.22	Yes
	9/12/2012	2.26 ± 0.25	8.36 ± 0.92	Yes	21.80 ± 0.71	80.66 ± 2.62	Yes
	9/19/2012	3.63 ± 0.27	13.43 ± 0.99	Yes	27.40 ± 0.69	101.38 ± 2.55	Yes
	9/26/2012	4.47 ± 0.37	16.54 ± 1.37	Yes	27.50 ± 0.88	101.75 ± 3.27	Yes
QA-2	7/3/2012	1.53 ± 0.21	5.66 ± 0.76	Yes	26.80 ± 0.72	99.16 ± 2.67	Yes
(MONTEVIEW)	7/11/2012	1.21 ± 0.16	4.48 ± 0.58	Yes	26.40 ± 0.59	97.68 ± 2.20	Yes
	7/18/2012	1.38 ± 0.18	5.11 ± 0.68	Yes	26.30 ± 0.65	97.31 ± 2.41	Yes
	7/25/2012	1.20 ± 0.17	4.44 ± 0.62	Yes	25.00 ± 0.63	92.50 ± 2.33	Yes
	8/1/2012	1.18 ± 0.17	4.37 ± 0.64	Yes	17.30 ± 0.55	64.01 ± 2.04	Yes
	8/8/2012	2.18 ± 0.21	8.07 ± 0.78	Yes	22.90 ± 0.61	84.73 ± 2.25	Yes
	8/15/2012	5.58 ± 0.32	20.65 ± 1.17	Yes	33.50 ± 0.73	123.95 ± 2.70	Yes
	8/22/2012	2.45 ± 0.24	9.07 ± 0.89	Yes	25.70 ± 0.70	95.09 ± 2.59	Yes
	8/29/2012	2.50 ± 0.24	9.25 ± 0.90	Yes	25.80 ± 0.70	95.46 ± 2.60	Yes
	9/5/2012	2.23 ± 0.21	8.25 ± 0.78	Yes	20.90 ± 0.61	77.33 ± 2.24	Yes
	9/12/2012	2.74 ± 0.27	10.14 ± 1.01	Yes	23.40 ± 0.74	86.58 ± 2.75	Yes
	9/19/2012	3.53 ± 0.27	13.06 ± 0.99	Yes	27.90 ± 0.70	103.23 ± 2.60	Yes
	9/26/2012	5.16 ± 0.40	19.09 ± 1.49	Yes	28.90 ± 0.93	106.93 ± 3.42	Yes
MUD LAKE	7/3/2012	1.13 ± 0.18	4.18 ± 0.67	Yes	24.30 ± 0.68	89.91 ± 2.52	Yes
	7/11/2012	1.69 ± 0.19	6.25 ± 0.69	Yes	28.90 ± 0.65	106.93 ± 2.39	Yes
	7/18/2012	1.33 ± 0.19	4.92 ± 0.69	Yes	27.90 ± 0.69	103.23 ± 2.54	Yes
	7/25/2012	1.18 ± 0.18	4.37 ± 0.65	Yes	28.30 ± 0.69	104.71 ± 2.57	Yes
	8/1/2012	1.16 ± 0.17	4.29 ± 0.63	Yes	16.70 ± 0.55	61.79 ± 2.02	Yes
	8/8/2012	2.31 ± 0.22	8.55 ± 0.80	Yes	23.80 ± 0.62	88.06 ± 2.29	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
	8/15/2012	4.77 ± 0.30	17.65 ± 1.12	Yes	29.30 ± 0.71	108.41 ± 2.63	Yes
	8/22/2012	2.37 ± 0.24	8.77 ± 0.88	Yes	27.60 ± 0.72	102.12 ± 2.66	Yes
	8/29/2012	4.08 ± 0.30	15.10 ± 1.11	Yes	24.70 ± 0.70	91.39 ± 2.60	Yes
	9/5/2012	2.44 ± 0.21	9.03 ± 0.79	Yes	26.40 ± 0.64	97.68 ± 2.38	Yes
	9/12/2012	2.30 ± 0.23	8.51 ± 0.85	Yes	26.80 ± 0.70	99.16 ± 2.59	Yes
	9/19/2012	2.70 ± 0.23	9.99 ± 0.84	Yes	32.90 ± 0.71	121.73 ± 2.64	Yes
	9/26/2012	4.47 ± 0.34	16.54 ± 1.27	Yes	32.30 ± 0.86	119.51 ± 3.20	Yes
DISTANT							
BLACKFOOT CMS	7/3/2012	1.34 ± 0.30	4.96 ± 1.11	Yes	27.50 ± 1.08	101.75 ± 4.00	Yes
	7/11/2012	1.46 ± 0.22	5.40 ± 0.80	Yes	20.50 ± 0.69	75.85 ± 2.56	Yes
	7/18/2012	1.75 ± 0.29	6.48 ± 1.07	Yes	32.20 ± 1.00	119.14 ± 3.70	Yes
	7/25/2012	2.06 ± 0.29	7.62 ± 1.07	Yes	33.30 ± 0.99	123.21 ± 3.68	Yes
	8/1/2012	1.78 ± 0.29	6.59 ± 1.07	Yes	18.70 ± 0.86	69.19 ± 3.17	Yes
	8/8/2012	2.61 ± 0.33	9.66 ± 1.21	Yes	32.80 ± 1.02	121.36 ± 3.77	Yes
	8/15/2012	4.31 ± 0.40	15.95 ± 1.48	Yes	38.30 ± 1.10	141.71 ± 4.07	Yes
	8/22/2012	2.81 ± 0.35	10.40 ± 1.28	Yes	41.50 ± 1.14	153.55 ± 4.22	Yes
	8/29/2012	7.20 ± 0.52	26.64 ± 1.91	Yes	31.40 ± 1.07	116.18 ± 3.96	Yes
	9/5/2012	2.60 ± 0.31	9.62 ± 1.15	Yes	32.00 ± 1.00	118.40 ± 3.69	Yes
	9/12/2012	2.00 ± 0.30	7.40 ± 1.12	Yes	37.10 ± 1.09	137.27 ± 4.03	Yes
	9/19/2012	4.13 ± 0.42	15.28 ± 1.54	Yes	38.90 ± 1.19	143.93 ± 4.40	Yes
a	9/26/2012	±	±	No	±	±	No
CRATERS OF	7/3/2012	0.93 ± 0.17	3.43 ± 0.63	Yes	24.40 ± 0.68	90.28 ± 2.51	Yes
THE MOON	7/11/2012	1.12 ± 0.15	4.14 ± 0.56	Yes	27.10 ± 0.60	100.27 ± 2.21	Yes
	7/18/2012	1.51 ± 0.19	5.59 ± 0.69	Yes	25.80 ± 0.64	95.46 ± 2.37	Yes
	7/25/2012	1.20 ± 0.16	4.44 ± 0.60	Yes	25.20 ± 0.61	93.24 ± 2.27	Yes
	8/1/2012	1.24 ± 0.18	4.59 ± 0.66	Yes	17.30 ± 0.56	64.01 ± 2.08	Yes
	8/8/2012	1.93 ± 0.20	7.14 ± 0.75	Yes	25.00 ± 0.63	92.50 ± 2.34	Yes
	8/15/2012	4.09 ± 0.30	15.13 ± 1.10	Yes	24.90 ± 0.70	92.13 ± 2.60	Yes
	8/22/2012	4.87 ± 0.32	18.02 ± 1.20	Yes	28.20 ± 0.74	104.34 ± 2.74	Yes
	8/29/2012	2.82 ± 0.26	10.43 ± 0.95	Yes	23.30 ± 0.68	86.21 ± 2.53	Yes
	9/5/2012	2.70 ± 0.23	9.99 ± 0.84	Yes	22.20 ± 0.61	82.14 ± 2.27	Yes
	9/12/2012	2.11 ± 0.23	7.81 ± 0.84	Yes	24.20 ± 0.69	89.54 ± 2.55	Yes
	9/19/2012	3.22 ± 0.25	11.91 ± 0.94	Yes	28.10 ± 0.70	103.97 ± 2.58	Yes
	9/26/2012	4.19 ± 0.32	15.50 ± 1.18	Yes	34.90 ± 0.85	129.13 ± 3.15	Yes
DUBOIS	7/3/2012	1.62 ± 0.27	5.99 ± 1.01	Yes	35.00 ± 1.02	129.50 ± 3.77	Yes
	7/11/2012	1.39 ± 0.17	5.14 ± 0.61	Yes	26.40 ± 0.60	97.68 ± 2.21	Yes
	7/18/2012	1.82 ± 0.20	6.73 ± 0.73	Yes	27.70 ± 0.65	102.49 ± 2.42	Yes
	7/25/2012	1.32 ± 0.18	4.88 ± 0.65	Yes	28.30 ± 0.67	104.71 ± 2.48	Yes
	8/1/2012	1.38 ± 0.18	5.11 ± 0.66	Yes	14.70 ± 0.52	54.39 ± 1.94	Yes
	8/8/2012	2.04 ± 0.22	7.55 ± 0.81	Yes	25.90 ± 0.68	95.83 ± 2.50	Yes
	8/15/2012	4.70 ± 0.32	17.39 ± 1.18	Yes	28.30 ± 0.75	104.71 ± 2.76	Yes
	8/22/2012	2.53 ± 0.23	9.36 ± 0.86	Yes	29.40 ± 0.70	108.78 ± 2.60	Yes
	8/29/2012	3.71 ± 0.28	13.73 ± 1.03	Yes	26.30 ± 0.69	97.31 ± 2.54	Yes
	9/5/2012	3.25 ± 0.24	12.03 ± 0.90	Yes	24.00 ± 0.63	88.80 ± 2.32	Yes
	9/12/2012	2.54 ± 0.23	9.40 ± 0.87	Yes	28.70 ± 0.70	106.19 ± 2.59	Yes
	9/19/2012	3.40 ± 0.25	12.58 ± 0.94	Yes	27.50 ± 0.67	101.75 ± 2.49	Yes
	9/26/2012	3.83 ± 0.30	14.17 ± 1.10	Yes	32.80 ± 0.80	121.36 ± 2.96	Yes
IDAHO FALLS	7/3/2012	1.09 ± 0.21	4.03 ± 0.77	Yes	26.20 ± 0.80	96.94 ± 2.94	Yes
	7/11/2012	1.08 ± 0.14	4.00 ± 0.52	Yes	25.10 ± 0.54	92.87 ± 2.01	Yes
