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Idaho National Laboratory Site Offsite Environmental Surveillance Program Report: Third Quarter 2011

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EXECUTIVE SUMMARY

None of the radionuclides detected in samples collected during the third quarter of 2011 could be directly linked with INL Site activities, with the exception of waterfowl taken from wastewater ponds. No remaining impacts were detected from the Fukushima nuclear accident in Japan. 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 guidelines 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 2011 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, 2011. All sample types (media) and the sampling schedule followed during 2011 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
- Surface water sampling
- Milk sampling
- Lettuce and grain sampling
- Alfalfa and elk forage sampling
- Game animal sampling, including large game animals and waterfowl

Table E-1 Summary of results for the Third Quarter of 2011.

Media	Sample Type	Analysis	Results
Air	Filters	Gross alpha, gross beta	No statistical differences were noted in either gross alpha or gross beta data on quarterly comparisons. In August, there was statistical difference between sample groups for gross beta, but INL Site and boundary locations were lower than distant locations. During two weeks, gross alpha concentrations were statistically higher at distant locations than boundary locations. During one weeks, gross beta concentrations were statistically higher at boundary locations than distant locations. These differences appeared to be normal variations in the data. No result exceeded the DCG for gross alpha or gross beta activity in air.
		Gamma-emitting radionuclides	No manmade gamma-emitting radionuclides were detected. Final ^{90}Sr and actinide results were not yet available.
	Charcoal Cartridge	Iodine-131	No Iodine-131 was found on any third quarter charcoal cartridges.
Atmospheric Moisture	Liquid	Tritium	Only three results were available and all three had tritium results greater than the 3s uncertainty. No sample result exceeded the DCG for tritium in air. Results were consistent with historical measurements.
Precipitation	Liquid	Tritium	Nine for samples were collected. All 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.
Surface Water	Liquid	Gross alpha, gross beta, Tritium	Samples were collected from the Big Lost River on the INL Site on two occasions. All three analytes were detected in all samples. Concentrations were similar to those measured historically in surface water.
Milk	Liquid	Iodine-131, other gamma-emitting radionuclides	Thirty-two samples, including a duplicate, were collected. No Iodine-131 or other manmade gamma-emitting radionuclides were detected..
Lettuce	Vegetation	Gamma-emitting radionuclides	No manmade gamma-emitting radionuclides were detected in any of the ten samples.

Grain	Vegetation	Gamma-emitting radionuclides	No manmade gamma-emitting radionuclides were detected in any of the ten samples.
Alfalfa	Vegetation	Gamma-emitting radionuclides	Cesium-137 was found in one of the three samples but a recount of this sample failed to confirm the detection.
Elk Forage	Vegetation	Gamma-emitting radionuclides	Samples of grasses and forbs were collected from two areas on the INL Site and one control location where elk have been located. No gamma-emitting radionuclides were found in any samples.
Large Game Animals	Tissue	Gamma-emitting radionuclides	One elk was sampled. No manmade gamma-emitting radionuclides were detected.
Waterfowl	Tissue	Gamma-emitting radionuclides	Samples were collected from wastewater ponds at ATR Complex and the Materials and Fuels Complex and at a distant location. Cesium-137, Cobalt-60, and Zinc-65 were detected in some of the ATR Complex birds. These detections included edible tissue. Concentrations were similar to or lower than samples collected in prior years.

LIST OF ABBREVIATIONS

AEC	Atomic Energy Commission
CFA	Central Facilities Area
DCG	Derived Concentration Guide
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 2011, environmental monitoring within the INL Site boundaries was primarily the responsibility of the INL and Idaho Cleanup Project (ICP) contractors, while monitoring outside the INL Site boundaries was conducted under the Environmental Surveillance, Education, and Research (ESER) Program. At the beginning of the first quarter of 2011, the ESER Program became led by a new partnership between S.M. Stoller and Jerome Gonzales Management Systems, Inc. with the support of the previous team members. This partnership is named Gonzales Stoller Surveillance, LLC (GSS).The ESER Program was led by GSS in cooperation with its team members, including the University of Idaho, Idaho State University (ISU), and the Wildlife Conservation Society.

This report contains monitoring results from the ESER Program for samples collected during the third quarter of 2011 (July 1-September 30, 2011).

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 15 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 third 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) will be performed by a new laboratory—ALS Global of Fort Collins, Colorado. Third quarter results from the new laboratory will be reported in the next quarterly report.

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 2009). 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.

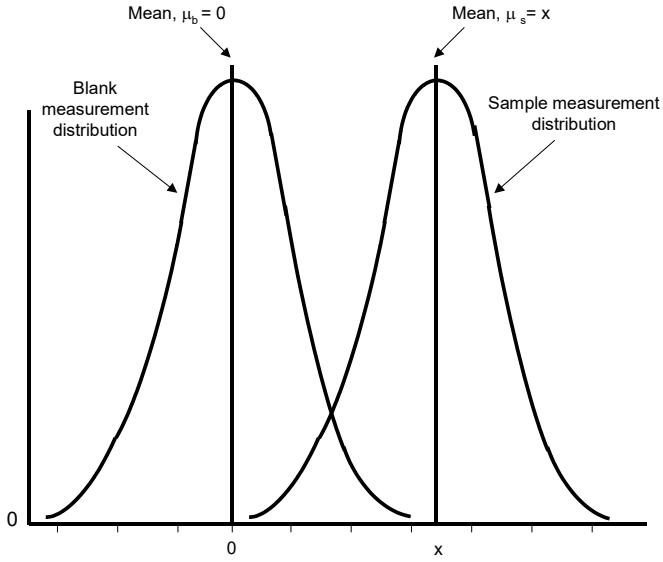

Figure 1. Example of overlap of blank and sample measurement distributions.

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 2011 are discussed below. A summary of approximate minimum detectable concentrations (MDCs) for radiological analyses and DOE Derived Concentration Guide (DCG) (DOE 1993) 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 2011 (Figure 2). Four of these samplers are located on the INL Site, seven are situated off the INL Site near the boundary, and seven have been placed at locations distant to the INL Site. Samplers are divided into INL Site, Boundary, and Distant groups to determine if there is a gradient of radionuclide concentrations, increasing towards the INL Site. Each replicate sampler is relocated every other year to a new location. During 2011, one replicate sampler was operating in Dubois (a Distant location) and one was operating at the Van Buren gate (an INL Site location). An average of 18,688 ft^3 (529 m^3) of air was sampled at each location, each week, at an average flow rate of 1.85 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.

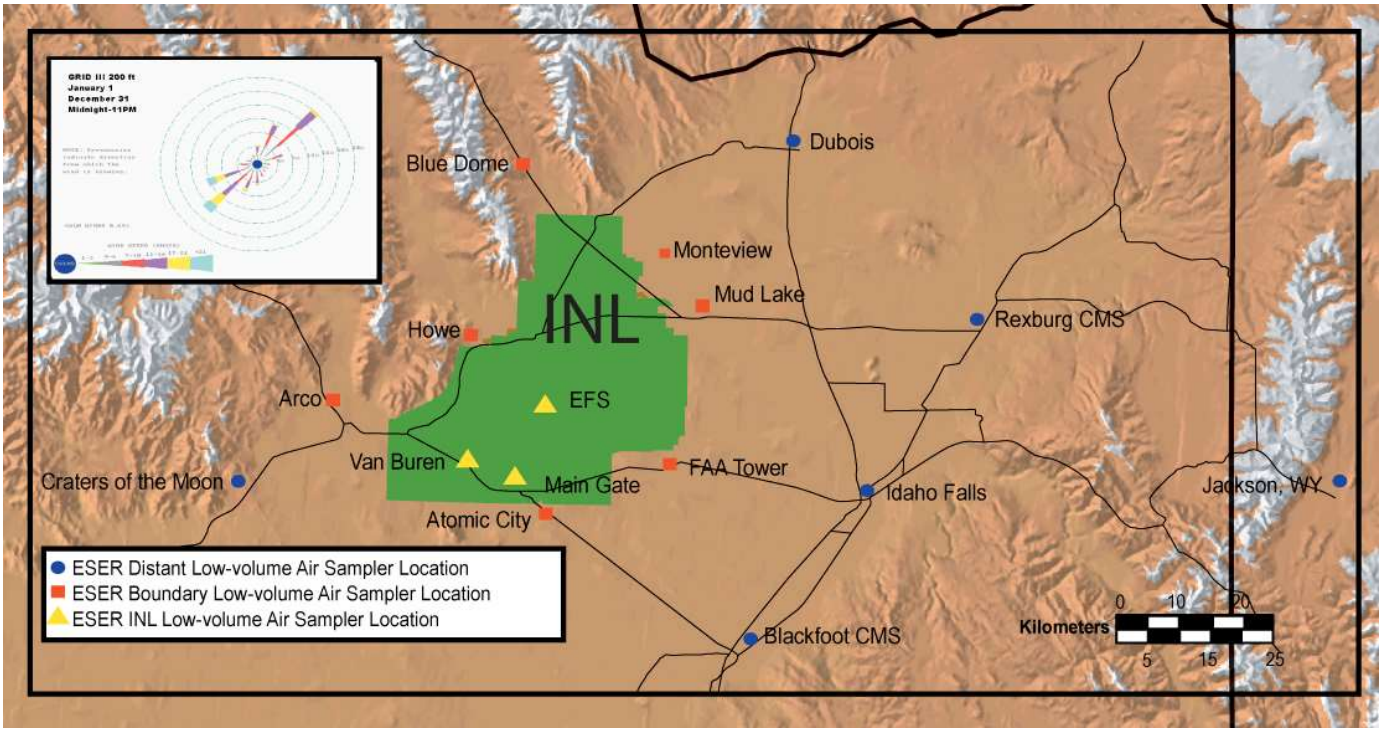

Figure 2. Low-volume air sampler locations.

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

Comparisons of gross alpha concentrations were made for each month of the quarter. Again the Kruskal-Wallis test of multiple independent groups was used 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 of the quarter (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 third quarter, there were three weeks (July 6, August 17, and August 31) where a statistical difference existed between the two sample groups (Table D-2). In the first two instances, the Distant group was higher than the Boundary group, which is not indicative of a potential INL Site impact. In the third week, the Boundary group was higher than the Distant group. During this week, a wildfire was burning in the vicinity of Howe. Elevated gross alpha concentrations are sometimes noted during smoky conditions and this may have impacted some of the Boundary locations such as Howe and Blue Dome.

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

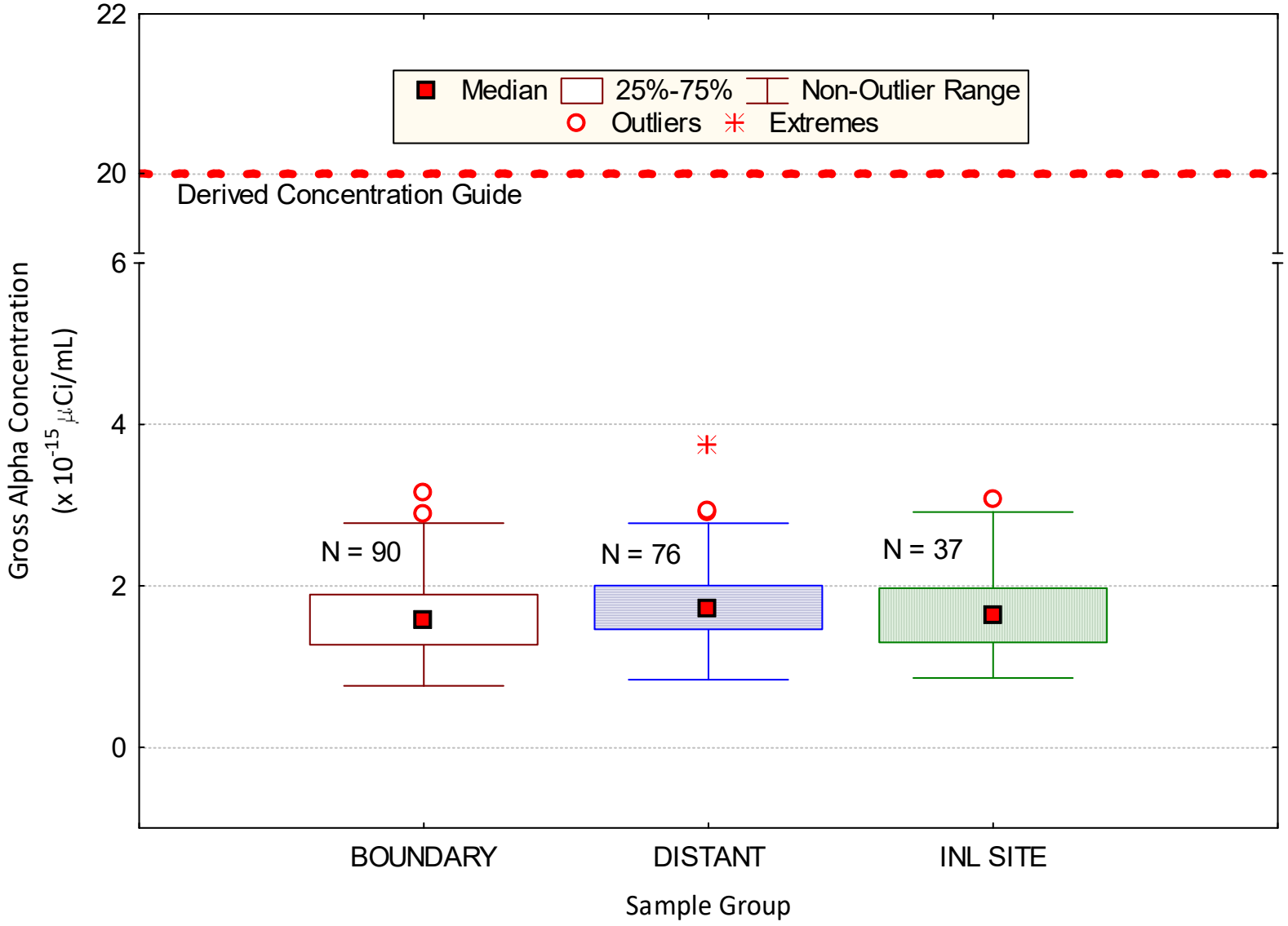

Figure 3. Gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations for the third quarter of 2011.

