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

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EXECUTIVE SUMMARY

None of the radionuclides detected in samples collected during the second quarter of 2013 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 2013 contains results from the Environmental Surveillance, Education, and Research (ESER) Program's monitoring of the Department of Energy's Idaho National Laboratory (INL) Site's offsite environment, April 1 through June 30, 2013. All sample types (media) and the sampling schedule followed during 2013 are listed in Appendix A. Specifically, this report contains the results for the following:

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

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

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	Gross alpha concentrations were statistically higher at Distant locations than at Boundary and INL Site locations for the quarter. This does not indicate an impact from INL Site operations. Gross Beta concentrations were statistically the same for all three sample groups for the quarter and for each month. There were three weeks where a statistical difference was noted in gross alpha concentrations, but it appeared due to normal variability in weekly data. No result exceeded the DCS for gross alpha or gross beta activity in air.
		Gamma-emitting radionuclides, ^{90}Sr, actinides (americium and plutonium)	No human-made gamma-emitting were detected. Strontium-90 and actinide results were not yet available.
	Charcoal Cartridge	Iodine-131	Iodine-131 was not detected in any of the 26 batches counted during the quarter.
Atmospheric Moisture	Liquid	Tritium	All of the 16 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. Five 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 close to the minimum detectable concentration. Gross beta was detected in most of the drinking water and all three of the surface water samples. Activities were consistent with natural levels of radioactivity in the aquifer. Tritium was detected in four drinking water samples, including

			a sample of bottled water and in all three surface water samples. The results were well below the DCS for tritium in drinking water.
Milk	Liquid	Iodine-131, other gamma-emitting radionuclides	No Iodine-131 or other human-made gamma emitting radionuclides were detected. Strontium-90 was found in all of the eight samples analyzed Results were consistent with previous measurements and positive detections included a sample of commercial organic milk. Four samples had detectable tritium at concentrations similar to those found in other liquid media. All detectable milk results were well below the DCSs for ^{90}Sr and tritium in drinking water.
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 just below the minimum detectable concentration in the other two subsamples.
Environmental Dosimeters	Environmental radiation	External radioactivity	Measurements of environmental radiation were made using both thermoluminescent dosimeters (TLDs) and optically-stimulated luminescent dosimeters (OSLDs). Both dosimeter types showed a similar pattern with slightly higher measurements at Distant locations than Boundary locations.

LIST OF ABBREVIATIONS

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

LIST OF UNITS

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

1. ESER PROGRAM DESCRIPTION

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

This report contains monitoring results from the ESER Program for samples collected during the second quarter of 2013 (April 1-June 30, 2013).

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

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

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

Environmental samples collected include:

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

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

The ESER Program used two laboratories to perform analyses on routine environmental samples collected during the quarter reported here. The ISU Environmental Assessment Laboratory (EAL) performed routine gross alpha, gross beta, tritium, and gamma spectrometry analyses. 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 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.

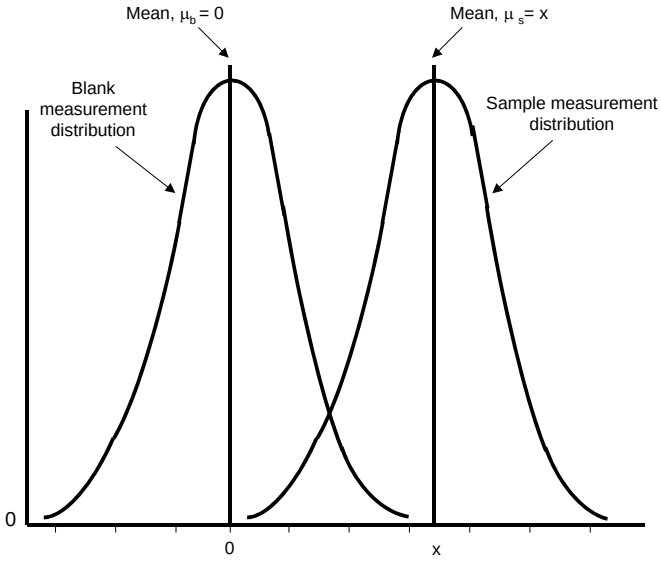

Figure 1. Example of overlap of blank and sample measurement distributions.

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 2013 are discussed below. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses and DOE Derived Concentration Standard (DCS) (DOE 2011) values is provided in Appendix B.

LOW-VOLUME AIR SAMPLING

Radioactivity associated with airborne particulates was monitored continuously by 18 low-volume air samplers (two of which are used as replicate samplers) at 16 locations during the second quarter of 2013 (Figure 2). Three of these samplers are located on the INL Site, nine are situated off the INL Site near the boundary, and six have been placed at locations distant to the INL Site. Samplers are divided into INL Site, Boundary, and Distant groups to determine if there is a gradient of radionuclide concentrations, increasing towards the INL Site. Each replicate sampler is relocated every other year to a new location. At the start of 2012, one replicate sampler was moved to Monteview (a Boundary location) and one was moved to Arco (also a Boundary location). An average of 20,239 ft^3 (573 m^3) of air was sampled at each location, each week, at an average flow rate of 2.01 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.

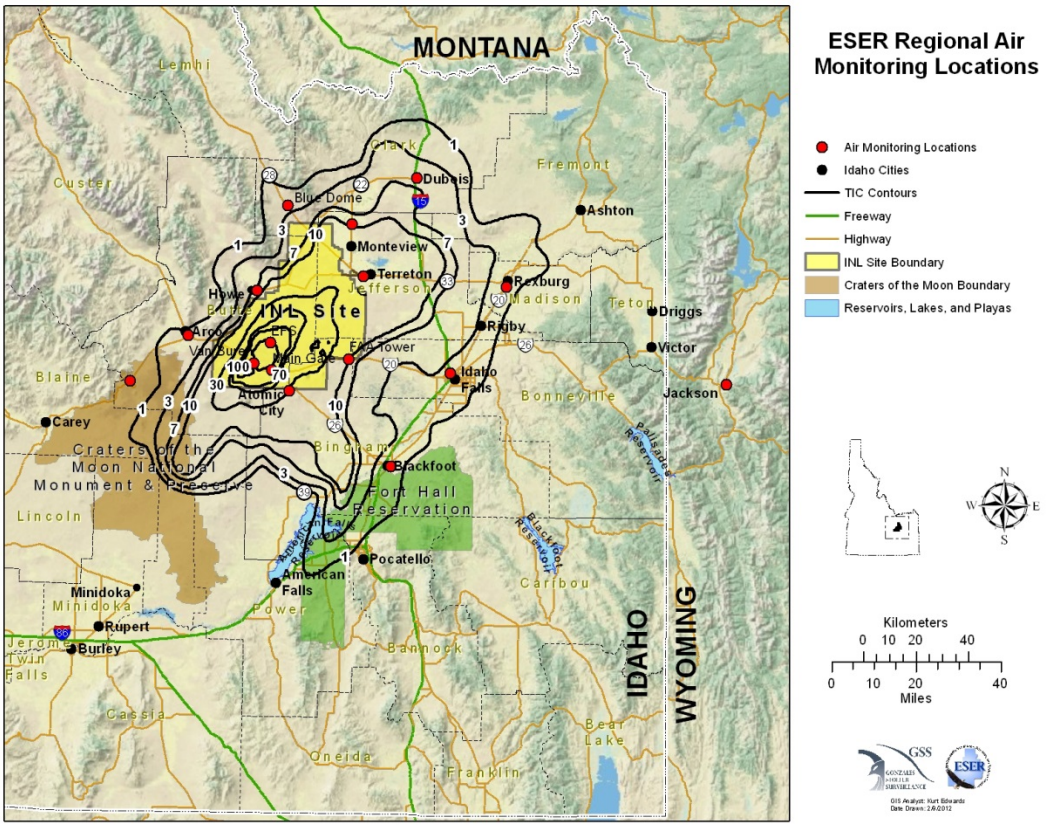

Figure 2. Low-volume air sampler locations.

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 a statistical difference noted in the data, as the p-value was just below 0.05. The data show, however, that the Distant group had the highest mean gross alpha concentrations, followed by the Boundary locations, with the INL Site group having the lowest gross alpha concentrations. This pattern is the opposite that would be expected if the INL Site was contributing to the detected concentrations and probably represents the usual random variability in the data.

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 three weeks, the weeks of April 3, May 22, and June 26, where a statistical difference existed between the two sample groups (Table D-2). During all of these weeks, gross alpha concentrations were higher at Distant locations than at Boundary locations. As noted in the previous paragraph, this does not indicate an INL Site impact.

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 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 no statistical differences between Boundary and Distant measurements during any week of the second quarter (Table D-1).

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. Cesium-137 results are found in Appendix C, Table C-3. Results for analysis of ^{90}Sr and actinides were not yet completed.

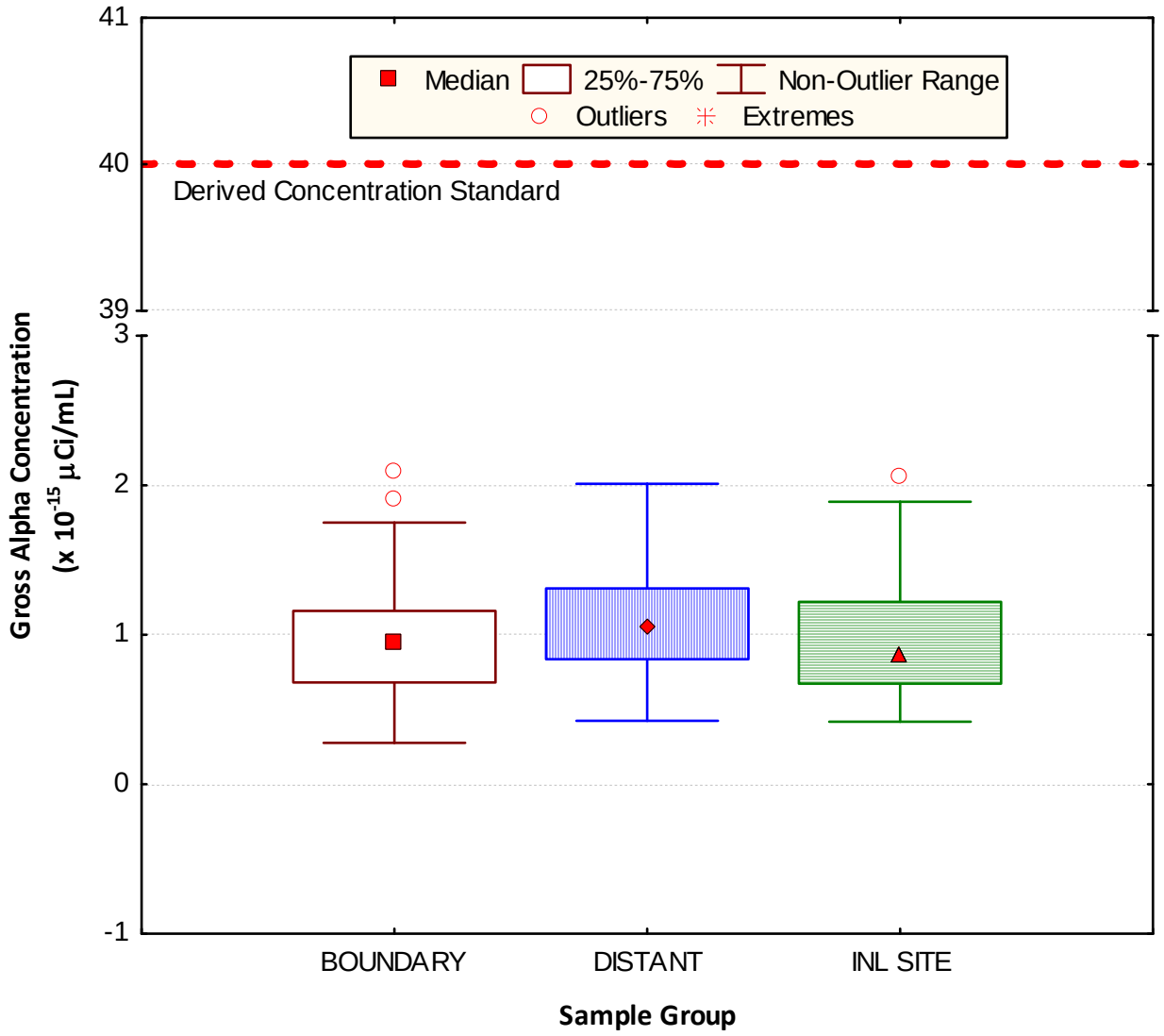

Figure 3. Gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations for the second quarter of 2013.