	7/18/2012	1.23 ± 0.16	4.55 ± 0.61	Yes	25.60 ± 0.60	94.72 ± 2.22	Yes
	7/25/2012	1.06 ± 0.15	3.92 ± 0.55	Yes	24.00 ± 0.57	88.80 ± 2.12	Yes
	8/1/2012	1.40 ± 0.17	5.18 ± 0.62	Yes	14.30 ± 0.48	52.91 ± 1.78	Yes
	8/8/2012	1.76 ± 0.19	6.51 ± 0.70	Yes	22.40 ± 0.59	82.88 ± 2.18	Yes
	8/15/2012	3.17 ± 0.24	11.73 ± 0.89	Yes	29.40 ± 0.67	108.78 ± 2.47	Yes
	8/22/2012	2.49 ± 0.25	9.21 ± 0.93	Yes	27.00 ± 0.74	99.90 ± 2.74	Yes
	8/29/2012	2.88 ± 0.23	10.66 ± 0.85	Yes	24.50 ± 0.62	90.65 ± 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
	9/5/2012	2.25 ± 0.20	8.33 ± 0.75	Yes	22.90 ± 0.59	84.73 ± 2.20	Yes
	9/12/2012	1.23 ± 0.16	4.55 ± 0.60	Yes	28.10 ± 0.63	103.97 ± 2.33	Yes
	9/19/2012	2.70 ± 0.22	9.99 ± 0.82	Yes	28.70 ± 0.65	106.19 ± 2.42	Yes
	9/26/2012	4.87 ± 0.42	18.02 ± 1.57	Yes	32.20 ± 1.05	119.14 ± 3.89	Yes
JACKSON	7/3/2012	1.95 ± 0.21	7.22 ± 0.78	Yes	30.70 ± 0.72	113.59 ± 2.66	Yes
	7/11/2012	1.52 ± 0.17	5.62 ± 0.62	Yes	32.30 ± 0.63	119.51 ± 2.33	Yes
	7/18/2012	1.35 ± 0.17	5.00 ± 0.63	Yes	32.00 ± 0.66	118.40 ± 2.45	Yes
	7/25/2012	1.45 ± 0.17	5.37 ± 0.63	Yes	30.50 ± 0.65	112.85 ± 2.40	Yes
	8/1/2012	1.53 ± 0.18	5.66 ± 0.66	Yes	19.40 ± 0.54	71.78 ± 2.01	Yes
	8/8/2012	2.27 ± 0.22	8.40 ± 0.80	Yes	31.30 ± 0.69	115.81 ± 2.55	Yes
	8/15/2012	4.11 ± 0.32	15.21 ± 1.20	Yes	41.20 ± 0.93	152.44 ± 3.42	Yes
a	8/22/2012	±	±	No	±	±	No
	8/29/2012	-0.27 ± 0.08	-1.00 ± 0.29	No	26.00 ± 0.66	96.20 ± 2.43	Yes
	9/5/2012	1.70 ± 0.18	6.29 ± 0.67	Yes	31.00 ± 0.66	114.70 ± 2.46	Yes
	9/12/2012	2.32 ± 0.22	8.58 ± 0.82	Yes	37.00 ± 0.76	136.90 ± 2.81	Yes
	9/19/2012	3.63 ± 0.35	13.43 ± 1.29	Yes	31.70 ± 0.97	117.29 ± 3.59	Yes
a	9/26/2012	±	±	No	±	±	No
REXBURG CMS	7/3/2012	1.23 ± 0.26	4.55 ± 0.97	Yes	29.10 ± 0.99	107.67 ± 3.66	Yes
	7/11/2012	1.24 ± 0.21	4.59 ± 0.77	Yes	30.20 ± 0.81	111.74 ± 3.00	Yes
	7/18/2012	1.69 ± 0.26	6.25 ± 0.95	Yes	31.60 ± 0.90	116.92 ± 3.33	Yes
	7/25/2012	1.59 ± 0.29	5.88 ± 1.08	Yes	35.00 ± 1.12	129.50 ± 4.14	Yes
	8/1/2012	1.61 ± 0.22	5.96 ± 0.81	Yes	17.80 ± 0.65	65.86 ± 2.42	Yes
	8/8/2012	2.57 ± 0.26	9.51 ± 0.95	Yes	31.10 ± 0.78	115.07 ± 2.90	Yes
	8/15/2012	4.11 ± 0.35	15.21 ± 1.28	Yes	39.10 ± 0.97	144.67 ± 3.60	Yes
	8/22/2012	3.85 ± 0.35	14.25 ± 1.28	Yes	43.00 ± 1.03	159.10 ± 3.81	Yes
	8/29/2012	2.69 ± 0.27	9.95 ± 1.00	Yes	33.90 ± 0.82	125.43 ± 3.04	Yes
	9/5/2012	2.55 ± 0.25	9.44 ± 0.93	Yes	31.90 ± 0.80	118.03 ± 2.95	Yes
	9/12/2012	2.00 ± 0.24	7.40 ± 0.90	Yes	40.00 ± 0.90	148.00 ± 3.34	Yes
	9/19/2012	3.46 ± 0.28	12.80 ± 1.03	Yes	37.40 ± 0.83	138.38 ± 3.07	Yes
	9/26/2012	6.40 ± 0.54	23.68 ± 1.98	Yes	45.80 ± 1.35	169.46 ± 5.00	Yes
INL SITE							
EFS	7/3/2012	1.10 ± 0.17	4.07 ± 0.64	Yes	25.70 ± 0.67	95.09 ± 2.46	Yes
	7/11/2012	1.24 ± 0.15	4.59 ± 0.56	Yes	27.00 ± 0.57	99.90 ± 2.12	Yes
	7/18/2012	1.31 ± 0.17	4.85 ± 0.63	Yes	26.30 ± 0.61	97.31 ± 2.27	Yes
	7/25/2012	1.11 ± 0.15	4.11 ± 0.57	Yes	24.70 ± 0.59	91.39 ± 2.19	Yes
	8/1/2012	0.98 ± 0.15	3.61 ± 0.57	Yes	18.10 ± 0.53	66.97 ± 1.94	Yes
	8/8/2012	1.97 ± 0.20	7.29 ± 0.75	Yes	23.60 ± 0.62	87.32 ± 2.28	Yes
	8/15/2012	3.65 ± 0.28	13.51 ± 1.03	Yes	26.90 ± 0.71	99.53 ± 2.61	Yes
	8/22/2012	3.31 ± 0.27	12.25 ± 1.01	Yes	27.20 ± 0.72	100.64 ± 2.67	Yes
	8/29/2012	3.26 ± 0.27	12.06 ± 1.00	Yes	23.70 ± 0.68	87.69 ± 2.50	Yes
	9/5/2012	2.32 ± 0.21	8.58 ± 0.78	Yes	21.70 ± 0.60	80.29 ± 2.22	Yes
	9/12/2012	2.48 ± 0.23	9.18 ± 0.87	Yes	26.00 ± 0.68	96.20 ± 2.53	Yes
	9/19/2012	3.38 ± 0.26	12.51 ± 0.96	Yes	29.10 ± 0.71	107.67 ± 2.62	Yes
	9/26/2012	4.82 ± 0.34	17.83 ± 1.24	Yes	38.40 ± 0.87	142.08 ± 3.22	Yes
MAIN GATE	7/3/2012	1.33 ± 0.19	4.92 ± 0.71	Yes	29.40 ± 0.73	108.78 ± 2.72	Yes
	7/11/2012	1.22 ± 0.15	4.51 ± 0.56	Yes	26.60 ± 0.58	98.42 ± 2.13	Yes
	7/18/2012	1.83 ± 0.20	6.77 ± 0.73	Yes	27.30 ± 0.65	101.01 ± 2.39	Yes
	7/25/2012	1.05 ± 0.15	3.89 ± 0.57	Yes	25.70 ± 0.61	95.09 ± 2.26	Yes
	8/1/2012	1.39 ± 0.18	5.14 ± 0.65	Yes	17.00 ± 0.53	62.90 ± 1.95	Yes
	8/8/2012	1.81 ± 0.20	6.70 ± 0.73	Yes	23.60 ± 0.62	87.32 ± 2.28	Yes
	8/15/2012	4.12 ± 0.31	15.24 ± 1.13	Yes	28.20 ± 0.75	104.34 ± 2.78	Yes
	8/22/2012	3.83 ± 0.30	14.17 ± 1.10	Yes	29.30 ± 0.76	108.41 ± 2.82	Yes
	8/29/2012	2.47 ± 0.24	9.14 ± 0.87	Yes	25.00 ± 0.68	92.50 ± 2.50	Yes
	9/5/2012	2.64 ± 0.22	9.77 ± 0.83	Yes	21.80 ± 0.61	80.66 ± 2.25	Yes
	9/12/2012	2.17 ± 0.23	8.03 ± 0.85	Yes	25.50 ± 0.70	94.35 ± 2.59	Yes
	9/19/2012	3.33 ± 0.25	12.32 ± 0.93	Yes	30.20 ± 0.70	111.74 ± 2.59	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
	9/26/2012	7.06	±	0.52	26.12	±	1.91	Yes	56.90	±	1.35	210.53	±	5.00	Yes
VAN BUREN GATE	7/3/2012	0.70	±	0.15	2.60	±	0.57	Yes	27.10	±	0.68	100.27	±	2.52	Yes
	7/11/2012	1.16	±	0.15	4.29	±	0.55	Yes	27.10	±	0.58	100.27	±	2.13	Yes
	7/18/2012	1.64	±	0.18	6.07	±	0.68	Yes	25.70	±	0.61	95.09	±	2.27	Yes
	7/25/2012	0.97	±	0.15	3.60	±	0.55	Yes	24.70	±	0.60	91.39	±	2.21	Yes
	8/1/2012	0.99	±	0.15	3.66	±	0.57	Yes	17.90	±	0.52	66.23	±	1.94	Yes
	8/8/2012	1.81	±	0.19	6.70	±	0.71	Yes	24.70	±	0.61	91.39	±	2.27	Yes
	8/15/2012	3.73	±	0.27	13.80	±	1.00	Yes	26.10	±	0.67	96.57	±	2.49	Yes
	8/22/2012	2.63	±	0.24	9.73	±	0.89	Yes	26.00	±	0.69	96.20	±	2.54	Yes