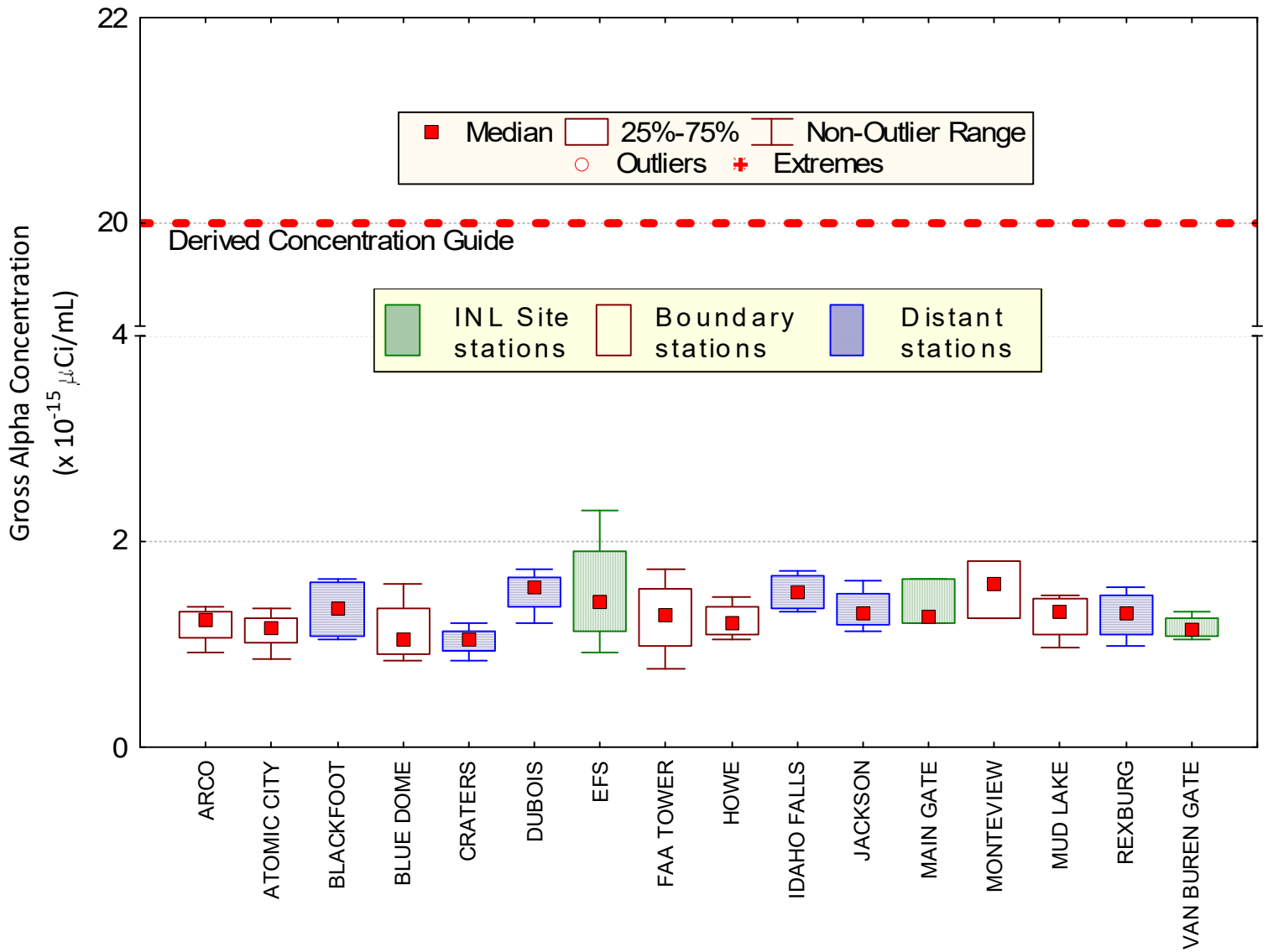

Figure 4. July gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location, except Main Gate and Monteview (N = 3).

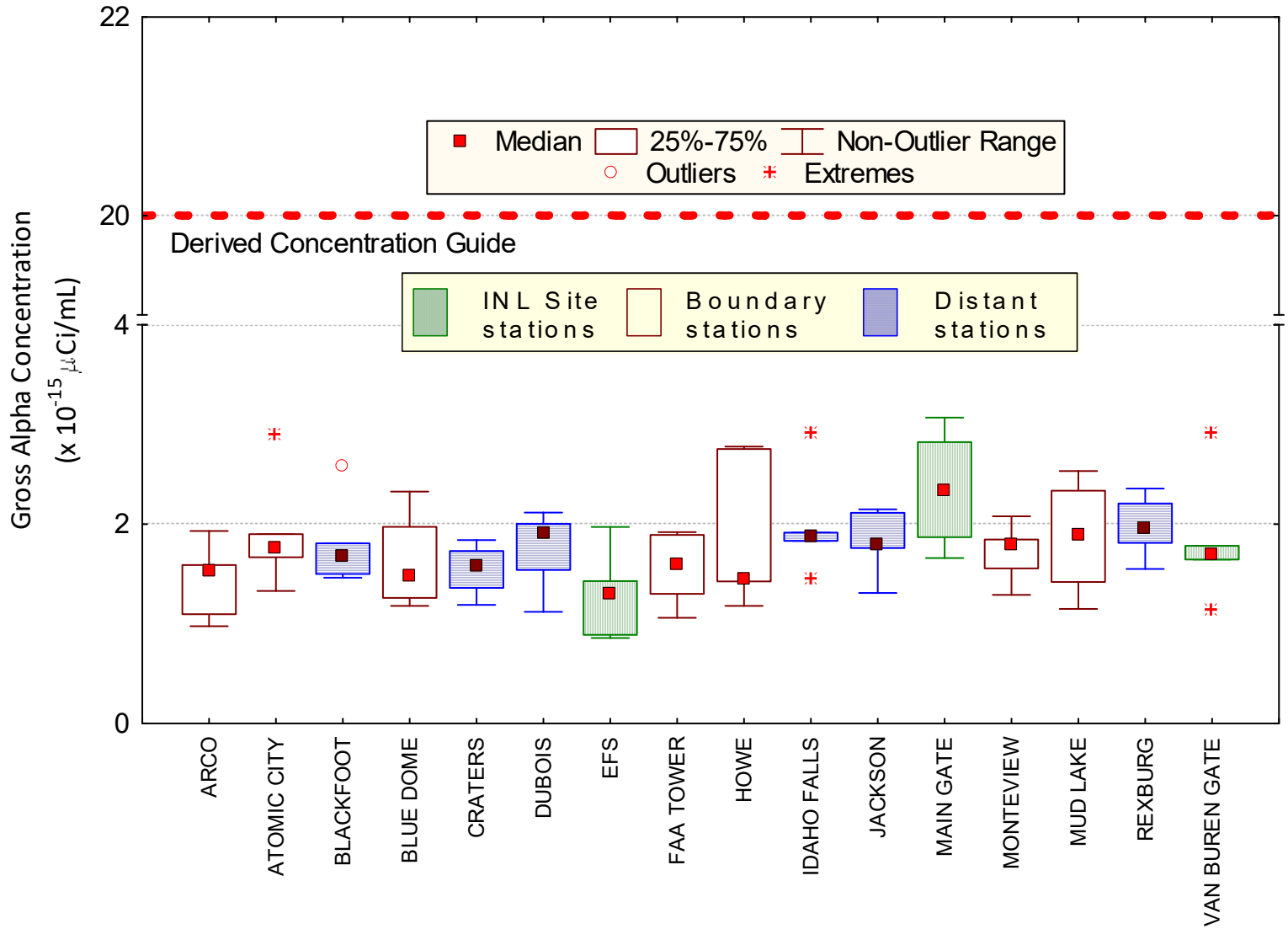

Figure 5. August gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location, except Blue Dome, Craters, and Main Gate (N = 4).

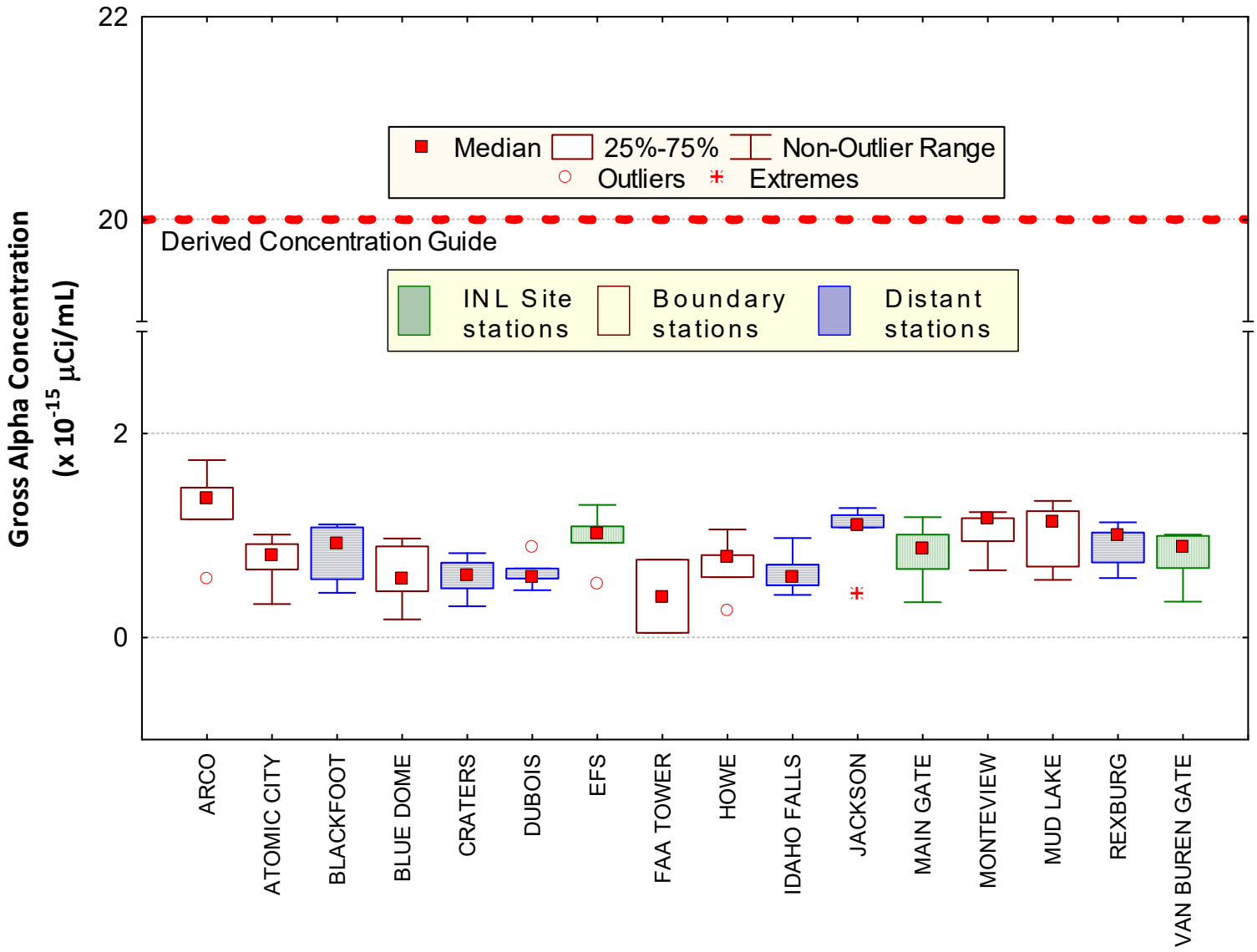

Figure 6. September gross alpha concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

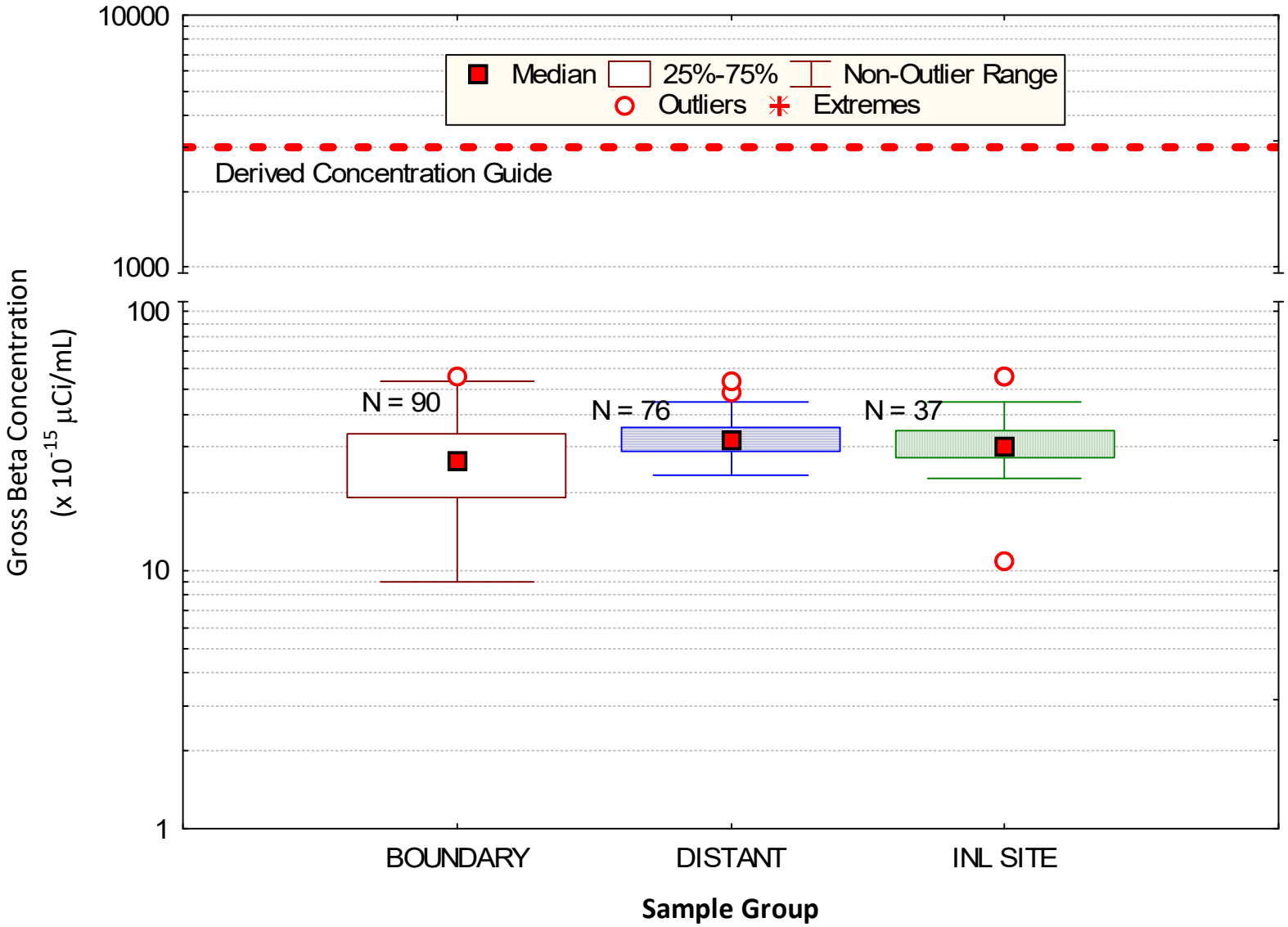

Figure 7. Gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations for the third quarter of 2011.