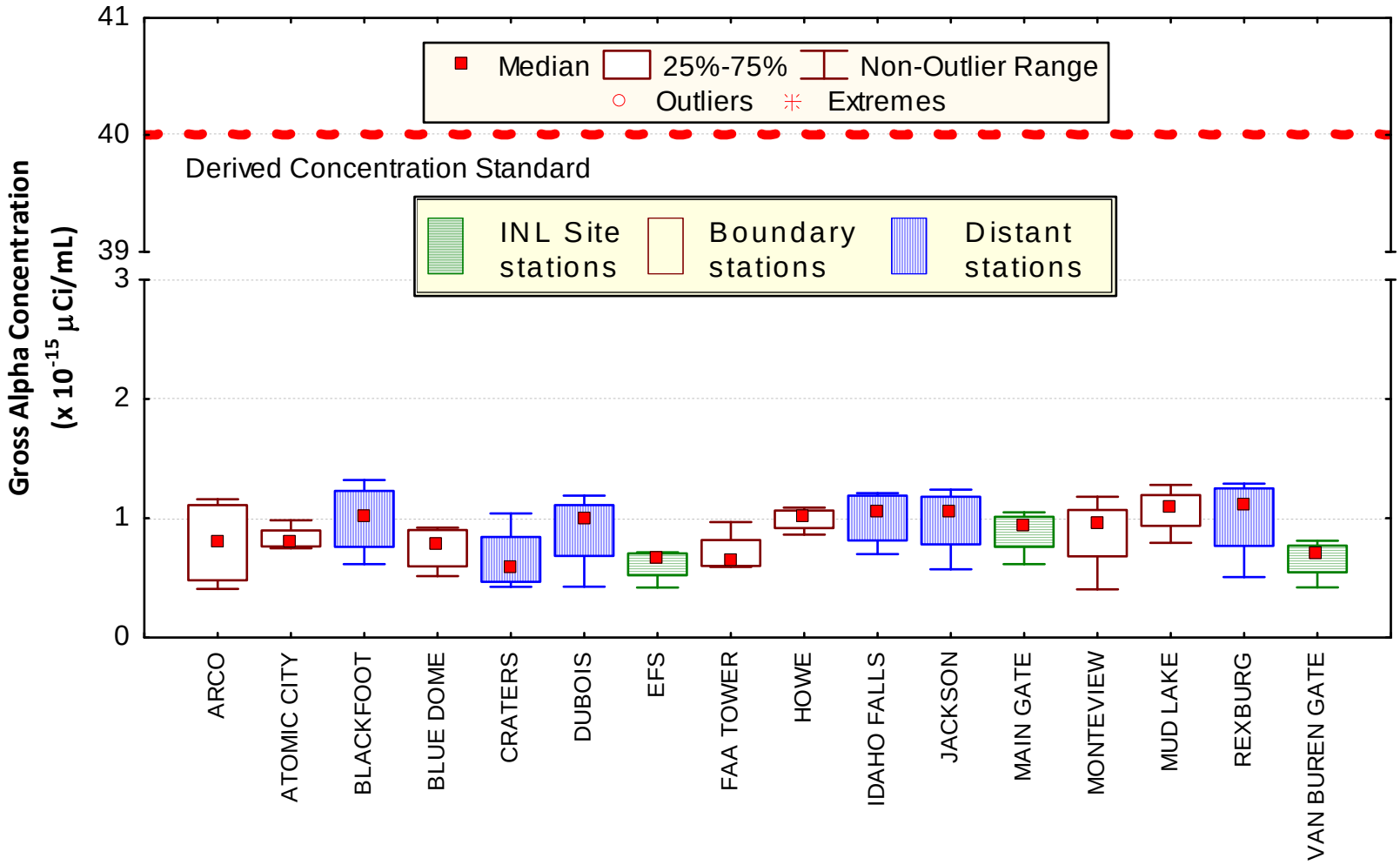

Figure 4. April gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

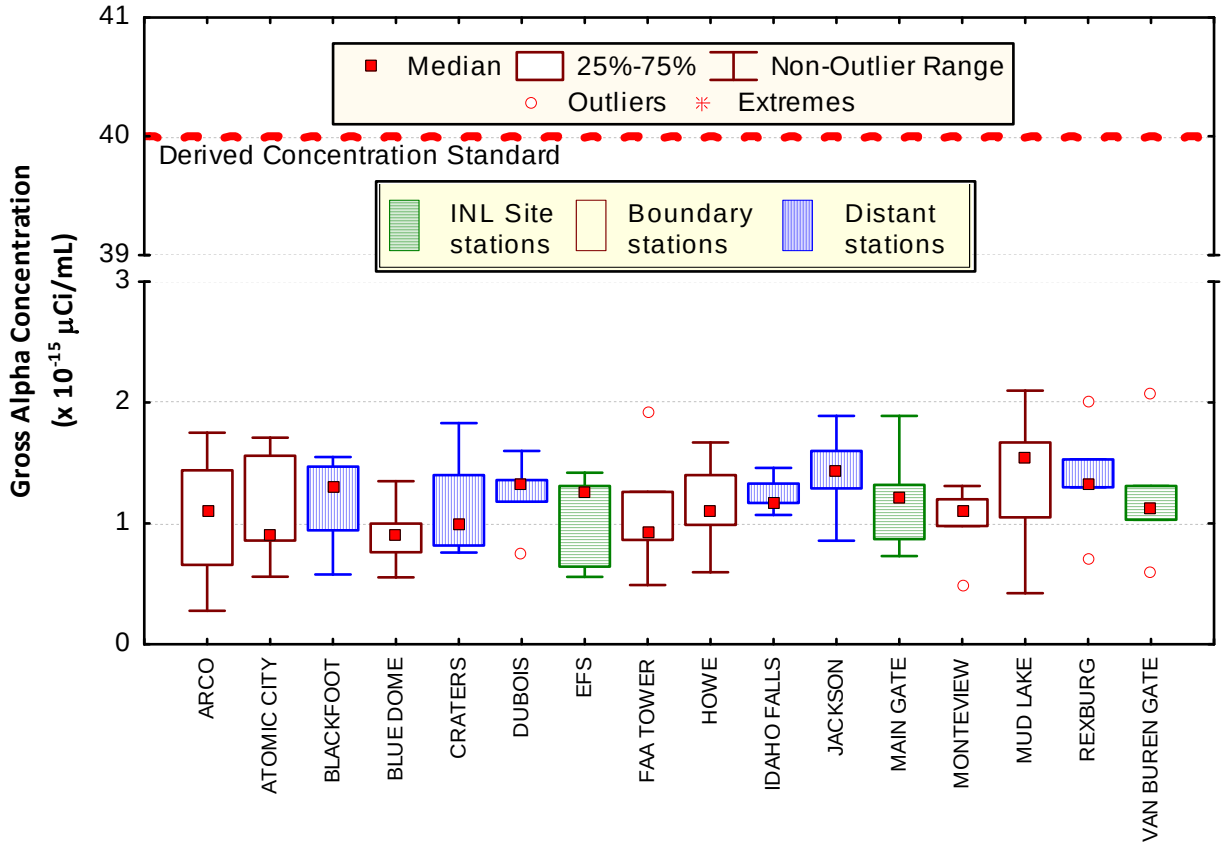

Figure 5. May gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location.

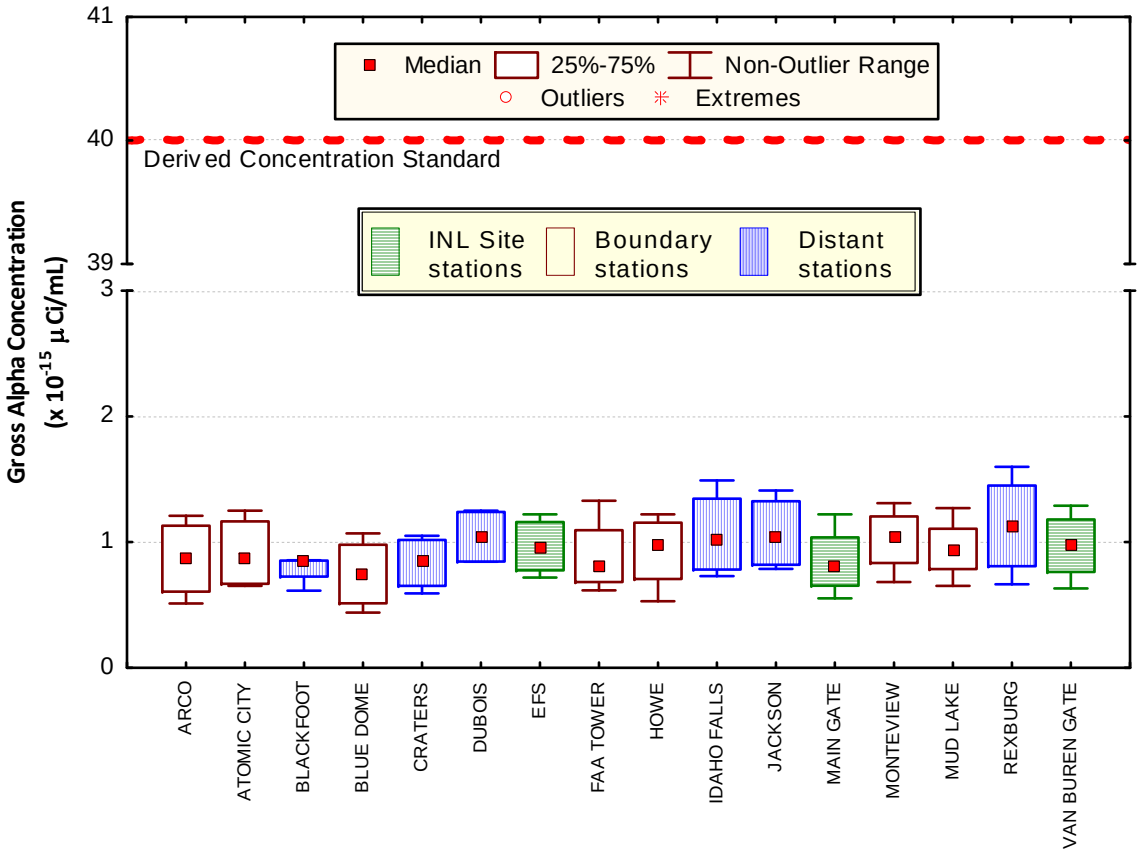

Figure 6. June gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

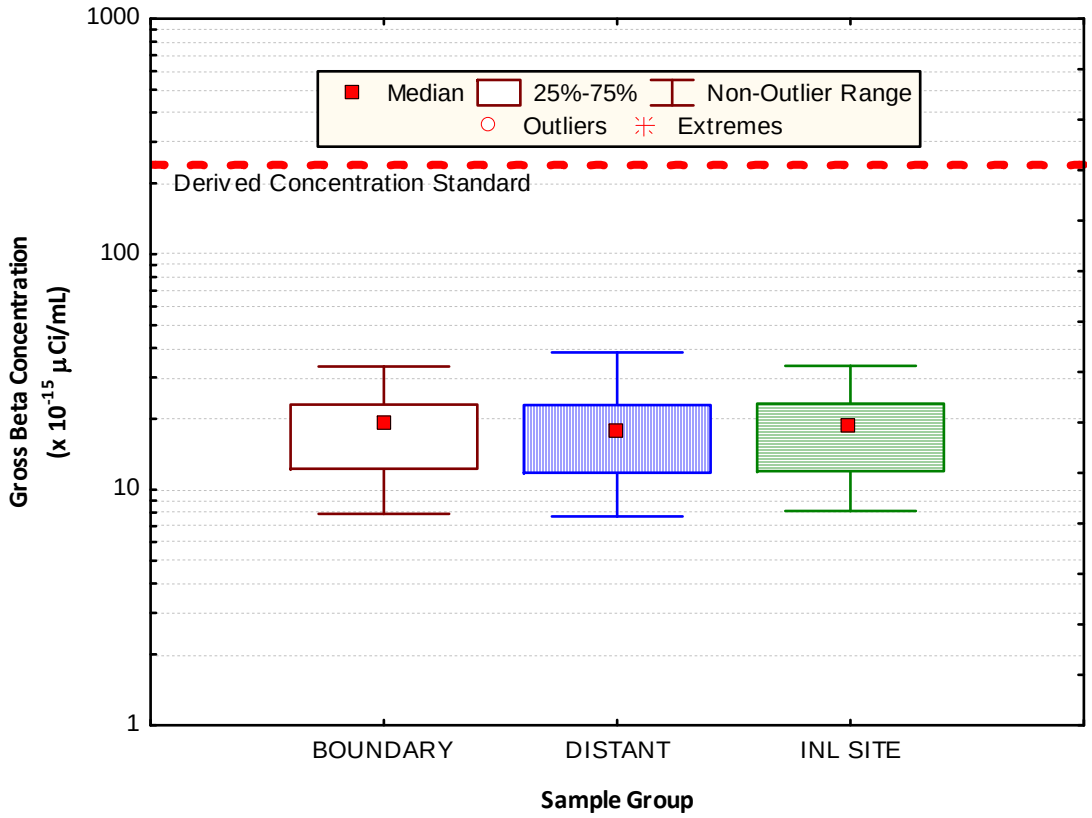

Figure 7. Gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations for the second quarter of 2013.