	8/29/2012	2.60	±	0.25	9.62	±	0.93	Yes	24.20	±	0.70	89.54	±	2.57	Yes
	9/5/2012	4.24	±	0.47	15.69	±	1.75	Yes	25.40	±	1.19	93.98	±	4.40	Yes
	9/12/2012	2.03	±	0.21	7.51	±	0.76	Yes	26.20	±	0.65	96.94	±	2.39	Yes
	9/19/2012	3.09	±	0.25	11.43	±	0.91	Yes	26.90	±	0.68	99.53	±	2.50	Yes
	9/26/2012	4.17	±	0.31	15.43	±	1.14	Yes	34.10	±	0.81	126.17	±	3.00	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	07/03/2012	-0.73	±	1.71	-2.71	±	6.35	No
	07/11/2012	-0.38	±	1.57	-1.40	±	5.81	No
	07/18/2012	1.11	±	2.11	4.10	±	7.82	No
	07/25/2012	0.22	±	1.75	0.80	±	6.46	No
	08/01/2012	-0.82	±	1.75	-3.04	±	6.48	No
	08/08/2012	0.06	±	1.75	0.23	±	6.49	No
	08/15/2012	0.00	±	1.85	0.00	±	6.86	No
	08/22/2012	-1.02	±	2.25	-3.78	±	8.32	No
	08/29/2012	2.75	±	1.42	10.16	±	5.26	No
	09/05/2012	-0.30	±	1.12	-1.12	±	4.15	No
	09/12/2012	-0.76	±	1.31	-2.82	±	4.84	No
	09/19/2012	0.68	±	1.98	2.50	±	7.32	No
	09/26/2012	1.49	±	1.43	5.51	±	5.29	No
QA-1 (ARCO)	07/03/2012	-0.71	±	1.66	-2.63	±	6.15	No
	07/11/2012	-0.35	±	1.46	-1.30	±	5.39	No
	07/18/2012	1.05	±	2.00	3.87	±	7.39	No
	07/25/2012	0.20	±	1.64	0.75	±	6.06	No
	08/01/2012	-0.77	±	1.64	-2.84	±	6.06	No
	08/08/2012	0.06	±	1.69	0.22	±	6.27	No
	08/15/2012	0.00	±	1.73	0.00	±	6.38	No
	08/22/2012	-1.00	±	2.20	-3.70	±	8.15	No
	08/29/2012	2.49	±	1.29	9.21	±	4.77	No
	09/05/2012	-0.31	±	1.13	-1.13	±	4.17	No
	09/12/2012	-0.69	±	1.19	-2.56	±	4.40	No
	09/19/2012	0.68	±	1.98	2.50	±	7.33	No
	09/26/2012	1.30	±	1.25	4.82	±	4.63	No
ATOMIC CITY	07/03/2012	-0.84	±	1.97	-3.11	±	7.28	No
	07/11/2012	-0.40	±	1.64	-1.46	±	6.06	No
	07/18/2012	1.07	±	2.03	3.94	±	7.52	No
	07/25/2012	0.22	±	1.82	0.83	±	6.72	No
	08/01/2012	-0.90	±	1.92	-3.33	±	7.10	No
	08/08/2012	0.07	±	1.86	0.24	±	6.88	No
	08/15/2012	0.00	±	1.74	0.00	±	6.42	No
	08/22/2012	-0.96	±	2.11	-3.54	±	7.81	No
	08/29/2012	2.49	±	1.29	9.20	±	4.76	No
	09/05/2012	-0.33	±	1.22	-1.22	±	4.52	No
	09/12/2012	-0.65	±	1.11	-2.40	±	4.12	No
	09/19/2012	0.71	±	2.08	2.63	±	7.71	No
	09/26/2012	1.58	±	1.52	5.85	±	5.61	No
BLUE DOME	07/03/2012	2.04	±	2.67	7.56	±	9.87	No
	07/11/2012	-1.52	±	1.83	-5.62	±	6.76	No
	07/18/2012	-1.59	±	2.05	-5.90	±	7.59	No
	07/25/2012	0.75	±	2.03	2.77	±	7.53	No
	08/01/2012	-2.12	±	2.12	-7.84	±	7.84	No
	08/08/2012	-1.67	±	1.97	-6.19	±	7.27	No
	08/15/2012	-2.13	±	2.62	-7.88	±	9.70	No
	08/22/2012	-2.71	±	2.09	-10.04	±	7.75	No
	08/29/2012	1.96	±	1.46	7.26	±	5.42	No
	09/05/2012	-0.77	±	1.45	-2.86	±	5.37	No
	09/12/2012	0.48	±	1.18	1.77	±	4.35	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								
	09/19/2012	-0.16	±	1.17	-0.58	±	4.33	No
	09/26/2012	0.02	±	1.42	0.07	±	5.26	No
FAA TOWER	07/03/2012	1.71	±	2.24	6.34	±	8.28	No
	07/11/2012	-1.29	±	1.55	-4.77	±	5.74	No
	07/18/2012	-1.41	±	1.82	-5.23	±	6.74	No
	07/25/2012	0.62	±	1.67	2.28	±	6.18	No
	08/01/2012	-1.78	±	1.78	-6.58	±	6.58	No
	08/08/2012	-1.52	±	1.79	-5.63	±	6.62	No
	08/15/2012	-1.70	±	2.09	-6.28	±	7.73	No
	08/22/2012	-2.49	±	1.92	-9.21	±	7.11	No
	08/29/2012	1.54	±	1.15	5.70	±	4.25	No
	09/05/2012	-0.55	±	1.04	-2.04	±	3.83	No
	09/12/2012	0.48	±	1.17	1.76	±	4.34	No
	09/19/2012	-0.15	±	1.08	-0.54	±	4.00	No
	09/26/2012	0.02	±	1.32	0.06	±	4.87	No
HOWE	07/03/2012	1.83	±	2.39	6.77	±	8.84	No
	07/11/2012	-1.22	±	1.47	-4.51	±	5.43	No
	07/18/2012	-1.53	±	1.97	-5.68	±	7.31	No
	07/25/2012	0.66	±	1.80	2.45	±	6.64	No
	08/01/2012	-1.96	±	1.96	-7.25	±	7.25	No
	08/08/2012	-1.74	±	2.05	-6.45	±	7.59	No
	08/15/2012	-1.50	±	1.85	-5.56	±	6.84	No
	08/22/2012	-2.80	±	2.16	-10.37	±	8.01	No
	08/29/2012	1.67	±	1.25	6.18	±	4.61	No
	09/05/2012	-0.59	±	1.11	-2.18	±	4.10	No
	09/12/2012	0.41	±	1.02	1.53	±	3.77	No
	09/19/2012	-0.15	±	1.10	-0.55	±	4.08	No
	09/26/2012	0.02	±	1.19	0.06	±	4.40	No
MONTEVIEW	07/03/2012	1.82	±	2.38	6.74	±	8.80	No
	07/11/2012	-1.31	±	1.58	-4.86	±	5.86	No
	07/18/2012	-1.56	±	2.01	-5.78	±	7.44	No
	07/25/2012	0.71	±	1.93	2.63	±	7.14	No
	08/01/2012	-1.92	±	1.92	-7.12	±	7.12	No
	08/08/2012	-1.50	±	1.77	-5.56	±	6.54	No
	08/15/2012	-1.54	±	1.90	-5.70	±	7.02	No
	08/22/2012	-2.69	±	2.07	-9.94	±	7.67	No
	08/29/2012	1.72	±	1.29	6.38	±	4.76	No
	09/05/2012	-0.57	±	1.07	-2.10	±	3.94	No
	09/12/2012	0.55	±	1.36	2.04	±	5.03	No
	09/19/2012	-0.16	±	1.17	-0.58	±	4.33	No
	09/26/2012	0.02	±	1.69	0.08	±	6.24	No
QA-2 (MONTEVIEW)	07/03/2012	1.79	±	2.34	6.63	±	8.66	No
	07/11/2012	-1.30	±	1.56	-4.80	±	5.78	No
	07/18/2012	-1.52	±	1.95	-5.62	±	7.23	No
	07/25/2012	0.66	±	1.79	2.43	±	6.61	No
	08/01/2012	-1.86	±	1.86	-6.87	±	6.87	No
	08/08/2012	-1.51	±	1.78	-5.59	±	6.58	No
	08/15/2012	-1.49	±	1.83	-5.50	±	6.77	No
	08/22/2012	-2.72	±	2.10	-10.08	±	7.78	No
	08/29/2012	1.74	±	1.30	6.43	±	4.80	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								
	09/05/2012	-0.59	±	1.11	-2.19	±	4.10	No
	09/12/2012	0.57	±	1.40	2.10	±	5.18	No
	09/19/2012	-0.16	±	1.20	-0.60	±	4.44	No
	09/26/2012	0.02	±	1.76	0.08	±	6.50	No
MUD LAKE	07/03/2012	1.73	±	2.26	6.42	±	8.37	No
	07/11/2012	-1.40	±	1.69	-5.19	±	6.25	No
	07/18/2012	-1.59	±	2.05	-5.89	±	7.58	No
	07/25/2012	0.72	±	1.94	2.65	±	7.19	No
	08/01/2012	-1.87	±	1.87	-6.90	±	6.90	No
	08/08/2012	-1.51	±	1.78	-5.60	±	6.59	No