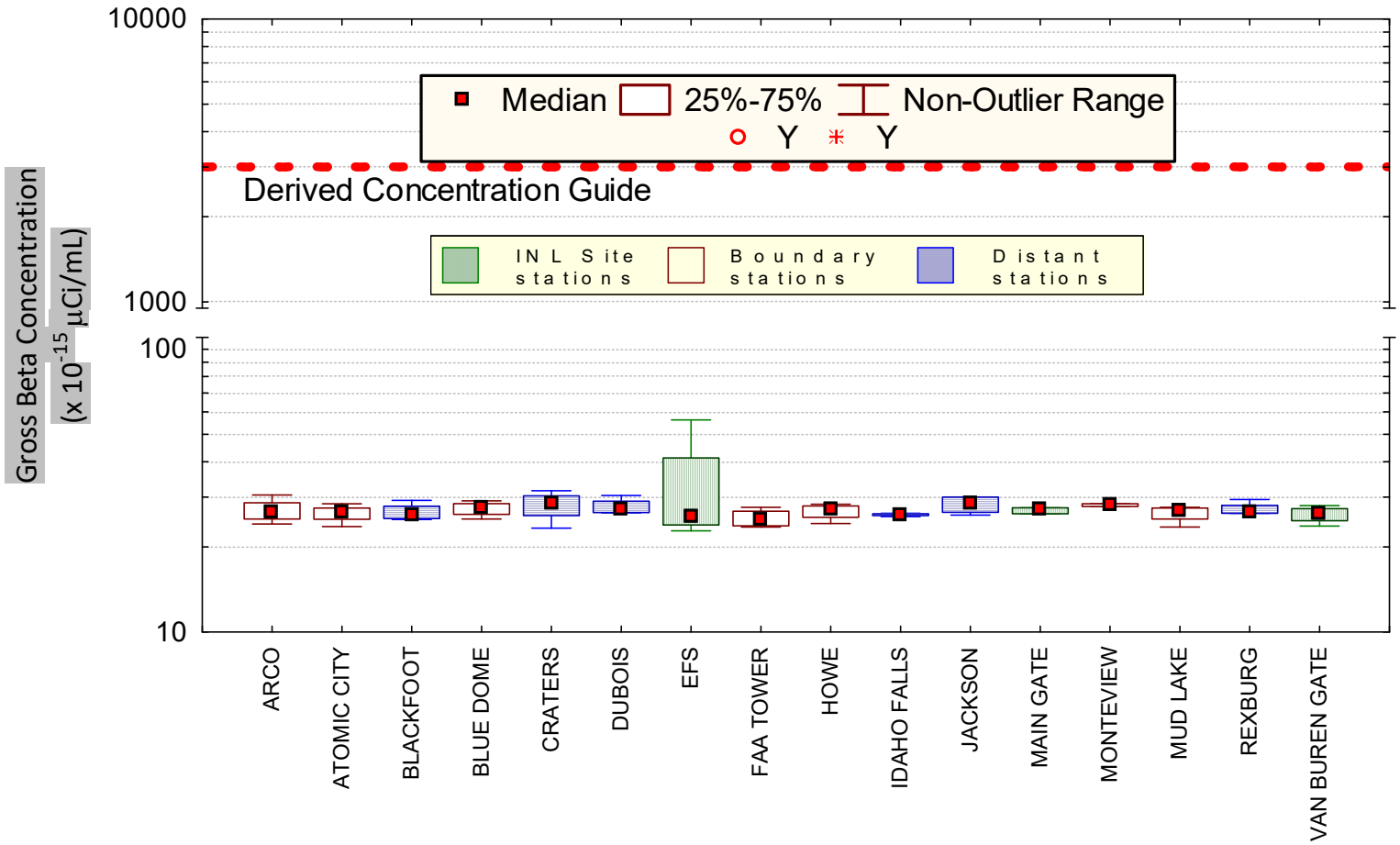

Figure 8. July gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location, except Main Gate and Monteview (N = 3).

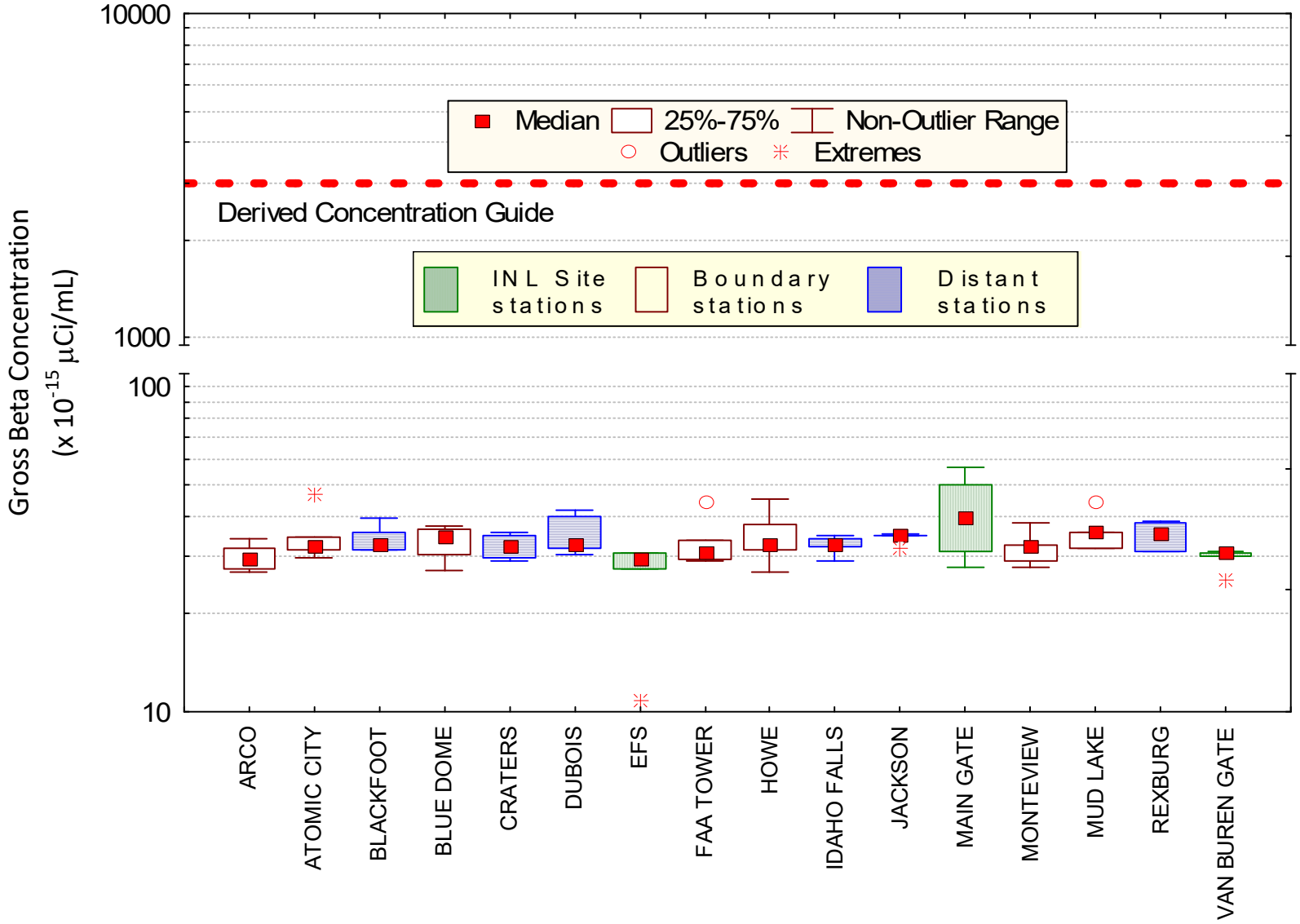

Figure 9. August gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 5 at each location, except Blue Dome, Craters, and Main Gate (N = 4).

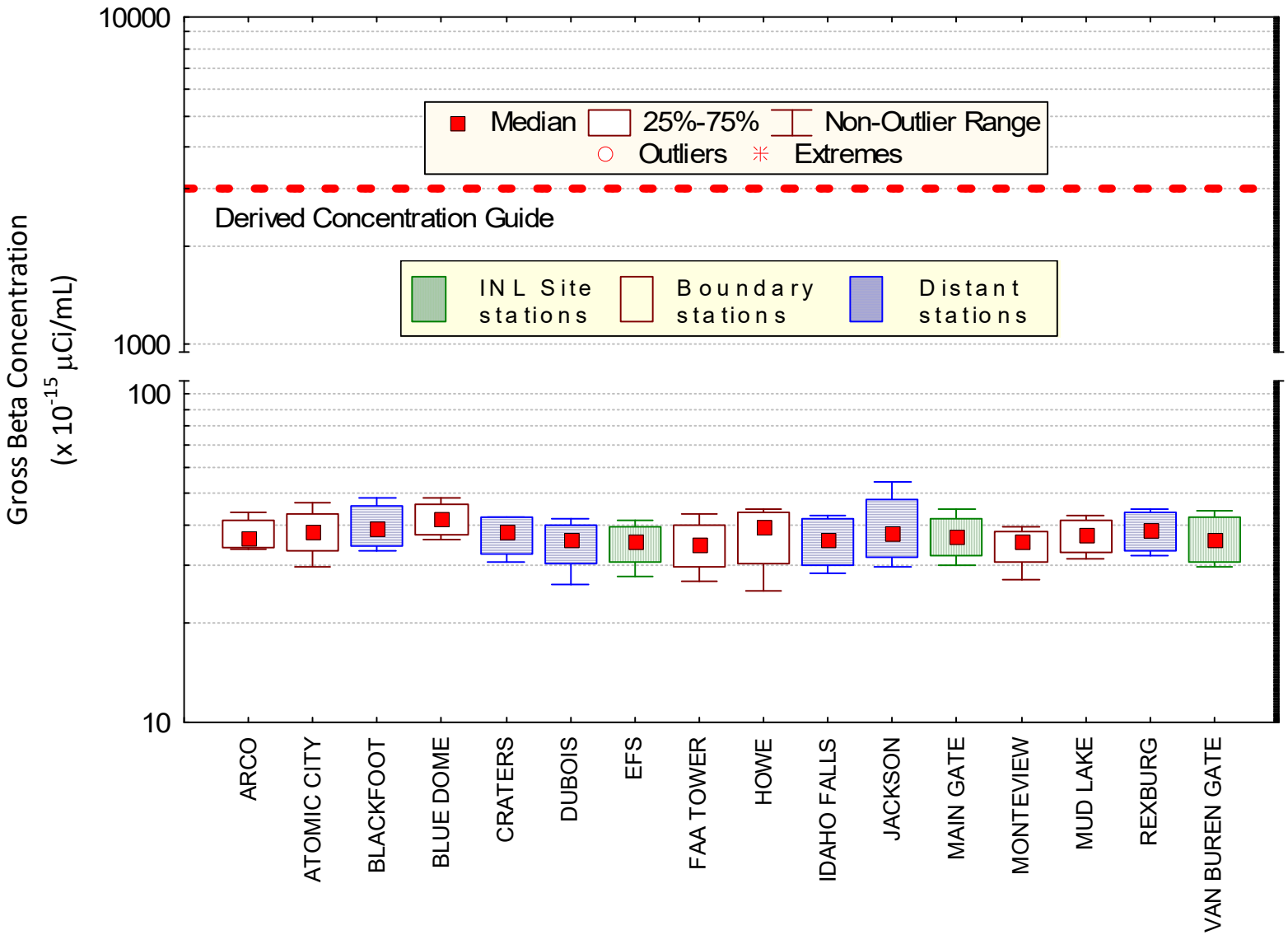

Figure 10. September gross beta concentrations in air at ESER INL Site, Boundary, and Distant locations. Number of samples (N) = 4 at each location.

collection, analysis, or reporting procedures. No statistical differences were noted in the quarterly data using the Kruskal-Wallace test (Table D-1).

Comparisons of gross beta concentrations were made for each month of the quarter. Statistical data are presented in Table D-1. A statistical difference was found during the month of August. Analysis of the data for this month indicates that the INL Site group the lowest median concentration followed by the Boundary group. This pattern is the opposite of what would be expected if the INL Site was impacting the gross beta values.

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 during the quarter (Table D-1).

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.

Weekly filters for the third quarter of 2011 were composited by location. All samples were analyzed for gamma-emitting radionuclides, including ^{137}Cs. Results are reported in Table C-3, Appendix C.

Selected composites were also analyzed for and ^{90}Sr, ^{238}Pu, $^{239/240}Pu$, and ^{241}Am. Results are not yet available.

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 only available for three atmospheric moisture samples collected during the third quarter of 2011.All of these exceeded the 3s uncertainty level for tritium, with similar results to those reported previously. All samples were significantly below the DOE DCG for tritium in air of 1×10^{-7} $\mu Ci/mL_{air}$ with a maximum reported value of 14.1×10^{-13} $\mu Ci/mL_{air}$ at Atomic City. Available results are shown in Table C-4, Appendix C. Additional results will be reported in the next quarterly report.

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 2011 produced sufficient precipitation to yield nine samples.

Tritium was measured above the 3s values in all of the nine 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. The EPA's RadNet program collects precipitation samples from across the United States. From 1980 to 2008, tritium measured in samples from Region 10 (which includes Idaho) averaged 117 pCi/L (EPA 2009). Data for third quarter precipitation samples collected by the ESER Program were within the range of this value (averaging about 124 pCi/L) and are listed in Table C-5 (Appendix C).

WATER SAMPLING

Samples were collected from the Big Lost River on the INL Site near the beginning of its period of flow and near the end of its period of flow. Samples were collected on June 30 at the public rest area on US Highway 20/26, on Lincoln Boulevard near the Idaho Nuclear Technology and Engineering Center (INTEC), at the Experimental Field Station, at Lincoln Boulevard north of the Naval Reactors Facility, and at the Big Lost River Sinks near Howe. A control sample was also collected from the Birch Creek outflow at the northern INL Site boundary. These areas were sampled again on July 14, except for the INTEC location, which was completely dry. Samples were analyzed for gross alpha, gross beta, and tritium. Results are listed in Table C-6 of Appendix C.

Gross alpha and gross beta activity was detected in all samples. Concentrations were generally similar to previous results from surface water sampling. A couple of the gross alpha results were somewhat above last year's values, but well within the historical range. Tritium was also detected in all of the samples. Concentrations were similar to those found in atmospheric moisture and precipitation samples and were consistent with previous years.

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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, grain, soil, and large game animal samples collected during the third quarter of 2011.

MILK SAMPLING

Milk samples were collected weekly in Idaho Falls. Monthly samples were collected at six other locations around the INL Site (Figure 10) during the third quarter of 2011. In addition, commercially-available organic milk was purchased as a control sample. All samples were analyzed for gamma emitting radionuclides.

Iodine-131 was 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-7.

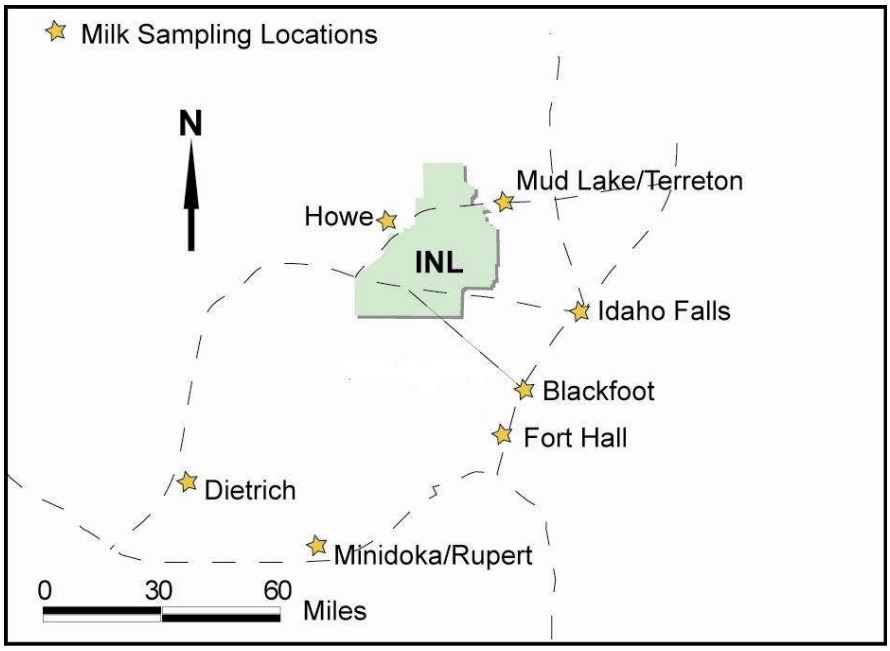

Figure 10. ESER milk sampling locations.