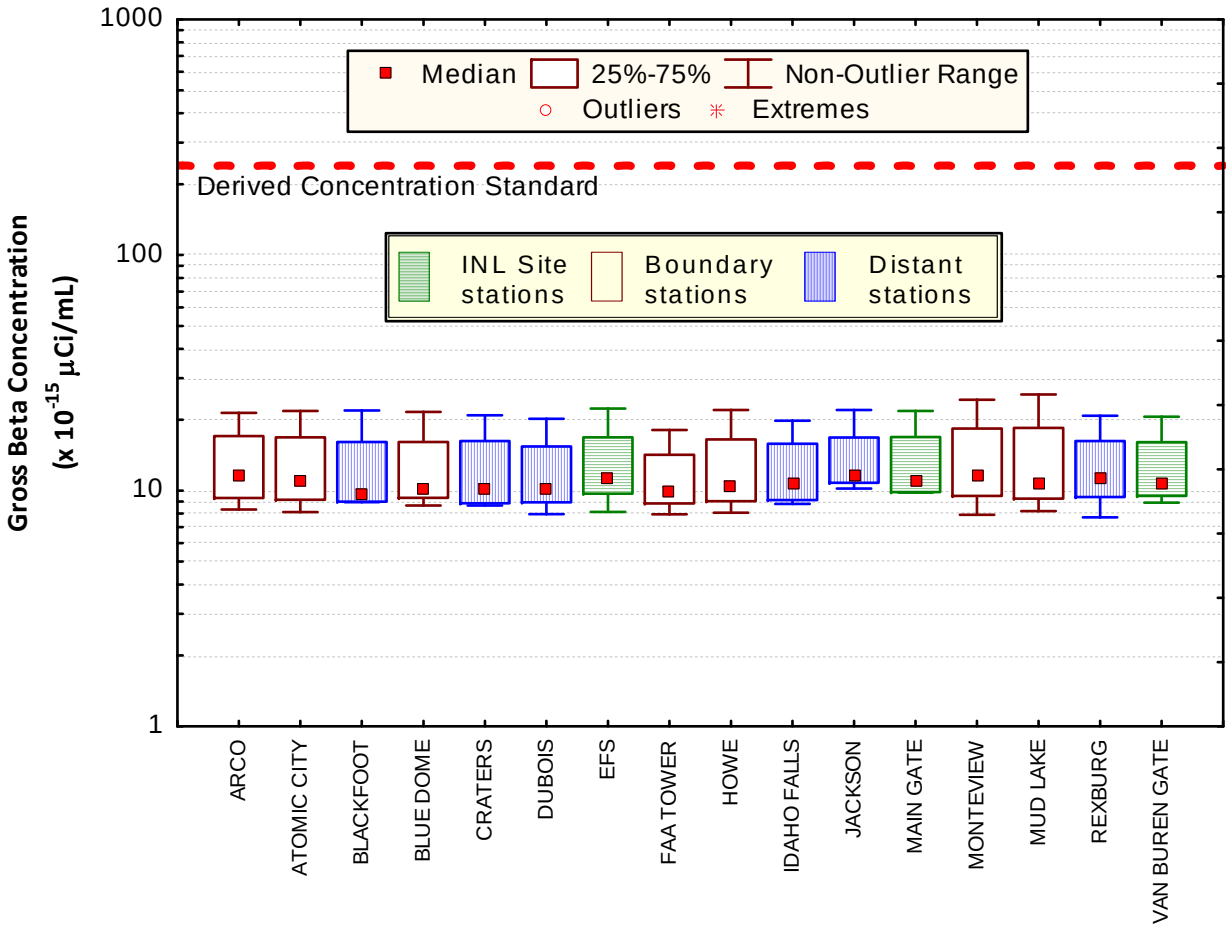

Figure 8. April gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

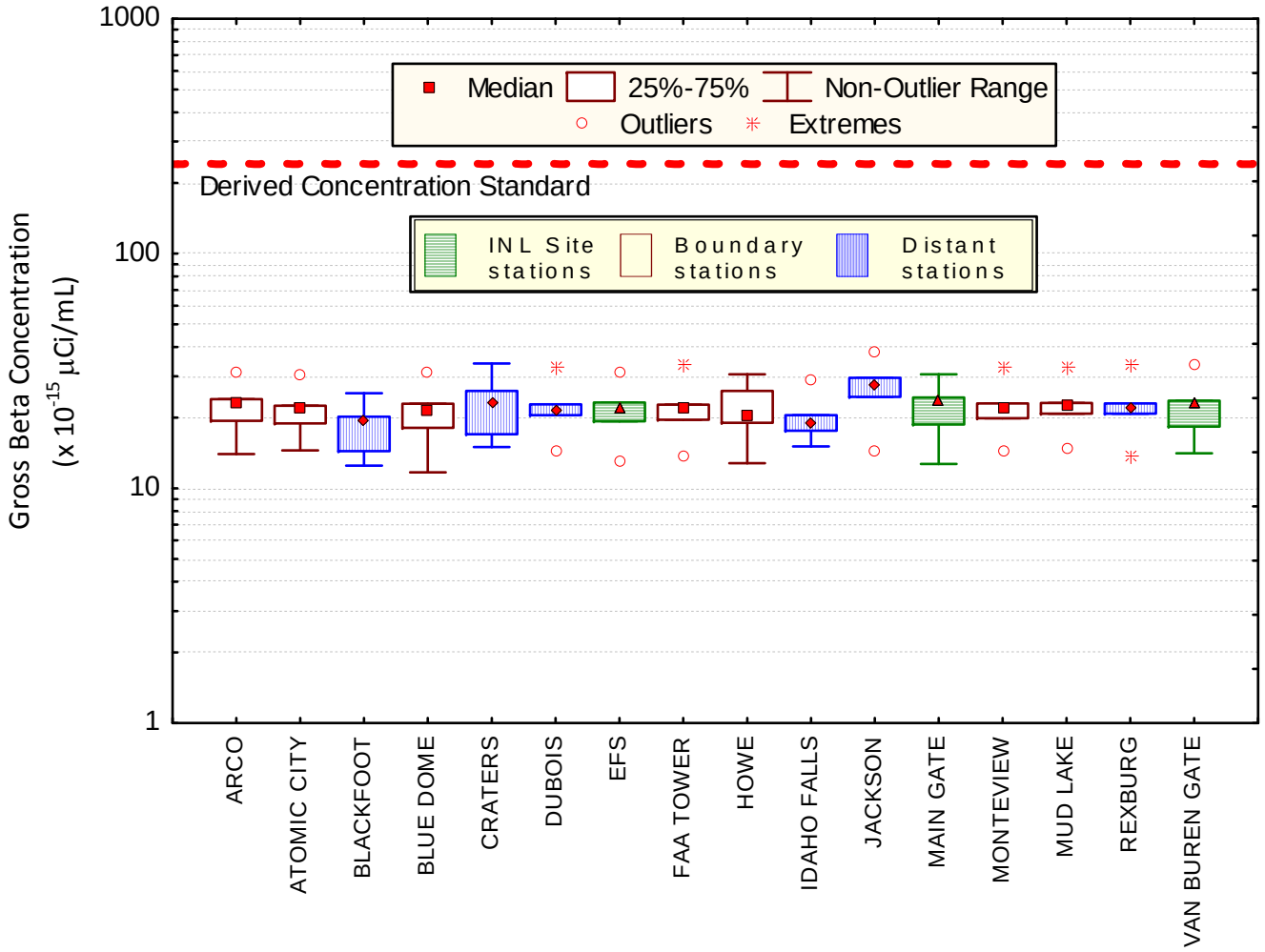

Figure 9. May gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location.

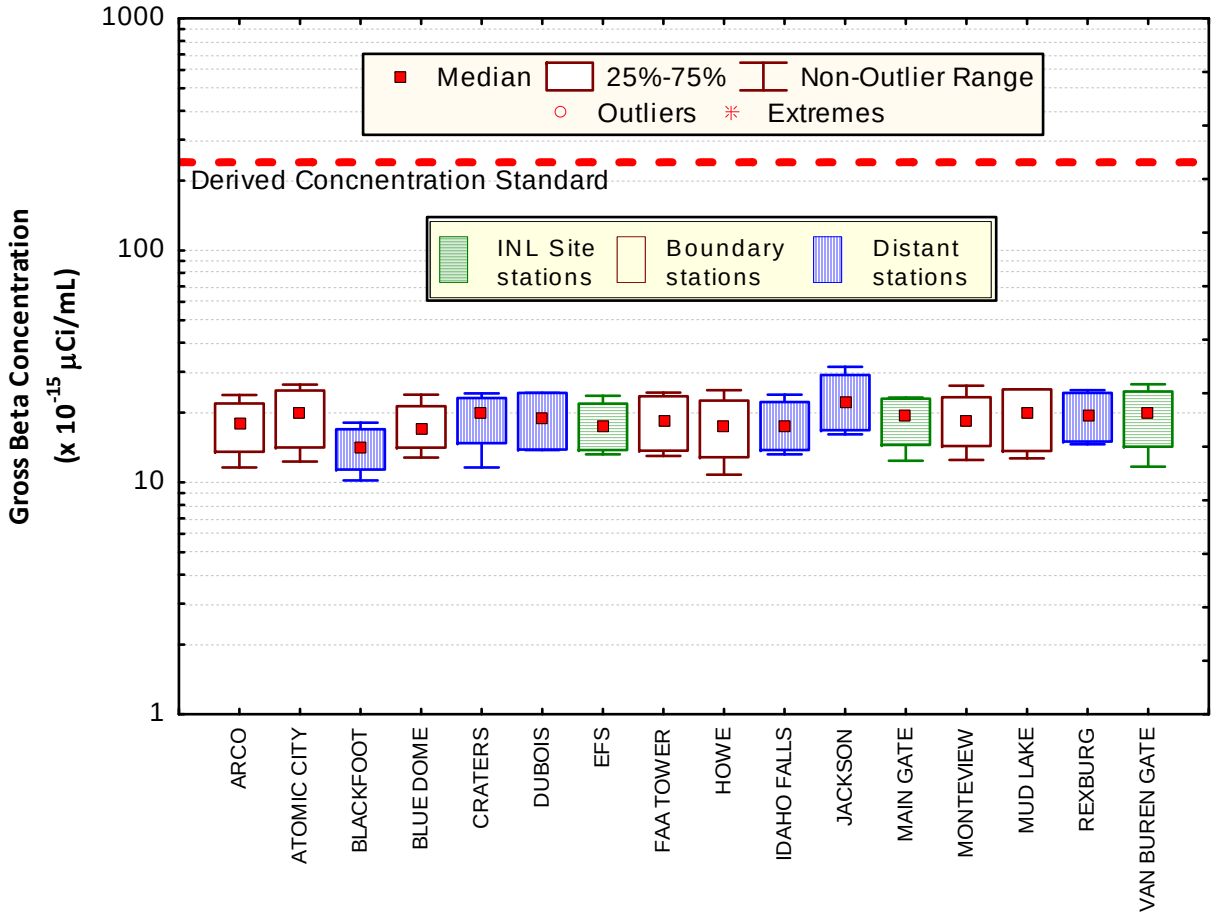

Figure 10. June gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

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 16 atmospheric moisture samples collected during the second quarter of 2013. All 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 15.4×10^{-13} $\mu Ci/mL_{air}$ at Rexburg. Results are shown in Table C-4, Appendix C.

4. PRECIPITATION AND WATER SAMPLING

PRECIPITATION SAMPLING

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

Tritium was measured above the 3s values in five 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 detectable tritium is sometimes found in ESER samples. When detected, tritium values have remained well within the historical range and the range measured across the country by the EPA Radnet program (EPA 2013).

WATER SAMPLING

Drinking water samples were collected at eight locations (plus a duplicate). A control sample of bottled water was also prepared. Surface water samples were collected at three Thousand Springs. 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 Appendix C, Table C-6 determined the values reported for the media were correct with one exception. The gross beta results for the surface water sample collected at Alpheus Spring on May 20, 2013 were incorrect. The incorrect values appear to be due to inadvertently copying the wrong activity concentration and uncertainty values. The activity concentration and uncertainty values were updated with the correct values.

Gross alpha activity was detected in one of the samples (Shoshone) at a level just above the minimum detectable concentration. Gross beta activity was detected in most of the drinking water samples (all except Howe, the US 20/26 rest area, and the control sample) and in all three 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 three of the drinking water samples and the bottled water, and in all three surface water samples. The concentrations were similar to those found in atmospheric moisture and precipitation samples and were consistent with previous results. The results are well below the DCS of 1.9×10^6 pCi/L for tritium in drinking water.

5. AGRICULTURAL PRODUCT, WILDLIFE, AND SOIL SAMPLING

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

MILK SAMPLING

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

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.

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 0.83 pCi/L from Terreton is well within the range of concentrations for the past five years. 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 four of eight samples analyzed. All results were similar to those previously measured. There is no DCS for tritium in milk, but the results were well below the DCS for tritium in drinking water (1.9×10^6 pCi/L).

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 106 pCi/kg, which is just above the detection limit; the other two subsamples were just below the detection limit. During each of the three years alfalfa has been collected, ^{90}Sr has been found in one of three subsamples, always in the 100-150 pCi/kg range.

LARGE GAME ANIMAL SAMPLING

No large game animals were sampled in the second quarter.

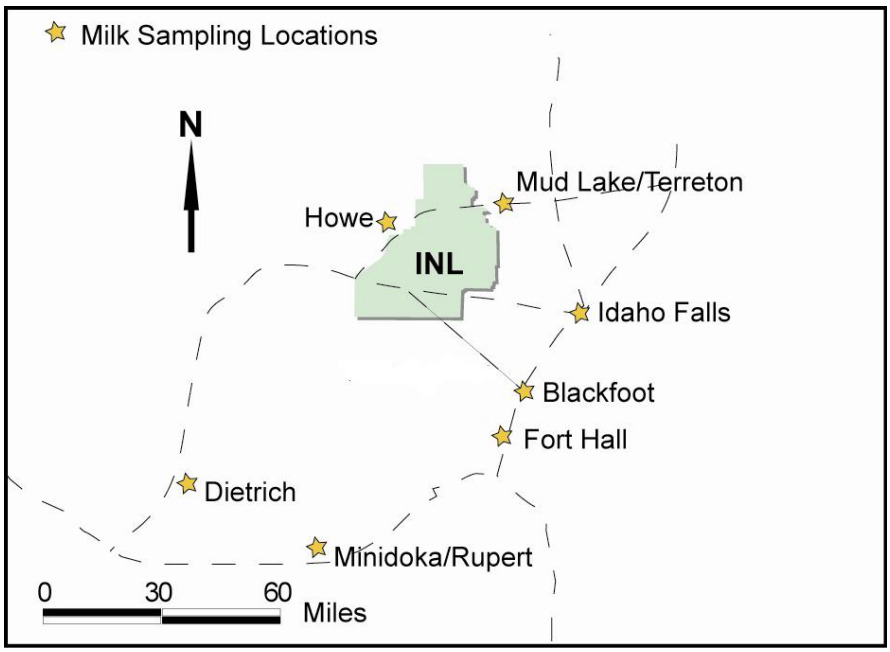

Figure 11. ESER milk sampling locations

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. 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 52.4 milliRotengens (mR) at Blue Dome to 64.7 mR at Mud Lake. The overall Boundary exposure was 58.5 mR. Distant exposures ranged from 52.0 mR at Dubois to 68.9 mR at Rexburg. The average Distant exposure was 60.0 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 42.95 mrem at Blue Dome to 56.74 mrem at Mud Lake, with an overall average of 50.04 mrem. Distant results varied from 42.05 mrem at Dubois to 63.01 mrem at Rexburg. The Distant average was 51.33 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 2013 (GSS 2013).

8. REFERENCES

Bartholomay, R.C., Knobel, L.L., and Rousseau, J.P., 2003, *Field Methods and Quality Plan for Quality-of-Water Activities, U.S. Geological Survey, Idaho National Engineering and Environmental Laboratory, Idaho*, DOE/ID-22182, January 2003.

Currie, L.A., 1984, *Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements*, NUREG/CR-4007, U.S. Nuclear Regulatory Commission, Washington, D.C., September 1984.

DOE, 2003, "Environmental Management System," U.S. Department of Energy Order 450.1, January 2003.

DOE, 2011, "Derived Concentration Technical Standard", Department of Energy Standard 1196-2011, April 2011.

EPA, 2013, RadNet—Tracking Environmental Radiation Nationwide, Web-page: http://www.epa.gov/narel/radnet/

GSS, 2012, *Quality Assurance Project Plan for the INL Site Offsite Environmental Surveillance Program*, Environmental Surveillance, Education and Research Program, April 2012.

GSS, 2013, *Environmental Quality Assurance Report 2nd Quarter 2013*, Environmental Surveillance, Education and Research Program, November 2013.