	08/15/2012	-1.56	±	1.92	-5.78	±	7.11	No
	08/22/2012	-2.72	±	2.10	-10.07	±	7.77	No
	08/29/2012	1.77	±	1.32	6.54	±	4.88	No
	09/05/2012	-0.56	±	1.05	-2.07	±	3.88	No
	09/12/2012	0.48	±	1.17	1.76	±	4.35	No
	09/19/2012	-0.15	±	1.10	-0.55	±	4.06	No
	09/26/2012	0.02	±	1.46	0.07	±	5.42	No
DISTANT								
BLACKFOOT CMS	07/03/2012	-1.56	±	3.64	-5.76	±	13.46	No
	07/11/2012	-0.62	±	2.56	-2.28	±	9.46	No
	07/18/2012	2.01	±	3.83	7.43	±	14.17	No
	07/25/2012	0.42	±	3.37	1.54	±	12.46	No
	08/01/2012	-1.66	±	3.53	-6.13	±	13.08	No
	08/08/2012	0.12	±	3.44	0.45	±	12.73	No
	08/15/2012	0.00	±	3.02	0.00	±	11.17	No
	08/22/2012	-1.65	±	3.64	-6.11	±	13.46	No
	08/29/2012	4.80	±	2.48	17.74	±	9.18	No
	09/05/2012	-0.55	±	2.03	-2.03	±	7.50	No
	09/12/2012	-1.27	±	2.18	-4.69	±	8.06	No
	09/19/2012	1.42	±	4.16	5.26	±	15.39	No
a	09/26/2012		±			±		No
CRATERS	07/03/2012	-0.79	±	1.85	-2.93	±	6.85	No
	07/11/2012	-0.40	±	1.66	-1.48	±	6.14	No
	07/18/2012	1.11	±	2.12	4.12	±	7.86	No
	07/25/2012	0.22	±	1.81	0.83	±	6.70	No
	08/01/2012	-0.95	±	2.03	-3.52	±	7.51	No
	08/08/2012	0.07	±	1.88	0.25	±	6.94	No
	08/15/2012	0.00	±	1.88	0.00	±	6.97	No
	08/22/2012	-1.02	±	2.26	-3.79	±	8.35	No
	08/29/2012	2.85	±	1.48	10.55	±	5.46	No
	09/05/2012	-0.31	±	1.15	-1.15	±	4.26	No
	09/12/2012	-0.79	±	1.36	-2.92	±	5.01	No
	09/19/2012	0.72	±	2.09	2.65	±	7.75	No
	09/26/2012	1.59	±	1.52	5.87	±	5.64	No
DUBOIS	07/03/2012	2.66	±	3.48	9.85	±	12.86	No
	07/11/2012	-1.31	±	1.57	-4.84	±	5.83	No
	07/18/2012	-1.47	±	1.89	-5.45	±	7.01	No
	07/25/2012	0.67	±	1.82	2.49	±	6.75	No
	08/01/2012	-1.85	±	1.85	-6.85	±	6.85	No
	08/08/2012	-1.66	±	1.95	-6.14	±	7.21	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								
	08/15/2012	-1.74	±	2.14	-6.43	±	7.92	No
	08/22/2012	-2.51	±	1.93	-9.27	±	7.16	No
	08/29/2012	1.64	±	1.22	6.07	±	4.53	No
	09/05/2012	-0.57	±	1.07	-2.11	±	3.95	No
	09/12/2012	0.45	±	1.12	1.68	±	4.13	No
	09/19/2012	-0.15	±	1.13	-0.56	±	4.16	No
	09/26/2012	0.02	±	1.27	0.06	±	4.70	No
IDAHO FALLS	07/03/2012	2.14	±	2.79	7.91	±	10.33	No
	07/11/2012	-1.16	±	1.39	-4.28	±	5.16	No
	07/18/2012	-1.35	±	1.74	-4.99	±	6.42	No
	07/25/2012	0.58	±	1.58	2.15	±	5.83	No
	08/01/2012	-1.66	±	1.66	-6.15	±	6.15	No
	08/08/2012	-1.45	±	1.71	-5.38	±	6.32	No
	08/15/2012	-1.41	±	1.74	-5.23	±	6.43	No
	08/22/2012	-2.90	±	2.24	-10.72	±	8.27	No
	08/29/2012	1.44	±	1.07	5.32	±	3.97	No
	09/05/2012	-0.28	±	1.02	-1.02	±	3.77	No
	09/12/2012	0.39	±	0.95	1.43	±	3.53	No
	09/19/2012	-0.14	±	1.04	-0.52	±	3.85	No
	09/26/2012	0.03	±	2.01	0.10	±	7.44	No
JACKSON	07/03/2012	-2.07	±	1.73	-7.66	±	6.42	No
	07/11/2012	-0.38	±	1.59	-1.42	±	5.89	No
	07/18/2012	1.02	±	1.95	3.78	±	7.21	No
	07/25/2012	0.21	±	1.73	0.79	±	6.40	No
	08/01/2012	-0.85	±	1.82	-3.16	±	6.74	No
	08/08/2012	0.07	±	1.84	0.24	±	6.82	No
	08/15/2012	0.00	±	2.12	0.00	±	7.85	No
	08/22/2012	-1.71	±	3.77	-6.32	±	13.94	No
	08/29/2012	2.50	±	1.29	9.26	±	4.79	No
	09/05/2012	-0.28	±	1.05	-1.05	±	3.87	No
	09/12/2012	-0.69	±	1.19	-2.56	±	4.39	No
	09/19/2012	1.15	±	3.38	4.27	±	12.50	No
	09/26/2012	1.24	±	1.19	4.58	±	4.40	No
REXBURG CMS	07/03/2012	2.85	±	3.72	10.55	±	13.77	No
	07/11/2012	-2.01	±	2.42	-7.44	±	8.96	No
	07/18/2012	-2.32	±	2.98	-8.57	±	11.03	No
	07/25/2012	1.37	±	3.73	5.08	±	13.80	No
	08/01/2012	-2.34	±	2.34	-8.65	±	8.65	No
	08/08/2012	-1.88	±	2.21	-6.94	±	8.16	No
	08/15/2012	-2.20	±	2.70	-8.13	±	10.00	No
	08/22/2012	-3.69	±	2.85	-13.64	±	10.53	No
	08/29/2012	1.90	±	1.41	7.02	±	5.23	No
	09/05/2012	-0.70	±	1.32	-2.61	±	4.90	No
	09/12/2012	0.56	±	1.37	2.05	±	5.06	No
	09/19/2012	-0.17	±	1.29	-0.64	±	4.78	No
	09/26/2012	0.03	±	2.44	0.12	±	9.05	No
INL SITE								
EFS	07/03/2012	-0.74	±	1.74	-2.75	±	6.42	No
	07/11/2012	-0.37	±	1.54	-1.38	±	5.70	No
	07/18/2012	1.01	±	1.94	3.75	±	7.16	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								
	07/25/2012	0.21	±	1.73	0.79	±	6.39	No
	08/01/2012	-0.84	±	1.80	-3.12	±	6.66	No
	08/08/2012	0.07	±	1.86	0.24	±	6.87	No
	08/15/2012	0.00	±	1.81	0.00	±	6.69	No
	08/22/2012	-1.01	±	2.22	-3.73	±	8.22	No
	08/29/2012	2.76	±	1.43	10.21	±	5.29	No
	09/05/2012	-0.31	±	1.13	-1.13	±	4.18	No
	09/12/2012	-0.74	±	1.27	-2.73	±	4.69	No
	09/19/2012	0.72	±	2.10	2.65	±	7.77	No
	09/26/2012	1.54	±	1.48	5.70	±	5.47	No
MAIN GATE	07/03/2012	-0.80	±	1.86	-2.94	±	6.88	No
	07/11/2012	-0.38	±	1.58	-1.41	±	5.84	No
	07/18/2012	1.08	±	2.06	4.00	±	7.64	No
	07/25/2012	0.22	±	1.77	0.81	±	6.53	No
	08/01/2012	-0.87	±	1.86	-3.23	±	6.89	No
	08/08/2012	0.07	±	1.86	0.24	±	6.87	No
	08/15/2012	0.00	±	1.94	0.00	±	7.18	No
	08/22/2012	-1.05	±	2.32	-3.90	±	8.59	No
	08/29/2012	2.66	±	1.38	9.86	±	5.10	No
	09/05/2012	-0.58	±	1.09	-2.14	±	4.02	No
	09/12/2012	-0.78	±	1.34	-2.89	±	4.97	No
	09/19/2012	0.68	±	2.01	2.53	±	7.42	No
	09/26/2012	2.46	±	2.36	9.11	±	8.74	No
VAN BUREN GATE	07/03/2012	-0.74	±	1.74	-2.75	±	6.42	No
	07/11/2012	-0.37	±	1.55	-1.39	±	5.75	No
	07/18/2012	1.03	±	1.97	3.83	±	7.30	No
	07/25/2012	0.22	±	1.75	0.80	±	6.49	No
	08/01/2012	-0.84	±	1.80	-3.11	±	6.64	No
	08/08/2012	0.06	±	1.79	0.23	±	6.62	No
	08/15/2012	0.00	±	1.70	0.00	±	6.29	No