LETTUCE SAMPLING

Lettuce sampling was completed during the third quarter and results were available for gamma-emitting radionuclides. No manmade gamma-emitting radionuclides were found in any

of the 10 samples. Data for ^{137}Cs in all lettuce samples taken during the third quarter are listed in Appendix C, Table C-8.

GRAIN SAMPLING

Grain sampling (wheat and barley) was completed during the third quarter of 2011. A total of 10 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. No manmade gamma-emitting radionuclides were detected in any grain sample. Data for ^{137}Cs in all grain samples taken during the third quarter are listed in Appendix C, Table C-8.

ALFALFA SAMPLING

Samples of alfalfa were obtained from a grower in the Mud Lake area. Samples were divided into three subsamples and analyzed for gamma-emitting radionuclides. Cesium-137 was detected in one of the three samples on the initial count; however, a recount of the sample did not confirm the detection. Data for ^{137}Cs in alfalfa samples are listed in Appendix C, Table C-9.

ELK FORAGE SAMPLING

Samples were collected of elk forage (grasses and forbs) from areas known to be frequented by elk based on radio collar information. Samples were obtained from an area north of the Materials and Fuels Complex, from around the Radioactive Waste Management Complex, and from a control area near Craters of the Moon National Monument. Individual samples from ten locations along transects were composited and then split into three subsamples. These were analyzed for gamma-emitting radionuclides. No manmade radionuclides were detected. Data for ^{137}Cs in alfalfa samples are listed in Appendix C, Table C-9.

LARGE GAME ANIMAL SAMPLING

Muscle tissue, liver, and the thyroid from one elk were sampled during the third quarter. No manmade radionuclides were detected in the samples. Results are presented in Appendix C, Table C-10.

WATERFOWL SAMPLING

Twelve waterfowl were collected during 2011. Six were collected from wastewater ponds located at the Advanced Test Reactor Complex (ATR Complex) and three were collected from ponds near the Materials and Fuels Complex (MFC). Three control samples were collected from an area near American Falls Reservoir. Each sample was divided into the following three sub-samples: 1) edible tissue (muscle, gizzard, heart, and liver), 2) external portion (feathers, feet, and head), and 3) all remaining tissue. All were analyzed for gamma-emitting radionuclides. Concentrations of radionuclides measured in the edible tissues of 2011 waterfowl are shown in Table C-11 (Appendix C). A review of Table C-11, performed in the Fall of 2020, determined the unit of concentration was correct for the results presented in the table, however, the unit of concentration needed updating. 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 units of concentration pCi/kg and ($x10^{-2}$) Bq/kg.

Cesium-137, cobalt-60, and zinc-65 were detected in three of the six samples from ATR Complex, including the edible portions. A single detection of ^{137}Cs occurred in an external portion of a MFC duck. No manmade gamma-emitting radionuclides were found in the control samples.

Because human-made radionuclides were found in ducks from the ATR Complex and for the most part not at MFC or control locations, it is assumed that radioactive wastewater ponds at the ATR Complex are the source of these radionuclides. The ducks were not taken directly from the two-celled hypalon-lined radioactive wastewater evaporation ponds, but rather from an adjacent sewage lagoon. However, the ducks probably also used the evaporation ponds. The maximum concentration of ^{137}Cs in edible tissues was substantially lower than in 2010; concentrations of ^{60}Co and ^{65}Zn were generally similar to those found in 2010.

6. QUALITY ASSURANCE

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

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

Sample results are compared to criteria described in the Quality Assurance Project Plan for the INL Site Offsite Environmental Surveillance Program (GSS 2011). The following table summarizes the results of the quality assurance program for the third quarter of 2011.

QA Sample Type	Number of Sample Results	Number of Results Meeting Criteria	Percentage Meeting Criteria
Spikes/Laboratory Control Samples	193	193	100.0
Field Duplicates	69	66	95.6
Laboratory Splits	36	36	100.0
Recounts	221	221	100.0
Blanks	63	60	95.2
Method Uncertainty	1770	1739	98.2

7. REFERENCES

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APPENDIX A

SUMMARY OF SAMPLING SCHEDULE

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

Sample Type Analysis	Collection Frequency	LOCATIONS		
		Distant	Boundary	INL Site
AIR SAMPLING				
LOW-VOLUME AIR				
Gross Alpha, Gross Beta, ^{131}I	weekly	Blackfoot, Craters of the Moon, Dubois, Idaho Falls, Jackson WY, 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 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 DCGs

Table B-1. Summary of Approximate Minimum Detectable Concentrations for Radiological Analyses Performed During Third Quarter 2011

Sample Type	Analysis	Approximate Minimum Detectable Concentration[a] (MDC)	Derived Concentration Guide[b] (DCG)
Air (particulate filter)[e]	Gross alpha[c]	3.61×10^{-16} µCi/mL	2×10^{-14} µCi/mL
	Gross beta[d]	1.11×10^{-15} µCi/mL	3×10^{-12} µCi/mL
	Specific gamma (^{137}Cs)	1.69×10^{-16} µCi/mL	4×10^{-10} µCi/mL
Air (charcoal cartridge)[e]	^{131}I	1.115806×10^{-15} µCi/mL	4×10^{-10} µCi/mL
Air (atmospheric moisture)	^{3}H	78.3 pCi/L_{water}	1×10^{-7} µCi/mL_{air}
Air (precipitation)	^{3}H	72.2 pCi/L	2×10^{-3} µCi/mL
Water	^{3}H	78.2 pCi/L	2×10^{-3} µCi/mL
Milk	^{131}I	0.63 pCi/L	--
	^{137}Cs	1.17 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 DCGs, 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 DCG for gross alpha is equivalent to the DCGs for ^{239,240}Pu and ^{241}Am.

d The DCG for gross beta is equivalent to the DCGs 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	7/6/2011	1.27 ± 0.17	4.70 ± 0.64	Y	26.10 ± 0.65	96.57 ± 2.41	Y
	7/13/2011	1.37 ± 0.18	5.07 ± 0.65	Y	30.50 ± 0.69	112.85 ± 2.57	Y
	7/20/2011	1.21 ± 0.17	4.48 ± 0.63	Y	26.80 ± 0.66	99.16 ± 2.43	Y
	7/27/2011	0.92 ± 0.15	3.42 ± 0.57	Y	24.10 ± 0.63	89.17 ± 2.33	Y
	8/3/2011	1.59 ± 0.19	5.88 ± 0.69	Y	27.50 ± 0.66	101.75 ± 2.43	Y
	8/10/2011	0.98 ± 0.16	3.61 ± 0.59	Y	27.00 ± 0.66	99.90 ± 2.45	Y
	8/17/2011	1.10 ± 0.16	4.06 ± 0.58	Y	29.46 ± 0.65	109.00 ± 2.42	Y
	8/24/2011	1.53 ± 0.19	5.66 ± 0.70	Y	32.06 ± 0.70	118.60 ± 2.60	Y
	8/31/2011	1.93 ± 0.19	7.15 ± 0.71	Y	34.20 ± 0.71	126.55 ± 2.63	Y
	9/7/2011	1.78 ± 0.18	6.57 ± 0.67	Y	33.60 ± 0.68	124.34 ± 2.53	Y
	9/14/2011	1.45 ± 0.18	5.37 ± 0.67	Y	43.45 ± 0.76	160.76 ± 2.81	Y
	9/21/2011	1.43 ± 0.18	5.30 ± 0.67	Y	34.44 ± 0.73	127.41 ± 2.68	Y
	9/28/2011	1.85 ± 0.20	6.85 ± 0.73	Y	38.89 ± 0.75	143.88 ± 2.78	Y
ATOMIC CITY	7/6/2011	1.16 ± 0.18	4.29 ± 0.65	Y	26.50 ± 0.69	98.05 ± 2.56	Y
	7/13/2011	1.16 ± 0.17	4.29 ± 0.64	Y	28.40 ± 0.70	105.08 ± 2.59	Y
	7/20/2011	1.35 ± 0.19	5.00 ± 0.69	Y	26.50 ± 0.69	98.05 ± 2.56	Y
	7/27/2011	0.86 ± 0.16	3.17 ± 0.58	Y	23.60 ± 0.66	87.32 ± 2.43	Y
	8/3/2011	1.90 ± 0.21	7.03 ± 0.79	Y	29.90 ± 0.73	110.63 ± 2.70	Y
	8/10/2011	1.33 ± 0.19	4.92 ± 0.69	Y	32.30 ± 0.74	119.51 ± 2.75	Y
	8/17/2011	1.67 ± 0.20	6.17 ± 0.75	Y	31.47 ± 0.74	116.43 ± 2.74	Y
	8/24/2011	1.76 ± 0.21	6.51 ± 0.77	Y	34.59 ± 0.76	127.99 ± 2.79	Y
	8/31/2011	2.89 ± 0.29	10.69 ± 1.06	Y	46.67 ± 1.02	172.67 ± 3.77	Y
	9/7/2011	1.93 ± 0.19	7.13 ± 0.71	Y	29.79 ± 0.67	110.24 ± 2.47	Y
	9/14/2011	1.93 ± 0.22	7.14 ± 0.82	Y	46.80 ± 0.87	173.15 ± 3.22	Y
	9/21/2011	2.07 ± 0.23	7.64 ± 0.84	Y	36.90 ± 0.82	136.51 ± 3.05	Y
	9/28/2011	2.07 ± 0.22	7.65 ± 0.82	Y	39.39 ± 0.81	145.74 ± 2.98	Y
BLUE DOME	7/6/2011	1.11 ± 0.17	4.11 ± 0.62	Y	27.80 ± 0.68	102.86 ± 2.51	Y
	7/13/2011	1.58 ± 0.19	5.85 ± 0.72	Y	29.10 ± 0.72	107.67 ± 2.65	Y
	7/20/2011	0.84 ± 0.16	3.11 ± 0.58	Y	27.00 ± 0.68	99.90 ± 2.53	Y
	7/27/2011	0.97 ± 0.16	3.59 ± 0.60	Y	25.10 ± 0.67	92.87 ± 2.48	Y
	8/3/2011	1.18 ± 0.18	4.37 ± 0.65	Y	27.10 ± 0.69	100.27 ± 2.54	Y
	8/10/2011	1.34 ± 0.19	4.96 ± 0.69	Y	34.00 ± 0.76	125.80 ± 2.82	Y
	8/17/2011	1.62 ± 0.20	5.99 ± 0.75	Y	35.35 ± 0.78	130.79 ± 2.89	Y
a	8/24/2011	±	±		±	±	
	8/31/2011	2.33 ± 0.22	8.61 ± 0.81	Y	37.29 ± 0.78	137.97 ± 2.88	Y
	9/7/2011	3.14 ± 0.32	11.63 ± 1.20	Y	48.45 ± 1.13	179.26 ± 4.18	Y
	9/14/2011	2.74 ± 0.24	10.14 ± 0.89	Y	44.35 ± 0.82	164.08 ± 3.02	Y
	9/21/2011	1.72 ± 0.20	6.38 ± 0.75	Y	35.89 ± 0.77	132.78 ± 2.85	Y
	9/28/2011	1.95 ± 0.22	7.22 ± 0.80	Y	39.08 ± 0.80	144.59 ± 2.96	Y
FAA TOWER	7/6/2011	1.21 ± 0.17	4.48 ± 0.63	Y	25.90 ± 0.65	95.83 ± 2.41	Y
	7/13/2011	1.37 ± 0.18	5.07 ± 0.66	Y	27.60 ± 0.68	102.12 ± 2.52	Y
	7/20/2011	1.72 ± 0.20	6.36 ± 0.73	Y	24.00 ± 0.65	88.80 ± 2.39	Y
	7/27/2011	0.76 ± 0.15	2.82 ± 0.55	Y	23.50 ± 0.64	86.95 ± 2.38	Y
	8/3/2011	1.06 ± 0.17	3.92 ± 0.63	Y	29.10 ± 0.70	107.67 ± 2.59	Y
	8/10/2011	1.30 ± 0.18	4.81 ± 0.67	Y	31.00 ± 0.72	114.70 ± 2.65	Y
	8/17/2011	1.92 ± 0.21	7.10 ± 0.76	Y	29.62 ± 0.71	109.58 ± 2.61	Y
	8/24/2011	1.89 ± 0.22	7.00 ± 0.80	Y	33.57 ± 0.75	124.22 ± 2.79	Y
	8/31/2011	1.60 ± 0.22	5.92 ± 0.80	Y	44.35 ± 0.94	164.08 ± 3.49	Y
	9/7/2011	1.82 ± 0.19	6.74 ± 0.69	Y	26.97 ± 0.64	99.78 ± 2.36	Y
	9/14/2011	1.76 ± 0.21	6.51 ± 0.76	Y	43.19 ± 0.81	159.80 ± 2.99	Y
	9/21/2011	1.46 ± 0.20	5.41 ± 0.75	Y	32.96 ± 0.79	121.94 ± 2.93	Y
	9/28/2011	2.24 ± 0.22	8.28 ± 0.83	Y	37.02 ± 0.78	136.99 ± 2.88	Y
HOWE	7/6/2011	1.05 ± 0.15	3.89 ± 0.57	Y	27.50 ± 0.63	101.75 ± 2.34	Y
	7/13/2011	1.26 ± 0.17	4.66 ± 0.62	Y	26.70 ± 0.65	98.79 ± 2.42	Y