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
ALFALFA				
Gamma Spec, ^{90}Sr	annually	Mud Lake	None	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 Second Quarter 2013

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Standard[b] (DCS)
Air (particulate filter)[e]	Gross alpha[c]	4.22×10^{-16} µCi/mL	4×10^{-14} µCi/mL
	Gross beta[d]	1.18×10^{-15} µCi/mL	2.4×10^{-13} µCi/mL
	^{137}Cs	1.22×10^{-16} µCi/mL	3.9×10^{-10} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	4.31×10^{-16} µCi/mL	4.1×10^{-10} µCi/mL
Air (atmospheric moisture)	^{3}H	82.9 pCi/L_{water}	1.4×10^{-8} $\mu Ci/mL_{air}$
Air (precipitation)	^{3}H	83.7 pCi/L	1.9×10^{-3} µCi/mL
Milk	^{131}I	0.53 pCi/L	--
	^{137}Cs	1.08 pCi/L	--
	^{90}Sr	0.26 pCi/L	--
	^{3}H	83.3 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	4/3/2013	1.16 ± 0.16	4.29 ± 0.58	Yes	21.40 ± 0.57	79.18 ± 2.12	Yes
	4/10/2013	0.41 ± 0.16	1.51 ± 0.60	No	10.30 ± 0.44	38.11 ± 1.61	Yes
	4/17/2013	0.55 ± 0.17	2.04 ± 0.63	Yes	8.32 ± 0.41	30.78 ± 1.51	Yes
	4/24/2013	1.06 ± 0.18	3.92 ± 0.68	Yes	12.70 ± 0.47	46.99 ± 1.72	Yes
	5/1/2013	1.44 ± 0.17	5.33 ± 0.62	Yes	24.00 ± 0.59	88.80 ± 2.20	Yes
	5/8/2013	1.10 ± 0.15	4.07 ± 0.56	Yes	23.10 ± 0.58	85.47 ± 2.14	Yes
	5/15/2013	1.75 ± 0.19	6.48 ± 0.70	Yes	31.50 ± 0.67	116.55 ± 2.48	Yes
	5/22/2013	0.28 ± 0.12	1.02 ± 0.43	No	14.00 ± 0.47	51.80 ± 1.75	Yes
	5/29/2013	0.66 ± 0.13	2.43 ± 0.49	Yes	19.40 ± 0.55	71.78 ± 2.05	Yes
	6/5/2013	0.51 ± 0.13	1.89 ± 0.46	Yes	15.50 ± 0.50	57.35 ± 1.85	Yes
	6/12/2013	1.05 ± 0.15	3.89 ± 0.56	Yes	20.00 ± 0.55	74.00 ± 2.04	Yes
	6/19/2013	1.21 ± 0.15	4.48 ± 0.57	Yes	23.80 ± 0.59	88.06 ± 2.17	Yes
	6/26/2013	0.70 ± 0.13	2.59 ± 0.47	Yes	11.60 ± 0.46	42.92 ± 1.69	Yes
QA-1 (ARCO)	4/3/2013	1.03 ± 0.14	3.81 ± 0.52	Yes	20.40 ± 0.53	75.48 ± 1.95	Yes
	4/10/2013	0.56 ± 0.16	2.08 ± 0.57	Yes	9.14 ± 0.39	33.82 ± 1.44	Yes
	4/17/2013	0.58 ± 0.16	2.14 ± 0.58	Yes	7.66 ± 0.37	28.34 ± 1.37	Yes
	4/24/2013	0.62 ± 0.15	2.31 ± 0.54	Yes	11.40 ± 0.41	42.18 ± 1.52	Yes
	5/1/2013	1.22 ± 0.15	4.51 ± 0.54	Yes	20.20 ± 0.52	74.74 ± 1.92	Yes
	5/8/2013	1.13 ± 0.14	4.18 ± 0.53	Yes	21.40 ± 0.53	79.18 ± 1.95	Yes
	5/15/2013	1.34 ± 0.16	4.96 ± 0.61	Yes	30.30 ± 0.63	112.11 ± 2.33	Yes
	5/22/2013	0.56 ± 0.13	2.07 ± 0.48	Yes	12.90 ± 0.45	47.73 ± 1.66	Yes
	5/29/2013	0.97 ± 0.15	3.59 ± 0.54	Yes	19.10 ± 0.53	70.67 ± 1.98	Yes
	6/5/2013	0.54 ± 0.12	2.00 ± 0.44	Yes	14.20 ± 0.46	52.54 ± 1.70	Yes
	6/12/2013	0.86 ± 0.14	3.19 ± 0.51	Yes	20.80 ± 0.55	76.96 ± 2.03	Yes
	6/19/2013	0.97 ± 0.14	3.60 ± 0.51	Yes	23.00 ± 0.56	85.10 ± 2.08	Yes
	6/26/2013	0.65 ± 0.12	2.42 ± 0.43	Yes	10.60 ± 0.42	39.22 ± 1.54	Yes
ATOMIC CITY	4/3/2013	0.98 ± 0.16	3.64 ± 0.58	Yes	21.80 ± 0.60	80.66 ± 2.23	Yes
	4/10/2013	0.78 ± 0.20	2.88 ± 0.72	Yes	10.20 ± 0.47	37.74 ± 1.73	Yes
	4/17/2013	0.75 ± 0.19	2.77 ± 0.69	Yes	8.11 ± 0.42	30.01 ± 1.55	Yes
	4/24/2013	0.81 ± 0.19	3.00 ± 0.68	Yes	11.90 ± 0.49	44.03 ± 1.79	Yes
	5/1/2013	1.56 ± 0.17	5.77 ± 0.64	Yes	21.80 ± 0.57	80.66 ± 2.12	Yes
	5/8/2013	0.91 ± 0.15	3.37 ± 0.56	Yes	22.50 ± 0.61	83.25 ± 2.25	Yes
	5/15/2013	1.71 ± 0.19	6.33 ± 0.71	Yes	30.70 ± 0.68	113.59 ± 2.51	Yes
	5/22/2013	0.56 ± 0.15	2.07 ± 0.56	Yes	14.50 ± 0.53	53.65 ± 1.97	Yes
	5/29/2013	0.86 ± 0.15	3.18 ± 0.55	Yes	18.90 ± 0.57	69.93 ± 2.09	Yes
	6/5/2013	0.69 ± 0.15	2.54 ± 0.54	Yes	16.00 ± 0.54	59.20 ± 2.01	Yes
	6/12/2013	1.25 ± 0.17	4.63 ± 0.63	Yes	23.40 ± 0.62	86.58 ± 2.29	Yes
	6/19/2013	1.08 ± 0.16	4.00 ± 0.60	Yes	26.40 ± 0.67	97.68 ± 2.48	Yes
	6/26/2013	0.65 ± 0.13	2.41 ± 0.49	Yes	12.30 ± 0.49	45.51 ± 1.83	Yes
BLUE DOME	4/3/2013	0.68 ± 0.13	2.52 ± 0.47	Yes	21.60 ± 0.55	79.92 ± 2.04	Yes
	4/10/2013	0.51 ± 0.16	1.90 ± 0.59	Yes	10.00 ± 0.41	37.00 ± 1.53	Yes
	4/17/2013	0.92 ± 0.18	3.41 ± 0.65	Yes	8.66 ± 0.39	32.04 ± 1.45	Yes
	4/24/2013	0.88 ± 0.16	3.26 ± 0.60	Yes	10.60 ± 0.41	39.22 ± 1.52	Yes
	5/1/2013	0.91 ± 0.14	3.37 ± 0.52	Yes	21.30 ± 0.56	78.81 ± 2.07	Yes
	5/8/2013	1.00 ± 0.14	3.69 ± 0.52	Yes	22.90 ± 0.55	84.73 ± 2.05	Yes
	5/15/2013	1.35 ± 0.17	5.00 ± 0.64	Yes	31.70 ± 0.67	117.29 ± 2.47	Yes
	5/22/2013	0.56 ± 0.13	2.05 ± 0.48	Yes	11.70 ± 0.43	43.29 ± 1.60	Yes
	5/29/2013	0.76 ± 0.13	2.82 ± 0.48	Yes	18.10 ± 0.51	66.97 ± 1.89	Yes
	6/5/2013	0.59 ± 0.13	2.18 ± 0.46	Yes	15.40 ± 0.48	56.98 ± 1.78	Yes
	6/12/2013	0.89 ± 0.15	3.28 ± 0.55	Yes	18.70 ± 0.56	69.19 ± 2.06	Yes
	6/19/2013	1.07 ± 0.16	3.96 ± 0.58	Yes	23.90 ± 0.63	88.43 ± 2.34	Yes
	6/26/2013	0.44 ± 0.11	1.62 ± 0.40	Yes	12.80 ± 0.45	47.36 ± 1.67	Yes
FAA TOWER	4/3/2013	0.59 ± 0.13	2.19 ± 0.47	Yes	18.10 ± 0.54	66.97 ± 2.01	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
	4/10/2013	0.61 ± 0.18	2.25 ± 0.68	Yes	9.71 ± 0.45	35.93 ± 1.67	Yes
	4/17/2013	0.67 ± 0.18	2.46 ± 0.66	Yes	7.95 ± 0.41	29.42 ± 1.52	Yes
	4/24/2013	0.97 ± 0.18	3.58 ± 0.66	Yes	10.30 ± 0.44	38.11 ± 1.61	Yes
	5/1/2013	1.26 ± 0.16	4.66 ± 0.59	Yes	22.70 ± 0.58	83.99 ± 2.15	Yes
	5/8/2013	0.93 ± 0.15	3.43 ± 0.56	Yes	22.10 ± 0.59	81.77 ± 2.20	Yes
	5/15/2013	1.92 ± 0.20	7.10 ± 0.75	Yes	33.40 ± 0.71	123.58 ± 2.64	Yes
	5/22/2013	0.49 ± 0.14	1.82 ± 0.53	Yes	13.70 ± 0.51	50.69 ± 1.88	Yes
	5/29/2013	0.86 ± 0.15	3.20 ± 0.56	Yes	19.60 ± 0.58	72.52 ± 2.14	Yes
	6/5/2013	0.62 ± 0.14	2.28 ± 0.53	Yes	14.40 ± 0.52	53.28 ± 1.94	Yes
	6/12/2013	1.33 ± 0.17	4.92 ± 0.64	Yes	22.60 ± 0.61	83.62 ± 2.24	Yes
	6/19/2013	0.86 ± 0.15	3.18 ± 0.54	Yes	24.40 ± 0.63	90.28 ± 2.34	Yes
	6/26/2013	0.75 ± 0.14	2.78 ± 0.51	Yes	13.00 ± 0.50	48.10 ± 1.85	Yes
HOWE	4/3/2013	1.04 ± 0.16	3.85 ± 0.60	Yes	22.00 ± 0.62	81.40 ± 2.29	Yes
	4/10/2013	0.86 ± 0.21	3.19 ± 0.77	Yes	10.00 ± 0.48	37.00 ± 1.78	Yes
	4/17/2013	0.97 ± 0.21	3.59 ± 0.76	Yes	8.06 ± 0.44	29.82 ± 1.62	Yes
	4/24/2013	1.09 ± 0.21	4.03 ± 0.76	Yes	11.00 ± 0.49	40.70 ± 1.82	Yes
	5/1/2013	1.11 ± 0.16	4.11 ± 0.57	Yes	20.30 ± 0.57	75.11 ± 2.10	Yes
	5/8/2013	1.40 ± 0.19	5.18 ± 0.68	Yes	26.00 ± 0.67	96.20 ± 2.49	Yes
	5/15/2013	1.67 ± 0.19	6.18 ± 0.72	Yes	30.60 ± 0.69	113.22 ± 2.55	Yes
	5/22/2013	0.60 ± 0.15	2.21 ± 0.56	Yes	12.80 ± 0.50	47.36 ± 1.86	Yes
	5/29/2013	0.99 ± 0.16	3.66 ± 0.58	Yes	19.00 ± 0.57	70.30 ± 2.10	Yes
	6/5/2013	0.88 ± 0.16	3.27 ± 0.59	Yes	14.90 ± 0.54	55.13 ± 1.99	Yes
	6/12/2013	1.09 ± 0.16	4.03 ± 0.58	Yes	20.00 ± 0.57	74.00 ± 2.09	Yes
	6/19/2013	1.22 ± 0.17	4.51 ± 0.63	Yes	25.00 ± 0.66	92.50 ± 2.44	Yes
	6/26/2013	0.53 ± 0.12	1.96 ± 0.45	Yes	10.80 ± 0.46	39.96 ± 1.71	Yes
MONTEVIEW	4/3/2013	0.96 ± 0.16	3.54 ± 0.59	Yes	24.30 ± 0.65	89.91 ± 2.40	Yes
	4/10/2013	0.96 ± 0.21	3.55 ± 0.79	Yes	11.10 ± 0.50	41.07 ± 1.86	Yes
	4/17/2013	0.40 ± 0.18	1.49 ± 0.67	No	7.90 ± 0.44	29.23 ± 1.62	Yes
	4/24/2013	1.18 ± 0.21	4.37 ± 0.77	Yes	12.40 ± 0.50	45.88 ± 1.86	Yes
	5/1/2013	1.20 ± 0.16	4.44 ± 0.60	Yes	22.00 ± 0.59	81.40 ± 2.20	Yes
	5/8/2013	1.11 ± 0.17	4.11 ± 0.63	Yes	23.00 ± 0.64	85.10 ± 2.38	Yes
	5/15/2013	1.31 ± 0.18	4.85 ± 0.68	Yes	33.20 ± 0.73	122.84 ± 2.69	Yes
	5/22/2013	0.49 ± 0.15	1.82 ± 0.57	Yes	14.40 ± 0.55	53.28 ± 2.03	Yes
	5/29/2013	0.98 ± 0.16	3.62 ± 0.61	Yes	19.90 ± 0.61	73.63 ± 2.26	Yes
	6/5/2013	0.99 ± 0.17	3.64 ± 0.63	Yes	16.20 ± 0.58	59.94 ± 2.13	Yes
	6/12/2013	1.10 ± 0.16	4.07 ± 0.61	Yes	20.50 ± 0.60	75.85 ± 2.20	Yes
	6/19/2013	1.31 ± 0.18	4.85 ± 0.68	Yes	26.10 ± 0.71	96.57 ± 2.62	Yes
	6/26/2013	0.68 ± 0.14	2.52 ± 0.50	Yes	12.50 ± 0.51	46.25 ± 1.87	Yes
QA-2	4/3/2013	1.12 ± 0.17	4.14 ± 0.62	Yes	22.50 ± 0.63	83.25 ± 2.31	Yes
(MONTEVIEW)	4/10/2013	0.98 ± 0.22	3.64 ± 0.80	Yes	11.70 ± 0.51	43.29 ± 1.88	Yes
	4/17/2013	0.69 ± 0.20	2.56 ± 0.72	Yes	9.17 ± 0.46	33.93 ± 1.69	Yes
	4/24/2013	1.26 ± 0.21	4.66 ± 0.77	Yes	13.50 ± 0.51	49.95 ± 1.89	Yes
	5/1/2013	1.38 ± 0.17	5.11 ± 0.64	Yes	23.00 ± 0.61	85.10 ± 2.25	Yes
	5/8/2013	1.18 ± 0.17	4.37 ± 0.64	Yes	22.70 ± 0.64	83.99 ± 2.37	Yes
	5/15/2013	1.70 ± 0.20	6.29 ± 0.75	Yes	35.20 ± 0.76	130.24 ± 2.81	Yes
	5/22/2013	0.65 ± 0.17	2.41 ± 0.62	Yes	15.40 ± 0.58	56.98 ± 2.13	Yes
	5/29/2013	0.77 ± 0.16	2.84 ± 0.57	Yes	21.20 ± 0.63	78.44 ± 2.34	Yes
	6/5/2013	0.84 ± 0.17	3.09 ± 0.62	Yes	16.00 ± 0.58	59.20 ± 2.16	Yes
	6/12/2013	1.38 ± 0.19	5.11 ± 0.68	Yes	21.80 ± 0.63	80.66 ± 2.34	Yes
	6/19/2013	1.51 ± 0.19	5.59 ± 0.71	Yes	25.40 ± 0.70	93.98 ± 2.59	Yes
	6/26/2013	0.83 ± 0.15	3.06 ± 0.55	Yes	13.20 ± 0.53	48.84 ± 1.95	Yes
MUD LAKE	4/3/2013	1.11 ± 0.18	4.11 ± 0.65	Yes	25.60 ± 0.69	94.72 ± 2.56	Yes
	4/10/2013	1.08 ± 0.22	4.00 ± 0.82	Yes	10.30 ± 0.50	38.11 ± 1.84	Yes
	4/17/2013	0.79 ± 0.22	2.94 ± 0.81	Yes	8.20 ± 0.48	30.34 ± 1.78	Yes
	4/24/2013	1.28 ± 0.21	4.74 ± 0.77	Yes	11.30 ± 0.48	41.81 ± 1.78	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
	5/1/2013	1.67 ± 0.19	6.18 ± 0.70	Yes	23.10 ± 0.62	85.47 ± 2.30	Yes
	5/8/2013	1.54 ± 0.19	5.70 ± 0.71	Yes	22.50 ± 0.65	83.25 ± 2.39	Yes
	5/15/2013	2.10 ± 0.23	7.77 ± 0.84	Yes	32.80 ± 0.76	121.36 ± 2.81	Yes
	5/22/2013	0.42 ± 0.15	1.57 ± 0.56	No	14.80 ± 0.56	54.76 ± 2.06	Yes
	5/29/2013	1.05 ± 0.17	3.89 ± 0.64	Yes	20.80 ± 0.64	76.96 ± 2.37	Yes
	6/5/2013	0.94 ± 0.17	3.49 ± 0.63	Yes	14.60 ± 0.56	54.02 ± 2.07	Yes
	6/12/2013	1.27 ± 0.19	4.70 ± 0.70	Yes	25.20 ± 0.70	93.24 ± 2.59	Yes
	6/19/2013	0.92 ± 0.16	3.40 ± 0.60	Yes	25.10 ± 0.70	92.87 ± 2.57	Yes
	6/26/2013	0.65 ± 0.14	2.41 ± 0.51	Yes	12.70 ± 0.52	46.99 ± 1.91	Yes