	08/22/2012	-0.96	±	2.12	-3.56	±	7.85	No
	08/29/2012	2.85	±	1.48	10.55	±	5.46	No
	09/05/2012	-0.82	±	3.02	-3.03	±	11.17	No
	09/12/2012	-0.67	±	1.16	-2.49	±	4.28	No
	09/19/2012	0.70	±	2.06	2.60	±	7.62	No
	09/26/2012	1.49	±	1.43	5.52	±	5.30	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	9/30/2012	AMERICIUM-241	-0.79	±	1.33	-2.91	±	4.92	No
		CESIUM-137	-159.00	±	169.00	-588.30	±	625.30	No
		PLUTONIUM-238	0.28	±	0.68	1.02	±	2.50	No
		PLUTONIUM-239/240	1.00	±	0.68	3.69	±	2.52	No
ARCO (QA-1)	9/30/2012	AMERICIUM-241	-0.24	±	1.08	-0.88	±	3.98	No
		CESIUM-137	-284.00	±	166.00	-1050.80	±	614.20	No
		PLUTONIUM-238	0.62	±	0.76	2.31	±	2.83	No
		PLUTONIUM-239/240	2.02	±	1.02	7.47	±	3.78	No
ATOMIC CITY	9/30/2012	CESIUM-137	-70.40	±	135.00	-260.48	±	499.50	No
BLUE DOME	9/30/2012	CESIUM-137	12.40	±	189.00	45.88	±	699.30	No
		STRONTIUM-90	17.01	±	8.91	62.93	±	32.95	No
FAA TOWER	9/30/2012	CESIUM-137	152.00	±	133.00	562.40	±	492.10	No
HOWE	9/30/2012	AMERICIUM-241	2.35	±	1.44	8.68	±	5.34	No
		CESIUM-137	-5.09	±	122.00	-18.83	±	451.40	No
		PLUTONIUM-238	2.46	±	0.90	9.10	±	3.34	No
		PLUTONIUM-239/240	1.84	±	0.88	6.80	±	3.25	No
MONTEVIEW	9/30/2012	CESIUM-137	-141.00	±	179.00	-521.70	±	662.30	No
		STRONTIUM-90	32.75	±	9.11	121.17	±	33.72	**Yes**
MONTEVIEW (QA-2)	9/30/2012	CESIUM-137	284.00	±	143.00	1050.80	±	529.10	No
		STRONTIUM-90	39.95	±	9.17	147.81	±	33.93	**Yes**
MUD LAKE	9/30/2012	AMERICIUM-241	3.91	±	1.86	14.48	±	6.89	No
		CESIUM-137	-41.60	±	126.00	-153.92	±	466.20	No
		PLUTONIUM-238	3.51	±	1.05	12.98	±	3.88	**Yes**
		PLUTONIUM-239/240	1.75	±	0.84	6.46	±	3.10	No
DISTANT									
BLACKFOOT	9/30/2012	CESIUM-137	60.40	±	226.00	223.48	±	836.20	No
		STRONTIUM-90	67.20	±	16.86	248.62	±	62.40	**Yes**
CRATERS	9/30/2012	CESIUM-137	4.81	±	172.00	17.80	±	636.40	No
DUBOIS	9/30/2012	CESIUM-137	-80.40	±	128.00	-297.48	±	473.60	No
IDAHO FALLS	9/30/2012	AMERICIUM-241	-0.15	±	1.43	-0.56	±	5.29	No
		CESIUM-137	38.60	±	129.00	142.82	±	477.30	No
		PLUTONIUM-238	1.77	±	0.84	6.54	±	3.12	No
		PLUTONIUM-239/240	3.52	±	1.40	13.03	±	5.19	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	9/30/2012	CESIUM-137	-247.00	±	143.00	-913.90	±	529.10	No
		STRONTIUM-90	147.48	±	19.62	545.67	±	72.58	**Yes**
REXBURG CMS	9/30/2012	CESIUM-137	-4.35	±	233.00	-16.10	±	862.10	No
INL SITE									
EFS	9/30/2012	CESIUM-137	-93.10	±	170.00	-344.47	±	629.00	No
		STRONTIUM-90	79.20	±	12.72	293.02	±	47.07	**Yes**
MAIN GATE	9/30/2012	CESIUM-137	202.00	±	179.00	747.40	±	662.30	No
		STRONTIUM-90	34.78	±	9.78	128.68	±	36.19	**Yes**
VAN BUREN GATE	9/30/2012	AMERICIUM-241	0.48	±	1.35	1.78	±	5.00	No
		CESIUM-137	-33.20	±	175.00	-122.84	±	647.50	No
		PLUTONIUM-238	2.54	±	1.12	9.41	±	4.13	No
		PLUTONIUM-239/240	2.53	±	1.12	9.35	±	4.13	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$_{air}$)			Collection Medium	Result > 3s
BOUNDARY										
ATOMIC CITY	06/27/2012	07/18/2012	4.08	±	1.66	15.09	±	6.15	Molecular Sieve	No
ATOMIC CITY	07/18/2012	08/08/2012	3.56	±	2.06	13.18	±	7.63	Molecular Sieve	No
ATOMIC CITY	08/08/2012	08/29/2012	5.65	±	1.75	20.92	±	6.48	Molecular Sieve	**Yes**
ATOMIC CITY	08/29/2012	09/26/2012	5.19	±	1.51	19.21	±	5.59	Molecular Sieve	**Yes**
DISTANT										
BLACKFOOT	06/06/2012	07/03/2012	3.01	±	0.95	11.14	±	3.52	Molecular Sieve	**Yes**
BLACKFOOT	07/03/2012	07/18/2012	5.44	±	1.75	20.13	±	6.46	Molecular Sieve	**Yes**
BLACKFOOT	07/18/2012	08/01/2012	3.63	±	1.68	13.43	±	6.22	Molecular Sieve	No
BLACKFOOT	08/01/2012	08/15/2012	9.30	±	2.08	34.43	±	7.69	Molecular Sieve	**Yes**
BLACKFOOT	08/15/2012	08/31/2012	7.81	±	2.18	28.91	±	8.06	Molecular Sieve	**Yes**
BLACKFOOT	08/31/2012	09/12/2012	3.79	±	2.16	14.01	±	8.01	Molecular Sieve	No
IDAHO FALLS	06/27/2012	07/12/2012	8.63	±	2.88	31.93	±	10.64	Molecular Sieve	**Yes**
IDAHO FALLS	07/12/2012	07/25/2012	8.54	±	3.28	31.61	±	12.13	Molecular Sieve	No
IDAHO FALLS	07/25/2012	08/08/2012	1.38	±	0.69	5.09	±	2.57	Molecular Sieve	No
IDAHO FALLS	08/08/2012	08/27/2012	1.63	±	0.62	6.02	±	2.29	Molecular Sieve	No
IDAHO FALLS	08/27/2012	09/12/2012	0.83	±	0.55	3.06	±	2.04	Molecular Sieve	No
REXBURG	06/27/2012	07/11/2012	1.91	±	2.92	7.06	±	10.82	Molecular Sieve	No
REXBURG	07/11/2012	07/25/2012	11.25	±	3.06	41.61	±	11.33	Molecular Sieve	**Yes**
REXBURG	07/25/2012	08/08/2012	10.88	±	2.78	40.25	±	10.28	Molecular Sieve	**Yes**
REXBURG	08/08/2012	08/22/2012	2.67	±	2.83	9.89	±	10.47	Molecular Sieve	No
REXBURG	08/22/2012	09/05/2012	8.53	±	2.50	31.56	±	9.23	Molecular Sieve	**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	7/2/2012	8/2/2012	68.28	±	28.35	2.53	±	1.05	No
	8/2/2012	9/3/2012	356.57	±	34.56	13.19	±	1.28	**Yes**
CFA	6/4/2012	7/3/2012	117.90	±	28.87	4.36	±	1.07	**Yes**
	7/2/2012	8/1/2012	67.40	±	28.56	2.49	±	1.06	No
	8/1/2012	9/4/2012	47.04	±	28.99	1.74	±	1.07	No
EFS	7/3/2012	7/11/2012	67.16	±	27.73	2.49	±	1.03	No
	7/11/2012	7/18/2012	75.84	±	28.60	2.81	±	1.06	No
	8/1/2012	8/8/2012	62.19	±	28.30	2.30	±	1.05	No
	8/22/2012	8/29/2012	42.41	±	27.10	1.57	±	1.00	No
	9/19/2012	9/26/2012	-19.70	±	41.30	-0.73	±	1.53	No