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
	7/20/2011	1.46 ± 0.17	5.40 ± 0.64	Y	28.30 ± 0.64	104.71 ± 2.38	Y
	7/27/2011	1.15 ± 0.17	4.26 ± 0.63	Y	24.20 ± 0.65	89.54 ± 2.41	Y
	8/3/2011	1.18 ± 0.18	4.37 ± 0.67	Y	26.80 ± 0.70	99.16 ± 2.58	Y
	8/10/2011	1.45 ± 0.19	5.37 ± 0.71	Y	31.70 ± 0.75	117.29 ± 2.76	Y
	8/17/2011	1.43 ± 0.19	5.28 ± 0.72	Y	32.55 ± 0.76	120.42 ± 2.82	Y
	8/24/2011	2.78 ± 0.30	10.28 ± 1.13	Y	45.39 ± 1.04	167.96 ± 3.83	Y
	8/31/2011	2.75 ± 0.24	10.19 ± 0.89	Y	37.75 ± 0.80	139.68 ± 2.97	Y
	9/7/2011	1.55 ± 0.17	5.75 ± 0.63	Y	25.09 ± 0.60	92.83 ± 2.23	Y
	9/14/2011	2.08 ± 0.22	7.71 ± 0.83	Y	44.66 ± 0.84	165.25 ± 3.11	Y
	9/21/2011	1.56 ± 0.19	5.78 ± 0.72	Y	35.74 ± 0.77	132.23 ± 2.84	Y
	9/28/2011	1.84 ± 0.21	6.81 ± 0.78	Y	43.07 ± 0.83	159.37 ± 3.08	Y
MONTEVIEW	7/6/2011	1.26 ± 0.18	4.66 ± 0.67	Y	28.30 ± 0.71	104.71 ± 2.63	Y
a	7/13/2011	±	±		±	±	
	7/20/2011	1.58 ± 0.19	5.85 ± 0.70	Y	28.40 ± 0.68	105.08 ± 2.52	Y
	7/27/2011	1.80 ± 0.21	6.66 ± 0.78	Y	27.80 ± 0.73	102.86 ± 2.69	Y
	8/3/2011	1.79 ± 0.21	6.62 ± 0.79	Y	27.80 ± 0.73	102.86 ± 2.69	Y
	8/10/2011	1.29 ± 0.18	4.77 ± 0.66	Y	29.20 ± 0.70	108.04 ± 2.59	Y
	8/17/2011	1.85 ± 0.20	6.83 ± 0.76	Y	32.11 ± 0.73	118.79 ± 2.70	Y
	8/24/2011	1.56 ± 0.20	5.76 ± 0.72	Y	32.77 ± 0.73	121.24 ± 2.69	Y
	8/31/2011	2.08 ± 0.21	7.69 ± 0.78	Y	38.03 ± 0.78	140.70 ± 2.89	Y
	9/7/2011	1.78 ± 0.18	6.58 ± 0.67	Y	27.23 ± 0.63	100.74 ± 2.33	Y
	9/14/2011	1.74 ± 0.20	6.42 ± 0.74	Y	39.47 ± 0.77	146.05 ± 2.83	Y
	9/21/2011	2.25 ± 0.21	8.34 ± 0.78	Y	34.15 ± 0.72	126.35 ± 2.66	Y
	9/28/2011	1.77 ± 0.20	6.53 ± 0.75	Y	37.22 ± 0.76	137.72 ± 2.82	Y
MUD LAKE	7/6/2011	1.23 ± 0.17	4.55 ± 0.62	Y	27.30 ± 0.65	101.01 ± 2.41	Y
	7/13/2011	1.40 ± 0.17	5.18 ± 0.64	Y	26.70 ± 0.65	98.79 ± 2.40	Y
	7/20/2011	1.48 ± 0.18	5.48 ± 0.65	Y	27.60 ± 0.64	102.12 ± 2.37	Y
	7/27/2011	0.96 ± 0.16	3.56 ± 0.58	Y	23.50 ± 0.63	86.95 ± 2.34	Y
	8/3/2011	1.15 ± 0.19	4.26 ± 0.70	Y	31.80 ± 0.77	117.66 ± 2.86	Y
	8/10/2011	1.42 ± 0.19	5.25 ± 0.70	Y	32.00 ± 0.74	118.40 ± 2.73	Y
	8/17/2011	2.53 ± 0.28	9.37 ± 1.02	Y	44.00 ± 0.99	162.81 ± 3.65	Y
	8/24/2011	1.89 ± 0.22	6.99 ± 0.80	Y	35.79 ± 0.78	132.44 ± 2.88	Y
	8/31/2011	2.34 ± 0.23	8.64 ± 0.83	Y	35.87 ± 0.79	132.70 ± 2.91	Y
	9/7/2011	2.31 ± 0.21	8.54 ± 0.78	Y	31.38 ± 0.70	116.09 ± 2.57	Y
	9/14/2011	1.70 ± 0.21	6.30 ± 0.77	Y	42.89 ± 0.82	158.68 ± 3.05	Y
	9/21/2011	1.89 ± 0.21	6.99 ± 0.77	Y	34.70 ± 0.76	128.38 ± 2.80	Y
	9/28/2011	2.26 ± 0.23	8.35 ± 0.84	Y	40.00 ± 0.80	148.01 ± 2.98	Y
DISTANT							
BLACKFOOT CMS	7/6/2011	1.58 ± 0.21	5.85 ± 0.76	Y	29.20 ± 0.75	108.04 ± 2.77	Y
	7/13/2011	1.63 ± 0.20	6.03 ± 0.74	Y	26.50 ± 0.71	98.05 ± 2.62	Y
	7/20/2011	1.04 ± 0.18	3.85 ± 0.65	Y	25.00 ± 0.70	92.50 ± 2.59	Y
	7/27/2011	1.10 ± 0.18	4.07 ± 0.66	Y	25.40 ± 0.71	93.98 ± 2.61	Y
	8/3/2011	1.50 ± 0.20	5.55 ± 0.72	Y	31.70 ± 0.74	117.29 ± 2.73	Y
	8/10/2011	1.67 ± 0.20	6.18 ± 0.74	Y	31.40 ± 0.74	116.18 ± 2.72	Y
	8/17/2011	2.57 ± 0.25	9.52 ± 0.93	Y	35.53 ± 0.83	131.46 ± 3.06	Y
	8/24/2011	1.81 ± 0.21	6.69 ± 0.79	Y	32.57 ± 0.75	120.49 ± 2.77	Y
	8/31/2011	1.46 ± 0.20	5.41 ± 0.73	Y	39.52 ± 0.85	146.21 ± 3.15	Y
	9/7/2011	2.13 ± 0.22	7.87 ± 0.83	Y	33.54 ± 0.79	124.08 ± 2.92	Y
	9/14/2011	2.19 ± 0.24	8.09 ± 0.88	Y	48.56 ± 0.90	179.68 ± 3.33	Y
	9/21/2011	1.74 ± 0.20	6.43 ± 0.74	Y	35.48 ± 0.76	131.29 ± 2.81	Y
	9/28/2011	2.24 ± 0.23	8.27 ± 0.84	Y	42.64 ± 0.83	157.78 ± 3.07	Y
CRATERS OF	7/6/2011	0.84 ± 0.16	3.10 ± 0.61	Y	28.30 ± 0.72	104.71 ± 2.67	Y
THE MOON	7/13/2011	1.05 ± 0.18	3.89 ± 0.68	Y	31.60 ± 0.80	116.92 ± 2.96	Y
	7/20/2011	1.20 ± 0.18	4.44 ± 0.67	Y	29.00 ± 0.73	107.30 ± 2.69	Y
	7/27/2011	1.04 ± 0.17	3.85 ± 0.63	Y	23.30 ± 0.66	86.21 ± 2.45	Y
	8/3/2011	1.19 ± 0.19	4.40 ± 0.69	Y	29.00 ± 0.74	107.30 ± 2.73	Y

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
a	8/10/2011	±	±		±	±	
	8/17/2011	1.84 ± 0.21	6.81 ± 0.77	Y	30.28 ± 0.73	112.04 ± 2.70	Y
	8/24/2011	1.62 ± 0.21	6.00 ± 0.76	Y	34.11 ± 0.76	126.20 ± 2.82	Y
	8/31/2011	1.53 ± 0.18	5.66 ± 0.67	Y	35.52 ± 0.74	131.42 ± 2.76	Y
	9/7/2011	1.77 ± 0.19	6.57 ± 0.70	Y	30.89 ± 0.69	114.29 ± 2.56	Y
	9/14/2011	1.81 ± 0.21	6.69 ± 0.76	Y	42.27 ± 0.80	156.38 ± 2.94	Y
	9/21/2011	1.61 ± 0.20	5.98 ± 0.73	Y	34.31 ± 0.76	126.95 ± 2.82	Y
	9/28/2011	1.98 ± 0.25	7.34 ± 0.91	Y	42.42 ± 0.93	156.94 ± 3.44	Y
DUBOIS	7/6/2011	1.72 ± 0.20	6.36 ± 0.75	Y	26.50 ± 0.69	98.05 ± 2.57	Y
	7/13/2011	1.54 ± 0.20	5.70 ± 0.74	Y	27.60 ± 0.73	102.12 ± 2.70	Y
	7/20/2011	1.20 ± 0.19	4.44 ± 0.69	Y	30.40 ± 0.76	112.48 ± 2.81	Y
	7/27/2011	1.57 ± 0.20	5.81 ± 0.74	Y	26.40 ± 0.71	97.68 ± 2.63	Y
	8/3/2011	1.54 ± 0.22	5.70 ± 0.80	Y	32.50 ± 0.81	120.25 ± 3.00	Y
	8/10/2011	1.12 ± 0.19	4.14 ± 0.69	Y	31.90 ± 0.78	118.03 ± 2.89	Y
	8/17/2011	2.12 ± 0.26	7.83 ± 0.96	Y	41.62 ± 0.96	153.99 ± 3.57	Y
	8/24/2011	2.00 ± 0.25	7.41 ± 0.92	Y	40.05 ± 0.91	148.19 ± 3.37	Y
	8/31/2011	1.92 ± 0.23	7.09 ± 0.84	Y	30.34 ± 0.81	112.24 ± 2.99	Y
	9/7/2011	1.48 ± 0.18	5.48 ± 0.66	Y	26.46 ± 0.66	97.91 ± 2.45	Y
	9/14/2011	2.04 ± 0.22	7.55 ± 0.82	Y	41.97 ± 0.81	155.28 ± 3.01	Y
	9/21/2011	2.72 ± 0.24	10.07 ± 0.89	Y	34.38 ± 0.76	127.19 ± 2.81	Y
	9/28/2011	1.66 ± 0.21	6.13 ± 0.76	Y	38.09 ± 0.80	140.92 ± 2.97	Y
QA-2	7/6/2011	1.24 ± 0.18	4.59 ± 0.67	Y	24.70 ± 0.68	91.39 ± 2.50	Y
(DUBOIS)	7/13/2011	1.78 ± 0.24	6.59 ± 0.88	Y	29.90 ± 0.85	110.63 ± 3.15	Y
	7/20/2011	1.46 ± 0.21	5.40 ± 0.79	Y	29.50 ± 0.81	109.15 ± 2.98	Y
	7/27/2011	1.70 ± 0.26	6.29 ± 0.96	Y	33.40 ± 0.98	123.58 ± 3.61	Y
	8/3/2011	1.62 ± 0.25	5.99 ± 0.93	Y	38.60 ± 0.98	142.82 ± 3.62	Y
	8/10/2011	1.03 ± 0.18	3.81 ± 0.66	Y	28.20 ± 0.74	104.34 ± 2.73	Y
	8/17/2011	2.24 ± 0.26	8.30 ± 0.95	Y	35.84 ± 0.89	132.62 ± 3.30	Y
	8/24/2011	2.03 ± 0.24	7.50 ± 0.87	Y	34.76 ± 0.81	128.61 ± 3.01	Y
	8/31/2011	1.81 ± 0.21	6.71 ± 0.77	Y	34.64 ± 0.79	128.15 ± 2.94	Y
	9/7/2011	1.90 ± 0.20	7.01 ± 0.72	Y	29.66 ± 0.69	109.73 ± 2.54	Y
	9/14/2011	2.00 ± 0.23	7.41 ± 0.84	Y	41.52 ± 0.84	153.61 ± 3.10	Y
	9/21/2011	2.32 ± 0.22	8.58 ± 0.83	Y	31.65 ± 0.73	117.12 ± 2.71	Y
	9/28/2011	2.11 ± 0.24	7.80 ± 0.88	Y	39.83 ± 0.87	147.36 ± 3.21	Y
IDAHO FALLS	7/6/2011	1.61 ± 0.19	5.96 ± 0.69	Y	26.10 ± 0.65	96.57 ± 2.40	Y
	7/13/2011	1.39 ± 0.19	5.14 ± 0.68	Y	26.30 ± 0.69	97.31 ± 2.55	Y
	7/20/2011	1.71 ± 0.19	6.33 ± 0.72	Y	26.00 ± 0.66	96.20 ± 2.44	Y
	7/27/2011	1.32 ± 0.19	4.88 ± 0.70	Y	25.60 ± 0.71	94.72 ± 2.62	Y
	8/3/2011	1.45 ± 0.19	5.37 ± 0.68	Y	29.20 ± 0.69	108.04 ± 2.56	Y
	8/10/2011	1.88 ± 0.21	6.96 ± 0.77	Y	32.70 ± 0.74	120.99 ± 2.75	Y
	8/17/2011	2.91 ± 0.24	10.77 ± 0.89	Y	32.06 ± 0.72	118.62 ± 2.67	Y
	8/24/2011	1.83 ± 0.21	6.78 ± 0.78	Y	34.07 ± 0.75	126.07 ± 2.78	Y
	8/31/2011	1.92 ± 0.20	7.09 ± 0.73	Y	34.76 ± 0.73	128.62 ± 2.71	Y
	9/7/2011	1.82 ± 0.18	6.75 ± 0.67	Y	28.44 ± 0.64	105.22 ± 2.35	Y
	9/14/2011	2.33 ± 0.23	8.63 ± 0.85	Y	42.83 ± 0.81	158.48 ± 3.00	Y
	9/21/2011	2.50 ± 0.23	9.27 ± 0.84	Y	31.77 ± 0.72	117.56 ± 2.67	Y
	9/28/2011	1.47 ± 0.19	5.42 ± 0.71	Y	40.69 ± 0.80	150.57 ± 2.95	Y
JACKSON	7/6/2011	1.36 ± 0.18	5.03 ± 0.66	Y	30.00 ± 0.69	111.00 ± 2.56	Y
	7/13/2011	1.24 ± 0.17	4.59 ± 0.64	Y	27.10 ± 0.68	100.27 ± 2.50	Y
	7/20/2011	1.13 ± 0.17	4.18 ± 0.62	Y	25.90 ± 0.66	95.83 ± 2.45	Y
	7/27/2011	1.61 ± 0.19	5.96 ± 0.70	Y	30.00 ± 0.70	111.00 ± 2.57	Y
	8/3/2011	1.76 ± 0.20	6.51 ± 0.74	Y	31.80 ± 0.72	117.66 ± 2.66	Y
	8/10/2011	1.31 ± 0.18	4.85 ± 0.65	Y	35.20 ± 0.73	130.24 ± 2.71	Y
	8/17/2011	2.11 ± 0.22	7.82 ± 0.82	Y	34.78 ± 0.77	128.69 ± 2.87	Y
	8/24/2011	1.79 ± 0.20	6.62 ± 0.75	Y	35.04 ± 0.74	129.66 ± 2.74	Y
	8/31/2011	2.15 ± 0.22	7.95 ± 0.80	Y	35.07 ± 0.77	129.77 ± 2.84	Y