DISTANT							
BLACKFOOT	4/3/2013	1.32 ± 0.18	4.88 ± 0.67	Yes	21.90 ± 0.63	81.03 ± 2.35	Yes
	4/10/2013	1.14 ± 0.22	4.22 ± 0.81	Yes	8.95 ± 0.47	33.12 ± 1.74	Yes
	4/17/2013	0.62 ± 0.19	2.28 ± 0.72	Yes	9.01 ± 0.46	33.34 ± 1.70	Yes
	4/24/2013	0.90 ± 0.19	3.34 ± 0.70	Yes	10.30 ± 0.47	38.11 ± 1.72	Yes
	5/1/2013	1.47 ± 0.17	5.44 ± 0.63	Yes	20.20 ± 0.56	74.74 ± 2.07	Yes
	5/8/2013	1.31 ± 0.17	4.85 ± 0.62	Yes	19.60 ± 0.57	72.52 ± 2.09	Yes
	5/15/2013	1.55 ± 0.18	5.74 ± 0.67	Yes	25.40 ± 0.62	93.98 ± 2.29	Yes
	5/22/2013	0.58 ± 0.13	2.14 ± 0.50	Yes	12.50 ± 0.46	46.25 ± 1.69	Yes
	5/29/2013	0.94 ± 0.14	3.49 ± 0.53	Yes	14.40 ± 0.49	53.28 ± 1.80	Yes
	6/5/2013	0.61 ± 0.13	2.27 ± 0.47	Yes	12.50 ± 0.45	46.25 ± 1.67	Yes
	6/12/2013	0.86 ± 0.14	3.16 ± 0.53	Yes	15.80 ± 0.52	58.46 ± 1.92	Yes
	6/19/2013	0.85 ± 0.14	3.15 ± 0.50	Yes	18.10 ± 0.54	66.97 ± 1.99	Yes
	6/26/2013	0.84 ± 0.13	3.10 ± 0.49	Yes	10.20 ± 0.43	37.74 ± 1.58	Yes
CRATERS OF THE MOON	4/3/2013	1.04 ± 0.16	3.85 ± 0.58	Yes	20.90 ± 0.59	77.33 ± 2.18	Yes
	4/10/2013	0.65 ± 0.18	2.39 ± 0.67	Yes	9.04 ± 0.43	33.45 ± 1.61	Yes
	4/17/2013	0.51 ± 0.18	1.88 ± 0.68	No	8.65 ± 0.44	32.01 ± 1.64	Yes
	4/24/2013	0.43 ± 0.15	1.57 ± 0.57	No	11.60 ± 0.45	42.92 ± 1.67	Yes
	5/1/2013	1.40 ± 0.17	5.18 ± 0.63	Yes	26.00 ± 0.63	96.20 ± 2.32	Yes
	5/8/2013	0.99 ± 0.15	3.67 ± 0.56	Yes	22.90 ± 0.59	84.73 ± 2.17	Yes
	5/15/2013	1.83 ± 0.20	6.77 ± 0.75	Yes	34.00 ± 0.73	125.80 ± 2.70	Yes
	5/22/2013	0.82 ± 0.16	3.03 ± 0.57	Yes	15.00 ± 0.51	55.50 ± 1.88	Yes
	5/29/2013	0.76 ± 0.14	2.81 ± 0.53	Yes	17.00 ± 0.55	62.90 ± 2.03	Yes
	6/5/2013	0.71 ± 0.14	2.63 ± 0.53	Yes	17.90 ± 0.55	66.23 ± 2.04	Yes
	6/12/2013	1.05 ± 0.16	3.89 ± 0.60	Yes	22.00 ± 0.61	81.40 ± 2.26	Yes
	6/19/2013	0.99 ± 0.15	3.64 ± 0.55	Yes	24.20 ± 0.62	89.54 ± 2.29	Yes
	6/26/2013	0.59 ± 0.13	2.19 ± 0.47	Yes	11.60 ± 0.48	42.92 ± 1.77	Yes
DUBOIS	4/3/2013	1.03 ± 0.16	3.81 ± 0.58	Yes	20.20 ± 0.59	74.74 ± 2.16	Yes
	4/10/2013	0.94 ± 0.20	3.49 ± 0.74	Yes	10.60 ± 0.47	39.22 ± 1.73	Yes
	4/17/2013	0.43 ± 0.17	1.58 ± 0.64	No	7.96 ± 0.42	29.45 ± 1.55	Yes
	4/24/2013	1.19 ± 0.19	4.40 ± 0.70	Yes	9.88 ± 0.44	36.56 ± 1.61	Yes
	5/1/2013	1.36 ± 0.17	5.03 ± 0.63	Yes	22.80 ± 0.60	84.36 ± 2.22	Yes
	5/8/2013	1.18 ± 0.17	4.37 ± 0.61	Yes	21.60 ± 0.60	79.92 ± 2.23	Yes
	5/15/2013	1.60 ± 0.20	5.92 ± 0.73	Yes	32.70 ± 0.73	120.99 ± 2.69	Yes
	5/22/2013	0.74 ± 0.16	2.75 ± 0.60	Yes	14.30 ± 0.53	52.91 ± 1.96	Yes
	5/29/2013	1.33 ± 0.18	4.92 ± 0.67	Yes	20.50 ± 0.62	75.85 ± 2.28	Yes
	6/5/2013	0.84 ± 0.15	3.12 ± 0.57	Yes	13.90 ± 0.51	51.43 ± 1.90	Yes
	6/12/2013	1.23 ± 0.18	4.55 ± 0.65	Yes	24.30 ± 0.65	89.91 ± 2.41	Yes
	6/19/2013	1.25 ± 0.17	4.63 ± 0.63	Yes	24.30 ± 0.65	89.91 ± 2.41	Yes
	6/26/2013	0.85 ± 0.15	3.14 ± 0.55	Yes	13.80 ± 0.53	51.06 ± 1.96	Yes
IDAHO FALLS	4/3/2013	1.21 ± 0.15	4.48 ± 0.57	Yes	19.80 ± 0.54	73.26 ± 1.98	Yes
	4/10/2013	0.70 ± 0.17	2.59 ± 0.62	Yes	9.45 ± 0.41	34.97 ± 1.51	Yes
	4/17/2013	0.93 ± 0.18	3.43 ± 0.67	Yes	8.79 ± 0.40	32.52 ± 1.48	Yes
	4/24/2013	1.17 ± 0.18	4.33 ± 0.65	Yes	11.80 ± 0.43	43.66 ± 1.58	Yes
	5/1/2013	1.33 ± 0.16	4.92 ± 0.59	Yes	19.00 ± 0.53	70.30 ± 1.97	Yes
	5/8/2013	1.46 ± 0.16	5.40 ± 0.60	Yes	20.50 ± 0.54	75.85 ± 1.98	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
	5/15/2013	1.17 ± 0.16	4.33 ± 0.59	Yes	28.80 ± 0.63	106.56 ± 2.32	Yes
	5/22/2013	1.18 ± 0.17	4.37 ± 0.62	Yes	15.10 ± 0.50	55.87 ± 1.85	Yes
	5/29/2013	1.07 ± 0.15	3.96 ± 0.55	Yes	17.60 ± 0.52	65.12 ± 1.91	Yes
	6/5/2013	0.84 ± 0.14	3.09 ± 0.51	Yes	14.40 ± 0.47	53.28 ± 1.74	Yes
	6/12/2013	1.20 ± 0.16	4.44 ± 0.59	Yes	20.50 ± 0.56	75.85 ± 2.07	Yes
	6/19/2013	1.49 ± 0.17	5.51 ± 0.61	Yes	23.90 ± 0.59	88.43 ± 2.18	Yes
	6/26/2013	0.73 ± 0.13	2.70 ± 0.47	Yes	13.20 ± 0.47	48.84 ± 1.73	Yes
JACKSON	4/3/2013	1.24 ± 0.18	4.59 ± 0.65	Yes	22.00 ± 0.64	81.40 ± 2.36	Yes
	4/10/2013	0.99 ± 0.21	3.67 ± 0.79	Yes	11.40 ± 0.50	42.18 ± 1.85	Yes
	4/17/2013	0.57 ± 0.20	2.12 ± 0.75	No	10.20 ± 0.50	37.74 ± 1.84	Yes
	4/24/2013	1.12 ± 0.21	4.14 ± 0.76	Yes	11.60 ± 0.50	42.92 ± 1.85	Yes
	5/1/2013	1.60 ± 0.19	5.92 ± 0.70	Yes	27.80 ± 0.68	102.86 ± 2.51	Yes
	5/8/2013	1.43 ± 0.19	5.29 ± 0.69	Yes	29.60 ± 0.71	109.52 ± 2.62	Yes
	5/15/2013	1.89 ± 0.22	6.99 ± 0.80	Yes	38.30 ± 0.80	141.71 ± 2.97	Yes
	5/22/2013	0.86 ± 0.17	3.17 ± 0.63	Yes	14.40 ± 0.54	53.28 ± 2.00	Yes
	5/29/2013	1.29 ± 0.19	4.77 ± 0.69	Yes	24.50 ± 0.68	90.65 ± 2.52	Yes
	6/5/2013	0.85 ± 0.16	3.16 ± 0.60	Yes	17.50 ± 0.58	64.75 ± 2.15	Yes
	6/12/2013	1.41 ± 0.19	5.22 ± 0.71	Yes	26.60 ± 0.70	98.42 ± 2.60	Yes
	6/19/2013	1.24 ± 0.18	4.59 ± 0.66	Yes	31.50 ± 0.75	116.55 ± 2.79	Yes
	6/26/2013	0.79 ± 0.15	2.91 ± 0.55	Yes	16.10 ± 0.57	59.57 ± 2.09	Yes
REXBURG	4/3/2013	1.29 ± 0.18	4.77 ± 0.66	Yes	20.80 ± 0.62	76.96 ± 2.29	Yes
	4/10/2013	1.03 ± 0.23	3.81 ± 0.84	Yes	11.10 ± 0.52	41.07 ± 1.93	Yes
	4/17/2013	0.51 ± 0.19	1.88 ± 0.72	No	7.71 ± 0.45	28.53 ± 1.67	Yes
	4/24/2013	1.21 ± 0.21	4.48 ± 0.79	Yes	11.70 ± 0.51	43.29 ± 1.89	Yes
	5/1/2013	1.53 ± 0.18	5.66 ± 0.67	Yes	22.20 ± 0.61	82.14 ± 2.24	Yes
	5/8/2013	1.30 ± 0.18	4.81 ± 0.67	Yes	23.00 ± 0.65	85.10 ± 2.40	Yes
	5/15/2013	2.01 ± 0.22	7.44 ± 0.83	Yes	34.10 ± 0.78	126.17 ± 2.87	Yes
	5/22/2013	0.72 ± 0.17	2.65 ± 0.62	Yes	13.90 ± 0.55	51.43 ± 2.02	Yes
	5/29/2013	1.33 ± 0.19	4.92 ± 0.70	Yes	20.80 ± 0.65	76.96 ± 2.39	Yes
	6/5/2013	0.66 ± 0.16	2.46 ± 0.57	Yes	15.40 ± 0.57	56.98 ± 2.11	Yes
	6/12/2013	1.30 ± 0.18	4.81 ± 0.67	Yes	23.60 ± 0.66	87.32 ± 2.43	Yes
	6/19/2013	1.60 ± 0.19	5.92 ± 0.71	Yes	25.00 ± 0.68	92.50 ± 2.52	Yes
	6/26/2013	0.95 ± 0.16	3.53 ± 0.60	Yes	14.60 ± 0.56	54.02 ± 2.08	Yes
INL SITE							
EFS	4/3/2013	0.72 ± 0.14	2.65 ± 0.51	Yes	22.30 ± 0.59	82.51 ± 2.18	Yes
	4/10/2013	0.63 ± 0.18	2.31 ± 0.66	Yes	11.30 ± 0.46	41.81 ± 1.70	Yes
	4/17/2013	0.70 ± 0.18	2.57 ± 0.65	Yes	8.12 ± 0.41	30.04 ± 1.50	Yes
	4/24/2013	0.42 ± 0.15	1.55 ± 0.54	No	11.40 ± 0.43	42.18 ± 1.61	Yes
	5/1/2013	1.31 ± 0.16	4.85 ± 0.58	Yes	23.20 ± 0.57	85.84 ± 2.12	Yes
	5/8/2013	1.25 ± 0.16	4.63 ± 0.60	Yes	22.00 ± 0.58	81.40 ± 2.14	Yes
	5/15/2013	1.42 ± 0.17	5.25 ± 0.64	Yes	31.40 ± 0.66	116.18 ± 2.46	Yes
	5/22/2013	0.56 ± 0.14	2.06 ± 0.52	Yes	13.00 ± 0.48	48.10 ± 1.78	Yes
	5/29/2013	0.64 ± 0.13	2.38 ± 0.50	Yes	19.30 ± 0.56	71.41 ± 2.07	Yes
	6/5/2013	0.83 ± 0.14	3.08 ± 0.53	Yes	14.40 ± 0.49	53.28 ± 1.82	Yes
	6/12/2013	1.22 ± 0.16	4.51 ± 0.61	Yes	20.10 ± 0.57	74.37 ± 2.12	Yes
	6/19/2013	1.10 ± 0.15	4.07 ± 0.55	Yes	23.60 ± 0.59	87.32 ± 2.19	Yes
	6/26/2013	0.72 ± 0.15	2.66 ± 0.56	Yes	13.20 ± 0.56	48.84 ± 2.06	Yes
MAIN GATE	4/3/2013	0.98 ± 0.15	3.61 ± 0.56	Yes	21.80 ± 0.59	80.66 ± 2.18	Yes
	4/10/2013	1.05 ± 0.20	3.89 ± 0.74	Yes	9.92 ± 0.45	36.70 ± 1.65	Yes
	4/17/2013	0.62 ± 0.19	2.28 ± 0.68	Yes	9.81 ± 0.45	36.30 ± 1.67	Yes
	4/24/2013	0.91 ± 0.18	3.35 ± 0.67	Yes	12.00 ± 0.47	44.40 ± 1.74	Yes
	5/1/2013	1.32 ± 0.16	4.88 ± 0.60	Yes	23.80 ± 0.59	88.06 ± 2.19	Yes
	5/8/2013	1.21 ± 0.17	4.48 ± 0.61	Yes	24.40 ± 0.62	90.28 ± 2.29	Yes
	5/15/2013	1.89 ± 0.20	6.99 ± 0.73	Yes	30.60 ± 0.67	113.22 ± 2.47	Yes
	5/22/2013	0.73 ± 0.15	2.70 ± 0.56	Yes	12.70 ± 0.49	46.99 ± 1.79	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
	5/29/2013	0.87 ± 0.15	3.22 ± 0.54	Yes	18.70 ± 0.56	69.19 ± 2.06	Yes
	6/5/2013	0.76 ± 0.21	2.79 ± 0.77	Yes	16.60 ± 0.74	61.42 ± 2.73	Yes
	6/12/2013	1.22 ± 0.17	4.51 ± 0.62	Yes	23.20 ± 0.61	85.84 ± 2.26	Yes
	6/19/2013	0.86 ± 0.14	3.16 ± 0.52	Yes	22.70 ± 0.60	83.99 ± 2.21	Yes
	6/26/2013	0.55 ± 0.12	2.04 ± 0.46	Yes	12.40 ± 0.49	45.88 ± 1.80	Yes
VAN BUREN GATE	4/3/2013	0.81 ± 0.14	3.00 ± 0.52	Yes	20.60 ± 0.57	76.22 ± 2.11	Yes
	4/10/2013	0.67 ± 0.18	2.49 ± 0.65	Yes	10.10 ± 0.43	37.37 ± 1.60	Yes
	4/17/2013	0.42 ± 0.17	1.55 ± 0.61	No	8.90 ± 0.42	32.93 ± 1.54	Yes
	4/24/2013	0.73 ± 0.16	2.70 ± 0.60	Yes	11.50 ± 0.43	42.55 ± 1.61	Yes
	5/1/2013	1.31 ± 0.16	4.85 ± 0.58	Yes	23.20 ± 0.57	85.84 ± 2.12	Yes
	5/8/2013	1.03 ± 0.15	3.81 ± 0.55	Yes	23.60 ± 0.59	87.32 ± 2.16	Yes
	5/15/2013	2.07 ± 0.20	7.66 ± 0.75	Yes	33.60 ± 0.69	124.32 ± 2.56	Yes
	5/22/2013	0.59 ± 0.14	2.18 ± 0.52	Yes	14.10 ± 0.49	52.17 ± 1.82	Yes
	5/29/2013	1.12 ± 0.16	4.14 ± 0.58	Yes	18.30 ± 0.54	67.71 ± 2.01	Yes
	6/5/2013	0.89 ± 0.15	3.30 ± 0.56	Yes	16.80 ± 0.53	62.16 ± 1.96	Yes
	6/12/2013	1.07 ± 0.16	3.96 ± 0.57	Yes	22.80 ± 0.59	84.36 ± 2.18	Yes
	6/19/2013	1.29 ± 0.17	4.77 ± 0.61	Yes	26.50 ± 0.64	98.05 ± 2.38	Yes
	6/26/2013	0.63 ± 0.13	2.34 ± 0.46	Yes	11.70 ± 0.46	43.29 ± 1.71	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	04/03/2013	0.63	±	1.07	2.32	±	3.96	No
	04/10/2013	0.56	±	1.04	2.06	±	3.84	No
	04/17/2013	0.33	±	1.24	1.23	±	4.57	No
	04/24/2013	1.29	±	1.07	4.76	±	3.97	No
	05/01/2013	-0.28	±	1.03	-1.04	±	3.82	No
	05/08/2013	-0.69	±	1.04	-2.55	±	3.85	No
	05/15/2013	-0.44	±	1.07	-1.64	±	3.96	No
	05/22/2013	0.12	±	1.02	0.46	±	3.77	No
	05/29/2013	-0.88	±	1.08	-3.24	±	4.01	No
	06/05/2013	0.77	±	1.09	2.83	±	4.03	No
	06/12/2013	0.32	±	0.97	1.19	±	3.59	No
	06/19/2013	0.27	±	1.03	1.00	±	3.82	No
	06/26/2013	1.45	±	1.13	5.37	±	4.17	No
QA-1	04/03/2013	0.56	±	0.96	2.07	±	3.54	No
(ARCO)	04/10/2013	0.50	±	0.93	1.85	±	3.45	No
	04/17/2013	0.30	±	1.11	1.11	±	4.10	No
	04/24/2013	1.13	±	0.94	4.17	±	3.48	No
	05/01/2013	-0.25	±	0.93	-0.93	±	3.43	No