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

Location	Sampling Date	Iodine-131 Result ± 1s Uncertainty (pCi[†]/L)	Iodine-131 Result ± 1s Uncertainty (Bq[‡]/L)	Result > 3s	Cesium-137 Result ± 1s Uncertainty (pCi/L)	Cesium-137 Result ± 1s Uncertainty (Bq/L)	Result > 3s
BLACKFOOT							
	07/02/12	0.61 ± 1.41	0.022 ± 0.052	No	-1.30 ± 1.47	-0.048 ± 0.054	No
	08/07/12	4.04 ± 1.79	0.150 ± 0.066	No	0.15 ± 1.45	0.006 ± 0.054	No
	09/17/12	2.87 ± 1.80	0.106 ± 0.067	No	-1.92 ± 1.41	-0.071 ± 0.052	No
CONTROL							
	07/02/12	2.19 ± 1.95	0.081 ± 0.072	No	0.55 ± 1.42	0.020 ± 0.053	No
	08/07/12	0.24 ± 2.12	0.009 ± 0.079	No	-1.56 ± 1.43	-0.058 ± 0.053	No
	09/04/12	-2.76 ± 1.29	-0.102 ± 0.048	No	-1.21 ± 1.43	-0.045 ± 0.053	No
DIETRICH							
	07/02/12	-0.48 ± 1.33	-0.018 ± 0.049	No	-0.62 ± 1.46	-0.023 ± 0.054	No
Duplicate	07/02/12	0.92 ± 0.95	0.034 ± 0.035	No	0.18 ± 0.85	0.007 ± 0.031	No
	08/07/12	0.14 ± 1.19	0.005 ± 0.044	No	1.23 ± 1.39	0.046 ± 0.051	No
	09/04/12	0.58 ± 1.12	0.021 ± 0.041	No	1.46 ± 1.42	0.054 ± 0.053	No
HOWE							
	07/02/12	1.74 ± 1.09	0.064 ± 0.040	No	1.40 ± 0.77	0.052 ± 0.029	No
	08/07/12	0.63 ± 1.31	0.023 ± 0.049	No	-1.00 ± 1.41	-0.037 ± 0.052	No
Duplicate	08/07/12	-0.97 ± 1.35	-0.036 ± 0.050	No	-2.37 ± 1.42	-0.088 ± 0.053	No
	09/04/12	0.86 ± 1.67	0.032 ± 0.062	No	-2.18 ± 1.37	-0.081 ± 0.051	No
IDAHO FALLS							
	07/02/12	-1.82 ± 1.04	-0.067 ± 0.039	No	-0.57 ± 0.78	-0.021 ± 0.029	No
	07/10/12	0.47 ± 1.15	0.017 ± 0.043	No	1.26 ± 1.28	0.047 ± 0.047	No
	07/17/12	1.97 ± 0.98	0.073 ± 0.036	No	1.20 ± 0.77	0.044 ± 0.029	No
	07/24/12	0.47 ± 0.93	0.017 ± 0.034	No	0.74 ± 0.79	0.027 ± 0.029	No
	07/31/12	-0.25 ± 0.93	-0.009 ± 0.034	No	1.02 ± 0.76	0.038 ± 0.028	No
	08/07/12	-0.03 ± 1.49	-0.001 ± 0.055	No	-0.46 ± 1.49	-0.017 ± 0.055	No
	08/14/12	0.41 ± 0.88	0.015 ± 0.033	No	1.17 ± 0.83	0.043 ± 0.031	No
	08/21/12	0.47 ± 0.95	0.017 ± 0.035	No	0.69 ± 0.78	0.025 ± 0.029	No
	08/28/12	-0.56 ± 1.14	-0.021 ± 0.042	No	-0.33 ± 1.48	-0.012 ± 0.055	No
	09/04/12	-0.04 ± 0.93	-0.001 ± 0.034	No	-1.06 ± 0.78	-0.039 ± 0.029	No
	09/11/12	-0.39 ± 0.92	-0.014 ± 0.034	No	-0.45 ± 0.74	-0.017 ± 0.027	No
	09/18/12	-0.17 ± 0.93	-0.006 ± 0.034	No	0.31 ± 0.75	0.012 ± 0.028	No
	09/25/12	0.26 ± 0.89	0.010 ± 0.033	No	0.32 ± 0.77	0.012 ± 0.028	No
RUPERT							
	07/02/12	2.76 ± 1.84	0.102 ± 0.068	No	0.40 ± 1.40	0.015 ± 0.052	No
	08/07/12	1.86 ± 0.85	0.069 ± 0.031	No	-0.69 ± 0.84	-0.026 ± 0.031	No
	09/04/12	0.27 ± 0.87	0.010 ± 0.032	No	1.10 ± 0.85	0.041 ± 0.032	No
TERRETON							
	07/02/12	1.17 ± 1.27	0.043 ± 0.047	No	-0.49 ± 1.46	-0.018 ± 0.054	No
	08/07/12	1.35 ± 1.37	0.050 ± 0.051	No	1.14 ± 1.45	0.042 ± 0.054	No
	09/04/12	0.41 ± 0.93	0.015 ± 0.034	No	-0.57 ± 0.87	-0.021 ± 0.032	No