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
	9/7/2011	2.78 ± 0.23	10.27 ± 0.86	Y	29.96 ± 0.69	110.85 ± 2.57	Y
	9/14/2011	3.73 ± 0.31	13.82 ± 1.16	Y	53.97 ± 1.02	199.69 ± 3.79	Y
	9/21/2011	1.58 ± 0.19	5.84 ± 0.70	Y	33.59 ± 0.73	124.30 ± 2.71	Y
	9/28/2011	2.92 ± 0.25	10.82 ± 0.93	Y	41.53 ± 0.82	153.67 ± 3.04	Y
REXBURG CMS	7/6/2011	1.55 ± 0.20	5.74 ± 0.73	Y	29.40 ± 0.72	108.78 ± 2.68	Y
	7/13/2011	1.40 ± 0.19	5.18 ± 0.70	Y	26.70 ± 0.70	98.79 ± 2.60	Y
	7/20/2011	1.21 ± 0.18	4.48 ± 0.66	Y	26.30 ± 0.69	97.31 ± 2.54	Y
	7/27/2011	0.98 ± 0.17	3.64 ± 0.61	Y	26.30 ± 0.69	97.31 ± 2.53	Y
	8/3/2011	1.96 ± 0.21	7.25 ± 0.79	Y	31.10 ± 0.73	115.07 ± 2.72	Y
	8/10/2011	1.55 ± 0.19	5.74 ± 0.71	Y	31.20 ± 0.72	115.44 ± 2.66	Y
	8/17/2011	2.36 ± 0.24	8.72 ± 0.89	Y	35.17 ± 0.81	130.12 ± 2.98	Y
	8/24/2011	2.21 ± 0.24	8.17 ± 0.89	Y	38.51 ± 0.84	142.50 ± 3.10	Y
	8/31/2011	1.81 ± 0.21	6.70 ± 0.78	Y	38.00 ± 0.82	140.60 ± 3.05	Y
	9/7/2011	1.98 ± 0.22	7.34 ± 0.80	Y	32.14 ± 0.77	118.90 ± 2.84	Y
	9/14/2011	2.63 ± 0.25	9.75 ± 0.93	Y	44.67 ± 0.87	165.27 ± 3.22	Y
	9/21/2011	2.19 ± 0.22	8.09 ± 0.80	Y	34.74 ± 0.75	128.54 ± 2.77	Y
	9/28/2011	1.86 ± 0.22	6.88 ± 0.81	Y	42.85 ± 0.85	158.53 ± 3.16	Y
INL SITE							
EFS	7/6/2011	2.30 ± 0.34	8.51 ± 1.27	Y	56.20 ± 1.37	207.94 ± 5.07	Y
	7/13/2011	1.50 ± 0.18	5.55 ± 0.68	Y	25.00 ± 0.65	92.50 ± 2.41	Y
	7/20/2011	1.33 ± 0.18	4.92 ± 0.65	Y	26.30 ± 0.66	97.31 ± 2.44	Y
	7/27/2011	0.92 ± 0.16	3.40 ± 0.57	Y	22.80 ± 0.63	84.36 ± 2.31	Y
	8/3/2011	1.30 ± 0.18	4.81 ± 0.66	Y	27.70 ± 0.68	102.49 ± 2.50	Y
	8/10/2011	0.86 ± 0.16	3.17 ± 0.57	Y	30.90 ± 0.70	114.33 ± 2.60	Y
	8/17/2011	1.97 ± 0.21	7.30 ± 0.76	Y	30.90 ± 0.71	114.33 ± 2.61	Y
	8/24/2011	1.43 ± 0.19	5.29 ± 0.70	Y	29.55 ± 0.70	109.34 ± 2.58	Y
	8/31/2011	0.89 ± 0.14	3.29 ± 0.52	Y	10.87 ± 0.47	40.22 ± 1.73	Y
	9/7/2011	1.62 ± 0.17	5.98 ± 0.64	Y	27.94 ± 0.63	103.38 ± 2.33	Y
	9/14/2011	1.52 ± 0.19	5.62 ± 0.69	Y	41.16 ± 0.75	152.30 ± 2.79	Y
	9/21/2011	2.20 ± 0.21	8.13 ± 0.79	Y	33.91 ± 0.73	125.46 ± 2.69	Y
	9/28/2011	1.91 ± 0.20	7.07 ± 0.75	Y	37.67 ± 0.76	139.38 ± 2.79	Y
MAIN GATE	7/6/2011	1.21 ± 0.18	4.48 ± 0.65	Y	27.50 ± 0.69	101.75 ± 2.55	Y
	7/13/2011	1.27 ± 0.18	4.70 ± 0.65	Y	26.20 ± 0.67	96.94 ± 2.48	Y
	7/20/2011	1.63 ± 0.19	6.03 ± 0.71	Y	27.30 ± 0.68	101.01 ± 2.52	Y
a	7/27/2011	±	±		±	±	
	8/3/2011	2.08 ± 0.28	7.70 ± 1.05	Y	44.00 ± 1.07	162.80 ± 3.96	Y
a	8/10/2011	±	±		±	±	
	8/17/2011	3.07 ± 0.36	11.36 ± 1.31	Y	56.38 ± 1.29	208.62 ± 4.78	Y
	8/24/2011	1.66 ± 0.20	6.14 ± 0.73	Y	34.79 ± 0.74	128.73 ± 2.72	Y
	8/31/2011	2.58 ± 0.23	9.53 ± 0.84	Y	27.89 ± 0.69	103.19 ± 2.57	Y
	9/7/2011	1.62 ± 0.17	6.01 ± 0.65	Y	30.11 ± 0.65	111.40 ± 2.42	Y
	9/14/2011	1.83 ± 0.21	6.78 ± 0.77	Y	44.73 ± 0.81	165.50 ± 3.01	Y
	9/21/2011	1.89 ± 0.20	6.98 ± 0.75	Y	34.54 ± 0.74	127.78 ± 2.75	Y
	9/28/2011	2.02 ± 0.21	7.46 ± 0.78	Y	38.90 ± 0.78	143.95 ± 2.87	Y
VAN BUREN GATE	7/6/2011	1.19 ± 0.17	4.40 ± 0.64	Y	26.60 ± 0.68	98.42 ± 2.50	Y
	7/13/2011	1.09 ± 0.16	4.03 ± 0.61	Y	25.80 ± 0.66	95.46 ± 2.45	Y
	7/20/2011	1.31 ± 0.18	4.85 ± 0.67	Y	28.00 ± 0.70	103.60 ± 2.57	Y
	7/27/2011	1.05 ± 0.16	3.89 ± 0.60	Y	23.70 ± 0.64	87.69 ± 2.36	Y
	8/3/2011	1.70 ± 0.20	6.29 ± 0.75	Y	30.80 ± 0.73	113.96 ± 2.69	Y
	8/10/2011	1.13 ± 0.17	4.18 ± 0.64	Y	30.80 ± 0.72	113.96 ± 2.65	Y
	8/17/2011	1.64 ± 0.19	6.09 ± 0.71	Y	30.18 ± 0.70	111.66 ± 2.59	Y
	8/24/2011	1.78 ± 0.20	6.59 ± 0.73	Y	31.02 ± 0.69	114.78 ± 2.55	Y
	8/31/2011	2.91 ± 0.27	10.78 ± 1.01	Y	25.44 ± 0.77	94.13 ± 2.85	Y
	9/7/2011	1.33 ± 0.16	4.94 ± 0.60	Y	29.74 ± 0.65	110.04 ± 2.41	Y
	9/14/2011	2.12 ± 0.22	7.85 ± 0.80	Y	43.99 ± 0.80	162.77 ± 2.96	Y
	9/21/2011	1.74 ± 0.20	6.44 ± 0.72	Y	31.82 ± 0.71	117.75 ± 2.63	Y

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
	9/28/2011	1.97	±	0.21	7.30	±	0.79	Y	40.22	±	0.80	148.81	±	2.95	Y
QA-1 (VAN BUREN)	7/6/2011	1.48	±	0.18	5.48	±	0.67	Y	30.00	±	0.68	111.00	±	2.53	Y
	7/13/2011	1.41	±	0.17	5.22	±	0.63	Y	26.00	±	0.62	96.20	±	2.31	Y
	7/20/2011	1.11	±	0.16	4.11	±	0.60	Y	29.40	±	0.68	108.78	±	2.50	Y
	7/27/2011	0.93	±	0.15	3.46	±	0.54	Y	23.90	±	0.60	88.43	±	2.22	Y
	8/3/2011	1.28	±	0.17	4.74	±	0.63	Y	29.80	±	0.67	110.26	±	2.48	Y
	8/10/2011	1.37	±	0.17	5.07	±	0.64	Y	31.80	±	0.68	117.66	±	2.53	Y
	8/17/2011	1.65	±	0.18	6.10	±	0.67	Y	30.79	±	0.66	113.91	±	2.44	Y
	8/24/2011	1.45	±	0.17	5.36	±	0.65	Y	31.75	±	0.66	117.48	±	2.44	Y
	8/31/2011	3.22	±	0.28	11.91	±	1.04	Y	27.19	±	0.78	100.61	±	2.88	Y
	9/7/2011	1.78	±	0.17	6.59	±	0.64	Y	28.88	±	0.61	106.86	±	2.27	Y
	9/14/2011	1.39	±	0.17	5.16	±	0.65	Y	41.54	±	0.73	153.69	±	2.71	Y
	9/21/2011	1.53	±	0.18	5.67	±	0.65	Y	34.34	±	0.69	127.06	±	2.55	Y
	9/28/2011	2.03	±	0.20	7.52	±	0.74	Y	39.11	±	0.73	144.71	±	2.72	Y

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	07/06/2011	-0.27	±	1.03	-1.01	±	3.80	
	07/13/2011	2.32	±	1.06	8.59	±	3.91	
	07/20/2011	-1.14	±	1.03	-4.23	±	3.81	
	07/27/2011	-0.88	±	1.12	-3.24	±	4.13	
	08/03/2011	-0.49	±	0.99	-1.83	±	3.66	
	08/10/2011	-0.14	±	1.03	-0.52	±	3.82	
	08/17/2011	-1.74	±	0.96	-6.42	±	3.54	
	08/24/2011	-1.56	±	1.02	-5.76	±	3.76	
	08/31/2011	-0.29	±	1.01	-1.08	±	3.75	
	09/07/2011	0.83	±	0.96	3.06	±	3.55	
	09/14/2011	0.55	±	0.94	2.03	±	3.47	
	09/21/2011	-0.97	±	1.05	-3.58	±	3.87	
	09/28/2011	0.30	±	1.02	1.11	±	3.78	
ATOMIC CITY	07/06/2011	-0.30	±	1.13	-1.11	±	4.18	
	07/13/2011	2.48	±	1.13	9.17	±	4.17	
	07/20/2011	-1.26	±	1.13	-4.65	±	4.20	
	07/27/2011	-0.95	±	1.22	-3.53	±	4.51	
	08/03/2011	-0.56	±	1.12	-2.07	±	4.14	
	08/10/2011	-0.15	±	1.11	-0.56	±	4.11	
	08/17/2011	-2.05	±	1.13	-7.58	±	4.18	
	08/24/2011	-1.67	±	1.09	-6.19	±	4.04	
	08/31/2011	-0.43	±	1.51	-1.61	±	5.58	
	09/07/2011	0.87	±	1.01	3.21	±	3.73	
	09/14/2011	0.66	±	1.13	2.45	±	4.19	
	09/21/2011	-1.15	±	1.24	-4.25	±	4.60	
	09/28/2011	0.34	±	1.15	1.25	±	4.25	
BLUE DOME	07/06/2011	1.19	±	0.97	4.39	±	3.60	
	07/13/2011	-1.50	±	1.02	-5.55	±	3.79	
	07/20/2011	-1.78	±	1.00	-6.59	±	3.71	
	07/27/2011	-0.11	±	1.02	-0.41	±	3.76	
	08/03/2011	1.99	±	1.01	7.36	±	3.75	
	08/10/2011	1.11	±	1.05	4.10	±	3.88	
	08/17/2011	0.53	±	1.08	1.95	±	3.99	
a	08/24/2011		±			±		
	08/31/2011	-1.11	±	1.01	-4.12	±	3.75	
	09/07/2011	-0.33	±	1.61	-1.23	±	5.95	
	09/14/2011	1.90	±	1.22	7.01	±	4.50	
	09/21/2011	-0.49	±	1.04	-1.83	±	3.86	
	09/28/2011	0.55	±	1.05	2.02	±	3.89	
FAA TOWER	07/06/2011	1.16	±	0.95	4.29	±	3.52	
	07/13/2011	-1.43	±	0.97	-5.27	±	3.60	
	07/20/2011	-1.75	±	0.98	-6.46	±	3.63	
	07/27/2011	-0.11	±	1.00	-0.40	±	3.68	
	08/03/2011	1.96	±	1.00	7.25	±	3.69	
	08/10/2011	1.06	±	1.01	3.93	±	3.73	
	08/17/2011	0.50	±	1.03	1.86	±	3.79	
	08/24/2011	1.92	±	1.06	7.09	±	3.93	
	08/31/2011	-1.37	±	1.25	-5.07	±	4.61	
	09/07/2011	-0.19	±	0.92	-0.71	±	3.41	
	09/14/2011	1.91	±	1.23	7.07	±	4.54	

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								
	09/21/2011	-0.55	±	1.17	-2.05	±	4.32	
	09/28/2011	0.54	±	1.05	2.00	±	3.87	
HOWE	07/06/2011	1.06	±	0.87	3.91	±	3.21	
	07/13/2011	-1.36	±	0.93	-5.04	±	3.44	
	07/20/2011	-1.54	±	0.86	-5.68	±	3.20	
	07/27/2011	-0.11	±	0.99	-0.40	±	3.68	
	08/03/2011	2.05	±	1.05	7.60	±	3.87	
	08/10/2011	1.12	±	1.06	4.16	±	3.94	
	08/17/2011	0.54	±	1.10	1.99	±	4.06	
	08/24/2011	2.66	±	1.47	9.84	±	5.46	
	08/31/2011	-1.16	±	1.06	-4.30	±	3.91	
	09/07/2011	-0.18	±	0.88	-0.67	±	3.24	
	09/14/2011	1.99	±	1.28	7.36	±	4.72	
	09/21/2011	-0.49	±	1.04	-1.82	±	3.84	
	09/28/2011	0.54	±	1.05	2.01	±	3.88	
MONTEVIEW	07/06/2011	1.26	±	1.04	4.67	±	3.83	
a	07/13/2011		±			±		
	07/20/2011	-1.70	±	0.96	-6.28	±	3.54	
	07/27/2011	-0.12	±	1.07	-0.43	±	3.96	
	08/03/2011	2.16	±	1.10	7.98	±	4.06	
	08/10/2011	1.07	±	1.01	3.95	±	3.74	
	08/17/2011	0.50	±	1.02	1.85	±	3.79	
	08/24/2011	1.83	±	1.01	6.76	±	3.75	
	08/31/2011	-1.10	±	1.00	-4.08	±	3.71	
	09/07/2011	-0.18	±	0.89	-0.68	±	3.29	
	09/14/2011	1.86	±	1.19	6.88	±	4.42	
	09/21/2011	-0.45	±	0.96	-1.68	±	3.55	
	09/28/2011	0.52	±	1.00	1.93	±	3.72	
MUD LAKE	07/06/2011	1.11	±	0.91	4.12	±	3.38	
	07/13/2011	-1.35	±	0.92	-4.99	±	3.40	
	07/20/2011	-1.56	±	0.88	-5.78	±	3.25	
	07/27/2011	-0.11	±	0.97	-0.39	±	3.59	
	08/03/2011	2.18	±	1.11	8.06	±	4.11	
	08/10/2011	1.09	±	1.04	4.05	±	3.83	
	08/17/2011	0.67	±	1.37	2.49	±	5.08	
	08/24/2011	1.93	±	1.07	7.14	±	3.96	
	08/31/2011	-1.16	±	1.06	-4.31	±	3.92	
	09/07/2011	-0.20	±	0.95	-0.73	±	3.53	
	09/14/2011	1.99	±	1.28	7.36	±	4.72	
	09/21/2011	-0.49	±	1.04	-1.82	±	3.84	
	09/28/2011	0.54	±	1.04	2.00	±	3.86	
DISTANT								
BLACKFOOT CMS	07/06/2011	-0.32	±	1.21	-1.19	±	4.46	
	07/13/2011	2.65	±	1.20	9.80	±	4.46	
	07/20/2011	-1.34	±	1.21	-4.97	±	4.48	
	07/27/2011	-1.02	±	1.31	-3.78	±	4.83	
	08/03/2011	-0.54	±	1.09	-2.01	±	4.03	
	08/10/2011	-0.15	±	1.11	-0.56	±	4.11	
	08/17/2011	-2.26	±	1.24	-8.35	±	4.61	
	08/24/2011	-1.73	±	1.13	-6.39	±	4.17	