	05/08/2013	-0.62	±	0.94	-2.30	±	3.47	No
	05/15/2013	-0.41	±	0.99	-1.51	±	3.66	No
	05/22/2013	0.12	±	0.99	0.45	±	3.65	No
	05/29/2013	-0.83	±	1.03	-3.07	±	3.81	No
	06/05/2013	0.71	±	1.01	2.61	±	3.72	No
	06/12/2013	0.31	±	0.94	1.15	±	3.47	No
	06/19/2013	0.26	±	0.98	0.96	±	3.64	No
	06/26/2013	1.30	±	1.01	4.82	±	3.75	No
ATOMIC CITY	04/03/2013	0.67	±	1.15	2.49	±	4.25	No
	04/10/2013	0.62	±	1.15	2.28	±	4.26	No
	04/17/2013	0.35	±	1.29	1.29	±	4.78	No
	04/24/2013	1.42	±	1.18	5.25	±	4.38	No
	05/01/2013	-0.28	±	1.04	-1.05	±	3.85	No
	05/08/2013	-0.76	±	1.15	-2.82	±	4.27	No
	05/15/2013	-0.46	±	1.12	-1.71	±	4.13	No
	05/22/2013	0.15	±	1.20	0.54	±	4.45	No
	05/29/2013	-0.92	±	1.14	-3.40	±	4.22	No
	06/05/2013	0.86	±	1.23	3.19	±	4.53	No
	06/12/2013	0.35	±	1.06	1.30	±	3.91	No
	06/19/2013	0.32	±	1.21	1.17	±	4.47	No
	06/26/2013	1.58	±	1.23	5.86	±	4.55	No
BLUE DOME	04/03/2013	2.12	±	1.07	7.85	±	3.96	No
	04/10/2013	-0.36	±	0.89	-1.31	±	3.29	No
	04/17/2013	-0.57	±	0.88	-2.09	±	3.27	No
	04/24/2013	0.14	±	0.89	0.53	±	3.28	No
	05/01/2013	0.76	±	0.96	2.82	±	3.55	No
	05/08/2013	0.15	±	0.89	0.55	±	3.29	No
	05/15/2013	-0.06	±	0.96	-0.23	±	3.56	No
	05/22/2013	-0.67	±	0.91	-2.48	±	3.39	No
	05/29/2013	-0.05	±	0.90	-0.19	±	3.32	No
	06/05/2013	1.11	±	0.97	4.10	±	3.58	No
	06/12/2013	1.25	±	0.97	4.62	±	3.60	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								
	06/19/2013	-0.17	±	1.08	-0.62	±	3.98	No
	06/26/2013	-1.76	±	1.04	-6.52	±	3.83	No
FAA TOWER	04/03/2013	2.33	±	1.18	8.63	±	4.35	No
	04/10/2013	-0.41	±	1.02	-1.50	±	3.77	No
	04/17/2013	-0.62	±	0.98	-2.31	±	3.62	No
	04/24/2013	0.16	±	0.97	0.58	±	3.60	No
	05/01/2013	0.78	±	0.98	2.88	±	3.63	No
	05/08/2013	0.17	±	1.03	0.64	±	3.80	No
	05/15/2013	-0.07	±	1.04	-0.25	±	3.83	No
	05/22/2013	-0.79	±	1.07	-2.92	±	3.97	No
	05/29/2013	-0.06	±	1.04	-0.22	±	3.86	No
	06/05/2013	1.32	±	1.15	4.88	±	4.27	No
	06/12/2013	1.26	±	0.98	4.66	±	3.64	No
	06/19/2013	-0.17	±	1.06	-0.61	±	3.93	No
	06/26/2013	-2.04	±	1.20	-7.56	±	4.44	No
HOWE	04/03/2013	2.56	±	1.29	9.46	±	4.77	No
	04/10/2013	-0.44	±	1.10	-1.63	±	4.07	No
	04/17/2013	-0.68	±	1.06	-2.50	±	3.92	No
	04/24/2013	0.18	±	1.13	0.67	±	4.17	No
	05/01/2013	0.81	±	1.02	2.99	±	3.77	No
	05/08/2013	0.19	±	1.14	0.71	±	4.21	No
	05/15/2013	-0.07	±	1.04	-0.25	±	3.86	No
	05/22/2013	-0.81	±	1.10	-2.99	±	4.07	No
	05/29/2013	-0.06	±	1.04	-0.22	±	3.83	No
	06/05/2013	1.35	±	1.18	5.01	±	4.38	No
	06/12/2013	1.23	±	0.96	4.54	±	3.54	No
	06/19/2013	-0.18	±	1.12	-0.65	±	4.14	No
	06/26/2013	-2.01	±	1.18	-7.42	±	4.36	No
MONTEVIEW	04/03/2013	2.58	±	1.30	9.55	±	4.82	No
	04/10/2013	-0.45	±	1.12	-1.65	±	4.13	No
	04/17/2013	-0.68	±	1.07	-2.53	±	3.96	No
	04/24/2013	0.18	±	1.11	0.66	±	4.10	No
	05/01/2013	0.83	±	1.04	3.06	±	3.85	No
	05/08/2013	0.19	±	1.14	0.71	±	4.23	No
	05/15/2013	-0.07	±	1.08	-0.26	±	3.99	No
	05/22/2013	-0.86	±	1.18	-3.20	±	4.36	No
	05/29/2013	-0.07	±	1.13	-0.24	±	4.17	No
	06/05/2013	1.43	±	1.25	5.29	±	4.63	No
	06/12/2013	1.31	±	1.02	4.84	±	3.77	No
	06/19/2013	-0.19	±	1.23	-0.71	±	4.54	No
	06/26/2013	-2.11	±	1.24	-7.81	±	4.59	No
QA-2 (MONTEVIEW)	04/03/2013	2.55	±	1.29	9.44	±	4.76	No
	04/10/2013	-0.44	±	1.11	-1.64	±	4.11	No
	04/17/2013	-0.69	±	1.07	-2.54	±	3.97	No
	04/24/2013	0.18	±	1.09	0.65	±	4.03	No
	05/01/2013	0.83	±	1.05	3.07	±	3.87	No
	05/08/2013	0.19	±	1.14	0.71	±	4.23	No
	05/15/2013	-0.07	±	1.12	-0.27	±	4.13	No
	05/22/2013	-0.90	±	1.22	-3.32	±	4.52	No
	05/29/2013	-0.07	±	1.15	-0.25	±	4.26	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								
	06/05/2013	1.47	±	1.29	5.45	±	4.77	No
	06/12/2013	1.39	±	1.09	5.15	±	4.02	No
	06/19/2013	-0.19	±	1.23	-0.71	±	4.53	No
	06/26/2013	-2.19	±	1.29	-8.09	±	4.76	No
MUD LAKE	04/03/2013	2.79	±	1.41	10.33	±	5.21	No
	04/10/2013	-0.45	±	1.13	-1.67	±	4.18	No
	04/17/2013	-0.76	±	1.20	-2.83	±	4.43	No
	04/24/2013	0.17	±	1.08	0.64	±	3.99	No
	05/01/2013	0.86	±	1.08	3.17	±	3.99	No
	05/08/2013	0.20	±	1.16	0.72	±	4.31	No
	05/15/2013	-0.08	±	1.17	-0.28	±	4.33	No
	05/22/2013	-0.87	±	1.19	-3.23	±	4.40	No
	05/29/2013	-0.07	±	1.19	-0.25	±	4.39	No
	06/05/2013	1.45	±	1.27	5.38	±	4.70	No
	06/12/2013	1.50	±	1.17	5.53	±	4.31	No
	06/19/2013	-0.19	±	1.22	-0.71	±	4.52	No
	06/26/2013	-2.17	±	1.28	-8.04	±	4.72	No
DISTANT								
BLACKFOOT	04/03/2013	0.73	±	1.25	2.69	±	4.61	No
	04/10/2013	0.65	±	1.22	2.42	±	4.51	No
	04/17/2013	0.38	±	1.41	1.41	±	5.21	No
	04/24/2013	1.42	±	1.19	5.27	±	4.40	No
	05/01/2013	-0.29	±	1.05	-1.06	±	3.89	No
	05/08/2013	-0.74	±	1.12	-2.74	±	4.14	No
	05/15/2013	-0.45	±	1.10	-1.68	±	4.06	No
	05/22/2013	0.13	±	1.03	0.46	±	3.81	No
	05/29/2013	-0.85	±	1.05	-3.13	±	3.88	No
	06/05/2013	0.74	±	1.06	2.74	±	3.90	No
	06/12/2013	0.34	±	1.02	1.26	±	3.78	No
	06/19/2013	0.28	±	1.07	1.04	±	3.97	No
	06/26/2013	1.39	±	1.08	5.16	±	4.01	No
CRATERS	04/03/2013	0.67	±	1.14	2.47	±	4.22	No
	04/10/2013	0.59	±	1.09	2.17	±	4.05	No
	04/17/2013	0.37	±	1.36	1.36	±	5.02	No
	04/24/2013	1.29	±	1.07	4.77	±	3.98	No
	05/01/2013	-0.29	±	1.07	-1.08	±	3.97	No
	05/08/2013	-0.71	±	1.07	-2.63	±	3.97	No
	05/15/2013	-0.48	±	1.17	-1.79	±	4.34	No
	05/22/2013	0.13	±	1.10	0.50	±	4.07	No
	05/29/2013	-0.93	±	1.15	-3.44	±	4.27	No
	06/05/2013	0.82	±	1.17	3.03	±	4.32	No
	06/12/2013	0.36	±	1.08	1.32	±	3.99	No
	06/19/2013	0.29	±	1.12	1.09	±	4.15	No
	06/26/2013	1.55	±	1.20	5.73	±	4.45	No
DUBOIS	04/03/2013	2.47	±	1.24	9.12	±	4.60	No
	04/10/2013	-0.41	±	1.03	-1.52	±	3.80	No
	04/17/2013	-0.65	±	1.01	-2.39	±	3.74	No
	04/24/2013	0.16	±	0.99	0.59	±	3.67	No
	05/01/2013	0.82	±	1.03	3.02	±	3.80	No
	05/08/2013	0.18	±	1.07	0.66	±	3.95	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								
	05/15/2013	-0.07	±	1.09	-0.26	±	4.04	No
	05/22/2013	-0.82	±	1.12	-3.03	±	4.14	No
	05/29/2013	-0.07	±	1.12	-0.24	±	4.16	No
	06/05/2013	1.31	±	1.15	4.84	±	4.24	No
	06/12/2013	1.36	±	1.06	5.05	±	3.93	No
	06/19/2013	-0.17	±	1.11	-0.64	±	4.12	No
	06/26/2013	-2.17	±	1.27	-8.03	±	4.72	No
IDAHO FALLS	04/03/2013	2.14	±	1.08	7.93	±	4.00	No
	04/10/2013	-0.36	±	0.89	-1.32	±	3.30	No
	04/17/2013	-0.58	±	0.91	-2.14	±	3.35	No
	04/24/2013	0.14	±	0.88	0.53	±	3.27	No
	05/01/2013	0.75	±	0.95	2.79	±	3.51	No
	05/08/2013	0.15	±	0.91	0.56	±	3.35	No
	05/15/2013	-0.06	±	0.93	-0.22	±	3.43	No
	05/22/2013	-0.72	±	0.98	-2.67	±	3.64	No
	05/29/2013	-0.05	±	0.92	-0.20	±	3.42	No
	06/05/2013	1.11	±	0.97	4.12	±	3.60	No
	06/12/2013	1.18	±	0.92	4.37	±	3.40	No
	06/19/2013	-0.15	±	0.95	-0.55	±	3.52	No
	06/26/2013	-1.82	±	1.07	-6.75	±	3.96	No
JACKSON	04/03/2013	0.73	±	1.25	2.71	±	4.63	No
	04/10/2013	0.65	±	1.21	2.40	±	4.48	No
	04/17/2013	0.40	±	1.50	1.49	±	5.53	No
	04/24/2013	1.49	±	1.24	5.52	±	4.60	No
	05/01/2013	-0.32	±	1.17	-1.18	±	4.32	No
	05/08/2013	-0.81	±	1.23	-3.01	±	4.56	No
	05/15/2013	-0.53	±	1.27	-1.95	±	4.71	No
	05/22/2013	0.15	±	1.24	0.56	±	4.59	No
	05/29/2013	-1.06	±	1.31	-3.90	±	4.84	No
	06/05/2013	0.90	±	1.29	3.35	±	4.76	No
	06/12/2013	0.40	±	1.20	1.47	±	4.43	No
	06/19/2013	0.34	±	1.30	1.26	±	4.80	No
	06/26/2013	1.68	±	1.30	6.20	±	4.82	No
REXBURG	04/03/2013	2.64	±	1.33	9.75	±	4.92	No
	04/10/2013	-0.47	±	1.17	-1.74	±	4.35	No
	04/17/2013	-0.72	±	1.13	-2.67	±	4.18	No
	04/24/2013	0.19	±	1.15	0.69	±	4.27	No
	05/01/2013	0.85	±	1.06	3.13	±	3.94	No
	05/08/2013	0.19	±	1.16	0.72	±	4.28	No
	05/15/2013	-0.08	±	1.18	-0.28	±	4.37	No
	05/22/2013	-0.87	±	1.19	-3.23	±	4.41	No
	05/29/2013	-0.07	±	1.20	-0.26	±	4.43	No
	06/05/2013	1.45	±	1.27	5.37	±	4.69	No
	06/12/2013	1.41	±	1.10	5.20	±	4.05	No
	06/19/2013	-0.18	±	1.17	-0.68	±	4.34	No
	06/26/2013	-2.30	±	1.35	-8.50	±	5.00	No
INL SITE								
EFS	04/03/2013	0.64	±	1.09	2.36	±	4.04	No
	04/10/2013	0.58	±	1.08	2.13	±	3.98	No
	04/17/2013	0.33	±	1.23	1.23	±	4.57	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								
	04/24/2013	1.23	±	1.03	4.56	±	3.80	No
	05/01/2013	-0.27	±	1.00	-1.00	±	3.68	No
	05/08/2013	-0.71	±	1.07	-2.63	±	3.97	No
	05/15/2013	-0.44	±	1.06	-1.61	±	3.91	No
	05/22/2013	0.13	±	1.10	0.50	±	4.06	No
	05/29/2013	-0.89	±	1.11	-3.30	±	4.09	No
	06/05/2013	0.78	±	1.11	2.90	±	4.12	No
	06/12/2013	0.34	±	1.03	1.26	±	3.80	No
	06/19/2013	0.28	±	1.05	1.02	±	3.88	No
	06/26/2013	1.82	±	1.41	6.73	±	5.23	No
MAIN GATE	04/03/2013	0.65	±	1.11	2.40	±	4.11	No
	04/10/2013	0.59	±	1.09	2.17	±	4.04	No
	04/17/2013	0.36	±	1.33	1.32	±	4.90	No
	04/24/2013	1.34	±	1.12	4.95	±	4.13	No
	05/01/2013	-0.28	±	1.04	-1.05	±	3.84	No
	05/08/2013	-0.74	±	1.12	-2.74	±	4.15	No
	05/15/2013	-0.45	±	1.09	-1.66	±	4.02	No
	05/22/2013	0.14	±	1.12	0.51	±	4.15	No
	05/29/2013	-0.90	±	1.12	-3.34	±	4.14	No
	06/05/2013	1.35	±	1.92	5.00	±	7.11	No
	06/12/2013	0.35	±	1.04	1.28	±	3.85	No
	06/19/2013	0.29	±	1.10	1.07	±	4.08	No
	06/26/2013	1.54	±	1.20	5.71	±	4.43	No
VAN BUREN GATE	04/03/2013	0.64	±	1.09	2.35	±	4.02	No
	04/10/2013	0.55	±	1.04	2.05	±	3.83	No
	04/17/2013	0.33	±	1.24	1.23	±	4.57	No
	04/24/2013	1.22	±	1.02	4.52	±	3.77	No
	05/01/2013	-0.27	±	0.99	-1.00	±	3.68	No
	05/08/2013	-0.69	±	1.04	-2.56	±	3.86	No
	05/15/2013	-0.44	±	1.08	-1.64	±	3.98	No
	05/22/2013	0.13	±	1.09	0.49	±	4.02	No
	05/29/2013	-0.88	±	1.09	-3.26	±	4.04	No
	06/05/2013	0.80	±	1.13	2.95	±	4.20	No
	06/12/2013	0.33	±	0.99	1.22	±	3.67	No
	06/19/2013	0.29	±	1.12	1.09	±	4.15	No
	06/26/2013	1.47	±	1.14	5.43	±	4.22	No