Table C-7. Cesium-137 and Strontium-90 Concentrations in Lettuce

Location	Sampling Date	Cesium-137 Result ± 1s Uncertainty pCi/kg			Cesium-137 Result ± 1s Uncertainty ($\times 10^{-2}$ Bq/kg)			Result > 3s
ARCO	07/25/2012	-35.51	±	129.45	-131.53	±	479.44	No
ATOMIC CITY	07/18/2012	31.63	±	69.40	117.15	±	257.05	No
BLACKFOOT	08/21/2012	-150.56	±	116.94	-557.61	±	433.11	No
CAREY	08/08/2012	-77.36	±	59.94	-286.51	±	222.01	No
CONTROL	08/20/2012	-89.38	±	76.39	-331.03	±	282.92	No
EFS	08/08/2012	-11.21	±	61.89	-41.51	±	229.21	No
FAA TOWER	08/01/2012	58.18	±	75.92	215.49	±	281.19	No
HOWE	08/01/2012	-230.83	±	177.26	-854.94	±	656.50	No
HOWE (DUPLICATE)	08/01/2012	18.83	±	78.03	69.75	±	289.01	No
IDAHO FALLS	08/13/2012	-91.28	±	118.89	-338.07	±	440.35	No
MONTEVIEW	07/18/2012	11.79	±	60.21	43.66	±	223.01	No

Location	Sampling Date	Strontium-90 Result ± 1s Uncertainty pCi/kg			Strontium-90 Result ± 1s Uncertainty ($\times 10^{-2}$ Bq/kg)			Result > 3s
ARCO	07/25/2012	126.00	±	29.80	466.67	±	110.37	**Yes**
ATOMIC CITY	07/18/2012	65.10	±	24.10	241.11	±	89.26	No
BLACKFOOT	08/21/2012	94.60	±	26.50	350.37	±	98.15	**Yes**
CAREY	08/08/2012	148.00	±	32.00	548.15	±	118.52	**Yes**
CONTROL	08/20/2012	45.70	±	21.80	169.26	±	80.74	No
EFS	08/08/2012	164.00	±	34.60	607.41	±	128.15	**Yes**
FAA TOWER	08/01/2012	70.30	±	24.90	260.37	±	92.22	No
HOWE	08/01/2012	41.90	±	20.60	155.19	±	76.30	No
HOWE (DUPLICATE)	08/01/2012	22.30	±	18.90	82.59	±	70.00	No
IDAHO FALLS	08/13/2012	59.60	±	23.60	220.74	±	87.41	No
MONTEVIEW	07/18/2012	104.00	±	27.40	385.19	±	101.48	**Yes**

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

Table C-8. Cesium-137 and Strontium-90 Concentrations in Grain

Location	Sampling Date	Cesium-137 Result ± 1s Uncertainty pCi/kg			Cesium-137 Result ± 1s Uncertainty Bq/kg			Result > 3s
AMERICAN FALLS	08/27/12	1.43	±	1.20	0.05	±	0.04	No
ARCO	08/27/12	-3.55	±	1.96	-0.13	±	0.07	No
BLACKFOOT	08/15/12	3.45	±	2.44	0.13	±	0.09	No
CONTROL	08/28/12	-1.06	±	2.77	-0.04	±	0.10	No
HAMER	08/22/12	0.30	±	1.09	0.01	±	0.04	No
IDAHO FALLS	08/14/12	1.65	±	1.38	0.06	±	0.05	No
MONTEVIEW	08/22/12	-2.95	±	1.70	-0.11	±	0.06	No
MONTEVIEW (DUPLICATE)	08/22/12	-1.40	±	1.13	-0.05	±	0.04	No
RUPERT	08/27/12	-3.01	±	2.44	-0.11	±	0.09	No
TERRETON	08/22/12	0.04	±	2.16	0.00	±	0.08	No
		Strontium-90						
		Result ± 1s Uncertainty pCi/kg			**Result ± 1s Uncertainty Bq/kg**			**Result > 3s**
AMERICAN FALLS	08/27/12	-17.20	±	21.50	-0.64	±	0.80	No
ARCO	08/27/12	27.30	±	25.50	1.01	±	0.94	No
BLACKFOOT	08/15/12	20.00	±	24.10	0.74	±	0.89	No
CONTROL	08/28/12	-12.80	±	24.20	-0.47	±	0.90	No
HAMER	08/22/12	-15.70	±	21.10	-0.58	±	0.78	No
IDAHO FALLS	08/14/12	-0.72	±	20.90	-0.03	±	0.77	No
MONTEVIEW	08/22/12	40.20	±	26.20	1.49	±	0.97	No
MONTEVIEW (DUPLICATE)	08/22/12	-51.70	±	21.30	-1.91	±	0.79	No
RUPERT	08/27/12	19.60	±	23.50	0.73	±	0.87	No
TERRETON	08/22/12	-11.00	±	22.00	-0.41	±	0.81	No

Table C-9. Cesium-137 and Iodine-131 Concentrations in Large Game Animals

Species	Collection Date	Tissue	Analyte	Result ± 1s Uncertainty (pCi/kg wet weight)			Result ± 1s Uncertainty (x 10^{-2} Bq/kg wet weight)			Result > 3s
MULE DEER	7/31/2012	Liver	^{131}I	-2.20	±	2.24	-8.14	±	8.29	No
			^{137}Cs	0.65	±	2.08	2.39	±	7.70	No
MULE DEER	7/31/2012	Muscle	^{131}I	1.92	±	5.91	7.10	±	21.87	No
			^{137}Cs	-9.89	±	6.42	-36.59	±	23.75	No
MULE DEER	7/31/2012	Thyroid	^{131}I	5.54	±	210.00	20.50	±	777.00	No
			^{137}Cs	-184.00	±	238.00	-680.80	±	880.60	No

Table C-10. Actinide, Cesium-137, and Strontium-90 Concentrations in Soil

Location	Sampling Date	Americium-241 Concentration ± 1s (pCi/Kg)			Americium-241 Concentration ± 1s (Bq/Kg)			Result > 3s
BOUNDARY								
ATOMIC CITY	07/10/12	3.96	±	7.09	0.15	±	0.26	No
BUTTE CITY	07/10/12	12.60	±	8.16	0.47	±	0.30	No
FAA TOWER	07/10/12	5.17	±	6.53	0.19	±	0.24	No
FRENCHMAN'S CABIN	07/10/12	0.12	±	6.78	0.00	±	0.25	No
HOWE	07/09/12	9.08	±	9.59	0.34	±	0.36	No
MONTEVIEW	07/09/12	10.60	±	6.80	0.39	±	0.25	No
MUD LAKE #1	07/09/12	7.29	±	9.78	0.27	±	0.36	No
MUD LAKE #2	07/09/12	9.67	±	7.12	0.36	±	0.26	No
RENO RANCH	07/09/12	21.30	±	8.42	0.79	±	0.31	No
DISTANT								
BLACKFOOT	07/20/12	15.80	±	10.40	0.59	±	0.39	No
CAREY	07/10/12	-7.21	±	5.41	-0.27	±	0.20	No
CAREY (DUPLICATE)	07/10/12	2.65	±	6.55	0.10	±	0.24	No
CRYSTAL ICE CAVES	07/20/12	9.34	±	7.28	0.35	±	0.27	No
ST. ANTHONY	07/09/12	8.51	±	7.35	0.32	±	0.27	No