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								
	08/31/2011	-0.36	±	1.25	-1.33	±	4.62	
	09/07/2011	1.06	±	1.23	3.94	±	4.57	
	09/14/2011	0.68	±	1.17	2.53	±	4.33	
	09/21/2011	-1.02	±	1.11	-3.79	±	4.10	
	09/28/2011	0.33	±	1.14	1.24	±	4.21	
CRATERS	07/06/2011	-0.31	±	1.16	-1.14	±	4.29	
	07/13/2011	2.90	±	1.32	10.72	±	4.87	
	07/20/2011	-1.28	±	1.15	-4.74	±	4.27	
	07/27/2011	-0.98	±	1.24	-3.61	±	4.60	
	08/03/2011	-0.58	±	1.16	-2.15	±	4.30	
a	08/10/2011		±			±		
	08/17/2011	-2.05	±	1.13	-7.60	±	4.19	
	08/24/2011	-1.73	±	1.12	-6.38	±	4.16	
	08/31/2011	-0.31	±	1.07	-1.14	±	3.96	
	09/07/2011	0.90	±	1.04	3.33	±	3.86	
	09/14/2011	0.61	±	1.05	2.26	±	3.87	
	09/21/2011	-1.06	±	1.15	-3.92	±	4.24	
	09/28/2011	0.41	±	1.40	1.52	±	5.17	
DUBOIS	07/06/2011	1.27	±	1.04	4.69	±	3.85	
	07/13/2011	-1.61	±	1.10	-5.96	±	4.07	
	07/20/2011	-1.96	±	1.10	-7.24	±	4.07	
	07/27/2011	-0.12	±	1.09	-0.44	±	4.02	
	08/03/2011	2.33	±	1.19	8.63	±	4.40	
	08/10/2011	1.21	±	1.15	4.49	±	4.25	
	08/17/2011	0.67	±	1.38	2.49	±	5.09	
	08/24/2011	2.34	±	1.30	8.64	±	4.79	
	08/31/2011	-1.38	±	1.25	-5.11	±	4.64	
	09/07/2011	-0.21	±	0.99	-0.76	±	3.67	
	09/14/2011	1.98	±	1.27	7.31	±	4.69	
	09/21/2011	-0.50	±	1.05	-1.83	±	3.87	
	09/28/2011	0.56	±	1.08	2.07	±	4.00	
QA-2 (DUBOIS)	07/06/2011	1.28	±	1.05	4.73	±	3.88	
	07/13/2011	-1.97	±	1.34	-7.29	±	4.98	
	07/20/2011	-2.21	±	1.24	-8.18	±	4.60	
	07/27/2011	-0.17	±	1.57	-0.63	±	5.81	
	08/03/2011	2.85	±	1.45	10.53	±	5.36	
	08/10/2011	1.20	±	1.14	4.45	±	4.22	
	08/17/2011	0.65	±	1.34	2.42	±	4.94	
	08/24/2011	2.13	±	1.18	7.87	±	4.36	
	08/31/2011	-1.22	±	1.11	-4.52	±	4.11	
	09/07/2011	-0.20	±	0.97	-0.74	±	3.60	
	09/14/2011	2.10	±	1.35	7.77	±	4.99	
	09/21/2011	-0.50	±	1.05	-1.83	±	3.87	
	09/28/2011	0.62	±	1.20	2.30	±	4.44	
IDAHO FALLS	07/06/2011	1.14	±	0.94	4.22	±	3.47	
	07/13/2011	-1.51	±	1.03	-5.58	±	3.81	
	07/20/2011	-1.71	±	0.96	-6.34	±	3.57	
	07/27/2011	-0.12	±	1.10	-0.44	±	4.06	
	08/03/2011	1.91	±	0.97	7.06	±	3.59	
	08/10/2011	1.09	±	1.03	4.03	±	3.81	

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								
	08/17/2011	0.49	±	1.00	1.82	±	3.72	
	08/24/2011	1.88	±	1.04	6.96	±	3.86	
	08/31/2011	-1.05	±	0.96	-3.89	±	3.54	
	09/07/2011	-0.18	±	0.88	-0.67	±	3.24	
	09/14/2011	1.93	±	1.24	7.15	±	4.59	
	09/21/2011	-0.48	±	1.02	-1.78	±	3.76	
	09/28/2011	0.53	±	1.02	1.95	±	3.76	
JACKSON	07/06/2011	-0.27	±	1.03	-1.02	±	3.82	
	07/13/2011	2.41	±	1.10	8.91	±	4.05	
	07/20/2011	-1.19	±	1.07	-4.38	±	3.95	
	07/27/2011	-0.89	±	1.13	-3.28	±	4.19	
	08/03/2011	-0.52	±	1.04	-1.92	±	3.86	
	08/10/2011	-0.14	±	1.02	-0.52	±	3.76	
	08/17/2011	-2.05	±	1.13	-7.60	±	4.19	
	08/24/2011	-1.60	±	1.04	-5.91	±	3.85	
	08/31/2011	-0.33	±	1.14	-1.22	±	4.22	
	09/07/2011	1.01	±	1.17	3.73	±	4.33	
	09/14/2011	0.79	±	1.35	2.92	±	5.00	
	09/21/2011	-1.00	±	1.08	-3.71	±	4.01	
	09/28/2011	0.33	±	1.13	1.23	±	4.19	
REXBURG CMS	07/06/2011	1.27	±	1.04	4.69	±	3.85	
	07/13/2011	-1.55	±	1.06	-5.72	±	3.91	
	07/20/2011	-1.83	±	1.03	-6.76	±	3.81	
	07/27/2011	-0.11	±	1.02	-0.41	±	3.78	
	08/03/2011	2.02	±	1.03	7.47	±	3.81	
	08/10/2011	1.07	±	1.01	3.95	±	3.74	
	08/17/2011	0.56	±	1.14	2.07	±	4.22	
	08/24/2011	2.08	±	1.16	7.71	±	4.27	
	08/31/2011	-1.21	±	1.10	-4.50	±	4.09	
	09/07/2011	-0.23	±	1.11	-0.85	±	4.11	
	09/14/2011	2.12	±	1.36	7.85	±	5.04	
	09/21/2011	-0.48	±	1.02	-1.78	±	3.76	
	09/28/2011	0.57	±	1.10	2.11	±	4.06	
INL SITE								
EFS	07/06/2011	-0.57	±	2.14	-2.10	±	7.90	
	07/13/2011	2.39	±	1.09	8.85	±	4.02	
	07/20/2011	-1.16	±	1.05	-4.30	±	3.88	
	07/27/2011	-0.90	±	1.15	-3.34	±	4.26	
	08/03/2011	-0.52	±	1.04	-1.92	±	3.84	
	08/10/2011	-0.14	±	1.04	-0.53	±	3.85	
	08/17/2011	-1.90	±	1.05	-7.04	±	3.89	
	08/24/2011	-1.63	±	1.07	-6.05	±	3.94	
	08/31/2011	-0.31	±	1.08	-1.15	±	3.98	
	09/07/2011	0.82	±	0.96	3.05	±	3.54	
	09/14/2011	0.57	±	0.97	2.10	±	3.59	
	09/21/2011	-0.98	±	1.06	-3.64	±	3.94	
	09/28/2011	0.31	±	1.06	1.15	±	3.91	
MAIN GATE	07/06/2011	-0.29	±	1.09	-1.08	±	4.05	
	07/13/2011	2.45	±	1.11	9.05	±	4.12	
	07/20/2011	-1.20	±	1.08	-4.44	±	4.00	

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								
a	07/27/2011		±			±		
	08/03/2011	-0.82	±	1.64	-3.03	±	6.07	
a	08/10/2011		±			±		
	08/17/2011	-3.50	±	1.93	-12.96	±	7.15	
	08/24/2011	-1.59	±	1.04	-5.90	±	3.84	
	08/31/2011	-0.33	±	1.13	-1.20	±	4.18	
	09/07/2011	0.83	±	0.96	3.07	±	3.56	
	09/14/2011	0.61	±	1.04	2.24	±	3.84	
	09/21/2011	-1.01	±	1.09	-3.72	±	4.02	
	09/28/2011	0.32	±	1.08	1.18	±	4.01	
VAN BUREN GATE	07/06/2011	-0.29	±	1.09	-1.07	±	4.02	
	07/13/2011	2.41	±	1.10	8.92	±	4.06	
	07/20/2011	-1.22	±	1.10	-4.52	±	4.07	
	07/27/2011	-0.91	±	1.16	-3.37	±	4.30	
	08/03/2011	-0.54	±	1.08	-2.00	±	4.01	
	08/10/2011	-0.15	±	1.08	-0.55	±	3.99	
	08/17/2011	-1.91	±	1.05	-7.06	±	3.90	
	08/24/2011	-1.54	±	1.01	-5.71	±	3.72	
	08/31/2011	-0.41	±	1.43	-1.52	±	5.29	
	09/07/2011	0.83	±	0.97	3.09	±	3.58	
	09/14/2011	0.60	±	1.02	2.21	±	3.77	
	09/21/2011	-0.99	±	1.07	-3.68	±	3.97	
	09/28/2011	0.32	±	1.11	1.20	±	4.09	
QA-1	07/06/2011	-0.27	±	1.01	-0.99	±	3.74	
(VAN BUREN GATE)	07/13/2011	2.16	±	0.98	8.00	±	3.64	
	07/20/2011	-1.12	±	1.01	-4.15	±	3.74	
	07/27/2011	-0.81	±	1.04	-3.01	±	3.84	
	08/03/2011	-0.48	±	0.97	-1.78	±	3.57	
	08/10/2011	-0.13	±	0.97	-0.49	±	3.58	
	08/17/2011	-1.70	±	0.94	-6.29	±	3.47	
	08/24/2011	-1.41	±	0.92	-5.22	±	3.41	
	08/31/2011	-0.40	±	1.39	-1.49	±	5.15	
	09/07/2011	0.77	±	0.89	2.83	±	3.28	
	09/14/2011	0.54	±	0.92	1.98	±	3.39	
	09/21/2011	-0.89	±	0.96	-3.28	±	3.55	
	09/28/2011	0.29	±	0.98	1.06	±	3.62	

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	9/30/2011	CESIUM-137	-286.19	±	132.47	-1058.90	±	490.13	
ATOMIC CITY	9/30/2011	CESIUM-137	-8.40	±	129.15	-31.09	±	477.84	
BLUE DOME	9/30/2011	CESIUM-137	24.22	±	143.86	89.62	±	532.28	
FAA TOWER	9/30/2011	CESIUM-137	15.91	±	80.75	58.85	±	298.78	
HOWE	9/30/2011	CESIUM-137	-91.94	±	81.89	-340.17	±	303.01	
MONTEVIEW	9/30/2011	CESIUM-137	-47.22	±	95.60	-174.70	±	353.72	
MUD LAKE	9/30/2011	CESIUM-137	-17.00	±	137.66	-62.89	±	509.33	
DISTANT									
BLACKFOOT	9/30/2011	CESIUM-137	-13.89	±	88.06	-51.41	±	325.81	
CRATERS	9/30/2011	CESIUM-137	8.16	±	145.49	30.19	±	538.31	
DUBOIS	9/30/2011	CESIUM-137	57.92	±	151.07	214.29	±	558.97	
DUBOIS (QA-2)	9/30/2011	CESIUM-137	50.29	±	109.30	186.07	±	404.40	
IDAHO FALLS	9/30/2011	CESIUM-137	-348.91	±	136.92	-1290.96	±	506.61	
JACKSON	9/30/2011	CESIUM-137	-53.52	±	81.64	-198.02	±	302.06	
REXBURG CMS	9/30/2011	CESIUM-137	24.34	±	150.34	90.06	±	556.24	
INL SITE									
EFS	9/30/2011	CESIUM-137	-196.37	±	134.36	-726.58	±	497.15	
MAIN GATE	9/30/2011	CESIUM-137	116.79	±	105.26	432.13	±	389.47	
VAN BUREN GATE	9/30/2011	CESIUM-137	-130.56	±	88.12	-483.06	±	326.06	
VAN BUREN GATE (QA-1)	9/30/2011	CESIUM-137	12.97	±	118.11	48.01	±	437.02	

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	06/15/2011	07/06/2011	14.14	±	1.71	52.31	±	6.31	Molecular Sieve	Y
DISTANT										
BLACKFOOT	06/22/2011	07/06/2011	10.41	±	1.75	38.51	±	6.46	Molecular Sieve	Y
IDAHO FALLS	06/23/2011	07/06/2011	10.24	±	1.74	37.91	±	6.42	Molecular Sieve	Y

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	6/1/2011	7/4/2011	177.00	±	22.00	6.55	±	0.81	Y
	7/4/2011	8/3/2011	118.00	±	21.30	4.37	±	0.79	Y
	8/3/2011	9/1/2011	63.70	±	20.70	2.36	±	0.77	Y
CFA	6/6/2011	7/6/2011	144.60	±	21.68	5.35	±	0.80	Y
	7/6/2011	8/1/2011	101.00	±	21.30	3.74	±	0.79	Y
	8/1/2011	9/1/2011	139.00	±	21.70	5.14	±	0.80	Y
EFS	7/6/2011	7/13/2011	146.00	±	21.60	5.40	±	0.80	Y
	7/27/2011	8/3/2011	126.00	±	21.60	4.66	±	0.80	Y
	8/3/2011	8/10/2011	101.00	±	21.30	3.74	±	0.79	Y

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

Location	Analyte	Sampling Date	Result ± 1s Uncertainty (pCi/L)			Result ± 1s Uncertainty (Bq/L)			Result > 3s
SURFACE WATER									
Big Lost River at Rest Area	GROSS ALPHA	6/30/11	1.18	±	0.39	0.04	±	0.01	Y
	GROSS BETA	6/30/11	3.00	±	0.51	0.11	±	0.02	Y
	TRITIUM	6/30/11	138.00	±	21.90	5.11	±	0.81	Y
Big Lost River near INTEC	GROSS ALPHA	6/30/11	5.61	±	0.59	0.21	±	0.02	Y
	GROSS BETA	6/30/11	3.79	±	0.54	0.14	±	0.02	Y
	TRITIUM	6/30/11	72.00	±	21.30	2.67	±	0.79	Y
Big Lost River at EFS	GROSS ALPHA	6/30/11	2.07	±	0.43	0.08	±	0.02	Y
	GROSS BETA	6/30/11	3.84	±	0.53	0.14	±	0.02	Y
	TRITIUM	6/30/11	71.50	±	21.30	2.65	±	0.79	Y
Big Lost River north of NRF	GROSS ALPHA	6/30/11	1.90	±	0.42	0.07	±	0.02	Y
	GROSS BETA	6/30/11	2.77	±	0.50	0.10	±	0.02	Y
	TRITIUM	6/30/11	92.40	±	21.30	3.42	±	0.79	Y
Big Lost River at Sinks	GROSS ALPHA	6/30/11	2.94	±	0.50	0.11	±	0.02	Y
	GROSS BETA	6/30/11	5.02	±	0.56	0.19	±	0.02	Y
	TRITIUM	6/30/11	109.00	±	21.80	4.04	±	0.81	Y
Birch Creek	GROSS ALPHA	6/30/11	1.39	±	0.38	0.05	±	0.01	Y
	GROSS BETA	6/30/11	3.51	±	0.51	0.13	±	0.02	Y
	TRITIUM	6/30/11	83.80	±	21.20	3.10	±	0.79	Y
Big Lost River at Rest Area	GROSS ALPHA	7/15/11	4.55	±	0.53	0.17	±	0.02	Y
	GROSS BETA	7/15/11	2.37	±	0.49	0.09	±	0.02	Y
	TRITIUM	7/15/11	89.50	±	21.70	3.31	±	0.80	Y
Big Lost River at EFS	GROSS ALPHA	7/15/11	6.15	±	0.63	0.23	±	0.02	Y
	GROSS BETA	7/15/11	3.50	±	0.54	0.13	±	0.02	Y
	TRITIUM	7/15/11	98.60	±	21.40	3.65	±	0.79	Y
Big Lost River north of NRF	GROSS ALPHA	7/15/11	1.79	±	0.41	0.07	±	0.02	Y
	GROSS BETA	7/15/11	3.38	±	0.51	0.13	±	0.02	Y
	TRITIUM	7/15/11	95.30	±	21.40	3.53	±	0.79	Y
Big Lost River at Sinks	GROSS ALPHA	7/15/11	2.82	±	0.56	0.10	±	0.02	Y
	GROSS BETA	7/15/11	7.68	±	0.63	0.28	±	0.02	Y
	TRITIUM	7/15/11	103.00	±	21.50	3.81	±	0.80	Y
Birch Creek	GROSS ALPHA	7/15/11	2.94	±	0.49	0.11	±	0.02	Y
	GROSS BETA	7/15/11	5.40	±	0.56	0.20	±	0.02	Y
	TRITIUM	7/15/11	73.60	±	21.10	2.73	±	0.78	Y