a. Invalid Sample Result

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

Sampling Group and Location	Sampling Date	Analyte	Result ± 1s Uncertainty ($\times 10^{-18}$ µCi/mL)			Result ± 1s Uncertainty ($\times 10^{-13}$ Bq/mL)			Result > 3s
BOUNDARY									
ARCO	6/26/2013	CESIUM-137	161.00	±	91.10	595.70	±	337.07	No
ARCO (QA-1)	6/26/2013	CESIUM-137	-135.00	±	103.00	-499.50	±	381.10	No
ATOMIC CITY	6/26/2013	CESIUM-137	-31.50	±	141.00	-116.55	±	521.70	No
BLUE DOME	6/26/2013	CESIUM-137	11.30	±	124.00	41.81	±	458.80	No
FAA TOWER	6/26/2013	CESIUM-137	-50.10	±	139.00	-185.37	±	514.30	No
HOWE	6/26/2013	CESIUM-137	-2.83	±	119.00	-10.47	±	440.30	No
MONTEVIEW	6/26/2013	CESIUM-137	99.70	±	146.00	368.89	±	540.20	No
MONTEVIEW (QA-2)	6/26/2013	CESIUM-137	70.10	±	102.00	259.37	±	377.40	No
MUD LAKE	6/26/2013	CESIUM-137	-119.00	±	167.00	-440.30	±	617.90	No
DISTANT									
BLACKFOOT	6/26/2013	CESIUM-137	-29.20	±	131.00	-108.04	±	484.70	No
CRATERS	6/26/2013	CESIUM-137	-89.00	±	117.00	-329.30	±	432.90	No
DUBOIS	6/26/2013	CESIUM-137	-17.60	±	131.00	-65.12	±	484.70	No
IDAHO FALLS	6/26/2013	CESIUM-137	64.90	±	118.00	240.13	±	436.60	No
JACKSON	6/26/2013	CESIUM-137	-68.40	±	103.00	-253.08	±	381.10	No
REXBURG CMS	6/26/2013	CESIUM-137	63.80	±	106.00	236.06	±	392.20	No
INL SITE									No
EFS	6/26/2013	CESIUM-137	119.00	±	138.00	440.30	±	510.60	No
MAIN GATE	6/26/2013	CESIUM-137	-73.90	±	148.00	-273.43	±	547.60	No
VAN BUREN GATE	6/26/2013	CESIUM-137	-42.50	±	129.00	-157.25	±	477.30	No

TABLE C-4. Tritium Concentrations in Atmospheric Moisture

Sampling Group and Location	Start Date	Sampling Date	Result ± 1s Uncertainty ($\times 10^{-13}$ $\mu Ci/mL_{air}$)			Result ± 1s Uncertainty ($\times 10^{-9}$ Bq/mL_{air})			Result > 3s
BOUNDARY									
ATOMIC CITY	03/27/2013	05/01/2013	4.99	±	0.93	18.46	±	3.45	**Yes**
ATOMIC CITY	05/01/2013	05/29/2013	7.19	±	1.27	26.60	±	4.69	**Yes**
ATOMIC CITY	05/29/2013	06/26/2013	5.10	±	1.25	18.88	±	4.62	**Yes**
DISTANT									
BLACKFOOT	03/13/2013	04/03/2013	3.99	±	1.09	14.75	±	4.04	**Yes**
BLACKFOOT	04/03/2013	04/24/2013	4.57	±	1.12	16.91	±	4.15	**Yes**
BLACKFOOT	04/24/2013	05/15/2013	4.96	±	1.28	18.36	±	4.75	**Yes**
BLACKFOOT	05/15/2013	05/29/2013	7.45	±	1.65	27.56	±	6.09	**Yes**
BLACKFOOT	05/29/2013	06/19/2013	8.46	±	1.39	31.32	±	5.14	**Yes**
IDAHO FALLS	03/27/2013	04/18/2013	0.87	±	0.26	3.22	±	0.97	**Yes**
IDAHO FALLS	04/18/2013	05/15/2013	1.24	±	0.25	4.58	±	0.94	**Yes**
IDAHO FALLS	05/15/2013	05/29/2013	1.78	±	0.41	6.59	±	1.50	**Yes**
IDAHO FALLS	05/29/2013	06/13/2013	2.29	±	0.55	8.47	±	2.02	**Yes**
REXBURG	03/27/2013	04/17/2013	6.44	±	1.29	23.81	±	4.78	**Yes**
REXBURG	04/17/2013	05/15/2013	5.24	±	1.27	19.37	±	4.71	**Yes**
REXBURG	05/15/2013	06/05/2013	15.36	±	1.93	56.82	±	7.14	**Yes**
REXBURG	06/05/2013	06/19/2013	8.65	±	2.20	32.00	±	8.13	**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	3/4/2013	4/1/2013	26.70	±	22.00	0.99	±	0.81	No
	4/1/2013	5/2/2013	75.10	±	22.20	2.78	±	0.82	**Yes**
	5/2/2013	6/3/2013	70.90	±	21.70	2.62	±	0.80	**Yes**
CFA	3/4/2013	4/1/2013	69.50	±	22.10	2.57	±	0.82	**Yes**
	5/1/2013	6/3/2013	30.30	±	21.40	1.12	±	0.79	No
EFS	5/1/2013	5/8/2013	111.00	±	22.60	4.11	±	0.84	**Yes**
	5/15/2013	5/22/2013	85.90	±	22.10	3.18	±	0.82	**Yes**
	5/22/2013	5/29/2013	55.10	±	21.70	2.04	±	0.80	No