Location	Sampling Date	Cesium-137 Concentration ± 1s (pCi/Kg)			Cesium-137 Concentration ± 1s (Bq/Kg)			Result > 3s
BOUNDARY								
ATOMIC CITY	07/10/12	447.00	±	25.70	16.56	±	0.95	**Yes**
BUTTE CITY	07/10/12	444.00	±	25.50	16.44	±	0.94	**Yes**
FAA TOWER	07/10/12	704.00	±	41.10	26.07	±	1.52	**Yes**
FRENCHMAN'S CABIN	07/10/12	339.00	±	20.60	12.56	±	0.76	**Yes**
HOWE	07/09/12	179.00	±	12.10	6.63	±	0.45	**Yes**
MONTEVIEW	07/09/12	285.00	±	16.60	10.56	±	0.61	**Yes**
MUD LAKE #1	07/09/12	114.00	±	8.61	4.22	±	0.32	**Yes**
MUD LAKE #2	07/09/12	256.00	±	15.00	9.48	±	0.56	**Yes**
RENO RANCH	07/09/12	663.00	±	37.60	24.56	±	1.39	**Yes**
DISTANT								
BLACKFOOT	07/20/12	52.20	±	5.87	1.93	±	0.22	**Yes**
CAREY	07/10/12	445.00	±	25.60	16.48	±	0.95	**Yes**
CAREY (DUPLICATE)	07/10/12	713.94	±	40.49	26.44	±	1.50	**Yes**
CRYSTAL ICE CAVES	07/20/12	492.00	±	29.30	18.22	±	1.09	**Yes**
ST. ANTHONY	07/09/12	746.00	±	43.20	27.63	±	1.60	**Yes**

Table C-10. Actinide, Cesium-137, and Strontium-90 Concentrations in Soil

Location	Sampling Date	Plutonium-238 Concentration ± 1s (pCi/Kg)			Plutonium-238 Concentration ± 1s (Bq/Kg)			Result > 3s
BOUNDARY								
ATOMIC CITY	07/10/12	9.00	±	3.74	0.33	±	0.14	No
BUTTE CITY	07/10/12	2.34	±	2.87	0.09	±	0.11	No
FAA TOWER	07/10/12	3.64	±	3.13	0.13	±	0.12	No
FRENCHMAN'S CABIN	07/10/12	7.62	±	3.78	0.28	±	0.14	No
HOWE	07/09/12	7.49	±	4.62	0.28	±	0.17	No
MONTEVIEW	07/09/12	11.50	±	3.92	0.43	±	0.15	No
MUD LAKE #1	07/09/12	5.06	±	4.02	0.19	±	0.15	No
MUD LAKE #2	07/09/12	2.00	±	4.89	0.07	±	0.18	No
RENO RANCH	07/09/12	14.40	±	5.10	0.53	±	0.19	No
DISTANT								
BLACKFOOT	07/20/12	11.80	±	4.05	0.44	±	0.15	No
CAREY	07/10/12	14.70	±	5.02	0.54	±	0.19	No
CAREY (DUPLICATE)	07/10/12	8.28	±	4.82	0.31	±	0.18	No
CRYSTAL ICE CAVES	07/20/12	6.95	±	4.64	0.26	±	0.17	No
ST. ANTHONY	07/09/12	11.20	±	4.91	0.41	±	0.18	No

Location	Sampling Date	Plutonium-239/240 Concentration ± 1s (pCi/Kg)			Plutonium-239/240 Concentration ± 1s (Bq/Kg)			Result > 3s
BOUNDARY								
ATOMIC CITY	07/10/12	31.50	±	7.59	1.17	±	0.28	**Yes**
BUTTE CITY	07/10/12	21.00	±	5.71	0.78	±	0.21	**Yes**
FAA TOWER	07/10/12	18.50	±	5.05	0.69	±	0.19	**Yes**
FRENCHMAN'S CABIN	07/10/12	22.80	±	6.87	0.84	±	0.25	**Yes**
HOWE	07/09/12	5.61	±	4.60	0.21	±	0.17	No
MONTEVIEW	07/09/12	24.20	±	6.87	0.90	±	0.25	**Yes**
MUD LAKE #1	07/09/12	2.52	±	5.65	0.09	±	0.21	No
MUD LAKE #2	07/09/12	33.90	±	9.51	1.26	±	0.35	**Yes**
RENO RANCH	07/09/12	43.00	±	9.23	1.59	±	0.34	**Yes**
DISTANT								
BLACKFOOT	07/20/12	14.40	±	4.86	0.53	±	0.18	No
CAREY	07/10/12	34.20	±	7.60	1.27	±	0.28	**Yes**
CAREY (DUPLICATE)	07/10/12	38.60	±	8.56	1.43	±	0.32	**Yes**
CRYSTAL ICE CAVES	07/20/12	44.40	±	9.43	1.64	±	0.35	**Yes**
ST. ANTHONY	07/09/12	40.40	±	9.03	1.50	±	0.33	**Yes**

Table C-10. Actinide, Cesium-137, and Strontium-90 Concentrations in Soil

Location	Sampling Date	Strontium-90 Concentration ± 1s (pCi/Kg)			Strontium-90 Concentration ± 1s (Bq/Kg)			Result > 3s
BOUNDARY								
ATOMIC CITY	07/10/12	141.00	±	38.10	5.22	±	1.41	**Yes**
BUTTE CITY	07/10/12	201.00	±	41.20	7.44	±	1.53	**Yes**
FAA TOWER	07/10/12	159.00	±	40.50	5.89	±	1.50	**Yes**
FRENCHMAN'S CABIN	07/10/12	81.60	±	43.60	3.02	±	1.61	No
HOWE	07/09/12	123.00	±	51.80	4.56	±	1.92	No
MONTEVIEW	07/09/12	38.70	±	33.00	1.43	±	1.22	No
MUD LAKE #1	07/09/12	13.80	±	35.00	0.51	±	1.30	No
MUD LAKE #2	07/09/12	123.00	±	41.10	4.56	±	1.52	No
RENO RANCH	07/09/12	265.00	±	46.30	9.81	±	1.71	**Yes**
DISTANT								
BLACKFOOT	07/20/12	97.70	±	36.60	3.62	±	1.36	No
CAREY	07/10/12	49.50	±	35.40	1.83	±	1.31	No
CAREY (DUPLICATE)	07/10/12	33.50	±	38.40	1.24	±	1.42	No
CRYSTAL ICE CAVES	07/20/12	161.00	±	44.20	5.96	±	1.64	**Yes**
ST. ANTHONY	07/09/12	238.00	±	43.60	8.81	±	1.61	**Yes**

Table C-11. Comparison of Environmental Radiation Measurements using TLDs and OSLDs.

Location	TLD Measurement ± 2s Uncertainty mrem	OSLD Measurement ± 2s Uncertainty mrem
BOUNDARY		
ARCO	67.1 ± 13.2	62.8 ± 6.3
ATOMIC CITY	70.1 ± 13.7	60.9 ± 6.1
BIRCH CREEK	61.3 ± 12.1	52.0 ± 5.2
BLUE DOME	57.8 ± 11.3	50.0 ± 5.0
HOWE	66.8 ± 13.1	62.1 ± 6.3
MONTEVIEW	65.3 ± 12.8	53.5 ± 5.3
MUD LAKE	75.0 ± 14.7	65.2 ± 6.6
Average	**66.2**	**Average** **58.1**
DISTANT		
ABERDEEN	69.1 ± 13.6	57.9 ± 5.8
BLACKFOOT	64.1 ± 12.6	59.6 ± 5.9
BLACKFOOT CMS	62.0 ± 12.2	56.2 ± 5.6
CRATERS	64.3 ± 12.6	54.0 ± 5.4
DUBOIS	57.7 ± 11.3	50.0 ± 5.0
IDAHO FALLS	67.2 ± 13.2	59.5 ± 6.0
MINIDOKA	61.9 ± 12.2	53.5 ± 5.4
REXBURG	79.2 ± 15.6	68.9 ± 6.9
ROBERTS	74.3 ± 14.5	70.3 ± 7.0
Average	**66.6**	**Average** **58.9**
OUT-OF-STATE		
JACKSON	56.7 ± 11.1	48.5 ± 4.9

APPENDIX D

STATISTICAL ANALYSIS RESULTS

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

Parameter	P[a]
Gross Alpha	
Quarter	0.79
July	0.18
August	0.67
September	0.57
Gross Beta	
Quarter	0.00
July	0.10
August	0.08
September	0.04

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		
	July 3	0.25
	July 11	0.57
	July 18	0.89
	July 25	0.28
	August 1	0.05
	August 8	0.89
	August 15	0.05
	August 22	0.94
	August 29	0.25
	September 5	0.57
	September 12	0.48
	September 19	0.89
	September 26	0.85
Gross Beta		
	July 3	0.07
	July 11	0.83
	July 18	0.57
	July 25	0.22
	August 1	0.78
	August 8	0.06
	August 15	0.15
	August 22	0.09
	August 29	0.06
	September 5	0.02
	September 12	0.05
	September 19	0.10
	September 26	0.45

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