Table C-7. 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															
	07/05/11	4.23	±	1.78	0.157	±	0.066		-1.71	±	0.89	-0.063	±	0.033	
CONTROL															
	07/05/11	0.90	±	1.02	0.033	±	0.038		1.74	±	0.82	0.064	±	0.030	
	08/02/11	1.25	±	2.02	0.046	±	0.075		2.48	±	1.41	0.092	±	0.052	
	09/06/11	1.63	±	2.38	0.060	±	0.088		0.01	±	1.42	0.000	±	0.053	
DIETRICH															
	07/05/11	-2.22	±	2.91	-0.082	±	0.108		-1.23	±	0.88	-0.046	±	0.033	
	08/02/11	-1.34	±	1.15	-0.050	±	0.043		0.68	±	0.89	0.025	±	0.033	
	09/06/11	0.16	±	1.53	0.006	±	0.057		1.65	±	1.34	0.061	±	0.050	
FORT HALL															
	07/05/11	-0.72	±	1.97	-0.027	±	0.073		-0.54	±	0.88	-0.020	±	0.033	
	08/02/11	-0.27	±	0.99	-0.010	±	0.036		1.02	±	0.77	0.038	±	0.029	
	09/06/11	1.00	±	0.92	0.037	±	0.034		1.50	±	0.76	0.056	±	0.028	
HOWE															
	07/05/11	0.50	±	1.69	0.019	±	0.063		0.91	±	1.34	0.034	±	0.050	
	08/02/11	0.63	±	1.60	0.023	±	0.059		-1.30	±	1.40	-0.048	±	0.052	
	09/06/11	-0.04	±	1.72	-0.002	±	0.064		0.73	±	1.43	0.027	±	0.053	
Duplicate	09/06/11	-1.90	±	2.26	-0.070	±	0.084		0.65	±	1.35	0.024	±	0.050	
IDAHO FALLS															
	07/05/11	1.24	±	1.50	0.046	±	0.056		-2.78	±	1.41	-0.103	±	0.052	
	07/12/11	-1.01	±	0.91	-0.037	±	0.034		1.77	±	0.75	0.066	±	0.028	
	07/19/11	-0.47	±	0.91	-0.017	±	0.034		1.74	±	0.79	0.064	±	0.029	
	07/26/11	-0.68	±	0.91	-0.025	±	0.034		1.20	±	0.78	0.044	±	0.029	
	08/02/11	-0.04	±	0.92	-0.001	±	0.034		1.29	±	0.78	0.048	±	0.029	
	08/09/11	-0.92	±	0.91	-0.034	±	0.034		0.60	±	0.75	0.022	±	0.028	
	08/16/11	0.10	±	0.92	0.004	±	0.034		1.87	±	0.77	0.069	±	0.029	
	08/23/11	-0.74	±	0.92	-0.027	±	0.034		0.63	±	0.77	0.023	±	0.029	
	08/30/11	0.98	±	0.92	0.036	±	0.034		-1.01	±	0.77	-0.037	±	0.029	
	09/06/11	0.99	±	0.91	0.037	±	0.034		0.24	±	0.78	0.009	±	0.029	
	09/13/11	-0.39	±	0.90	-0.014	±	0.033		-0.06	±	0.79	-0.002	±	0.029	
	09/20/11	1.66	±	1.53	0.061	±	0.057		1.12	±	1.37	0.041	±	0.051	
	09/27/11	0.52	±	0.92	0.019	±	0.034		0.75	±	0.76	0.028	±	0.028	
RUPERT															
	07/05/11	-1.42	±	0.94	-0.053	±	0.035		-0.05	±	0.79	-0.002	±	0.029	
	08/02/11	1.88	±	1.70	0.070	±	0.063		-1.31	±	1.40	-0.049	±	0.052	
	09/06/11	-1.18	±	1.70	-0.044	±	0.063		-0.43	±	1.42	-0.016	±	0.053	
TERRETON															
	07/05/11	-0.81	±	1.28	-0.030	±	0.047		1.54	±	0.90	0.057	±	0.033	
	09/06/11	-2.45	±	1.53	-0.091	±	0.057		0.83	±	0.88	0.031	±	0.032	

Table C-8. Cesium-137 Concentrations in Lettuce and Grain.

Lettuce

Location	Sampling Date	Cesium-137 Result ± 1s Uncertainty pCi/kg			Cesium-137 Result ± 1s Uncertainty Bq/kg			Result > 3s
ARCO	07/28/11	-28.10	±	40.80	-1.04	±	1.51	
ATOMIC CITY	07/28/11	185.00	±	70.10	6.85	±	2.60	
ATOMIC CITY (DUPLICATE	07/28/11	-4.13	±	53.00	-0.15	±	1.96	
BLACKFOOT	08/04/11	1.55	±	29.90	0.06	±	1.11	
CAREY	08/02/11	-48.00	±	38.80	-1.78	±	1.44	
CONTROL	08/25/11	4.93	±	27.90	0.18	±	1.03	
EFS	07/28/11	31.90	±	38.40	1.18	±	1.42	
FAA TOWER	07/28/11	23.25	±	39.58	0.86	±	1.47	
HOWE	08/10/11	36.80	±	54.40	1.36	±	2.01	
MONTEVIEW	07/28/11	-123.00	±	64.60	-4.56	±	2.39	

Grain

Location	Sampling Date	Cesium-137 Result ± 1s Uncertainty pCi/kg			Cesium-137 Result ± 1s Uncertainty Bq/kg			Result > 3s
AMERICAN FALLS	09/06/11	0.59	±	1.17	0.02	±	0.04	
ARCO	09/14/11	0.73	±	1.39	0.03	±	0.05	
CONTROL	09/06/11	-0.16	±	1.17	-0.01	±	0.04	
IDAHO FALLS	09/06/11	-0.27	±	1.73	-0.01	±	0.06	
MONTEVIEW	09/07/11	1.85	±	1.24	0.07	±	0.05	
MORELAND	08/17/11	-3.27	±	1.71	-0.12	±	0.06	
RUPERT	09/06/11	0.99	±	1.19	0.04	±	0.04	
RUPERT (DUPLICATE)	09/06/11	-3.27	±	1.59	-0.12	±	0.06	
TABER	08/17/11	-0.30	±	1.14	-0.01	±	0.04	
TERRETON	09/07/11	-0.76	±	1.84	-0.03	±	0.07	

Table C-9. Cesium-137 Concentrations in Alfalfa and Elk Forage.

Alfalfa

		Cesium-137						
		Result ± 1s Uncertainty pCi/kg			Result ± 1s Uncertainty Bq/kg			
Location	Sampling Date							Result > 3s
MUD LAKE	06/23/11	212.00	±	59.70	7.85	±	2.21	Y
MUD LAKE	06/23/11	76.80	±	72.70	2.84	±	2.69	
MUD LAKE	06/23/11	104.00	±	69.60	3.85	±	2.58	

Elk Forage

		Cesium-137						
		Result ± 1s Uncertainty pCi/kg			Result ± 1s Uncertainty Bq/kg			
Location	Sampling Date							Result > 3s
CRATERS	07/07/11	44.20	±	82.90	1.64	±	3.07	
CRATERS	07/07/11	109.00	±	80.20	4.04	±	2.97	
CRATERS	07/07/11	120.00	±	98.30	4.44	±	3.64	
MFC	07/07/11	-50.80	±	73.60	-1.88	±	2.73	
MFC	07/07/11	-27.70	±	60.50	-1.03	±	2.24	
MFC	07/07/11	81.30	±	45.00	3.01	±	1.67	
RWMC	07/07/11	-12.80	±	68.20	-0.47	±	2.53	
RWMC	07/07/11	115.00	±	100.00	4.26	±	3.70	
RWMC	07/07/11	-5.79	±	43.80	-0.21	±	1.62	

Table C-10. 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
ELK	9/28/2011	Liver	^{131}I	0.36	±	1.24	1.32	±	4.59	
			^{137}Cs	1.82	±	1.07	6.73	±	3.96	
ELK	9/28/2011	Muscle	^{131}I	1.48	±	1.74	5.48	±	6.44	
			^{137}Cs	2.52	±	1.58	9.32	±	5.85	
ELK	9/28/2011	Thyroid	^{131}I	-170.00	±	145.00	-629.00	±	536.50	
			^{137}Cs	346.00	±	164.00	1280.20	±	606.80	

Table C-11. Gamma-emitting Radionuclides in Waterfowl

Location	Sampling Date	Analyte	Result ± Uncertainty(1s) pCi/kg[a]			Result ± Uncertainty(1s) (x 10^{-2}) Bq/kg[a]			Result > 3s
ATR Complex	9/10/2011								
		CESIUM-137	107.00	±	5.33	396.30	±	19.74	Y
		CHROMIUM-51	-17.30	±	40.00	-64.07	±	148.15	
		COBALT-60	28.30	±	3.05	104.81	±	11.30	Y
		ZINC-65	697.00	±	22.40	2581.48	±	82.96	Y
ATR Complex	9/10/2011								
		CESIUM-137	114.00	±	7.10	422.22	±	26.30	Y
		CHROMIUM-51	12.50	±	60.00	46.30	±	222.22	
		COBALT-60	37.40	±	4.40	138.52	±	16.30	Y
		ZINC-65	688.00	±	27.20	2548.15	±	100.74	Y
ATR Complex	9/10/2011								
		CESIUM-137	9.48	±	7.99	35.11	±	29.59	
		CHROMIUM-51	-95.00	±	161.00	-351.85	±	596.30	
		COBALT-60	0.57	±	5.72	2.12	±	21.19	
		ZINC-65	-15.10	±	18.30	-55.93	±	67.78	
ATR Complex	9/10/2011								
		CESIUM-137	11.60	±	6.13	42.96	±	22.70	
		CHROMIUM-51	-113.00	±	145.00	-418.52	±	537.04	
		COBALT-60	0.29	±	4.76	1.09	±	17.63	
		ZINC-65	-15.30	±	15.10	-56.67	±	55.93	
ATR Complex	9/10/2011								
		CESIUM-137	11.10	±	8.12	41.11	±	30.07	
		CHROMIUM-51	-216.00	±	182.00	-800.00	±	674.07	
		COBALT-60	-24.40	±	2210.00	-90.37	±	8185.19	
		ZINC-65	25.60	±	18.70	94.81	±	69.26	
ATR Complex	9/10/2011								
		CESIUM-137	140.00	±	5.01	518.52	±	18.56	Y
		CHROMIUM-51	-37.20	±	51.70	-137.78	±	191.48	
		COBALT-60	54.30	±	2.87	201.11	±	10.63	Y
		ZINC-65	654.00	±	19.50	2422.22	±	72.22	Y
MFC	9/9/2011								
		CESIUM-137	12.30	±	10.10	45.56	±	37.41	
		CHROMIUM-51	-122.00	±	116.00	-451.85	±	429.63	
		COBALT-60	-1.89	±	8.98	-7.00	±	33.26	
		ZINC-65	12.10	±	21.50	44.81	±	79.63	

[a] In the Fall of 2020, a review of the table determined the unit of concentration listed in the column headers was correct for the results presented in the table. However, in 2010 the concentration unit of pCi/kg was adopted for reporting radionuclide concentrations in soil and biota (vegetation and animals). The unit of concentration listed in the column headers was updated to pCi/kg and (x10^{-2}) Bq/kg. For further discussion, see Waterfowl Sampling in Section 5.

Table C-11. Gamma-emitting Radionuclides in Waterfowl

Location	Sampling Date	Analyte	Result ± Uncertainty(1s) pCi/kg[a]			Result ± Uncertainty(1s) (x 10^{-2}) Bq/kg[a]			Result > 3s
MFC	9/9/2011								
		CESIUM-137	2.58	±	2.46	9.56	±	9.11	
		CHROMIUM-51	-27.00	±	28.50	-100.00	±	105.56	
		COBALT-60	-0.99	±	1.88	-3.65	±	6.96	
		ZINC-65	-8.92	±	5.47	-33.04	±	20.26	
MFC	9/10/2011								
		CESIUM-137	-3.62	±	3.67	-13.41	±	13.59	
		CHROMIUM-51	-32.90	±	42.50	-121.85	±	157.41	
		COBALT-60	1.53	±	2.60	5.67	±	9.63	
		ZINC-65	9.82	±	8.00	36.37	±	29.63	
CONTROL	10/1/2011								
		CESIUM-137	-0.47	±	3.37	-1.73	±	12.48	
		CHROMIUM-51	-26.50	±	54.80	-98.15	±	202.96	
		COBALT-60	4.27	±	2.57	15.81	±	9.52	
		ZINC-65	-23.00	±	7.79	-85.19	±	28.85	
CONTROL	10/1/2011								
		CESIUM-137	1.24	±	1.44	4.59	±	5.33	
		CHROMIUM-51	39.50	±	23.10	146.30	±	85.56	
		COBALT-60	0.07	±	1.15	0.27	±	4.26	
		ZINC-65	-1.99	±	3.59	-7.37	±	13.30	
CONTROL	10/1/2011								
		CESIUM-137	-1.62	±	2.11	-6.00	±	7.81	
		CHROMIUM-51	-68.00	±	30.30	-251.85	±	112.22	
		COBALT-60	-0.80	±	161.00	-2.95	±	596.30	
		ZINC-65	1.14	±	5.02	4.22	±	18.59	

[a] In the Fall of 2020, a review of the table determined the unit of concentration listed in the column headers was correct for the results presented in the table. However, in 2010 the concentration unit of pCi/kg was adopted for reporting radionuclide concentrations in soil and biota (vegetation and animals). The unit of concentration listed in the column headers was updated to pCi/kg and (x10^{-2}) Bq/kg. For further discussion, see Waterfowl Sampling in Section 5.

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	0.27
July	0.53
August	0.41
September	0.20
Gross Beta	
Quarter	0.50
July	0.59
August	0.04
September	0.82

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 6	0.05
	July 13	0.69
	July 20	0.17
	July 27	0.09
	August 3	0.32
	August 10	0.22
	August 17	0.03
	August 24	0.63
	August 31	0.03
	September 7	1.00
	September 14	0.06
	September 21	0.20
	September 28	0.78
Gross Beta		
	July 6	0.13
	July 13	0.30
	July 20	0.67
	July 27	0.15
	August 3	0.05
	August 10	0.37
	August 17	0.39
	August 24	0.63
	August 31	0.20
	September 7	0.89
	September 14	0.78
	September 21	0.25
	September 28	0.12

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