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

Location	Sampling Date	Analyte	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
SURFACE WATER									
Alpheus Spring	5/20/2013	GROSS ALPHA	1.03	±	0.54	0.04	±	0.02	No
		GROSS BETA[a]	7.63	±	0.62	0.28	±	0.02	**Yes**
		TRITIUM	133.00	±	22.60	4.93	±	0.84	**Yes**
Bill Jones Fish Farm	5/20/2013	GROSS ALPHA	0.93	±	0.47	0.03	±	0.02	No
		GROSS BETA	3.15	±	0.58	0.12	±	0.02	**Yes**
		TRITIUM	115.00	±	22.30	4.26	±	0.83	**Yes**
Clear Springs	5/20/2013	GROSS ALPHA	0.46	±	0.48	0.02	±	0.02	No
		GROSS BETA	4.04	±	0.56	0.15	±	0.02	**Yes**
		TRITIUM	114.00	±	22.30	4.22	±	0.83	**Yes**
DRINKING WATER									
Atomic City	5/21/2013	GROSS ALPHA	1.15	±	0.49	0.04	±	0.02	No
		GROSS BETA	2.91	±	0.58	0.11	±	0.02	**Yes**
		TRITIUM	11.20	±	21.10	0.41	±	0.78	No
Control	5/23/2013	GROSS ALPHA	0.11	±	0.32	0.00	±	0.01	No
		GROSS BETA	-1.03	±	0.51	-0.04	±	0.02	No
		TRITIUM	74.40	±	22.10	2.76	±	0.82	**Yes**
Craters of the Moon	5/22/2013	GROSS ALPHA	1.16	±	0.43	0.04	±	0.02	No
		GROSS BETA	3.40	±	0.53	0.13	±	0.02	**Yes**
		TRITIUM	3.77	±	21.00	0.14	±	0.78	No
Craters of the Moon (duplicate)	5/22/2013	GROSS ALPHA	0.77	±	0.47	0.03	±	0.02	No
		GROSS BETA	2.19	±	0.58	0.08	±	0.02	**Yes**
		TRITIUM	93.30	±	22.30	3.46	±	0.83	**Yes**
Howe	5/22/2013	GROSS ALPHA	0.21	±	0.47	0.01	±	0.02	No
		GROSS BETA	0.60	±	0.56	0.02	±	0.02	No
		TRITIUM	9.10	±	21.00	0.34	±	0.78	No
Idaho Falls	5/21/2013	GROSS ALPHA	0.40	±	0.52	0.01	±	0.02	No
		GROSS BETA	3.16	±	0.53	0.12	±	0.02	**Yes**
		TRITIUM	43.10	±	21.40	1.60	±	0.79	No
Minidoka	5/20/2013	GROSS ALPHA	0.78	±	0.47	0.03	±	0.02	No
		GROSS BETA	3.32	±	0.56	0.12	±	0.02	**Yes**
		TRITIUM	11.80	±	21.00	0.44	±	0.78	No
Mud Lake	5/22/2013	GROSS ALPHA	-0.11	±	0.34	0.00	±	0.01	No
		GROSS BETA	4.52	±	0.53	0.17	±	0.02	**Yes**
		TRITIUM	57.10	±	21.60	2.11	±	0.80	No
Rest Area	5/21/2013	GROSS ALPHA	0.88	±	0.49	0.03	±	0.02	No
		GROSS BETA	0.68	±	0.56	0.03	±	0.02	No
		TRITIUM	70.60	±	22.20	2.61	±	0.82	**Yes**
Shoshone	5/20/2013	GROSS ALPHA	1.80	±	0.53	0.07	±	0.02	**Yes**
		GROSS BETA	5.33	±	0.63	0.20	±	0.02	**Yes**
		TRITIUM	70.00	±	22.20	2.59	±	0.82	**Yes**

[a] A review of the table, performed during the summer of 2020, identified the values listed for the result and uncertainty were incorrect. The result and uncertainty values were updated with the correct values. For further discussion, see Water Sampling in Section 5.

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			±		0.000	±	0.000	No		±		0.000	±	0.000	No
	04/01/13	1.21	±	1.05	0.045	±	0.039	No	0.28	±	0.81	0.010	±	0.030	No
Duplicate	04/01/13	-0.97	±	1.33	-0.036	±	0.049	No	3.70	±	1.52	0.137	±	0.056	No
	05/05/13	2.24	±	1.08	0.083	±	0.040	No	0.92	±	0.82	0.034	±	0.031	No
	06/02/13	1.45	±	1.05	0.054	±	0.039	No	0.72	±	0.92	0.027	±	0.034	No
CONTROL															
	04/02/13	-1.81	±	1.97	-0.067	±	0.073	No	0.16	±	1.46	0.006	±	0.054	No
	05/07/13	-0.96	±	1.93	-0.036	±	0.071	No	-0.84	±	1.41	-0.031	±	0.052	No
	06/04/13	3.00	±	2.01	0.111	±	0.074	No	-1.37	±	1.43	-0.051	±	0.053	No
DIETRICH															
	04/02/13	0.41	±	1.62	0.015	±	0.060	No	-1.38	±	1.41	-0.051	±	0.052	No
	05/07/13	0.35	±	1.05	0.013	±	0.039	No	0.51	±	0.79	0.019	±	0.029	No
	06/04/13	-0.40	±	1.01	-0.015	±	0.037	No	0.60	±	0.80	0.022	±	0.030	No
FORT HALL															
	05/05/13	0.75	±	1.08	0.028	±	0.040	No	-0.93	±	0.89	-0.034	±	0.033	No
	06/03/13	0.15	±	1.80	0.006	±	0.066	No	1.74	±	1.45	0.064	±	0.054	No
HOWE															
	04/02/13	0.08	±	0.91	0.003	±	0.034	No	-1.05	±	0.89	-0.039	±	0.033	No
	05/07/13	-0.35	±	1.22	-0.013	±	0.045	No	0.93	±	1.34	0.034	±	0.050	No
	06/04/13	0.31	±	0.99	0.011	±	0.037	No	0.24	±	0.86	0.009	±	0.032	No
Duplicate	06/04/13	-0.97	±	1.76	-0.036	±	0.065	No	-1.96	±	1.48	-0.073	±	0.055	No
IDAHO FALLS															
	04/02/13	-0.35	±	1.25	-0.013	±	0.046	No	-0.02	±	1.41	-0.001	±	0.052	No
	04/09/13	1.89	±	0.99	0.070	±	0.037	No	0.98	±	0.83	0.036	±	0.031	No
	04/16/13	-1.53	±	0.98	-0.057	±	0.036	No	1.03	±	0.77	0.038	±	0.029	No
	04/23/13	-0.30	±	0.93	-0.011	±	0.035	No	1.11	±	0.81	0.041	±	0.030	No
	04/30/13	-0.82	±	0.95	-0.030	±	0.035	No	-0.25	±	0.76	-0.009	±	0.028	No
	05/07/13	-0.15	±	1.01	-0.006	±	0.037	No	-0.03	±	0.77	-0.001	±	0.029	No
	05/14/13	-2.84	±	1.31	-0.105	±	0.049	No	-1.43	±	1.46	-0.053	±	0.054	No
	05/21/13	-0.44	±	1.19	-0.016	±	0.044	No	-0.13	±	1.40	-0.005	±	0.052	No
	05/28/13	-0.62	±	0.94	-0.023	±	0.035	No	0.86	±	0.82	0.032	±	0.030	No
	06/04/13	0.03	±	0.84	0.001	±	0.031	No	1.36	±	0.82	0.050	±	0.030	No
	06/11/13	-1.94	±	1.00	-0.072	±	0.037	No	0.49	±	0.79	0.018	±	0.029	No
	06/18/13	-0.08	±	0.89	-0.003	±	0.033	No	2.08	±	0.86	0.077	±	0.032	No
	06/25/13	2.11	±	0.93	0.078	±	0.035	No	-0.24	±	0.83	-0.009	±	0.031	No
RUPERT															
	04/02/13	-0.74	±	1.02	-0.027	±	0.038	No	0.24	±	0.77	0.009	±	0.029	No
	05/07/13	0.41	±	1.32	0.015	±	0.049	No	1.05	±	1.36	0.039	±	0.050	No
	06/04/13	-0.51	±	1.32	-0.019	±	0.049	No	-0.25	±	1.41	-0.009	±	0.052	No
TERRETON															
	04/02/13	-1.64	±	1.83	-0.061	±	0.068	No	1.88	±	1.48	0.070	±	0.055	No
	05/07/13	-0.61	±	0.97	-0.022	±	0.036	No	-0.09	±	0.84	-0.003	±	0.031	No
	06/04/13	-0.25	±	1.05	-0.009	±	0.039	No	1.00	±	0.78	0.037	±	0.029	No

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

Location	Sampling Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
Strontium-90								
BLACKFOOT	05/05/13	0.72	±	0.12	0.027	±	0.004	**Yes**
CONTROL	05/07/13	0.73	±	0.12	0.027	±	0.004	**Yes**
DIETRICH	05/07/13	0.80	±	0.14	0.030	±	0.005	**Yes**
FORT HALL	05/05/13	0.68	±	0.12	0.025	±	0.004	**Yes**
HOWE	05/07/13	0.73	±	0.12	0.027	±	0.005	**Yes**
IDAHO FALLS	05/07/13	0.79	±	0.13	0.029	±	0.005	**Yes**
RUPERT	05/07/13	0.82	±	0.13	0.031	±	0.005	**Yes**
TERRETON	05/07/13	0.83	±	0.13	0.031	±	0.005	**Yes**
Tritium								
		Concentration ± 1s			**Concentration ± 1s**			**Result > 3s**
BLACKFOOT	05/05/13	80.74	±	22.43	2.991	±	0.831	**Yes**
CONTROL	05/07/13	34.40	±	21.80	1.274	±	0.807	No
DIETRICH	05/07/13	67.00	±	22.30	2.481	±	0.826	**Yes**
FORT HALL	05/05/13	78.70	±	22.33	2.915	±	0.827	**Yes**
HOWE	05/07/13	27.20	±	21.70	1.007	±	0.804	No
IDAHO FALLS	05/07/13	91.80	±	22.60	3.400	±	0.837	**Yes**
RUPERT	05/07/13	44.20	±	22.00	1.637	±	0.815	No
TERRETON	05/07/13	52.60	±	22.00	1.948	±	0.815	No

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

Location	Sampling Date	Cesium-137 Result ± 1s Uncertainty pCi/kg			Cesium-137 Result ± 1s Uncertainty Bq/kg			Result > 3s
MUD LAKE	06/13/13	-1.78	±	93.50	-0.07	±	3.46	No
MUD LAKE	06/13/13	-26.60	±	115.00	-0.99	±	4.26	No
MUD LAKE	06/13/13	47.60	±	137.00	1.76	±	5.07	No
		Strontium-90						
MUD LAKE	06/13/13	106.00	±	31.80	3.93	±	1.18	**Yes**
MUD LAKE	06/13/13	74.60	±	28.60	2.76	±	1.06	No
MUD LAKE	06/13/13	71.30	±	28.90	2.64	±	1.07	No

Table C-10. Environmental Radiation Measurements Using TLDs

Location	Start Date	End Date	Radiation Measurement ± 2s Uncertainty mR	Exposure mR/day
BOUNDARY				
ARCO	11/7/2012	5/8/2013	58.2 ± 11.4	0.32
ATOMIC CITY	11/7/2012	5/8/2013	62.8 ± 12.3	0.35
BIRCH CREEK	11/7/2012	5/8/2013	54.5 ± 10.7	0.30
BLUE DOME	11/7/2012	5/8/2013	52.4 ± 10.3	0.29
HOWE	11/7/2012	5/8/2013	58.9 ± 11.5	0.32
MONTEVIEW	11/7/2012	5/8/2013	57.9 ± 11.4	0.32
MUD LAKE	11/7/2012	5/8/2013	64.7 ± 12.7	0.36
			Boundary Average	**0.32**
DISTANT				
ABERDEEN	11/6/2012	5/7/2012	63.5 ± 12.5	0.35
BLACKFOOT	11/7/2012	5/8/2013	58.3 ± 11.4	0.32
BLACKFOOT CMS	11/7/2012	5/8/2013	55.7 ± 10.9	0.31
CRATERS	11/7/2012	5/8/2013	55.7 ± 10.9	0.31
DUBOIS	11/7/2012	5/8/2013	52.0 ± 10.2	0.29
IDAHO FALLS	11/7/2012	5/8/2013	60.0 ± 11.8	0.33
MINIDOKA	11/6/2012	5/7/2012	61.0 ± 12.0	0.34
REXBURG	11/7/2012	5/8/2013	68.9 ± 13.5	0.38
ROBERTS	11/6/2012	5/7/2012	64.7 ± 12.7	0.36
			Distant Average	**0.33**
OUT-OF-STATE				
JACKSON	11/1/2012	5/3/2012	50.4 ± 9.9	0.28

Table C-11. Environmental Radiation Measurements Using OSLDs

Location	Start Date	End Date	Radiation Measurement ± 2s Uncertainty mrem	Dose mrem/day
BOUNDARY				
ARCO	11/7/2012	5/8/2013	52.15 ± 4.36	0.29
ATOMIC CITY	11/7/2012	5/8/2013	52.70 ± 4.41	0.29
BIRCH CREEK	11/7/2012	5/8/2013	45.52 ± 3.69	0.25
BLUE DOME	11/7/2012	5/8/2013	42.95 ± 3.44	0.24
HOWE	11/7/2012	5/8/2013	50.71 ± 4.21	0.28
MONTEVIEW	11/7/2012	5/8/2013	49.53 ± 4.09	0.27
MUD LAKE	11/7/2012	5/8/2013	56.74 ± 4.81	0.31
			Boundary Average	**0.27**
DISTANT				
ABERDEEN	11/6/2012	5/7/2012	52.27 ± 4.37	0.29
BLACKFOOT	11/7/2012	5/8/2013	48.68 ± 4.01	0.27
BLACKFOOT CMS	11/7/2012	5/8/2013	48.58 ± 4.00	0.27
CRATERS	11/7/2012	5/8/2013	46.30 ± 3.77	0.25
DUBOIS	11/7/2012	5/8/2013	42.05 ± 3.35	0.23
IDAHO FALLS	11/7/2012	5/8/2013	54.87 ± 4.63	0.30
MINIDOKA	11/6/2012	5/7/2012	46.25 ± 3.77	0.25
REXBURG	11/7/2012	5/8/2013	63.01 ± 5.44	0.35
ROBERTS	11/6/2012	5/7/2012	59.96 ± 5.14	0.33
			Distant Average	**0.28**
OUT-OF-STATE				
JACKSON	11/1/2012	5/3/2012	41.74 ± 3.31	0.23

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	0.05
April	0.08
May	0.23
June	0.71
Gross Beta	
Quarter	0.99
April	0.90
May	0.98
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 3	0.03
	April 10	0.20
	April 17	0.25
	April 24	0.67
	May 1	0.32
	May 8	0.25
	May 15	0.89
	May 22	0.00
	May 29	0.09
	June 5	1.00
	June 12	0.83
	June 19	0.32
	June 26	0.03
Gross Beta		
	April 3	0.22
	April 10	0.83
	April 17	0.25
	April 24	0.52
	May 1	0.78
	May 8	0.39
	May 15	0.57
	May 22	0.43
	May 29	0.83
	June 5	0.67
	June 12	0.43
	June 19	0.48
	June 26	0.22

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